THE 2006 ANNUAL REPORT OF THE MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP (MAPS) PROGRAM AT NAVAL AIR STATION BRUNSWICK AND REDINGTON TRAINING FACILITY

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April 13, 2007

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EXECUTIVE SUMMARY

Since 1989, The Institute for Bird Populations has been coordinating the Monitoring Avian Productivity and Survivorship (MAPS) Program, a cooperative effort among public and private agencies and individual bird banders in North America, to operate a continent-wide network of constant-effort mist-netting and banding stations. The purpose of the MAPS program is to provide annual indices of adult population size and post-fledging productivity, as well as estimates of adult survivorship and recruitment into the adult population, for various landbird species. Broad-scale data on productivity and survivorship are not obtained from any other avian monitoring program in North America and are needed to provide crucial information upon which to initiate research and management actions to reverse the recently-documented declines in North American landbird populations. The system of military installations in the United States may provide one group of ideal locations for this large-scale, long-term biomonitoring because they provide large areas of breeding habitat for Neotropical migratory landbirds that are subject to varying management practices.

A second objective of the MAPS program is to provide standardized population and demographic data for the landbirds found on federally managed public lands, such as military installations, national forests, national parks, and wildlife refuges. It is expected that population and demographic data on the landbirds found on any given military installation will aid research and management efforts on the installation to protect and enhance its avifauna and ecological integrity while simultaneously helping it to fulfill its military mission in an optimal manner.

We re-established and operated six MAPS stations on Naval Air Station Brunswick (hereafter "Brunswick") and the Redington Training Facility (hereafter "Redington") in 2006, in the exact same locations in which they were established in 2003 and operated in 2004-2005. These included two stations at Brunswick (Golf Course and Chimney Rock) and four stations at Redington (Potato Nubble, Redington Pond, Blueline Trail, and Highland). Ten mist nets at each station were operated for six morning hours per day, on one day per 10-day period, and for seven consecutive 10-day periods between May 31 and August 8.

Because the MAPS program has only been operated for four years at Brunswick and Redington, we are not yet ready to formulate management strategies specific to these bases. However, with the addition of a fourth year of data we are now able to estimate survival for up to 12 species breeding at Brunswick and Redington. These survival estimates will form the focus of this report. In last year's report (Pyle et al. 2006) we also used multivariate analyses to compare results between habitats, stations, and years. This year we will begin to assess how population dynamics of landbirds at Brunswick and Redington are affected by reproductive success, survival, or both.

A total of 493 individual birds of 44 species were newly banded at the six stations during the summer of 2006, various individuals of these species were recaptured a total of 219 times, and 17 birds were captured and released unbanded, for a total of 729 captures of 47 species. Capture indices (adults captured/600 net-hrs) suggest that the total adult population size in 2003-2006 was greatest at Redington Pond, followed Blueline Trail, Potato Nubble, Chimney Rock,

Highland, and Golf Course. The reproductive index, as determined by the number of young per adult, was highest atHighland, followed by Potato Nubble, Blueline Trail, Redington Pond, Chimney Rock, and Golf Course.

Constant-effort comparisons between 2005 and 2006 were undertaken at all six Brunswick and Redington stations. Adult breeding populations, of all species pooled and for all six stations combined, increased fairly substantially but non-significantly (by +19.2%), the number of young birds captured increased substantially (by a highly significant +132.9%), and reproductive index (the number of young per adult) showed an absolute increase of +0.231, a near-significant change. In general, these changes were region-wide and species-wide, with Highland (decreasing breeding populations) and Chimney Rock (decreasing productivity) being the only two stations showing discordant patterns.

Over the four-year period, the highest breeding populations have been recorded at Redington Pond and Blueline Trail, and the lowest breeding populations have been recorded at Chimney Rock. Productivity values have been high at Potato Nubble, Blueline Trail, and Redington Pond, and much lower at Golf Course and Chimney Rock. An overall, four-year reproductive index of 0.31 is fairly low compared with the mean value of 0.44 calculated for all species pooled in the Northeast MAPS Region, during the ten-year period 1992-2001. Of nine target species for which productivity values could be compared, four showed substantially (> 50%) lower, three showed slightly (< 50%) lower, and only two showed slightly (< 50%) higher productivity at Brunswick/Redington than in the Northeast Region. This indicates that productivity may be lower than it should be for many species at Brunswick and Redington.

The population trend for all species pooled was substantially but not significantly positive during the four-year period 2003-2006, showing an annual increase of 6.7%. Substantial four-year increases were recorded for eight of the 18 species, whereas substantial declines were recorded for four species. The four-year trend in productivity for all species pooled also increased substantially but non-significantly between 2003 and 2006. Ten species showed substantial increases whereas five species showed substantial negative trends, with that of White-throated Sparrow being significant.

We were able to obtain estimates of adult survival and recapture probabilities using temporally variable, time-constant ($\phi p \tau$) models, for 12 species breeding at Brunswick and Redington. Estimates of annual adult survival rate ranged from a low of 0.389 for White-throated Sparrow to a high of 0.899 for Common Yellowthroat, with a mean of 0.654. The precision of these survival estimates, as estimated by mean C.V., was 36.1%, which is as expected for survivorship analyses on four years of data. The precision of our estimates will invariably improve as more years of data are collected at Brunswick and Redington.

We compared survival values at Brunswick and Redington to values estimated from MAPS stations operated in 1992-2003 within Bird Conservation Region (BCR) 14, the Atlantic Northern Forest Region, in which Brunswick and Redington are located. Survival at the two installations during 2003-2006 was much higher than that recorded in BCR 14 during 1992-

2003, with eleven of twelve species showing higher survival at the installations whereas only one species, Hermit Thrush, had lower survival at the installations than in BCR 14, by a difference of only -1.0%. These results indicate excellent survival for target species breeding at Brunswick and Redington.

Both productivity and survival of birds vary with body mass so we compared mean productivity indices and survival estimates recorded at Brunswick and Redington as a function of mean body mass (log transformed) for 12 target species for which survival estimates were obtained. Two of the three these species showing population declines, Black-capped Chickadee and Magnolia Warbler showed lower-than expected productivity but higher-than-expected survival, indicating that low productivity at Brunswick and Redington may be the cause of the declines. The third species showing a population decline, Hermit Thrush, showed close-to-expected productivity and adult survival-rate values, perhaps indicating that another factor, such as low first-year survival or recruitment may be causing the decline. Overall, low productivity is implicated as causes for these two declines and is potentially preventing increases in three other species, whereas low survival appears to be a problem only for one species, White-throated Sparrow (even though survival for this species is 10.7% higher than that calculated for BCR 14). These results reinforce those presented above, indicating that productivity is much lower and survival much higher at Brunswick and Redington than is indicated for the region and the continent.

Thus, it appears that high survival is counterbalancing low productivity, resulting in stable or increasing four-year population trends for most species. While on the surface this may appear to be a favorable situation, it is opposite to results from other MAPS stations across the continent, generally indicating that low survival, particularly for Neotropical migrants, is the primary factor driving population declines. Thus, should survival of the populations at Brunswick and Reddington decline, we will likely be facing some severe population declines on the installations. Low productivity combined with increasing populations may also indicate that Brunswick and Redington are harboring “sink populations”, that are being supported primarily by higher productivity from surrounding regions. One of the goals of MAPS is to identify such populations such that management actions can be taken to increase productivity.

As more years of data accumulate we will be able to make better assessments of population trends as well as inferences about the effects of weather on productivity and the effect of changes in productivity on population size. MAPS data from Brunswick and Redington can be pooled with other MAPS data to provide large-scale regional (or even continental) indices and estimates of (and longer-term trends in) these key demographic parameters, as we have provided in this report regarding productivity in the Northeastern MAPS region and adult survival in Bird Conservation Region 14. Once causal factors for population declines or low productivity have been identified, we will be prepared to make management recommendations to increase productivity and/or survival of landbirds at Brunswick and Redington and to assess the results of management actions.

The long-term goal for the Brunswick/Redington MAPS program is to continue to monitor the primary demographic parameters of landbirds on these installations, to: (1) determine spatial

patterns in productivity indices and survival rate estimates as a function of spatial patterns in populations trends for target species (DeSante 2000, DeSante et al. 1999, 2001); (2) determine the proximate demographic factor(s) (i.e., productivity or survivorship) causing observed population trends in the target species (DeSante et al. 2001); (3) link MAPS data with landscape-level habitat data and spatially explicit weather data in a geographical information system (GIS) (Nott 2002); (4) identify relationships between landscape-level habitat and/or weather characteristics and the primary demographic responses (productivity and survival rates) of the target species (Nott 2002, Nott et al. 2002, Nott et al 2003a, Nott and Michel 2005); (5) generate hypotheses regarding the ultimate environmental causes of the population trends; and (6) make comprehensive recommendations for habitat and use-related management strategies both on the installations and elsewhere (Nott 2000, Nott et al. 2003a). We conclude that the MAPS protocol is very well-suited to achieving these long-term ecological goals and recommend continuing the MAPS program at Brunswick and Redington well into the future.

INTRODUCTION

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

Recent important results from MAPS reported in the peer-reviewed literature include the following:

- Age ratios obtained during late summer, population-wide mist netting provided a good index to actual productivity in the Kirtland's Warbler (Bart et al. 1999).

- Measures of productivity and survival derived from MAPS data were consistent with observed population changes at multiple spatial scales (DeSante et al. 1999).

- Patterns of productivity from MAPS at two large spatial scales (eastern North America and the Sierra Nevada) not only agreed with those found by direct nest monitoring and those predicted from theoretical considerations, but were in general agreement with current life-history theory and were robust with respect to both time and space (DeSante 2000).

- Modeling spatial variation in MAPS productivity indices and survival-rate estimates as a function of spatial variation in population trends provides a successful means for identifying the proximate demographic cause(s) of population change at multiple spatial scales (DeSante et al. 2001).

- Productivity of landbirds breeding in Pacific Northwest national forests is affected by global climate cycles including the El Niño Southern Oscillation and the North Atlantic Oscillation, in such a manner that productivity of Neotropical migratory species is determined more by late winter and early spring weather conditions on their wintering grounds than by late spring and summer weather conditions on their breeding grounds (Nott et al. 2002).

- Analyses describing relationships between four demographic parameters (adult population size, population trend, number of young, and productivity) and landscape-

> level habitat characteristics for bird species of conservation concern have been completed for 13 military installations in south-central and southeastern United States, allowing conservation management strategies to be formulated and tested (Nott et al. 2003a).

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

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

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

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

Accordingly, the MAPS program was established on Naval Air Station Brunswick (hereafter “Brunswick”) and Redington Training Facility (hereafter “Redington”) in 2003. It is expected that information from the MAPS program will be capable of aiding research and management efforts at Brunswick and Redington to protect and enhance the installation’s avifauna and ecological integrity, while helping it fulfill its military mission in an optimal manner.

The initial objective of the MAPS Program on DoD installations has been to identify generalized

management guidelines and formulate specific management actions that could be implemented on military installations and elsewhere to reverse the population declines of target landbird species and to maintain the populations of stable or increasing species. The identification and formulation of these management guidelines and actions has been achieved for many installations by modeling the vital rates (productivity and survivorship) of the various landbird species as a function of landscape-level habitat characteristics and spatially explicit weather variables. The goal was to identify relationships between adult population size, numbers of young produced, productivity (ratio of young to adults), and trends in those parameters and these habitat and weather variables. Resultant management strategies were designed to involve efforts to modify the habitat from characteristics associated with low population size, population trend, or productivity to characteristics associated with high population size, population trend, or productivity (especially for species for which low productivity was found to be driving the population decline).

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

Because the MAPS program has only been operated for four years at Brunswick and Redington, we are not yet ready to formulate management strategies specific to these bases. However, with the addition of a fourth year of data we are now able to estimate survival for up to 12 species breeding at Brunswick and Redington. These survival estimates will form the focus of this report. In last year's report (Pyle et al. 2006) we also used multivariate analyses to compare results between habitats, stations, and years. This year we will begin to assess how population dynamics of landbirds at Brunswick and Redington are affected by reproductive success, survival, or both.

METHODS

Specifics of the Brunswick and Redington Stations

Six MAPS stations were re-established and operated on Brunswick (two stations), near the coast at Brunswick, Maine, and Redington (four stations), in a montane region near Rangeley, Maine, in 2006, in the exact same locations in which they were originally established in 2003 and operated in 2004 and 2005. In 2003, these stations were selected in three different habitat types,

deciduous, mixed, and coniferous forests, and along an elevational gradient such that species diversity on each installation could be inventoried and differences in species composition and productivity between habitat types and elevation could be examined (Pyle et al. 2006).

At Brunswick the two stations are: 1) Golf Course (GOCO) in mixed (primarily balsam fir/eastern hemlock canopy with deciduous understory) habitat at 13 m elevation at the southwestern end on the installation near the golf course, and 2) Chimney Rock (CHRO) in deciduous (primarily northern red oak) habitat at 18 m elevation on the southeastern edge of the installation. At Redington, stations were selected, in careful consideration of Survival, Evasion, Resistance, and Escape (SERE) training exercises, at: 3) Potato Nubble (PONU) in mixed (primarily maple and birch with fir/spruce subdominant) habitat at 488 m elevation near the entrance road at the west end of the installation, 4) Redington Pond (REPO) in deciduous (primarily birch and maple) habitat at 507 m elevation on the east end of Redington Pond, 5) Blueline Trail (BLUE) in lowland coniferous (primarily balsam fir and Eastern hemlock) habitat at 515 m elevation in the central region of the installation near the head of Blueline Trail, and 6) Highland (HGHL) in upland coniferous (primarily balsam fir and red spruce) habitat at 724 m elevation in the north-central region of the installation just south of the High Road. A summary of the major habitats represented at each of the six stations is presented in Table 1. Additional details on the habitat composition (Nott et al. 2003b), degree of drainage, and history of habitat disturbance to the stations are presented in Table 2 of Pyle et al. (2006).

The six stations were re-established for operation by IBP Biologist interns Angela Burns, Andrew Thornton, and David Lad during May 29 to June 3, 2006. The two field biologist interns had received intensive training during a comprehensive course in mist netting and bird-banding techniques given by IBP biologists Amy Finfera and Ron Taylor, which took place May 1-12 at the Jug Bay Wetlands Sanctuary in Maryland. The two interns Angela Burns and Andrew Thornton began operation of the Brunswick and Redington stations June 1-7. Each station was operated for six morning hours per day (beginning at local sunrise) on one day in each of seven consecutive 10-day periods between Period 4 (beginning May 31), and Period 10 (beginning July 29). The operation of all stations occurred on schedule during each of the seven 10-day periods, in coordination with personnel at Reddington to avoid conflict with SERE exercises.

Collection of MAPS Data

All MAPS stations were operated in accordance with the highly standardized banding protocols established by The Institute for Bird Populations for use by the MAPS Program throughout North America and spelled out in detail in the MAPS Manual (DeSante et al. 2006). On each day of operation each year, one 12-m long, 30-mm mesh, 4-tier nylon mist net was erected at each of ten fixed mist-net sites within the interior eight ha of each 20-ha station. With few exceptions, all birds captured during the course of the study were identified to species, age, and sex and, if unbanded, were banded with USGS/BRD numbered aluminum bands. Birds were released immediately upon capture and before being banded or processed if situations arose where bird safety would be compromised. The following data were taken on all birds captured, including recaptures, according to MAPS guidelines using standardized codes and forms (DeSante et al. 2006):

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

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

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

(1) Clean-up programs to check the validity of all codes entered and the ranges of all numerical data;
(2) Cross-check programs to compare station, date, and net fields from the banding data with those from the effort and breeding status data;
(3) Cross-check programs to compare species, age, and sex determinations against degree of skull pneumaticization, breeding condition (extent of cloacal protuberance and brood patch), extent of juvenal plumage, extent of body and flight-feather molt, extent of primary-feather wear, and presence of molt limits and plumage characteristics;
(4) Screening programs which allow identification of unusual or duplicate band numbers or unusual band sizes for each species; and
(5) Verification programs to screen banding and recapture data from all years of

operation for inconsistent species, age, or sex determinations for each band number.

Any discrepancies or suspicious data identified by any of these programs were examined manually and corrected if necessary. Wing chord, body mass, fat content, date and station of capture, and any pertinent notes were used as supplementary information for the correct determination of species, age, and sex in all of these verification processes.

Data Analysis

To facilitate analyses, we first classified the landbird species captured in mist nets into five groups based upon their breeding or summer residency status. Each species was classified as one of the following: a regular breeder (B) if we had positive or probable evidence of breeding or summer residency within the boundaries of the MAPS station *during all years* that the station was operated; a usual breeder (U) if we had positive or probable evidence of breeding or summer residency within the boundaries of the MAPS station *during more than half but not all of the years* that the station was operated; an occasional breeder (O) if we had positive or probable evidence of breeding or summer residency within the boundaries of the MAPS station *during half or fewer of the years* that the station was operated; a transient (T) if the species was *never* a breeder or summer resident at the station, but the station was within the overall breeding range of the species; and a migrant (M) if the station was not located within the overall breeding range of the species. Data from a station for a species classified as a migrant 'M' at the station were not included in any analyses, except those used to produce Table 3.

A. Population-Size and Productivity Analyses — The proofed, verified, and corrected banding data from 2006 were run through a series of analysis programs that calculated for each species and for all species combined at each station and for all stations pooled:

(1) the numbers of newly banded birds, recaptured birds, and birds released unbanded;
(2) the numbers and capture rates (per 600 net-hours) of first captures (in 2006) of individual adult and young birds; and
(3) the reproductive index.

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

For each station, we calculated percent changes between 2005 and 2006 in the numbers of adult and young birds captured, and actual changes in the reproductive index. These between-year comparisons were made in a "constant-effort" manner by means of a specially designed analysis program that used actual net-run (capture) times and net-opening and -closing times on a net-by-net and period-by-period basis to exclude captures that occurred in a given net in a given period in one year during the time when that net was not operated in that period in the other year.

We determined the statistical significance of between-year changes in the indices of adult population size and post-fledging productivity according to methods developed by the BTO in their CES scheme (Peach et al. 1996), by using confidence intervals derived from the standard errors of the mean percentage changes of all six stations. The statistical significance of the overall change at a given station was inferred from a one-sided binomial test on the proportion of species at that station that increased (or decreased). Throughout this report, we use an alpha level of 0.05 for statistical significance, and we use the term "near-significant" or "nearly significant" for differences for which $0.05 \leq P < 0.10$.

For each of the six stations operated for the four years, 2003-2006, and for all stations combined, we calculated four-year means for the numbers of adult and young birds captured per 600 net hours and the reproductive index for each individual species and for all species pooled. While these mean numbers provide an indication of the relative adult population size and productivity of the various species at each station and at all stations pooled, they don't provide sufficient information by themselves for statistical inference of the differences in adult population size or reproductive index among years or between stations. In order to make such inferences, we previously (Pyle et al. 2006) conducted multivariate analyses of variance (of numbers of adults captured) and logistic regression analyses (of productivity index, or the probability that a captured bird is young).

B. Analyses of trends in adult population size and productivity — We examined four-year (2003-2006) trends in indices of adult population size and productivity, for each target species for which we recorded an average of at least 2.5 individual adults per year at the six stations combined, at stations at which the species was a regular (B) or usual (U) breeder. For trends in adult population size, we first calculated adult population indices for each species in each of the four years based on an arbitrary starting index of 1.0 in 2003. Constant-effort changes (as defined above) were used to calculate these "chain" indices in each subsequent year by multiplying the proportional change between the two years times the index of the previous year and adding that figure to the index of the previous year, or simply:

$$PSI_{i+1} = PSI_i + PSI_i * (d_i/100)$$

where PSI_i is the population size index for year I and d_i is the percentage change in constant-effort numbers from year i to year i+1. A regression analysis was then run to determine the slope of these indices over the four years (*PT*). Because the indices for adult population size were based on percentage changes, we further calculated the annual percent change (*APC*), defined as the average change per year over the five-year period, to provide an estimate of the population trend for the species; *APC* was calculated as:

(actual 2004 value of *PSI* / predicted 2003 value of *PSI* based on the regression) * *PT*.

We present *APC*, the standard error of the slope (*SE)*, the correlation coefficient *(r*), and the significance of the correlation (*P*) to describe each trend. Species for which $r > 0.5$ are considered to have a substantially increasing trend; those for which $r < -0.5$ are considered to

have a substantially decreasing trend; those for which $-0.5 \leq r \leq 0.5$ and $SE \leq 0.219$ (for four-year trends) are considered to have a stable trend; and those for which $-0.5 \leq r \leq 0.5$ and $SE > 0.219$ are considered to have widely fluctuating values but no substantial trend.

Trends in productivity, *PrT*, were calculated in an analogous manner by starting with actual reproductive index values in 2003 and calculating each successive year's value based on the constant-effort changes in productivity between each pair of consecutive years. For trends in productivity, the slope (*PrT*) and its standard error (*SE*) are presented, along with the correlation coefficient *(r)*, and the significance of the correlation (*P*). Productivity trends are characterized in a manner analogous to that for population trends, except that we do not categorize productivity trends as highly fluctuating.

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

RESULTS

A total of 2374.2 net-hours was accumulated at the six MAPS stations operated at Bruswick and Redington in 2006 (Table 1). This represents 94.2% of the maximum possible hours for six stations in seven periods. Of these, 2230.5 net-hours could be compared with 2005 data in a constant-effort manner.

Indices of Adult Population Size and Post-fledging Productivity

The 2006 capture summary of the numbers of newly-banded, unbanded, and recaptured birds is presented for each species and all species pooled at each of the six stations in Table 2 and for all stations combined in Table 4. A total of 729 captures of 47 species were recorded at the six stations combined (Table 4). Newly banded birds represented 67.6% of the total captures. The greatest number of captures occurred at Redington Pond (191), followed by Blueline Trail (154), Potato Nubble (135), Highland (115), Chimney Rock (79), and Golf Course (55). Species richness was greatest at Redington Pond and Blueline Trail (31 species each), followed by Chimney Rock (19), Potato Nubble (18), Golf Course (16), and Highland (15). Overall, the most abundantly captured species at the six stations, in descending order (Table 4), were Swainson's Thrush, White-throated Sparrow, Ovenbird, Black-throated Blue Warbler, Magnolia Warbler, American Redstart, Hermit Thrush, and Common Yellowthroat.

In order to standardize the number of captures with respect to variation in mist-netting effort (due to unsuitable weather conditions and accidental net damage; see Table 1), we present capture rates (per 600 net-hours) of individual adult and young birds, as well as the reproductive index (young captured per adult), for each species and for all species pooled at each station in Table 3 and for all stations combined in Table 4. These capture indices suggest that the total adult population size in 2006 was greatest at Redington Pond (151.5 adults/600 net-hours), followed Blueline Trail (111.4), Potato Nubble (93.8), Chimney Rock (74.4), Highland (72.2), and Golf Course (69.5).

Overall, the most abundant breeding species at the six Brunswick and Redington MAPS stations in 2006, as determined by adults captured per 600 net-hrs, was Swainson's Thrush followed in descending order by White-throated Sparrow, Ovenbird, Magnolia Warbler, Red-eyed Vireo, Common Yellowthroat, Black-throated Green Warbler, Hermt Thrush, Nashville Warbler, Black-throated Blue Warbler, and American Redstart (Table 4). The following is a list of the common breeding species (captured at a rate of at least 6.0 adults per 600 net-hours), in decreasing order, at each station in 2006 (see Table 3):

Golf Course
Common Yellowthroat
Ovenbird
Veery*
Hermit Thrush*
Black-thr.Green Warbler†

Chimney Rock
Ovenbird
Red-eyed Vireo*
Black-thr. Green Warbler*
Hermit Thrush

Highland
Swainson's Thrush
Nashville Warbler*
Blackpoll Warbler
Magnolia Warbler†
Oregon Junco†

Redington Pond
Swainson's Thrush
American Redstart
Black-thr. Blue Warbler
Red-eyed Vireo
Magnolia Warbler
White-throated Sparrow
Traill's Flycatcher
Least Flycatcher*
Black-thr. Green Warbler*
Canada Warbler†
Black-capped Chickadee†
Yellow-rumped Warbler†
American Robin†
Ovenbird†

Blueline Trail
White-throated Sparrow
Swainson's Thrush
Traill's Flycatcher*
Common Yellowthroat
Cedar Waxwing*
Tennessee Warbler*
Magnolia Warbler†
Black-capped Chickadee†

Potato Nubble
Magnolia Warbler
Ovenbird
Swainson's Thrush
White-throated Sparrow*
Black-thr. Blue Warbler*
Yellow-rumped Warbler*
Black-capped Chickadee†

* At least 6.0 adults per 600 net hours in 2006 but not in 2005.
† At least 6.0 adults per 600 net hours in 2005 but not in 2006.

Captures of young of all species pooled (Table 3) varied substantially, being highest at Redington Pond (78.9 young birds/600 net hours) followed by Blueline Trail (63.0), Potato Nubble (58.2), Highland (50.2), Chimney Rock (11.4), and Golf Course (3.2). The reproductive index, as determined by the number of young per adult, also varied, being highest at Highland (0.69) followed by Potato Nubble (0.62), Blueline Trail (0.57); Redington Pond (0.52), Chimney Rock (0.15), and Golf Course (0.05).

Comparisons between 2005 and 2006
Constant-effort comparisons between 2005 and 2006 were undertaken at all six Brunswick and Redington stations, for numbers of adult birds captured (index of adult population size; Table 5), numbers of young birds captured (Table 6), and number of young per adult (reproductive index; Table 7).

Adult population size, for all species pooled and at all six stations combined, increased fairly substantially but non-significantly, by +19.2% between 2005 and 2006 (Table 5). Increases were recorded for 26 of 51 species, a proportion not significantly greater than 0.50, the proportion expected by chance. The number of adults captured of all species pooled increased at five stations, by amounts ranging from +3.4% at Redington Pond to +85.7% at Chimney Rock, and it decreased at Highland (by -11.3%). The proportions of increasing species were significantly greater than 0.50 at Potato Nubble and near-significantly greater at Chimney Rock.

Veery showed a near-significant between-year increase across stations and Canada Warbler showed a similar decrease.

The number of young birds captured, of all species pooled and for all six stations combined, increased by +132.9%, a highly significant change (Table 6). Increases between 2005 and 2006 were recorded for 26 of 35 species (0.74), a proportion highly significantly greater than 0.50. Young captured for all species pooled increased at all six stations by amounts ranging from +33.3% at Chimney Rock to +175% at Highland (the increase at Golf Course was incalculable since no young were captured there in 2005). The proportion of increasing species was near-significantly greater than 0.50 at Redington Pond. No species showed significant or near-significant increases (or declines) in young captured across stations.

Reproductive index (the number of young per adult) showed an absolute increase of +0.231, from 0.242 in 2005 to 0.472 in 2006 for all species pooled and both stations combined, a near-significant change (Table 7). Increases in productivity were recorded for 19 of 38 species, a proportion not significantly greater than 0.50. Reproductive index increased at five stations by amounts ranging from +0.047 at Golf Course to +0.476 at Highland, whereas it decreased at Chimney Rock by -0.061. The proportion of increasing or decreasing species was not significantly greater than 0.50 at any station, and only one species (Nashville Warbler) showed a significant change across stations, in this case an increase.

Thus, in general, breeding populations increased fairly substantially, young increased substantially and significantly, and reproductive success also increased substantially but only near-significantly at Brunswick and Redington between 2005 and 2006. In general, these changes were region-wide and species-wide, with Highland (decreasing breeding populations) and Chimney Rock (decreasing productivity) being the only two stations showing discordant patterns.

Four-year mean population size and productivity values in relation to the Northeast Region

Mean numbers of individual adults (an index of adult population size) and young captured per 600 net-hours, and reproductive index (a measure of productivity), averaged over the four-year period 2003-2006, are presented in Table 8, for each station and for all six stations combined. Examination of values for all species pooled indicates that the highest breeding populations have been recorded at Redington Pond and Blueline Trail, and that the lowest breeding populations have been recorded at Chimney Rock. Productivity values were high at Potato Nubble, Blueline Trail, and Redington Pond, and much lower at Golf Course and Chimney Rock. Highland showed population size and reproductive index values that were close to average.

The overall reproductive index of 0.31 is fairly low compared with the mean value of 0.44 calculated for all species pooled in the Northeast MAPS Region, during the ten-year period 1992-2001. Of nine target species for which productivity values could be compared, four (Red-eyed Vireo, American Robin, American Redstart, and Common Yellowthroat) were substantially (> 50%) lower, three (Hermit Thrush, Magnolia Warbler, and Ovenbird) were slightly (< 50%) lower; and two (Black-capped Chickadee and White-throated Sparrow) were slightly (< 50%)

higher at Brunswick/Redington than in the Northeast Region. This indicates that productivity may be lower than it should be for many species at Brunswick and Redington, at least during the four-year period 2003-2006. However, productivity did improve substantially from that of 2005, when six species showed substantially lower values and only one species showed a slightly higher value than was found in the Northeast Region.

Four-year trends in adult population size and productivity

"Chain" indices of adult population size and productivity, at the six Bruswick and Redington stations combined, for the 28 target species and for all species pooled, are presented in Figures 1 and 2, respectively. We used the slope of the regression line for each species to calculate the Annual Percentage Change (*APC*) for the population. *APC* along with the standard error of the slope (SE), the correlation coefficient *(r*), and the significance of the correlation (*P*) for each target species and for all species pooled are included in Figure 1.

The population trend for all species pooled was substantially ($r > 0.5$) but not significantly ($P = 0.120$) positive during the four-year period 2003-2006 (Fig. 1), showing an annual increase of 6.7%. Substantial four-year increases were recorded for eight of the 18 species, the trends being nearly significant for Traill's Flycatcher and Ovenbird, and being non-significant for Hairy Woodpecker, Red-eyed Vireo, Veery, Swainson's Thrush, Yellow-rumped Warbler, and Dark-eyed Junco. Substantial and non-significant declines were recorded for four species, Yellow-bellied Flycatcher, Philadelphia Vireo, Blue Jay, and American Robin. The remaining 16 species showed non-substantial population trends (absolute $r < 0.5$), with those of Black-capped Chickadee, Hermit Thrush, Nashville Warbler, Magnolia Warbler, American Redstart, Common Yellowthroat, and White-throated Sparrow being non-fluctuating (SE of the slope < 0.219 for a four-year population trend) and those of Blue-headed Vireo, Boreal Chickadee, Red-breasted Nuthatch, Cedar Waxwing, and Black-throated Blue, Black-throated Green, Blackburnian, Blackpoll, and Canada warblers showing wide inter-annual fluctuation (SE of slope > 0.219).

The four-year trend in productivity for all species pooled increased substantially but non-significantly between 2003 and 2006 (Fig. 2). Seven species had no young captured during the four year period (Table 7), preventing the calculation of meaningful trends. Of the remaining 21 species, ten (Philadelphia Vireo, Red-eyed Vireo, Black-capped Chickadee, American Robin, Magnolia Warbler, Yellow-rumped Warbler, Blackpoll Warbler, American Redstart, Ovenbird, and Canada Warbler) showed substantial increases (with that of Magnolia Warbler and American Redstart being significant) and five (Hairy Woodpecker, Black-throated Green Warbler, Blackburnian Warbler, White-throated Sparrow, and Dark-eyed Junco) showed substantial negative trends (with that of White-throated Sparrow being significant). The remaining six species (Blue-headed Vireo, Swainson's Thrush, Hermit Thrush, Nashville Warbler, Black-throated Blue Warbler, and Common Yellowthroat) showed non-substantial trends.

Estimates of Adult Survivorship

Using four years of data (2003- 2006) from all six stations, we were able to obtain estimates of adult survival and recapture probabilities using temporally variable, time-constant ($\phi p \tau$) models,

for 12 species breeding at Brunswick and Redington (Table 9).
Estimates of annual adult survival rate ranged from a low of 0.389 for White-throated Sparrow to a high of 0.899 for Common Yellowthroat, with a mean of 0.654. Recapture probability varied form a low of 0.284 for Red-eyed Vireo to a high of 0.730 for American Redstart, with a mean of 0.509. Proportion of residents varied from a low of 0.092 for American Redstart to a high of 1.000 for Blackpoll Warbler, and averaged 0.408. The precision of these survival estimates, as estimated by mean C.V., was 36.1%, which is as expected for survivorship analyses on four years of data. Six of the 12 species had CV's that we consider to be high enough that caution is warranted in interpreting the survivorship estimates. The precision of our estimates will invariably improve as more years of data are collected at Brunswick and Redington.

To see how the survival values compare to those of surrounding areas, we have presented the values estimated from MAPS stations operated in 1992-2003 within Bird Conservation Region (BCR) 14, the Atlantic Northern Forest Region, in which Brunswick and Redington are located. Remarkably, survival at the two installations during 2003-2006 was much higher than that recorded in BCR 14 during 1992-2003 (Table 9): eleven of twelve species had higher survival at the installations by amounts ranging from +0.2% (Black-capped Chickadee) to +45.3% (Common Yellowthroat) for a mean of +20.8%, whereas only one species, Hermit Thrush, had lower survival at the installations than in BCR 14, by a difference of only -1.0%. Although some of these differences may relate to the different time frames for data analysis, these results indicate excellent survival for target species breeding at Brunswick and Redington.

Productivity and Survival as a Function of Body Mass
It has previously been shown that both productivity and survival of birds vary with body mass: on average, the larger the bird the lower the productivity and the higher the survival. Thus, in order to assess whether or not productivity or survival in a given species is higher or lower than expected, body mass needs to be accounted for. Figure 3 shows mean productivity indices and time-constant annual adult survival rate estimates recorded at Brunswick and Redington as a function of mean body mass (log transformed) for 12 target species for which survival estimates were obtained (two species, Traill's Flycatcher and Veery are not included for productivity because it could not be calculated for these species; Fig. 2). The purpose of this analysis was to determine which species at Brunswick and Redington showed higher or lower productivity or survival than might be expected given their body mass. Two regression lines are presented on each graph, one (solid) for the 12 (survival) or 10 (productivity) target species using data from Brunswick and Redington, and one (dashed) using data from 210 (productivity) and 89 (survival) species for which these parameters could be estimated from MAPS data collected from stations distributed across the entire North American continent. For productivity (Fig. 3**A**), the regression line based on data from the 10 species at Brunswick and Redington is well below that based on data from North America as a whole, whereas the opposite was the case for survival (Fig. 3**B**), indicating poor productivity but good survival at the installations compared with values from North America as a whole.

Three of the species shown in Figure 3 (species alpha codes in bold uppercase letters) showed population declines (Fig. 1). Two of these species, Black-capped Chickadee (**BCCH**) and

Magnolia Warbler (**MAWA**) showed lower-than expected productivity but higher-than-expected survival, indicating that low productivity at Brunswick and Redington may be the cause of the declines. The third species, Hermit Thrush (**HETH**) showed close-to-expected productivity and adult survival-rate values, perhaps indicating that another factor, such as low first-year survival or recruitment may be causing the decline.

Three species shown in Figure 3 (in regular-font uppercase letters) showed substantial increases ($r > 0.85$; Fig. 1). Two of these species, Swainson's Thrush (SWTH) and Ovenbird (OVEN) showed close-to-expected productivity but higher-than-expected survival, indicating that good survival may be contributing to the increases. The third species, Traill's Flycatcher (TRFL) also showed higher than expected survival (no productivity values were available) suggesting as well that this was the cause for the observed population increase.

The remaining six species shown in Figure 3 (in lower-case letters) showed positive population trends that were not as substantial as those noted above ($r < 0.85$) and thus showed intermediate trends among the 12 species sampled. Three of these species, Red-eyed Vireo (revi), Blackpoll Warbler (blpw), and Common Yellowthroat (coye) showed much lower-than-expected productivity but higher-than expected survival. Two species, American Redstart (amre) and Veery (veer) also showed higher than expected survival but also showed higher-than-expected (amre) or undefined (veer) productivity values. Only one species, White-throated Sparrow, showed lower-than-expected survival (along with expected or slightly higher-than-expected) productivity, indicating that the lower survival may be counterbalancing the higher productivity to produce a non-substantial positive trend (Fig. 1).

Thus, in summary, low productivity is implicated as causes for declines in two of the three declining species and is potentially preventing increases in three other species, whereas low survival appears to be a problem only for one species, White-throated Sparrow (even though survival for this species is 10.7% higher than that calculated for BCR 14). These results reinforce those presented above, indicating that productivity is much lower and survival much higher at Brunswick and Redington than is indicated for the region and the continent.

DISCUSSION

Despite the fact that the Brunswick and Redington MAPS stations have been run for only four years, important and interesting data have been gathered on breeding populations and productivity for many summer resident landbird species on the installations. Notably, the species composition at these stations shows a strong boreal-forest component that is not sampled adequately by MAPS locations elsewhere. Among MAPS stations operated by the Institute for Bird Populations, for example, six target species at Brunswick and Redington (Yellow-bellied Flycatcher, Magnolia, Black-throated Blue, Black-throated Green, and Canada warblers, and White-throated Sparrow) have not been captured in sufficient numbers to be monitored effectively at any other location. This underscores the importance of the Brunswick and Redington stations to understanding the population dynamics of this important group of landbirds.

Data from all six MAPS stations at Brunswick and Redington have been pooled to provide indices of breeding population size and productivity, and we have been able to examine four-year trends in breeding population sizes and productivity for 28 target species and all species pooled.
We have also been able to generate adult survival estimates for 12 species, which was not possible after only three years of data had been collected. In previous reports (e.g., Pyle et al. 2006), we were also able to compare population size and productivity estimates between two habitat types, and between three soil-saturation categories at Brunswick and Redington.

As more years of data accumulate we will be able to make better assessments of population trends as well as inferences about the effects of weather on productivity and the effect of changes in productivity on population size. The precision of our survival estimates will improve substantially as more data is collected, up to and even beyond 12 years of data collection (Rosenberg 1996). Pooling data at this level will further allow comparison between Brunswick/Redington and other military installations, parks, other protected areas along the Atlantic seaboard that participate in the MAPS program, as well as comparisons between these landholdings and unprotected areas along the Atlantic coast. Finally, MAPS data from Brunswick and Redington can be pooled with other MAPS data to provide large-scale regional (or even continental) indices and estimates of (and longer-term trends in) these key demographic parameters, as we have provided in this report regarding productivity in the Northeastern MAPS region and adult survival in Bird Conservation Region 14.

An immediate concern from the first four years (2003-2006) of MAPS at Brunswick and Redington is that productivity on the installations appears to be very low in comparison to the Northeastern Region and to North America as a whole. In return, it appears that high survival is counterbalancing this low productivity, resulting in stable or increasing four-year population trends for most species. While on the surface this may appear to be a favorable situation, it is opposite to results from other MAPS stations across the continent, generally indicating that low survival, particularly for Neotropical migrants, is the primary factor driving population declines.

Thus, should survival of the populations at Brunswick and Reddington decline, we will likely be facing some severe population declines on the installations. Low productivity combined with increasing populations may also indicate that Brunswick and Redington are harboring "sink populations", that are being supported primarily by higher productivity from surrounding regions. One of the goals of MAPS is to identify such populations such that management actions can be taken to increase productivity. With five years of data we may be able to detect inter-annual patterns in adult survival, which may indicate whether or not survival is stable at Brunswick and Redington or not.

Once additional years of data have been gathered, we will also be able to explore the underlying causes of these patterns and many others concerning landbird dynamics at these two installations, to combine these results with those of constant-effort, year-to-year comparisons, long-term trends in populations and productivity, and mark-recapture analyses of survival, capture probability, and proportion of residents as well. Once causal factors for population declines or low productivity have been identified, we will be prepared to make management recommendations to increase productivity and/or survival of landbirds at Brunswick and Redington and to assess the results of management actions.

The long-term goal for the Brunswick/Redington MAPS program is to continue to monitor the primary demographic parameters of landbirds on these installations, in order to provide critical information that can be used to aid our understanding of the ecological processes leading from environmental stressors to population responses. This is to be accomplished by including data from the Brunswick/Redington MAPS program in analyses of data from other Atlantic slope MAPS stations to: (1) determine spatial patterns in productivity indices and survival rate estimates as a function of spatial patterns in populations trends for target species (DeSante 2000, DeSante et al. 1999, 2001); (2) determine the proximate demographic factor(s) (i.e., productivity or survivorship) causing observed population trends in the target species (DeSante et al. 2001); (3) link MAPS data with landscape-level habitat data and spatially explicit weather data in a geographical information system (GIS) (Nott 2002); (4) identify relationships between landscape-level habitat and/or weather characteristics and the primary demographic responses (productivity and survival rates) of the target species (Nott 2002, Nott et al. 2002, Nott et al 2003a, Nott and Michel 2005); (5) generate hypotheses regarding the ultimate environmental causes of the population trends; and (6) make comprehensive recommendations for habitat and use-related management strategies both on the installations and elsewhere (Nott 2000, Nott et al. 2003a). We conclude that the MAPS protocol is very well-suited to achieving these long-term ecological goals and recommend continuing the MAPS program at Brunswick and Redington well into the future.

ACKNOWLEDGMENTS

All data collected for the MAPS Program at Naval Air Station Brunswick and Redington Training Facility in 2006 were gathered by Angela Burns and Andrew Thornton (field biologist interns of The Institute for Bird Populations). We thank these interns for their excellent work in operating the Brunswick/Redington MAPS stations. We thank Amy Finfera and Ron Taylor for

providing indispensable training for the interns, and Chris Swarth and Danny Bystrak of Jug Bay Wetlands Sanctuary for facilitating this training. We also thank David Ladd for assistance re-establishing the stations and the on-duty personnel of SERE exercises for logistical help. We especially thank Natural Resource Managers Kari Moore and Greg Apraham for invaluable assistance in selecting and setting up the stations, Ted Herald and Bonnie Smith for assistance with logistics and equipment, and Redington Captain Charlton Evans and Chief of SERE Operations Merle Wagg for assistance in working in conjunction with SERE exercises. Financial support for the MAPS Program and housing for the field biologist interns, for which we are very grateful, were provided by Naval Air Station Brunswick and Redington through a Cooperative Agreement between NAVFACENGCOM, Atlantic Division, and The Institute for Bird Populations. We especially thank Jack Markham for facilitating this agreement and for his enthusiastic support of this work. This is Contribution Number 316 of IBP.

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Table 1. Summary of the 2006 MAPS program on Naval Air Station Brunswick and Redington Training Facility.

Station					Avg Elev. (m)	2006 operation		
Name	Code	No.	Major Habitat Type	Latitude-longitude		Total number of net-hours[1]	No. of periods	Inclusive dates
Naval Air Station Brunswick								
Golf Course	GOCO	15654	Mixed balsam fir and maple forest with boggy areas, golf course	43°52'15"N,-69°56'30"W	13	380.0 (364.5)	7	6/06 - 7/30
Chimney Rock	CHRO	15655	Northern red oak and maple forest, shrubs and small firs along seasonal streams	43°52'30"N,-69°55'05"W	18	419.5 (418.8)	7	6/07 - 8/05
Redington Training Facility								
Potato Nubble	PONU	15657	Mixed forest of maple/birch deciduous and fir/spruce coniferous components	44°59'30"N,-70°30'30"W	488	371.0 (333.7)	7	6/04 - 8/01
Redington Pond	REPO	15656	Primarily birch/maple forest with scattered balsam fir, pond, alder thicket	44°58'58"N,-70°24'59"W	507	388.0 (354.8)	7	6/02 - 8/02
Blueline Trail	BLUE	15658	Boggy balsam fir and Eastern hemlock forest, alder thicket	44°59'25"N,-70°26'20"W	515	409.3 (374.7)	7	6/01 - 8/04
Highland	HGHL	15659	Stunted red spruce and balsam fir forest, beaver ponds, very boggy areas	45°00'35"N,-70°27'15"W	724	406.3 (384.0)	7	6/05 - 7/31
ALL STATIONS COMBINED						2374.2(2230.5)	7	6/01 - 8/05

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

Table 2. Capture summary for the six individual MAPS stations operated on Naval Air Station Brunswick and Redington Training Facility in 2006. N = Newly Banded, U = Unbanded, R = Recaptures of banded birds.

	Golf Course			Chimney Rock			Potato Nubble			Redington Pond			Blueline Trail			Highland		
Species	N	U	R	N	U	R	N	U	R	N	U	R	N	U	R	N	U	R
Ruby-throated Hummingbird											1							
Downy Woodpecker	1						1			1			1		1			
Hairy Woodpecker				1			1						2					
Pileated Woodpecker		1																
Yellow-bellied Flycatcher										1			4		1	3		3
Traill's Flycatcher										3		2	6		1			
Least Flycatcher										8	1	2	6					
Unidentified Empid. Flyc.														2				
Blue-headed Vireo	1			1						2			1					
Philadelphia Vireo										4								
Red-eyed Vireo				6		3	3			8		1	1					
Blue Jay				1						1								
Black-capped Chickadee	5		3	4		1				3		1	3			2		
Boreal Chickadee																2		
Red-breasted Nuthatch							1						1					
Brown Creeper	3			2			3			2								
Golden-crowned Kinglet													3			4		
Veery	3		3	2		4							2					
Swainson's Thrush							7		5	15		13	8		6	25	1	10
Hermit Thrush	4		3	4		4	2		1	2			5		1			
Unidentified Thrush								1										
American Robin				3						4		1	4	1				
Cedar Waxwing										3			5					
Tennessee Warbler													5		2			
Nashville Warbler	1						3		3	1	1		4			10		3
Northern Parula													1					
Chestnut-sided Warbler										4		1	4					
Magnolia Warbler							12		14	3		7	3	1	3	7		2

Table 2. (cont.) Capture summary for the six individual MAPS stations operated on Naval Air Station Brunswick and Redington Training Facility in 2006. N = Newly Banded, U = Unbanded, R = Recaptures of banded birds.

	Golf Course			Chimney Rock			Potato Nubble			Redington Pond			Blueline Trail			Highland		
Species	N	U	R	N	U	R	N	U	R	N	U	R	N	U	R	N	U	R
Black-throated Blue Warbler							17		10	16		5	3			1		
Yellow-rumped Warbler				1			7		1	2		1	2			4		4
Black-throated Green Warb.	3			6		2	2		1	5			5	1				
Blackburnian Warbler	1									3			2					
Bay-breasted Warbler																5		4
Blackpoll Warbler													1			6		5
Black-and-white Warbler	3			2									1					
American Redstart							3		1	18	2	11	2					
Ovenbird	5		2	10	1	12	13		8	4		1						
Northern Waterthrush				1									4		1			
Common Yellowthroat	5		4	1		2	1			2		1	5		5			
Canada Warbler							2			4		1						
Scarlet Tanager						1												
Song Sparrow										1								
Swamp Sparrow										1			3	1	1			
White-throated Sparrow	1			1			7		3	5	1	5	13		16	5		3
Dark-eyed Junco							2			2		1				3		1
Northern Cardinal	1																	
Rose-breasted Grosbeak																1		
Purple Finch				1						2		1				1		
American Goldfinch	1			2														
Unidentified Bird		1																
ALL SPECIES POOLED	38	2	15	49	1	29	87	1	47	130	6	55	110	6	38	79	1	35
Total Number of Captures		55			79			135			191			154			115	
Number of Species	15	1	5	18	1	8	18	0	10	30	5	17	31	4	11	15	1	9
Total Number of Species		16			19			18			31			31			15	

Table 3. Numbers of adult and young individual birds captured per 600 net-hours and reproductive index (young/adult) at the six individual MAPS stations operated on Naval Air Station Brunswick and Redington Training Facility in 2006.

	Golf Course			Chimney Rock			Potato Nubble			Redington Pond			Blueline Trail			Highland		
Species	Ad.	Yg.	Repr. index	Ad.	Yg.	Repr. index	Ad.	Yg.	Repr. index	Ad.	Yg.	Repr. index	Ad.	Yg.	Repr. index	Ad.	Yg.	Repr. index
Downy Woodpecker	1.6	0.0	0.00				1.6	0.0	0.00	1.5	0.0	0.00	1.5	0.0	0.00			
Hairy Woodpecker				1.4	0.0	0.00	1.6	0.0	0.00				2.9	0.0	0.00			
Yellow-bellied Flycatcher										1.5	0.0	0.00	4.4	1.5	0.33	4.4	0.0	0.00
Traill's Flycatcher										6.2	0.0	0.00	10.3	0.0	0.00			
Least Flycatcher										6.2	7.7	1.25	0.0	8.8	und.[1]			
Blue-headed Vireo	1.6	0.0	0.00	1.4	0.0	0.00				3.1	0.0	0.00	0.0	1.5	und.			
Philadelphia Vireo										4.6	1.5	0.33						
Red-eyed Vireo				11.4	0.0	0.00	4.9	0.0	0.00	10.8	1.5	0.14	1.5	0.0	0.00			
Blue Jay				1.4	0.0	0.00				1.5	0.0	0.00						
Black-capped Chickadee	4.7	3.2	0.67	5.7	0.0	0.00				4.6	1.5	0.33	0.0	4.4	und.	0.0	3.0	und.[1]
Boreal Chickadee																3.0	0.0	0.00
Red-breasted Nuthatch							1.6	0.0	0.00				1.5	0.0	0.00			
Brown Creeper	4.7	0.0	0.00	0.0	2.9	und.[1]	1.6	3.2	2.00	1.5	0.0	0.00						
Golden-crowned Kinglet													2.9	1.5	0.50	0.0	5.9	und.
Veery	7.9	0.0	0.00	4.3	0.0	0.00							2.9	0.0	0.00			
Swainson's Thrush							9.7	6.5	0.67	24.7	7.7	0.31	14.7	1.5	0.10	20.7	17.7	0.86
Hermit Thrush	7.9	0.0	0.00	7.2	1.4	0.20	1.6	1.6	1.00	0.0	3.1	und.[1]	4.4	2.9	0.67			
American Robin				2.9	1.4	0.50				4.6	1.5	0.33	4.4	1.5	0.33			
Cedar Waxwing										4.6	0.0	0.00	7.3	0.0	0.00			
Tennessee Warbler													7.3	0.0	0.00			
Nashville Warbler	1.6	0.0	0.00				3.2	1.6	0.50	0.0	1.5	und.	4.4	1.5	0.33	11.8	3.0	0.25
Northern Parula													0.0	1.5	und.			
Chestnut-sided Warbler										3.1	3.1	1.00	0.0	5.9	und.			
Magnolia Warbler							16.2	4.9	0.30	7.7	1.5	0.20	4.4	2.9	0.67	3.0	8.9	3.00
Black-throated Blue Warbler							8.1	22.6	2.80	12.4	12.4	1.00	1.5	2.9	2.00	0.0	1.5	und.
Yellow-rumped Warbler				1.4	0.0	0.00	8.1	3.2	0.40	1.5	1.5	1.00	0.0	2.9	und.	5.9	1.5	0.25

Table 3. (cont.) Numbers of adult and young individual birds captured per 600 net-hours and reproductive index (young/adult) at the six individual MAPS stations operated on Naval Air Station Brunswick and Redington Training Facility in 2006.

	Golf Course			Chimney Rock			Potato Nubble			Redington Pond			Blueline Trail			Highland		
Species	Ad.	Yg.	Repr. index	Ad.	Yg.	Repr. index	Ad.	Yg.	Repr. index	Ad.	Yg.	Repr. index	Ad.	Yg.	Repr. index	Ad.	Yg.	Repr. index
Black-throated Green Warbler	4.7	0.0	0.00	10.0	0.0	0.00	3.2	0.0	0.00	6.2	1.5	0.25	1.5	5.9	4.00			
Blackburnian Warbler	1.6	0.0	0.00							1.5	3.1	2.00	1.5	1.5	1.00			
Bay-breasted Warbler																5.9	1.5	0.25
Blackpoll Warbler													0.0	1.5	und.	8.9	1.5	0.17
Black-and-white Warbler	4.7	0.0	0.00	2.9	0.0	0.00							0.0	1.5	und.			
American Redstart							4.9	0.0	0.00	17.0	17.0	1.00	0.0	2.9	und.			
Ovenbird	11.1	0.0	0.00	14.3	4.3	0.30	11.3	11.3	1.00	1.5	6.2	4.00						
Northern Waterthrush				0.0	1.4	und.							2.9	1.5	0.50			
Common Yellowthroat	12.6	0.0	0.00	2.9	0.0	0.00	0.0	1.6	und.[1]	4.6	0.0	0.00	8.8	0.0	0.00			
Canada Warbler							3.2	0.0	0.00	4.6	1.5	0.33						
Scarlet Tanager				1.4	0.0	0.00												
Song Sparrow										1.5	0.0	0.00						
Swamp Sparrow										0.0	1.5	und.	1.5	2.9	2.00			
White-throated Sparrow	1.6	0.0	0.00	1.4	0.0	0.00	9.7	1.6	0.17	7.7	1.5	0.20	19.1	4.4	0.23	5.9	1.5	0.25
Dark-eyed Junco							3.2	0.0	0.00	3.1	0.0	0.00				3.0	1.5	0.50
Northern Cardinal	1.6	0.0	0.00															
Rose-breasted Grosbeak																0.0	1.5	und.
Purple Finch				1.4	0.0	0.00				3.1	1.5	0.50				0.0	1.5	und.
American Goldfinch	1.6	0.0	0.00	2.9	0.0	0.00												
ALL SPECIES POOLED	69.5	3.2	0.05	74.4	11.4	0.15	93.8	58.2	0.62	151.5	78.9	0.52	111.4	63.0	0.57	72.4	50.2	0.69
Number of Species	15	1		17	5		17	10		27	20		22	22		10	13	
Total Number of Species		15			19			18			30			31			15	

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

Table 4. Summary of results for all six Naval Air Station Brunswick and Redington Training Facility MAPS stations combined in 2006.

Species	Birds captured			Birds/600 nethours		Reprod. Index
	Newly banded	Un-banded	Recap-tured	Adults	Young	
Ruby-throated Hummingbird		1				
Downy Woodpecker	4		1	1.0	0.0	0.00
Hairy Woodpecker	4			1.0	0.0	0.00
Pileated Woodpecker		1				
Yellow-bellied Flycatcher	8		4	1.8	0.3	0.14
Traill's Flycatcher	9		3	2.8	0.0	0.00
Least Flycatcher	14	1	2	1.0	2.8	2.75
Unidentified Empidonax Flycat.		2				
Blue-headed Vireo	5			1.0	0.3	0.25
Philadelphia Vireo	4			0.8	0.3	0.33
Red-eyed Vireo	18		4	4.8	0.3	0.05
Blue Jay	2			0.5	0.0	0.00
Black-capped Chickadee	17		5	2.5	2.0	0.80
Boreal Chickadee	2			0.5	0.0	0.00
Red-breasted Nuthatch	2			0.5	0.0	0.00
Brown Creeper	10			1.3	1.0	0.80
Golden-crowned Kinglet	7			0.5	1.3	2.50
Veery	7		7	2.5	0.0	0.00
Swainson's Thrush	55	1	34	11.6	5.6	0.48
Hermit Thrush	17		9	3.5	1.5	0.43
Unidentified Thrush		1				
American Robin	11	1	1	2.0	0.8	0.38
Cedar Waxwing	8			2.0	0.0	0.00
Tennessee Warbler	5		2	1.3	0.0	0.00
Nashville Warbler	19	1	6	3.5	1.3	0.36
Northern Parula	1			0.0	0.3	und.[1]
Chestnut-sided Warbler	8		1	0.5	1.5	3.00
Magnolia Warbler	25	1	26	5.1	3.0	0.60
Black-throated Blue Warbler	37		15	3.5	6.3	1.79
Yellow-rumped Warbler	16		6	2.8	1.5	0.54
Black-throated Green Warbler	21	1	3	4.3	1.3	0.29
Blackburnian Warbler	6			0.8	0.8	1.00
Bay-breasted Warbler	5		4	1.0	0.3	0.25

Table 4. (cont.) Summary of results for all six Naval Air Station Brunswick and Redington Training Facility MAPS stations combined in 2006.

Species	Birds captured			Birds/600 nethours		Reprod. Index
	Newly banded	Un-banded	Recap-tured	Adults	Young	
Blackpoll Warbler	7		5	1.5	0.5	0.33
Black-and-white Warbler	6			1.3	0.3	0.20
American Redstart	23	2	12	3.5	3.3	0.93
Ovenbird	32	1	23	6.3	3.5	0.56
Northern Waterthrush	5		1	0.5	0.5	1.00
Common Yellowthroat	14		12	4.8	0.3	0.05
Canada Warbler	6		1	1.3	0.3	0.20
Scarlet Tanager			1	0.3	0.0	0.00
Song Sparrow	1			0.3	0.0	0.00
Swamp Sparrow	4	1	1	0.3	0.8	3.00
White-throated Sparrow	32	1	27	7.6	1.5	0.20
Dark-eyed Junco	7		2	1.5	0.3	0.17
Northern Cardinal	1		0	0.3	0.0	0.00
Rose-breasted Grosbeak	1		0	0.0	0.3	und.
Purple Finch	4		1	0.8	0.5	0.67
American Goldfinch	3			0.8	0.0	0.00
Unidentified Bird		1				
ALL SPECIES POOLED	493	17	219	95.3	44.0	0.46
Total Number of Captures		729				
Number of Species	44	12	29	43	32	
Total Number of Species		47			45	

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

Table 5. Percentage changes between 2005 and 2006 in the numbers of individual ADULT birds captured at six constant-effort MAPS stations on Naval Air Station Brunswick and Redington Training Facility.

Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	All six stations combined: Number of adults 2005	All six stations combined: Number of adults 2006	All six stations combined: Percent change	All six stations combined: SE[2]	
Yellow-bellied Sapsucker					-100.0		1	2	0	-100.0		
Downy Woodpecker	+[3]	-100.0	+[3]	-100.0	+[3]		5	2	3	50.0	153.1	
Hairy Woodpecker		+[3]	+		100.0		3	1	4	300.0	300.0	
Yellow-bellied Flycatcher				0.0	-50.0	50.0	3	7	6	-14.3	33.7	
Traill's Flycatcher				-57.1	133.3		2	10	10	0.0	80.0	
Least Flycatcher				+[3]	-100.0		2	1	4	300.0	800.0	
Eastern Phoebe					-100.0		1	1	0	-100.0		
Blue-headed Vireo	-66.7	+	-100.0	+	-100.0		5	5	4	-20.0	64.2	
Philadelphia Vireo				100.0			1	1	2	100.0		
Red-eyed Vireo	-100.0	166.7	+	100.0	0.0		5	8	18	125.0	58.9	
Gray Jay						-100.0	1	1	0	-100.0		
Blue Jay		+		+	-100.0		3	2	2	0.0	150.0	
Black-capped Chickadee	200.0	300.0	-100.0	-40.0	-100.0	-100.0	6	18	10	-44.4	35.6	
Boreal Chickadee						0.0	1	2	2	0.0		
Tufted Titmouse		-100.0					1	2	0	-100.0		
Red-breasted Nuthatch			-50.0		0.0		2	3	2	-33.3	22.2	
Brown Creeper	+	-100.0	+	-100.0			4	2	4	100.0	244.9	
Winter Wren				-100.0			1	1	0	-100.0		
Golden-crowned Kinglet					+		1	0	1	+		
Veery	33.3	50.0			100.0		3	6	9	50.0	14.4	*
Swainson's Thrush	-100.0		50.0	7.7	350.0	-13.3	5	35	42	20.0	27.5	
Hermit Thrush	400.0	-16.7	+		200.0		4	8	14	75.0	95.1	
American Robin		100.0	-100.0	-25.0	+		4	6	8	33.3	78.6	
Gray Catbird					-100.0		1	1	0	-100.0		

Table 5. (cont.) Percentage changes between 2005 and 2006 in the numbers of individual ADULT birds captured at six constant-effort MAPS stations on Naval Air Station Brunswick and Redington Training Facility.

Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	All six stations combined: Number of adults 2005	Number of adults 2006	Percent change	SE[2]	
Cedar Waxwing				+	150.0		2	2	8	300.0	300.0	
Tennessee Warbler					150.0		1	2	5	150.0		
Nashville Warbler	-50.0		100.0		200.0	250.0	4	6	13	116.7	83.8	
Northern Parula							0	0	0			
Chestnut-sided Warbler				+			1	0	2	+[3]		
Magnolia Warbler			66.7	-42.9	-57.1	-71.4	4	27	19	-29.6	29.2	
Black-throated Blue Warb.			33.3	100.0	+		3	7	13	85.7	34.1	
Yellow-rumped Warbler		0.0	150.0	-80.0	-100.0	0.0	5	14	11	-21.4	38.8	
Black-throated Grn. Warb.	-25.0	250.0	+	300.0	0.0		5	8	17	112.5	95.4	
Blackburnian Warbler	+		-100.0	+	-50.0		4	3	3	0.0	77.0	
Bay-breasted Warbler						+[3]	1	0	4	+		
Blackpoll Warbler						-45.5	1	11	6	-45.5		
Black-and-white Warbler	50.0	+					2	2	5	150.0	200.0	
American Redstart			100.0	83.3	-100.0		3	9	13	44.4	51.1	
Ovenbird	75.0	100.0	40.0	-75.0	-100.0		5	19	25	31.6	34.7	
Northern Waterthrush				-100.0	-33.3	-100.0	3	5	2	-60.0	24.0	
Common Yellowthroat	0.0	-33.3	-100.0	50.0	50.0	-100.0	6	19	19	0.0	16.3	
Wilson's Warbler					-100.0		1	1	0	-100.0		
Canada Warbler	-100.0		+	-66.7	-100.0		4	12	5	-58.3	22.4	*
Scarlet Tanager	-100.0	+					2	1	1	0.0	200.0	
Song Sparrow				-50.0			1	2	1	-50.0		
Swamp Sparrow					-50.0		1	2	1	-50.0		
White-throated Sparrow	-50.0	+	400.0	-28.6	116.7	100.0	6	18	29	61.1	50.4	
Dark-eyed Junco			+	+		-50.0	3	4	6	50.0	150.0	

Table 5. (cont.) Percentage changes between 2005 and 2006 in the numbers of individual ADULT birds captured at six constant-effort MAPS stations on Naval Air Station Brunswick and Redington Training Facility.

Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	All six stations combined: Number of adults 2005	Number of adults 2006	Percent change	SE[2]
Northern Cardinal	+						1	0	1	+	
Rose-breasted Grosbeak							0	0	0		
Baltimore Oriole	-100.0						1	1	0	-100.0	
Purple Finch		+		0.0			2	2	3	50.0	100.0
American Goldfinch	+	+					2	0	3	+	
ALL SPECIES POOLED	19.4	85.7	57.1	3.4	15.9	-11.3	6	302	360	19.2	11.3
No. species that increased[4]	10(5)	14(8)	16(8)	14 (7)	14(4)	4(1)				26(5)	
No. species that decreased[5]	9(5)	5 (3)	6(5)	13 (4)	17(12)	8(4)				19(8)	
No. species remained same	1	1	0	2	3	2				6	
Total Number of Species	20	20	22	29	34	14				51	
Proportion of increasing (decreasing) species	0.500	0.700	0.727	0.483	0.412	(0.571)				0.510	
Sig. of increase (decrease)[6]	0.588	0.058 *	0.026 **	0.644	0.885	(0.395)				0.500	

[1] Number of stations lying within the breeding range of the species at which at least one individual adult bird of the species was captured in either year.
[2] Standard error of the percent change in the number of individual adults captured.
[3] Increase indeterminate (infinite) because no adult was captured during 2005.
[4] No. of species for which adults were captured in 2006 but not in 2005 are in parentheses.
[5] No. of species for which adults were captured in 2005 but not in 2006 are in parentheses.
[6] Statistical significance of the one-sided binomial test that the proportion of increasing (decreasing) species is not greater than 0.50.
*** $P < 0.01$; ** $0.01 < P < 0.05$; * $0.05 < P < 0.10$.

Table 6. Percentage changes between 2005 and 2006 in the numbers of individual YOUNG birds captured at six constant-effort MAPS stations on Naval Air Station Brunswick and Redington Training Facility.

Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	All six stations combined: Number of young 2005	All six stations combined: Number of young 2006	All six stations combined: Percent change	All six stations combined: SE[2]
Yellow-bellied Sapsucker							0	0	0		
Downy Woodpecker			-100.0		-100.0		2	2	0	-100.0	88.9
Hairy Woodpecker							0	0	0		
Yellow-bellied Flycatcher							0	0	0		
Traill's Flycatcher							0	0	0		
Least Flycatcher				400.0	+[3]		2	1	11	1000.0	1200.0
Eastern Phoebe							0	0	0		
Blue-headed Vireo			-100.0		+		2	1	1	0.0	200.0
Philadelphia Vireo				+[3]			1	0	1	+[3]	
Red-eyed Vireo				+			1	0	1	+	
Gray Jay						-100.0	1	1	0	-100.0	
Blue Jay							0	0	0		
Black-capped Chickadee	+[3]			+	0.0	+[3]	4	3	8	166.7	224.4
Boreal Chickadee							0	0	0		
Tufted Titmouse							0	0	0		
Red-breasted Nuthatch							0	0	0		
Brown Creeper		0.0	+[3]	-100.0			3	3	4	33.3	101.8
Winter Wren			-100.0				1	1	0	-100.0	
Golden-crowned Kinglet				-100.0	0.0	+	3	3	5	66.7	214.3
Veery							0	0	0		
Swainson's Thrush			0.0	66.7	+	120.0	4	12	21	75.0	37.4
Hermit Thrush		-50.0	-66.7	+	+		4	5	6	20.0	94.4
American Robin		+[3]		-50.0	0.0		3	3	3	0.0	57.7
Gray Catbird							0	0	0		

Table 6. (cont.) Percentage changes between 2005 and 2006 in the numbers of individual YOUNG birds captured at six constant-effort MAPS stations on Naval Air Station Brunswick and Redington Training Facility.

Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	All six stations combined: Number of young 2005	All six stations combined: Number of young 2006	All six stations combined: Percent change	All six stations combined: SE[2]
Cedar Waxwing							0	0	0		
Tennessee Warbler							0	0	0		
Nashville Warbler			+	+	+	+	4	0	5	+	
Northern Parula					+		1	0	1	+	
Chestnut-sided Warbler			-100.0	+	+		3	1	6	500.0	916.5
Magnolia Warbler			0.0	0.0	-66.7	+	4	10	12	20.0	92.0
Black-throated Blue Warb.			1300.0	+	+	0.0	4	2	25	1150.0	821.6
Yellow-rumped Warbler			100.0	+	100.0	0.0	4	3	6	100.0	54.4
Black-throated Grn. Warb.				+	+		2	0	5	+	
Blackburnian Warbler				+	+		2	0	3	+	
Bay-breasted Warbler						+	1	0	1	+	
Blackpoll Warbler					+	+	2	0	2	+	
Black-and-white Warbler					0.0		1	1	1	0.0	
American Redstart				120.0	0.0	-100.0	3	7	12	71.4	53.5
Ovenbird		50.0	+	+			3	2	13	550.0	755.0
Northern Waterthrush		+			+		2	0	2	+	
Common Yellowthroat			+	-100.0			2	1	1	0.0	200.0
Wilson's Warbler							0	0	0		
Canada Warbler				+			1	0	1	+	
Scarlet Tanager							0	0	0		
Song Sparrow						-100.0	1	1	0	-100.0	
Swamp Sparrow				+	+		2	0	3	+	
White-throated Sparrow			-66.7	-50.0	+	+	4	5	6	20.0	99.9
Dark-eyed Junco					-100.0	-50.0	2	4	1	-75.0	25.0

Table 6. (cont.) Percentage changes between 2005 and 2006 in the numbers of individual YOUNG birds captured at six constant-effort MAPS stations on Naval Air Station Brunswick and Redington Training Facility.

Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	All six stations combined: Number of young 2005	Number of young 2006	Percent change	SE[2]	
Northern Cardinal							0	0	0			
Rose-breasted Grosbeak						+	1	0	1	+		
Baltimore Oriole							0	0	0			
Purple Finch				0.0		+	2	1	2	100.0	200.0	
American Goldfinch							0	0	0			
ALL SPECIES POOLED	+	33.3	84.2	168.4	141.2	175.0	6	73	170	132.9	21.1	***
No. species that increased[4]	1(1)	3 (2)	6(4)	16 (13)	15(14)	10(9)				26(12)		
No. species that decreased[5]	0(0)	1 (0)	6(4)	5(3)	3(2)	4(3)				5(4)		
No. species remained same	0	1	2	2	5	2				4		
Total Number of Species	1	5	14	23	23	16				35		
Proportion of increasing (decreasing) species	1.000	0.333	0.429	0.696	0.652	0.625				0.743		
Sig. of increase (decrease)[6]		0.875	0.788	0.047 *	0.105	0.227				0.003 ***		

[1] Number of stations lying within the breeding range of the species at which at least one individual young bird of the species was captured in either year.
[2] Standard error of the percent change in the number of individual young captured.
[3] Increase indeterminate (infinite) because no young bird was captured during 2005.
[4] No. of species for which young birds were captured in 2006 but not in 2005 are in parentheses.
[5] No. of species for which young birds were captured in 2005 but not in 2006 are in parentheses.
[6] Statistical significance of the one-sided binomial test that the proportion of increasing (decreasing) species is not greater than 0.50.
*** $P < 0.01$; ** $0.01 < P < 0.05$; * $0.05 < P < 0.10$.

Table 7. Changes between 2005 and 2006 in the REPRODUCTIVE INDEX (young/adult) at six constant-effort MAPS stations on Naval Air Station Brunswick and Redington Training Facility.

Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	All six stations combined: Reproductive Index 2005	Reproductive Index 2006	Change	SE[2]
Yellow-bellied Sapsucker					nc.[3]		1	0.000	und.[4]	nc.[3]	
Downy Woodpecker	nc.[3]	nc.[3]	nc.[3]	nc.[3]	nc.		5	1.000	0.000	-1.000	1.118
Hairy Woodpecker		nc.	nc.		0.000		3	0.000	0.000	0.000	0.000
Yellow-bellied Flycatcher				0.000	0.000	0.000	3	0.000	0.000	0.000	0.000
Traill's Flycatcher				0.000	0.000		2	0.000	0.000	0.000	0.000
Least Flycatcher				nc.	nc.		2	1.000	2.750	1.750	3.606
Eastern Phoebe					nc.		1	0.000	und.	nc.	
Blue-headed Vireo	0.000	nc.	nc.	nc.	nc.		5	0.200	0.250	0.050	0.399
Philadelphia Vireo				0.500			1	0.000	0.500	0.500	
Red-eyed Vireo	nc.	0.000	nc.	0.167	0.000		5	0.000	0.056	0.056	0.051
Gray Jay						nc.[3]	1	1.000	und.	nc.	
Blue Jay		nc.		nc.	nc.		3	0.000	0.000	0.000	0.000
Black-capped Chickadee	0.667	0.000	nc.	0.333	nc.	nc.	6	0.167	0.800	0.633	0.575
Boreal Chickadee						0.000	1	0.000	0.000	0.000	
Tufted Titmouse		nc.					1	0.000	und.	nc.	
Red-breasted Nuthatch			0.000		0.000		2	0.000	0.000	0.000	0.000
Brown Creeper	nc.	nc.	nc.	nc.			4	1.500	1.000	-0.500	1.155
Winter Wren			nc.	nc.			2	1.000	und.	nc.	
Golden-crowned Kinglet				nc.	nc.	nc.	3	und.[4]	5.000	nc.	
Veery	0.000	0.000			0.000		3	0.000	0.000	0.000	0.000
Swainson's Thrush	nc.		-0.333	0.126	0.111	0.513	5	0.343	0.500	0.157	0.191
Hermit Thrush	0.000	-0.133	nc.	nc.	0.667		5	0.625	0.429	-0.196	0.565
American Robin		0.500	nc.	-0.167	nc.		4	0.500	0.375	-0.125	0.240
Gray Catbird					nc.		1	0.000	und.	nc.	

Table 7. (cont.) Changes between 2005 and 2006 in the REPRODUCTIVE INDEX (young/adult) at six constant-effort MAPS stations on Naval Air Station Brunswick and Redington Training Facility.

Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	All six stations combined: Reproductive Index 2005	Reproductive Index 2006	Change	SE[2]	
Cedar Waxwing				nc.	0.000		2	0.000	0.000	0.000	0.000	
Tennessee Warbler					0.000		1	0.000	0.000	0.000		
Nashville Warbler	0.000		0.500	nc.	0.333	0.286	5	0.000	0.385	0.385	0.112	**
Northern Parula					nc.		1	und.	und.	nc.		
Chestnut-sided Warbler			nc.	nc.	nc.		3	und.	3.000	nc.		
Magnolia Warbler			-0.200	0.107	-0.190	3.000	4	0.370	0.632	0.261	0.414	
Black-throated Blue Warb.			3.167	1.000	nc.	nc.	4	0.286	1.923	1.637	0.903	
Yellow-rumped Warbler		0.000	-0.100	1.000	nc.	0.000	5	0.214	0.546	0.331	0.280	
Black-throated Grn. Warb.	0.000	0.000	nc.	0.250	4.000		5	0.000	0.294	0.294	0.288	
Blackburnian Warbler	nc.		nc.	nc.	1.000		4	0.000	1.000	1.000	0.544	
Bay-breasted Warbler						nc.	1	und.	0.250	nc.		
Blackpoll Warbler					nc.	0.167	2	0.000	0.333	0.333	0.333	
Black-and-white Warbler	0.000	nc.			nc.		3	0.500	0.200	-0.300	0.917	
American Redstart			0.000	0.167	nc.	nc.	4	0.778	0.923	0.145	0.272	
Ovenbird	0.000	-0.100	0.857	4.000	nc.		5	0.105	0.520	0.415	0.285	
Northern Waterthrush		nc.		nc.	0.500	nc.	4	0.000	1.000	1.000	0.816	
Common Yellowthroat	0.000	0.000	nc.	-0.500	0.000	nc.	6	0.053	0.053	0.000	0.089	
Wilson's Warbler					nc.		1	0.000	und.	nc.		
Canada Warbler	nc.		nc.	0.333	nc.		4	0.000	0.200	0.200	0.131	
Scarlet Tanager	nc.	nc.					2	0.000	0.000	0.000	0.000	
Song Sparrow				0.000		nc.	2	0.500	0.000	-0.500	1.000	
Swamp Sparrow				nc.	2.000		2	0.000	3.000	3.000	2.000	
White-throated Sparrow	0.000	nc.	-2.800	-0.086	0.231	0.250	6	0.278	0.207	-0.071	0.201	
Dark-eyed Junco			nc.	nc.	nc.	0.000	4	1.000	0.167	-0.833	0.831	

Table 7. (cont.) Changes between 2005 and 2006 in the REPRODUCTIVE INDEX (young/adult) at six constant-effort MAPS stations on Naval Air Station Brunswick and Redington Training Facility.

Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	All six stations combined: Reproductive Index 2005	Reproductive Index 2006	Change	SE[2]	
Northern Cardinal	nc.						1	und.	0.000	nc.		
Rose-breasted Grosbeak						nc.	1	und.	und.	nc.		
Baltimore Oriole	nc.						1	0.000	und.	nc.		
Purple Finch		nc.		0.000		nc.	3	0.500	0.667	0.167	0.509	
American Goldfinch	nc.	nc.					2	und.	0.000	nc.		
ALL SPECIES POOLED	0.047	-0.061	0.094	0.348	0.292	0.476	6	0.242	0.472	0.231	0.105	*
No. species that increased	1	1	3	11	8	5				19		
No. species that decreased	0	2	4	3	1	0				8		
No. species remained same	9	6	2	4	9	4				11		
Total Number of Species[5]	10	9	9	18	18	9				38		
Proportion of increasing (decreasing) species	0.100	(0.222)	0.333	0.611	0.444	0.556				0.500		
Sig. of increase (decrease)[6]	0.999	(0.980)	0.910	0.240	0.760	0.500				0.564		

[1] Number of stations lying within the breeding range of the species at which at least one individual aged bird of the species was captured in either year.
[2] Standard error of the change in the reproductive index.
[3] The change in reproductive index is undefined/non-calculable at this station because no adult individual of the species was captured in one of the two years.
[4] Reproductive index not given because no adult individual of the species was captured in the year shown.
[5] Species for which the change in the reproductive index is undefined are not included.
[6] Statistical significance of the one-sided binomial test that the proportion of increasing (decreasing) species is not greater than 0.50.
*** $P < 0.01$; ** $0.01 \leq P < 0.05$; * $0.05 \leq P < 0.10$

Table 8. Mean numbers of aged individual birds captured per 600 net-hours and reproductive index at the six individual MAPS stations operated on Naval Air Station Brunswick and Redington Training Facility averaged over the four years, 2003-2006. Data for each species are included only from stations that lie within the breeding range of the species.

	Golf Course			Chimney Rock			Potato Nubble			Redington Pond			Blueline Trail			Highland			All stations pooled		
Species	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]
Yellow-bellied Sapsucker							0.4	0.0	0.00				1.5	0.0	0.00				0.3	0.0	0.00
Downy Woodpecker	0.4	0.0	0.00	0.4	0.0	0.00	0.4	0.8	0.00	1.2	0.0	0.00	1.6	0.8	0.17				0.6	0.3	0.50
Hairy Woodpecker	1.2	0.4	0.50	0.4	0.0	0.00	0.4	0.4	0.00				2.3	0.0	0.00				0.7	0.1	0.25
Eastern Wood-Pewee				0.4	0.0	0.00													0.1	0.0	0.00
Yellow-bellied Flycatcher										0.8	0.0	0.00	6.7	0.4	0.08	3.4	0.0	0.00	1.8	0.1	0.04
Traill's Flycatcher										7.8	0.0	0.00	5.7	0.0	0.00	0.4	0.0	0.00	2.3	0.0	0.00
Least Flycatcher										2.3	3.1	1.08	1.1	2.7	0.00	0.4	0.0	0.00	0.6	1.0	1.27
Eastern Phoebe													0.8	0.0	0.00				0.1	0.0	0.00
Blue-headed Vireo	2.7	0.0	0.00	0.4	0.0	0.00	0.7	0.4	0.50	1.2	0.0	0.00	0.8	0.8	0.50				1.0	0.2	0.17
Philadelphia Vireo										4.3	1.1	0.33							0.7	0.2	0.33
Red-eyed Vireo	0.7	0.0	0.00	4.7	0.0	0.00	1.6	0.0	0.00	7.4	0.4	0.04	1.6	0.0	0.00				2.7	0.1	0.01
Gray Jay																0.4	0.4	1.00	0.1	0.1	1.00
Blue Jay	1.5	0.0	0.00	0.7	0.0	0.00	0.9	0.0	0.00	0.4	0.0	0.00	0.8	0.0	0.00				0.7	0.0	0.00
Black-capped Chickadee	4.6	0.8	0.22	2.9	0.0	0.00	2.6	0.0	0.00	3.9	0.8	0.28	6.3	2.6	0.27	2.3	1.1	0.33	3.7	0.9	0.29
Boreal Chickadee																4.5	0.0	0.00	0.8	0.0	0.00
Tufted Titmouse				0.7	0.0	0.00													0.1	0.0	0.00
Red-breasted Nuthatch	0.4	0.0	0.00	0.4	0.0	0.00	1.5	0.0	0.00	0.0	0.4	und.[3]	1.5	0.0	0.00				0.6	0.1	0.25
Brown Creeper	1.6	0.0	0.00	0.4	1.4	2.00	0.4	0.8	2.00	1.6	0.4	0.33							0.6	0.4	0.77
Winter Wren							0.0	0.4	und.[3]	1.5	0.0	0.00							0.2	0.1	0.50
Golden-crowned Kinglet							0.4	0.4	0.00	0.0	0.8	und.	1.5	1.2	0.50	0.0	2.2	und.[3]	0.3	0.8	1.83
Ruby-crowned Kinglet													0.8	0.0	0.00				0.1	0.0	0.00
Veery	3.9	0.0	0.00	3.3	0.0	0.00				0.4	0.0	0.00	1.9	0.0	0.00				1.6	0.0	0.00
Swainson's Thrush	0.4	0.0	0.00	0.4	0.0	0.00	9.2	6.3	0.73	18.3	6.6	0.39	7.6	0.7	0.09	19.2	7.8	0.39	9.1	3.6	0.38
Hermit Thrush	9.9	0.0	0.00	6.2	1.1	0.13	2.2	4.9	1.20	0.0	1.6	und.	3.0	1.2	0.42				3.6	1.5	0.43
American Robin	0.9	0.0	0.00	1.4	0.4	0.17	2.4	0.0	0.00	3.9	1.2	0.21	1.9	1.6	0.78				1.7	0.5	0.27
Gray Catbird	0.0	0.4	und.[3]							0.4	0.0	0.00	0.4	0.0	0.00				0.1	0.1	0.00
Cedar Waxwing	0.4	0.0	0.00							3.6	0.0	0.00	3.4	0.0	0.00				1.2	0.0	0.00

Table 8. (cont.) Mean numbers of aged individual birds captured per 600 net-hours and reproductive index at the six individual MAPS stations operated on Naval Air Station Brunswick and Redington Training Facility averaged over the four years, 2003-2006. Data for each species are included only from stations that lie within the breeding range of the species.

	Golf Course			Chimney Rock			Potato Nubble			Redington Pond			Blueline Trail			Highland			All stations pooled		
Species	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]
Tennessee Warbler										0.4	0.0	0.00	2.6	0.0	0.00				0.5	0.0	0.00
Nashville Warbler	3.8	0.4	0.06				1.9	0.4	0.17	0.7	2.3	2.00	5.5	2.0	0.27	8.6	1.1	0.09	3.5	1.0	0.27
Northern Parula													0.8	0.8	0.50				0.1	0.1	0.50
Chestnut-sided Warbler	0.4	0.0	0.00				0.0	0.4	und.	1.2	0.8	0.50	0.0	1.5	und.[3]				0.3	0.4	1.50
Magnolia Warbler							8.5	3.1	0.29	10.1	2.3	0.20	5.0	4.2	1.01	11.7	2.2	0.75	5.8	1.9	0.33
Black-thrtd. Blue Warb.							7.0	8.3	1.08	9.2	5.8	0.56	0.7	2.3	2.50	0.8	0.8	0.00	2.9	2.8	0.86
Yellow-rumped Warbler				0.7	0.0	0.00	2.8	1.2	0.45	3.9	1.1	0.50	3.1	1.5	0.25	4.1	0.8	0.13	2.4	0.8	0.28
Black-thrtd. Green Warb.	4.9	0.0	0.00	6.6	0.0	0.00	2.0	0.0	0.00	2.3	0.4	0.08	1.1	3.4	2.33	0.8	0.0	0.00	3.0	0.6	0.22
Blackburnian Warbler	0.4	0.0	0.00				0.7	0.0	0.00	0.4	1.5	2.00	3.8	3.1	1.17				0.9	0.8	1.21
Bay-breasted Warbler													0.4	0.0	0.00	2.2	0.4	0.13	0.5	0.1	0.13
Blackpoll Warbler													0.0	0.7	und.	12.1	0.4	0.04	2.0	0.2	0.11
Black-and-white Warbler	3.1	0.0	0.00	0.7	0.0	0.00							0.0	0.8	und.				0.6	0.1	0.18
American Redstart							1.6	0.0	0.00	12.5	6.2	0.46	1.5	1.5	0.50	0.0	0.4	und.	2.5	1.3	0.45
Ovenbird	7.0	0.0	0.00	8.8	1.8	0.18	7.8	4.3	0.45	4.6	2.3	1.10	1.2	0.4	0.00	0.4	0.0	0.00	5.0	1.4	0.25
Northern Waterthrush	0.4	0.0	0.00	0.4	0.4	0.00	0.4	0.4	1.00	0.8	0.0	0.00	3.9	0.8	0.21	1.1	0.0	0.00	1.2	0.3	0.32
Mourning Warbler										0.4	0.4	1.00							0.1	0.1	1.00
Common Yellowthroat	10.1	0.4	0.05	4.8	0.0	0.00	1.7	0.4	0.00	3.8	1.1	0.28	6.5	0.7	0.13	1.1	0.0	0.00	4.7	0.4	0.10
Wilson's Warbler													0.4	0.0	0.00				0.1	0.0	0.00
Canada Warbler	1.2	0.0	0.00	0.8	0.0	0.00	1.6	0.0	0.00	7.4	0.8	0.11	0.8	0.8	0.50	0.4	0.4	1.00	2.0	0.3	0.19
Scarlet Tanager	0.4	0.0	0.00	1.1	0.0	0.00													0.3	0.0	0.00
Chipping Sparrow	0.4	0.0	0.00																0.1	0.0	0.00
Song Sparrow	0.4	0.0	0.00							1.6	0.0	0.00	0.4	0.0	0.00	0.0	0.4	und.	0.4	0.1	0.08
Lincoln's Sparrow	0.4	0.0	0.00																0.1	0.0	0.00
Swamp Sparrow										0.0	0.8	und.	1.9	1.5	1.00				0.3	0.4	1.33
White-throated Sparrow	2.4	0.0	0.00	0.4	0.0	0.00	5.0	2.6	0.76	8.2	4.6	0.60	15.7	2.7	0.17	6.8	3.8	0.45	6.4	2.3	0.37
Dark-eyed Junco							1.2	1.2	0.50	2.3	0.0	0.00	0.0	0.8	und.	3.4	1.5	0.38	1.1	0.6	0.55
Northern Cardinal	0.4	0.0	0.00	0.4	0.0	0.00													0.1	0.0	0.00

Table 8. (cont.) Mean numbers of aged individual birds captured per 600 net-hours and reproductive index at the six individual MAPS stations operated on Naval Air Station Brunswick and Redington Training Facility averaged over the four years, 2003-2006. Data for each species are included only from stations that lie within the breeding range of the species.

	Golf Course			Chimney Rock			Potato Nubble			Redington Pond			Blueline Trail			Highland			All stations pooled		
Species	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]	Ad.	Yg.	Repr. Ind.[1]
Rose-breasted Grosbeak																0.0	0.4	und.	0.0	0.1	und.[3]
Common Grackle				0.4	0.0	0.00													0.1	0.0	0.00
Baltimore Oriole	0.4	0.0	0.00																0.1	0.0	0.00
Purple Finch				0.4	0.0	0.00				3.5	1.2	0.38				0.0	0.4	und.	0.6	0.3	0.42
American Goldfinch	1.1	0.0	0.00	0.7	0.0	0.00													0.3	0.0	0.00
ALL SPECIES POOLED	65.7	2.4	0.04	48.7	5.0	0.09	65.2	36.7	0.55	132.3	47.9	0.36	106.6	41.4	0.38	84.0	24.3	0.31	83.4	26.1	0.31
Number of Species	30	5		27	5		26	18		34	25		38	27		20	17		58	40	
Total Number of Species		31			27			28			38			42			25			59	

[1] Years for which the reproductive index was undefined (no adult birds were captured in the year) are not included in the mean reproductive index.
[2] For numbers presented in italics, the mean number of adults or young is greater than 0.1 at one or more stations, but over the entire location the mean number is less than 05. The species is counted in the number of species over all stations pooled.
[3] The reproductive index is undefined at this station because no young individual of the species was ever captured in the same year as an adult individual of the species.

Table 9. Estimates of adult annual survival and recapture probabilities and proportion of residents among newly captured adults using both temporally variable and time-constant models for 12 species breeding at MAPS stations on Naval Air Station Brunswick and Redington Training Facility obtained from four years (2003-2006) of mark-recapture data.

Species	Num. sta2.[1]	Num. ind.[2]	Num. caps.[3]	Num. ret.[4]	Survival probability[5]	Surv. C.V.[6]	Recapture probability[7]	Proportion of residents[8]	Survival prob. Atlantic Northern Forest 1992-2003[9]
Traill's Flycatcher *	2	30	40	5	0.742 (0.348)	46.8	0.467 (0.305)	0.362 (0.266)	0.460 (0.070)
Red-eyed Vireo *	5	39	48	3	0.611 (0.386)	63.2	0.284 (0.334)	0.455 (0.498)	0.555 (0.076)
Black-capped Chickadee *	6	54	67	4	0.553 (0.321)	58.1	0.350 (0.310)	0.206 (0.190)	0.551 (0.052)
Veery *	3	20	33	4	0.616 (0.401)	65.1	0.459 (0.360)	0.734 (0.732)	0.543 (0.045)
Swainson's Thrush	4	114	193	27	0.811 (0.137)	16.9	0.463 (0.123)	0.404 (0.124)	0.608 (0.062)
Hermit Thrush	4	48	74	8	0.453 (0.166)	36.7	0.648 (0.272)	0.333 (0.218)	0.463 (0.042)
Magnolia Warbler	4	78	140	14	0.652 (0.187)	28.7	0.536 (0.194)	0.278 (0.130)	0.400 (0.046)
Blackpoll Warbler *†	1	25	45	7	0.550 (0.266)	48.4	0.425 (0.265)	1.000 (0.634)	0.338 (0.128)
American Redstart	2	27	58	9	0.894 (0.122)	13.7	0.730 (0.171)	0.092 (0.091)	0.412 (0.045)
Ovenbird *	4	66	106	8	0.673 (0.223)	33.2	0.486 (0.242)	0.196 (0.128)	0.501 (0.050)
Common Yellowthroat	5	56	88	13	0.899 (0.172)	19.1	0.532 (0.172)	0.256 (0.109)	0.446 (0.046)
White-throated Sparrow	4	79	141	14	0.389 (0.128)	32.9	0.724 (0.218)	0.582 (0.272)	0.282 (0.043)

[1] Number of stations where the species was a regular or usual breeder and at which adults of the species were captured. Stations within one km of each other were combined into a single super-station to prevent individuals whose home ranges included portions of two or more stations from being counted as multiple individuals.
[2] Number of adult individuals captured at stations where the species was a regular or usual breeder (i.e., number of capture histories).
[3] Total number of captures of adult birds of the species at stations where the species was a regular or usual breeder.
[4] Total number of returns. A return is the first recapture in a given year of a bird originally banded at the same station in a previous year.
[5] Survival probability (φ) presented as the maximum likelihood estimate (standard error of the estimate).
[6] The coefficient of variation for survival probability, CV(φ).
[7] Recapture probability (p) presented as the maximum likelihood estimate (standard error of the estimate).
[8] The proportion of residents among newly captured adults (τ) presented as the maximum likelihood estimate (standard error of the estimate).
[9] Survival probability (φ) presented as the maximum likelihood estimate (standard error of the estimate) for the Bird Conservation Region the Atlantic Northern Forest over the 12 years 1992-2003.
* The estimate for survival probability should be viewed with caution because it is based on fewer than five between-year recaptures or the estimate is very imprecise (SE(φ)$\geq$0.200 or CV(φ)$\geq$50.0%)
† The estimate for survival probability, recapture probability, or both may be biased low because the estimate for τ was 1.00.

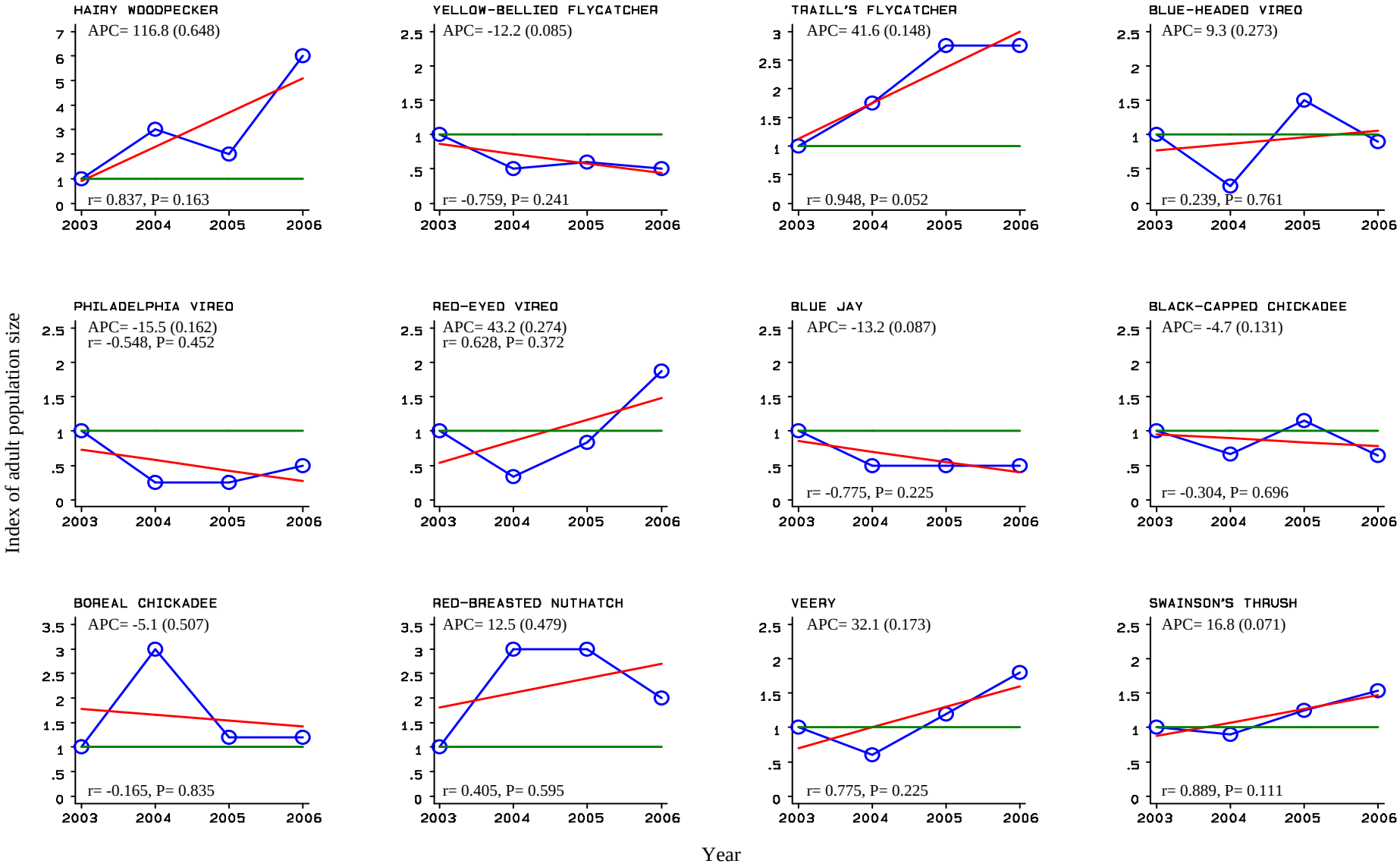


Figure 1. Population trends for 28 species and all species pooled on Naval Air Station Brunswick and Redington Training Facility over the four years 2003-2006. The index of population size was arbitrarily defined as 1.0 in 2003. Indices for subsequent years were determined from constant-effort between-year changes in the number of adult birds captured from stations where the species was a regular or usual breeder and summer resident. The annual percentage change in the index of adult population size was used as the measure of the population trend (APC), and it and the standard error of the slope (in parentheses) are presented on each graph. The correlation coefficient (r) and significance of the correlation coefficient (P) are also shown on each graph.

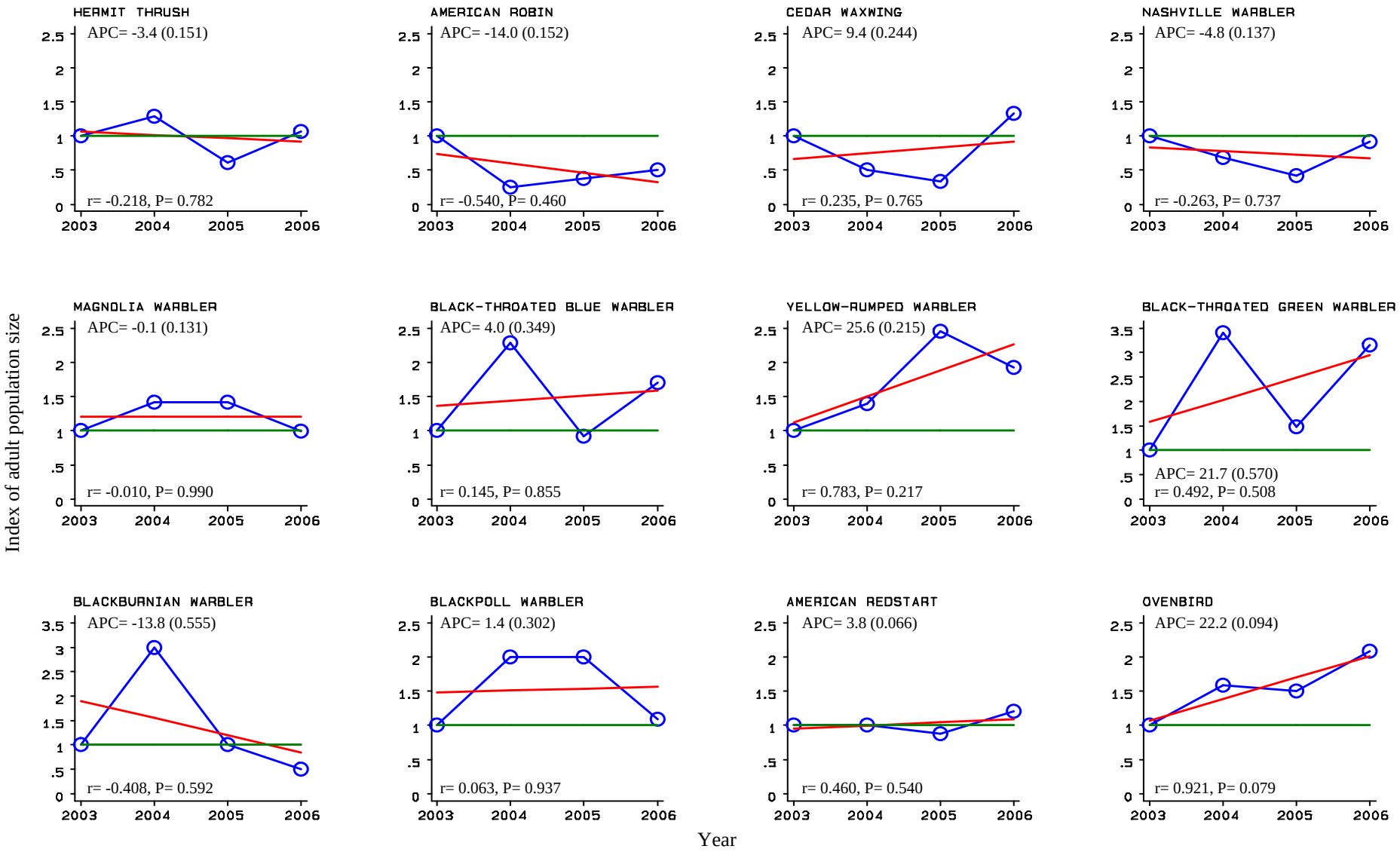


Figure 1. (cont.) Population trends for 28 species and all species pooled on Naval Air Station Brunswick and Redington Training Facility over the four years 2003-2006. The index of population size was arbitrarily defined as 1.0 in 2003. Indices for subsequent years were determined from constant-effort between-year changes in the number of adult birds captured from stations where the species was a regular or usual breeder and summer resident. The annual percentage change in the index of adult population size was used as the measure of the population trend (APC), and it and the standard error of the slope (in parentheses) are presented on each graph. The correlation coefficient (r) and significance of the correlation coefficient (P) are also shown on each graph.

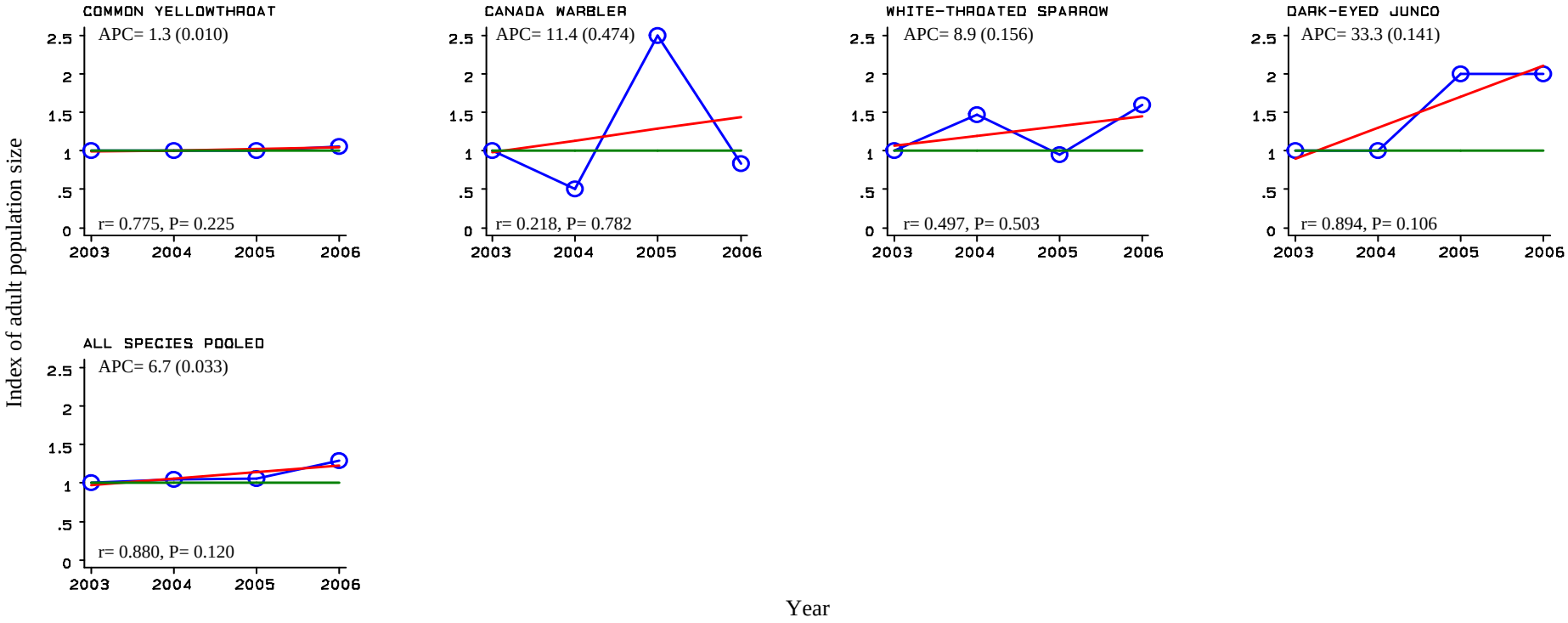


Figure 1. (cont.) Population trends for 28 species and all species pooled on Naval Air Station Brunswick and Redington Training Facility over the four years 2003-2006. The index of population size was arbitrarily defined as 1.0 in 2003. Indices for subsequent years were determined from constant-effort between-year changes in the number of adult birds captured from stations where the species was a regular or usual breeder and summer resident. The annual percentage change in the index of adult population size was used as the measure of the population trend (APC), and it and the standard error of the slope (in parentheses) are presented on each graph. The correlation coefficient (r) and significance of the correlation coefficient (P) are also shown on each graph.

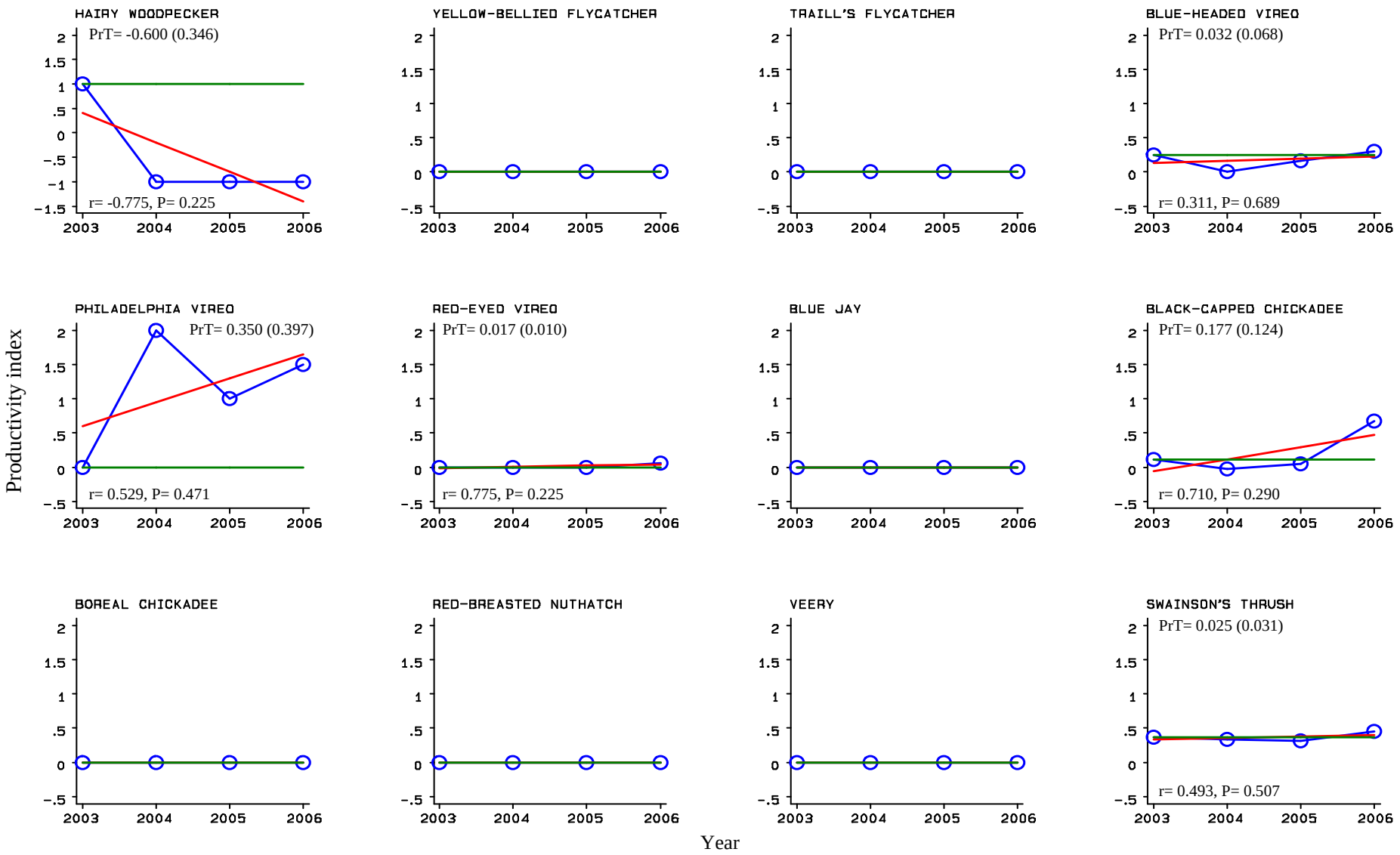


Figure 2. Trend in productivity for 28 species and all species pooled on Naval Air Station Brunswick and Redington Training Facility over the four years 2003-2006. The productivity index was defined as the actual productivity value in 2003. Indices for subsequent years were determined from constant-effort between-year changes in reproductive index from stations where the species was a regular or usual breeder and summer resident. The slope of the regression line for annual change in the index of productivity was used as the measure of the productivity trend (PrT), and it and the standard error of the slope (in parentheses) are presented on each graph. The correlation coefficient (r) and significance of the correlation coefficient (P) are also shown on each graph.

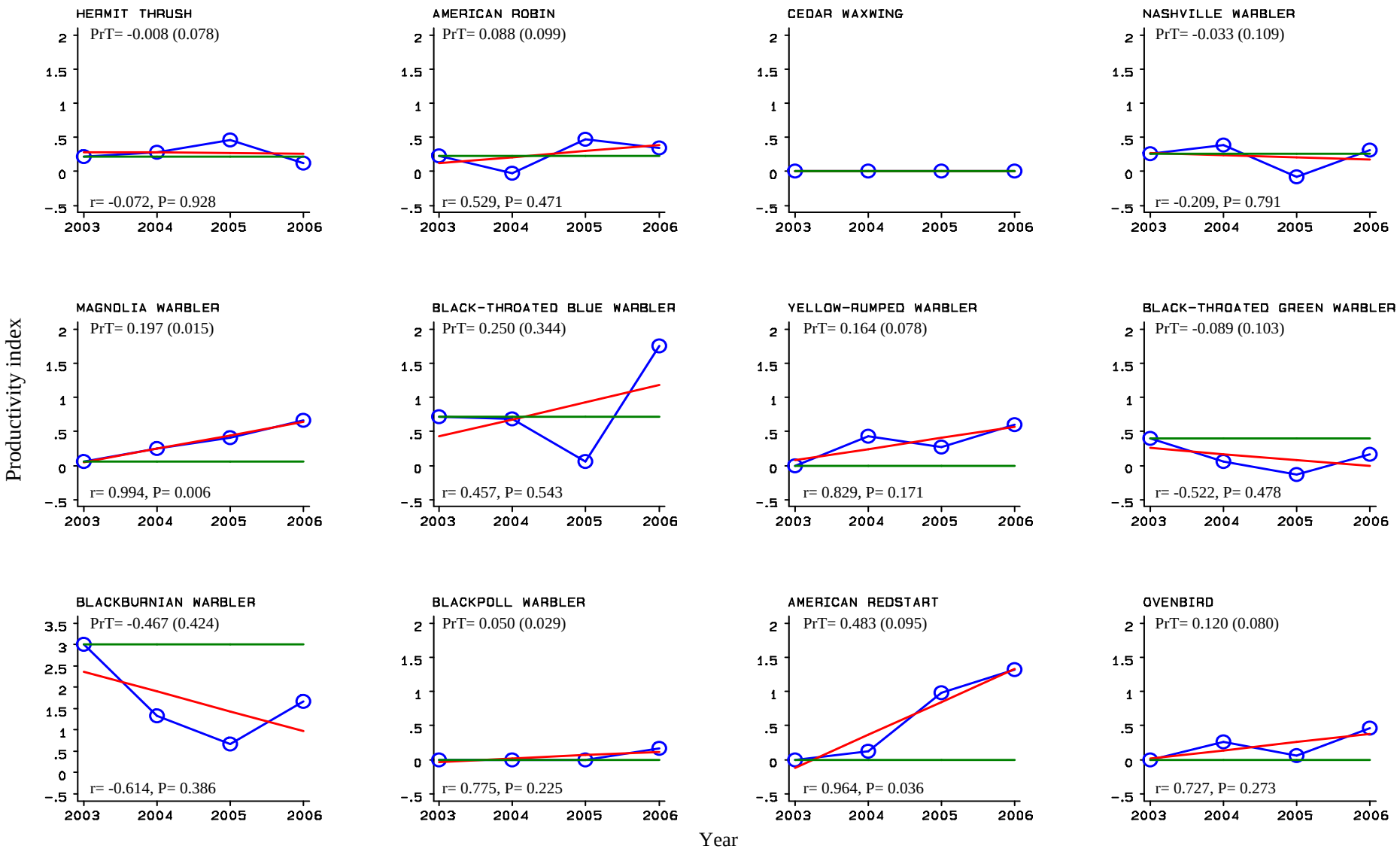
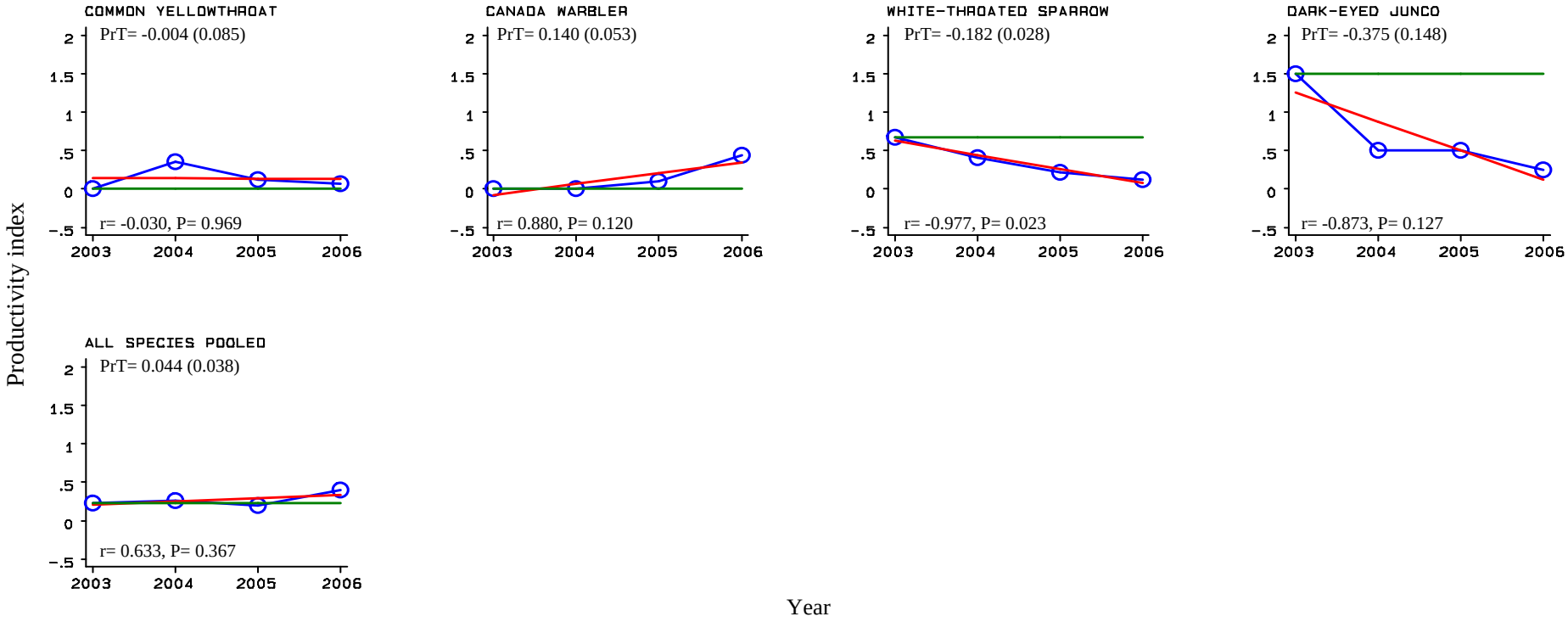


Figure 2. (cont.) Trend in productivity for 28 species and all species pooled on Naval Air Station Brunswick and Redington Training Facility over the four years 2003-2006. The productivity index was defined as the actual productivity value in 2003. Indices for subsequent years were determined from constant-effort between-year changes in reproductive index from stations where the species was a regular or usual breeder and summer resident. The slope of the regression line for annual change in the index of productivity was used as the measure of the productivity trend (PrT), and it and the standard error of the slope (in parentheses) are presented on each graph. The correlation coefficient (r) and significance of the correlation coefficient (P) are also shown on each graph.



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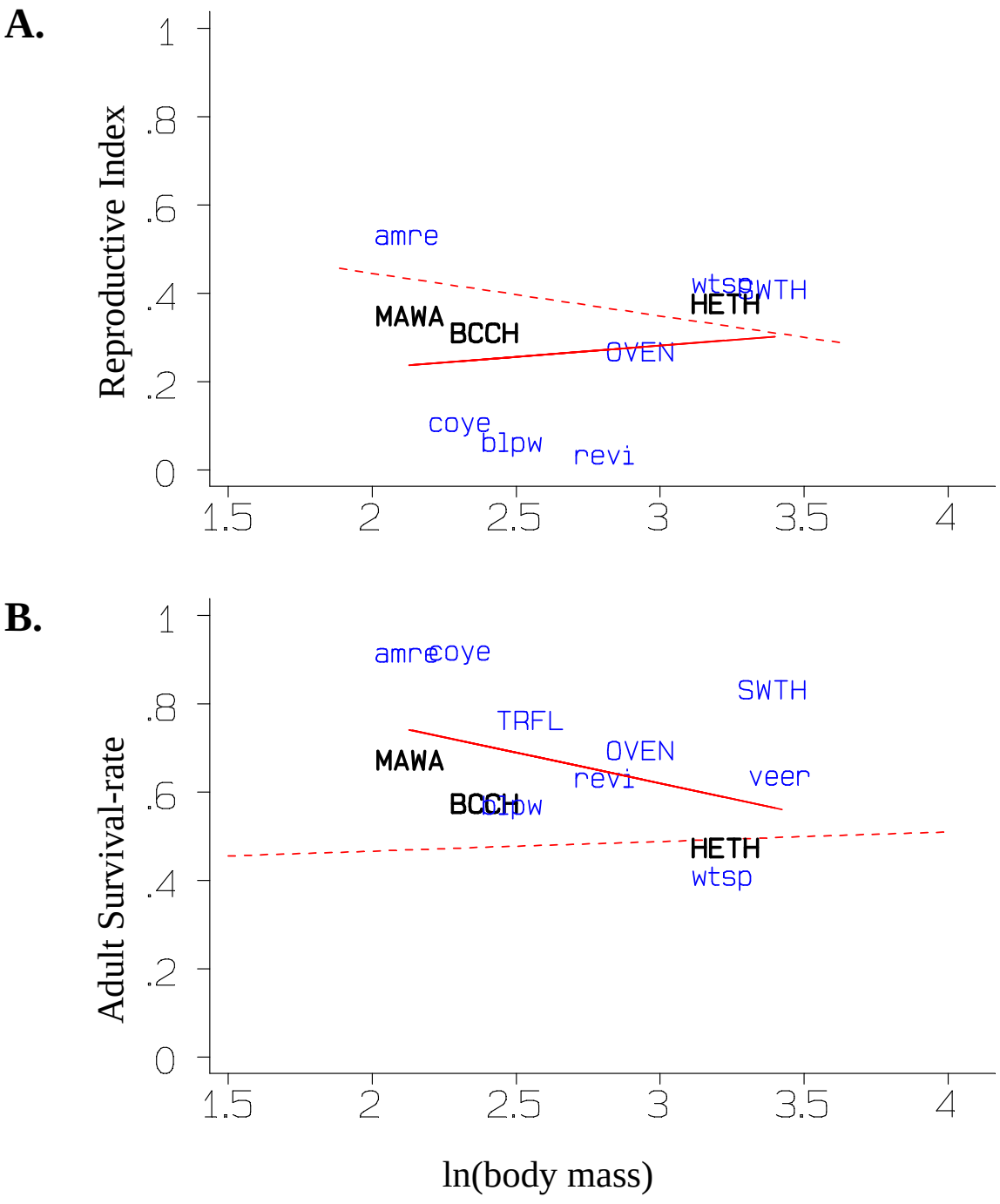

Figure 3. Regressions of mean reproductive index (**A**) and time-constant annual adult survival rate (**B**) at Naval Air Station Brunswick and Redington Training Facility on the natural log of body mass for target species for which survival estimates could be provided (12 species) and for which reproductive index was not zero in any years for the four years 2003-2006 (10 species). Four-letter codes (see Appendix I) in bold upper-case letters represent species that had decreasing population trends; those in non-bold upper-case letters had substantially increasing trends; and those in lower-case letters had highly fluctuating data without any substantial linear trend. Regression lines are presented for the target species at Naval Air Station Brunswick and Redington Training Facility (solid line) and for all species throughout all of North America (dashed line; see text). The slope, the r-value, and P-value are presented for the target species.

Appendix I. Numerical listing (in AOU checklist order) of all the species sequence numbers, species alpha codes, and species names for all species banded or encountered during the four years, 2003-2006, of the MAPS Program on the six stations operated on Naval Air Station Brunswick and Redington Training Facility.

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

NUMB	SPEC	SPECIES NAME	Golf Course (GOCO)	Chimmney Rock (CHRO)	Potato Nubble (PONU)	Redington Pond (REPO)	Blueline Trail (BLUE)	Highland (HGHL)
00100	COLO	Common Loon	T	T			T	T
00860	DCCO	Double-crested Cormorant	T					
01010	GBHE	Great Blue Heron	T	T	T	T	T	T
01300	TUVU	Turkey Vulture	T			T		
01460	CANG	Canada Goose	T			T		
01570	WODU	Wood Duck	T					
01620	ABDU	American Black Duck				T	T	B
01630	MALL	Mallard				T	T	
01680	BWTE	Blue-winged Teal					T	
01980	COME	Common Merganser			T	T	T	T
02020	OSPR	Osprey	O	O				
02130	BAEA	Bald Eagle		T				
02200	SSHA	Sharp-shinned Hawk			T	T	T	
02210	COHA	Cooper's Hawk	T		T			
02400	BWHA	Broad-winged Hawk	O	O	O	O	T	U
02460	RTHA	Red-tailed Hawk		T	T	T		
02640	MERL	Merlin				T		
02940	RUGR	Ruffed Grouse	O	O	O	U	B	
03040	WITU	Wild Turkey	T	T		T	T	T
03780	KILL	Killdeer	T					
03910	LEYE	Lesser Yellowlegs	M					
03970	SOSA	Solitary Sandpiper						M
04020	SPSA	Spotted Sandpiper				U		T
04490	AMWO	American Woodcock		O	O	T	T	
04690	RBGU	Ring-billed Gull	M					
04710	HERG	Herring Gull	O	T				
04940	COTE	Common Tern		T				
05570	MODO	Mourning Dove	U	U				
06400	BBCU	Black-billed Cuckoo	O	O		T	T	
06410	YBCU	Yellow-billed Cuckoo		O				
06950	BADO	Barred Owl	T				T	

Appendix I. Continued.

NUMB	SPEC	SPECIES NAME	GOCO	CHRO	PONU	REPO	BLUE	HGHL
08630	RTHU	Ruby-throated Hummingbird	T	T	U	T	T	O
09110	BEKI	Belted Kingfisher		T	O	T	T	T
09580	YBSA	Yellow-bellied Sapsucker	T		O	T	T	T
09650	DOWO	Downy Woodpecker	O	O	O	O	B	B
09660	HAWO	Hairy Woodpecker	B	O	U	T	B	O
09710	BBWO	Black-backed Woodpecker						O
09800	YSFL	Yellow-shafted Flicker	T	T	T	T	O	T
09860	PIWO	Pileated Woodpecker	T	O	O	T	T	
11390	EAWP	Eastern Wood-Pewee	B	B	T		T	T
11450	YBFL	Yellow-bellied Flycatcher		T	O	O	B	B
11475	ALFL	Alder Flycatcher	O			B	B	T
11475	TRFL	Traill's Flycatcher	O			B	B	T
11475	WIFL	Willow Flycatcher				T		
11500	LEFL	Least Flycatcher	T	O		B	O	O
11595	UEFL	Unidentified Empidonax Flycatcher					?	
11610	EAPH	Eastern Phoebe	O	O	T		T	T
11760	GCFL	Great Crested Flycatcher	O	T	T			
12030	EAKI	Eastern Kingbird	O	T		T		T
12720	BHVI	Blue-headed Vireo	B	O	B	B	B	B
12760	WAVI	Warbling Vireo		T				
12780	PHVI	Philadelphia Vireo				U		
12790	REVI	Red-eyed Vireo	U	B	B	B	B	O
12910	GRAJ	Gray Jay			T			O
12930	BLJA	Blue Jay	B	B	B	U	B	U
13190	AMCR	American Crow	U	U	O		O	O
13300	CORA	Common Raven	T	T	T	O	O	O
13410	TRES	Tree Swallow	U	T		T	T	U
13540	BARS	Barn Swallow	O	T				
13570	BCCH	Black-capped Chickadee	U	B	B	B	B	B
13610	BOCH	Boreal Chickadee	T		U		O	B
13660	TUTI	Tufted Titmouse	O	B				
13690	RBNU	Red-breasted Nuthatch	B	U	B	O	B	B
13700	WBNU	White-breasted Nuthatch	O	T	T			O
13730	BRCR	Brown Creeper	U	O	T	U	O	T
14110	WIWR	Winter Wren			B	B	B	B
14240	GCKI	Golden-crowned Kinglet	O		B	O	B	U
14250	RCKI	Ruby-crowned Kinglet				T	O	O
14560	EABL	Eastern Bluebird	T	T				
14780	VEER	Veery	B	B	T	O	U	
14810	SWTH	Swainson's Thrush	O	O	B	B	B	B

Appendix I. Continued.

NUMB	SPEC	SPECIES NAME	GOCO	CHRO	PONU	REPO	BLUE	HGHL
14820	HETH	Hermit Thrush	B	B	B	O	U	O
14835	UNTH	Unidentified Thrush			?			
15000	AMRO	American Robin	B	B	B	B	B	O
15130	GRCA	Gray Catbird	O	T		T	T	
15370	EUST	European Starling	T	T				
15550	CEDW	Cedar Waxwing	B	B	B	B	B	B
15650	TEWA	Tennessee Warbler				T	O	
15670	NAWA	Nashville Warbler	B		U	U	B	B
15730	NOPA	Northern Parula	O	O	O	O	B	
15760	CSWA	Chestnut-sided Warbler	O		T	O	O	T
15770	MAWA	Magnolia Warbler	O	T	B	B	B	B
15790	BTBW	Black-throated Blue Warbler		T	B	B	U	O
15800	MYWA	Myrtle Warbler	U	U	B	B	B	B
15830	BTNW	Black-throated Green Warbler	B	B	B	B	B	B
15860	BLBW	Blackburnian Warbler	O	T	O	O	B	
15910	PIWA	Pine Warbler	T					
15960	BBWA	Bay-breasted Warbler			O	T	O	B
15970	BLPW	Blackpoll Warbler	T				O	B
16030	BAWW	Black-and-white Warbler	B	O	T	U	U	
16040	AMRE	American Redstart	O	T	O	B	U	T
16080	OVEN	Ovenbird	B	B	B	B	O	O
16090	NOWA	Northern Waterthrush	T	T	O	O	B	O
16130	MOWA	Mourning Warbler				T	T	
16150	COYE	Common Yellowthroat	B	B	O	B	B	U
16290	WIWA	Wilson's Warbler					T	
16300	CAWA	Canada Warbler	T	T	T	U	T	O
16495	UNWA	Unidentified Warbler					?	
16830	SCTA	Scarlet Tanager	U	B	T			T
18020	CHSP	Chipping Sparrow	B	O	T		T	O
18230	SOSP	Song Sparrow	O			B	T	T
18240	LISP	Lincoln's Sparrow	T			T		O
18250	SWSP	Swamp Sparrow		T		O	O	U
18270	WTSP	White-throated Sparrow	O	T	B	B	B	B
18320	SCJU	Slate-colored Junco			B	O	O	B
18335	UNSP	Unidentified Sparrow					?	
18560	NOCA	Northern Cardinal	O	O				
18600	RBGR	Rose-breasted Grosbeak	T	T		T		T
18720	BOBO	Bobolink	T	T				
18730	RWBL	Red-winged Blackbird	T	O	T	T	T	
18850	RUBL	Rusty Blackbird				O	O	T

Appendix I. Continued.

NUMB	SPEC	SPECIES NAME	GOCO	CHRO	PONU	REPO	BLUE	HGHL
18870	COGR	Common Grackle	T	O	T	T	T	O
18960	BHCO	Brown-headed Cowbird	O	U	T			T
19160	BAOR	Baltimore Oriole	O	O				
19350	PUFI	Purple Finch	B	O	O	B	T	U
19370	HOFI	House Finch	T					
19390	WWCR	White-winged Crossbill					T	T
19430	PISI	Pine Siskin			T	T	T	T
19510	AMGO	American Goldfinch	B	U	T	T	O	T
19580	EVGR	Evening Grosbeak			T		T	O
20085	UNBI	Unidentified Bird	?					