MANAGEMENT STRATEGIES FOR REVERSING DECLINES IN LANDBIRDS OF CONSERVATION CONCERN ON MILITARY INSTALLATIONS:

PREDICTIVE MODELING OF LANDBIRD POPULATIONS ON MILITARY INSTALLATIONS

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PREDICTIVE MODELING OF LANDBIRD POPULATIONS OF CONSERVATION CONCERN ON MILITARY INSTALLATIONS

EXECUTIVE SUMMARY

The Institute for Bird Populations, through its Monitoring Avian Productivity and Survivorship (MAPS) program (1994-2002), effectively monitored 34 landbird species on 13 U.S. Department of Defense installations (or groups of installations) across the eastern and central United States. Of these 34 species, ten are nationally or regionally listed (as of December, 2002) by the US Fish and Wildlife Service as "*Birds of Conservation Concern.*" In 2003, the 1994-2001 bird banding data was used to identify species of conservation concern on each installation and the local populations that had declined (i.e. species of management concern).

We reorganized the network of monitoring stations by replacing six stations on five installations in 2003 (3) and 2004 (3). The six new stations were located to a) monitor the effects of land management intended to sustain military range activities (i.e., range sustainment), and b) better monitor birds of conservation concern on each of a subset of eight installations.

To provide management guidelines intended to maintain healthy populations or reverse local declines in Neotropical migratory birds and other landbirds, we constructed species-landscape models. To achieve this we explored the relationships between demographic parameters calculated from banding data and landscape metrics calculated from the National Land Cover Dataset (NLCD; 1992). These models were used to predict the effects of landscape change (i.e. management) on adults, trends in adults, numbers of young, and reproductive success.

In 2005, we reconstructed a new set of species-landscape models using the longer 1994-2002 dataset and intended to improve the predictive power of the models. We used a 2.5 kilometer radius around each station to provide the local spatial statistics. A unique edge combination model (UCEM), developed by the Institute, detects and quantifies unique edge types such as forest-grassland.

For species of conservation concern, we used both the newer and original species-landscape models to predict the annual mean numbers of adults expected to be banded at the six new stations. We then compared these predictions to data collected in the field from those stations.

The new species-landscape models were designed to include appropriate transformation of each landscape parameter including estimates of the amount of ecologically important edge habitat. Curiously, these models were in most cases statistically weaker, or made less biological sense, than those originally constructed. Consequently, with the exception of the new prairie warbler model, they performed less accurately.

We validated 10 models representing six of ten species among eight stations located on six installations (Table 1). Three of the models predicted adult numbers to within two individuals of the observed numbers. The other seven models underestimated the number of birds actually banded by as much as 40%. However, in three of the validation the observed numbers were an average of two years, and only a single year of data was available for the other three. Although the results are very encouraging, we need a few more years of banding data to reduce the potential bias of temporal variability. Overall, however the models were useful in predicting numbers of individuals captured.

Table 1. Species of management concern and identities of MAPS station where species-landscape models have been used to predict the expected mean annual numbers of adults (Expected) that would be banded at those stations (Observed) averaged over the years of operation.

Species	Station/Installation	Expected	Observed
Prairie warbler	Sandhill, Fort Bragg, NC	8.54	19.0
Kentucky warbler	Area 03, Jefferson PG, IN	11.55	12.0
Wood thrush	Area 03, Jefferson PG, IN	7.18	5.0
Prairie warbler	Cowley Cemetery, Fort Knox, KY	18.87	25.0
Acadian flycatcher	Area 14, NWSC Crane, IN	13.14	22.3
Wood thrush	Area 14, NWSC Crane, IN	12.90	11.7
Blue-winged warbler	Tilley Bottom, Fort Leonard Wood , MO	15.79	27.5
Prairie warbler	Tilley Bottom, Fort Leonard Wood , MO	10.62	5.0
Prairie warbler	Bradford Cemetery, Fort Leonard Wood , MO	6.84	12.5
Painted bunting	Dropzone, Camp Swift, TX	8.63	9.0

Overall, the number of birds captured each year increased during the 1994-2002 period. The mean annual number of captures was 7860 captures and significantly increased ($P<0.05$) by 157 captures per year. So, assuming the same increasing rate of captures in 2003 and 2004 (data not available) we estimated that the models should be underestimating by only 13%. However, between 1999 and 2001 captures increased by 375 per year which extra-polated to an underestimate of 18%.

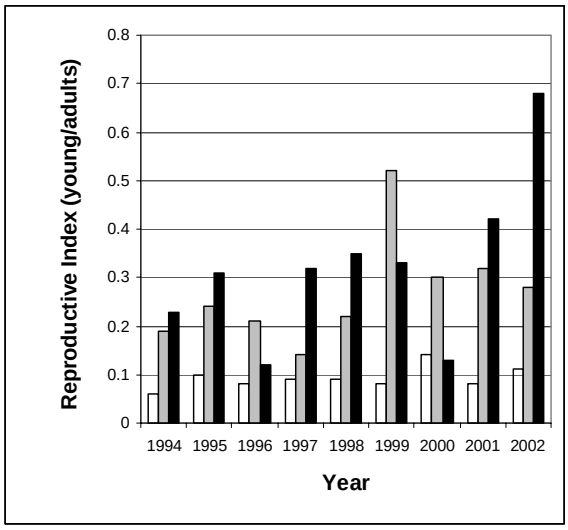

Figure 1. Annual reproductive indices for three species of conservation concern, Acadian flycatcher (no fill), prairie warbler (gray), and painted bunting (black), for which numbers of young significantly increased over the 1994-2002 period.

Perhaps the reason for these increases is that reproductive success has been high in recent years; 71% of the 34 species experienced increases in young and reproductive success during the 1994-2002 period. Trends in numbers of young significantly increased for nine species including three species of conservation concern, Acadian flycatcher, prairie warbler, and painted bunting (Figure 1). In all cases the two most productive years of the whole period occurred in those last four years (1999-2002).

Species not of conservation concern showed similarly increasing study-wide patterns. Four of eight significantly increasing species, Carolina chickadee, white-eyed vireo, Northern cardinal, and indigo bunting, exhibited significant increases in young populations and reproductive success of between 100% and 300%.

Exceptionally high levels of recruitment occurred in 2001 and 2002. For instance, white-eyed vireo adults increased at 3.66% per year but young increased at 13.1% per year. These trends were accompanied by a steady increase in recruitment such that ten birds banded as hatch-year individuals during the 1994-2001 period, were recaptured as adults in 2002, which represents ~4% of the total number of adults captured that year. This level of annual recruitment is rare in the MAPS database in which the majority of species exhibit either no natal habitat recruitment, or mean annual recruitment levels of less than 1%.

In 2002, seven other species exhibited extreme levels of recruitment; black-capped chickadee (11%), tufted titmouse (10.4%), ovenbird (2.2%), Carolina wren (8.4%), Bewick's wren (10.4%), field sparrow (6.6%), northern cardinal (4%).

If recruits were evenly distributed among the eight years they were detected (recruits cannot be detected in the first year) we would expect the number in any year to represent approximately 12% of the total number of recruits. The numbers of recruits detected in 2002 for the eight species mentioned above were between two to three times higher than the expected percentage of 12%; black-capped chickadee (25%), tufted titmouse (25%), ovenbird (25%), white-eyed vireo (31%), Carolina wren (20%), Bewick's wren (14%), field sparrow (33%), and northern cardinal (34%).

This pattern led to short term increases in adult populations of several species by 2003 and 2004 thereby biasing the observed numbers high. We expect that if less productive future years are included in the dataset that the mean annual number of adults will decrease and these predictions will be more accurate. Despite the consistent underestimation, the expected and observed data were strongly and positively correlated ($r=0.71$, $P<0.02$).

Future landbird monitoring efforts on DoD installations will continue to focus on the effects of land management on *Birds of Conservation Concern* as listed by USFWS. We will continue to monitor landbirds on DoD installations. However, the network of operating stations has been reduced from 78 to 48 stations on eight installations. In 2005, two MAPS stations were moved, at Jefferson Proving Ground and at Fort Knox, to areas subjected to regular management.

IBP is already committed to monitoring the effects of recent (or imminent) management actions in the vicinity of existing MAPS stations at Fort Bragg, Fort Leonard Wood, Camp Bowie and Camp Swift. For instance, at Fort Leonard Wood, two MAPS stations have been relocated to act as control sites for studying the effects of "disclimax" management of scrub/successional habitats that provide breeding habitat for prairie warblers. Effectiveness monitoring of this kind is planned at Fort Bragg, Jefferson Proving Ground, Fort Knox, Crane NSWC, and Camp Swift. However no management of MAPS stations has been implemented on Camp Bowie or Fort Hood.

Improved species-landscape models are proposed through the development of more sophisticated analysis and modeling techniques. We expect that the NLCD 2001 dataset will be completed by the 2006 breeding season. This will make available, a) a more biologically detailed land cover data including canopy cover estimates, and b) allow quantification of changes in land cover between 1992 and 2001. We believe that introducing land cover change parameters pertaining to the vicinity of MAPS stations into the models will explain more of the spatial variability in demographics than explained by the current models. Similarly, we can test models in which we include the temporal variability in the "greenness", or volume of photosynthetic material, provided by the Normalized Difference Vegetation Index (NDVI) dataset.

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INTRODUCTION AND RESULTS

The primary goals of the research documented in this report were 1) to incorporate management guidelines to reverse population declines of Neotropical migratory birds and other landbird species into current and proposed land management actions on United States Department of Defense (DoD) military installations, especially those actions designed to increase military readiness and to sustain military ranges and operating areas for future use; 2) to predict changes in demographic parameters of birds of management concern that breed in the vicinity of where the range sustainment management is implemented; 3) to, where possible, report the effectiveness of the implementation of avian management guidelines, and 4) to implement an adaptive management cycle in which annually, using new data, we refine the species-landscape models and subsequently adjust the management guidelines to better achieve the conservation goals.

Previously we prepared management guidelines for reversing avian population declines based on species-landscape models that describe the relationships between landscape-level habitat characteristics and six demographic parameters (adult population size, population trend, number of young, young trend, mean annual reproductive success, and trend in reproductive success) for ten bird species listed by the U.S. Fish and Wildlife Service (2002) as "Birds of Conservation Concern" (BCC) breeding on eight DoD installations. These guidelines were formulated through Legacy Project Number 00103, which extended from FY2000 through FY2005. The original species-landscape models were based on eight years (1994-2001) of MAPS (Monitoring Avian Productivity and Survivorship) data from 78 stations on 13 military installations (or groups of nearby installations) that were funded through Legacy Project Number 930451.

This ongoing research focuses on ten Species of Conservation Concern (a subset of the BCC list) although this report only addresses seven of those in any detail. The list includes five forest/woodland species Acadian flycatcher (ACFL), wood thrush (WOTH), worm-eating warbler (WEWA), Louisiana waterthrush (LOWA), Kentucky warbler (KEWA), and five successional/scrub species, Bewick's wren (BEWR), blue-winged warbler (BWWA), prairie warbler (PRAW), field sparrow (FISP), and painted bunting (PABU). If a population of one

of these species of conservation concern declined at an individual installation it was designated a "species of management concern".

Using species-landscape models to predict numbers of birds

The Institute for Bird Populations began operating 78 constant-effort mist netting stations during 1992 (six stations), 1993 (12 stations), 1994 (42 stations), and 1995 (18 stations) on 13 DoD installations (or groups of nearby installations). DoD Legacy funding supported the operation of these MAPS stations and this research through the breeding season of 2005. The banding data collected at these stations included data on numerous landbird species, including many Neotropical migrants, that breed in forest and scrub/successional communities. The ultimate goal of this ongoing research documented is to identify, formulate, and refine management strategies on these (and other) DoD installations to reverse declining populations and maintain stable or increasing populations of target Neotropical migratory landbirds and other species. We moved towards this goal in 2004 by constructing species-landscape models for a suite of ten species of conservation concern that prefer forested (5) or successional habitats (5). Since 2003, six new stations have replaced six discontinued stations on 5 installations for which we have one or two complete years of banding data and one incomplete year (to mid-July 2005).

In this study, we added the 2002 MAPS data and report the results of demographic analysis of the nine-year (1994-2002) dataset and discuss patterns therein (Appendices 1 & 2). We repeated the construction of species-landscape models based on the nine year MAPS data and spatial analyses of USGS National Land Cover Data (NLCD) within 2.5 kilometer radii surrounding each station. These models included information relating to edges (or ecotones) in the landscape (e.g. forest-grassland) produced by a *unique combination edge model* (UCEM) applied to reclassified NLCD data. We also spatially analyzed spatial data from 2.5 kilometer radii surrounding the six new stations that were established in 2003 or 2004. The resultant landscape metrics were entered into both the original and the new species-landscape models to predict the numbers of individual birds of conservation concern that we expected to be banded at that station. We then compared these predictions with annual counts of adults (counts of young were also reported) banded at each of the six new stations. In addition, for an existing

station at NWSC Crane in Indiana we use the models to predict the effects of recent (2005) regeneration management of a forested landscape on two forest-woodland species. This management was required to remove mature timber that would otherwise die and pose a fire fuel problem. However, the banding data with which to compare these predictions may take several years to collect.

For each installation and species of management concern we had previously identified the stations at which they declined. We provided installation-specific recommendations concerning which species and existing MAPS stations should become the focus of future monitoring efforts. We listed those stations to be discontinued in favor of relocating them to areas where they can more effectively monitor species of management concern. We discussed many of these recommendations and proposed management actions with natural resource managers of eight installations. Several of the original proposed station discontinuations and proposed management actions have been implemented since 2003. However, opportunity, logistical considerations, and changes in installations' management plans meant that some of the previous recommendations as to which stations should be relocated, and/or to which management should be applied, were reevaluated. Several proposed actions involved the use of prescribed fire but they were delayed due to unsuitable weather and other logistical issues. Prescribed fire was not implemented until 2004 at the Camp Swift Dropzone station, and has not been implemented where suggested at Fort Hood or at Camp Bowie, plus grazing continues at both installations. Other management actions are proposed to be implemented later in 2005 or in 2006, if possible.

The rationale behind the station relocations, proposed management actions, and summaries of the comparisons between model predictions and field observations are reported in the following section.

Target installations and species of management concern

Of the original 13 installations in the MAPS DoD network, management is currently proposed or being implemented in the vicinity of one or more MAPS stations on eight installations. The following sections provide an update on the proposed management actions and management implementations for each of these eight installations. We report, by installation, which stations were discontinued (and when) and which stations were subjected to management. We also report the numbers of individual birds banded during the 2003 and 2004 field seasons (if operated), and the partial numbers reported prior to mid-July 2005 (Table 2). The 2005 data are partial and will change greatly during the post-fledging portion of the breeding season.

Table 2. Numbers of adult and young (Adults/Young) individuals of ten Species of Conservation Concern, captured at management- or monitoring-oriented MAPS stations since 2003. 2005 data is not broken down into adults and young but because they represent early season captures most are adults. Installation names (locations) are abbreviated (Fort Bragg (BRAG); Jefferson Proving Ground (JEFF*) now operated by USFWS as Big Oaks NWR; Fort Knox (KNOX); Fort Leonard Wood (LEON); and Crane Naval Surface Warfare Center (CRAN)). Two installations, Camps Bowie (BOWI) and Fort Hood (HOOD) in Texas, had no stations relocated or managed. * denotes stations at which 2005 data were reported up to mid-July.

Location	Station Abbr.	Station	Year	Acadian flycatcher	Wood thrush	Worm-eating warbler	Louisiana waterthrush	Kentucky warbler	Bewicks's wren	Blue-winged warbler	Prairie warbler	Field sparrow	Painted bunting
BRAG	SAHI	16706	03								13/8	2/0	
BRAG	SAHI	16706	04								1/0		
BRAG	SAHI	16706	05*								15/2		
JEFF	AR03	16712	04	2/0	5/2	1/0	3/5	12/2			3/0		
JEFF	AR46	16717	05*	3	6			2				2	
KNOX	COWL	16713	04	3/0	0/2	0/1	1/0	2/0			25/7	1/0	
KNOX	ORLA	16718	05*	2	6			5			2	2	
CRAN	SULP	16629	04	14/2	12/8	2/2	1/5	13/3					
CRAN	AR14	16631	04	13/0	14/4	2/0		0/2					
CRAN	AR14	16631	05*	5	6	3	1	4					
LEON	BRCE	14494	03			1/1		4/0	0/1	12/2	12/0	25/11	
LEON	BRCE	14494	04		1/0	1/1		3/2		8/3	13/5	12/13	
LEON	BRCE	14494	05*					2		7	5	14	
LEON	TIBO	14495	03	0/1		1/0		3/3		34/6	8/1	5/3	
LEON	TIBO	14495	04	2/1		1/1		6/4		20/1	2/3	5/1	
LEON	TIBO	14495	05*			2				10	1	3	
LEON	MACE	14425	03		1/0	2/0	1/0	1/0				1/0	
LEON	MACE	14425	04		1/0					1/2	3/0	3/1	
LEON	MACE	14425	05*	1			1						
SWIF	DROP	14509	04										6/3
SWIF	DROP	14509	05*										12

Fort Bragg, North Carolina

Wood thrush and prairie warbler were chosen as candidate species of management concern. Before the 2003 season, the I102 station was discontinued due its proximity to multiple territories of the federally-endangered Red-cockaded woodpecker and replaced by a station called Sandstone Hill (SAHI). The new station lies in a frequently burned upland area in the southwest corner of the installation, which has improved our ability to effectively monitor prairie warblers and, since opening this station, field sparrows. During the first year of operation (2003 breeding season) 21 prairie warblers (13 adult and 8 juveniles) were banded. Prior to the 2004 breeding season this station and surrounding area was subjected to a controlled burn designed to reduce fuel and therefore the risk of wildfire from military range activities. In 2004, a single prairie warbler was captured and no field sparrows. By mid-July of 2005, however, 17 individual prairie warblers (15 adults and two juveniles) had been detected, suggesting that the habitat is recovering from the fire. Clearly, fire has a strong effect on occupancy and based on the number of early 2005 captures this station will likely band many more birds by the end of the season than were banded in 2003. These data suggest that few birds will occupy prairie warbler habitat after a springtime burn but that numbers will recover in the second year after fire. Using the older model constructed in the previous report we estimated the expected number of prairie warblers at the new station (Table 3). The model for prairie warbler heavily underestimates the average number of adult birds (19) actually detected (Table 3) in 2003 and 2005. This model is considered flawed. Not only are there too many parameters but simulating fire using this model would both reduce the forest cover and possibly increase the amount of forested edge leading to a lower estimate of the number of adults.

Table 3. Species-landscape model constructed to estimate expected numbers of prairie warblers at the SAHI MAPS station on Fort Bragg. Contributions to the expected number are calculated by multiplying the value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Contribution
-0.2994	Water edge (m/ha)	0.950	-0.28
-0.1416	Successional (% cover)	0.015	-0.002
+0.2010	Forest (% cover)	80.34	+16.14
-0.1908	Forest edge (m/ha)	69.20	-13.20
+0.4641	Agricultural (% cover)	0.155	+0.07
		Expected number	2.73

Table 4, however, shows the newer modified model constructed during the recent analysis. This is a simpler model that better estimates the number of adults but still underestimates the 2003 recorded data by ~40%. However, in this typical Sandhills region ecosystem successional pine forest and post oak regeneration occurs post-fire and that may increase the contribution of the successional patch size parameter and hence the magnitude of the overall estimate. In this example, doubling the successional mean patch size increased the estimate to 9.57, reflecting a 12% increase in the expected number of individuals.

Table 4. Modified species-landscape model constructed to estimate expected numbers of prairie warblers at the SAHI MAPS station on Fort Bragg. Contributions to the expected number are calculated by multiplying the value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Transformation	Contribution
4.8351	Successional MPS (ha)	0.57	square root(x + 1)	6.04
2.7541	Water edge (m/ha)	0.91	loge (x + 1)	2.50
			Expected number	8.54

Big Oaks NWR (formerly Jefferson Proving Ground), Indiana

Although this refuge is primarily managed to maintain healthy populations of Henslow's sparrow (not monitored by MAPS) in grassland habitat, forest species typical of mid- to late-seral deciduous forest (e.g. wood thrush, worm-eating warbler, and Kentucky warbler) are experiencing population declines in the forested areas. Because canopy closure is the likely reason for the declines, canopy thinning is recommended as a management action to reverse these declines. Also, the Area 54 monitoring station, at which successional-scrub species are declining, specifically prairie warbler and field sparrow, will be subjected to a frequent prescribed burn regime. We expect such management will reverse the declines after an initial drop in the first few years. Thus, a prescribed springtime burn was set in Area 54 management area, adjacent to the established MAPS station AR54, with three management goals, a) to reduce fuel loads in forested habitat that is adjacent to national forest property, b) to reverse prairie warbler and field sparrow populations of in the vicinity, and c) to encourage native plant growth. At the start of the 2004 breeding season, AR27 was discontinued and replaced by a new station in Area 03 (AR03) management area. This was placed to better monitor forest dwelling species of conservation concern more typical of those breeding in the vicinity of the MAPS station AR07 (i.e., wood thrush, worm-eating warbler, and Kentucky

warbler). In an attempt to increase monitoring levels of shrub/successional species, AR16 was discontinued at the beginning of the 2005 breeding season and a new station (AR46) was established in management area Area 46. Clearly, further fragmentation of the forest in this area would reduce the positive contribution of the forest cover and increase the negative contribution of the forest edge component. However, it is known that Kentucky warblers will tolerate some thinning and clearing repopulate successional habitat after a number of years. As it begins to succeed the amount of successional edge would increase to compensate for the reduced contributions of other parameters caused by reducing the forest cover.

Table 5. Species-landscape model constructed to estimate expected numbers of Kentucky warbler at the AR03 MAPS station on Big Oaks NWR. Contributions to the expected number are calculated by multiplying the value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Contribution
+0.1285	Successional edge (m/ha)	0	0
+0.1505	Forest (% cover)	88.74	+13.36
-0.0633	Forest edge (m/ha)	28.50	-1.80
+0.3560	Grassland (% cover)	0	0
		Expected number	11.55

Using the older species-landscape model (P=0.023) we estimated the number of expected adult Kentucky warbler captures to be 11.55 (Table 5), compared with the observed 12. The newer model (AHY = [Forest-grassland edge x -0.7736] + 9.289) realized an estimate of 9.29 due to the absence of grassland habitat at this station. We also estimated the expected number of wood thrush in Table 5 to be 7.18 birds compared to the five observed in 2004. Again the model represented functions of forest cover and edge, which is consistent with the known ecology of this species in the central United States.

Table 5. Species-landscape model (P=0.034) constructed to estimate expected numbers of wood thrush at the AR03 MAPS station on Big Oaks NWR. Contributions to the expected number are calculated by multiplying the value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Contribution
+0.0447	Forest (% cover)	88.74	+3.97
+0.1125	Forest edge (m/ha)	28.50	+3.21
		Expected number	7.18

Fort Knox, Kentucky

Since 1994, four species of conservation concern, blue-winged warbler, worm-eating warbler, Louisiana waterthrush, and Kentucky warbler all declined at Fort Knox. Of particular management concern are blue-winged warbler that significantly declined at the CEDA station, and Kentucky warbler that significantly declined at the SARI station. Fire management of adjacent areas is expected to maintain early seral habitat for blue-winged warblers and add edge habitat for Kentucky warbler, which may reverse those declines. In 2004, the operation of the Duck Lake station (DULA) was discontinued in favor of establishing a new station, Cowley Cemetery (COWL) to better monitor blue-winged warbler. The new station comprises an oldfield complex with a riparian corridor and upland forest habitats. Unfortunately, no blue winged warblers were banded at this station but 25 adult and 7 juvenile prairie warblers (another species of conservation concern) have been banded during the 2004 breeding season. In 2005, the operation of the Lower Douglas Lake station (LDLA) was discontinued in favor of establishing a new station, Ordinance Lake (ORLA) to better monitor other species of conservation concern (e.g. Acadian flycatcher, wood thrush, and Kentucky warbler). This station represents mixed forest and successional habitats and has realized 19 species, including five Kentucky warblers and six wood thrushes. Although the McCracken Springs MAPS station was previously slated for closure, the sudden appearance of a beaver dam within its boundaries has changed the flood characteristics and local environmental conditions and provided the opportunity to assess the impact of such a natural disturbance on the avifauna.

Using the older species-landscape model applied to the Cowley Cemetery station (Table 7) we estimated a negative number of expected adult prairie warbler. Using the more recent model we obtained an estimate of 18.87 compared to the 25 observed, underestimated by approximately 30%.

Table 7. Modified species-landscape model constructed to estimate expected numbers of prairie warblers at the COWL MAPS station on Fort Knox. Contributions to the expected number are calculated by multiplying the transformed value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Transformation	Contribution
+4.8351	Successional MPS (ha)	0.71	square root(x + 1)	+6.32
+2.7541	Water edge (m/ha)	6.26	loge (x + 1)	+12.55
			Expected number	18.87

Crane Naval Surface Warfare Center, Indiana

Three species of management concern, blue-winged warbler, prairie warbler, and field sparrow declined at this installation. Because the function of Crane NSWC is primarily weapons storage no fire management can be implemented. An active and sustainable forestry program, however, allowed for mixed age regeneration gaps to be created in the vicinity of one station, Sulphur Creek, which is expected to increase populations of all three species of management concern. Although our initial intent was to move Area 14 (AR14) to an area also represented by a mosaic of mixed aged regeneration openings, recent timber harvesting (2004) throughout the AR14 MAPS station has resulted in just such a mosaic. This timber harvest was intended to remove mature trees and stands that would otherwise soon senesce and provide a fire risk. Although the management actions disturbed 7 of the 10 existing net lanes those lanes have been moved to suitable locations and the boundaries of the station remain the same. The extent of the regeneration gaps is shown in Figure 1. Mature trees were selectively logged throughout the management area boundary, but if the whole stand was mature it was removed leaving regeneration gaps that will naturally regenerate as oak stands.

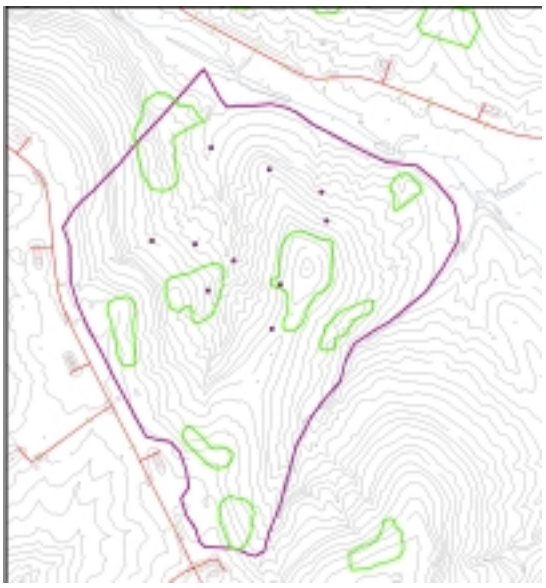

Figure 2. A topographical map of the vicinity of the Area 14 MAPS station showing the boundary of the management area (black outline) and the positions of the net lanes (dots) and boundaries of regeneration gaps (small gray outlines) cleared in February of 2005.

During the 2005 breeding season several bluebirds and a pair of yellow-throated vireos were banded whereas only three individuals of each species have ever been banded on this

installation. More interestingly, five brown-headed cowbirds were captured by mid-July whereas only four had been captured in the first nine years of operation, including a female that was captured in 2000 and 2002. Removing timber required cutting access roads for equipment and vehicles, such "corridors" provide easy access for cowbirds to explore an area previously more of an interior forested area and less accessible. This may be the reason why so many cowbirds were captured.

Using the older species-landscape model (P=0.023) we estimated the expected number of adult Acadian flycatchers captures to be 13.14 (Table 8), compared with the observed 22.28 for the 1994-2002 data, underestimated by ~40%. However, in 2004 only 13 adults were captured. A 10% reduction (~9 hectares) of the forest cover in one nine-hectare block would be accompanied by a small increase in the forest edge component estimated not to exceed 81 m/ha. Such a landscape alteration would result in an 8.06% decline in adult populations. Although a smaller grained treatment such as cutting nine one-hectare regeneration gaps would result in more forest edge density to counterbalance the loss of forest contribution. In this case, the forest edge component would not exceed 82m/ha and reduce the decline to 7.76%. We therefore predict that post-regeneration gap treatment at AR14 will reduce the mean number to around 21, a reduction of approximately two birds. However, using aerial photography it will be possible to estimate more accurately the post-management pattern of remaining forest.

Table 8. Species-landscape model constructed to estimate expected numbers of Acadian flycatchers at the AR14 MAPS station on NSWC Crane. Contributions to the expected number are calculated by multiplying the value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Contribution
+0.0509	Water (% cover)	0	0
+0.1246	Forest (% cover)	87	+10.84
+0.0412	Forest edge (m/ha)	80.16	+3.30
-0.3560	Agricultural edge (m/ha)	14.84	-1.00
		Expected number	13.14

Table 9. Species-landscape model constructed to estimate expected numbers of wood thrush at the AR14 MAPS station on NSWC Crane. Contributions to the expected number are calculated by multiplying the value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Contribution
+0.0447	Forest (% cover)	87.00	+3.88
+0.1125	Forest edge (m/ha)	80.16	+9.02
		Expected number	12.90

Using the older central region species-landscape model (P=0.031) we estimated the expected number of adult wood thrush captures to be 12.90 (Table 9), compared with the observed 11.70 for the 1994-2002 data, overestimated by ~10%. Using the same simulated regeneration gap model as for Acadian flycatcher (resulting in a 10% reduction of forest cover) we estimated a negligible 1% decline in the wood thrush adult population compared with about 8% for Acadian flycatcher.

Fort Leonard Wood, Missouri

Five species are regarded as species of management concern including four forest species (Acadian flycatcher, worm-eating warbler, Louisiana waterthrush, and Kentucky warbler) and field sparrow. In the spring of 2003, the two upland mature forest MAPS stations, Miller Ridge (MIRI) and Smith Ridge (SMRI), which captured few species of interest and low numbers, were discontinued in favor of establishing two new stations. One new station, Tilley Bottom (TIBO), was located to replicate monitoring of bottomland forest species, and the other, Bradford Cemetery (BRCE), to monitor the succession of an area previously managed as grassland. This area is now being allowed to succeed towards pine forest. TIBO operated in 2003 and 2004 and yielded acceptable numbers of Kentucky warbler, blue-winged warbler, prairie warbler, and field sparrow. Likewise, BRCE yielded acceptable numbers of Kentucky warbler, blue-winged warbler, prairie warbler, and field sparrow. However, numbers of adult field sparrow captures dropped from 25 to 12 between 2003 and 2004 consistent with the development of dense successional habitat.

In addition, a large area surrounding and including the Macedonia monitoring station was subjected to warm-season burning in 2003, a scheduled military range fire-break maintenance which is expected to create habitat for breeding field sparrows. In 2003, a single adult field sparrow was captured but three adults and one juvenile were captured in 2004.

Using the older species-landscape model (Table 1) we estimated the number of expected adult blue-winged warbler captures to be 15.79 compared with the observed average over two years of 27.5, which is underestimated by ~42%.

Table 10. Modified species-landscape model constructed to estimate expected numbers of blue-winged warblers at the Tilley Bottoms MAPS station on Fort Leonard Wood. Contributions to the expected number are calculated by multiplying the value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Contribution
-0.3172	Water edge (m/ha)	6.26	-1.99
-0.3069	Successional (% cover)	n/a	
+0.0977	Forest (% cover)	87.25	+8.52
-0.5527	Agricultural (% cover)	8.7	-4.80
+0.3608	Agricultural edge (m/ha)	38.97	+14.06
		Expected number	15.79

Table 11. Modified species-landscape model constructed to estimate expected numbers of prairie warblers at the Tilley Bottoms MAPS station on Fort Leonard Wood. Contributions to the expected number are calculated by multiplying the transformed value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Transformation	Contribution
4.8351	Successional MPS (ha)	0.14	square root(x + 1)	5.16
2.7541	Water edge (m/ha)	6.26	loge (x + 1)	5.46
			Expected number	10.62

Using the newer prairie warbler model (Table 11) we estimated that 10.62 adult prairie warblers would be detected at Bradford Cemetery, nearly half the observed average (2004-2005) of 12.5 individuals per year.

Table 12. Modified species-landscape model constructed to estimate expected numbers of prairie warblers at the Bradford Cemetery MAPS station on Fort Leonard Wood. Contributions to the expected number are calculated by multiplying the transformed value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Transformation	Contribution
4.8351	Successional MPS (ha)	0.11	square root(x + 1)	5.09
2.7541	Water edge (m/ha)	0.89	loge (x + 1)	1.75
			Expected number	6.84

Camp Swift, Texas

Painted bunting emerged as the primary species of management concern due to installation-wide declines in adult numbers. Fortunately, prescribed fire management of the oak-prairie habitats creates military training areas and is consistent with providing high quality painted bunting habitat. Plans to implement warm-season prescribed burns should improve the nesting and foraging quality of the Camp Swift's oak-prairie habitats and encourage the establishment of a more natural grassland-forb community than currently exists. In 2004, McLaughlin Creek (MCCR) was discontinued in favor of establishing Dropzone (DROP) in a fire managed military training area where painted buntings nested and it where it was also proposed to conduct warm-season prescribed burns. Due to unsuitable springtime weather, plans to manage for painted bunting populations with spring burning (2004) of management units at Camp Swift were postponed. During that year 6 adult and 3 juveniles were captured. Finally, in the spring of 2005, a prescribed burn was implemented across the fire management area that encapsulates the DROP MAPS station. By mid-July of 2005 a total of eleven painted buntings had been captured.

Using the older species-landscape model ($P<0.10$) we estimated the number of expected adult painted bunting individuals captured to be 8.63 (Table 13), compared favorably with the observed average over two years (2003-2004) of 9. The newer model had poor statistical significance and estimated 11.07 adults.

Table 13. Species-landscape model constructed to estimate expected numbers of painted buntingsat the Dropzone MAPS station on Camp Swift. Contributions to the expected number are calculated by multiplying the value of a spatial parameter, extracted from spatial analysis of 2.5km radius surrounding the station, by the coefficients resulting from the model.

Coefficient	Spatial parameter	Value	Contribution
+0.2790	Water (% cover)	5.53	+0.08
+0.1037	Forest edge (m/ha)	62.94	+6.52
-0.2213	Grassland (% cover)	6.21	-1.37
+0.4733	Agricultural (% cover)	7.17	+3.39
		Expected number	8.63

Fort Hood, Texas

Species of management concern include two federally endangered species, golden-cheeked warbler and black-capped vireo that are the focus of an ongoing research project managed by Fort Hood Natural Resources Division. However, the analyses of MAPS data suggest that successional species, including Bewick's wren and field sparrow, suffered declines across the installation. Proposed management to reverse these declines includes prescribed burning of oldfield and open woodland habitats and cessation of grazing. Neither of these actions had been implemented by the 2005 breeding season.

Camp Bowie, Texas

Six of eight landbird species monitored by MAPS showed installation-wide declines, including three successional species of management concern (Bewick's wren, field sparrow, and painted bunting). A number of management issues are pending at this installation. Cattle grazing activities are likely a factor in causing physical disturbance of successional/shrub and grassland nesting habitat, as well as attracting cowbirds. As of July 2005, no agreement had been made to cease grazing. Management plans also include restoration of riparian corridors, filling of stock ponds, and installation-wide prescribed fires intended to clear vegetation for military training purposes and at the same time restore native plant communities. 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 finally implemented.

METHODS

In this investigation we constructed a new of species-landscape models to act as management guidelines designed to reverse declining population trends among birds that breed on Department of Defense installations. We analyzed nine years (1994-2002) of bird banding data (MAPS data) from 78 monitoring stations to provide a list of 34 species for which we recorded an average of at least 1 aged individuals per year (including at least one hatching-year individual in at least one year). Furthermore, for 10 target species, identified by U.S. Fish and Wildlife (2002) as "Birds of Conservation Concern" (BCC), we calculated and reported demographics parameters. Station-specific analyses of the banding data allowed us to quantify 10 demographic parameters for each of 10 BCC species. We then collated multiple spatial statistics associated with a 2.5-km area centered on each MAPS station by analyzing reclassified (from 21 class to 8 class) portions of the publicly available National Land Cover Dataset (NLCD 1992). We also analyzed the 8-class land cover datasets using an "unique combination edge model" (UCEM) designed to detect edge habitats, especially forest-successional, forest-grassland, and grassland-successional ecotones. Such ecotones are preferred habitat for many species. We spatially analyzed the land cover datasets generated by UCEM and included estimates of the amount of three important edge habitats. Combining these spatial data and the avian demographic data we constructed species-landscape models by applying information theory and maximum likelihood principles multivariate regression analyses.

MAPS DATA

The Institute for Bird Populations (IBP), through its Monitoring Avian Productivity and Survivorship (MAPS) program (DeSante et al. 1998; DeSante and O'Grady 2000), collected breeding season mist netting and banding data from 78 constant-effort monitoring stations on United States Department of Defense installations in the Mid-Atlantic States and in the Southeastern and South-central US. These 78 stations were divided evenly among 13 installations, or groups of nearby installations and other federal land, in Maryland, Virginia, North Carolina, Indiana, Kentucky, Missouri, Kansas, and Texas. Six stations are located on each of the installations (or groups of installations and other federal land), as shown in Table 1. Of these, 5 stations have operated since 1992, 13 since 1993, 40 since 1994, 19 since

1995, and 1 since 1996. Table 2 also includes three discontinued stations that operated for only one or two years, and are not included in this analysis.

In addition, during the period 2003 to 2005 a total of eight stations were discontinued and replaced by stations intended to better monitor management species of concern or monitor the effects of land management on those species. Three other stations operated since 1994 have been subjected to management.

We collected and analyzed banding data collected between 1994 and 2002 from each station to obtain study-wide, installation-specific, and station-specific demographic parameters for 34 species. In addition, for the ten species of conservation concern we extracted the numbers of adults and young captured in 2003, 2004, and rough estimates of birds captured in 2005 before mid-July.

Table 14. Names, locations, station numbers, and geographic coordinates of 87 Monitoring Avian Productivity and Survivorship (MAPS) bird-banding stations located in the Southeast or South-central MAPS regions at eleven US Department of Defense installations (or groups of installations), including eight Department of the Army installations or groups of installations (U.S. Army Fort Belvoir, U.S. Army Fort A.P. Hill, and Mason Neck National Wildlife Refuge (BELV); U.S. Army Fort Bragg (BRAG); U.S. Army Jefferson Proving Ground (JEFF*) now operated by USFWS as Big Oaks NWR; U.S. Army Fort Knox (KNOX); U.S. Army Fort Leavenworth and Sunflower Army Ammunition Plant (LEAV); U.S. Army Fort Leonard Wood (LEON); U.S. Army Fort Riley (RILE) and U.S. Army Fort Hood (HOOD)), and three Department of the Navy installations or groups of installations (Patuxent River Naval Air Station, Dahlgren Naval Surface Warfare Center, and Indian Head Naval Weapons Support Center (NAVY); Naval Amphibious Base Little Creek Annex Camp Pendleton, Naval Air Station Oceana, Naval Air Station Oceana Auxiliary Landing Field Fentress, and Naval Security Group Activity Northwest (TIDE),and Crane Naval Surface Warfare Center (CRAN)). This list also includes two Texas National Guard installations, Camps Bowie (BOWI) and Swift (SWIF).

Location	Station Abbr.	Station Name	Station Number	State	Lat	Long	Elev (m)	Years Operated
BELV	BUPL	Belvoir Upland	16644	VA	38.736	-77.150	38	1995-2002
BELV	BLOW	Belvoir Lowland	16645	VA	38.739	-77.133	9	1995-2002
BELV	MAS1	Mason Neck 1	16646	VA	38.626	-77.173	6	1995-
BELV	MAS2	Mason Neck 2	16647	VA	38.626	-77.201	6	1995-
BELV	APH1	A.P. Hill 1	16648	VA	38.139	-77.339	55	1995-2003
BELV	APH2	A.P. Hill 2	16649	VA	38.150	-77.339	61	1995-2003
NAVY	PLOW	Patuxent Lowland	16610	MD	38.269	-76.436	30	1992-
NAVY	PUP1	Patuxent Upland 1	16611	MD	38.253	-76.422	21	1992-
NAVY	PUP2	Patuxent Upland 2	16612	MD	38.253	-76.422	30	1992-
NAVY	DAHL	Dahlgren	16613	VA	38.344	-77.050	7	1992-2002
NAVY	INHE	Indian Head	16614	MD	38.575	-77.197	6	1992-2003
NAVY	STNE	Stump Neck	16619	MD	38.553	-77.197	9	1993-2003
TIDE	FENT	Fentress	16650	VA	36.683	-76.150	4	1995-2002
TIDE	PEND	Pendleton	16651	VA	36.806	-75.981	3	1995-2002
TIDE	OWLS	Owls Creek	16652	VA	36.822	-75.992	3	1995-2002
TIDE	BOAR	Boardwalk	16653	NC	36.533	-76.269	5	1995-2002
TIDE	POND	Oceana Pond	16654	VA	36.811	-76.003	6	1995-2002
TIDE	ROTH	Rothr Antenna	16655	VA	36.558	-76.281	6	1995-2002
BRAG	I102	++ I102	16656	NC	35.139	-79.328	94	1995-2002, 2004-
BRAG	I104	I104	16657	NC	35.128	-79.317	100	1995-2002, 2004-
BRAG	I113	I113	16658	NC	35.092	-79.325	95	1995-2002, 2004-
BRAG	S110	S110	16659	NC	35.119	-79.336	94	1995-2002, 2004-
BRAG	S112	S112	16660	NC	35.111	-79.367	114	1995-2002, 2004-
BRAG	S114	S114	16661	NC	35.047	-79.269	70	1995-2002, 2004-
BRAG	SAHI	+ Sandstone Hill	16706	NC	35.047	-79.327	152	2004-
JEFF	AR54	Area 54	16620	IN	38.897	-85.375	268	1994-2002, 2004-
JEFF	AR27	+ Area 27	16621	IN	38.997	-85.375	277	1994-2002
JEFF	AR66	Area 66 *	16622	IN	38.831	-85.447	258	1994-1995
JEFF	AR16	+ Area 16	16623	IN	39.014	-85.394	274	1994-2002, 2004-
JEFF	AR31	Area 31	16624	IN	38.967	-85.456	259	1994-2002, 2004-
JEFF	AR07	Area 07	16625	IN	39.036	-85.436	259	1994-2002, 2004-
JEFF	AR64	Area 64	16669	IN	38.933	-85.378	270	1996-2001
JEFF	AR03	++ Area 03	16712	IN	39.046	-85.439	235	2004-
JEFF	AR03	++ Area 46	16717	IN	39.921	-85.364		2005-
KNOX	OHRI	Ohio River	16632	KY	37.975	-86.031	131	1994-2002, 2004-
KNOX	MCSP	McCracken Springs	16633	KY	37.892	-86.031	171	1994-2002, 2004-
KNOX	CEDA	Cedar Creek	16634	KY	37.811	-85.828	151	1994-2002, 2004-
KNOX	SARI	Salt River	16635	KY	37.942	-85.769	140	1994-2002, 2004-
KNOX	DULA	+ Duck Lake	16636	KY	37.967	-85.781	131	1994-2002, 2004-
KNOX	LDLA	+ Lower Douglas Lake	16637	KY	37.825	-85.878	221	1994-2002, 2004-

Location	Station Abbr.	Station Name	Station Number	State	Lat	Long	Elev (m)	Years Operated
KNOX	COWL	++ Cowley Cemetery	16713	KY	37.861	-85.919	163	2004-
KNOX	COWL	++ Ordinance Lake	16713	KY	37.861	-85.919	163	2004-
CRAN	FIRS	First Creek	16626	IN	38.872	-86.903	162	1994-2002, 2004-
CRAN	WICE	Williams Cemetery	16627	IN	38.808	-86.883	219	1994-2002, 2004-
CRAN	SEED	Seedtick Creek	16628	IN	38.758	-86.886	149	1994-2002, 2004-
CRAN	SULP	++ Sulphur Creek	16629	IN	38.886	-86.736	177	1994-2002, 2004-
CRAN	EABO	East Boggs	16630	IN	38.794	-86.836	152	1994-2002, 2004-
CRAN	AR14	++ Area 14	16631	IN	38.839	-86.794	198	1994-2002, 2004-
LEON	BIPI	Big Piney	14422	MO	37.739	-92.044	235	1993-2002, 2004-
LEON	LABO	Laughlin Bottoms	14423	MO	37.778	-92.178	300	1993-2002, 2004-
LEON	MIPO	Miller Pond	14424	MO	37.694	-92.111	326	1993-2002, 2004-
LEON	MACE	Macedonia	14425	MO	37.611	-92.236	360	1993-2002, 2004-
LEON	SMRI	+ Smith Ridge	14426	MO	37.739	-92.197	320	1993-2002
LEON	MIRI	+ Miller Ridge	14427	MO	37.717	-92.058	270	1993-2002
LEON	BRCE	++Bradford Cemetery	14494	MO	37.705	-92.117	317	2003-
LEON	TIBO	++ Tilley Bottoms	14495	MO	37 774	-92.201	250	2003-
LEAV	FOSU	Fort Sully	13326	KS	39.344	-94.936	274	1993-2002, 2004-
LEAV	NOWE	North Weston	13327	KS	39.386	-94.892	235	1993-2002, 2004-
LEAV	CAMI	Camp Miles	13328	KS	39.369	-94.928	259	1993-2002, 2004-
LEAV	SOWE	South Weston	13329	KS	39.369	-94.892	233	1993-2002, 2004-
LEAV	RADE	Rabbit's Demise	14448	KS	38.925	-95.033	256	1994-2002, 2004-
LEAV	SPHA	Sparrow's Haven	14449	KS	38.889	-94.997	274	1994-2002, 2004-
RILE	TICR	Timber Creek	14428	KS	39.292	-96.953	369	1993-2002
RILE	KARI	Kansas River	14429	KS	39.056	-96.786	323	1993-2002
RILE	MYPR	Myersdale Prairie	14450	KS	39.231	-96.950	381	1994-2002, 2004-
RILE	ESDR	Estes Draw	14451	KS	39.111	-96.828	381	1994-2002
RILE	RIPO	Richardson's Posts	14452	KS	39.164	-96.811	396	1994-2002, 2004-
RILE	RCPR	Rush Creek Prairie *	14453	KS	39.158	-96.856	381	1994
RILE	TMCR	Three Mile Creek	14462	KS	39.094	-97.567	323	1995-2002
SWIF	PIPE	Pipeline	14436	TX	30.283	-97.328	143	1994-
SWIF	EALW	East Loop West	14437	TX	30.262	-97.272	152	1994-
SWIF	EALE	East Loop East	14438	TX	30.262	-97.263	152	1994-
SWIF	WCLO	Wine Cellar Loop	14439	TX	30.274	-97.320	137	1994-
SWIF	SAJU	Sandy Junction	14440	TX	30.286	-97.290	155	1994-
SWIF	MCCR	+ McLaughlin Creek	14441	TX	30.271	-97.282	137	1994-2003
SWIF	DROP	++ Dropzone	14509	TX	30.250	-97.267	??	2004-
HOOD	SHOR	Shorthorn	14430	TX	31.360	-97.664	220	1994-2002
HOOD	TAYL	++ Taylor Field	14431	TX	31.179	-97.559	240	1994-2002
HOOD	DEER	Deer Camp **	14432	TX	31.306	-97.678	280	1994
HOOD	ENGI	Engineer Lake	14433	TX	31.153	-97.665	280	1994-2002
HOOD	VIRE	Vireo	14434	TX	31.164	-97.636	280	1994-2002
HOOD	BROO	Brookhaven Mountain	14435	TX	31.182	-97.622	275	1994-2002
HOOD	TABR	Taylor Branch	14454	TX	31.191	-97.567	210	1994-2002
BOWI	STON	Stonehouse	14442	TX	31.595	-98.907	442	1994-2002
BOWI	NIGH	Nighthawk	14443	TX	31.625	-98.950	485	1994-2002
BOWI	MOCK	Mockingbird Lane	14444	TX	31.604	-98.924	479	1994-2002
BOWI	BEDR	Bedrock	14445	TX	31.642	-98.936	442	1994-2002
BOWI	MESQ	Mesquite	14446	TX	31.650	-98.910	396	1994-2002
BOWI	DEVI	Devil's Hill	14447	TX	31.618	-98.894	424	1994-2002

* discontinued for logistic reasons
** discontinued due to extreme disturbance
\+ replaced by managed station
++ managed station

Demographic parameter descriptions

From the corrected MAPS data we calculated a suite of demographic parameters that represent useful metrics for identifying the meso-scale effects of landscape pattern on avian populations. Many studies correlate landscape indices with numbers of birds detected during point count surveys. However, as Villard et al. (1999) suggested, such studies should also consider the reproductive output of populations. Basing conservation efforts on numbers of adults alone may be counter-productive because high densities of adults are not necessarily correlated with high reproductive output unless the population conforms to the concept of an ideal free distribution (Sutherland 1983) in which the numbers of individuals in a given area are proportional to the resources available. Many bird species conform to a despotic distribution in which primary breeding habitat is competed for and subsequently inhabited by the fittest individuals that hold large territories. Reproductive output per individual is normally higher in such areas than it is in areas of secondary habitat in which the rest of the population is found in high densities occupying small territories. Also, information on vital rates provides a clear index of habitat quality. Because of confounding effects of population sources and sinks, information on presence/absence or even relative abundance or population size can provide misleading indicators of habitat quality (Van Horne 1983, Pulliam 1988). In the previous study we only collected four demographic parameters for each species. To those we added trend in young population and trend in reproductive success. Consideration of the following parameters in the landscape models may offer more insight into the ecological processes operating on avian populations:

AHYmean – the mean number of after-hatch-year (adult) individuals (unique band numbers) captured per year.

YNGmean – the mean number of hatch-year individuals (young) captured per year.

RImean – the mean annual reproductive index (RI). Annual reproductive indices are calculated as the ratio of young to adults captured (YNG_t / AHY_t).

AHYtrend – a magnitude-independent adult population trend. The annual rate of change in the adult population is expressed the annual change in adult population density as the percentage change per year relative to the mean annual number of adult individuals captured (AHYmean).

YNGtrend – a magnitude-independent young population trend. The annual rate of change in the young population is expressed the annual change in young population density as the percentage change per year relative to the mean annual number of young individuals captured (YNGmean).

RItrend – The annual rate of change in the reproductive index is expressed the annual change in the annual reproductive indices (YNG_t / AHY_t).

Species of management concern

We selected a set of 34 species for demographic analyses, ten of which are Species of Conservation Concern (FWS 2002). We classified the species that met the basic selection criteria for the number of annual individual captures as breeding in forest/woodland or breeding in scrub/successional habitats. If the adult population of one of these species significantly declined at an installation (or station) over the 1994-2001 period it was classified as a "species of management concern" for that installation (Table 15). For each of these 10 species, using the 1994-2002 dataset, we extracted the demographic parameters described above and in Appendix 1. These were examined, summarized, and compared with previous results. For all 34 species and the stations at which they were captured, we reported demographic means and trends by a) the entire study, b) by regional clusters of DoD installations, and c) by installation (Appendix 2).

Table 15. Population trends from MAPS data for ten species of management concern that were effectively monitored between 1994 and 2002 on 13 DoD installations. Increasing adult populations are denoted by (+) symbols and declining populations are denoted by (-) symbols. Shaded cells indicate statistical significance ($0.001 \leq P < 0.10$) of the trend. The numbers of species of management concern and the total number of species effectively monitored are provided for each installation.

Installation / ***Species Common Name***	Fort Belvoir/ Fort A.P. Hill	Pax. River/ Indian Head/Dahlgren	Tidewater, VA Naval Complex	Fort Bragg	Jefferson Proving (Big Oaks NWR)	Fort Knox	Crane Naval Warfare Center	Fort Leonard Wood	Fort Leavenworth/ Sunflower	Fort Riley	Camp Swift	Fort Hood	Camp Bowie
Forest													
Acadian flycatcher	-	+	+		+	+	+	-					
Wood thrush	-	-	+	-	-	+	+	+	+	+			
Worm-eating warbler		-			-	-	+	-					
Louisiana waterthrush	-	+				-	+	-	+	+			
Kentucky warbler		-			-	-	+	-	-				
Scrub/successional													
Bewick's wren												-	-
Blue-winged warbler					-	-	-	+					
Prairie warbler				-	-	+	-	+					
Field sparrow					-		-	-	-	+		-	-
Painted bunting											-	+	+
Species of concern	**3**	**5**	**2**	**2**	**7**	**7**	**8**	**8**	**4**	**3**	**1**	**3**	**3**
Total species monitored	**15**	**17**	**14**	**14**	**24**	**16**	**22**	**21**	**16**	**17**	**6**	**12**	**8**

Landscape Data

One problem in designing land management models for birds that breed on DoD installations is that the focus and spatial resolution of local GIS-based land cover layers differ from installation to installation. To establish species-landscape relationships using MAPS data from multiple MAPS stations located on up to 13 installations requires a common land cover database. Also, landscape effects on birds operate at spatial scales of 2km or more, but most DoD installation's GIS layers are restricted to the boundaries of the installation and do not measure the landscape pattern and structure of surrounding lands that might influence the ecology of habitats within the installation. For these reasons, we utilized the publicly available National Land Cover Dataset.

Landscape data and scale

We constructed a GIS project that superimposed the locations of the 78 original MAPS stations (plus six new stations) on portions of the 21 class, 30-m resolution National Land Cover Dataset available from the U.S. Geological Survey (NLCD, http://landcover.usgs.gov/natllandcover.html, 2002). The previous study focused on the results obtained from analyses of 2-km radius landscapes (or cookies), but because we have found that species-landscape relationships are stronger as increases we increased the "cookie" radius to 2.5 kilometers. In most cases a 2.5 kilometers restricts the spatial extent to areas still within the boundaries of the installation where management actions can be realized without involving private lands.

Reclassification of NLCD 1992 dataset

To identify landscape determinants of avian demography and community structure, we superimposed MAPS data on the 21 class, 30m-resolution National Land Cover Dataset (NLCD 1992) provided by USGS (provide reference/website). Preliminary investigations suggested that for many species the cover class vertical resolution of the NLCD data was too fine. For instance, three of the 21 NLCD classes identify different kinds of forest cover. For more generalist forest-inhabiting species, this delineation is redundant. Wood thrushes, for example, breed successfully in mixed forest (classified as mixed), bottomland hardwoods (classed as deciduous) and cypress swamps (classified as evergreen), and therefore, these

cover classes must be pooled into a single class to enable important landscape parameters to be measured and related to wood thrush demographic data. In this case, measurements of the core area of individual forest types cannot be related to the core area of all forest types pooled which wood thrushes respond to. In accordance, we defined an 8-class system (Table 16) aggregating classes to better represent the overall landscape fragmentation pattern and the pattern of general habitat types (e.g. Forest-woodland, shrub-successional, grasslands, wetlands). We developed ArcView/Avenue scripts to handle this time consuming reclassification by batch processing NLCD themes prior to spatial analysis. These also allow for future reclassifications based on alternate systems of aggregating the base NLCD classes.

Table16.National Land Cover Dataset (NLCD) System Key – (Rev. July 20, 1999) describing 21 cover classes (Code). These classes are aggregated into 7 classes (CL7) for spatial analysis of MAPS data : water sources (1), development (2), barren (3), shrub/scrub (4), forested (5), grassland (6), agricultural (7).

Code	Classification	*CL7*	Code	Classification	*CL7*
Water			***Shrubland***		
11	Open Water	***1***	51	Shrubland	***4***
12	Perennial Ice/Snow	***1***	***Non-natural Woody***		
Developed			61	Orchards/Vineyards/Other	***4***
21	Low Intensity Residential	***2***	***Herbaceous Upland***		
22	High Intensity Residential	***2***	71	Grasslands/Herbaceous	***6***
23	Commerce/Industry/Transport	***2***	***Herbaceous Planted/Cultivated***		
Barren			81	Pasture/Hay	***7***
31	Bare Rock/Sand/Clay	***3***	82	Row Crops	***7***
32	Quarries/ Mines/Gravel Pits	***3***	83	Small Grains	***7***
33	Transitional	***4***	84	Fallow	***7***
Forested Upland			85	Urban/Rec. Grasses	***6***
41	Deciduous Forest	***5***	***Wetlands***		
42	Evergreen Forest	***5***	91	Woody Wetlands	***8***
43	Mixed Forest	***5***	92	Emergent Herbaceous Wetlands	***8***

Specifically, we aggregated NLCD cover types to produce eight new combined cover types (compared to seven in the previous study) of possible biological significance as follows. Combining the *Open Water* and *Perennial Ice/Snow* types (Classes 11 and 12) with provided a **Water** sources type (1). We combined the coverage of the three *Developed* types (Classes 21-23) to create a single habitat type, **Development** (2). *Bare Rock/Sand/Clay* and

Quarries/Mines/ Gravel Pits (Classes 31 and 32) were combined to provide a **Barren** habitat type (3). The *Transitional, Shrubland,* and *Non-natural Woody* classes (33, 51, and 61) were combined to create a **Shrubland** type (4). We combined deciduous, evergreen, and mixed *Forested Upland* types to represent total **Forest** cover (5). *Herbaceous Upland* grassland (class 71) was combined with *Urban/Rec. Grasses* (class 85) to produce a **Grassland** habitat type (6). We combined the coverage of the remaining four *Herbaceous Planted/Cultivated* classes (81-84) into a single **Agricultural** habitat type (7). Finally, we combined *Woody Wetlands* with *Emergent Herbaceous Wetlands* (Class 92) to provide a wetlands category (8). We then calculated the spatial statistics (using Patch Analyst) of each new type within a 2.5-km radius of each MAPS station.

Edge classification

The types and amounts of edge in a landscape may be important determinants of the abundance and reproductive success of many landbirds. We reanalyzed the 8-class NLCD data to identify unique edges using GIS scripts developed during similar studies of Pacific Northwest Forest stations under National Fish and Wildlife Project Number 2002-0232-000. We developed a methodology called the Unique Combination Edge Model (UCEM) to a) identify unique edge types in any GIS raster coverage, and b) quantify, using Patch Analyst, a suite of spatial statistics describing the amount, and pattern of each unique edge type. The binary series reclassification in Table 5 is critical to running the UCEM model. We applied this model to reclassifications of the NLCD (1992) coverages.

Table 17. Reclassified 30m canopy cover classifications for NLCD (1992) coverages. The original class codes are assigned unique numbers from a binary series) as necessitated by the GIS-based edge detection UCEM algorithm. We assigned the final cover class code to contiguous patches of the original cover classes whereby they can not coincide with any result of subtractions between any two numbers in the binary classification.

Original Cover Class Description	Original Cover Class Code	Binary Series Reclassification	Final Cover Class Code
Water	1	1	102
Development	2	2	103
Barren	3	4	104
Successional	4	8	105
Forest	5	16	106
Grassland/	6	32	107
Agricultural	7	64	108
Wetlands	8	128	109

*The three tree cover classes were grouped into a single tree cover class before running the model.

The model works by overlaying a copy of the (binary series) reclassified landscape on the original but offset by one pixel and taking the unsigned (or absolute) difference between the two layers. As a result, all but the edge pixels of contiguous patches of cover class are assigned a zero value. However, each edge type (e.g. forest/shrubland) is assigned a unique number corresponding to the difference between the class codes of adjacent patch types (Table 18). The resulting (binary series) layer is shifted back one pixel and becomes the initial UCEM layer. The process is repeated but this time the two reclassified layers are offset by one pixel in a different direction. The resulting difference layer is merged with the UCEM layer such that non-zero pixels retain their values. This process is repeated six more times to complete one-pixel shifts representing the eight points of the compass (N, NE, E, SE, S, SW, W, and NW).

The cell values of the resulting grid layer represent all combinations of edge type superimposed on the original single cover patches. Of these, we chose six combinations of greatest ecological interest, forest-successional, forest-grassland, forest-agriculture, successional-grassland, successional-agriculture, and grassland-agriculture. We analyzed the edge layer and for each station we extracted the area of the highlighted ecotones (Table 18).

Table 18. Unique cover class combination codes representing a) single cover classes and b) the differences between paired binary reclassifications of the 30m USFS Region 6 national forest (1988-1991) coverages (excluding Shadow class). Combinations of ecological interest are shown in bold type.

Cover Class Descriptions	Single cover	Development	Barren	Successional	**Forest**	**Grassland**	**Agriculture**	Wetlands
Water	102	1	3	7	15	31	63	127
Development	103	-	2	6	14	30	62	126
Barren	104		-	4	12	28	60	124
Successional	105			-	**8**	**24**	**56**	120
Forest	106				-	**16**	**48**	112
Grassland	107					-	**32**	96
Agriculture	108						-	64
Wetlands	109							-

Landscape analyses

We mapped the geographic locations of 78 MAPS stations that operated 1994-2002 (Table 1; Figure 3; the three stations that operated for only one or two years were ignored) onto portions of the NLCD coverage in which the stations are located. Around each station we spatially analyzed a circular area of the reclassified NLCD data using Arcview 3.2 (ESRI 1996) in conjunction with the Patch Analyst 2.2 extension (McGarigal and Marks 1994, Elkie et al. 1999). We also mapped the locations of six new MAPS station established in 2003 or 2004 on Fort Bragg, Jefferson Proving Ground, Fort Knox, Fort Leonard Wood (2), and Camp Swift.

Figure 3. Map of 13 DoD installations (or group of nearby installations) where MAPS stations (yellow triangles) operated in Maryland, Virginia, North Carolina, Indiana, Kentucky, Missouri, Kansas, and Texas.

Avian Demographic-Landscape Models

We constructed species-landscape models for a) numbers of adults, b) adult population trends (the annual percentage rate of change in the numbers of adults), c) numbers of resident adults, d) numbers of young, e) reproductive success as measured by the ratio of young to adults, and f) trend in reproductive success. In these models we relaxed the capture rate criterion to an average of 1.0 adult bird per year for all species.

Model selection

We constructed the newer models using the same multivariate regression techniques, information theory and maximum likelihood principles as used in the 1994-2001 analysis. Initially, we selected a suite of landscape parameters for inclusion in each model based on known or proposed ecological relationships from the literature. In addition, we inspected the correlation matrix of dependent and independent variables for evidence of other significant correlations. We used custom software (Luh 1994 -modified by Nott in 2003) to regress all unique combinations of N parameters plus the intercept term, which for 10 parameters results in 1,023 regression models each with their associated regression statistics. For each model, the software calculates values of Akaike Information Criteria (AIC) and the closely related Bozdogan's index of informational complexity (ICOMP) (Bozdogan 1990, 1994). The "best" model minimizes these criteria based on the maximum likelihood and the number of parameters. Thus, a model with a high "goodness-of-fit" may be penalized by AIC for having too many parameters.

DISCUSSION

The model descriptions and management guidelines proposed in this report are based on two sets of relationships between demographic parameters calculated from MAPS data collected on 78 DoD installations, and spatial statistics (landscape metrics) obtained from analyses of two kilometer and 2.5 kilometer radius areas of reclassified NLCD (1992) data surrounding each station. The study focused on 10 target species that are both well represented in the MAPS database and also listed as bird species *of conservation concern* by the U.S. Fish and Wildlife Service (2002) within the southeastern region of the Unites States.

We validated 10 species-landscape models for six of the ten species of conservation concern among eight stations located on six installations (Table 1). Three of the ten models predicted adult numbers to within two individuals of the observed numbers. The other seven models underestimated the number of birds actually banded by as much as 40%. However, in three of the cases the observed numbers were an average of two years and only a single year of data was available for the other three. Although the results are very encouraging, we need a few more years of banding data to reduce the potential bias of temporal variability.

Overall, the number of birds captured each year increased during the 1994-2002 period. The mean annual number of captures was 7860 captures and significantly increased ($P<0.05$) by 157 captures per year. So, assuming the same increasing rate of captures in 2003 and 2004 (data not available) we estimated that the models should be underestimating by only 13%. However, between 1999 and 2001 captures increased by 375 per year which extrapolated to an underestimate of 18%.

Perhaps the reason for these increases is that reproductive success has been high in recent years; 71% of the 34 species experienced increases in young and reproductive success during the 1994-2002 period. Trends in numbers of young significantly increased for nine species including three species of conservation concern, Acadian flycatcher, prairie warbler, and painted bunting (Figure 1). In all cases the two most productive years of the whole period occurred in those last four years (1999-2002). Species not of conservation concern showed similarly increasing study-wide patterns. Four species of eight significantly increasing species, Carolina chickadee, white-eyed vireo, Northern cardinal, and indigo bunting

exhibited significant increases in young populations and reproductive success of between 100% and 300%.

This pattern is likely to have led to short term increases in adult populations of several species by 2003 and 2004, thereby biasing the observed numbers high. We expect that if less productive future years are included in the dataset that the mean annual number of adults will decrease and these predictions will be more accurate. Despite the consistent underestimation, the expected and observed data were strongly correlated ($r=0.71$, $P<0.02$). We regard these models as useful in predicting adult populations that will result from land management activities designed to enhance the military mission, especially those resulting from spatially extensive prescribed fire. Many DoD installations implement prescribed fire regimes to decrease the risk of a uncontrollable wildfire caused by exploding ordinance and other military range activities.

Future research

Future landbird monitoring efforts on DoD installations will continue to focus on the effects of land management on *Birds of Conservation Concern* as listed by USFWS. We will continue to monitor these and other landbirds on DoD installations. However, the network of operating stations has been reduced from 78 to 48 stations on eight installations. In 2005, a further two MAPS stations were moved, at Jefferson Proving Ground and at Fort Knox, to areas subjected to regular management.

IBP is already committed to monitoring the effects of recent (or imminent) management actions in the vicinity of existing MAPS stations at Fort Bragg, Fort Leonard Wood, Camp Bowie and Camp Swift. For instance, at Fort Leonard Wood, two MAPS stations have been relocated to act as control sites for studying the effects of "disclimax" management of scrub/successional habitats that provide breeding habitat for prairie warblers. Effectiveness monitoring of this kind is planned at Fort Bragg, Jefferson Proving Ground, Fort Knox, Crane NSWC, and Camp Swift. However no management of MAPS stations has been implemented on Camp Bowie or Fort Hood.

In summary, we conclude that a) the original (2003) species-landscape models predict the mean annual numbers of adults with acceptable accuracy, b) the tendency of these models to underestimate the mean annual numbers of adults is partially due to increasing adult population trends and temporal population variability, c) that, in general, the more recently developed models either lacked biological sense, contained too many parameters, and were statistically inferior to those constructed in 2003, and d) more years of data would be needed to make any conclusions about the efficacy of the models. In future, we will have to have to adjust for year effects to remove the bias of temporal variability and short term trends in the predictions.

We propose to construct improved species-landscape models through the development of spatio-temporal landscape parameters currently not available. We expect that the NLCD 2001 dataset will be completed by the 2006 breeding season. This will provide a more biologically detailed land cover dataset including canopy cover percentage estimates (30m cell), and allow quantification of changes in land cover between 1992 and 2001. These changes will have been caused by management on the installation, and land use change generated by landowners adjacent to the installation. We believe that introducing land cover change parameters (e.g. forest cover percent change) pertaining to the vicinity of MAPS stations into the models will explain more of the spatial variability in demographics than is explained by the current models. Similarly, we can test models in which we include annual seasonal indices of the "greenness", or volume of photosynthetic material, provided by the Normalized Difference Vegetation Index (NDVI) datasets.

This is Contribution Number 269 of The Institute for Bird Populations.

APPENDIX 1

DEMOGRAPHIC PARAMETER TABLES BY SPECIES AND STATION

From analyses of the 1994-2002 MAPS dataset, we report various demographic parameters associated with each of ten species of conservation concern, including 5 forest inhabiting species and 5 successional/scrub species. We also report and discuss MAPS regional temporal trends for adults, residents, young and reproductive success (RI). These trends are described as stable if the change is less than or equal to 5% annually. More pronounced trends are described as declining (< -5% change annually), or increasing (> +5% change annually), and are either statistically non-significant (non-sig) or significant (sig).

The regional information is derived from tabulated demographic data that summarize complex analyses of species-specific MAPS data (e.g. Table 1.1). Each MAPS station is one of a group of stations associated with a location (DoD installation or group of nearby stations) that is identified by a four-character station identifier (MAPS LOC), a unique four-character station identifier (Sta name), and a unique station reference number (Sta number) for internal purposes. For each station, the slope of the temporal trend (Trend) and associated regression statistics (R-squared and P-value) are given for:

a) Adult – adult population size.
b) Resid – numbers of adult individuals captured and identified as resident (within the station boundaries). Resident status is bestowed upon adults that are captured in two different years, or adults that are caught multiple times in a single year spanning a period of at least seven days.
c) Young – numbers of hatch-year individuals captured.
d) PI – proportion of young in the catch (young/(young+adults)). In other sections of this report reproductive indices (RI) are expressed as the ratio of young to adults (young/adults).

Four other parameters are also reported:

e) N/yr - the mean annual number of adult individuals captured.

f) Adult %/yr - the Trend of the adult population expressed as a percentage of the mean annual number of adult individuals captured (i.e. 100 multiplied by item *a* divided by item *e*).

g) RI - the reproductive index expressed as the mean of the annual ratios of young to adults.

h) Resid/Adult - the mean annual proportion of resident birds.

These metrics are reported for selected stations (those stations that catch acceptable numbers) pooled. In each case, the data are duplicated in each field except the PI regression fields under which the regional trends are given for the productivity index (PI) and the reproductive index (RI). Finally, for numbers of adults, resident individuals, young, and productivity indices we provide counts of positive and negative station-specific trends at two significance levels: those trends where the P-value is less than 0.05 ($P<.05$) and those trends that are only significant at a P-value of less than 0.10 ($P<.10$).

Acadian flycatcher – *Empidonax virescens*

Regional demographics:

Demographics for Acadian flycatcher were reported for the eastern MAPS stations and Indiana/Kentucky stations where trends are generally stable, but with significant declines in adults. Overall, they were captured in acceptable numbers at 31 stations (5 more than the 1994-2001 study) and the majority of station-specific demographic trends were positive, especially trends in young ($P<0.10$) and reproductive success (~66%). However, of six statistically significant adult trends five showed declines compared to only two of three in the 1994-2001 analysis. Also, six of seven resident trends significantly declined compared to three of five previously.

Acadian flycatcher is already a species of management concern at Fort Belvoir (BUPL) and Fort A.P. Hill (APH2). However, the resident population declined significantly across the Naval Weapons Support Center Crane, but reproductive success, adult and resident populations significantly declined at the SEED station. At Fort Leonard Woods the adult population significantly declined by ~7% per annum at the Macedonia station, which is expected considering this site is now fire-managed as an early-successional habitat.

Table 1.1. Acadian flycatcher

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	N/yr	Adult %/yr	Adult RI	Resid /Adult
BELV	BUPL	16644	-1.608	0.823	0.002	-0.700	0.624	0.020	-0.292	0.342	0.128	-0.023	0.372	0.108	7.28	-22.097	0.094	0.37
BELV	BLOW	16645	-0.650	0.353	0.120	-0.520	0.605	0.023	+0.051	0.061	0.556	+0.012	0.074	0.515	6.62	-9.818	0.074	0.42
BELV	MAS1	16646	+0.076	0.003	0.895	-0.098	0.029	0.688	-0.208	0.266	0.191	-0.034	0.301	0.159	5.51	+1.376	0.185	0.26
BELV	MAS2	16647	+0.064	0.002	0.911	-0.155	0.060	0.559	+0.042	0.007	0.848	+0.010	0.029	0.689	6.60	+0.963	0.136	0.13
BELV	APH1	16648	+0.090	0.006	0.856	+0.036	0.004	0.882	-0.178	0.203	0.263	-0.013	0.174	0.304	8.93	+1.008	0.064	0.37
BELV	APH2	16649	-1.180	0.434	0.076	-0.493	0.464	0.063	-0.148	0.563	0.032	-0.010	0.573	0.030	7.73	-15.267	0.019	0.31
NAVY	PLOW	16610	+0.058	0.004	0.871	+0.062	0.015	0.757	+0.001	0.000	0.989	-0.005	0.011	0.784	6.37	+0.905	0.110	0.35
NAVY	PUP1	16611	-0.230	0.087	0.440	-0.086	0.075	0.476	-0.068	0.124	0.353	-0.019	0.108	0.387	2.87	-8.005	0.158	0.10
NAVY	PUP2	16612	+0.044	0.006	0.847	-0.010	0.002	0.911	+0.083	0.080	0.462	+0.018	0.117	0.367	3.47	+1.273	0.133	0.20
NAVY	DAHL	16613	+0.263	0.038	0.617	+0.264	0.146	0.311	+0.125	0.134	0.332	+0.017	0.059	0.527	6.80	+3.870	0.259	0.33
NAVY	INHE	16614	+0.428	0.279	0.144	+0.170	0.079	0.465	+0.053	0.095	0.420	+0.007	0.059	0.530	5.59	+7.652	0.045	0.49
NAVY	STNE	16619	+0.288	0.049	0.566	+0.285	0.099	0.410	+0.076	0.024	0.688	+0.001	0.001	0.953	9.69	+2.970	0.106	0.34
TIDE	BOAR	16653	+0.416	0.051	0.591	+0.201	0.048	0.602	-0.270	0.365	0.112	-0.022	0.251	0.206	10.77	+3.866	0.094	0.42
TIDE	ROTH	16655	+0.771	0.223	0.238	+0.535	0.293	0.166	+0.548	0.479	0.057	+0.030	0.407	0.089	11.60	+6.650	0.091	0.36
JEFF	AR54	16620	+0.621	0.348	0.095	+0.151	0.226	0.195	+0.150	0.272	0.149	+0.036	0.165	0.278	2.97	+20.908	0.336	0.18
JEFF	AR27	16621	+0.326	0.225	0.197	+0.115	0.296	0.130	+0.035	0.075	0.476	+0.007	0.075	0.476	4.05	+8.030	0.032	0.11
JEFF	AR16	16623	-0.170	0.037	0.621	-0.185	0.203	0.224	-0.204	0.180	0.256	-0.015	0.065	0.507	8.04	-2.116	0.181	0.34
JEFF	AR07	16625	+0.572	0.140	0.322	+0.755	0.323	0.110	-0.299	0.309	0.120	-0.019	0.490	0.036	17.52	+3.264	0.100	0.44
KNOX	OHRI	16632	+0.069	0.007	0.828	-0.037	0.011	0.784	+0.037	0.008	0.824	+0.005	0.002	0.909	2.66	+2.597	0.022	0.17
KNOX	MCSP	16633	+0.665	0.189	0.243	+0.202	0.081	0.459	+0.044	0.017	0.739	-0.000	0.000	0.970	10.38	+6.408	0.056	0.40
KNOX	CEDA	16634	-0.086	0.044	0.587	-0.106	0.300	0.127	+0.053	0.169	0.272	+0.050	0.169	0.272	1.16	-7.432	0.000	0.15
KNOX	DULA	16636	-0.096	0.055	0.545	+0.000	0.000	0.000	+0.072	0.300	0.127	+0.037	0.300	0.127	2.12	-4.532	0.139	0.00
CRAN	FIRS	16626	+0.230	0.015	0.754	+0.225	0.072	0.485	+0.222	0.134	0.333	-0.001	0.000	0.974	8.82	+2.605	0.255	0.31
CRAN	WICE	16627	+0.292	0.033	0.642	+0.126	0.065	0.507	+0.230	0.140	0.321	+0.019	0.069	0.493	6.40	+4.565	0.445	0.17
CRAN	SEED	16628	-1.335	0.689	0.006	-1.070	0.699	0.005	+0.018	0.019	0.725	+0.001	0.019	0.725	12.20	-10.947	0.008	0.38
CRAN	SULP	16629	+0.156	0.032	0.644	+0.193	0.566	0.019	-0.103	0.031	0.648	-0.010	0.022	0.705	5.49	+2.840	0.324	0.08
CRAN	EABO	16630	-0.066	0.003	0.893	-0.029	0.003	0.881	+0.208	0.088	0.437	+0.011	0.073	0.482	8.35	-0.785	0.086	0.15
CRAN	AR14	16631	-1.176	0.262	0.159	-0.469	0.395	0.070	+0.292	0.684	0.006	+0.013	0.683	0.006	22.88	-5.141	0.041	0.46
LEON	BIPI	14422	-0.314	0.145	0.313	-0.135	0.046	0.581	+0.178	0.317	0.115	+0.020	0.357	0.090	8.79	-3.569	0.086	0.52
LEON	MACE	14425	-0.607	0.459	0.045	-0.326	0.573	0.018	+0.020	0.019	0.725	+0.017	0.019	0.725	1.45	-41.720	0.000	0.46
LEON	MIRI	14427	-0.674	0.430	0.055	-0.228	0.181	0.254	-0.041	0.024	0.693	+0.000	0.000	0.997	7.12	-9.470	0.053	0.39
Sel	RI	31	-0.071	0.083	0.451	-0.025	0.060	0.526	+0.032	0.388	0.073	+0.005	0.316	0.115	7.43	-0.955	0.096	0.34
	PI	31	-0.071	0.083	0.451	-0.025	0.060	0.526	+0.032	0.388	0.073	+0.004	0.320	0.112	7.43	-0.955	0.096	0.34

Trends	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10
+slope	18	0	1	14	1	0	21	1	1	19	1	2
-slope	13	3	2	16	4	2	10	1	0	12	2	0

Wood thrush – *Hylocichla mustelina*

Regional demographics:

Demographics for wood thrush were reported for the eastern MAPS stations (Eastern) and MPA stations in Indiana, Kentucky, Kansas and Missouri (Central). Although adult and resident trends generally increased in both regions, reproductive success significantly ($P<0.10$) declined in the eastern region, and both young and reproductive success significantly ($P<0.05$) increased in the central region

Overall, they were captured in acceptable numbers at 41 stations (18 eastern and 23 central) where 66% of station-specific adult trends were positive and 56% of resident trends were positive. In the eastern region, the percentages of negatively sloped young and reproductive success trends were ~56% and ~66%, respectively, whereas in the central region the percentages of negatively sloped young and reproductive success trends were ~50%.

Wood thrush is a species of management concern at Fort Belvoir (BLOW), where the trend is non-significantly increasing, and Fort A.P. Hill (APH1 and APH2) where adult populations continued to decline. At the Navy stations PUP1, PUP2, DAHL and INHE populations continued to decline, but at PLOW the non-significant decline reversed to become an increase. Populations continued to increase at the TIDE location but declined at Fort Bragg's S112 station (since discontinued). At Jefferson Proving Ground the adult population at AR07 non-significantly declined, whereas previously it significantly declined. In contrast, non-significant declines reported at Fort Knox for the 1994-2002 analysis are now significant. At the Naval Weapons Support Center Crane stations AR07 and FIRS the adult trends reversed and became positive Young and reproductive success, significantly increased at the EABO and SULP stations. At Fort Leonard Woods the adult population significantly declined at BIPI (discontinued in 2003) and MIRI. Fort Leavenworth and Fort Riley demographic trends continued to generally increase.

Table 1.2a. Wood thrush (Eastern)

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	Adult N/yr	Adult %/yr	Resid RI	Resid /Adult
BELV	BUPL	16644	+0.992	0.250	0.207	+0.521	0.247	0.211	+0.167	0.170	0.310	+0.009	0.170	0.310	4.77	+20.804	0.024	0.22
BELV	BLOW	16645	+0.065	0.009	0.828	+0.089	0.067	0.536	-0.181	0.334	0.134	-0.059	0.174	0.304	1.58	+4.106	0.205	0.27
BELV	MAS1	16646	+1.248	0.664	0.014	+0.155	0.170	0.310	+0.311	0.443	0.072	+0.031	0.092	0.466	2.92	+42.770	0.400	0.11
BELV	MAS2	16647	+0.775	0.751	0.005	+0.000	0.000	0.000	+0.062	0.042	0.626	-0.028	0.024	0.716	1.69	+45.848	0.055	0.00
BELV	APH1	16648	-0.677	0.141	0.358	-0.441	0.295	0.164	-0.147	0.099	0.448	-0.013	0.071	0.522	7.27	-9.308	0.194	0.32
BELV	APH2	16649	-1.315	0.781	0.004	-0.415	0.633	0.018	-0.070	0.138	0.365	+0.002	0.000	0.976	3.53	-37.201	0.017	0.25
NAVY	PLOW	16610	+0.123	0.011	0.787	+0.035	0.004	0.878	-0.257	0.231	0.190	-0.028	0.237	0.183	4.57	+2.684	0.204	0.42
NAVY	PUP1	16611	-0.301	0.178	0.258	-0.344	0.439	0.052	+0.090	0.132	0.337	+0.012	0.104	0.398	4.31	-6.990	0.085	0.28
NAVY	PUP2	16612	-1.128	0.563	0.020	-0.757	0.712	0.004	-0.449	0.524	0.027	-0.006	0.009	0.811	6.25	-18.053	0.377	0.43
NAVY	DAHL	16613	-2.814	0.933	0.000	-1.166	0.730	0.003	-0.228	0.102	0.403	-0.013	0.085	0.446	9.48	-29.685	0.087	0.38
NAVY	INHE	16614	-0.470	0.140	0.321	-0.336	0.124	0.353	-0.396	0.653	0.008	-0.055	0.701	0.005	4.83	-9.717	0.239	0.51
NAVY	STNE	16619	+0.595	0.104	0.398	-0.032	0.001	0.922	-0.262	0.060	0.525	-0.035	0.334	0.103	9.84	+6.052	0.387	0.36
TIDE	FENT	16650	+3.855	0.860	0.001	+1.803	0.737	0.006	+0.085	0.063	0.549	-0.056	0.168	0.313	10.44	+36.942	0.073	0.48
TIDE	PEND	16651	+0.602	0.541	0.038	+0.425	0.562	0.032	+0.027	0.008	0.835	-0.032	0.131	0.379	2.01	+29.966	0.267	0.45
TIDE	BOAR	16653	+1.153	0.084	0.486	+0.563	0.059	0.564	-0.003	0.000	0.996	-0.005	0.023	0.719	24.14	+4.778	0.226	0.46
TIDE	POND	16654	+0.182	0.027	0.695	+0.018	0.001	0.948	+0.085	0.156	0.333	+0.008	0.127	0.386	7.25	+2.514	0.043	0.44
TIDE	ROTH	16655	+2.931	0.790	0.003	+1.373	0.698	0.010	-0.087	0.004	0.875	-0.030	0.282	0.175	19.55	+14.994	0.312	0.28
BRAG	S112	16660	-0.375	0.104	0.436	+0.070	0.012	0.794	+0.353	0.225	0.236	+0.046	0.248	0.209	6.98	-5.375	0.294	0.28
Sel	RI	18	+0.126	0.091	0.430	+0.026	0.093	0.425	-0.089	0.336	0.102	-0.014	0.367	0.084	7.33	+1.725	0.212	0.37
	PI	18	+0.126	0.091	0.430	+0.026	0.093	0.425	-0.089	0.336	0.102	-0.010	0.383	0.076	7.33	+1.725	0.212	0.37

Trends	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10
+slope	11	5	0	10	3	0	8	0	1	6	0	0
-slope	7	3	0	7	3	1	10	2	0	12	1	0

Table 1.2b. Wood thrush (Central)

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	Adult N/yr	Adult %/yr	Resid RI	Resid /Adult
JEFF	AR54	16620	+0.865	0.127	0.346	+0.342	0.076	0.474	+0.516	0.326	0.108	+0.044	0.436	0.053	7.74	+11.176	0.363	0.55
JEFF	AR27	16621	+1.539	0.364	0.085	+0.907	0.431	0.055	+0.676	0.642	0.009	+0.016	0.251	0.169	13.81	+11.147	0.175	0.48
JEFF	AR16	16623	+0.109	0.064	0.512	+0.200	0.117	0.367	-0.277	0.062	0.518	-0.015	0.048	0.573	7.29	+1.497	0.401	0.34
JEFF	AR31	16624	-0.037	0.003	0.882	-0.283	0.570	0.019	-0.000	0.000	1.000	-0.000	0.000	1.000	2.59	-1.428	0.266	0.32
JEFF	AR07	16625	-0.498	0.075	0.475	+0.067	0.006	0.841	-0.197	0.037	0.621	-0.001	0.002	0.920	12.28	-4.055	0.323	0.39
JEFF	AR64	16669	+0.551	0.270	0.232	+0.004	0.000	0.981	+0.584	0.355	0.158	+0.027	0.055	0.612	3.72	+14.819	0.729	0.15
KNOX	MCSP	16633	-1.327	0.345	0.096	-1.256	0.576	0.018	-0.305	0.217	0.206	-0.000	0.000	0.982	18.57	-7.145	0.150	0.53
KNOX	CEDA	16634	+0.291	0.058	0.534	-0.016	0.002	0.918	+0.665	0.384	0.075	+0.069	0.557	0.021	4.82	+6.036	0.426	0.19
KNOX	SARI	16635	+0.948	0.211	0.214	+0.457	0.122	0.357	-0.021	0.003	0.897	-0.037	0.191	0.239	6.55	+14.471	0.458	0.45
KNOX	LDLA	16637	-1.076	0.442	0.051	-0.418	0.599	0.014	-0.124	0.300	0.127	-0.009	0.300	0.127	3.49	-30.884	0.017	0.33
CRAN	FIRS	16626	+0.275	0.012	0.780	+0.490	0.143	0.316	+0.096	0.015	0.751	-0.002	0.008	0.824	15.80	+1.744	0.254	0.42
CRAN	WICE	16627	+0.373	0.018	0.728	-0.040	0.001	0.936	+0.906	0.216	0.208	+0.019	0.111	0.381	12.53	+2.979	0.598	0.38
CRAN	SEED	16628	-0.275	0.027	0.672	-0.199	0.131	0.339	-0.498	0.148	0.306	-0.014	0.033	0.642	7.57	-3.637	0.656	0.39
CRAN	SULP	16629	+0.454	0.207	0.218	+0.248	0.571	0.019	+0.642	0.489	0.036	+0.055	0.361	0.087	3.18	+14.279	0.394	0.17
CRAN	EABO	16630	+0.900	0.249	0.171	+0.194	0.036	0.623	+1.795	0.706	0.005	+0.062	0.537	0.025	12.43	+7.239	0.468	0.38
CRAN	AR14	16631	+1.296	0.265	0.156	+1.277	0.567	0.019	-0.048	0.030	0.654	-0.022	0.123	0.355	11.70	+11.074	0.209	0.46
LEON	BIPI	14422	-0.004	0.000	0.987	-0.147	0.337	0.101	+0.222	0.211	0.213	+0.082	0.402	0.067	2.53	-0.147	0.252	0.30
LEON	MIRI	14427	-0.493	0.341	0.099	-0.300	0.221	0.202	-0.199	0.169	0.272	-0.018	0.169	0.272	2.22	-22.214	0.062	0.47
LEAV	FOSU	13326	+0.014	0.000	0.967	-0.064	0.019	0.724	-0.083	0.268	0.153	-0.083	0.268	0.154	1.17	+1.227	0.000	0.43
LEAV	NOWE	13327	+0.847	0.329	0.106	+0.338	0.156	0.292	+0.595	0.575	0.018	+0.031	0.703	0.005	11.19	+7.569	0.083	0.44
LEAV	CAMI	13328	+0.648	0.577	0.018	+0.235	0.338	0.101	+0.242	0.435	0.053	+0.012	0.063	0.515	4.40	+14.722	0.213	0.42
LEAV	SOWE	13329	+0.375	0.158	0.290	+0.072	0.026	0.676	+0.331	0.510	0.031	+0.052	0.593	0.015	3.79	+9.874	0.269	0.38
RILE	TMCR	14462	+0.068	0.003	0.906	-0.031	0.002	0.918	-0.056	0.011	0.808	-0.011	0.065	0.542	6.73	+1.012	0.187	0.40
Sel	RI	23	+0.209	0.129	0.343	+0.076	0.430	0.055	+0.222	0.458	0.045	+0.020	0.494	0.035	7.71	+2.709	0.272	0.42
	PI	23	+0.209	0.129	0.343	+0.076	0.430	0.055	+0.222	0.458	0.045	+0.012	0.456	0.046	7.71	+2.709	0.272	0.42

Trends	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10
+slope	16	1	1	13	2	1	12	5	2	11	4	3
-slope	7	0	3	10	3	0	11	0	0	12	0	0

Worm-eating warbler – *Helmitheros vermivorus*

Regional demographics:

Demographics for worm-eating warbler were reported for 13 MAPS stations where trends are generally increasing (~66%). It is a species of management concern at the NAVY location Stump Neck station where it continues to decline, AR07 at Jefferson Proving Ground where it continues to significantly decline, at Fort Knox's CEDA station where it continues to decline, and at Fort Leonard Woods' BIPI station where it continues to decline. Fort A.P. Hill (APH2). However, the resident population declined significantly across the Naval Weapons Support Center Crane, but reproductive success, adult and resident populations significantly declined at the SEED station. At Fort Leonard Woods the adult population significantly declined by ~7% per annum at the Macedonia station, which is expected considering this site is now fire-managed as an early-successional habitat.

Table 1.3. Worm-eating warbler

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	N/yr	Adult %/yr	RI	Resid /Adult
NAVY	PUP1	16611	+0.480	0.304	0.124	+0.325	0.381	0.077	+0.254	0.418	0.060	+0.031	0.313	0.117	2.36	+20.288	0.116	0.46
NAVY	PUP2	16612	+0.294	0.197	0.232	+0.085	0.125	0.350	+0.053	0.082	0.455	-0.001	0.001	0.946	1.48	+19.829	0.115	0.29
NAVY	STNE	16619	-0.119	0.017	0.737	-0.023	0.001	0.935	-0.066	0.035	0.630	-0.005	0.012	0.782	3.69	-3.221	0.166	0.46
JEFF	AR07	16625	-1.163	0.600	0.014	-0.445	0.200	0.227	-0.914	0.238	0.183	+0.001	0.000	0.964	6.36	-18.294	0.305	0.46
KNOX	CEDA	16634	-0.187	0.077	0.469	-0.131	0.526	0.027	-0.513	0.215	0.209	+0.018	0.017	0.736	2.09	-8.950	1.087	0.12
KNOX	SARI	16635	+0.087	0.107	0.391	+0.000	0.000	0.000	+0.062	0.025	0.687	+0.026	0.029	0.659	1.13	+7.727	0.583	0.00
CRAN	WICE	16627	+0.086	0.021	0.710	+0.000	0.000	0.000	+0.333	0.219	0.203	+0.104	0.479	0.039	1.01	+8.482	0.274	0.00
CRAN	SULP	16629	+0.451	0.424	0.057	+0.071	0.139	0.322	+0.225	0.148	0.307	+0.047	0.136	0.329	1.92	+23.539	0.222	0.22
CRAN	EABO	16630	+0.793	0.516	0.029	+0.297	0.469	0.042	+0.242	0.167	0.274	-0.033	0.095	0.419	3.34	+23.719	0.602	0.34
CRAN	AR14	16631	+0.156	0.018	0.730	+0.290	0.225	0.197	+0.228	0.299	0.127	+0.040	0.410	0.063	6.52	+2.388	0.222	0.31
LEON	BIPI	14422	-0.070	0.014	0.762	+0.138	0.243	0.177	+0.176	0.045	0.586	+0.026	0.056	0.538	4.06	-1.723	0.624	0.18
LEON	LABO	14423	+0.307	0.606	0.013	+0.000	0.000	0.000	-0.082	0.175	0.263	-0.068	0.176	0.261	1.03	+29.671	0.131	0.00
LEON	MIRI	14427	-0.367	0.278	0.145	-0.217	0.351	0.093	+0.187	0.388	0.073	+0.031	0.361	0.087	4.19	-8.761	0.103	0.33
Sel	RI	13	+0.057	0.043	0.592	+0.030	0.132	0.337	+0.014	0.003	0.880	+0.006	0.006	0.849	3.01	+1.902	0.420	0.31
	PI	13	+0.057	0.043	0.592	+0.030	0.132	0.337	+0.014	0.003	0.880	+0.002	0.004	0.873	3.01	+1.902	0.420	0.31

Trends	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10
+slope	8	2	1	6	1	1	9	0	2	9	1	2
-slope	5	1	0	4	1	1	4	0	0	4	0	0

Louisiana waterthrush – *Seiurus motacilla*

Regional demographics:

Demographics for Louisiana waterthrush were reported for 15 MAPS stations where adult and resident trends were generally increasing (~67%). Young and reproductive success remained fairly stable. It is a species of management concern at the Fort A.P.Hill's APH1 station where it continues to decline. At Stump Neck's STNE station, Fort Knox's MCSP station, and Crane's SULP station adult trends continued to decline. However, at Jefferson Proving Ground's AR07 station it increased rather than decreased.

Table 1.4. Louisiana waterthrush

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	N/yr	Adult %/yr	Adult RI	Resid /Adult
BELV	APH1	16648	-0.351	0.291	0.167	-0.095	0.244	0.214	-0.018	0.001	0.935	+0.062	0.154	0.336	1.23	-28.647	0.465	0.43
BELV	APH2	16649	+0.066	0.013	0.792	+0.048	0.043	0.621	-0.186	0.770	0.004	-0.122	0.669	0.013	1.52	+4.337	0.300	0.34
NAVY	STNE	16619	-0.140	0.015	0.750	-0.063	0.010	0.796	-0.042	0.001	0.945	-0.003	0.004	0.869	9.71	-1.442	0.961	0.52
TIDE	FENT	16650	+0.059	0.017	0.759	+0.011	0.002	0.920	-0.135	0.133	0.375	-0.052	0.235	0.224	1.24	+4.777	0.351	0.24
KNOX	MCSP	16633	-0.201	0.017	0.740	-0.023	0.001	0.954	+0.005	0.000	0.994	+0.001	0.000	0.986	6.75	-2.970	1.261	0.46
KNOX	CEDA	16634	+0.193	0.094	0.422	+0.000	0.000	0.000	-0.117	0.086	0.445	-0.071	0.169	0.272	1.11	+17.409	0.124	0.00
CRAN	FIRS	16626	+0.196	0.034	0.636	+0.020	0.002	0.919	+0.117	0.033	0.642	-0.008	0.005	0.852	3.17	+6.189	0.562	0.34
CRAN	SEED	16628	+0.397	0.084	0.448	+0.170	0.148	0.307	+0.109	0.009	0.810	-0.025	0.091	0.430	6.45	+6.158	1.300	0.22
CRAN	SULP	16629	-0.189	0.128	0.345	+0.000	0.000	0.000	+0.109	0.066	0.506	+0.026	0.062	0.520	1.68	-11.234	0.659	0.00
CRAN	EABO	16630	-0.084	0.041	0.602	+0.074	0.300	0.127	+0.260	0.278	0.145	+0.029	0.076	0.472	2.14	-3.903	0.766	0.06
LEON	BIPI	14422	+0.010	0.000	0.986	-0.015	0.000	0.963	-0.044	0.001	0.943	+0.001	0.000	0.978	6.31	+0.164	0.372	0.40
LEAV	FOSU	13326	+0.597	0.503	0.032	+0.376	0.519	0.029	+0.085	0.098	0.413	+0.028	0.055	0.545	1.42	+41.921	0.034	0.48
LEAV	CAMI	13328	+0.384	0.267	0.154	+0.196	0.118	0.365	+0.076	0.096	0.416	+0.001	0.000	0.970	2.16	+17.793	0.381	0.60
LEAV	RADE	14448	+0.115	0.064	0.512	+0.041	0.097	0.414	-0.030	0.015	0.756	-0.060	0.228	0.193	1.34	+8.600	0.075	0.14
RILE	TICR	14428	+0.291	0.200	0.227	+0.030	0.013	0.773	-0.281	0.264	0.157	-0.067	0.288	0.136	2.51	+11.577	0.063	0.21
Sel	RI	15	+0.074	0.221	0.201	+0.047	0.228	0.194	-0.037	0.032	0.648	-0.031	0.138	0.324	3.28	+2.244	0.701	0.36
	PI	15	+0.074	0.221	0.201	+0.047	0.228	0.194	-0.037	0.032	0.648	-0.008	0.102	0.402	3.28	+2.244	0.701	0.36

Trends	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10
+slope	10	1	0	9	1	0	7	0	0	7	0	0
-slope	5	0	0	4	0	0	8	1	0	8	1	0

Kentucky warbler – *Oporornis formosus*

Regional demographics:

Demographics for Kentucky warbler were reported for 31 MAPS stations where adult and resident trends are stable but trends in young and reproductive success are generally increasing at ~66% and ~58% of stations respectively. It is a species of management concern at the NAVY location where populations continued to significantly decline at four stations although the trend at PUP2 is now non-significant. At Jefferson Proving Ground it was captured in acceptable numbers at all six stations operated between 1994 and 2002 where it continued to significantly decline at AR31 and AR07 and the negative trend at AR16 became significant. Likewise, at Fort Knox it was captured at five stations and continued to significantly decline at SARI. At Naval Weapons Support Center Crane it continued to decline at three stations and increase at the other three. At Fort Leonard Woods it continued to decline at three stations and increase at the other two. At Fort Leavenworth it continued to significantly decline at the RADE station.

Table 1.5. Kentucky warbler

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	N/yr	Adult %/yr	RI	Resid /Adult
NAVY	PLOW	16610	+0.292	0.080	0.461	+0.143	0.053	0.550	-0.377	0.552	0.022	-0.089	0.714	0.004	4.22	+6.917	0.698	0.51
NAVY	PUP1	16611	-0.672	0.544	0.023	-0.296	0.453	0.047	-0.227	0.398	0.069	-0.037	0.311	0.119	2.06	-32.661	0.175	0.49
NAVY	PUP2	16612	-0.270	0.206	0.220	+0.057	0.027	0.673	+0.071	0.083	0.451	+0.069	0.335	0.103	2.79	-9.671	0.280	0.37
NAVY	STNE	16619	-0.148	0.155	0.295	-0.050	0.029	0.661	+0.098	0.077	0.470	+0.050	0.255	0.166	2.18	-6.756	0.462	0.53
BRAG	S114	16661	+0.126	0.011	0.807	+0.176	0.043	0.623	+0.060	0.170	0.310	+0.018	0.170	0.310	1.85	+6.791	0.056	0.57
JEFF	AR54	16620	+0.999	0.450	0.048	+0.470	0.304	0.124	+0.322	0.655	0.008	-0.049	0.139	0.322	4.73	+21.106	0.272	0.43
JEFF	AR27	16621	-0.055	0.002	0.915	-0.057	0.003	0.889	+0.334	0.371	0.082	+0.021	0.255	0.166	12.18	-0.450	0.185	0.55
JEFF	AR16	16623	-1.210	0.479	0.039	-0.688	0.598	0.015	-0.720	0.201	0.226	-0.015	0.060	0.527	9.71	-12.460	0.525	0.52
JEFF	AR31	16624	-0.525	0.567	0.019	-0.067	0.049	0.567	-0.309	0.324	0.110	-0.030	0.093	0.425	2.92	-17.999	0.437	0.29
JEFF	AR07	16625	-2.281	0.898	0.000	-1.233	0.798	0.001	-0.624	0.140	0.321	+0.015	0.062	0.517	12.98	-17.571	0.352	0.54
JEFF	AR64	16669	+0.819	0.780	0.008	+0.277	0.728	0.015	+0.825	0.723	0.015	+0.071	0.540	0.060	3.50	+23.408	0.440	0.16
KNOX	OHRI	16632	+0.649	0.256	0.164	+0.143	0.032	0.643	+0.008	0.000	0.971	-0.013	0.045	0.585	7.93	+8.187	0.469	0.47
KNOX	MCSP	16633	+0.891	0.204	0.222	+0.513	0.123	0.355	+0.705	0.248	0.172	-0.026	0.054	0.549	9.85	+9.052	0.277	0.53
KNOX	CEDA	16634	+0.258	0.051	0.557	+0.231	0.156	0.292	-0.359	0.067	0.501	-0.011	0.046	0.581	11.14	+2.314	0.468	0.57
KNOX	SARI	16635	-1.254	0.473	0.041	-0.400	0.116	0.369	-0.494	0.168	0.274	-0.006	0.014	0.765	12.63	-9.930	0.481	0.59
KNOX	DULA	16636	+0.008	0.000	0.988	+0.068	0.008	0.821	-0.037	0.005	0.851	-0.022	0.065	0.507	5.93	+0.139	0.388	0.40
CRAN	FIRS	16626	-0.528	0.275	0.147	-0.239	0.114	0.373	+0.263	0.102	0.403	+0.028	0.190	0.240	8.65	-6.110	0.389	0.56
CRAN	WICE	16627	-0.990	0.282	0.141	-0.534	0.214	0.210	+0.509	0.179	0.257	+0.026	0.270	0.152	18.29	-5.413	0.421	0.55
CRAN	SEED	16628	-0.711	0.220	0.203	-0.781	0.464	0.043	-0.185	0.031	0.649	+0.007	0.072	0.484	11.41	-6.228	0.767	0.51
CRAN	SULP	16629	+0.436	0.040	0.607	+0.422	0.278	0.145	+1.030	0.470	0.041	+0.025	0.219	0.204	16.20	+2.689	0.429	0.54
CRAN	EABO	16630	+0.155	0.010	0.798	+0.306	0.044	0.590	+0.116	0.005	0.860	+0.000	0.000	0.974	16.54	+0.935	0.509	0.48
CRAN	AR14	16631	+0.468	0.096	0.416	+0.161	0.034	0.636	+0.516	0.203	0.223	-0.020	0.047	0.574	5.22	+8.969	1.224	0.48
LEON	MACE	14425	-0.583	0.314	0.117	-0.458	0.387	0.074	+0.274	0.463	0.044	+0.067	0.522	0.028	2.52	-23.117	0.304	0.50
LEON	MIRI	14427	-0.084	0.006	0.838	+0.034	0.003	0.898	+0.399	0.569	0.019	+0.071	0.447	0.049	2.81	-2.985	0.505	0.34
LEAV	FOSU	13326	+0.761	0.361	0.087	+0.343	0.268	0.154	+0.179	0.154	0.296	+0.005	0.015	0.757	9.33	+8.151	0.110	0.52
LEAV	CAMI	13328	+0.396	0.285	0.139	+0.335	0.377	0.079	+0.392	0.225	0.197	+0.015	0.081	0.457	6.67	+5.929	0.210	0.53
LEON	BIPI	14422	-0.124	0.004	0.874	-0.041	0.001	0.938	+1.137	0.386	0.074	+0.033	0.333	0.104	17.94	-0.688	0.301	0.56
LEON	LABO	14423	+0.290	0.092	0.428	+0.230	0.168	0.273	+0.776	0.736	0.003	+0.070	0.561	0.020	5.80	+4.996	0.446	0.39
LEON	MIPO	14424	+0.015	0.004	0.878	-0.050	0.267	0.155	-0.005	0.000	0.978	-0.003	0.001	0.935	1.53	+0.998	0.590	0.09
LEAV	RADE	14448	-0.715	0.372	0.081	-0.436	0.504	0.032	-0.148	0.065	0.509	-0.002	0.002	0.915	8.71	-8.210	0.101	0.53
RILE	TMCR	14462	+0.318	0.131	0.378	+0.156	0.090	0.471	+0.048	0.011	0.806	+0.015	0.090	0.471	3.44	+9.245	0.088	0.42
Sel	RI	31	-0.174	0.324	0.109	-0.074	0.179	0.257	+0.119	0.207	0.218	+0.023	0.301	0.126	7.88	-2.211	0.371	0.51
	PI	31	-0.174	0.324	0.109	-0.074	0.179	0.257	+0.119	0.207	0.218	+0.012	0.274	0.148	7.88	-2.211	0.371	0.51

Trends	N	Adult P<.05	Adult P<.10	N	Resid P<.05	Resid P<.10	N	Young P<.05	Young P<.10	N	PI P<.05	PI P<.10
+slope	16	2	1	17	1	1	20	6	2	18	3	1
-slope	15	5	1	14	5	1	11	1	1	13	1	0

Bewick's wren – *Thryomanes bewickii*

Regional demographics:

Demographics for Bewick's wren were reported for 11 MAPS stations on Fort Hood and Camp Bowie where adult and resident trends significantly declined overall, young declined but reproductive success generally increased. At Fort Hood the ENGI station failed to meet the criteria for selection in this period, and both adult and resident populations continued to decline at three of the five remaining stations. At Camp Bowie the declines reported for adults and residents in the 1994-2001 analysis became statistically significant ($P<0.05$).

Table 1.6. Bewick's wren

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	N/yr	Adult %/yr	RI	Resid /Adult
HOOD	SHOR	14430	-0.447	0.363	0.086	-0.210	0.405	0.065	+0.119	0.062	0.517	+0.042	0.214	0.210	2.27	-19.669	0.745	0.39
HOOD	TAYL	14431	-0.338	0.343	0.097	-0.263	0.369	0.083	-1.291	0.622	0.012	-0.035	0.414	0.061	6.23	-5.421	1.202	0.40
HOOD	VIRE	14434	+0.090	0.020	0.719	+0.136	0.119	0.363	+0.332	0.084	0.449	+0.023	0.030	0.658	1.75	+5.122	2.129	0.37
HOOD	BROO	14435	+0.002	0.000	0.989	+0.067	0.169	0.272	-0.060	0.046	0.579	-0.032	0.057	0.536	1.05	+0.210	0.622	0.14
HOOD	TABR	14454	-0.049	0.011	0.806	-0.095	0.227	0.233	-0.748	0.240	0.218	-0.018	0.017	0.761	1.49	-3.315	1.413	0.29
BOWI	STON	14442	-0.270	0.054	0.547	-0.144	0.070	0.490	-0.440	0.138	0.325	+0.011	0.023	0.695	5.34	-5.053	1.886	0.28
BOWI	NIGH	14443	+0.080	0.016	0.745	+0.235	0.281	0.143	+0.781	0.339	0.100	+0.050	0.321	0.111	4.10	+1.954	1.367	0.21
BOWI	MOCK	14444	-0.750	0.616	0.012	-0.344	0.345	0.097	-0.516	0.201	0.227	+0.019	0.078	0.467	3.96	-18.938	1.478	0.40
BOWI	BEDR	14445	-0.224	0.124	0.353	-0.093	0.084	0.450	-0.642	0.603	0.014	-0.032	0.120	0.362	2.27	-9.869	1.993	0.34
BOWI	MESQ	14446	+0.190	0.019	0.724	+0.140	0.029	0.661	+0.409	0.213	0.211	+0.010	0.021	0.708	6.54	+2.914	0.922	0.41
BOWI	DEVI	14447	-0.833	0.541	0.024	-0.536	0.588	0.016	-0.330	0.010	0.801	+0.002	0.000	0.965	7.46	-11.165	1.825	0.46
Sel	RI	11	-0.253	0.356	0.090	-0.108	0.398	0.069	-0.222	0.073	0.482	+0.039	0.027	0.670	3.90	-6.480	1.275	0.37
	PI	11	-0.253	0.356	0.090	-0.108	0.398	0.069	-0.222	0.073	0.482	+0.007	0.016	0.749	3.90	-6.480	1.275	0.37
		Trends	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10				
		+slope	4	0	0	4	0	0	4	0	1	7	0	0				
		-slope	7	2	2	7	1	3	7	2	0	4	0	1				

Blue-winged warbler – *Vermivora pinus*

Regional demographics:

Demographics for blue-winged warbler were reported for 13 MAPS stations where adult and resident trends are stable but trends in young and reproductive success are generally increasing at ~62% of stations. At Jefferson Proving Ground it was captured in acceptable numbers at four stations and significantly declined at AR54 and AR27. It is a species of management concern at Fort Knox location where populations continued to significantly decline at CEDA, and failed to meet the acceptance criteria at SARI. At Naval Weapons Support Center Crane it continued to decline at two of three stations but declined non-significantly at SULP rather than significantly as it did previously. At Fort Leonard Woods it continued to decline at two stations, significantly at MACE, and increase at two others.

Table 1.7. Blue-winged warbler

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	N/yr	Adult %/yr	RI	Resid /Adult
LEON	BIPI	14422	-0.459	0.176	0.261	-0.174	0.056	0.540	-0.146	0.093	0.425	-0.004	0.007	0.831	5.99	-7.657	0.227	0.37
LEON	LABO	14423	+0.272	0.019	0.725	-0.191	0.108	0.389	+0.299	0.179	0.257	+0.011	0.075	0.476	13.75	+1.977	0.174	0.32
LEON	MIPO	14424	+0.651	0.071	0.489	+0.467	0.161	0.285	+0.328	0.163	0.282	+0.005	0.005	0.852	14.54	+4.480	0.267	0.39
LEON	MACE	14425	-0.690	0.445	0.050	-0.197	0.396	0.070	+0.018	0.019	0.725	+0.017	0.019	0.725	2.06	-33.540	0.000	0.24
JEFF	AR54	16620	-0.881	0.367	0.084	-0.419	0.187	0.246	+0.259	0.034	0.635	+0.045	0.185	0.248	6.83	-12.901	0.796	0.40
JEFF	AR27	16621	+0.665	0.425	0.057	+0.321	0.454	0.047	+0.654	0.276	0.147	+0.046	0.385	0.075	1.89	+35.275	0.198	0.34
JEFF	AR31	16624	+0.035	0.000	0.966	+0.101	0.008	0.821	-0.035	0.001	0.948	-0.006	0.003	0.895	7.42	+0.475	0.260	0.47
CRAN	WICE	16627	-0.120	0.070	0.490	+0.083	0.322	0.111	-0.095	0.068	0.498	+0.000	0.000	0.994	1.90	-6.310	0.332	0.18
CRAN	SULP	16629	-1.812	0.287	0.137	-0.550	0.133	0.334	-0.936	0.372	0.081	-0.018	0.116	0.369	16.32	-11.106	0.296	0.44
CRAN	EABO	16630	+0.031	0.001	0.927	+0.188	0.099	0.410	+0.152	0.024	0.689	+0.017	0.050	0.563	6.02	+0.515	0.377	0.23
KNOX	CEDA	16634	-0.502	0.581	0.017	-0.195	0.255	0.165	+0.036	0.002	0.919	-0.004	0.002	0.914	3.26	-15.408	0.748	0.44
KNOX	DULA	16636	-0.346	0.304	0.124	+0.029	0.043	0.593	-0.157	0.683	0.006	-0.044	0.569	0.019	2.01	-17.244	0.150	0.16
JEFF	AR64	16669	+0.197	0.018	0.777	+0.002	0.000	0.994	+0.309	0.131	0.426	+0.022	0.021	0.756	4.53	+4.363	1.349	0.27
Sel	RI	13	-0.268	0.306	0.122	-0.052	0.098	0.412	+0.045	0.019	0.725	+0.021	0.157	0.290	6.71	-3.991	0.302	0.37
	PI	13	-0.268	0.306	0.122	-0.052	0.098	0.412	+0.045	0.019	0.725	+0.013	0.158	0.289	6.71	-3.991	0.302	0.37
	Trends		N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10				
	+slope		6	0	1	7	1	0	8	0	0	8	0	1				
	-slope		7	2	1	6	0	1	5	1	1	5	1	0				

Prairie warbler – *Dendroica discolor*

Regional demographics:

Demographics for prairie warbler were reported for 12 MAPS stations where adult, resident and reproductive success trends are stable but trends in young significantly increased overall. It is a species of management concern at Fort Bragg where populations continued to decline at two of four stations, significantly so at AR54. At Jefferson Proving Ground populations continued to decline at two stations. At Naval Weapons Support Center Crane adult populations declined at two stations. At Fort Leonard Woods the adult population at LABO significantly increased, the population at MIPO also continued to increase, and a small but decreasing population was detected at MACE.

Table 1.8. Prairie warbler

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	N/yr	Adult %/yr	RI	Resid /Adult
BRAG	I102	16656	-1.059	0.334	0.134	-0.215	0.121	0.399	-0.248	0.076	0.508	-0.011	0.006	0.854	4.15	-25.512	0.181	0.22
BRAG	I104	16657	-0.759	0.299	0.161	-0.656	0.492	0.053	+0.181	0.152	0.340	+0.027	0.152	0.340	6.33	-11.983	0.252	0.41
BRAG	I113	16658	+0.352	0.068	0.532	+0.219	0.123	0.395	-0.041	0.009	0.823	-0.029	0.146	0.351	3.66	+9.625	0.235	0.27
BRAG	S110	16659	+0.581	0.063	0.550	+0.401	0.087	0.477	+0.155	0.081	0.495	-0.009	0.070	0.527	9.06	+6.415	0.185	0.42
JEFF	AR54	16620	-0.708	0.475	0.040	-0.232	0.332	0.105	-0.265	0.262	0.159	+0.028	0.033	0.638	2.41	-29.398	0.221	0.29
JEFF	AR31	16624	-0.020	0.000	0.967	-0.336	0.329	0.107	+0.349	0.245	0.175	+0.054	0.286	0.138	5.47	-0.372	0.767	0.27
KNOX	DULA	16636	+0.022	0.002	0.915	+0.058	0.037	0.621	+0.035	0.016	0.748	-0.021	0.032	0.645	2.08	+1.051	0.124	0.23
CRAN	WICE	16627	-0.019	0.001	0.943	+0.072	0.036	0.625	+0.165	0.084	0.449	+0.014	0.034	0.636	3.70	-0.509	0.282	0.17
CRAN	SULP	16629	-0.360	0.057	0.536	-0.175	0.063	0.514	-0.051	0.013	0.766	+0.008	0.014	0.761	7.84	-4.596	0.446	0.30
LEON	LABO	14423	+0.609	0.391	0.072	+0.273	0.627	0.011	+0.148	0.263	0.158	-0.005	0.004	0.865	2.86	+21.308	0.189	0.20
LEON	MIPO	14424	+1.564	0.296	0.130	+0.980	0.539	0.024	+0.820	0.388	0.073	+0.025	0.187	0.244	14.76	+10.601	0.315	0.35
LEON	MACE	14425	-0.080	0.020	0.717	+0.021	0.013	0.767	-0.054	0.169	0.272	-0.019	0.169	0.272	1.89	-4.241	0.067	0.16
Sel	RI	12	+0.059	0.022	0.705	+0.061	0.257	0.163	+0.109	0.410	0.063	+0.019	0.189	0.242	5.31	+1.104	0.260	0.31
	PI	12	+0.059	0.022	0.705	+0.061	0.257	0.163	+0.109	0.410	0.063	+0.012	0.231	0.191	5.31	+1.104	0.260	0.31
		Trends	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10				
		+slope	5	0	1	7	2	0	7	0	1	6	0	0				
		-slope	7	1	0	5	0	1	5	0	0	6	0	0				

Field sparrow – *Spizella pusilla*

Regional demographics:

Demographics for field sparrow were reported for 17 MAPS stations where adult and resident trends highly significantly declined across the study area from Indiana to Kentucky. Negatively-sloped adult and resident trends represented 71% and 82% of stations, respectively. Young and reproductive success trends declined in just less than 50% of cases. Adult trends significantly declined at six stations representing Jefferson Proving Ground (AR%4), Crane (SULP), Fort Leonard Woods, (MACE), Fort Leavenworth (SPHA), Fort Hood (TAYL), and Camp Bowie (MOCK). Resident trends also declined at four of these stations, and young declined at two of them.

Table 1.9. Field sparrow

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	Adult N/yr	Adult %/yr	Adult RI	Resid /Adult
JEFF	AR54	16620	-0.464	0.434	0.054	-0.270	0.515	0.030	-0.030	0.023	0.697	+0.021	0.121	0.360	3.67	-12.623	0.255	0.43
JEFF	AR31	16624	-0.342	0.140	0.322	-0.319	0.161	0.285	+0.405	0.630	0.011	+0.029	0.659	0.008	11.32	-3.021	0.135	0.36
JEFF	AR64	16669	-0.345	0.349	0.163	-0.103	0.074	0.555	-0.114	0.375	0.144	-0.020	0.375	0.144	2.43	-14.239	0.034	0.27
CRAN	SULP	16629	-0.481	0.580	0.017	-0.168	0.180	0.256	-0.183	0.059	0.529	-0.035	0.135	0.331	2.07	-23.244	0.526	0.25
LEON	LABO	14423	-0.442	0.051	0.561	+0.157	0.039	0.609	-0.460	0.232	0.189	-0.023	0.246	0.174	12.89	-3.431	0.179	0.33
LEON	MIPO	14424	+1.069	0.153	0.297	+0.575	0.116	0.370	+2.617	0.351	0.092	+0.028	0.339	0.100	21.89	+4.884	0.516	0.43
LEON	MACE	14425	-0.555	0.412	0.062	-0.299	0.404	0.066	+0.017	0.004	0.874	+0.010	0.040	0.606	2.50	-22.169	0.117	0.41
LEAV	RADE	14448	-0.201	0.105	0.395	-0.091	0.077	0.470	-0.138	0.300	0.127	-0.067	0.300	0.127	1.35	-14.938	0.000	0.48
LEAV	SPHA	14449	-2.087	0.709	0.004	-0.782	0.477	0.040	-0.843	0.523	0.028	-0.024	0.285	0.139	15.19	-13.742	0.174	0.35
RILE	TICR	14428	+0.380	0.055	0.545	-0.342	0.260	0.161	+0.278	0.115	0.372	+0.016	0.089	0.435	6.91	+5.495	0.196	0.30
RILE	MYPR	14450	-0.432	0.044	0.619	-0.225	0.074	0.514	+0.292	0.130	0.380	+0.040	0.135	0.371	6.73	-6.411	0.714	0.36
RILE	ESDR	14451	+0.724	0.697	0.005	+0.075	0.154	0.297	+0.134	0.037	0.619	-0.005	0.005	0.860	4.48	+16.150	0.284	0.18
HOOD	TAYL	14431	-1.433	0.670	0.007	-0.763	0.766	0.002	-0.851	0.373	0.081	-0.015	0.024	0.692	6.39	-22.430	0.525	0.38
HOOD	TABR	14454	-0.204	0.027	0.698	-0.412	0.258	0.199	-0.172	0.057	0.570	-0.006	0.010	0.810	5.01	-4.066	0.252	0.40
BOWI	STON	14442	+0.153	0.062	0.519	-0.110	0.203	0.223	+0.096	0.269	0.153	+0.024	0.267	0.154	3.15	+4.866	0.087	0.12
BOWI	MOCK	14444	-0.720	0.387	0.074	-0.406	0.287	0.137	+0.239	0.277	0.145	+0.035	0.391	0.071	7.72	-9.329	0.196	0.37
BOWI	DEVI	14447	+0.104	0.019	0.723	-0.152	0.125	0.350	+0.183	0.106	0.392	+0.007	0.003	0.892	3.93	+2.646	0.098	0.30
Sel	RI	17	-0.351	0.728	0.003	-0.229	0.810	0.001	+0.059	0.029	0.664	+0.031	0.218	0.206	7.03	-4.989	0.300	0.35
	PI	17	-0.351	0.728	0.003	-0.229	0.810	0.001	+0.059	0.029	0.664	+0.016	0.218	0.205	7.03	-4.989	0.300	0.35

Trends	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10
+slope	5	1	0	3	0	0	9	1	1	9	1	2
-slope	12	3	3	14	3	1	8	1	1	8	0	0

Painted bunting – *Passerina cyanea*

Regional demographics:

Demographics for painted bunting were reported for 17 MAPS stations on Fort Hood and Camps Bowie and Swift where adult resident trends generally increased (~65% of stations) but resident trends declined (~65%) stable but young and reproductive success trends significantly increased overall. Young and reproductive success trends significantly increased at 82% and 71% of stations, respectively. Of six adult declines four of them were detected at Camp Swift stations. At one of these stations, EALW, both adult and resident trends significantly declined. Young trends significantly increased at nine stations and significantly declined at one Camp Bowie station (DEVI). Reproductive success declined at five of these stations and one other.

Table 1.10. Painted bunting

MAPS LOC	Sta name	Sta number	Adult Slope	Adult Rsq	Adult P	Resid Slope	Resid Rsq	Resid P	Young Slope	Young Rsq	Young P	PI Slope	PI Rsq	PI P	N/yr	Adult %/yr	RI	Resid /Adult
SWIF	PIPE	14436	+0.803	0.235	0.186	+0.370	0.301	0.126	-0.042	0.013	0.771	-0.031	0.159	0.287	6.50	+12.346	0.318	0.29
SWIF	EALW	14437	-1.012	0.405	0.066	-0.518	0.370	0.082	+0.065	0.036	0.627	+0.018	0.129	0.343	6.16	-16.421	0.115	0.37
SWIF	EALE	14438	-0.211	0.015	0.752	-0.289	0.083	0.452	+0.702	0.044	0.586	+0.027	0.126	0.349	15.42	-1.367	0.404	0.37
SWIF	WCLO	14439	-0.682	0.077	0.470	-0.697	0.254	0.167	+0.873	0.266	0.155	+0.025	0.403	0.066	17.33	-3.938	0.259	0.47
SWIF	SAJU	14440	-0.178	0.012	0.778	-0.164	0.023	0.697	+0.273	0.485	0.037	+0.022	0.084	0.449	4.46	-3.990	0.228	0.53
SWIF	MCCR	14441	+0.084	0.058	0.533	-0.059	0.255	0.166	-0.036	0.036	0.625	-0.010	0.027	0.670	2.34	+3.601	0.161	0.07
HOOD	SHOR	14430	+0.161	0.012	0.783	-0.337	0.143	0.315	+0.920	0.060	0.525	+0.016	0.061	0.521	18.76	+0.857	0.772	0.40
HOOD	TAYL	14431	+2.269	0.689	0.006	+0.575	0.618	0.012	+1.318	0.348	0.094	+0.010	0.045	0.585	17.44	+13.016	0.276	0.45
HOOD	ENGI	14433	+0.245	0.027	0.672	-0.075	0.007	0.825	+0.088	0.011	0.791	-0.015	0.032	0.644	7.73	+3.165	0.491	0.24
HOOD	VIRE	14434	+1.226	0.572	0.018	+0.400	0.335	0.102	+0.352	0.496	0.034	+0.031	0.370	0.082	3.61	+33.968	0.099	0.23
HOOD	BROO	14435	+1.967	0.748	0.003	+0.974	0.532	0.026	+1.301	0.366	0.084	+0.032	0.289	0.136	8.16	+24.101	0.205	0.46
HOOD	TABR	14454	-0.538	0.291	0.168	-0.177	0.115	0.412	+0.880	0.445	0.071	+0.067	0.334	0.133	5.43	-9.897	1.208	0.33
BOWI	STON	14442	+1.211	0.433	0.054	+0.096	0.020	0.713	+1.197	0.563	0.020	+0.047	0.694	0.005	9.26	+13.074	0.194	0.33
BOWI	MOCK	14444	+0.007	0.000	0.983	-0.489	0.442	0.051	+0.751	0.474	0.040	+0.042	0.495	0.035	8.15	+0.082	0.350	0.42
BOWI	BEDR	14445	+0.345	0.618	0.012	+0.000	0.000	0.000	+0.006	0.000	0.976	-0.035	0.058	0.532	1.15	+30.081	0.499	0.00
BOWI	MESQ	14446	-0.693	0.270	0.152	-0.170	0.123	0.355	-0.499	0.439	0.052	-0.020	0.224	0.198	8.76	-7.912	0.144	0.31
BOWI	DEVI	14447	+0.036	0.000	0.961	-0.205	0.056	0.539	+0.765	0.439	0.052	+0.029	0.448	0.049	13.44	+0.270	0.175	0.30
Sel	RI	17	+0.289	0.156	0.293	-0.049	0.050	0.563	+0.514	0.383	0.076	+0.035	0.374	0.080	9.09	+3.175	0.322	0.38
	PI	17	+0.289	0.156	0.293	-0.049	0.050	0.563	+0.514	0.383	0.076	+0.018	0.315	0.116	9.09	+3.175	0.322	0.38

Trends	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10	N	P<.05	P<.10
+slope	11	4	1	5	2	0	14	4	4	12	3	2
-slope	6	0	1	11	0	2	3	0	1	5	0	0

APPENDIX 2

AVIAN DEMOGRAPHICS BY CLUSTERED AND INDIVIDUAL DoD INSTALLATIONS

This section lists landbird species that were effectively monitored at each of 13 DoD military installations between 1994 and 2002, and the numbers of stations at which they are captured in acceptable numbers. For adult, resident, young individuals, and reproductive success the mean annual numbers per station are presented with the regression slope and statistical significance of the temporal trend. The temporal trend in adult individuals is also expressed as the annual percentage change relative to the mean annual number of individuals captured. Pooled data are also shown for 78 DoD Legacy-funded stations and for four clusters of MAPS stations in Texas (3 locations, 18 stations), Kansas and Missouri (3 locations, 18 stations), Indiana and Kentucky (3 locations, 18 stations), and along the east coast - Virginia, Maryland, North Carolina, and South Carolina (4 locations, 24 stations).

All stations pooled and individual installations

Prior to the 2003 banding season 78 stations existed in the DoD Legacy-funded MAPS network. All but a few of these were operated since 1994. Since 2003, however, monitoring efforts have focused on a subset of 48 stations at six locations; Jefferson Proving Ground (IN); NSWC Crane (IN); Fort Knox (KY); Fort Bragg (NC); Fort Leonard Woods (MO); Fort Hood (TX); and Texas Army Reserve National Guard Camps Swift and Bowie. Demographic trends shown in Table 2.1 (and 2.2) represent 31 (and 34) species captured among 13 installations and 78 stations operated during the breeding seasons of 1994 through 2002. Studywide, of 34 species the percentages of negatively sloped adult and resident population trends were ~53% and ~59%, respectively. However, young and reproductive success only declined in ~29% of species. Six species Bell's Vireo, Bewick's wren, American robin, northern mockingbird, common yellowthroat, and field sparrow showed significant negative adult population trends. All these species, except American robin, also exhibited significant ($P<0.10$) negative resident population trends, and five of these species showed non-significant declines in numbers of young, but only northern mockingbird showed a significant adult population decline. In the six years prior to 2000 between five and eight stations realized 30 young. Since 2000 only 3 young have been captured at 2 or 3 stations, but no mockingbird young were captured in 2002.

Table 2.1. Table of direction and significance in adult population trends for 14 forest species and 17 scrub/successional species on 13 military installations. The direction of the trend is indicated as decreasing (-) or increasing (+), and significance is indicated by multiple plus or minus characters (e.g. + non-significant, ++ 0.05≤P<0.10, +++ 0.01≤P<0.05, and ++++ P<0.01). Gray shading indicates species listed by U.S. Fish and Wildlife Service (FWS) as species of conservation concern (December, 2002) and candidate species of management concern at individual installation because populations declined at one or more stations (see Section).

Installation/ Common Name	CODE	BELV	NAVY	TIDE	BRAG	JEFF	KNOX	CRAN	LEON	LEAV	RILE	SWIF	HOOD	BOWI
Forest														
Downy woodpecker	*DOWO*	+	-			+	+	+	-	-	-			
Acadian flycatcher	*ACFL*	--	+	+		+	+	-	---					
Red-eyed vireo	*REVI*	-	-		-	-	+	-	+	+++	-		-	
Blue jay	*BLJA*		+	+						--	-			
Carolina chickadee	*CACH*	-	+	-	+	+		+	+			-	-	----
Tufted titmouse	*TUTI*	+	-	-	++	+	++	-	+	+	+++	+++	-	-
Blue-gray gnatcatcher	*BGGN*				-	+			+		+		+++	
Wood thrush	*WOTH*	+	--	++++	-	+	-	+	-	++++	-			
Black-&-white warbler	*BAWW*	+		+++		+		++	-				+	
Worm-eating warbler	*WEWA*		+			----	-	++	-					
Ovenbird	*OVEN*	+	-	+	+	--		+++	-					
Louisiana waterthrush	*LOWA*	-	+				+	+	+	+++	+			
Kentucky warbler	*KEWA*		--			---	+	-	-	+				
Hooded warbler	*HOWA*	-	+	+	-	---		+++						
Scrub/successional														
White-eyed vireo	*WEVI*	-	+		-	---	--	-	++			++	+++	
Bell's vireo[1]	*BEVI*										-			
Carolina wren	*CARW*	+++	+++	+	+	+	+	-	-	-	-	+	+	
Bewick's wren	*BEWR*												-	-
House wren	*HOWR*					-				+	+			
American robin	*AMRO*		---	+		-				----				
Gray catbird	*GRCA*				-	-		---		++++				
Northern mockingbird	*NOMO*													----
Brown thrasher	*BRTH*			-	-	++				+	+			
Blue-winged warbler	*BWWA*					-	----	--	-					
Prairie warbler	*PRAW*				-	-	+	-	++					
Common yellowthroat	COYE	-			-	----	----	-	-	+	---			
Yellow-breasted chat	YBCH					-		----	+					
Field sparrow	FISP					----		---	-	---	+		---	-
Northern cardinal	NOCA	--	+	++	-	-	--	+	++	+	-	-	-	-
Indigo bunting	INBU					+	---	+	+	+	+			
Painted bunting	PABU											-	+++	+
Common grackle	COGR	-	+	--										
No. of forest species		10	12	8	7	12	8	12	12	7	7	2	5	2
No. of succ. species		5	5	5	7	13	7	10	9	9	8	4	6	5

[1] Although Bell's vireo is only caught in acceptable numbers at 3 stations (on Fort Riley) it is included because IBP recognizes a need to increase MAPS monitoring of this species.

Adult populations of three species, blue-gray gnatcatcher, ovenbird, and white-eyed vireo significantly increased (Table 2.2). White-eyed vireo residents, young and reproductive success also increased. In fact, white eyed vireo adults increased at 3.66% per year but young increased at 13.1% per year. These trends were accompanied by a steady increase in recruitment such that ten birds banded as hatch-year individuals during the 1994-2001 period, were recaptured as adults in 2002, which represents ~4% of the total number of adults captured that year. This level of annual recruitment is rare in the MAPS database in which the majority of species exhibit either no natal habitat recruitment, or mean annual levels of less than 1%. In 2002, seven other species showed exceptionally high levels of recruitment, nearly twice the annual mean; black-capped chickadee (11%), tufted titmouse (10.4%), ovenbird (2.2%), Carolina wren (8.4%), Bewick's wren (10.4%), field sparrow (6.6%), northern cardinal (4%). If recruits were evenly distributed among the eight years they were detected (recruits cannot be detected in the first year) we would expect the number in any year to represent approximately 12% of the total number of recruits. The numbers of recruits detected in 2002 for the eight species mentioned above were between two to three times higher than the expected percentage of 12%; black-capped chickadee (25%), tufted titmouse (25%), ovenbird (25%), white-eyed vireo (31%), Carolina wren (20%), Bewick's wren (14%), field sparrow (33%), and northern cardinal (34%).

Five species, Carolina chickadee, white-eyed vireo, Northern cardinal, indigo bunting, and painted bunting exhibited significant increases in young populations and reproductive success of between 100% and 300%. In all species (see above) but white-eyed vireo the adult populations remained relatively stable. Acadian flycatcher, black-and-white warbler, Carolina wren, and prairie warbler young populations significantly increased.

Species of conservation concern

Among the ten species of conservation concern in this study adult populations are stable (non-significant and <5% per year change). Bewick's wren and field sparrow exhibited the only significant (negative) adult and resident population trends. Acadian flycatcher showed a significant positive trend in the young population. However, if Kentucky and blue-winged warbler populations continue to decline their trends may become significant.

Table 2.2. Summary of avian demographics (1994-2002) derived from MAPS data for 34 landbird species that breed at 78 stations comprising the DoD Legacy-funded MAPS monitoring station network. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	26	2.36	-0.021	0.82	-0.88	0.55	-0.028	0.21	1.37	+0.122	0.13	0.655	+0.067	0.18
ACFL	31	7.43	-0.071	0.45	-0.95	2.52	-0.025	0.53	**0.70**	**+0.032**	**0.07**	0.096	+0.005	0.11
REVI	41	7.52	-0.129	0.24	-1.71	1.98	-0.058	0.42	0.59	+0.025	0.55	0.081	+0.005	0.44
BLJA	13	2.19	-0.152	0.13	-6.97	0.43	-0.025	0.33	0.41	-0.045	0.27	0.180	-0.005	0.78
CACH	42	2.17	-0.063	0.28	-2.89	0.46	-0.007	0.43	**1.91**	**+0.167**	**0.02**	**0.916**	**+0.097**	**0.02**
TUTI	68	2.99	+0.092	0.13	+3.08	1.05	+0.001	0.93	3.27	+0.163	0.11	1.087	+0.016	0.49
BGGN	15	**2.51**	**+0.236**	**0.00**	**+9.39**	0.27	+0.036	0.13	1.59	+0.109	0.12	0.649	-0.012	0.68
WOTH	41	7.64	+0.152	0.39	+1.99	2.99	+0.043	0.18	1.89	+0.085	0.24	0.245	+0.006	0.33
BAWW	16	1.79	+0.078	0.23	+4.35	0.25	+0.019	0.14	**1.08**	**+0.120**	**0.00**	0.613	+0.036	0.13
WEWA	13	3.01	+0.057	0.59	+1.90	0.93	+0.030	0.34	1.26	+0.014	0.88	0.420	+0.006	0.85
OVEN	31	**6.56**	**+0.222**	**0.01**	**+3.39**	2.39	+0.041	0.49	3.27	+0.214	0.08	0.499	+0.015	0.42
LOWA	15	3.28	+0.074	0.20	+2.24	1.17	+0.047	0.19	2.25	-0.037	0.65	0.701	-0.031	0.32
KEWA	31	7.88	-0.174	0.11	-2.21	4.01	-0.074	0.26	2.87	+0.119	0.22	0.371	+0.023	0.13
HOWA	13	4.32	+0.117	0.43	+2.70	1.72	-0.010	0.87	0.83	-0.011	0.89	0.181	-0.005	0.73
WEVI	30	**9.30**	**+0.340**	**0.07**	**+3.66**	**4.45**	**+0.168**	**0.01**	**6.35**	**+0.832**	**0.00**	**0.667**	**+0.063**	**0.00**
BEVI	3	**7.70**	**-1.220**	**0.04**	**-15.85**	**3.30**	**-0.859**	**0.02**	1.35	-0.332	0.12	0.154	-0.002	0.91
CARW	54	3.37	+0.178	0.12	+5.29	1.25	+0.060	0.27	**3.40**	**+0.315**	**0.02**	1.038	+0.037	0.38
BEWR	11	**3.90**	**-0.253**	**0.09**	**-6.48**	1.42	-0.108	0.07	4.63	-0.222	0.48	1.275	+0.039	0.67
HOWR	6	6.54	+0.572	0.19	+8.75	1.63	+0.139	0.29	3.56	+0.072	0.80	0.642	-0.070	0.23
AMRO	11	**5.17**	**-0.640**	**0.02**	-12.37	0.38	-0.038	0.16	3.18	-0.260	0.27	0.643	+0.016	0.64
GRCA	18	13.67	-0.225	0.61	-1.64	4.63	-0.144	0.26	3.80	+0.125	0.56	0.276	+0.015	0.28
NOMO	6	**4.93**	**-1.428**	**0.00**	**-28.99**	**1.03**	**-0.317**	**0.00**	**1.13**	**-0.374**	**0.00**	0.217	-0.013	0.42
BRTH	10	3.13	+0.088	0.24	+2.81	0.77	+0.007	0.87	0.95	+0.002	0.96	0.306	-0.011	0.46
BWWA	13	6.71	-0.268	0.12	-3.99	2.46	-0.052	0.41	1.96	+0.045	0.73	0.302	+0.021	0.29
PROW	5	3.46	+0.211	0.37	+6.11	1.24	-0.078	0.34	0.91	+0.004	0.97	0.249	+0.013	0.62
PRAW	12	5.31	+0.059	0.71	+1.10	1.63	+0.061	0.16	**1.32**	**+0.109**	**0.06**	0.260	+0.019	0.24
COYE	30	**8.03**	**-0.516**	**0.03**	**-6.42**	**3.17**	**-0.223**	**0.01**	1.83	-0.091	0.28	0.230	+0.000	0.97
YBCH	8	10.29	-0.142	0.50	-1.38	4.88	+0.129	0.31	1.41	+0.041	0.73	0.140	+0.006	0.58
FISP	17	**7.03**	**-0.351**	**0.00**	**-4.99**	**2.51**	**-0.229**	**0.00**	2.02	+0.059	0.66	0.300	+0.031	0.21
NOCA	69	7.14	-0.138	0.46	-1.93	**2.91**	**-0.099**	**0.00**	**2.86**	**+0.379**	**0.02**	**0.406**	**+0.056**	**0.01**
INBU	32	8.82	+0.133	0.47	+1.51	3.21	-0.031	0.80	**0.66**	**+0.082**	**0.01**	**0.076**	**+0.008**	**0.02**
PABU	17	9.09	+0.289	0.29	+3.17	3.38	-0.049	0.56	**3.11**	**+0.514**	**0.08**	**0.322**	**+0.035**	**0.08**
COGR	10	4.74	-0.078	0.79	-1.65	0.14	+0.021	0.20	0.77	-0.070	0.58	0.147	-0.018	0.26
BHCO	11	3.15	-0.096	0.28	-3.04	0.97	-0.021	0.65	0.44	-0.037	0.29	0.143	-0.004	0.73

Avian demographics from DoD installations in the eastern US

Demographic trends shown in Table 2.3 represent 23 species captured among 24 eastern MAPS stations operated during the breeding seasons of 1994 to 2002. Overall, populations are stable but declines in reproductive success were detected which may lead to future declines in adult populations. The percentages of declining adult and resident population trends were ~52% and ~43%, respectively. Similarly, young populations declined in 57% of species, whereas reproductive success declined in ~70% of species. We detected statistically significant ($P<0.10$) negative adult population trends in red-eyed vireo and Kentucky warbler. Neither of these species exhibited statistically significant ($P<0.10$) negative resident population trends although common yellowthroat showed a significant decline. Blue jay, Carolina wren, wood thrush, and hooded warbler showed significant declines in reproductive success.

Adult populations of three species, black-and-white warbler, Carolina wren, and ovenbird significantly increased. Carolina wren residents also significantly increased but young populations remained stable, which contributed to a significant decline in reproductive success.

Fort Belvoir, Mason Neck, and Fort A.P. Hill (BELV)

Overall, populations at this location continued to decline, especially Acadian flycatcher, a species of management concern (Table 2.4). Since the last analysis (1994-2001) American robin and prothonotary warbler have failed to meet the criteria for effective monitoring thereby reducing the total number of effectively monitored species to 15. The percentages of negatively sloped adult and resident population trends were ~60% and ~60%, respectively. However, young populations and reproductive success declined in 73% of species.

Of the three species of conservation concern at this location Acadian flycatcher adult and young populations declined more significantly than in the 1994-2001 analysis. Wood thrush data is now accepted from all six stations and the adult trend increased non-significantly,

whereas it declined non-significantly in the 1994-2001 dataset. Louisiana waterthrush adults declined non-significantly.

Notable among other species Carolina wren adult populations continued to significantly increase, white-eyed vireo adults, previously significantly increasing, are now stable whereas ovenbird adults, previously stable, significantly increased.

Patuxent Naval Air Station, Indian Head, and Dahlgren (NAVY)

Overall, populations at this location declined less markedly (Table 2.5), however wood thrush and Kentucky warbler, species of management concern, continued to significantly decline. Since the last analysis (1994-2001) worm-eating warbler failed to meet the criteria for effective monitoring at two of three stations previously included and has low abundance at the remaining station. Kentucky warbler continues to significantly decline. The percentages of negatively sloped adult and resident population trends were ~44% and ~44%, respectively, whereas previously they were 55% and 61%, respectively. Although young populations and reproductive success showed similar percentages of declining trends between the two periods, wood thrush and Kentucky warbler young populations continued to decline. Notable among other species, Carolina wren adults continued to significantly increase and gain data from one extra station.

Naval Air Station Oceana and Camp Pendleton (TIDE)

Overall, populations at this location are still increasing, especially wood thrush, a species of management concern (Table 2.6). Since the last analysis (1994-2001), however, downy woodpecker and prothonotary warbler have failed to meet the criteria for effective monitoring thereby reducing the total number of effectively monitored species to 13. The percentages of negatively sloped adult and resident population trends were ~30% and ~23%, respectively. Young populations declined in 62% of species, whereas reproductive success declined in ~54% of species. These represent an average of ~10% fewer declines than

occurred during the 1994-2001 period which is consistent with deselecting two declining species.

Fort Bragg (BRAG)

Overall, populations at this location are still stable, especially wood thrush and prairie warbler, for the two species of management concern (Table 2.7). Since the last analysis (1994-2001) eastern towhee failed to meet the criteria for effective monitoring thereby reducing the total number of effectively monitored species to 14. The percentages of negatively sloped adult and resident population trends were ~71% and ~57%, respectively. Similarly, young populations declined in 57% of species, whereas reproductive success declined in ~71% of species. These represent similar percentages to those derived from the 1994-2001 dataset. Tufted titmouse adults and residents significantly declined, common yellowthroat and northern cardinal residents significantly declined, and Carolina wren reproductive success significantly declined.

Table 2.3. Summary of avian demographics (1994-2002) derived from MAPS data for 23 landbird species that breed at 24 stations comprising the DoD Legacy-funded MAPS monitoring stations located in Maryland, Virginia, North Carolina, and South Carolina (i.e. Belvoir, Navy, Brag and Tidewater MAPS clusters). Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	6	1.91	+0.064	0.39	+3.35	0.23	-0.004	0.92	1.49	-0.091	0.60	0.797	-0.091	0.31
ACFL	14	6.97	+0.036	0.82	+0.52	2.32	+0.052	0.55	0.61	+0.012	0.77	0.090	+0.003	0.66
WEVI	9	2.35	+0.086	0.39	+3.66	0.81	+0.049	0.41	0.83	+0.038	0.58	0.338	+0.015	0.57
REVI	12	**11.74**	**-0.912**	**0.04**	**-7.77**	3.44	-0.249	0.13	0.64	-0.040	0.54	0.061	-0.001	0.86
BLJA	7	2.17	+0.099	0.37	+4.55	0.47	+0.026	0.61	0.47	-0.035	0.44	**0.224**	**-0.038**	**0.06**
CACH	15	1.86	+0.076	0.39	+4.08	0.31	+0.027	0.14	1.89	+0.003	0.98	1.155	-0.117	0.13
TUTI	23	3.78	-0.060	0.60	-1.59	1.47	-0.056	0.42	3.83	-0.133	0.25	1.038	-0.030	0.41
CARW	21	**3.75**	**+0.501**	**0.00**	**+13.35**	**1.48**	**+0.142**	**0.06**	4.23	+0.044	0.81	**1.293**	**-0.173**	**0.00**
BGGN	2	2.20	-0.134	0.41	-6.09	0.29	+0.027	0.72	1.32	+0.019	0.92	0.910	+0.114	0.49
WOTH	18	7.33	+0.126	0.43	+1.73	2.65	+0.026	0.42	1.52	-0.089	0.10	**0.212**	**-0.014**	**0.08**
AMRO	6	6.51	-0.519	0.15	-7.97	0.43	+0.041	0.38	5.14	-0.348	0.32	0.839	-0.014	0.78
GRCA	3	6.24	-0.195	0.65	-3.13	1.90	+0.071	0.59	1.29	-0.051	0.75	0.287	-0.011	0.84
BRTH	5	2.45	-0.126	0.21	-5.15	0.92	-0.063	0.19	0.82	+0.053	0.65	0.329	+0.030	0.47
BAWW	4	**2.28**	**+0.311**	**0.01**	**+13.65**	0.50	+0.078	0.18	1.46	+0.083	0.65	0.649	-0.042	0.63
PRAW	4	5.25	-0.197	0.48	-3.76	1.77	-0.095	0.44	1.25	+0.007	0.95	0.255	-0.000	1.00
WEWA	4	2.12	+0.196	0.14	+9.26	**0.96**	**+0.126**	**0.09**	0.48	+0.039	0.52	0.193	+0.006	0.80
OVEN	17	**7.45**	**+0.323**	**0.07**	**+4.34**	3.09	-0.019	0.77	3.79	+0.135	0.56	0.500	+0.005	0.87
LOWA	4	4.03	-0.258	0.21	-6.40	2.44	-0.207	0.36	3.40	-0.504	0.15	0.841	-0.064	0.31
COYE	6	8.39	-0.214	0.42	-2.55	**3.04**	**-0.273**	**0.02**	2.68	-0.227	0.23	0.339	-0.019	0.52
KEWA	5	2.75	-0.216	0.10	-7.88	1.31	-0.014	0.88	0.77	-0.103	0.10	0.312	-0.017	0.56
HOWA	9	4.65	+0.246	0.24	+5.29	1.87	+0.104	0.25	0.98	-0.118	0.26	**0.220**	**-0.043**	**0.02**
NOCA	23	4.40	-0.001	0.99	-0.02	1.80	-0.021	0.78	1.65	-0.068	0.56	0.380	-0.014	0.61
COGR	8	5.03	-0.188	0.59	-3.74	0.18	+0.027	0.20	0.74	-0.049	0.76	0.114	+0.007	0.73

Table 2.4. Summary of avian demographics (1994-2002) derived from MAPS data for 17 landbird species that breed at 6 stations comprising the Belvoir (BELV) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	3	2.43	+0.187	0.32	+7.70	0.24	+0.005	0.92	1.68	-0.407	0.19	0.912	-0.285	0.12
ACFL	6	**7.15**	**-0.422**	**0.05**	**-5.90**	**2.13**	**-0.265**	**0.01**	**0.68**	**-0.128**	**0.04**	0.093	-0.012	0.12
WEVI	2	4.34	-0.089	0.50	-2.06	1.67	-0.071	0.62	0.57	+0.052	0.73	0.123	+0.017	0.56
REVI	4	10.04	-0.690	0.16	-6.87	3.00	-0.128	0.42	**0.54**	**-0.153**	**0.06**	0.048	-0.011	0.14
CACH	4	2.08	-0.129	0.35	-6.22	**0.18**	**-0.061**	**0.06**	2.64	-0.574	0.10	1.281	-0.262	0.10
TUTI	6	4.25	+0.024	0.82	+0.57	1.46	+0.100	0.21	5.10	-0.442	0.16	1.212	-0.097	0.16
CARW	5	**3.75**	**+0.663**	**0.00**	**+17.69**	1.05	+0.123	0.18	2.98	-0.423	0.45	0.975	-0.272	0.19
WOTH	6	3.99	+0.203	0.38	+5.08	0.84	-0.040	0.69	0.72	+0.027	0.59	0.182	-0.003	0.83
BAWW	1	3.99	+0.318	0.29	+7.96	1.61	+0.100	0.70	1.74	+0.289	0.47	0.449	-0.010	0.91
OVEN	5	**8.13**	**+0.541**	**0.05**	**+6.65**	3.25	+0.081	0.35	3.39	-0.246	0.13	**0.444**	**-0.058**	**0.02**
LOWA	2	1.58	-0.167	0.51	-10.60	0.75	-0.011	0.89	0.62	-0.094	0.32	0.710	-0.067	0.51
COYE	2	2.53	-0.300	0.27	-11.86	**0.36**	**-0.214**	**0.03**	0.33	-0.013	0.84	0.201	+0.026	0.57
HOWA	2	10.50	-0.188	0.75	-1.79	4.49	-0.102	0.69	2.33	-0.510	0.15	0.204	-0.034	0.13
NOCA	5	**6.41**	**-0.344**	**0.05**	**-5.37**	**2.83**	**-0.462**	**0.01**	2.60	-0.099	0.70	0.401	+0.013	0.74
COGR	3	4.65	-0.183	0.71	-3.93	**0.25**	**+0.091**	**0.03**	0.68	+0.047	0.76	0.141	+0.009	0.79

Table 2.5. Summary of avian demographics (1994-2002) derived from MAPS data for 18 landbird species that breed at 6 stations comprising the NAVY location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	4	1.37	-0.060	0.43	-4.37	0.21	+0.002	0.95	1.08	+0.001	0.99	0.778	+0.015	0.77
ACFL	6	5.67	+0.036	0.83	+0.64	1.89	+0.072	0.24	0.54	+0.035	0.57	0.107	+0.004	0.75
WEVI	2	2.47	+0.188	0.30	+7.63	0.74	+0.104	0.19	0.48	+0.018	0.70	0.151	+0.024	0.13
REVI	6	13.82	-0.652	0.16	-4.72	4.29	-0.279	0.27	0.76	-0.007	0.96	0.064	-0.000	0.98
BLJA	2	2.15	+0.035	0.89	+1.64	0.46	-0.005	0.92	0.41	-0.037	0.56	0.273	-0.039	0.39
CACH	4	1.57	+0.065	0.58	+4.15	0.08	+0.033	0.15	0.87	+0.086	0.27	0.894	-0.085	0.50
TUTI	6	4.33	-0.072	0.51	-1.66	**1.84**	**-0.145**	**0.01**	4.20	+0.128	0.53	0.975	+0.036	0.36
CARW	4	**2.80**	**+0.670**	**0.02**	**+23.91**	0.83	+0.096	0.13	**3.48**	**+0.711**	**0.06**	1.150	+0.013	0.92
WOTH	6	**6.50**	**-0.503**	**0.07**	**-7.73**	**2.65**	**-0.401**	**0.02**	**1.39**	**-0.228**	**0.06**	0.211	-0.018	0.31
AMRO	1	**5.94**	**-1.241**	**0.02**	**-20.88**	0.22	-0.067	0.48	2.42	-0.352	0.26	0.399	-0.008	0.90
NOPA	1	2.07	-0.262	0.19	-12.67	0.11	-0.017	0.73	**0.74**	**-0.224**	**0.05**	**0.327**	**-0.117**	**0.02**
WEWA	3	2.28	+0.196	0.22	+8.62	0.97	+0.109	0.19	0.57	+0.057	0.41	0.237	+0.016	0.63
OVEN	4	4.55	-0.170	0.24	-3.74	**1.84**	**-0.206**	**0.04**	1.17	-0.109	0.46	0.252	-0.016	0.61
LOWA	1	8.70	+0.406	0.24	+4.67	5.72	+0.355	0.22	8.32	+0.083	0.87	1.032	-0.056	0.49
KEWA	4	**2.79**	**-0.240**	**0.08**	**-8.60**	1.37	-0.055	0.56	0.91	-0.127	0.12	0.339	-0.021	0.49
HOWA	1	6.61	+0.232	0.50	+3.50	3.34	+0.218	0.28	0.94	+0.084	0.65	0.197	-0.015	0.77
NOCA	6	3.74	+0.059	0.67	+1.57	1.49	+0.063	0.30	1.35	+0.017	0.83	0.386	+0.001	0.97
COGR	2	2.59	+0.282	0.35	+10.91	0.11	+0.042	0.15	0.56	+0.025	0.88	0.111	-0.003	0.92

Table 2.6. Summary of avian demographics (1994-2002) derived from MAPS data for 15 landbird species that breed at 6 stations comprising the TIDE location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
ACFL	2	10.94	+0.425	0.47	+3.89	4.65	+0.429	0.23	0.77	+0.120	0.30	0.075	+0.006	0.61
BLJA	4	2.64	+0.004	0.98	+0.16	0.62	+0.004	0.97	0.51	-0.019	0.82	0.178	-0.007	0.79
CACH	2	1.97	-0.241	0.42	-12.21	0.00	+0.000		1.87	-0.306	0.18	0.633	-0.054	0.61
TUTI	5	2.26	-0.037	0.61	-1.64	0.53	+0.030	0.45	**2.68**	**-0.516**	**0.09**	1.114	-0.184	0.11
CARW	6	5.24	+0.331	0.38	+6.31	2.04	+0.232	0.14	6.10	+0.020	0.97	1.408	-0.140	0.35
WOTH	5	**11.88**	**+1.365**	**0.00**	**+11.49**	**4.84**	**+0.803**	**0.01**	2.51	-0.006	0.97	**0.228**	**-0.028**	**0.07**
AMRO	3	8.09	+0.416	0.48	+5.14	0.68	+0.018	0.89	8.71	-0.943	0.26	1.222	-0.194	0.12
BRTH	1	5.00	-0.435	0.33	-8.70	2.75	-0.248	0.31	0.50	+0.190	0.20	0.122	+0.049	0.19
BAWW	2	**1.95**	**+0.494**	**0.01**	**+25.34**	0.00	+0.000		1.63	+0.084	0.75	0.453	+0.014	0.84
OVEN	6	11.04	+0.069	0.86	+0.62	4.66	-0.209	0.12	7.79	-0.024	0.96	0.732	+0.001	0.99
HOWA	1	3.70	+0.616	0.18	+16.66	**1.14**	**+0.375**	**0.07**	0.63	+0.131	0.29	0.238	+0.007	0.90
NOCA	6	**3.86**	**+0.315**	**0.03**	**+8.17**	1.23	+0.071	0.35	1.48	-0.259	0.15	0.412	-0.104	0.05
COGR	3	**8.12**	**-1.769**	**0.03**	**-21.79**	0.20	-0.075	0.20	1.13	-0.400	0.34	0.124	+0.004	0.91

Table 2.7. Summary of avian demographics (1994-2002) derived from MAPS data for 14 landbird species that breed at 6 stations comprising the Fort Bragg (BRAG) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
WEVI	4	1.67	-0.077	0.43	-4.62	0.61	-0.033	0.58	1.17	-0.035	0.78	0.769	-0.016	0.87
REVI	2	2.49	-0.183	0.46	-7.36	0.50	-0.003	0.98	0.38	-0.010	0.95	0.134	+0.005	0.91
CACH	6	1.85	+0.065	0.40	+3.54	0.64	+0.016	0.32	2.05	+0.058	0.75	1.201	-0.046	0.71
TUTI	6	**2.75**	**+0.349**	**0.07**	**+12.69**	**1.24**	**+0.165**	**0.05**	2.05	+0.063	0.39	0.894	-0.104	0.13
CARW	6	3.48	+0.194	0.41	+5.58	1.86	+0.056	0.60	4.12	-0.661	0.10	**1.458**	**-0.356**	**0.07**
BGGN	2	1.98	-0.129	0.37	-6.52	0.29	+0.027	0.72	1.20	+0.013	0.94	0.885	+0.110	0.49
WOTH	1	6.86	-0.244	0.44	-3.56	1.90	-0.001	1.00	0.82	+0.182	0.35	0.164	+0.062	0.20
GRCA	3	5.78	-0.247	0.55	-4.27	1.86	+0.069	0.59	1.25	-0.052	0.76	0.289	-0.010	0.86
BRTH	4	1.79	-0.047	0.64	-2.63	0.46	-0.032	0.53	0.96	+0.043	0.75	0.561	+0.027	0.69
PRAW	4	5.15	-0.194	0.48	-3.76	1.72	-0.092	0.44	1.18	+0.004	0.97	0.244	-0.000	0.98
OVEN	2	2.81	+0.194	0.19	+6.89	0.98	+0.027	0.67	0.74	-0.055	0.58	0.343	-0.062	0.28
COYE	4	9.91	-0.265	0.31	-2.68	**4.32**	**-0.345**	**0.04**	3.74	-0.341	0.23	0.398	-0.028	0.45
HOWA	4	2.86	-0.052	0.82	-1.83	1.09	-0.072	0.61	0.59	-0.146	0.28	0.180	-0.043	0.21
NOCA	6	3.67	-0.132	0.29	-3.58	**2.07**	**-0.203**	**0.00**	1.43	-0.229	0.22	0.369	-0.044	0.34

Avian demographics from DoD installations of Indiana and Kentucky

Demographic trends shown in Table 2.8 represent 26 species captured among 18 Kentucky and Indiana MAPS stations operated during the breeding seasons of 1994 to 2002. Overall, populations are stable but declines in reproductive success were detected which may lead to future declines in adult populations. The percentages of negatively sloped adult and resident population trends were both ~54%. Similarly, young populations and reproductive success declined in only ~19% of species. Three species of conservation concern, Kentucky warbler, blue-winged warbler, and field sparrow significantly declined, as did four other species, white-eyed vireo, gray catbird, common yellowthroat, and yellow-breasted chat. Only brown thrasher and field sparrow exhibited statistically significant negative resident population trends although common yellowthroat showed a significant adult population decline. No species showed significant declines in young or reproductive success.

Adult populations of two less abundant species, brown thrasher and brown-headed cowbird, significantly increased. Young populations of seven species, downy wood pecker, wood thrush, ovenbird, hooded warbler, and brown-headed cowbird, significantly increased. Also, reproductive success of six species, white-eyed vireo, gray catbird, wood thrush, ovenbird, hooded warbler, and brown-headed cowbird, significantly increased.

Big Oaks NWR- formerly Jefferson Proving Ground (JEFF)

Overall, populations at this location continued to decline, especially Acadian flycatcher, a species of management concern (Table 2.9). Since the last analysis (1994-2001) blue-gray gnatcatcher failed to meet the criteria for effective monitoring but brown-headed cowbird was added to the analysis. The percentages of negatively sloped adult and resident population trends were ~60% and ~56%, respectively. However, young populations and reproductive success declined in only ~32% and ~24% of species. These percentages are consistent with those of the 1994-2001 period.

Of the five species of conservation concern at this location worm-eating warbler, Kentucky warbler, and field sparrow adult and young populations declined more significantly than in the earlier period. Blue winged warbler and prairie warbler adult populations remained stable, although prairie warbler residents significantly declined.

Notable among other species, white-eyed vireo, ovenbird, common yellowthroat, and hooded warbler adult populations continued to significantly decline. Common yellowthroat and hooded warbler resident populations also continued to significantly decline. Brown thrasher and brown-headed cowbird adults significantly increased. Yellow-breasted chat, northern cardinal, and brown-headed cowbird young significantly increased, and reproductive success significantly increased in field sparrow and brown-headed cowbird.

Fort Knox (KNOX)

Overall, populations at this location continued to decline (Table 2.10). Of three species of management concern, blue-winged warbler adults continued to significantly decline, worm eating warbler residents significantly declined, and Louisiana waterthrush demographics remained stable. Since the last analysis (1994-2001) Carolina chickadee and prothonotory warbler failed to meet the criteria for effective monitoring thereby reducing the list of species to 15. Kentucky warbler continued to significantly decline. The percentages of negatively sloped adult and resident population trends were ~47% and ~60%, respectively, However, young populations and reproductive success declined in ~60% and ~40% of species, respectively. Considering the loss of two declining species, these percentages are consistent with those of the 1994-2001 period.

Notable among other species, white-eyed vireo, common yellowthroat, northern cardinal, and indigo bunting adults and residents all significantly declined. Tufted titmouse adults, residents and young all increased. However, reproductive success showed no significant trends.

Crane Naval Surface Warfare Center (CRAN)

Overall, populations at Crane are relatively stable (Table 2.11). However, both species of management concern, blue-winged warbler and field sparrow, continued to significantly decline. Since the last analysis (1994-2001), however, downy woodpecker and worm-eating warbler have failed to meet the criteria for effective monitoring at one less station each, but Acadian flycatcher, red-eyed vireo, ovenbird, northern cardinal and indigo bunting gained stations. The percentages of negatively sloped adult and resident population trends were ~57% and ~43%, respectively. Young populations and reproductive success, however, declined in only 29% and 26% of species, respectively. These percentages were comparable with those of the previous period.

Notable among other species, gray catbird and yellow breasted chat adults significantly declined. Black-and-white warbler, worm-eating warbler, ovenbird, and hooded warbler adults significantly increased. Resident populations of three species Acadian flycatcher, Carolina wren, and gray catbird, significantly declined, whereas resident populations of five species, red-eyed vireo, wood thrush, worm-eating warbler, ovenbird and northern cardinal, significantly declined. Four species, white-eyed vireo, red-eyed vireo, gray catbird, and ovenbird showed significant increases in both young and reproductive success, and wood thrush and hooded warbler young also showed significant increases.

Table 2.8. Summary of avian demographics (1994-2002) derived from MAPS data for 26 landbird species that breed at 18 stations comprising the DoD Legacy-funded MAPS monitoring stations located in Indiana (i.e., Jefferson and Crane MAPS clusters) and Kentucky (i.e., Fort Knox). Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	6	1.68	+0.101	0.25	+5.99	0.34	+0.053	0.21	**1.16**	**+0.237**	**0.04**	0.867	+0.019	0.86
ACFL	14	7.61	-0.011	0.93	-0.15	2.42	-0.033	0.26	0.79	+0.055	0.16	0.104	+0.008	0.17
WEVI	10	**7.11**	**-0.576**	**0.01**	**-8.10**	3.68	-0.165	0.14	1.65	+0.098	0.39	**0.248**	**+0.038**	**0.02**
REVI	16	6.69	-0.123	0.40	-1.83	1.73	-0.004	0.96	0.54	+0.016	0.78	0.083	+0.004	0.62
CACH	8	2.09	+0.094	0.45	+4.49	0.70	+0.053	0.33	1.36	+0.039	0.61	0.787	-0.028	0.67
TUTI	13	2.23	+0.082	0.31	+3.68	0.57	+0.030	0.55	2.00	+0.191	0.18	0.889	+0.039	0.56
CARW	10	2.54	+0.144	0.30	+5.67	0.81	+0.052	0.18	1.94	+0.210	0.17	0.876	+0.022	0.78
HOWR	1	2.23	-0.074	0.83	-3.31	0.29	-0.071	0.50	0.29	-0.143	0.13	0.062	-0.016	0.66
WOTH	16	8.81	+0.136	0.62	+1.54	3.60	+0.049	0.37	**2.69**	**+0.245**	**0.09**	**0.298**	**+0.022**	**0.07**
AMRO	1	2.52	-0.264	0.28	-10.47	0.00	+0.000		0.65	+0.057	0.78	0.293	+0.047	0.60
GRCA	8	**11.09**	**-0.954**	**0.04**	**-8.61**	3.83	-0.199	0.18	2.87	+0.124	0.47	**0.285**	**+0.035**	**0.05**
BRTH	4	**1.38**	**+0.098**	**0.09**	**+7.12**	**0.30**	**-0.045**	**0.08**	0.49	-0.015	0.73	0.354	-0.035	0.18
BWWA	9	**5.47**	**-0.358**	**0.00**	**-6.54**	2.07	-0.068	0.17	2.15	+0.010	0.94	0.407	+0.032	0.21
PRAW	5	4.30	-0.192	0.40	-4.46	**1.17**	**-0.148**	**0.05**	1.22	+0.045	0.55	0.347	+0.032	0.37
BAWW	3	1.44	+0.128	0.30	+8.90	0.17	+0.026	0.51	0.61	-0.088	0.31	0.450	-0.089	0.17
WEWA	6	3.52	+0.025	0.82	+0.70	1.15	+0.003	0.97	1.77	-0.109	0.53	0.502	-0.022	0.63
OVEN	12	5.30	+0.188	0.20	+3.54	1.58	+0.061	0.32	**2.72**	**+0.453**	**0.01**	**0.495**	**+0.060**	**0.02**
LOWA	6	3.30	+0.052	0.69	+1.57	0.78	+0.029	0.61	2.77	+0.062	0.67	0.909	+0.019	0.76
KEWA	17	**9.57**	**-0.191**	**0.06**	**-2.00**	4.91	-0.103	0.10	4.13	+0.068	0.68	0.436	+0.016	0.39
COYE	12	**8.90**	**-0.496**	**0.04**	**-5.57**	3.92	-0.142	0.11	2.15	-0.011	0.93	0.248	+0.011	0.43
HOWA	5	2.69	+0.009	0.92	+0.33	0.95	-0.095	0.11	**0.48**	**+0.105**	**0.03**	**0.184**	**+0.040**	**0.06**
YBCH	6	**6.61**	**-0.345**	**0.02**	**-5.21**	2.80	+0.017	0.78	0.52	-0.015	0.72	0.082	+0.004	0.61
FISP	4	**5.43**	**-0.591**	**0.00**	**-10.88**	**1.93**	**-0.351**	**0.01**	0.93	+0.013	0.85	0.186	+0.018	0.16
NOCA	17	4.54	-0.090	0.53	-1.98	1.81	-0.022	0.58	0.95	+0.042	0.46	0.210	+0.013	0.23
INBU	13	8.29	-0.246	0.27	-2.96	3.12	-0.163	0.33	0.61	+0.023	0.58	0.074	+0.005	0.28
BHCO	1	**1.29**	**+0.338**	**0.02**	**+26.29**	**0.93**	**+0.302**	**0.00**	**0.29**	**+0.183**	**0.04**	**0.127**	**+0.082**	**0.03**

Table 2.9. Summary of avian demographics (1994-2002) derived from MAPS data for 25 landbird species that breed at 6 stations comprising the Jefferson Proving Ground (JEFF) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	1	2.81	+0.067	0.75	+2.37	1.26	+0.096	0.59	1.37	+0.269	0.33	0.574	+0.099	0.45
ACFL	4	7.68	+0.245	0.18	+3.19	2.49	+0.169	0.20	0.79	-0.072	0.36	0.108	-0.014	0.20
WEVI	4	**7.13**	**-0.688**	**0.01**	**-9.65**	4.28	-0.184	0.28	1.62	-0.134	0.44	0.223	+0.009	0.60
REVI	6	7.04	-0.257	0.14	-3.65	2.17	+0.071	0.57	0.42	+0.028	0.40	0.064	+0.008	0.13
CACH	3	2.19	+0.034	0.88	+1.55	0.67	-0.006	0.95	1.86	+0.186	0.24	1.212	+0.180	0.11
TUTI	4	2.38	+0.018	0.91	+0.77	0.91	-0.057	0.65	2.05	+0.142	0.47	0.955	+0.068	0.51
CARW	2	1.62	+0.136	0.50	+8.37	**0.41**	**+0.125**	**0.09**	1.60	+0.441	0.12	0.680	+0.142	0.40
HOWR	1	2.23	-0.074	0.83	-3.31	0.29	-0.071	0.50	0.29	-0.143	0.13	0.062	-0.016	0.66
WOTH	6	7.65	+0.063	0.77	+0.83	3.07	+0.051	0.50	2.45	+0.141	0.24	0.314	+0.013	0.15
AMRO	1	2.46	-0.257	0.27	-10.45	0.00	+0.000		0.57	+0.073	0.67	0.281	+0.049	0.56
GRCA	6	7.14	-0.312	0.31	-4.37	2.58	+0.021	0.86	1.11	+0.129	0.17	0.177	+0.024	0.21
BRTH	3	**1.40**	**+0.087**	**0.07**	**+6.21**	0.28	-0.016	0.60	0.41	-0.004	0.95	0.251	-0.004	0.93
BWWA	4	5.05	-0.038	0.84	-0.75	1.93	+0.015	0.91	2.24	+0.276	0.20	0.468	+0.068	0.12
PRAW	2	4.35	-0.336	0.30	-7.74	**1.30**	**-0.358**	**0.04**	1.23	+0.048	0.74	0.879	+0.110	0.69
BAWW	2	1.42	+0.017	0.91	+1.23	0.27	+0.041	0.51	0.67	-0.088	0.39	0.501	-0.066	0.36
WEWA	1	**5.70**	**-0.994**	**0.00**	**-17.43**	2.92	-0.432	0.17	2.59	-0.830	0.20	0.360	-0.015	0.81
OVEN	6	**5.54**	**-0.191**	**0.09**	**-3.44**	1.85	-0.094	0.15	1.97	+0.095	0.46	0.370	+0.034	0.22
KEWA	6	**7.51**	**-0.423**	**0.03**	**-5.64**	**3.58**	**-0.313**	**0.00**	2.54	-0.140	0.47	0.338	+0.003	0.91
COYE	3	**13.17**	**-1.325**	**0.00**	**-10.05**	**6.22**	**-0.602**	**0.00**	3.41	+0.101	0.61	0.282	+0.031	0.10
HOWA	3	**2.89**	**-0.311**	**0.02**	**-10.76**	**1.43**	**-0.172**	**0.05**	0.30	-0.015	0.82	0.090	-0.000	0.98
YBCH	2	9.06	-0.055	0.88	-0.61	3.51	-0.140	0.59	**0.34**	**+0.060**	**0.06**	0.038	+0.006	0.13
FISP	3	**6.59**	**-0.704**	**0.00**	**-10.70**	**2.51**	**-0.479**	**0.01**	0.85	+0.085	0.12	**0.149**	**+0.030**	**0.02**
NOCA	6	4.24	-0.113	0.54	-2.68	1.78	-0.014	0.85	**1.13**	**+0.144**	**0.07**	0.296	+0.047	0.10
INBU	3	6.31	+0.117	0.75	+1.85	2.06	+0.069	0.72	0.44	+0.041	0.54	0.101	+0.001	0.97
BHCO	1	**1.37**	**+0.371**	**0.01**	**+27.07**	**1.01**	**+0.340**	**0.00**	**0.29**	**+0.183**	**0.04**	**0.117**	**+0.074**	**0.03**

Table 2.10. Summary of avian demographics (1994-2002) derived from MAPS data for 17 landbird species that breed at 6 stations comprising the Fort Knox (KNOX) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	3	1.37	+0.116	0.33	+8.52	**0.30**	**+0.084**	**0.08**	**1.04**	**+0.373**	**0.01**	0.834	+0.304	0.10
ACFL	4	3.96	+0.145	0.21	+3.66	1.06	+0.025	0.60	0.31	+0.047	0.36	0.080	+0.009	0.53
WEVI	3	**3.07**	**-0.486**	**0.09**	**-15.82**	**1.36**	**-0.215**	**0.06**	0.64	-0.146	0.16	0.220	+0.015	0.66
REVI	6	4.94	+0.033	0.86	+0.68	1.29	-0.076	0.22	0.44	-0.109	0.23	0.107	-0.029	0.24
TUTI	4	**1.99**	**+0.264**	**0.05**	**+13.24**	**0.47**	**+0.085**	**0.05**	**1.70**	**+0.390**	**0.07**	0.918	-0.013	0.90
CARW	4	3.73	+0.371	0.16	+9.94	1.24	+0.163	0.10	2.76	+0.200	0.28	1.099	-0.179	0.18
WOTH	4	8.24	-0.189	0.51	-2.29	**3.53**	**-0.366**	**0.08**	1.41	+0.055	0.71	0.179	+0.017	0.36
BWWA	2	**2.92**	**-0.479**	**0.00**	**-16.44**	**1.08**	**-0.106**	**0.08**	1.06	-0.051	0.78	0.415	+0.083	0.41
PRAW	1	2.11	+0.028	0.88	+1.34	0.45	+0.103	0.31	0.52	+0.020	0.84	0.117	+0.017	0.53
WEWA	2	1.64	-0.020	0.89	-1.22	**0.11**	**-0.058**	**0.03**	1.72	-0.197	0.38	0.874	-0.095	0.44
LOWA	2	3.04	+0.068	0.69	+2.23	1.06	-0.000	1.00	3.49	-0.138	0.66	1.269	-0.119	0.39
KEWA	5	8.90	+0.027	0.89	+0.30	4.55	+0.105	0.55	3.48	-0.003	0.99	0.407	+0.001	0.97
COYE	4	**4.93**	**-0.639**	**0.00**	**-12.97**	**2.35**	**-0.277**	**0.03**	0.90	-0.069	0.55	0.194	+0.004	0.89
NOCA	6	**5.23**	**-0.278**	**0.07**	**-5.32**	**2.15**	**-0.181**	**0.04**	0.92	-0.059	0.66	0.164	-0.000	0.98
INBU	6	**7.75**	**-0.610**	**0.01**	**-7.87**	**3.11**	**-0.242**	**0.06**	0.50	-0.008	0.90	0.064	+0.002	0.79

Table 2.11. Summary of avian demographics (1994-2002) derived from MAPS data for 23 landbird species that breed at 6 stations comprising the Crane Naval Surface Warfare Center (CRAN) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	2	1.08	+0.074	0.24	+6.88	0.00	+0.000		1.02	-0.029	0.84	1.562	-0.129	0.66
ACFL	6	9.20	-0.257	0.32	-2.79	**3.06**	**-0.181**	**0.02**	1.07	+0.139	0.18	0.119	+0.017	0.12
WEVI	3	10.38	-0.544	0.18	-5.24	4.86	-0.140	0.45	**2.75**	**+0.591**	**0.01**	**0.299**	**+0.080**	**0.01**
REVI	4	7.40	-0.187	0.55	-2.52	1.38	-0.009	0.94	**0.74**	**+0.183**	**0.06**	**0.101**	**+0.027**	**0.02**
CACH	3	1.99	+0.078	0.61	+3.90	**0.86**	**+0.151**	**0.07**	1.22	-0.143	0.26	0.877	-0.153	0.17
TUTI	5	1.78	-0.036	0.63	-2.01	0.26	+0.034	0.40	1.93	+0.046	0.74	1.076	+0.039	0.53
CARW	3	1.77	-0.178	0.27	-10.07	**0.58**	**-0.149**	**0.01**	1.37	+0.131	0.44	1.821	+0.723	0.11
WOTH	6	9.58	+0.395	0.44	+4.12	**3.86**	**+0.314**	**0.06**	**3.75**	**+0.472**	**0.08**	0.378	+0.035	0.14
GRCA	3	**14.23**	**-1.744**	**0.02**	**-12.26**	**4.73**	**-0.514**	**0.04**	5.28	+0.223	0.56	**0.428**	**+0.067**	**0.01**
BWWA	3	**6.68**	**-0.554**	**0.05**	**-8.29**	2.47	-0.099	0.39	2.51	-0.233	0.26	0.367	-0.006	0.82
PRAW	2	4.90	-0.177	0.50	-3.62	1.21	-0.055	0.54	1.54	+0.070	0.59	0.350	+0.034	0.40
BAWW	1	**1.40**	**+0.321**	**0.05**	**+22.88**	0.00	+0.000		0.45	-0.073	0.48	0.300	-0.092	0.13
WEWA	3	**3.54**	**+0.386**	**0.05**	**+10.91**	**1.08**	**+0.175**	**0.03**	1.52	+0.218	0.11	0.434	+0.011	0.77
OVEN	6	**4.72**	**+0.481**	**0.03**	**+10.18**	**1.24**	**+0.186**	**0.01**	**3.44**	**+0.798**	**0.00**	**0.665**	**+0.090**	**0.01**
LOWA	4	3.02	+0.033	0.85	+1.11	0.56	+0.033	0.44	2.19	+0.150	0.12	0.836	+0.070	0.28
KEWA	6	11.01	-0.151	0.41	-1.37	5.83	-0.078	0.38	6.14	+0.347	0.33	0.560	+0.036	0.23
COYE	5	9.03	-0.104	0.74	-1.15	3.62	+0.110	0.48	2.42	-0.050	0.82	0.261	-0.002	0.91
HOWA	2	**1.90**	**+0.409**	**0.04**	**+21.49**	0.13	+0.058	0.27	**0.74**	**+0.282**	**0.01**	0.365	+0.119	0.12
YBCH	3	**5.10**	**-0.654**	**0.00**	**-12.82**	2.29	+0.004	0.97	0.71	-0.005	0.95	0.172	+0.033	0.17
EATO	3	2.04	-0.097	0.27	-4.76	0.49	+0.009	0.90	0.61	+0.012	0.88	0.363	+0.020	0.70
FISP	1	**1.83**	**-0.420**	**0.01**	**-22.92**	0.33	-0.117	0.22	1.11	-0.167	0.53	0.512	-0.063	0.49
NOCA	5	3.72	+0.117	0.58	+3.16	**1.31**	**+0.132**	**0.04**	0.75	+0.039	0.59	0.206	+0.002	0.88
INBU	5	7.85	+0.075	0.80	+0.95	2.85	-0.102	0.59	0.72	+0.040	0.52	0.092	+0.004	0.62

Avian demographics from DoD installations of Kansas and Missouri

Demographic trends shown in Table 2.12 represent 27 species captured among 18 eastern MAPS stations operated during the breeding seasons of 1994 to 2002. Overall, populations are stable but declines in reproductive success were detected which may lead to future declines in adult populations. The percentages of negatively sloped adult and resident population trends were ~48% and ~52%, respectively, however young populations and reproductive success declined in only 30% and 33% of species, respectively. Adults and residents of three species, Bell's vireo, blue jay, and American robin showed significant declines, whereas adults and residents of three other species, white-eyed vireo, wood thrush, and prairie warbler showed significant increases. Tufted titmouse and brown thrasher adults also showed significant declines. For six species, Carolina chickadee, wood thrush, black-and-white warbler, Kentucky warbler, northern cardinal, and indigo bunting we detected significant increases in young and reproductive success.

Fort Leonard Woods (LEON)

Overall, populations at this location are relatively stable (Table 2.13). Of eight species of conservation concern, Acadian flycatcher significantly declined, and prairie warbler significantly increased. Demographics of the other six species of conservation concern, wood thrush, blue-winged warbler, worm-eating warbler, Loiusiana waterthrush, Kentucky warbler, and field sparrow remain stable except that Kentucky warbler young and reproductive success significantly increased. Since the last analysis (1994-2001) eastern towhee failed to meet the criteria for effective monitoring, thereby reducing the number of study species to 21. The percentages of negatively sloped adult and resident population trends were ~57% and ~62%, respectively. However, young populations and reproductive success declined in only ~14% and ~29% of species. These percentages are consistent with those of the 1994-2001 analysis.

Notable among other species, adults and residents of three species, white-eyed vireo, prairie warbler and northern cardinal showed significant increases. Four species, red-eyed vireo,

Carolina chickadee, black-and-white warbler, and Kentucky warbler showed significant increases in both young and reproductive success. In addition, Carolina wren, common yellowthroat and indigo bunting showed significant increases in young.

Fort Leavenworth (LEAV)

Overall, demographic parameters at this location continued to increase (Table 2.14). Of four species of conservation concern, Kentucky warbler demographics remained stable and field sparrow adults, residents and young significantly declined. Wood thrush adults, residents, and young significantly increased. The percentages of negatively sloped adult and resident population trends were ~35% and ~47%, respectively. Young populations and reproductive success declined in ~29% and ~53% of species. Notable among other species, blue jay and American robin adults and residents significantly declined. Red-eyed vireo, gray catbird and Louisiana waterthrush adults, and residents significantly increased. However, reproductive success showed no significant trends.

Fort Riley (RILE)

Overall, demographic parameters at Fort Riley are still increasing (Table 14). However, Bell's vireo, the only species of management concern, showed significant declines in both adult and resident populations. Since the last analysis (1994-2001), however, eastern wood-pewee, American robin, grasshopper sparrow and common grackle failed to meet the criteria for effective monitoring. Yellow warbler and grasshopper sparrow were left out of this analysis, thereby reducing the number of species to 17. The percentages of negatively sloped adult and resident population trends were ~53% and ~41%, respectively. Young populations and reproductive success declined in only 35% and 29% of species, respectively. These percentages were comparable with those of the previous period given the trends previously associated with the five deselected species.

Adults and residents significantly declined for common yellowthroat but significantly increased for tufted titmouse. Four species, downy woodpecker, tufted titmouse, blue-gray gnatcatcher, and northern cardinal showed significant increases in young.

Table 2.12. Summary of avian demographics (1994-2002) derived from MAPS data for 27 landbird species that breed at 18 stations comprising the DoD Legacy-funded MAPS monitoring stations located in Kansas (i.e., Fort Riley and Fort Leavenworth MAPS clusters) and Missouri (i.e., Fort Leonard Woods). Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	14	2.79	-0.111	0.45	-3.99	**0.78**	**-0.078**	**0.07**	1.37	+0.147	0.15	**0.599**	**+0.097**	**0.09**
BEVI	3	**7.62**	**-1.207**	**0.04**	**-15.84**	**3.30**	**-0.859**	**0.02**	1.32	-0.324	0.12	0.152	-0.002	0.90
WEVI	3	**7.26**	**+0.895**	**0.05**	**+12.34**	**3.59**	**+0.387**	**0.04**	2.24	+0.155	0.37	0.356	-0.019	0.61
REVI	11	5.10	+0.317	0.10	+6.21	1.09	-0.046	0.44	**0.47**	**+0.085**	**0.02**	0.094	+0.010	0.19
BLJA	6	**1.89**	**-0.305**	**0.04**	**-16.13**	**0.33**	**-0.061**	**0.05**	0.28	-0.046	0.30	0.172	+0.020	0.51
CACH	4	2.50	+0.141	0.53	+5.65	0.55	-0.045	0.34	**1.98**	**+0.531**	**0.01**	**0.998**	**+0.173**	**0.09**
TUTI	15	**3.21**	**+0.193**	**0.09**	+6.00	1.13	+0.021	0.42	3.30	+0.246	0.21	1.059	+0.006	0.92
CARW	12	2.25	-0.181	0.28	-8.03	0.88	-0.056	0.52	1.36	+0.202	0.22	**0.789**	**+0.217**	**0.01**
HOWR	5	7.22	+0.728	0.15	+10.09	1.84	+0.185	0.24	4.08	+0.170	0.62	0.669	-0.069	0.27
BGGN	5	2.04	+0.081	0.52	+3.95	0.20	+0.006	0.86	**1.20**	**+0.108**	**0.03**	0.678	+0.039	0.41
WOTH	7	**4.91**	**+0.400**	**0.02**	**+8.14**	**2.10**	**+0.146**	**0.05**	**0.90**	**+0.178**	**0.01**	**0.179**	**+0.023**	**0.07**
AMRO	4	**3.70**	**-1.063**	**0.00**	**-28.77**	**0.26**	**-0.099**	**0.02**	**0.80**	**-0.218**	**0.04**	0.192	+0.001	0.95
GRCA	6	21.46	+1.140	0.20	+5.31	7.44	-0.094	0.76	6.64	+0.299	0.49	0.304	-0.000	0.99
BRTH	3	**4.98**	**+0.326**	**0.08**	**+6.55**	0.90	+0.020	0.79	1.42	-0.054	0.68	0.291	-0.031	0.15
BWWA	4	8.89	-0.006	0.99	-0.07	3.12	+0.017	0.86	1.47	+0.112	0.42	0.172	+0.014	0.37
PRAW	3	**6.34**	**+0.634**	**0.08**	**+10.00**	**2.07**	**+0.468**	**0.00**	**1.45**	**+0.274**	**0.08**	0.261	+0.025	0.50
BAWW	5	1.68	-0.171	0.13	-10.16	0.11	-0.021	0.23	**0.83**	**+0.152**	**0.09**	**0.640**	**+0.143**	**0.09**
WEWA	3	3.13	-0.019	0.91	-0.60	0.69	+0.008	0.85	0.85	+0.116	0.31	0.391	+0.044	0.57
OVEN	3	2.77	-0.090	0.66	-3.24	0.95	-0.024	0.74	0.52	-0.059	0.31	0.256	-0.018	0.56
LOWA	5	2.64	+0.154	0.20	+5.82	0.96	+0.041	0.35	1.15	-0.045	0.76	0.496	-0.047	0.45
KEWA	9	7.11	-0.068	0.68	-0.96	3.61	-0.033	0.75	**1.53**	**+0.344**	**0.01**	**0.221**	**+0.047**	**0.01**
COYE	9	7.51	-0.417	0.14	-5.55	**2.81**	**-0.228**	**0.03**	**1.29**	**-0.178**	**0.09**	0.169	-0.015	0.26
YBCH	2	19.57	+0.641	0.42	+3.28	10.73	+0.526	0.29	3.99	+0.259	0.53	0.213	+0.006	0.78
FISP	8	8.53	-0.214	0.40	-2.51	3.12	-0.100	0.39	2.79	+0.183	0.42	0.355	+0.039	0.28
NOCA	13	5.55	+0.105	0.39	+1.89	1.78	+0.087	0.14	**1.38**	**+0.167**	**0.05**	**0.241**	**+0.026**	**0.05**
INBU	15	10.41	+0.484	0.11	+4.65	3.77	+0.074	0.62	**0.80**	**+0.143**	**0.00**	**0.075**	**+0.011**	**0.02**
BHCO	5	3.57	-0.080	0.64	-2.25	0.83	-0.015	0.81	**0.74**	**-0.120**	**0.07**	0.236	-0.052	0.11

Table 2.13. Summary of avian demographics (1994-2002) derived from MAPS data for 21 landbird species that breed at 6 stations comprising the Fort Leonard Woods (LEON) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	4	2.17	-0.265	0.21	-12.18	0.43	-0.057	0.18	1.36	+0.160	0.31	0.906	+0.151	0.17
ACFL	4	**4.90**	**-0.328**	**0.04**	**-6.69**	2.47	-0.127	0.13	0.30	+0.016	0.74	0.070	+0.008	0.45
WEVI	3	**7.18**	**+0.898**	**0.05**	**+12.51**	**3.55**	**+0.383**	**0.04**	2.21	+0.152	0.37	0.357	-0.020	0.60
REVI	5	4.51	+0.045	0.84	+1.00	**1.18**	**-0.163**	**0.07**	**0.78**	**+0.169**	**0.03**	**0.187**	**+0.036**	**0.06**
CACH	4	2.50	+0.148	0.50	+5.89	0.55	-0.044	0.35	**1.98**	**+0.532**	**0.01**	**0.927**	**+0.161**	**0.04**
TUTI	6	1.90	+0.181	0.35	+9.52	0.22	-0.008	0.78	1.53	+0.215	0.29	0.767	-0.012	0.91
CARW	3	2.17	-0.449	0.10	-20.70	0.56	-0.103	0.22	1.18	+0.224	0.10	**1.117**	**+0.503**	**0.08**
BGGN	3	2.36	+0.005	0.97	+0.20	0.20	-0.030	0.44	1.59	+0.083	0.28	0.852	+0.020	0.80
WOTH	2	2.60	-0.193	0.34	-7.42	**0.93**	**-0.246**	**0.06**	0.62	+0.043	0.68	0.221	-0.005	0.91
BWWA	4	8.89	-0.006	0.99	-0.07	3.12	+0.017	0.86	1.47	+0.112	0.42	0.172	+0.014	0.37
PRAW	3	**6.34**	**+0.634**	**0.08**	**+10.00**	**2.07**	**+0.468**	**0.00**	**1.45**	**+0.274**	**0.08**	0.261	+0.025	0.50
BAWW	5	1.65	-0.176	0.12	-10.65	0.11	-0.021	0.23	**0.81**	**+0.146**	**0.09**	**0.646**	**+0.149**	**0.09**
WEWA	3	3.13	-0.019	0.91	-0.60	0.69	+0.008	0.85	0.85	+0.116	0.31	0.391	+0.044	0.57
OVEN	3	2.74	-0.075	0.71	-2.73	0.94	-0.024	0.75	0.52	-0.059	0.31	0.257	-0.018	0.56
LOWA	1	5.61	-0.305	0.52	-5.44	2.25	-0.217	0.38	3.36	-0.130	0.82	0.415	-0.018	0.78
KEWA	5	6.80	-0.217	0.40	-3.19	3.41	-0.114	0.51	**1.90**	**+0.512**	**0.00**	**0.312**	**+0.083**	**0.01**
COYE	3	7.77	-0.427	0.26	-5.49	3.57	-0.256	0.14	**1.43**	**-0.284**	**0.03**	0.202	-0.027	0.21
YBCH	2	19.31	+0.643	0.41	+3.33	10.62	+0.523	0.29	3.76	+0.244	0.52	0.203	+0.006	0.78
FISP	3	11.65	-0.153	0.73	-1.32	4.72	+0.100	0.63	4.77	+0.641	0.17	0.423	+0.064	0.13
NOCA	3	**4.40**	**+0.446**	**0.08**	**+10.14**	**1.65**	**+0.205**	**0.07**	1.40	+0.140	0.40	0.285	+0.001	0.98
INBU	5	13.24	+0.421	0.22	+3.18	5.48	+0.094	0.70	**1.25**	**+0.232**	**0.04**	0.093	+0.013	0.11

Table 2.14. Summary of avian demographics (1994-2002) derived from MAPS data for 17 landbird species that breed at 6 stations comprising the Fort Leavenworth (LEAV) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	6	3.25	-0.054	0.72	-1.66	1.15	-0.065	0.26	1.53	+0.113	0.39	0.571	+0.058	0.35
REVI	4	**5.13**	**+0.601**	**0.01**	**+11.72**	0.88	-0.041	0.56	0.18	+0.014	0.68	0.036	-0.001	0.86
BLJA	5	**1.93**	**-0.301**	**0.05**	**-15.62**	0.38	-0.063	0.07	0.27	-0.052	0.25	0.178	+0.015	0.68
TUTI	6	4.76	+0.136	0.39	+2.85	2.26	+0.003	0.97	4.32	+0.029	0.91	1.046	-0.063	0.53
CARW	6	2.24	-0.095	0.66	-4.23	0.92	-0.036	0.72	1.34	+0.224	0.35	0.727	+0.108	0.33
HOWR	2	7.70	+0.580	0.45	+7.54	1.94	+0.247	0.31	2.70	+0.205	0.69	0.385	-0.061	0.24
WOTH	4	**5.40**	**+0.738**	**0.00**	**+13.66**	**2.41**	**+0.359**	**0.00**	**0.90**	**+0.265**	**0.01**	0.154	+0.021	0.12
AMRO	4	**3.73**	**-1.059**	**0.00**	**-28.37**	**0.27**	**-0.101**	**0.02**	**0.75**	**-0.207**	**0.04**	0.174	-0.001	0.98
GRCA	2	**17.08**	**+4.248**	**0.00**	**+24.87**	**4.27**	**+0.997**	**0.00**	2.87	+0.535	0.13	0.135	+0.006	0.65
BRTH	1	2.98	+0.124	0.45	+4.15	**0.22**	**-0.100**	**0.07**	2.76	-0.198	0.59	0.935	-0.037	0.76
LOWA	3	**1.41**	**+0.238**	**0.03**	**+16.81**	**0.60**	**+0.131**	**0.05**	0.50	+0.053	0.54	0.455	-0.082	0.38
KEWA	3	8.30	+0.181	0.33	+2.18	4.46	+0.091	0.20	1.19	+0.146	0.40	0.135	+0.011	0.56
COYE	2	8.06	+0.781	0.31	+9.69	2.24	+0.197	0.29	1.37	+0.023	0.94	0.163	-0.003	0.94
FISP	2	**7.87**	**-1.007**	**0.01**	**-12.79**	**2.70**	**-0.317**	**0.04**	**1.36**	**-0.436**	**0.03**	0.170	-0.044	0.11
NOCA	6	6.23	+0.036	0.78	+0.58	1.94	+0.039	0.70	1.39	+0.138	0.27	0.227	+0.021	0.31
INBU	6	8.45	+0.482	0.22	+5.70	2.57	+0.023	0.87	0.53	+0.078	0.14	0.066	+0.008	0.32
BHCO	2	1.40	-0.140	0.46	-9.98	0.46	-0.076	0.44	**0.22**	**-0.092**	**0.04**	**0.200**	**-0.100**	**0.06**

Table 2.15. Summary of avian demographics (1994-2002) derived from MAPS data for 22 landbird species that breed at 6 stations comprising the Fort Riley (RILE) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
DOWO	4	2.38	-0.023	0.87	-0.97	0.47	-0.101	0.11	**0.90**	**+0.223**	**0.07**	0.550	+0.160	0.10
BEVI	3	**7.58**	**-1.206**	**0.04**	**-15.90**	**3.30**	**-0.858**	**0.02**	1.32	-0.324	0.12	0.153	-0.002	0.90
REVI	2	5.19	+0.263	0.46	+5.07	**0.67**	**+0.198**	**0.04**	0.25	-0.016	0.78	0.041	-0.008	0.42
BLJA	1	1.40	-0.181	0.55	-12.92	0.00	+0.000		0.28	+0.026	0.77	0.096	+0.017	0.61
TUTI	3	**2.02**	**+0.256**	**0.02**	**+12.66**	**0.52**	**+0.124**	**0.01**	**3.89**	**+0.590**	**0.05**	2.111	+0.098	0.55
CARW	3	2.15	-0.041	0.84	-1.93	1.01	-0.037	0.80	1.48	+0.121	0.53	0.776	+0.073	0.53
HOWR	3	6.84	+0.757	0.17	+11.07	1.75	+0.120	0.37	4.99	+0.082	0.80	0.877	-0.074	0.36
BGGN	1	1.77	+0.131	0.39	+7.41	0.00	+0.000		**0.75**	**+0.217**	**0.08**	0.352	+0.055	0.42
WOTH	1	6.73	-0.046	0.93	-0.69	3.10	-0.094	0.73	1.30	-0.027	0.88	0.195	-0.005	0.85
GRCA	3	29.89	-0.481	0.70	-1.61	11.67	-0.873	0.14	11.02	+0.207	0.76	0.371	+0.013	0.53
BRTH	2	5.97	+0.409	0.11	+6.86	1.19	+0.081	0.45	0.59	+0.092	0.21	0.108	+0.010	0.53
LOWA	1	2.56	+0.308	0.19	+12.05	0.58	+0.016	0.88	0.62	-0.215	0.20	0.076	+0.000	1.00
COYE	4	**7.27**	**-1.171**	**0.02**	**-16.11**	**2.55**	**-0.459**	**0.01**	1.15	-0.236	0.10	0.158	+0.001	0.94
FISP	3	5.17	+0.269	0.44	+5.21	1.67	-0.198	0.15	1.57	+0.199	0.22	0.339	+0.055	0.32
NOCA	4	4.79	-0.048	0.81	-1.00	1.46	+0.053	0.43	**1.28**	**+0.225**	**0.04**	**0.272**	**+0.049**	**0.02**
INBU	4	8.32	+0.506	0.11	+6.08	2.81	+0.112	0.36	0.50	+0.108	0.11	0.066	+0.011	0.28
BHCO	3	4.75	-0.113	0.62	-2.39	0.94	+0.057	0.56	1.21	-0.210	0.10	0.264	-0.049	0.12

Avian demographics from DoD installations of Texas

Demographic trends shown in Table 2.16 represent 12 species captured among 18 Texas MAPS stations operated during the breeding seasons of 1994 to 2002. Overall, populations are stable but 4 of the 5 adult and resident population declines were significant. However, increases in young and reproductive success were detected which may subsequently reverse or reduce the rate of declines in adult populations. The percentages of negatively sloped adult and resident population trends were ~42% and ~58%, respectively. Young populations and reproductive success declined in only 25% and 17% of species, respectively. Adults and residents of four species, Carolina chickadee, Bewick's wren, northern mockingbird, and field sparrow showed significant declines, whereas adults and residents of two other species, white-eyed vireo, and blue-gray gnatcatcher showed significant increases. For four species, white-eyed vireo, northern cardinal, and painted bunting we detected significant increases in young and reproductive success.

Camp Swift (SWIF)

Overall, populations at this location remained stable including painted bunting, the only species of management concern (Table 2.17). The percentages of negatively sloped adult and resident population trends were ~50% and ~33%, respectively. However, young populations and reproductive success increased in all six species. Notable among other species, white-eyed vireo significantly increased for all demographic parameters. Northern cardinal residents significantly declined but young and reproductive success both increased. Carolina wren young and reproductive success both significantly increased, and tufted titmouse young significantly increased.

Fort Hood (HOOD)

Overall, adult populations at this location remained stable (Table 2.18). Field sparrow, one of two species of management concern, showed significant declines in adults, residents, and young. The other species of management concern, Bewick's wren, continued to decline, significantly so for residents. Since the last analysis (1994-2001) northern mockingbird and

rufous-crowned sparrow failed to meet the criteria for effective monitoring, thereby reducing the number of study species to 11. The percentages of negatively sloped adult and resident population trends were ~55% and ~45% respectively, however, young populations and reproductive success declined in only ~18% and ~27% of species, respectively.

Notable among other species, blue-gray gnatcatcher and painted bunting adults and residents continued to significantly increase. Northern cardinal residents significantly declined but young and reproductive success both significantly increased, and tufted titmouse young showed a significant increase.

Camp Bowie (BOWI)

Overall, adult and resident populations at Camp Bowie are still decreasing in 15 of 16 cases, including Bewick's wren and field sparrow, two species of management concern (Table 2.19). Since the last analysis (1994-2001), however, rufous-crowned sparrow and common grackle failed to meet the criteria for effective monitoring. Brown-headed cowbird was added to the list. The percentages of negatively sloped adult and resident population trends were ~88% and ~100%, respectively. Young populations and reproductive success declined in only 38% and 25% of species, respectively. These percentages were comparable with those of the previous period.

Notable among other species, Carolina chickadee and northern cardinal adults and residents continued to significantly decline. Young and reproductive success of northern cardinal and painted bunting both significantly increased.

Table 2.16. Summary of avian demographics (1994-2002) derived from MAPS data for 12 landbird species that breed at 18 stations comprising the MAPS monitoring stations located in Texas (i.e., TXARNG Camps Swift and Bowie, and Fort Hood MAPS clusters). Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
WEVI	11	14.55	+1.280	0.00	+8.80	**6.88**	**+0.534**	**0.00**	**14.15**	**+2.162**	**0.00**	**0.949**	**+0.066**	**0.07**
REVI	2	3.10	+0.164	0.52	+5.27	0.43	+0.088	0.29	0.71	+0.154	0.11	0.191	+0.037	0.25
CACH	15	**2.09**	**-0.252**	**0.05**	**-12.04**	0.36	-0.050	0.18	**1.93**	**+0.222**	**0.05**	**1.374**	**+0.266**	**0.08**
TUTI	14	2.78	+0.030	0.78	+1.07	1.07	-0.073	0.13	**3.59**	**+0.322**	**0.08**	1.346	+0.077	0.30
CARW	11	4.28	+0.085	0.70	+1.97	1.57	+0.029	0.74	**5.20**	**+0.892**	**0.04**	1.333	+0.175	0.12
BEWR	11	**3.93**	**-0.256**	**0.09**	**-6.53**	**1.44**	**-0.109**	**0.07**	4.64	-0.219	0.49	1.262	+0.037	0.68
NOMO	6	**4.96**	**-1.448**	**0.00**	**-29.18**	**1.03**	**-0.323**	**0.00**	**1.13**	**-0.374**	**0.00**	0.218	-0.012	0.48
BGGN	6	**3.27**	**+0.495**	**0.00**	**+15.15**	**0.41**	**+0.079**	**0.07**	2.15	+0.110	0.34	0.761	-0.079	0.17
BAWW	4	1.56	+0.133	0.23	+8.52	0.29	+0.002	0.96	1.43	+0.147	0.15	0.956	+0.030	0.62
FISP	5	**5.15**	**-0.384**	**0.09**	**-7.46**	**1.80**	**-0.335**	**0.00**	1.41	-0.085	0.53	0.276	+0.008	0.73
NOCA	18	13.01	-0.242	0.56	-1.86	**5.68**	**-0.256**	**0.00**	**6.72**	**+1.363**	**0.01**	**0.538**	**+0.112**	**0.01**
PABU	17	9.13	+0.292	0.31	+3.20	3.40	-0.052	0.55	**3.11**	**+0.514**	**0.08**	**0.322**	**+0.035**	**0.08**

Table 2.17. Summary of avian demographics (1994-2002) derived from MAPS data for 6 landbird species that breed at 6 stations comprising the Camp Swift (SWIF) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
WEVI	5	**12.15**	**+1.007**	**0.05**	**+8.29**	**5.42**	**+0.346**	**0.03**	**4.44**	**+1.014**	**0.00**	**0.361**	**+0.055**	**0.04**
CACH	4	1.41	-0.116	0.41	-8.28	0.07	+0.012	0.54	**1.65**	**+0.376**	**0.05**	2.634	+1.101	0.11
TUTI	4	**1.84**	**+0.232**	**0.04**	**+12.59**	0.84	+0.033	0.49	**1.68**	**+0.235**	**0.02**	1.054	+0.051	0.62
CARW	6	4.75	+0.106	0.71	+2.24	1.82	+0.025	0.87	**4.68**	**+0.963**	**0.04**	**1.144**	**+0.202**	**0.08**
NOCA	6	15.74	-0.175	0.77	-1.11	**7.19**	**-0.461**	**0.01**	**6.01**	**+1.398**	**0.02**	**0.448**	**+0.109**	**0.09**
PABU	6	8.95	-0.176	0.64	-1.97	3.58	-0.233	0.13	2.50	+0.354	0.25	0.255	+0.035	0.11

Table 2.18. Summary of avian demographics (1994-2002) derived from MAPS data for 13 landbird species that breed at 6 stations comprising the Fort Hood (HOOD) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
WEVI	6	**16.55**	**+1.589**	**0.01**	**+9.60**	**8.13**	**+0.715**	**0.00**	**22.22**	**+3.042**	**0.00**	1.343	+0.048	0.35
REVI	1	2.83	-0.217	0.59	-7.68	0.52	+0.051	0.71	1.25	+0.193	0.36	0.666	+0.082	0.57
CACH	6	2.67	-0.246	0.21	-9.19	0.59	-0.060	0.35	2.57	+0.242	0.16	1.553	+0.236	0.19
TUTI	4	1.69	-0.014	0.90	-0.82	0.54	-0.052	0.29	**2.17**	**+0.230**	**0.04**	1.515	+0.114	0.27
CARW	5	3.61	+0.050	0.77	+1.39	1.24	+0.024	0.64	5.82	+0.763	0.11	1.759	+0.140	0.35
BEWR	4	2.96	-0.250	0.12	-8.45	**1.18**	**-0.157**	**0.04**	3.78	-0.436	0.16	1.383	-0.048	0.68
BGGN	6	**3.24**	**+0.498**	**0.00**	**+15.38**	**0.41**	**+0.080**	**0.07**	2.15	+0.108	0.34	0.772	-0.085	0.14
BAWW	4	1.51	+0.145	0.23	+9.60	0.30	+0.002	0.96	1.37	+0.140	0.14	0.960	+0.024	0.66
FISP	2	**6.28**	**-1.034**	**0.04**	**-16.45**	**2.65**	**-0.688**	**0.01**	**2.83**	**-0.784**	**0.08**	0.399	-0.028	0.46
NOCA	6	16.77	-0.551	0.28	-3.29	**6.77**	**-0.253**	**0.05**	**9.89**	**+1.576**	**0.02**	**0.599**	**+0.106**	**0.00**
PABU	6	**9.40**	**+0.729**	**0.04**	**+7.75**	**3.64**	**+0.187**	**0.07**	4.50	+0.706	0.10	0.461	+0.033	0.34

Table 2.19. Summary of avian demographics (1994-2002) derived from MAPS data for 9 landbird species that breed at 6 stations comprising the Camp Bowie (BOWI) location. Species names are given as 4 character codes (SPEC). The numbers of stations at which each species a) breeds, and b) is captured in acceptable numbers (No. STA) is given. For adult, resident and young individuals the mean annual numbers per station are presented (N/yr) and associated with the regression slope of the temporal trend (Trend) and the corresponding P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type. The temporal trend in adult individuals is also expressed as the annual percentage change (%/yr) relative the mean number of individuals captured (100 x Trend / N/yr). The temporal trend in reproductive indices (RI Trend) is given with the mean annual RI (Annual) and the associated P-value (P). Demographics of species of conservation concern are shaded. Statistically significant trends (P<0.10) are in bold type.

SPEC	No.		Adult				Resid.			Young			RI	
Code	STA	N/yr	Trend	P	%/yr	N/yr	Trend	P	N/yr	Trend	P	Annual	Trend	P
CACH	6	**1.81**	**-0.319**	**0.00**	**-17.65**	**0.28**	**-0.070**	**0.01**	1.34	+0.085	0.40	1.200	+0.260	0.13
TUTI	6	3.99	-0.077	0.71	-1.94	**1.50**	**-0.159**	**0.07**	5.65	+0.386	0.25	1.503	+0.118	0.20
BEWR	6	4.90	-0.295	0.10	-6.01	1.78	-0.114	0.16	5.72	-0.084	0.85	1.259	+0.082	0.46
NOMO	5	**5.19**	**-1.435**	**0.00**	**-27.68**	**1.14**	**-0.343**	**0.00**	**1.27**	**-0.422**	**0.00**	0.222	-0.016	0.31
FISP	3	4.67	-0.117	0.43	-2.52	**1.39**	**-0.190**	**0.04**	**0.72**	**+0.184**	**0.03**	**0.165**	**+0.042**	**0.03**
NOCA	6	6.31	-0.039	0.88	-0.62	2.94	-0.069	0.65	**4.22**	**+1.035**	**0.05**	**0.701**	**+0.172**	**0.05**
PABU	5	8.53	+0.288	0.40	+3.37	2.71	-0.110	0.34	**2.15**	**+0.446**	**0.04**	**0.235**	**+0.033**	**0.04**
BHCO	4	2.82	-0.152	0.24	-5.39	1.18	-0.049	0.39	0.20	-0.018	0.77	0.094	-0.002	0.93