THE 2005 ANNUAL REPORT OF THE MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP (MAPS) PROGRAM AT NAVAL AIR STATION BRUNSWICK AND REDINGTON TRAINING FACILITY

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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 (NAS) Brunswick and the Redington Training Facility in 2005, in the exact same locations in which they were established in 2003 and operated in 2004. These included two stations at NAS Brunswick (Golf Course and Chimney Rock) and four stations at Redington (Potato Nubble, Redington Pond, Blueline Trail, and Highland). Stations were characterized by habitat in two ways: as either riparian (Redington Pond, Blueline Trail, Highland) or non-riparian (Golf Course, Chimney Rock, Potato Nubble), and by degree of soil saturation, as low (Potato Nubble and Redington Pond), mixed (Golf Course and Chimney Rock), and highly (Blueline Trail and Highland) saturated. 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.

A total of 377 individual birds of 50 species were newly banded at the six stations during the summer of 2005, various individuals of these species were recaptured a total of 138 times, and 27 birds were captured and released unbanded, for a total of 542 captures of 51 species. Capture indices (adults captured/600 net-hrs) suggest that the total adult population size in 2003-2005 was greatest at Redington Pond, followed Blueline Trail, Highland, Golf Course, Potato Nubble, and Chimney Rock. The reproductive index, as determined by the number of young per adult, was highest at Potato Nubble followed by Blueline Trail, Redington Pond, Highland, Chimney Rock, and Golf Course.

Despite the fact that the NAS Brunswick and Redington Training Facility MAPS stations have been run for only three 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 IBP staff, 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.

Constant-effort comparisons between 2004 and 2005 were undertaken at all six Brunswick and Redington stations. Adult breeding populations increased slightly whereas productivity decreased moderately between 2004 and 2005; however, these changes did not appear to be region wide or species wide. As in past years, population dynamics at Chimney Rock and Highland seemed to vary from those of the other stations. Interestingly, however, the changes were very similar to those recorded between 2003 and 2004 but in the opposite direction. This type of alternating, two-year cycle may be driven by density dynamics, where increased productivity one year causes increased recruitment and thus increased population sizes the next year which, in turn, results in increased competition and a higher proportion of inexperienced breeders causing decreased productivity that year. Should this pattern continue at Brunswick and Redington (e.g., not get interrupted by a climatological event), we might expect to see lower breeding populations with higher reproductive success in 2006. Importantly, a population may still show overall declines or increases which underlie these cycles.

With only three years of data, it appears to be too early to tell which direction populations are trending at Brunswick and Redington, although some interesting preliminary information was revealed by three-year trends analyses. For example, both population and productivity trends were substantially positive for Magnolia Warbler, Yellow-rumped Warbler, American Redstart, and Canada Warbler, leading to an early conclusion that these species may be doing well at Brunswick and Redington, at least during the recent three-year period. On the other hand, both the population and the productivity trend of Nashville Warbler were substantially negative (the population trend being significant), indicating that this species should be monitored carefully in upcoming years.

A result of potential concern is that the three-year mean reproductive index from all six stations combined (0.25) was low compared with the mean value calculated for all species pooled in the Northeast MAPS Region as a whole (0.44 during the ten-year period 1992-2001), and that six of nine target species showed substantially (> 50%) lower productivity at Brunswick/Redington than in the Northeast Region. It is possible that productivity was simply lower than normal along the Atlantic Seaboard during these three years, and that more years of data will reveal higher levels of productivity at Brunswick and Redington than were observed in 2003-2005. Alternatively, low productivity at Brunswick and Redington could be counterbalanced by high survival rates among the birds breeding there. We will be able to obtain preliminary estimates of survival for target species after four years of data have been collected.

Multivariate ANOVAs and logistic regression analyses indicated that adult population sizes were higher at stations with low-saturation (drier) soil than at stations with high-saturation (wetter) soil. Productivity also tended to show the same habitat-specific pattern. This may suggest that the drier habitats in Brunswick and Redington are more diverse or healthier than those of wetter soils. Populations sizes similarly were higher at stations with riparian components than at those with without riparian components, although productivity showed the opposite pattern, being higher at non-riparian locations. We as yet have no explanation for this interesting result. Once additional years of data have been gathered, the power of these multivariate analyses will increase. We will also be able to combine these results with those of long-term trends in populations and productivity, and mark-recapture analyses estimating survival, capture probability, and proportion of residents. Once causal factors for population declines 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.

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. After four or more years of data have been collected we will also be able to examine annual survival-rate estimates, capture probabilities, and proportion of residents. 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.

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 at a regional level by (1) determining spatial patterns in productivity indices and survival rate estimates as a function of spatial patterns in populations trends for target species; (2) determining the proximate demographic factors causing observed population trends in the target species; (3) link MAPS data with landscape-level habitat data and spatially explicit weather data in a geographical information system (GIS); (4) identify relationships between landscape-level habitat and/or weather characteristics and the primary demographic responses (productivity and survival rates) of the target species; (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.

We conclude that the MAPS protocol is well-suited to provide an integral component of Brunswick and Redington's integrated natural resource management, and we recommend the continued operation of the NAS Brunswick and Redington Training Facility MAPS stations well into the future.

INTRODUCTION

The United States Department of Defense (DoD), including the Department of the Navy, has assumed responsibility for managing natural resources on lands under their jurisdiction in a manner that, as much as possible considering their military mission, maintains the ecological integrity and species diversity of the ecosystems present on those lands. In order to carry out this responsibility, integrated long-term programs are needed to monitor the natural resources on military installations and to monitor the effects of varying management practices on those resources.

The development and implementation of an effective long-term monitoring program on military installations can be of even wider importance than aiding the Department of Defense in its management of those resources. Such information can be incorporated into Integrated Natural Resource Management Plans (INRMP) which guide land management on DoD installations. Because military lands often provide large areas of multiple and often relatively pristine ecosystems that are subject to varying management practices, studies conducted on these lands can provide invaluable information for understanding natural ecological processes and for evaluating the effects of large-scale, even global, environmental changes. Thus, long-term monitoring data from military installations can provide information that is crucial for efforts to preserve natural resources and biodiversity on a continental or even global scale.

Landbirds

Landbirds, because of their high body temperature, rapid metabolism, and high ecological position on most food webs, are excellent indicators of the effects of local, regional, and global environmental change in terrestrial ecosystems. Furthermore, their abundance and diversity in virtually all terrestrial habitats, diurnal nature, discrete reproductive seasonality, and intermediate longevity facilitate the monitoring of their population and demographic parameters. It is not surprising, therefore, that landbirds have been selected by the DoD to receive high priority for monitoring. Nor is it surprising that several large-scale monitoring programs that provide annual population estimates and long-term population trends for landbirds are already in place on this continent. They include the North American Breeding Bird Survey (BBS), the Breeding Bird Census, the Winter Bird Population Study, and the Christmas Bird Count.

Recent analyses of data from several of these programs, particularly the BBS, suggest that populations of many landbirds, including forest-, scrubland-, and grassland-inhabiting species, are in serious decline (Peterjohn et al. 1995). Indeed, populations of most landbird species appear to be declining on a global basis. Nearctic-Neotropical migratory landbirds (species that breed in North America and winter in Central and South America and the West Indies; hereafter, Neotropical migratory birds) constitute one group for which pronounced population declines have been documented (Robbins et al. 1989, Terborgh 1989). In response to these declines, the Neotropical Migratory Bird Conservation Program, "Partners in Flight - Aves de las Americas," was initiated in 1991 (Finch and Stangel 1993). The major goal of Partners in Flight (PIF) is to reverse the declines in Neotropical migratory birds through a coordinated program of monitoring, research, management, education, and international cooperation. As one of the major cooperating agencies in PIF, the DoD has established long-term avian monitoring efforts at military installations using protocols developed by the Monitoring Working Group of PIF. Clearly, the long-term monitoring goals of the DoD and the monitoring and research goals of PIF share many common elements.

Primary Demographic Parameters

Existing population-trend data on Neotropical migrants, while suggesting severe and sometimes accelerating declines, provide no information on primary demographic parameters (productivity and survivorship) of these birds. Thus, population-trend data alone provide no means for determining at what point(s) in the life cycles problems are occurring, or to what extent the observed population trends are being driven by causal factors that affect birth rates, death rates, or both (DeSante 1995). In particular, large-scale North American avian monitoring programs that provide only population-trend data have been unable to determine to what extent forest fragmentation and deforestation on the temperate breeding grounds, versus that on the tropical wintering grounds, are causes for declining populations of Neotropical migrants. Without critical data on productivity and survivorship, it will be extremely difficult to identify effective management and conservation actions to reverse current population declines (DeSante 1992).

The ability to monitor primary demographic parameters of target species must also be an important component of any successful long-term inventory and monitoring program that aims to monitor the ecological processes leading from environmental stressors to population responses (DeSante and Rosenberg 1998). This is because environmental factors and management actions affect primary demographic parameters directly and these effects can be observed over a short time period (Temple and Wiens 1989). Because of the buffering effects of floater individuals and density-dependent responses of populations, there may be substantial timelags between changes in primary parameters and resulting changes in population size or density as measured by census or survey methods (DeSante and George 1994). Thus, a population could be in trouble long before this becomes evident from survey data. Moreover, because of the vagility of many animal species, especially birds, local variations in secondary parameters (e.g., population size or density) may be masked by recruitment from a wider region (George et al. 1992) or accentuated by lack of recruitment from a wider area (DeSante 1990). A successful monitoring program should be able to account for these factors.

MAPS

In 1989, The Institute for Bird Populations (IBP) established the Monitoring Avian Productivity and Survivorship (MAPS) program, a cooperative effort among public agencies, private organizations, and individual bird banders in North America to operate a continent-wide network of constant-effort mist-netting and banding stations to provide long-term demographic data on landbirds (DeSante et al. 1995). The design of the MAPS program was patterned after the very successful British Constant Effort Sites (CES) Scheme that has been operated by the British Trust for Ornithology since 1981 (Peach et al. 1996). The MAPS program was endorsed in 1991 by both the Monitoring Working Group of PIF and the USDI Bird Banding Laboratory, and a four-year pilot project (1992-1995) was approved by the USDI Fish and Wildlife Service and National Biological Service (now the Biological Resources Division [BRD] of the U.S. Geological Survey [USGS]) to evaluate its utility and effectiveness for monitoring demographic parameters of landbirds.

Now in its 17th year (14th year of standardized protocol and extensive distribution of stations), the MAPS program has expanded greatly from 178 stations in 1992 to nearly 500 stations in 2005. The substantial growth of the Program since 1992 was caused by its endorsement by PIF and the subsequent involvement of various federal agencies in PIF, including the Department of Defense, Department of the Navy, Department of the Army, Texas Army National Guard, National Park Service, USDA Forest Service, and US Fish and Wildlife Service. Within the past ten years, for example, IBP has been contracted to operate as many as 157 MAPS stations per year on federal properties, including 78 stations on military installations administered by the DoD and the Texas Army National Guard.

Goals and Objectives of MAPS

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.

The overall objectives of MAPS are to achieve the above-outlined goals by means of long-term monitoring at two major spatial scales. The first is a very large scale — effectively the entire North American continent divided into eight geographical regions. It is envisioned that DoD military installations, along with national parks, national forests, and other publicly owned lands, will provide a major subset of sites for this large-scale objective.

The second, smaller-scale but still long-term objective is to fulfill the above-outlined goals for specific geographical areas (perhaps based on physiographic strata or Bird Conservation Regions) or specific locations (such as individual military installations, national forests, or national parks) to aid research and management efforts within the installations, forests, or parks to protect and enhance their avifauna and ecological integrity. The sampling strategy utilized at these smaller scales should be hypothesis-driven and should be integrated with other research and monitoring efforts. DeSante et al. (1999) showed that measures of productivity and survival derived from MAPS data were consistent with observed population changes at these smaller spatial scales. This provides considerable assurance that the goals and objectives outlined above can be achieved.

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

Recent Important Results from MAPS

Recent important results from MAPS reported in the peer-reviewed literature include the following: (1) 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). (2) Measures of productivity and survival derived from MAPS data were consistent with observed population changes at multiple spatial scales (DeSante et al. 1999). (3) 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). (4) 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). (5) 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). These results indicate that MAPS is capable of achieving, and in some cases is already achieving, its objectives and goals.

Specifics of the Naval Air Station Brunswick and Redington Training Facility MAPS Program in 2005

Six MAPS stations were re-established and operated on Naval Air Station (NAS) Brunswick (two stations), near the coast at Brunswick, Maine, and Redington Training Facility (four stations), in a montane region near Rangeley, Maine, in 2005, in the exact same locations in which they were originally established in 2003 and operated in 2004. 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. In 2005 we performed a thorough re-evaluation of the habitat characteristics of each station and have re-grouped them for analysis according to this re-evaluation.

At NAS 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 Training Facility, 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 and additional details on the habitat composition, degree of drainage, and history of habitat disturbance to the stations are presented in Table 2.

The six stations were re-established for operation by IBP Biologist Danielle Kaschube, with the help of IBP field biologist interns, Sara Ashline and Jason Deeter, during May 29 to June 5, 2005. The two field biologist interns had received intensive training during a comprehensive course in mist netting and bird-banding techniques given by IBP biologists Nicole Michel and Jennifer McNicoll, which took place May 9-14 at the Jug Bay Wetlands Sanctuary in Maryland, and they received additional in-the-field training setting up and operating stations at NSGA Sugar Grove during May 14-16. The interns began operation of the Brunswick and Redington stations May 29-June 5. 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. The interns were supervised by Danielle Kaschube for the duration of the field season.

METHODS

The operation of each of the six stations during 2005 followed MAPS protocol, as established for use by the MAPS Program throughout North America and spelled out in the MAPS Manual (DeSante et al. 2005a). An overview of both the field and analytical techniques is presented here.

Data Collection

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 comprised. The following data were taken on all birds captured, including recaptures, according to MAPS guidelines using standardized codes and forms (DeSante et al. 2005a):

(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 (period) 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.

For each of the six stations operated, simple habitat maps were prepared on which up to four major habitat types, as well as the locations of all structures, roads, trails, and streams, were identified and delineated. The pattern and extent of cover of each major habitat type identified at each station, as well as the pattern and extent of cover of each of four major vertical layers of vegetation (upperstory, midstory, understory, and ground cover) in each major habitat type, were classified into one of twelve pattern types and eleven cover categories according to guidelines spelled out in the MAPS Habitat Structure Assessment (HSA) Protocol, developed by IBP Landscape Ecologist, Philip Nott, and the IBP staff (Nott et al. 2003b). These data were revised in 2005 and are summarized in Table 2.

Computer Data Entry and Verification
The computer entry of all banding data was completed by John W. Shipman of Zoological Data Processing, Socorro, NM. 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. Computer entry of effort, breeding status, and vegetation data was completed by IBP biologists using specially designed data entry programs. 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 2005 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 2005) 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 2004 and 2005 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 three years, 2003-2005, and for all stations combined, we calculated three-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 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. Multivariate analyses of adult population size and productivity. We conducted multivariate ANOVAs on indices of adult population size, and logistic regression analyses on reproductive indices as a function of year, station, habitat, and the degree of water saturation in the soil. Habitat was categorized by station as either riparian (Redington Pond, Blueline Trail, Highland) or non-riparian (Golf Course, Chimney Rock, Potato Nubble), and degree of soil saturation was categorized as low (Potato Nubble and Redington Pond), mixed (Golf Course and Chimney Rock), and highly (Blueline Trail and Highland) saturated (or highly drained, mixed, and poorly drained, respectively). Because station, habitat, and saturation are incorporated into these analyses as non-continuous variables, the analysis format requires the designation of reference categories against which values for the other categories are compared. For both multivariate ANOVAs and logistic regressions we chose the group with the highest abundance of adults captured as the reference group. Thus we chose Blueline Trail as the reference station, riparian stations as the reference habitat, and highly saturated soil as the reference saturation category. When no young were caught at a reference station or category we chose the station or category with the next-highest abundance as the reference group for logistic regression. We also chose the current year, 2005, as the reference year.

We set the relative number of adults to be zero and the relative productivity (actually odds ratio) to be one for the reference year, station, habitat, and soil-saturation category. All ANOVA analyses also included a net-hour term to adjust for the variable amount of effort that occurred at each station. Because the categories were generally divided along an elevational gradient, we also included an elevation term (m; Table 1) in the models. We conducted these multivariate analyses for all species pooled and for each target species for which we recorded an average of five or more individuals per year at the six stations combined, and at which the species was a regular (B) or usual (U) breeder.

Data preparation for the ANOVA analyses was completed using data-management programs in dBASE5.7. The multivariate ANOVAs themselves were completed using the statistical-analysis package STATA (Stata Corporation 1995), and statistical significance was determined based on the F-statistic. Logistic regression, when used in productivity analyses, estimates the probability of an individual bird captured at random being a young bird. The "odds ratio", the term used for the probability value produced by logistic regression, is the odds of a captured individual being a young bird after all other variables (year, station, net-hours, elevation, etc.) have been accounted for. Data preparation for the logistic regression analyses was completed using data-management programs in dBASE5.7, and the logistic regression analyses themselves were completed on all species pooled and each target species using the statistical-analysis package STATA (Stata Corporation 1995). Statistical significance in logistic regression was determined based on the z-statistic (or Wald Statistic) which equates to the maximum likelihood estimate based on the odds ratio divided by the standard error (Stata Corporation 1995).

C. Analyses of trends in adult population size and productivity — We examined three-year (2003-2005) trends in indices of adult population size and productivity, for each target species for which we recorded an average of five or more 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 five 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 2001 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 $SE \leq 0.389$ (for three-year trends) are considered to have a stable trend; and those for which $-0.5 \leq r \leq 0.5$ and $SE >$ 0.389 (for five-year trends) 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 productivity trends are considered to be highly fluctuating if the *SE* of the slope > 0.222 (for three-year productivity trends).

RESULTS

A total of 2399.2 net-hours was accumulated at the six MAPS stations operated at NAS Bruswick and Redington Training Facility in 2005 (Table 1). Of these, 2311.5 net-hours could be compared with 2004 data in a constant-effort manner. A summary of the habitat characteristics at each of the six stations (Tables 1 and 2) indicates that three of the stations (Redington Pond, Blueline Trail, and Highland) had riparian components and were thus classified as riparian stations in multivariate analyses. Information on drainage conditions at each station (Table 2) led to the categorization of Potato Nubble and Redington Pond as low-saturation stations, Golf Course and Chimney Rock as mixed-saturation stations, and Blueline Trail and Highland as high-saturation stations.

Indices of Adult Population Size and Post-fledging Productivity

The 2005 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 3 and for all stations combined in Table 5. A total of 542 captures of 51 species were recorded at the six stations combined (Table 5). Newly banded birds represented 69.6% of the total captures. The greatest number of captures occurred at Redington Pond (157), followed by Blueline Trail (112), Potato Nubble (85), Highland (84), Golf Course (62), and Chimney Rock (42). Species richness of adults was greatest at Blueline Trail (39 species), followed by Redington Pond (26), Potato Nubble (19), Golf Course (18), Highland (16), and Chimney Rock (12). These sequences were exactly the same as recorded in 2004. Overall, the most abundantly captured species at the six stations, in descending order (Table 5), were Swainson's Thrush (68), followed by Magnolia Warbler (54), White-throated Sparrow (35), Ovenbird (34), Black-capped Chickadee (30), Common Yellowthroat (29), American Redstart (24), and Canada Warbler (21).

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 4 and for all stations combined in Table 5. These capture indices suggest that the total adult population size in 2005 was greatest at Redington Pond (148.3 adults/600 net-hours), followed Blueline Trail (100.4), Highland (87.0), Golf Course (62.4), Potato Nubble (57.9), and Chimney Rock (40.1).

Overall, the most abundant breeding species at the six Brunswick and Redington MAPS stations in 2005, as determined by adults captured per 600 net-hrs, was Swainson's Thrush followed in descending order by Magnolia Warbler, White-throated Sparrow, Black-capped Chickadee, Ovenbird, Yellow-rumped Warbler, Canada Warbler, Traill's Flycatcher, Blackpoll Warbler, Red-eyed Vireo, Hermit Thrush, and American Redstart (Table 5). The following is a list of the common breeding species (captured at a rate of at least 4.0 adults per 600 net-hours), in decreasing order, at each station in 2005 (see Table 4):

Golf Course
Common Yellowthroat
Black-thr. Green Warbler
Ovenbird
Blue-headed Vireo
Nashville Warbler
Veery

Blueline Trail
Magnolia Warbler
White-throated Sparrow
Black-capped Chickadee
Yellow-bellied Flycacther
Common Yellowthroat
Traill's Flycatcher
Northern Waterthrush

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

Potato Nubble
Black-capped Chickadee
Magnolia Warbler
Swainson's Thrush
Ovenbird
Red-breasted Nuthatch
Black-throated Blue Warbler

Highland
Magnolia Warbler
Swainson's Thrush
Blackpoll Warbler
Black-capped Chickadee

Chimney Rock
Hermit Thrush
Ovenbird
Red-eyed Vireo
Common Yellowthroat

Captures of young of all species pooled (Table 4) were highest at Potato Nubble and Redington Pond (31.2 young birds/600 net hours each) followed by Blueline Trail (25.9), Highland (18.3), Chimney Rock (8.6), and Golf Course (0.0). The reproductive index, as determined by the number of young per adult, was highest at Potato Nubble (0.54) followed by Blueline Trail (0.26); Chimney Rock, Redington Pond , and Highland (0.21 each); and Golf Course (0.00), where no young birds were captured.

Comparisons between 2004 and 2005

Constant-effort comparisons between 2004 and 2005 were undertaken at all six Brunswick and Redington stations, for numbers of adult birds captured (index of adult population size; Table 6), numbers of young birds captured (Table 7), and number of young per adult (reproductive index; Table 8).

Adult population size, for all species pooled and at all six stations combined, increased slightly and non-significantly, by +3.6% between 2004 and 2005 (Table 6). Increases between 2004 and 2005 were recorded for 23 of 51 species, a proportion not significantly greater than 0.50. The number of adults captured of all species pooled increased at four stations, by amounts ranging from +1.9% at Highland to +20.5% at Redington Pond, and they decreased at Potato Nubble (by -4.9%) and Blueline Trail (-15.2%). The proportion of increasing or decreasing species was not significantly greater than 0.50 at any station. Two species (Red-eyed Vireo, and Swainson's Thrush) showed significant or near-significant between-year increases across stations and two species (Black-throated Blue and Black-throated Green warblers) showed such decreases.

The number of young birds captured, of all species pooled and for all six stations combined, decreased by -16.5%, a non-significant change (Table 7). Decreases between 2004 and 2005 were recorded for 16 of 31 species, a proportion not significantly greater than 0.50. Young captured for all species pooled decreased at four stations by amounts ranging from -8.7% at Potato Nubble to -100.0% at Golf Course, and they increased at Highland (+140.0%) and Chimney Rock (by an incalculable amount since no young were captured there in 2004). The proportion of increasing species was near-significantly greater than 0.50 at Highland. Three species (Black-throated Blue Warbler, Common Yellowthroat, and White-throated Sparrow) showed significant or near-significant declines in young captured across stations whereas no species showed such increases.

Reproductive index (the number of young per adult) showed an absolute decrease of -0.059, from 0.301 in 2004 to 0.243 in 2005 for all species pooled and both stations combined, a non-significant change (Table 8). Decreases in productivity were recorded for 13 of 37 species, a proportion not significantly greater than 0.50. Reproductive index decreased at four stations by amounts ranging from -0.023 at Potato Nubble to -0.262 at Redington Pond, whereas it increased at Chimney Rock (by +0.222) and Highland (by +0.126). The proportion of increasing or decreasing species was not significantly greater than 0.50 at any station, and only one species (American Redstart) showed a near-significant change across stations, in this case an increase.

Thus, in general, breeding populations increased slightly whereas productivity decreased moderately at NAS Brunswick and Redington Training Facility between 2004 and 2005. However, these changes did not appear to be region wide or species wide. As in past years, population dynamics at Chimney Rock and Highland seemed to vary from those of the other stations. Interestingly, however, the changes were very similar to those recorded between 2003 and 2004 but in the opposite direction, a pattern commonly observed at MAPS stations (see Discussion).

Three-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 three-year period 2003-2005, are presented in Table 9, 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 and Potato Nubble. Productivity values were high at Potato Nubble, Redington Pond, and Blueline Trail, and much lower at Highland, Golf Course, and Chimney Rock.

The overall reproductive index of 0.25 is low compared with the mean value calculated for all species pooled in the Northeast MAPS Region, during the ten-year period 1992-2001 (0.44; see http://www.birdpop.org/nbii/NBIIHome.asp). Of nine target species for which productivity values could be compared, six (Red-eyed Vireo, Black-capped Chickadee, American Robin, American Redstart, Ovenbird, and Common Yellowthroat) were substantially (> 50%) lower, two (Hermit Thrush and Magnolia Warbler) were slightly (< 50%) lower and one (White-throated

Sparrow) was slightly (< 50%) higher at Brunswick/Redington than in the Northeast Region. This indicates that productivity may be lower than it should be at Brunswick and Redington, at least during the three-year period 2003-2005.

Multivariate Analyses of Adult Population Size and Productivity

Multivariate ANOVAs assessing variation in numbers of adults captured by habitat, year, and station for 18 target species are shown in Figures 1-18 and for all species pooled in Figure 19. Variation by year was analyzed while adjusting for forest type.

For all species pooled, no between-year differences in breeding population sizes (as estimated by adults captured), adjusting for effort, elevation, habitat, and saturation, were near-significant (Fig. 19**A**), indicating little inter-annual variation among the first three years of operation. Similarly, there were no significant or near-significant, between-year differences for 13 of the 17 target species according to multivariate ANOVA (Figs. 1-17**A**). For Black-throated Blue Warbler, higher populations were recorded in 2004 than in 2005 (Fig. 10**A**); for Yellow-rumped Warbler, lower populations were recorded in 2003 than in 2005 (Fig. 11**A**); for Black-throated Green Warbler, higher populations were recorded in 2004 than in 2005 (Fig. 12**A**); and for Blackpoll Warbler, lower populations were recorded in 2003 than in 2005 (Fig. 13**A**). Similarly, for all species pooled, there were no significant or near-significant between-year differences in productivity, adjusting for elevation, habitat, and saturation (Fig. 19**E**) or for 12 of 13 species with enough data to perform this comparison (Figs. 2-17**E**). The one exception was White-throated Sparrow, for which productivity in 2005 was significantly lower than that of 2003 (Fig. 18**E**).

Adjusting for year, effort, elevation, and habitat, significantly higher breeding populations were found in stations with low-saturation (drier) soil than at stations with high-saturation soil, when all species were pooled (Fig. 19**B**). A similar pattern was found for Traill's Flycatcher (Fig. 2**B**), Red-eyed Vireo (Fig. 3**B**), Swainson's Thrush (where mixed-saturation soils also supported higher breeding populations; Fig. 6**B**), American Robin (Fig. 7**B**), Magnolia Warbler (where mixed-saturation soils also supported higher breeding populations; Fig. 9**B**), Black-throated Blue Warbler (Fig. 10**B**), American Redstart (Fig. 14**B**), Ovenbird (Fig. 15**B**), and Canada Warbler (Fig. 17**B**). These species are associated with drier habitats at Brunswick and Redington. Only two species showed the opposite pattern (higher populations in wetter stations with high-saturation soil): Yellow-bellied Flycatcher (Fig. 9**B**), and White-throated Sparrow (Fig. 18**B**), both of which also showed lower breeding populations in mixed saturation soils. Blackpoll Warbler showed higher populations at stations with mixed-saturation soils (Fig. 13**B**). Only six species (Black-capped Chickadee, Hermit Thrush, Nashville Warbler, Yellow-rumped Warbler, Black-throated Green Warbler, and Common Yellowthroat) did not show near-significant variation in breeding populations according to soil type.

Adjusting for year, elevation, and habitat, significantly lower productivity was found in stations with mixed-saturation soil than at stations with high-saturation soil, when all species were pooled (Fig. 19**F**). Among the 9 species with enough data to perform this analysis, lower productivity at stations with higher-saturation soils was noted for Magnolia Warbler (Fig. 9**F**), Black-throated Blue Warbler (Fig. 10**F**), and Canada Warbler (Fig. 17**F**), whereas productivity of White-throated Sparrow showed the opposite pattern, being higher at high-saturation stations (Fig. 18**F**). The remaining five species (Black-capped Chickadee, Swainson's Thrush, Yellow-rumped Warbler, American Redstart, and Ovenbird) showed no significant or near-significant differences with soil saturation.

Adjusting for year, effort, elevation, and soil saturation, significantly higher breeding populations were found at riparian stations than at non-riparian stations, when all species were pooled (Fig. 19**C**). This same pattern was noted for Traill's Flycatcher (Fig. 2**C**), Red-eyed Vireo (Fig. 3**C**), Swainson's Thrush (Fig. 5**C**), Yellow-rumped Warbler (Fig. 11**C**), American Redstart (Fig. 14**C**), Canada Warbler (Fig. 17**C**), and White-throated Sparrow (Fig. 18**C**). No species showed significantly or near-significantly higher breeding populations at non-riparian stations, the remaining 11 species showing no significant habitat-specific differences. Adjusting for year, elevation, and soil saturation, productivity showed the opposite pattern when all species were pooled, significantly higher productivity occurring at non-riparian stations than at riparian stations (Fig. 19**H**). None of the nine target species with enough data showed significant differences on their own (Fig. 1-18**H**).

Adjusting for year, breeding populations of all species pooled were significantly higher at Blueline Trail than at Golf Course, Chimney Rock, and Potato Nubble, they were significantly lower at Blueline Trail than at Redington Pond, and they were similar at Blueline Trail and Highland (Fig. 19**C**). Populations at Blueline Trail were also significantly or near-significantly higher than they were at one or more other stations for Yellow-bellied Flycatcher (Fig. 1**D**), "Traill's" Flycatcher (Fig. 2**D**), Nashville Warbler (Fig. 8**D**), Magnolia Warbler (Fig. 9**D**), Yellow-rumped Warbler (Fig. 11**D**), American Redstart (Fig. 14**D**), Common Yellowthroat (Fig. 16**D**), and White-throated Sparrow (Fig. 17**D**), whereas they were significantly or near-significantly lower at Blueline Trail than at one or more stations for Red-eyed Vireo (Fig. 3**D**), Swainson's Thrush (Fig. 5**D**), Hermit Thrush (Fig. 6**D**), American Robin (Fig. 7**D**), Magnolia Warbler (Fig. 9**D**), Black-throated Blue Warbler (Fig. 10**D**), Black-throated Green Warbler (Fig. 12**D**), Blackpoll Warbler (Fig. 13**D**), American Redstart (Fig. 14**D**), and Ovenbird (Fig. 15**D**). Adjusting for year, productivity was higher at Blueline Trail than at Golf Course, Chimney Rock, and Highland, and it was lower at Blueline Trail than at Potato Nubble, for all species pooled (Fig. 18**H**). Productivity at Blueline Trail was also significantly or near-significantly higher than it was at one or more other stations for Magnolia Warbler (Fig. 9**H**), Black-throated Blue Warbler (Fig. 10**H**), and Canada Warbler (Fig. 17**H**) and it was significantly or near-significantly lower at Blueline Trail than it was at one or more other stations for Swainson's Thrush (Fig. 5**H**), Hermit Thrush (Fig. 6**H**), Nashville Warbler (Fig. 8**H**), and White-throated Sparrow (Fig. 18**H**).

Thus, in general, there was little inter-annual variation between 2003 and 2005 in either adult population sizes or productivity, after controlling for elevation, habitat type, and soil saturation level. Both breeding population sizes were higher at stations with high soil saturation and riparian components, whereas productivity showed the opposite pattern, being higher at stations with low soil saturation and without riparian components

Three-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 18 target species and for all species pooled, are presented in Figures 20 and 21, 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 20.

The population trend for all species pooled was substantially (absolute $r > 0.5$) but not significantly ($P = 0.142$) positive between 2003 and 2005 (Fig. 20), showing an annual increase of 0.7%. Although slight, the increase was consistent during both between-year periods. Among species, substantial three-year increases were recorded for eight of the 18 species: Traill's Flycatcher (nearly significant), Swainson's Thrush, Magnolia Warbler, Yellow-rumped Warbler, Blackpoll Warbler, American Redstart, Ovenbird, and Canada Warbler. Substantial declines were recorded for four species: Yellow-bellied Flycatcher, Hermit Thrush, American Robin, and Nashville Warbler (significant). The remaining six species showed non-substantial population trends (absolute $r < 0.5$), with those of Red-eyed Vireo, Black-capped Chickadee, Common Yellowthroat, and White-throated Sparrow being non-fluctuating (SE of the slope < 0.389 for a 3-year population trend) and those of Black-throated Blue Warbler and Black-throated Green Warbler, showing wide inter-annual fluctuation (SE of slope > 0.389).

The three-year trend in productivity for all species pooled decreased slightly and non-significantly between 2003 and 2005 (Fig. 21). Four species (Yellow-bellied Flycatcher, Traill's Flycatcher, Red-eyed Vireo, and Blackpoll Warbler) showed flat trends because no young that could be compared between years were captured (Table 8). Substantial three-year increases in productivity were shown by five species, Hermit Thrush, Magnolia Warbler (significant), Yellow-rumped Warbler, and American Redstart, and Canada Warbler, and substantial decreases were also shown by five species, Swainson's Thrush (nearly significant), Nashville Warbler, Black-throated Blue Warbler, Black-throated Green Warbler, and White-throated Sparrow (nearly significant). The remaining four species (Black-capped Chickadee, American Robin, Ovenbird, and Common Yellowthroat) showed non-substantial productivity trends (absolute $r < 0.5$), which in all four cases were non-fluctuating (SE of the slope < 0.222 for a 3-year trend).

DISCUSSION

Despite the fact that the NAS Brunswick and Redington Training Facility MAPS stations have been run for only three 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 IBP staff, 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 comparisons between the three years, between two habitat types, and between three soil-saturation categories have been performed. In addition, we have been able to examine three-year trends in breeding population sizes and productivity for up to 18 target species and all species pooled. Even though three years of data is inadequate to assess population and productivity trends some interesting preliminary information was revealed by these analyses. For example, both population and productivity trends were substantially positive for Magnolia Warbler, Yellow-rumped Warbler, American Redstart, and Canada Warbler, leading to an early conclusion that these species may be doing well at Brunswick and Redington, at least during the recent three-year period. On the other hand, both the population and the productivity trend of Nashville Warbler were substantially negative (the population trend being significant), indicating that this species should be monitored carefully in upcoming years.

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. After four or more years of data have been collected we will also be able to examine annual survival-rate estimates, capture probabilities, and proportion of residents. 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.

A result of potential concern from the first three years (2003-2005) of MAPS at Brunswick and Redington is that the overall reproductive index (0.25) was low compared with the mean value calculated for all species pooled in the Northeast MAPS Region as a whole (0.44 during the ten-year period 1992-2001), and that six of nine target species showed substantially (> 50%) lower productivity at Brunswick/Redington than in the Northeast Region. It is possible that productivity was simply lower than normal along the Atlantic Seaboard during these three years, and that more years of data will reveal higher levels of productivity at Brunswick and Redington than were observed in 2003-2005. It is possible that low productivity at Brunswick and Redington is being counterbalanced by high survival rates among the birds breeding there. We will be able to obtain preliminary estimates of survival for many of these target species after four years of data have been collected.

We have seen large fluctuations in productivity at other MAPS stations, which is often related to density-dependent effects at the station. We may be seeing such a pattern emerging at Brunswick and Redington, where breeding landbird populations were higher in 2003 and 2005 than in 2004, but productivity was higher in 2004 than in 2003 or 2005. This type of alternating, two-year cycle is often observed at other MAPS locations and may be driven by density dynamics. Increased productivity one year (as was observed in 2004 at Brunswick and Redington) causes increased recruitment and thus increased population sizes the next year. This, in turn, results in increased competition and a higher proportion of inexperienced breeders, which causes decreased productivity that year, such as occurred in 2005 at Brunswick and Redington. Should this pattern continue (e.g., not get interrupted by a climatological event), we might expect to see lower breeding populations with higher reproductive success in 2006. Importantly, a population may still show overall declines or increases which underlie these cycles. With only three years of data, it appears to be too early to tell which direction populations are trending at Brunswick and Redington.

Mean numbers of adults captured, an index of breeding population size, was higher at stations with low-saturation (drier) soil than at stations with high-saturation (wetter) soil, with nine species showing this pattern but only two species showing the opposite pattern. Productivity also tended to show the same habitat-specific pattern, four species having higher productivity in drier habitats vs. one species showing the opposite pattern. This may suggest that the drier habitats in Brunswick and Redington are more diverse or healthier than those of wetter soils. Populations sizes similarly were higher at stations with riparian components than at those with without riparian components, although productivity showed the opposite pattern, being higher at non-riparian locations. We as yet have no explanation for this interesting result.

Once additional years of data have been gathered, we will be able to explore the underlying causes of these patterns and many others concerning landbird dynamics at these two installations. With more years of data not only will we be able to strengthen the power of ANOVA analyses of adult population sizes and logistic regression analyses of productivity (including multivariate examinations of the 17 or more individual target species), we will be able 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 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); (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 NAS Brunswick and Redington Training Facility well into the future.

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LITERATURE CITED

Bart, J., Kepler, C., Sykes, P., & Bocetti, C. 1999. Evaluation of mist-net sampling as an index to productivity in Kirtland's Warblers. *Auk* 116:1147-1151.

DeSante, D.F. 1990. The role of recruitment in the dynamics of a Sierran subalpine bird community. *American Naturalist* 136:429-455.

DeSante, D.F. 1992. Monitoring Avian Productivity and Survivorship (MAPS): a sharp, rather than blunt, tool for monitoring and assessing landbird populations. Pp. 511-521 *in*: D.R. McCullough and R.H. Barrett (eds.), *Wildlife 2001: Populations*. Elsevier Applied Science, London, U.K.

DeSante, D.F. 1995. Suggestions for future directions for studies of marked migratory landbirds from the perspective of a practitioner in population management and conservation. *Journal Applied Statistics* 22:949-965.

DeSante, D.F. 2000. Patterns of productivity and survivorship from the MAPS Program. *In* Bonney, R., D.N. Pashley, R. Cooper, and L. Niles (eds.), *Strategies for Bird Conservation: the Partners in Flight Planning Process*. Proceedings RMRS-P-16. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station.

DeSante, D.F., K.M. Burton, J.F. Saracco, and B.L. Walker. 1995. Productivity indices and survival rate estimates from MAPS, a continent-wide programme of constant-effort mist netting in North America. *Journal Applied Statistics* 22:935-947.

DeSante, D.F., K.M. Burton, P. Velez, and D. Froehlich. 2005a. *MAPS Manual*. The Institute for Bird Populations, Point Reyes Station, CA. 49 pp.

DeSante, D.F., and T.L. George. 1994. Population trends in the landbirds of western North America. Pp. 173-190 *in*: J.R. Jehl, Jr. and N.K. Johnson (eds.), A Century of Avifaunal Change in Western North America, *Studies in Avian Biology*, No. 15, (Cooper Ornithological Society).

DeSante, D.F., M.P. Nott, and D.R. O'Grady, D.R. 2001. Identifying the proximate demographic cause(s) of population change by modeling spatial variation in productivity, survivorship, and population trends. *Ardea* 89(special issue):185-207.

DeSante, D.F., D.R. O'Grady, and P. Pyle. 1999. Measures of productivity and survival derived from standardized mist-netting are consistent with observed population changes. *Bird Study* 46(suppl.):S178-188.

DeSante, D.F., P. Pyle, and D. Kaschube. 2004. The 2003 annual and final report of the Monitoring Avian Productivity and Survivorship (MAPS) Program on Cape Cod National Seashore. The Institute for Bird Populations, Point Reyes Station, California.48 pp.

DeSante, D.F., and D.K. Rosenberg. 1998. What do we need to monitor in order to manage landbirds? Pp. 93-106 *in*: J. Marzluff and R. Sallabanks (eds.), *Avian Conservation: Research Needs and Effective Implementation*. Island Press, Washington, DC.

Finch, D.M., and P.W. Stangel. 1993. *Status and Management of Neotropical Migratory Birds*. USDA Forest Service, General Technical Report RM-229. 422 pp.

George, T.L., A.C. Fowler, R.L. Knight, and L.C. McEwen. 1992. Impacts of a severe drought on grassland birds in western North America. *Ecological Applications* 2:275-284.

Nott, M.P. 2000. *Identifying Management Actions on DoD Installations to Reverse Declines in Neotropical Birds*. Unpubl. report to the U.S. Department of Defense Legacy Resource Management Program. The Institute for Bird Populations, Point Reyes Station, CA 18 pp.

Nott, M.P. 2002. *Climate, Weather, and Landscape Effects on Landbird Survival and Reproductive Success in Texas*. Unpublished report to the U.S. Department of Defense Legacy Resource Management Program, Adjutant General's Department of Texas, and USGS/BRD Patuxent Wildlife Research Center. The Institute for Bird Populations, Point Reyes Station, CA. 29 pp.

Nott, M.P., D.F. DeSante, and N. Michel. 2003b. *Monitoring Avian Productivity and Survivorship (MAPS) Habitat Structure Assessment (HSA) Protocol*. The Institute for Bird Populations, Point Reyes Station, CA. 43 pp.

Nott, M.P., D.F. DeSante, and N. Michel. 2003a. *Management strategies for reversing declines in landbirds of conservation concern on military installations: A landscape-scale analysis of MAPS data*. The Institute for Bird Populations, Pt. Reyes Station, CA. 357 pp.

Nott, M.P., D.F. DeSante, R.B. Siegel, and P. Pyle. 2002. Influences of the El Niño/Southern Oscillation and the North Atlantic Oscillation on avian productivity in forests of the Pacific Northwest of North America. *Global Ecology and Biogeography* 11:333-342.

Peach, W.J., S.T. Buckland, and S.R. Baillie. 1996. The use of constant effort mist-netting to measure between-year changes in the abundance and productivity of common passerines. *Bird Study* 43:142-156.

Peterjohn, B.G., J.R. Sauer, and C.S. Robbins. 1995. Population trends from the North American Breeding Bird Survey. Pp. 3-39 *in*: T.E. Martin and D.M. Finch (eds.), *Ecology and Management of Neotropical Migratory Birds*. Oxford University Press, New York.

Robbins, C.S., J.R. Sauer, R.S. Greenberg, and S. Droege. 1989. Population declines in North American birds that migrate to the Neotropics. *Proceedings of the National Academy of Sciences (USA)* 86:7658-7662.

Stata Corporation 1995. *Reference Manual*, Release 4. Stata Press, College Station, TX. 1601.

Temple, S.A., and J.A. Wiens. 1989. Bird populations and environmental changes: can birds be bio-indicators? *American Birds* 43:260-270.

Terborgh, J. 1989. *Where Have All the Birds Gone?, Essays on the Biology and Conservation of Birds that Migrate to the American Tropics*. Princeton Univ Press, Princeton, NJ. 207 pp.

Table 1. Summary of the 2005 MAPS program on Naval Air Station Brunswick and Redington Training Facility.

Station: Name	Code	No.	Major Habitat Type	Latitude-longitude	Avg Elev. (m)	2005 operation: 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	403.8 (395.5)	7	6/03 - 8/06
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	419.3 (390.7)	7	6/05 - 8/07
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	404.0 (402.5)	7	6/02 - 8/05
Redington Pond	REPO	15656	Primarily birch/maple forest with scattered balsam fir, pond, alder thicket	44°58'58"N,-70°24'59"W	507	384.3 (373.3)	7	5/30 - 8/02
Blueline Trail	BLUE	15658	Boggy balsam fir and Eastern hemlock forest, alder thicket	44°59'25"N,-70°26'20"W	515	394.3 (379.5)	7	5/31 - 8/03
Highland	HGHL	15659	Stunted red spruce and balsam fir forest, beaver ponds, very boggy areas	45°00'35"N,-70°27'15"W	724	393.3 (370.0)	7	5/29 - 8/04
ALL STATIONS COMBINED						2399.2(2311.5)	7	5/29 - 8/07

[1] Total net-hours in 2005. Net-hours in 2005 that could be compared in a constant-effort manner to 2004 are shown in parentheses.

Table 2. Habitat summary of the six MAPS stations located on Naval Air Station Brunswick and Redington Training Facility.

Station	Physgr. Region[1]	Dom. hab. type[2]	Dominant Species [3]: Upperstory and midstory	Dominant Species [3]: Understory and ground level	Slope, drainage and presence of water	Disturbance history of station
Golf Course	N.New England	MF	Abies balsamea, Tsuga canadensis, Acer rubrum, Pinus strobus, Quercus rubra, Populus tremuloides	Abies balsamea, Tsuga canadensis, Maianthemum canadense, Trientalis borealis	flat bottomland, mixed well and poorly drained areas	Pipeline and roads bisect the station
Chimney Rock	N.New England	MF	Acer rubrum, Pinus strobus, Pinus resinosa, Abies balsamea, Quercus rubra, Quercus velutina	Abies balsamea, Pinus strobus, Acer rubrum	gently sloping bottomland, mixed well and poorly drained areas,	Homestead (~1800), selective logging (~1940-50)
Potato Nubble	N. Spruce Hardwoods	MF	Abies balsamea, Betula papyrifera, Betula alleghaniensis, Acer rubrum, Acer saccharum, Populus tremuloides	Abies balsamea, Alnus incana, Corylus cornuta, grass spp., Fragaria virginiana, Oxalis montana	well drained hillside	Selective logging (up to ~1960), bisected by road
Redington Pond	N. Spruce Hardwoods	MF	Abies balsamea, Betula alleghaniensis, Betula papyrifera, Acer rubrum, Acer saccharum, Alnus incana	Alnus incana, Abies balsamea, Acer pennsylvanicum, Acer saccharum, Acer rubrum, Alnus rugosa, Cornus Canadensis	riparian corridor including a large stream and dammed pond bordered by well drained steep hillsides	Selective logging (up to ~1960), railway track
Blueline Trail	N. Spruce Hardwoods	MF	Abies balsamea, Betula papyrifera, Alnus incana	Abies balsamea, Cornus canadensis, Oxalis montana, moss spp., grass spp., fern spp.	boggy riparian corridor including wide stream and bordered by well drained undulating hills	Selective logging (up to ~1960), railway track

Table 2. (cont.) Habitat summary of the six MAPS stations located on Naval Air Station Brunswick and Redington Training Facility.

Station	Physgr. Region[1]	Dom. hab. type[2]	Dominant Species[3]: Upperstory and midstory	Dominant Species[3]: Understory and ground level	Slope, drainage and presence of water	Disturbance history of station
Highland	N. Spruce Hardwoods	CF	Abies balsamea, Picea rubens	Ledum groenlandicum, Betula papyrifera, Cornus canadensis, Oxalis montana, fern spp., moss spp., Abies balsamea, Picea rubens	mix of bog, open marsh land, and steep rocky well drained hillside	Selective logging (up to ~1960), fire (~1980)

[1] Breeding Bird Survey (BBS) physiographic stratum/province.

[2] General habitat type of the station. MF - mixed forest; CF - coniferous forest.

[3] The dominant and most common species in each vegetative layer. Upperstory and midstory = vegetation found over 5m above ground. Understory and ground cover = vegetation found under 5m above ground.

Table 3. Capture summary for the six individual MAPS stations operated on Naval Air Station Brunswick and Redington Training Facility in 2005. 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									2			2				
Yellow-bellied Sapsucker													2					
Downy Woodpecker				1			1			1			1					
Hairy Woodpecker													1	1				
Yellow-bellied Flycatcher										1			3		1	2		
Traill's Flycatcher										6		2	4					
Least Flycatcher										1			1					
Eastern Phoebe													1					
Blue-headed Vireo	4		1				2						1					
Philadelphia Vireo										2								
Red-eyed Vireo	1			3						4		1	1					
Gray Jay																2		
Blue Jay	1												2		1			
Black-capped Chickadee	1			1			6	1		4	1	4	8	2	1	1		
Boreal Chickadee																2		
Tufted Titmouse				2														
Red-breasted Nuthatch							3		1				1					
Brown Creeper				3						2								
Winter Wren							1			1								
Golden-crowned Kinglet										3			1					
Veery	3		1	1		2							1					
Swainson's Thrush	1						7		5	12		13	2	1		20	1	6
Hermit Thrush	1		2	7		4	3						1					
American Robin				1			1			5		2	1	1				
Gray Catbird													1		1			
Cedar Waxwing													2					

Table 3. (cont.) Capture summary for the six individual MAPS stations operated on Naval Air Station Brunswick and Redington Training Facility in 2005. 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
Tennessee Warbler													2					
Nashville Warbler	3		3				2		1				2			2		
Chestnut-sided Warbler							1											
Magnolia Warbler							10	1	10	6		6	13		1	5		6
Black-throated Blue Warbler							5			5						1		
Yellow-rumped Warbler				1			4			5			3			5		1
Black-throated Green Warb.	3	2	2	1		1				1			1					
Blackburnian Warbler							1						3					
Bay-breasted Warbler													1					
Blackpoll Warbler													2			8		7
Black-and-white Warbler	1		2										1		1			
American Redstart							1		1	13		5	3			1		
Ovenbird	4	1	1	7		4	7		3	3	1	2	1					
Northern Waterthrush										1			3		1	1	1	
Common Yellowthroat	6	2	4	3			1			3		2	4		3	1		
Wilson's Warbler													1					
Canada Warbler	1	1					1			11		6	1					
Unidentified Warbler														5				
Scarlet Tanager	1																	
Song Sparrow										3						1		
Swamp Sparrow													2					
White-throated Sparrow	2		3				5			6		6	4		5	3		1
Dark-eyed Junco										2			2		1	5		1
Baltimore Oriole	1																	
Purple Finch										3								
American Goldfinch	2																	

Table 3. (cont.) Capture summary for the six individual MAPS stations operated on Naval Air Station Brunswick and Redington Training Facility in 2005. 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
ALL SPECIES POOLED	36	7	19	31		11	62	2	21	104	4	49	84	12	16	60	2	22
Total Number of Captures		62			42			85			157			112			84	
Number of Species	17	5	9	12		4	19	2	6	25	3	11	37	6	10	16	2	6
Total Number of Species		18			12			19			26			39			16	

Table 4. Numbers of adult and young individual birds captured per 600 net-hours and reproductive index (young/adult) at the six individual MAPS stations operated Naval Air Station Brunswick and Redington Training Facility in 2005.

	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
Yellow-bellied Sapsucker													3.0	0.0	0.00			
Downy Woodpecker				1.4	0.0	0.00	0.0	1.5	und.[1]	1.6	0.0	0.00	0.0	1.5	und.[1]			
Hairy Woodpecker													3.0	0.0	0.00			
Yellow-bellied Flycatcher										1.6	0.0	0.00	6.1	0.0	0.00	3.1	0.0	0.00
Traill's Flycatcher										12.5	0.0	0.00	4.6	0.0	0.00			
Least Flycatcher										0.0	1.6	und.[1]	1.5	0.0	0.00			
Eastern Phoebe													1.5	0.0	0.00			
Blue-headed Vireo	5.9	0.0	0.00				1.5	1.5	1.00				1.5	0.0	0.00			
Philadelphia Vireo										3.1	0.0	0.00						
Red-eyed Vireo	1.5	0.0	0.00	4.3	0.0	0.00				7.8	0.0	0.00	1.5	0.0	0.00			
Gray Jay																1.5	1.5	1.00
Blue Jay	1.5	0.0	0.00										3.0	0.0	0.00			
Black-capped Chickadee	1.5	0.0	0.00	1.4	0.0	0.00	8.9	0.0	0.00	7.8	0.0	0.00	7.6	4.6	0.60	1.5	0.0	0.00
Boreal Chickadee																3.1	0.0	0.00
Tufted Titmouse				2.9	0.0	0.00												
Red-breasted Nuthatch							4.5	0.0	0.00				1.5	0.0	0.00			
Brown Creeper				1.4	2.9	2.00				1.6	1.6	1.00						
Winter Wren							0.0	1.5	und.	1.6	0.0	0.00						
Golden-crowned Kinglet										0.0	3.1	und.	0.0	1.5	und.			
Veery	4.5	0.0	0.00	2.9	0.0	0.00							1.5	0.0	0.00			
Swainson's Thrush	1.5	0.0	0.00				7.4	7.4	1.00	20.3	4.7	0.23	3.0	0.0	0.00	25.9	7.6	0.29
Hermit Thrush	3.0	0.0	0.00	8.6	2.9	0.33	0.0	4.5	und.				1.5	0.0	0.00			
American Robin				1.4	0.0	0.00	1.5	0.0	0.00	6.2	3.1	0.50	0.0	1.5	und.			
Gray Catbird													1.5	0.0	0.00			

Table 4. (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 Naval Air Station Brunswick and Redington Training Facility in 2005.

	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
Cedar Waxwing													3.0	0.0	0.00			
Tennessee Warbler													3.0	0.0	0.00			
Nashville Warbler	4.5	0.0	0.00				3.0	0.0	0.00				1.5	0.0	0.00	3.1	0.0	0.00
Chestnut-sided Warbler							0.0	1.5	und.									
Magnolia Warbler							8.9	5.9	0.67	10.9	1.6	0.14	10.7	9.1	0.86	12.2	0.0	0.00
Black-throated Blue Warbler							4.5	1.5	0.33	6.2	0.0	0.00				0.0	1.5	und.[1]
Yellow-rumped Warbler				1.4	0.0	0.00	3.0	1.5	0.50	7.8	0.0	0.00	3.0	1.5	0.50	6.1	1.5	0.25
Black-throated Green Warbler	5.9	0.0	0.00	2.9	0.0	0.00				1.6	0.0	0.00	1.5	0.0	0.00			
Blackburnian Warbler							1.5	0.0	0.00				3.0	0.0	0.00			
Bay-breasted Warbler													0.0	0.0	0.00			
Blackpoll Warbler													0.0	0.0	0.00	16.8	0.0	0.00
Black-and-white Warbler	3.0	0.0	0.00										0.0	1.5	und.			
American Redstart							1.5	0.0	0.00	9.4	7.8	0.83	3.0	1.5	0.50	0.0	1.5	und.
Ovenbird	5.9	0.0	0.00	7.2	2.9	0.40	7.4	0.0	0.00	6.2	0.0	0.00	1.5	0.0	0.00			
Northern Waterthrush										1.6	0.0	0.00	4.6	0.0	0.00	1.5	0.0	0.00
Common Yellowthroat	11.9	0.0	0.00	4.3	0.0	0.00	1.5	0.0	0.00	4.7	1.6	0.33	6.1	0.0	0.00	1.5	0.0	0.00
Wilson's Warbler													1.5	0.0	0.00			
Canada Warbler	3.0	0.0	0.00				0.0	0.0	0.00	15.6	1.6	0.10	1.5	0.0	0.00			
Scarlet Tanager	1.5	0.0	0.00															
Song Sparrow										4.7	0.0	0.00				0.0	1.5	und.
Swamp Sparrow													3.0	0.0	0.00			
White-throated Sparrow	3.0	0.0	0.00				3.0	4.5	1.50	10.9	3.1	0.29	10.7	0.0	0.00	4.6	0.0	0.00
Dark-eyed Junco										1.6	0.0	0.00	0.0	3.0	und.	6.1	3.1	0.50
Baltimore Oriole	1.5	0.0	0.00															

Table 4. (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 Naval Air Station Brunswick and Redington Training Facility in 2005.

	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
Purple Finch										3.1	1.6	0.50						
American Goldfinch	3.0	0.0	0.00															
ALL SPECIES POOLED	62.4	0.0	0.00	40.1	8.6	0.21	57.9	31.2	0.54	148.3	31.2	0.21	100.4	25.9	0.26	87.0	18.3	0.21
Number of Species	17	0		12	3		14	10		23	11		30	9		13	7	
Total Number of Species		17			12			18			25			35			16	

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

Table 5. Summary of results for all six Naval Air Station Brunswick and Redington Training Facility MAPS stations combined in 2005.

Species	Birds captured: Newly banded	Un-banded	Recap-tured	Birds/600 nethours: Adults	Young	Reprod. Index
Ruby-throated Hummingbird		5				
Yellow-bellied Sapsucker	2			0.5	0.0	0.00
Downy Woodpecker	4			0.5	0.5	1.00
Hairy Woodpecker	1	1		0.5	0.0	0.00
Yellow-bellied Flycatcher	6		1	1.8	0.0	0.00
Traill's Flycatcher	10		2	2.8	0.0	0.00
Least Flycatcher	2			0.3	0.3	1.00
Eastern Phoebe	1			0.3	0.0	0.00
Blue-headed Vireo	7		1	1.5	0.3	0.17
Philadelphia Vireo	2			0.5	0.0	0.00
Red-eyed Vireo	9		1	2.5	0.0	0.00
Gray Jay	2			0.3	0.3	1.00
Blue Jay	3		1	0.8	0.0	0.00
Black-capped Chickadee	21	4	5	4.8	0.8	0.16
Boreal Chickadee	2			0.5	0.0	0.00
Tufted Titmouse	2			0.5	0.0	0.00
Red-breasted Nuthatch	4		1	1.0	0.0	0.00
Brown Creeper	5			0.5	0.8	1.50
Winter Wren	2			0.3	0.3	1.00
Golden-crowned Kinglet	4			0.0	0.8	und.[1]
Veery	5		3	1.5	0.0	0.00
Swainson's Thrush	42	2	24	9.5	3.0	0.32
Hermit Thrush	12		6	2.3	1.3	0.56
American Robin	8	1	2	1.5	0.8	0.50
Gray Catbird	1		1	0.3	0.0	0.00
Cedar Waxwing	2			0.5	0.0	0.00
Tennessee Warbler	2			0.5	0.0	0.00
Nashville Warbler	9		4	2.0	0.0	0.00
Chestnut-sided Warbler	1			0.0	0.3	und.
Magnolia Warbler	34	1	23	7.0	2.8	0.39
Black-throated Blue Warbler	11			1.8	0.5	0.29
Yellow-rumped Warbler	18		1	3.5	0.8	0.21
Black-throated Green Warbler	6	2	3	2.0	0.0	0.00

Table 5. (cont.) Summary of results for all six Naval Air Station Brunswick and Redington Training Facility MAPS stations combined in 2005.

Species	Birds captured: Newly banded	Un-banded	Recap-tured	Birds/600 nethours: Adults	Young	Reprod. Index
Blackburnian Warbler	4			0.8	0.0	0.00
Bay-breasted Warbler	1			0.0	0.0	und.
Blackpoll Warbler	10		7	2.8	0.0	0.00
Black-and-white Warbler	2		3	0.5	0.3	0.50
American Redstart	18		6	2.3	1.8	0.78
Ovenbird	22	2	10	4.8	0.5	0.11
Northern Waterthrush	5	1	1	1.3	0.0	0.00
Common Yellowthroat	18	2	9	5.0	0.3	0.05
Wilson's Warbler	1			0.3	0.0	0.00
Canada Warbler	14	1	6	3.3	0.3	0.08
Unidentified Warbler		5				
Scarlet Tanager	1			0.3	0.0	0.00
Song Sparrow	4			0.8	0.3	0.33
Swamp Sparrow	2			0.5	0.0	0.00
White-throated Sparrow	20		15	5.3	1.3	0.24
Dark-eyed Junco	9		2	1.3	1.0	0.80
Baltimore Oriole	1			0.3	0.0	0.00
Purple Finch	3			0.5	0.3	0.50
American Goldfinch	2			0.5	0.0	0.00
ALL SPECIES POOLED	377	27	138	81.8	18.8	0.23
Total Number of Captures		542				
Number of Species	50	11	25	47	24	
Total Number of Species		51			49	

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

Table 6. Percentage changes between 2004 and 2005 in the numbers of individual ADULT birds captured at six constant-effort MAPS stations Naval Air Station Brunswick and Redington Training Facility.

							All six stations combined					
							Number of adults					
Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	2004	2005	Percent change	SE[2]	
Yellow-bellied Sapsucker			-100.0		100.0		2	2	2	0.0	100.0	
Downy Woodpecker		+[3]		+[3]			2	0	2	+[3]		
Hairy Woodpecker	-100.0				100.0		2	3	2	-33.3	88.9	
Yellow-bellied Flycatcher				+	33.3	0.0	3	5	7	40.0	31.7	
Traill's Flycatcher				60.0	50.0		2	7	11	57.1	4.1	
Least Flycatcher				-100.0	-50.0		2	3	1	-66.7	22.2	
Eastern Phoebe					+[3]		1	0	1	+		
Blue-headed Vireo	+[3]		0.0		+		3	1	6	500.0	793.7	
Philadelphia Vireo				0.0			1	2	2	0.0		
Red-eyed Vireo	0.0	200.0		150.0	+		4	4	10	150.0	54.0	*
Gray Jay						+[3]	1	0	1	+		
Blue Jay	-50.0				+		2	2	2	0.0	100.0	
Black-capped Chickadee	+	0.0	500.0	+	0.0	-75.0	6	11	19	72.7	96.0	
Boreal Chickadee						-60.0	1	5	2	-60.0		
Tufted Titmouse		+					1	0	1	+		
Red-breasted Nuthatch	-100.0	-100.0	+[3]		-100.0		4	3	3	0.0	133.3	
Brown Creeper		+		+			2	0	2	+		
Winter Wren				-66.7			1	3	1	-66.7		
Golden-crowned Kinglet			-100.0		-100.0		2	2	0	-100.0	88.9	
Veery	+	0.0			0.0		3	3	6	100.0	152.8	
Swainson's Thrush	+		25.0	30.0	-33.3	77.8	5	26	37	42.3	18.4	*
Hermit Thrush	-75.0	100.0	-100.0		-66.7		4	19	9	-52.6	33.3	
American Robin		+	-50.0	300.0	-100.0		4	4	6	50.0	106.1	
Gray Catbird				-100.0	+		2	1	1	0.0	200.0	

Table 6. (cont.) Percentage changes between 2004 and 2005 in the numbers of individual ADULT birds captured at six constant-effort MAPS stations Naval Air Station Brunswick and Redington Training Facility.

							All six stations combined					
								Number of adults				
Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	2004	2005	Percent change	SE[2]	
Cedar Waxwing	-100.0			-100.0	100.0		3	3	2	-33.3	66.7	
Tennessee Warbler					+		1	0	2	+		
Nashville Warbler	-25.0		100.0	-100.0	-75.0	0.0	5	13	8	-38.5	21.8	
Chestnut-sided Warbler							0	0	0			
Magnolia Warbler			20.0	-22.2	400.0	-27.3	4	26	26	0.0	24.3	
Black-throated Blue Warb.			-50.0	-62.5	-100.0	-100.0	4	17	6	-64.7	8.1	***
Yellow-rumped Warbler		+	+	150.0	-50.0	100.0	5	8	14	75.0	79.7	
Black-thrted. Green Warb.	-33.3	-66.7	-100.0	0.0	-100.0	-100.0	6	16	7	-56.3	12.2	***
Blackburnian Warbler			0.0		-66.7		2	7	3	-57.1	16.3	
Blackpoll Warbler						0.0	1	10	10	0.0		
Black-and-white Warbler	0.0						1	2	2	0.0		
American Redstart			+	-14.3	0.0		3	8	8	0.0	21.7	
Ovenbird	0.0	0.0	0.0	-20.0	+		5	19	19	0.0	8.3	
Northern Waterthrush		-100.0		0.0	50.0	+	4	4	5	25.0	48.9	
Mourning Warbler				-100.0			1	1	0	-100.0		
Common Yellowthroat	60.0	-25.0	+	-25.0	-50.0	+	6	17	18	5.9	26.9	
Canada Warbler	+		-100.0	400.0	0.0		4	4	13	225.0	163.0	
Scarlet Tanager	+						1	0	1	+		
Chipping Sparrow	-100.0						1	1	0	-100.0		
Song Sparrow				+	-100.0		2	1	3	200.0	600.0	
Swamp Sparrow					0.0		1	2	2	0.0		
White-throated Sparrow	+		-60.0	40.0	-53.8	-40.0	5	28	20	-28.6	21.6	
Dark-eyed Junco			-100.0	-50.0		300.0	3	4	5	25.0	103.3	
Northern Cardinal		-100.0					1	1	0	-100.0		

Table 6. (cont.) Percentage changes between 2004 and 2005 in the numbers of individual ADULT birds captured at six constant-effort MAPS stations Naval Air Station Brunswick and Redington Training Facility.

								All six stations combined			
								Number of adults			
Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	2004	2005	Percent change	SE[2]
Common Grackle		-100.0					1	1	0	-100.0	
Baltimore Oriole	+						1	0	1	+	
Purple Finch				-33.3			1	3	2	-33.3	
American Goldfinch	+						1	0	2	+	
ALL SPECIES POOLED	13.5	3.8	-4.9	20.5	-15.2	1.9	6	302	313	3.6	6.8
No. species that increased[4]	10(9)	7(5)	8(4)	12(5)	14(7)	6(3)				23(9)	
No. species that decreased[5]	8(4)	6(4)	9(6)	13(5)	14(6)	6(2)				17(5)	
No. species remained same	3	3	3	3	5	3				11	
Total Number of Species	21	16	20	28	33	15				51	
Proportion of increasing (decreasing) species	0.476	0.438	(0.450)	0.429	(0.424)	0.400				0.451	
Sig. of increase (decrease)[6]	0.668	0.773	(0.748)	0.828	(0.852)	0.849				0.799	

[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 2004.
[4] No. of species for which adults were captured in 2005 but not in 2004 are in parentheses.
[5] No. of species for which adults were captured in 2004 but not in 2005 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. Percentage changes between 2004 and 2005 in the numbers of individual YOUNG birds captured at six constant-effort MAPS stations Naval Air Station Brunswick and Redington Training Facility.

							All six stations combined				
								Number of young			
Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	2004	2005	Percent change	SE[2]
Yellow-bellied Sapsucker							0	0	0		
Downy Woodpecker			+[3]		+[3]		2	0	2	+[3]	
Hairy Woodpecker							0	0	0		
Yellow-bellied Flycatcher							0	0	0		
Traill's Flycatcher							0	0	0		
Least Flycatcher				0.0			1	1	1	0.0	
Eastern Phoebe							0	0	0		
Blue-headed Vireo			+				1	0	1	+	
Philadelphia Vireo				-100.0			1	2	0	-100.0	
Red-eyed Vireo							0	0	0		
Gray Jay						+[3]	1	0	1	+	
Blue Jay							0	0	0		
Black-capped Chickadee					200.0		1	1	3	200.0	
Boreal Chickadee							0	0	0		
Tufted Titmouse							0	0	0		
Red-breasted Nuthatch							0	0	0		
Brown Creeper		+[3]		+[3]			2	0	3	+	
Winter Wren			+				1	0	1	+	
Golden-crowned Kinglet				+	+	-100.0	3	2	3	50.0	229.1
Veery							0	0	0		
Swainson's Thrush			66.7	-40.0	-100.0	400.0	4	10	13	30.0	62.0
Hermit Thrush		+	-57.1				2	7	5	-28.6	57.1
American Robin				+	+		2	0	3	+	
Gray Catbird							0	0	0		

Table 7. (cont.) Percentage changes between 2004 and 2005 in the numbers of individual YOUNG birds captured at six constant-effort MAPS stations Naval Air Station Brunswick and Redington Training Facility.

							All six stations combined					
								Number of young				
Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	2004	2005	Percent change	SE[2]	
Cedar Waxwing							0	0	0			
Tennessee Warbler							0	0	0			
Nashville Warbler	-100.0			-100.0	-100.0		3	6	0	-100.0	88.9	
Chestnut-sided Warbler			+				1	0	1	+		
Magnolia Warbler			300.0	-75.0	200.0		3	7	11	57.1	113.4	
Black-throated Blue Warb.			-75.0	-100.0	-100.0	+	4	12	2	-83.3	13.8	***
Yellow-rumped Warbler			+	-100.0	0.0	+	4	3	3	0.0	94.3	
Black-thrted. Green Warb.					-100.0		1	3	0	-100.0		
Blackburnian Warbler				-100.0	-100.0		2	6	0	-100.0	88.9	
Blackpoll Warbler					-100.0		1	1	0	-100.0		
Black-and-white Warbler					+		1	0	1	+		
American Redstart				+	+	+	3	0	7	+		
Ovenbird		+	-100.0	-100.0	-100.0		4	7	2	-71.4	39.4	
Northern Waterthrush							0	0	0			
Mourning Warbler				-100.0			1	1	0	-100.0		
Common Yellowthroat	-100.0			-50.0	-100.0		3	5	1	-80.0	18.3	**
Canada Warbler				+	-100.0		2	1	1	0.0	200.0	
Scarlet Tanager							0	0	0			
Chipping Sparrow							0	0	0			
Song Sparrow						+	1	0	1	+		
Swamp Sparrow					-100.0		1	2	0	-100.0		
White-throated Sparrow			0.0	-71.4	-100.0	-100.0	4	13	5	-61.5	19.1	**
Dark-eyed Junco			-100.0		+	+	3	1	4	300.0	600.0	
Northern Cardinal							0	0	0			

Table 7. (cont.) Percentage changes between 2004 and 2005 in the numbers of individual YOUNG birds captured at six constant-effort MAPS stations Naval Air Station Brunswick and Redington Training Facility.

							All six stations combined				
								Number of young			
Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	2004	2005	Percent change	SE[2]
Common Grackle							0	0	0		
Baltimore Oriole							0	0	0		
Purple Finch				+			1	0	1	+	
American Goldfinch							0	0	0		
ALL SPECIES POOLED	-100.0	+	-8.7	-45.9	-29.2	140.0	6	91	76	-16.5	18.3
No. species that increased4	0(0)	3(3)	7(5)	6(6)	8(6)	7(6)				16(11)	
No. species that decreased5	2(2)	0(0)	4(2)	11(7)	11(11)	2(2)				12(7)	
No. species remained same	0	0	1	1	1	0				3	
Total Number of Species	2	3	12	18	20	9				31	
Proportion of increasing (decreasing) species	(1.000)	1.000	(0.333)	(0.611)	(0.550)	0.778				(0.387)	
Sig. of increase (decrease)[6]	(0.250)	0.125	(0.927)	(0.240)	(0.412)	0.090 *				(0.925)	

[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 2004.
[4] No. of species for which young birds were captured in 2005 but not in 2004 are in parentheses.
[5] No. of species for which young birds were captured in 2004 but not in 2005 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 8. Changes between 2004 and 2005 in the REPRODUCTIVE INDEX (young/adult) at six constant-effort MAPS stations Naval Air Station Brunswick and Redington Training Facility.

							All six stations combined				
							Reproductive Index				
Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	2004	2005	Change	SE[2]
Yellow-bellied Sapsucker			nc.[3]		0.000		2	0.000	0.000	0.000	0.000
Downy Woodpecker		nc.[3]	nc.	nc.[3]	nc.[3]		4	und.[4]	1.000	nc.[3]	
Hairy Woodpecker	nc.[3]				0.000		2	0.000	0.000	0.000	0.000
Yellow-bellied Flycatcher				nc.	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.	0.000		2	0.333	1.000	0.667	2.049
Eastern Phoebe					nc.		1	und.	0.000	nc.	
Blue-headed Vireo	nc.		1.000		nc.		3	0.000	0.167	0.167	0.220
Philadelphia Vireo				-1.000			1	1.000	0.000	-1.000	
Red-eyed Vireo	0.000	0.000		0.000	nc.		4	0.000	0.000	0.000	0.000
Gray Jay						nc.[3]	1	und.	1.000	nc.	
Blue Jay	0.000				nc.		2	0.000	0.000	0.000	0.000
Black-capped Chickadee	nc.	0.000	0.000	nc.	0.400	0.000	6	0.091	0.158	0.067	0.161
Boreal Chickadee						0.000	1	0.000	0.000	0.000	
Tufted Titmouse		nc.					1	und.	0.000	nc.	
Red-breasted Nuthatch	nc.	nc.	nc.		nc.		4	0.000	0.000	0.000	0.000
Brown Creeper		nc.		nc.			2	und.	1.500	nc.	
Winter Wren			nc.	0.000			2	0.000	1.000	1.000	2.000
Golden-crowned Kinglet			nc.	nc.	nc.	nc.	4	1.000	und.[4]	nc.	
Veery	nc.	0.000			0.000		3	0.000	0.000	0.000	0.000
Swainson's Thrush	nc.		0.250	-0.269	-0.333	0.201	5	0.385	0.351	-0.033	0.174
Hermit Thrush	0.000	0.333	nc.		0.000		4	0.368	0.556	0.187	0.585
American Robin		nc.	0.000	0.500	nc.		4	0.000	0.500	0.500	0.236
Gray Catbird				nc.	nc.		2	0.000	0.000	0.000	0.000

Table 8. (cont.) Changes between 2004 and 2005 in the REPRODUCTIVE INDEX (young/adult) at six constant-effort MAPS stations Naval Air Station Brunswick and Redington Training Facility.

							All six stations combined					
							Reproductive Index					
Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	2004	2005	Change	SE[2]	
Cedar Waxwing	nc.			nc.	0.000		3	0.000	0.000	0.000	0.000	
Tennessee Warbler					nc.		1	und.	0.000	nc.		
Nashville Warbler	-0.250		0.000	nc.	-0.250	0.000	5	0.462	0.000	-0.462	0.297	
Chestnut-sided Warbler			nc.				1	und.	und.	nc.		
Magnolia Warbler			0.467	-0.302	-0.800	0.000	4	0.269	0.423	0.154	0.304	
Black-throated Blue Warb.			-0.333	-0.625	nc.	nc.	4	0.706	0.333	-0.373	0.331	
Yellow-rumped Warbler		nc.	nc.	-1.000	0.250	0.250	5	0.375	0.214	-0.161	0.241	
Black-thrted. Green Warb.	0.000	0.000	nc.	0.000	nc.	nc.	6	0.188	0.000	-0.188	0.222	
Blackburnian Warbler			0.000	nc.	-0.667		3	0.857	0.000	-0.857	0.430	
Blackpoll Warbler					nc.	0.000	2	0.100	0.000	-0.100	0.200	
Black-and-white Warbler	0.000				nc.		2	0.000	0.500	0.500	1.000	
American Redstart			nc.	0.833	1.000	nc.	4	0.000	0.875	0.875	0.196	**
Ovenbird	0.000	0.400	-0.800	-0.400	nc.		5	0.368	0.105	-0.263	0.221	
Northern Waterthrush		nc.		0.000	0.000	nc.	4	0.000	0.000	0.000	0.000	
Mourning Warbler				nc.			1	1.000	und.	nc.		
Common Yellowthroat	-0.200	0.000	nc.	-0.167	-0.500	nc.	6	0.294	0.056	-0.239	0.126	
Canada Warbler	nc.		nc.	0.100	-1.000		4	0.250	0.077	-0.173	0.271	
Scarlet Tanager	nc.						1	und.	0.000	nc.		
Chipping Sparrow	nc.						1	0.000	und.	nc.		
Song Sparrow				nc.	nc.	nc.	3	0.000	0.333	0.333	0.577	
Swamp Sparrow					-1.000		1	1.000	0.000	-1.000		
White-throated Sparrow	nc.		0.900	-1.114	-0.077	-0.400	5	0.464	0.250	-0.214	0.325	
Dark-eyed Junco			nc.	0.000	nc.	0.500	4	0.250	0.800	0.550	0.630	
Northern Cardinal		nc.					1	0.000	und.	nc.		

Table 8. (cont.) Changes between 2004 and 2005 in the REPRODUCTIVE INDEX (young/adult) at six constant-effort MAPS stations Naval Air Station Brunswick and Redington Training Facility.

							All six stations combined				
								Reproductive Index			
Species	Golf Course	Chimney Rock	Potato Nubble	Redingt. Pond	Blueline Trail	Highland	n[1]	2004	2005	Change	SE[2]
Common Grackle		nc.					1	0.000	und.	nc.	
Baltimore Oriole	nc.						1	und.	0.000	nc.	
Purple Finch				0.500			1	0.000	0.500	0.500	
American Goldfinch	nc.						1	und.	0.000	nc.	
ALL SPECIES POOLED	-0.054	0.222	-0.023	-0.262	-0.060	0.126	6	0.301	0.243	-0.059	0.104
No. species that increased	0	2	4	4	3	3				12	
No. species that decreased	2	0	2	8	8	1				13	
No. species remained same	6	5	4	6	9	6				12	
Total Number of Species[5]	8	7	10	18	20	10				37	
Proportion of increasing (decreasing) species	(0.250)	0.286	(0.200)	(0.444)	(0.400)	0.300				(0.351)	
Sig. of increase (decrease)[6]	(0.965)	0.938	(0.989)	(0.760)	(0.868)	0.945				(0.976)	

[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 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.
*** $P < 0.01$; ** $0.01 \le P < 0.05$; * $0.05 \le P < 0.10$

Table 9. Mean numbers of aged individual birds captured per 600 net-hours and reproductive index at the six individual MAPS stations operated Naval Air Station Brunswick and Redington Training Facility averaged over the three years, 2003-2005. 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							0.5	0.0	0.00				2.1	0.0	0.00				0.4	0.0	0.00
Downy Woodpecker				0.5	0.0	0.00	0.0	1.1	und.[2]	1.1	0.0	0.00	1.7	1.1	0.33				0.5	0.3	0.75
Hairy Woodpecker	1.5	0.6	0.50				0.0	0.6	und.				2.1	0.0	0.00				0.6	0.2	0.33
Eastern Wood-Pewee				0.5	0.0	0.00													0.1	0.0	0.00
Yellow-bellied Flycatcher										0.5	0.0	0.00	7.4	0.0	0.00	3.0	0.0	0.00	1.8	0.0	0.00
Traill's Flycatcher										8.3	0.0	0.00	4.2	0.0	0.00	0.5	0.0	0.00	2.1	0.0	0.00
Least Flycatcher										1.0	1.6	1.00	1.5	0.6	0.00	0.5	0.0	0.00	0.5	0.3	0.78
Eastern Phoebe													1.1	0.0	0.00				0.2	0.0	0.00
Blue-headed Vireo	3.1	0.0	0.00				1.0	0.5	0.50	0.5	0.0	0.00	1.1	0.6	0.50				0.9	0.2	0.14
Philadelphia Vireo										4.2	1.0	0.33							0.7	0.2	0.33
Red-eyed Vireo	1.0	0.0	0.00	2.4	0.0	0.00	0.6	0.0	0.00	6.3	0.0	0.00	1.6	0.0	0.00				2.0	0.0	0.00
Gray Jay																0.5	0.5	1.00	0.1	0.1	1.00
Blue Jay	2.0	0.0	0.00	0.5	0.0	0.00	1.2	0.0	0.00				1.0	0.0	0.00				0.8	0.0	0.00
Black-capped Chickadee	4.5	0.0	0.00	2.0	0.0	0.00	3.5	0.0	0.00	3.7	0.5	0.25	8.3	2.0	0.27	3.0	0.5	0.33	4.1	0.5	0.12
Boreal Chickadee																5.0	0.0	0.00	0.8	0.0	0.00
Tufted Titmouse				1.0	0.0	0.00													0.2	0.0	0.00
Red-breasted Nuthatch	0.5	0.0	0.00	0.5	0.0	0.00	1.5	0.0	0.00	0.0	0.5	und.[2]	1.6	0.0	0.00				0.7	0.1	0.33
Brown Creeper	0.6	0.0	0.00	0.5	1.0	2.00				1.6	0.5	0.50							0.4	0.3	0.75
Winter Wren							0.0	0.5	und.	2.0	0.0	0.00							0.3	0.1	0.50
Golden-crowned Kinglet							0.5	0.6	0.00	0.0	1.0	und.	1.1	1.1	0.50	0.0	1.0	und.[2]	0.3	0.6	1.50
Ruby-crowned Kinglet													1.1	0.0	0.00				0.2	0.0	0.00
Veery	2.6	0.0	0.00	3.0	0.0	0.00				0.5	0.0	0.00	1.6	0.0	0.00				1.3	0.0	0.00
Swainson's Thrush	0.5	0.0	0.00	0.5	0.0	0.00	9.0	6.2	0.75	16.1	6.2	0.41	5.2	0.5	0.08	18.7	4.6	0.23	8.3	2.9	0.35
Hermit Thrush	10.6	0.0	0.00	5.9	1.0	0.11	2.4	6.0	1.40	0.0	1.1	und.	2.5	0.6	0.33				3.6	1.4	0.43
American Robin	1.1	0.0	0.00	1.0	0.0	0.00	3.2	0.0	0.00	3.7	1.0	0.17	1.1	1.6	1.00				1.6	0.4	0.24
Gray Catbird	0.0	0.6	und.[2]							0.5	0.0	0.00	0.5	0.0	0.00				0.2	0.1	0.00
Cedar Waxwing	0.5	0.0	0.00							3.2	0.0	0.00	2.1	0.0	0.00				1.0	0.0	0.00

Table 9. (cont.) Mean numbers of aged individual birds captured per 600 net-hours and reproductive index at the six individual MAPS stations operated Naval Air Station Brunswick and Redington Training Facility averaged over the three years, 2003-2005. 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										0.5	0.0	0.00	1.0	0.0	0.00				0.3	0.0	0.00
Nashville Warbler	4.6	0.5	0.08				1.5	0.0	0.00	1.0	2.5	2.00	5.8	2.2	0.25	7.6	0.5	0.03	3.5	0.9	0.24
Northern Parula													1.1	0.6	0.50				0.2	0.1	0.50
Chestnut-sided Warbler	0.6	0.0	0.00				0.0	0.5	und.	0.5	0.0	0.00							0.2	0.1	0.00
Magnolia Warbler							5.9	2.5	0.29	10.9	2.5	0.20	5.2	4.6	1.12	14.6	0.0	0.00	6.1	1.6	0.24
Black-thrted. Blue Warb.							6.7	3.6	0.50	8.2	3.6	0.41	0.5	2.0	3.00	1.0	0.5	0.00	2.7	1.6	0.56
Yellow-rumped Warbler				0.5	0.0	0.00	1.0	0.5	0.50	4.7	1.0	0.33	4.1	1.0	0.25	3.5	0.5	0.08	2.3	0.5	0.20
Black-thrtd. Green Warb.	4.9	0.0	0.00	5.5	0.0	0.00	1.5	0.0	0.00	1.0	0.0	0.00	1.0	2.6	1.50	1.0	0.0	0.00	2.5	0.4	0.19
Blackburnian Warbler							1.0	0.0	0.00	0.0	1.0	und.	4.5	3.6	1.22				0.9	0.8	1.29
Bay-breasted Warbler													0.6	0.0	0.00	1.0	0.0	0.00	0.3	0.0	0.00
Blackpoll Warbler													0.0	0.5	und.[2]	13.1	0.0	0.00	2.2	0.1	0.03
Black-and-white Warbler	2.5	0.0	0.00										0.0	0.5	und.				0.4	0.1	0.17
American Redstart							0.5	0.0	0.00	11.0	2.6	0.28	2.0	1.0	0.50	0.0	0.5	und.	2.2	0.7	0.30
Ovenbird	5.6	0.0	0.00	6.9	1.0	0.13	6.6	1.9	0.27	5.7	1.0	0.13	1.6	0.5	0.00	0.5	0.0	0.00	4.5	0.7	0.15
Northern Waterthrush	0.6	0.0	0.00	0.5	0.0	0.00	0.6	0.6	1.00	1.0	0.0	0.00	4.2	0.6	0.11	1.5	0.0	0.00	1.4	0.2	0.10
Mourning Warbler										0.5	0.5	1.00							0.1	0.1	1.00
Common Yellowthroat	9.2	0.5	0.07	5.5	0.0	0.00	2.2	0.0	0.00	3.6	1.5	0.42	5.7	1.0	0.17	1.5	0.0	0.00	4.6	0.5	0.11
Wilson's Warbler													0.5	0.0	0.00				0.1	0.0	0.00
Canada Warbler	1.6	0.0	0.00	1.0	0.0	0.00	1.1	0.0	0.00	8.4	0.5	0.03	1.0	1.1	0.50	0.5	0.5	1.00	2.2	0.3	0.18
Scarlet Tanager	0.5	0.0	0.00	1.0	0.0	0.00													0.3	0.0	0.00
Chipping Sparrow	0.5	0.0	0.00																0.1	0.0	0.00
Song Sparrow	0.6	0.0	0.00							1.6	0.0	0.00	0.5	0.0	0.00	0.0	0.5	und.	0.4	0.1	0.11
Lincoln's Sparrow	0.6	0.0	0.00																0.1	0.0	0.00
Swamp Sparrow										0.0	0.5	und.	2.0	1.0	0.50				0.3	0.3	0.50
White-throated Sparrow	2.7	0.0	0.00				3.4	2.9	1.05	8.3	5.6	0.73	14.4	2.2	0.15	7.1	4.5	0.52	6.0	2.6	0.42
Dark-eyed Junco							0.5	1.6	1.00	2.1	0.0	0.00	0.0	1.0	und.	3.5	1.5	0.33	1.0	0.7	0.68
Northern Cardinal				0.5	0.0	0.00													0.1	0.0	0.00

Table 9. (cont.) Mean numbers of aged individual birds captured per 600 net-hours and reproductive index at the six individual MAPS stations operated Naval Air Station Brunswick and Redington Training Facility averaged over the three years, 2003-2005. 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]
Common Grackle				0.5	0.0	0.00													0.1	0.0	0.00
Baltimore Oriole	0.5	0.0	0.00																0.1	0.0	0.00
Purple Finch										3.6	1.1	0.33							0.6	0.2	0.33
American Goldfinch	1.0	0.0	0.00																0.2	0.0	0.00
ALL SPECIES POOLED	64.5	2.1	0.03	40.2	2.9	0.07	55.7	29.6	0.53	125.9	37.6	0.30	104.4	33.8	0.32	87.9	15.7	0.18	79.4	20.2	0.25
Number of Species	27	4		21	3		23	15		32	22		38	25		20	12		58	36	
Total Number of Species		28			21			27			37			41			23			58	

[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] 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.

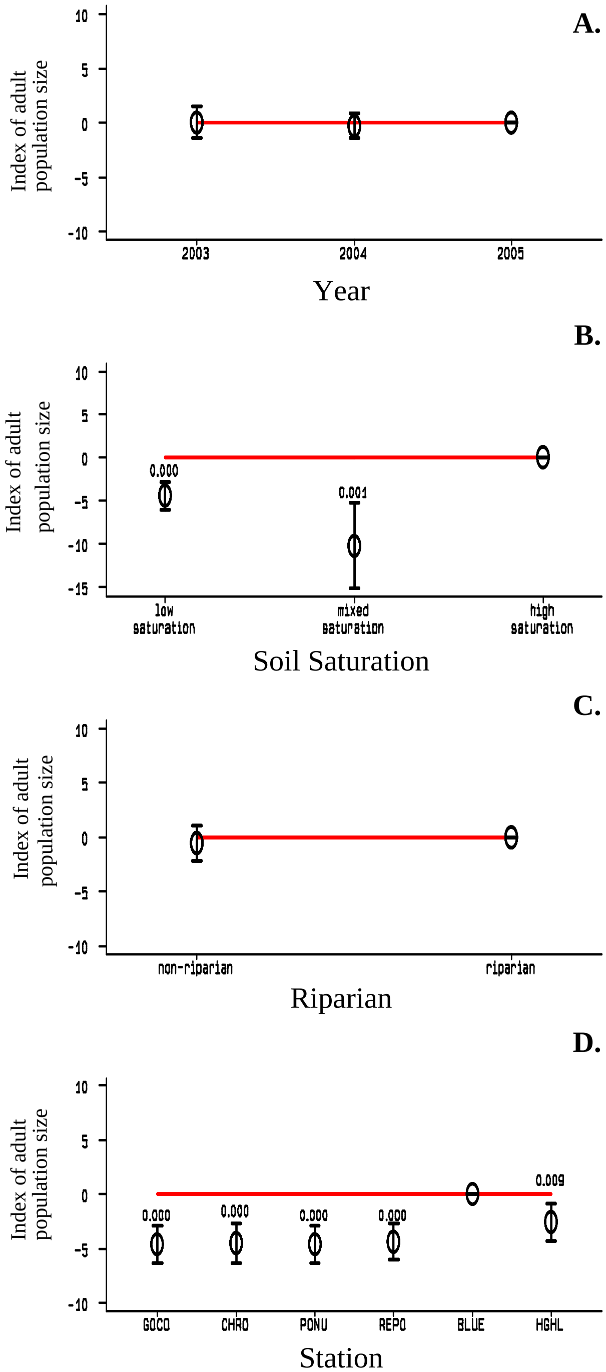

Figure 1. Relative mean numbers of adults (A-D) with 95% confidence intervals, for **Yellow-bellied Flycatcher**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours and elevation) thus controlling for the other variable while calculating the differences in the target variable. The variables included were year, soil saturation, and presence of a riparian zone for figures A-C or year and station for figure D (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

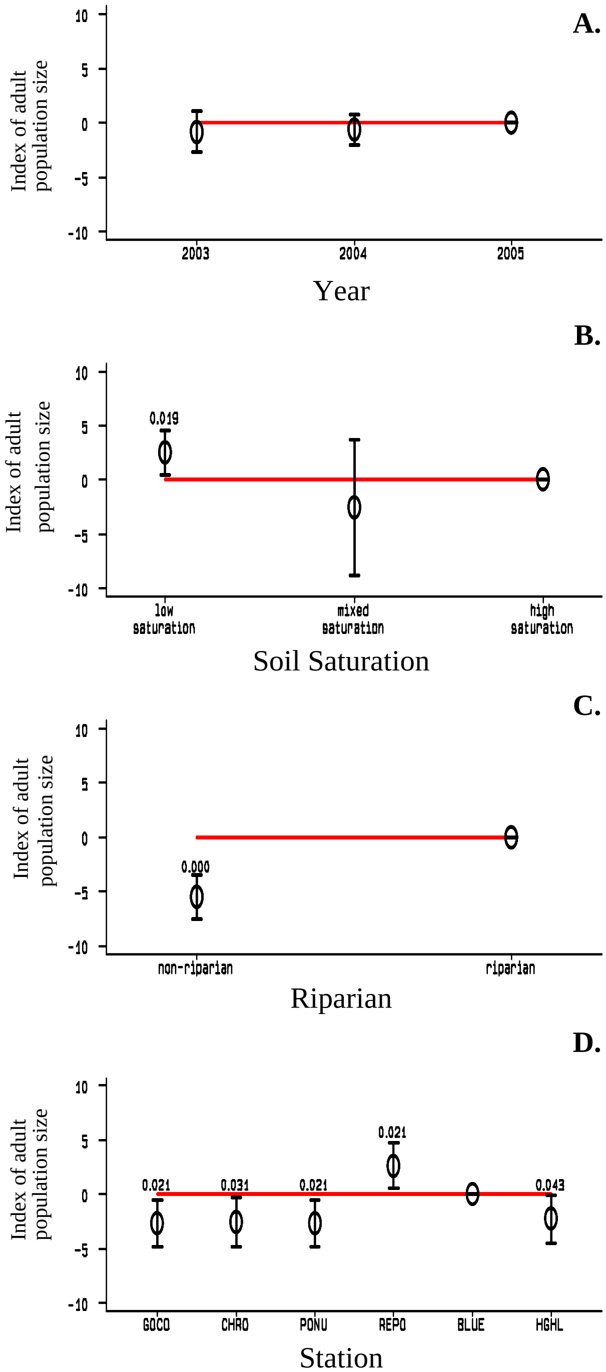

Figure 2. Relative mean numbers of adults (A-D) with 95% confidence intervals, for **Traill's Flycatcher**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours and elevation) thus controlling for the other variable while calculating the differences in the target variable. The variables included were year, soil saturation, and presence of a riparian zone for figures A-C or year and station for figure D (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

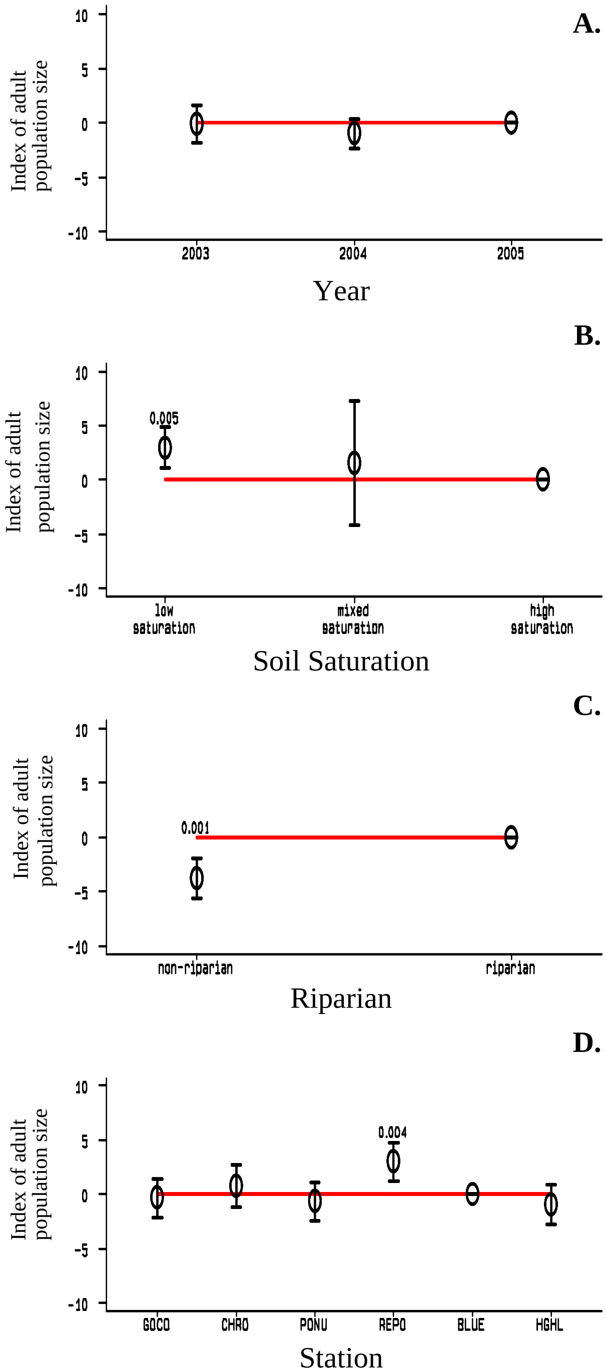

Figure 3. Relative mean numbers of adults (A-D) with 95% confidence intervals, for **Red-eyed Vireo**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours and elevation) thus controlling for the other variable while calculating the differences in the target variable. The variables included were year, soil saturation, and presence of a riparian zone for figures A-C or year and station for figure D (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

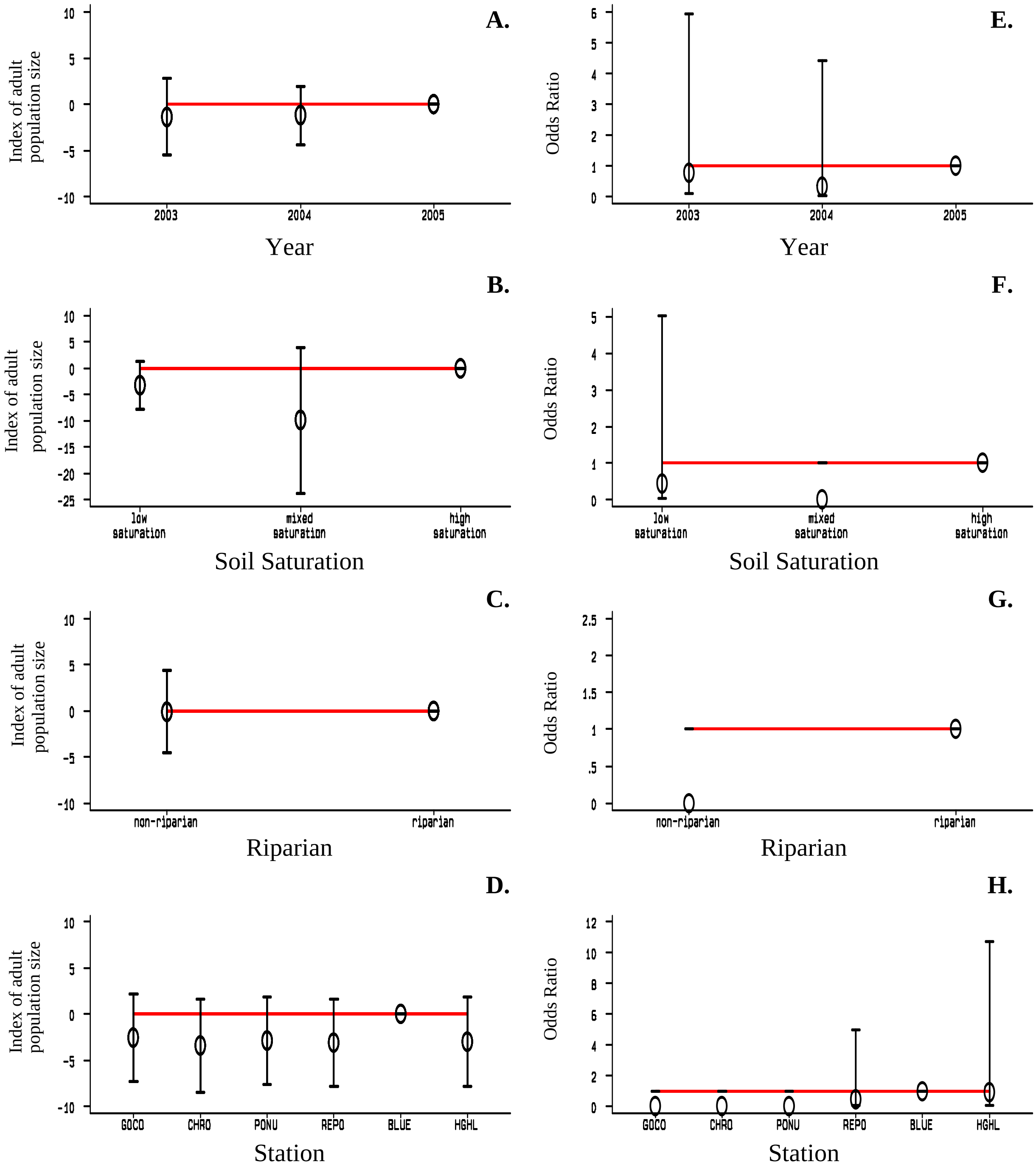

Figure 4. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E-H), with 95% confidence intervals, for **Black-capped Chickadee**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours) and the odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included, after controlling for elevation, were year, soil saturation, and presence of a riparian zone for figures A-C, E-G or year and station for figures D and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

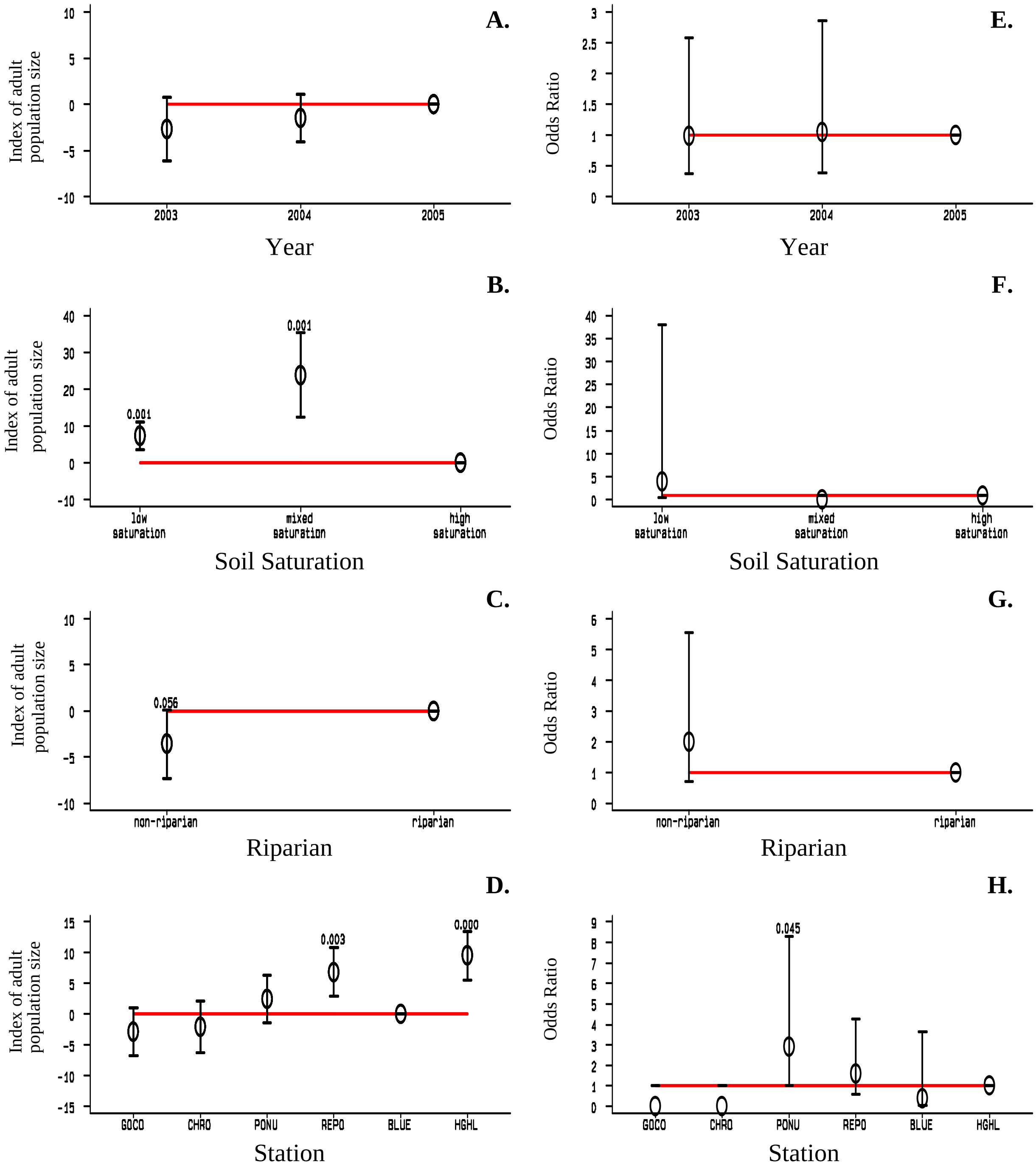

Figure 5. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E-H), with 95% confidence intervals, for **Swainson's Thrush**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours) and the odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included, after controlling for elevation, were year, soil saturation, and presence of a riparian zone for figures A-C, E-G or year and station for figures D and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

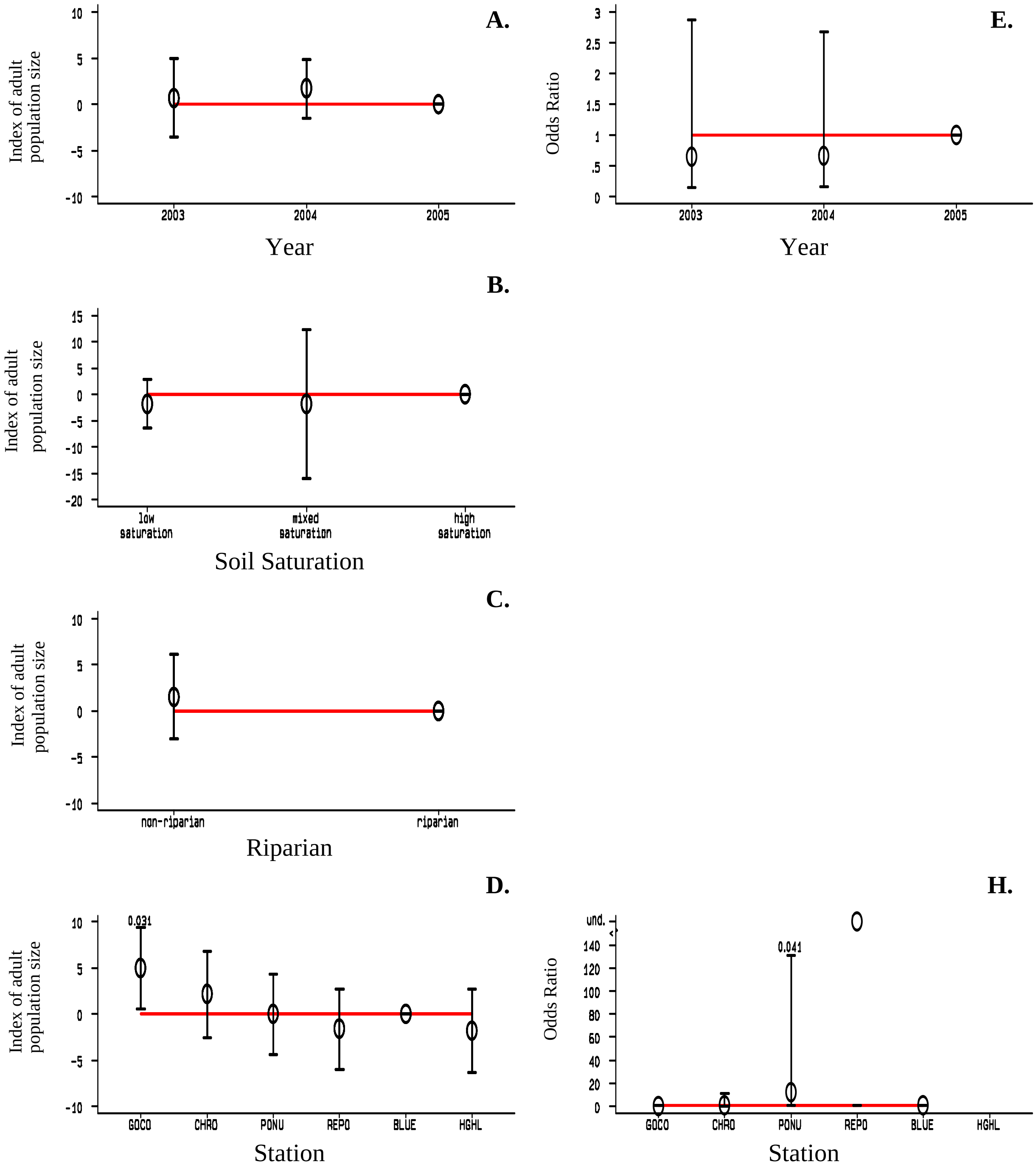

Figure 6. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E and H), with 95% confidence intervals, for **Hermit Thrush**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours and elevation) thus controlling for the other variable while calculating the differences in the target variable. The odds ratios for each design variable were estimated using univariate logistic regression because of the sparsity of young birds in the data. The variables included were year, soil saturation, and presence of a riparian zone for figures A-C or year and station for figure. Year or station were included for figure E and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

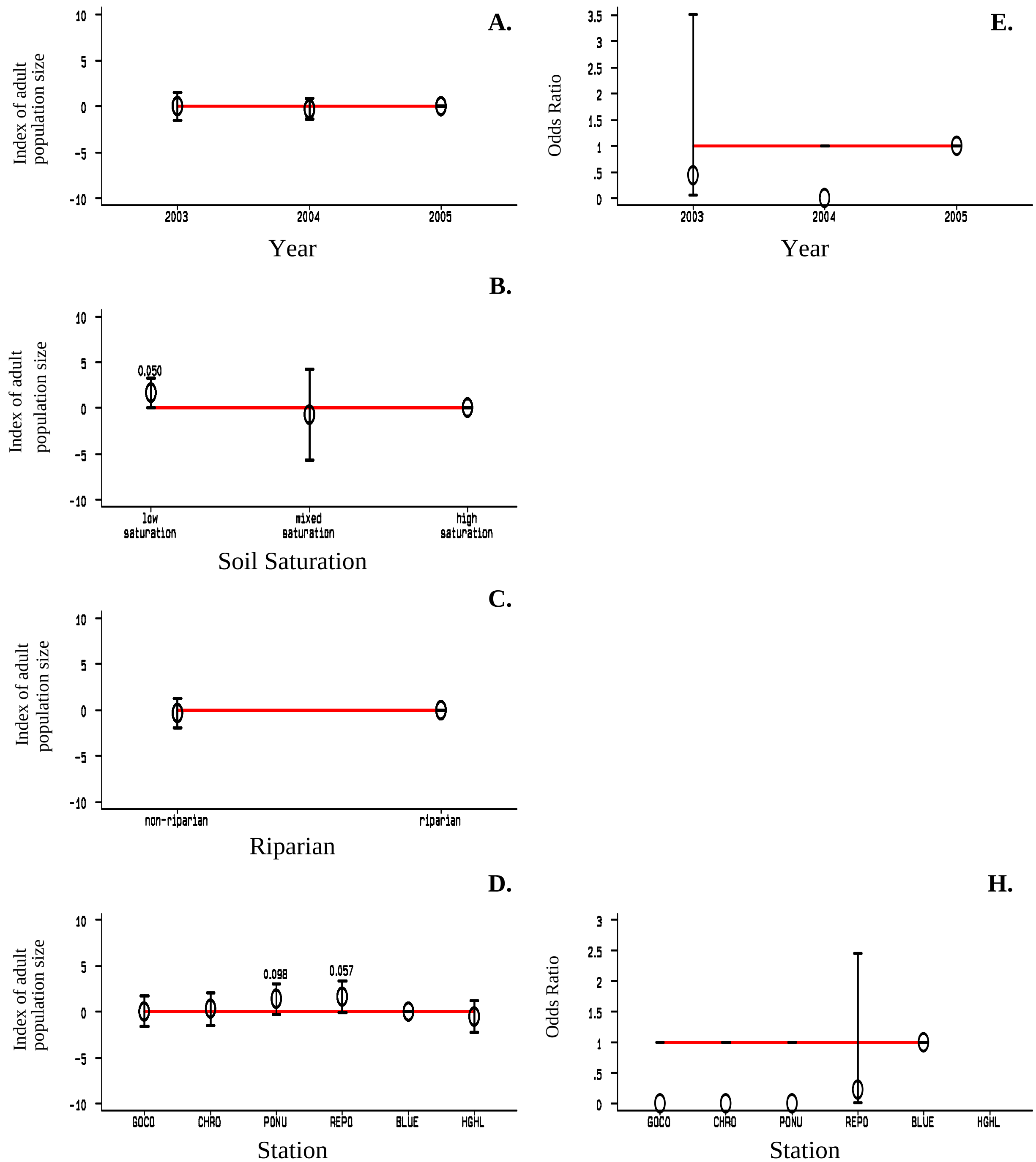

Figure 7. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E and H), with 95% confidence intervals, for **American Robin**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours and elevation) thus controlling for the other variable while calculating the differences in the target variable. The odds ratios for each design variable were estimated using univariate logistic regression because of the sparsity of young birds in the data. The variables included were year, soil saturation, and presence of a riparian zone for figures A-C or year and station for figure D. Year or station were included for figure E and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

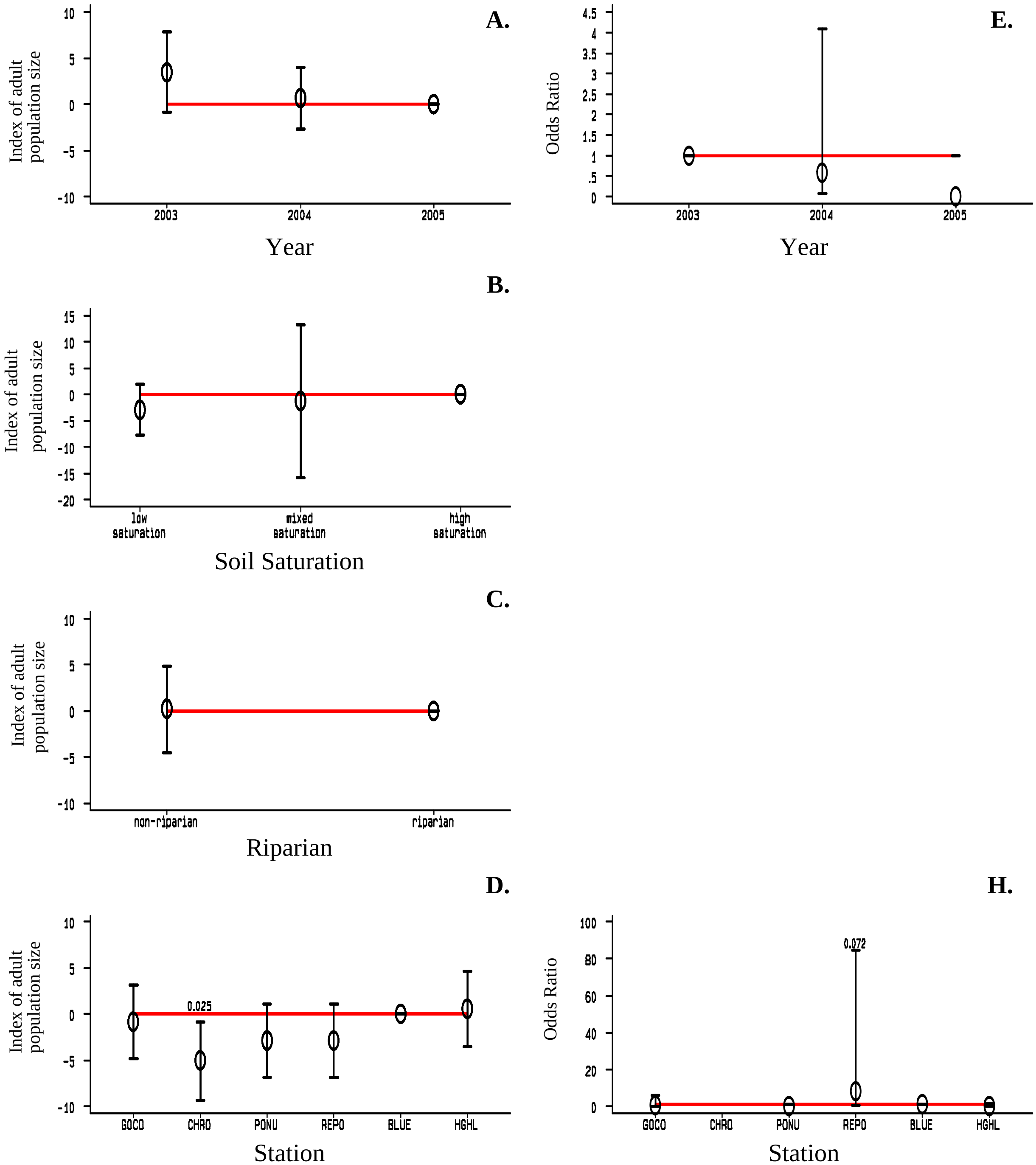

Figure 8. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E and H), with 95% confidence intervals, for **Nashville Warbler**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours and elevation), and odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included were year, soil saturation, and presence of a riparian zone for figures A-C or year and station for figures D, E, and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

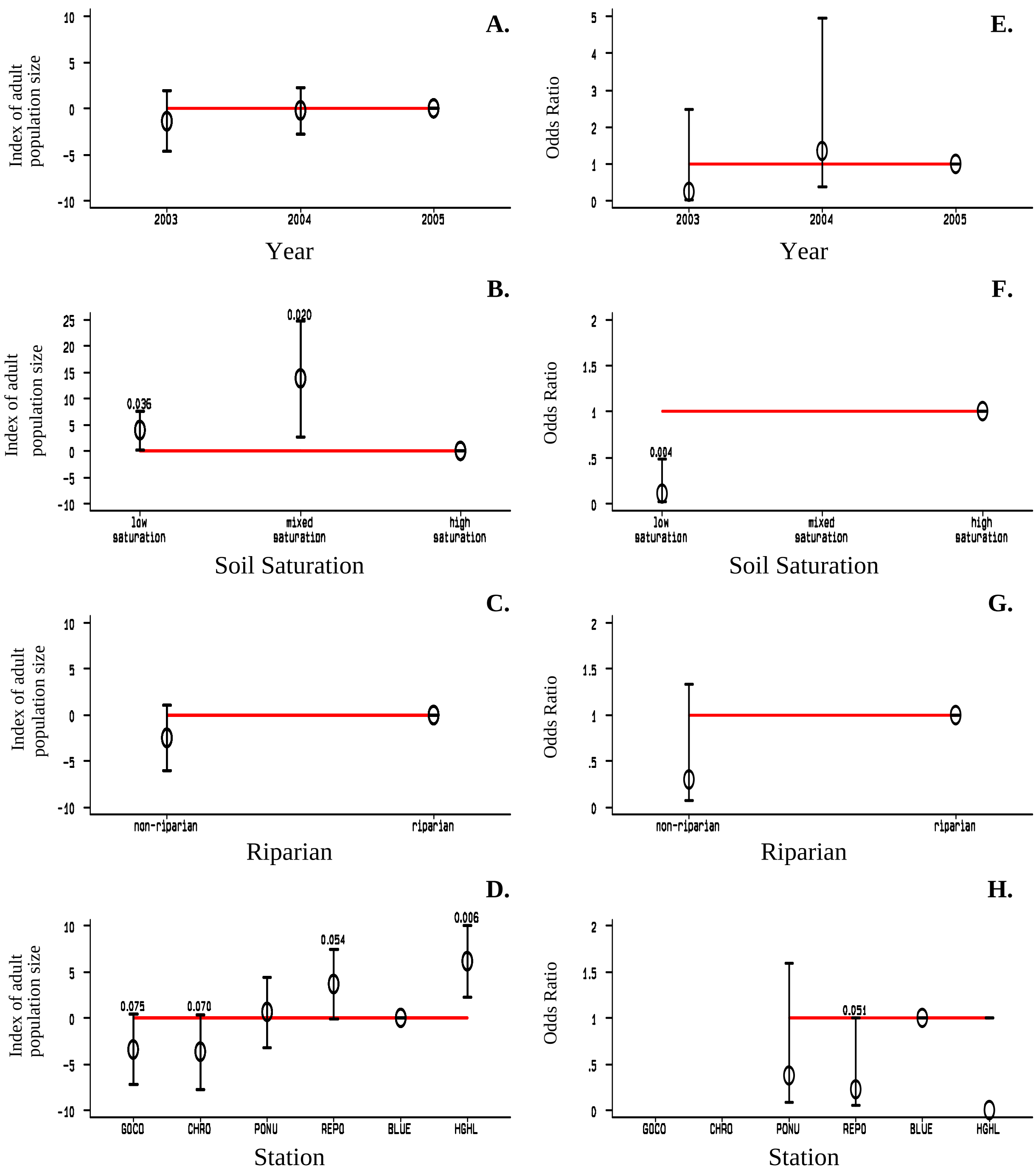

Figure 9. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E-H), with 95% confidence intervals, for **Magnolia Warbler**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours) and the odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included, after controlling for elevation, were year, soil saturation, and presence of a riparian zone for figures A-C, E-G or year and station for figures D and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

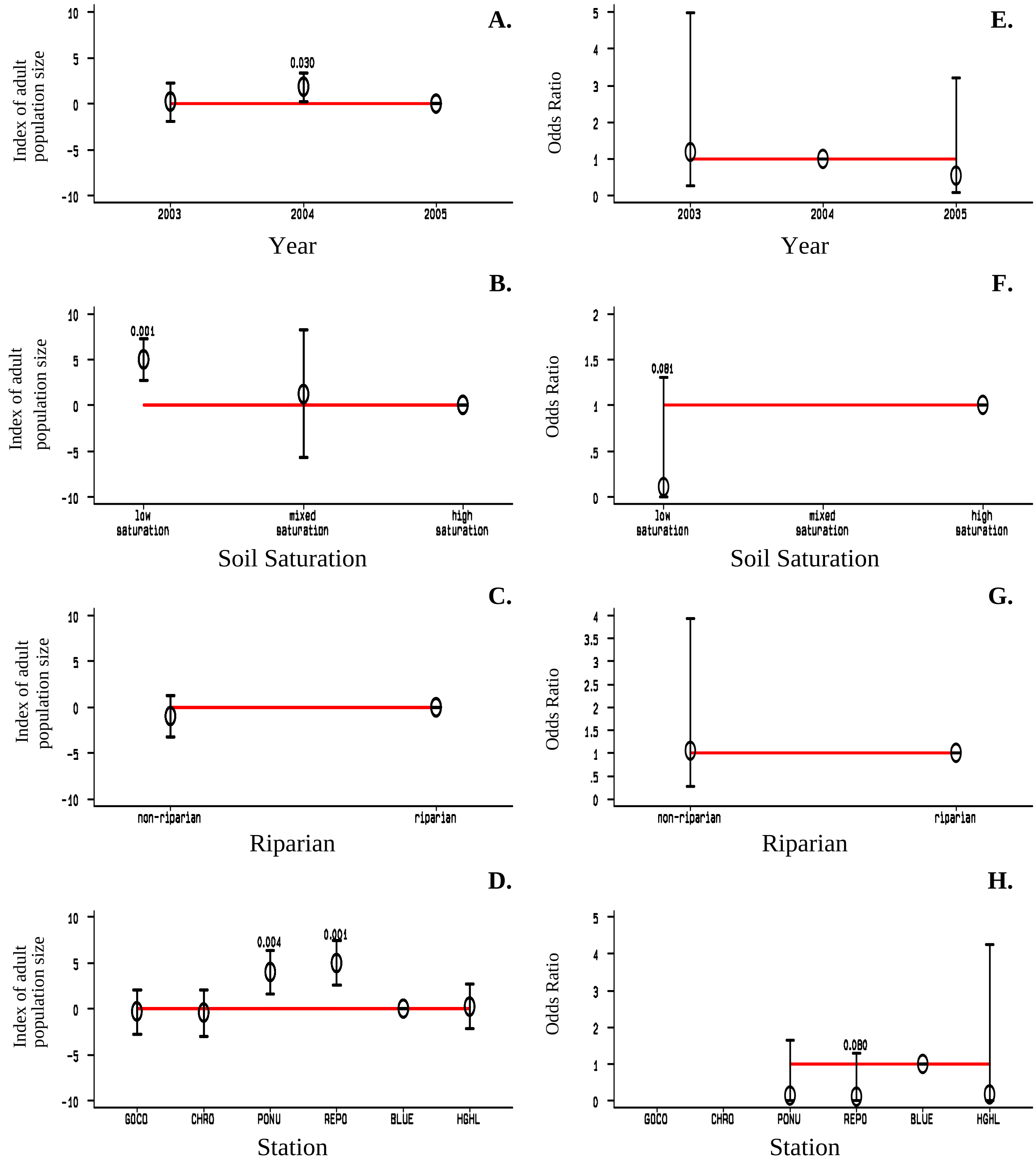

Figure 10. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E-H), with 95% confidence intervals, for **Black-throated Blue Warbler**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours) and the odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included, after controlling for elevation, were year, soil saturation, and presence of a riparian zone for figures A-C, E-G or year and station for figures D and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

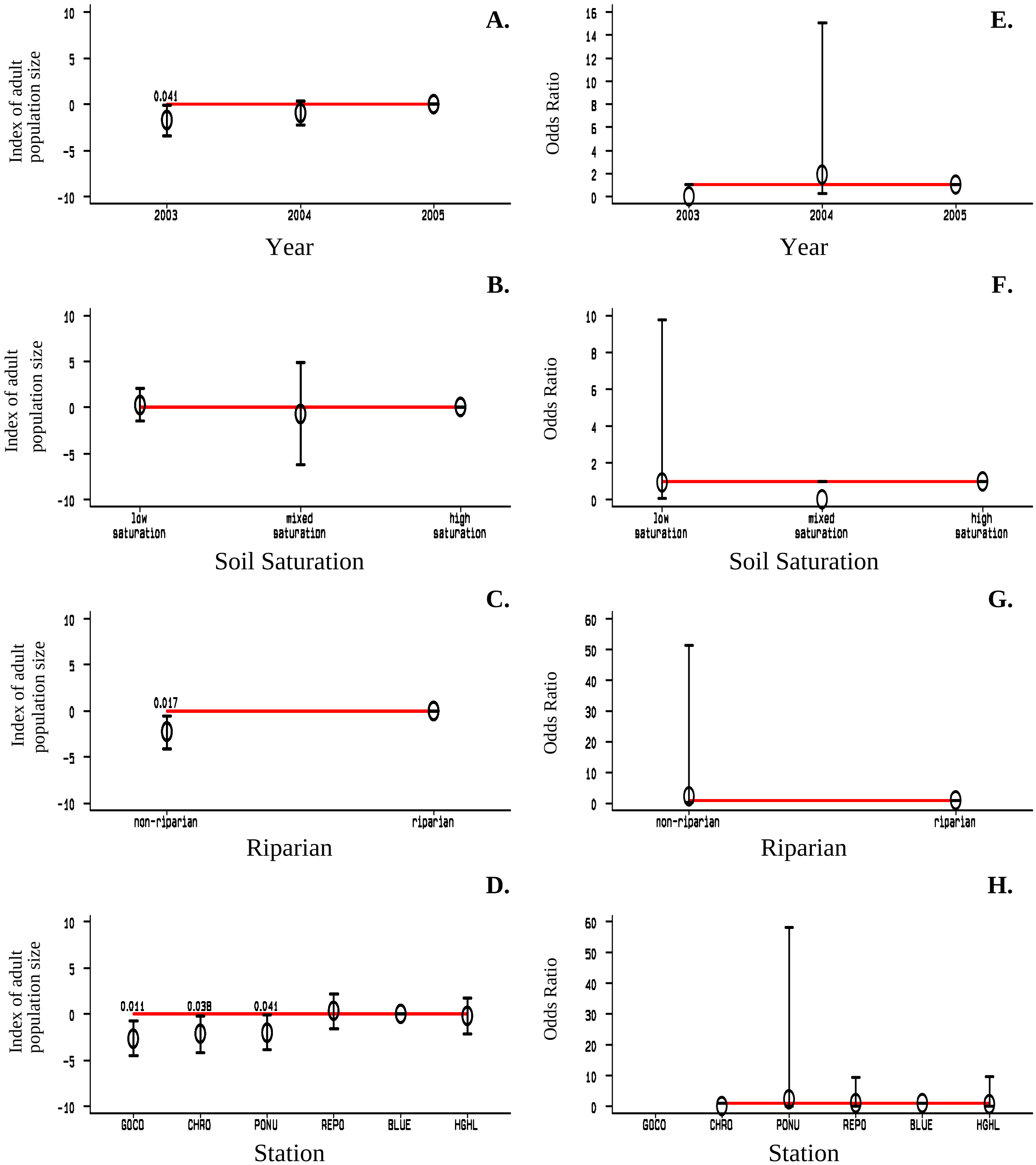

Figure 11. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E-H), with 95% confidence intervals, for **Yellow-rumped Warbler**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours) and the odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included, after controlling for elevation, were year, soil saturation, and presence of a riparian zone for figures A-C, E-G or year and station for figures D and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

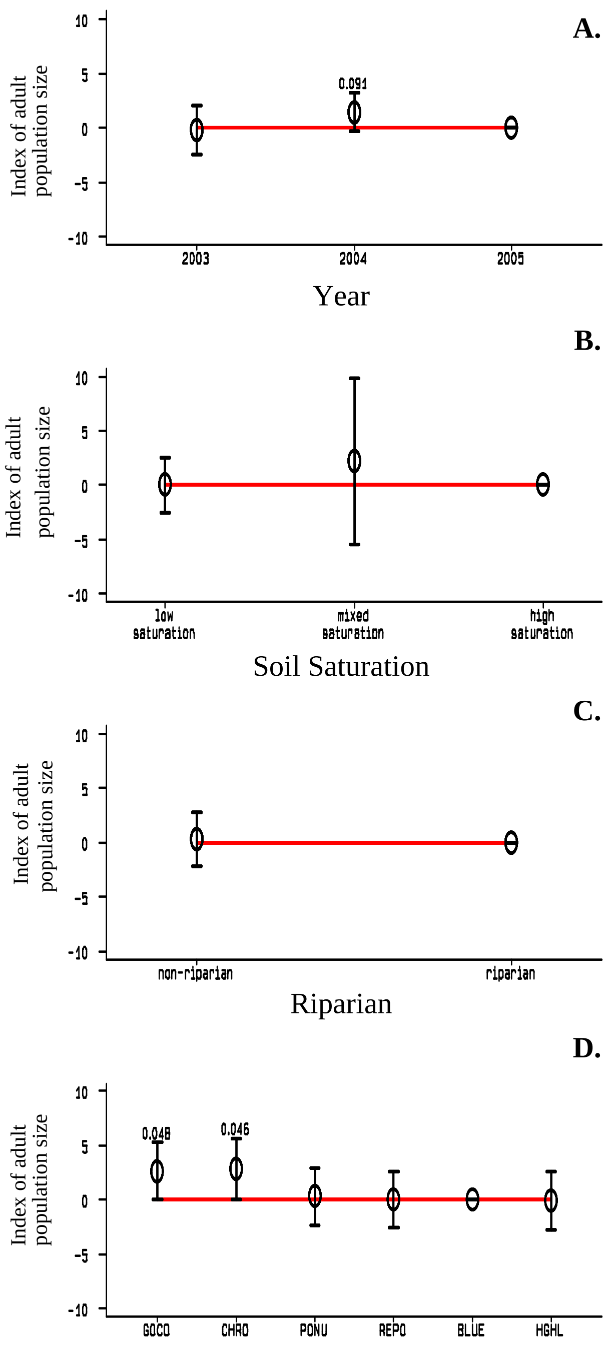

Figure 12. Relative mean numbers of adults (A-D) with 95% confidence intervals, for **Black-throated Green Warbler**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours and elevation) thus controlling for the other variable while calculating the differences in the target variable. The variables included were year, soil saturation, and presence of a riparian zone for figures A-C or year and station for figure D (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

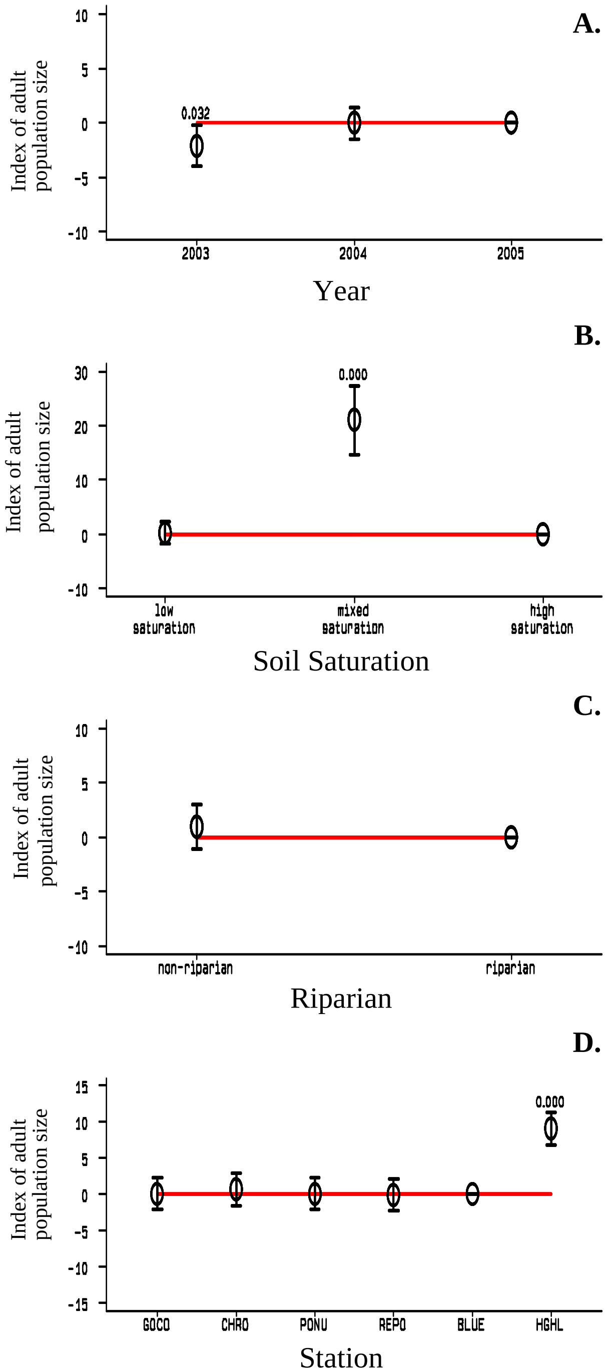

Figure 13. Relative mean numbers of adults (A-D) with 95% confidence intervals, for **Blackpoll Warbler**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours and elevation) thus controlling for the other variable while calculating the differences in the target variable. The variables included were year, soil saturation, and presence of a riparian zone for figures A-C or year and station for figure D (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

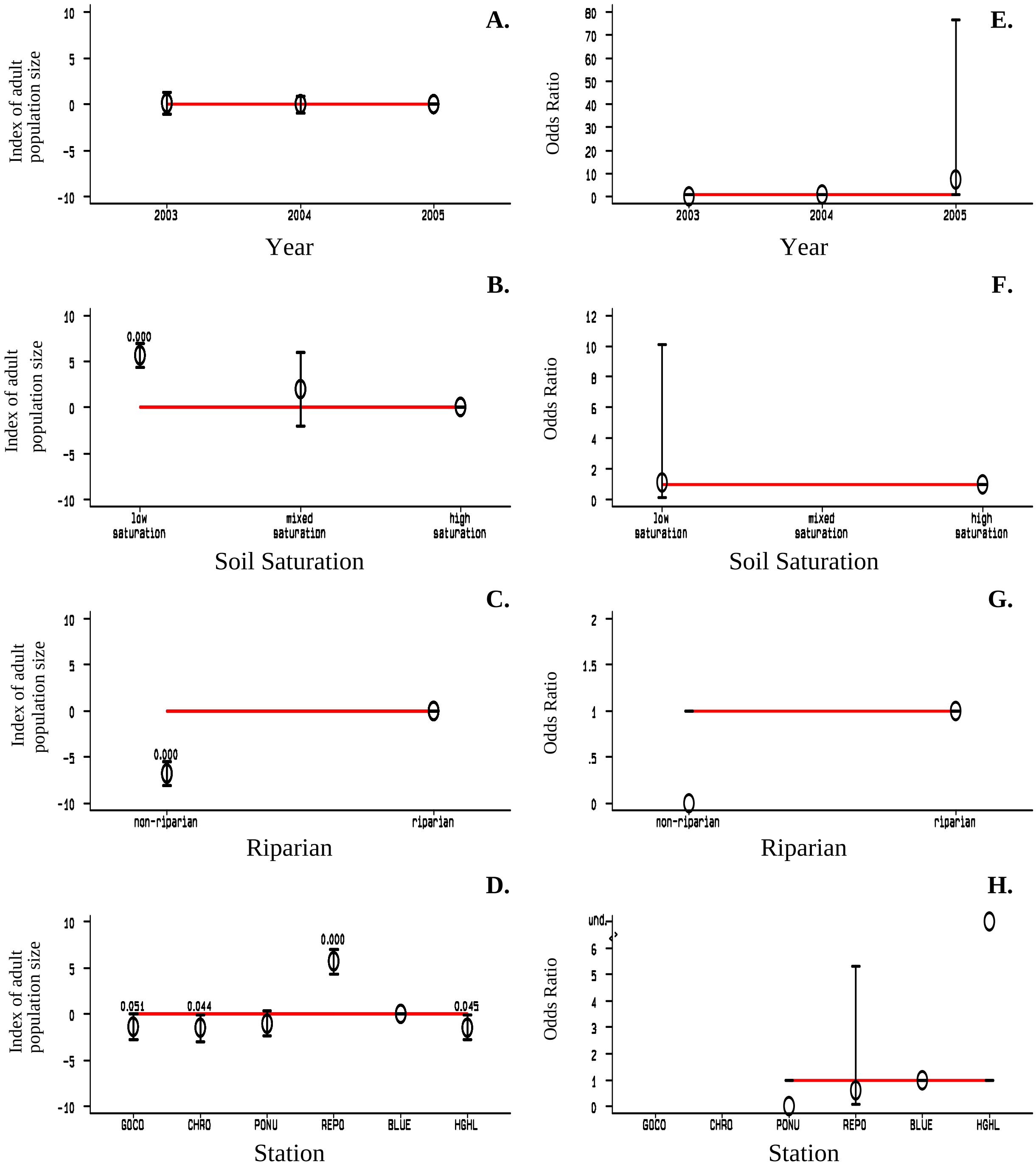

Figure 14. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E-H), with 95% confidence intervals, for **American Redstart**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours) and the odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included, after controlling for elevation, were year, soil saturation, and presence of a riparian zone for figures A-C, E-G or year and station for figures D and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

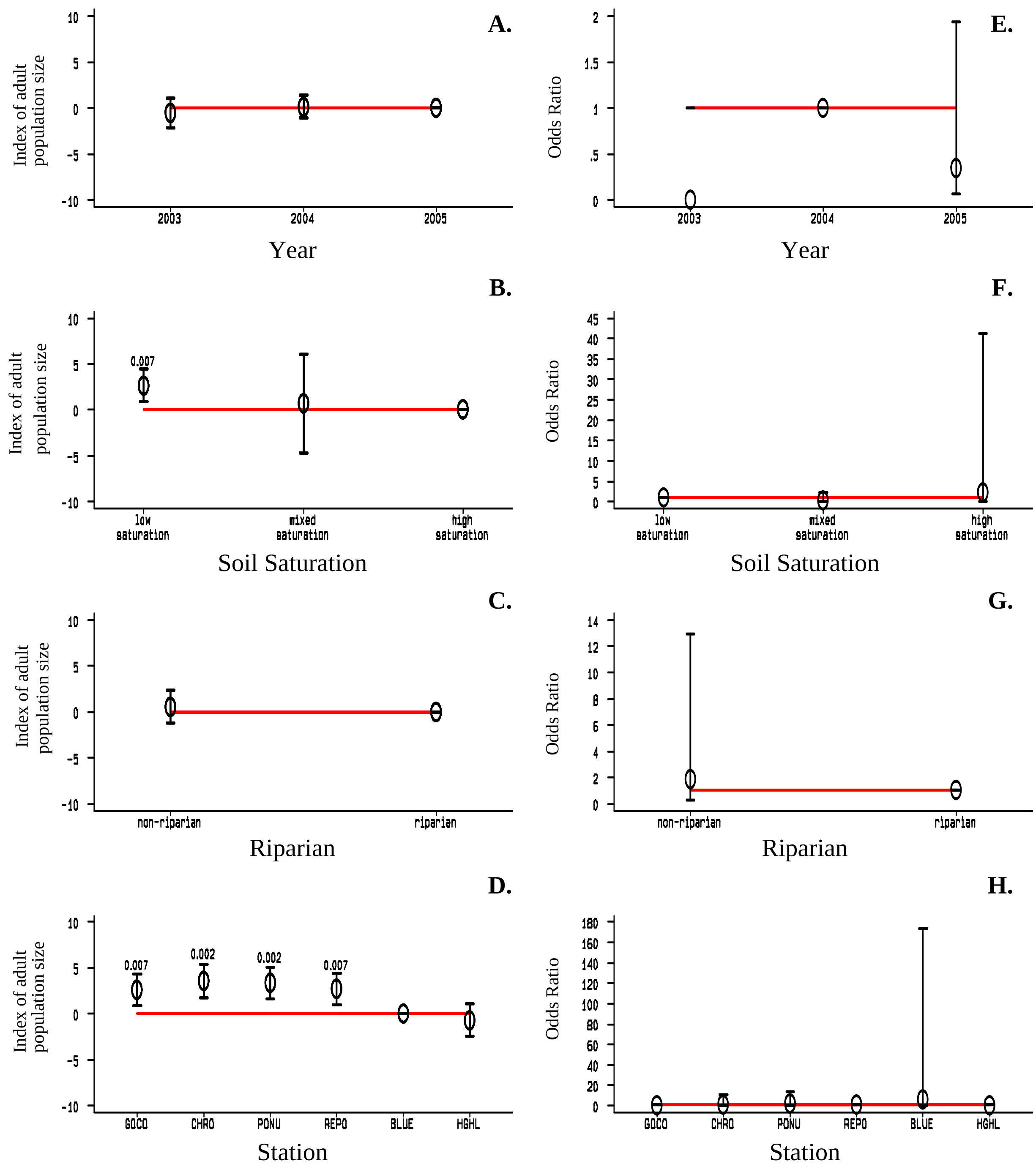

Figure 15. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E-H), with 95% confidence intervals, for **Ovenbird**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours and elevation) and the odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included were year, soil saturation, and presence of a riparian zone for figures A-C, E-G or year and station for figures D and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

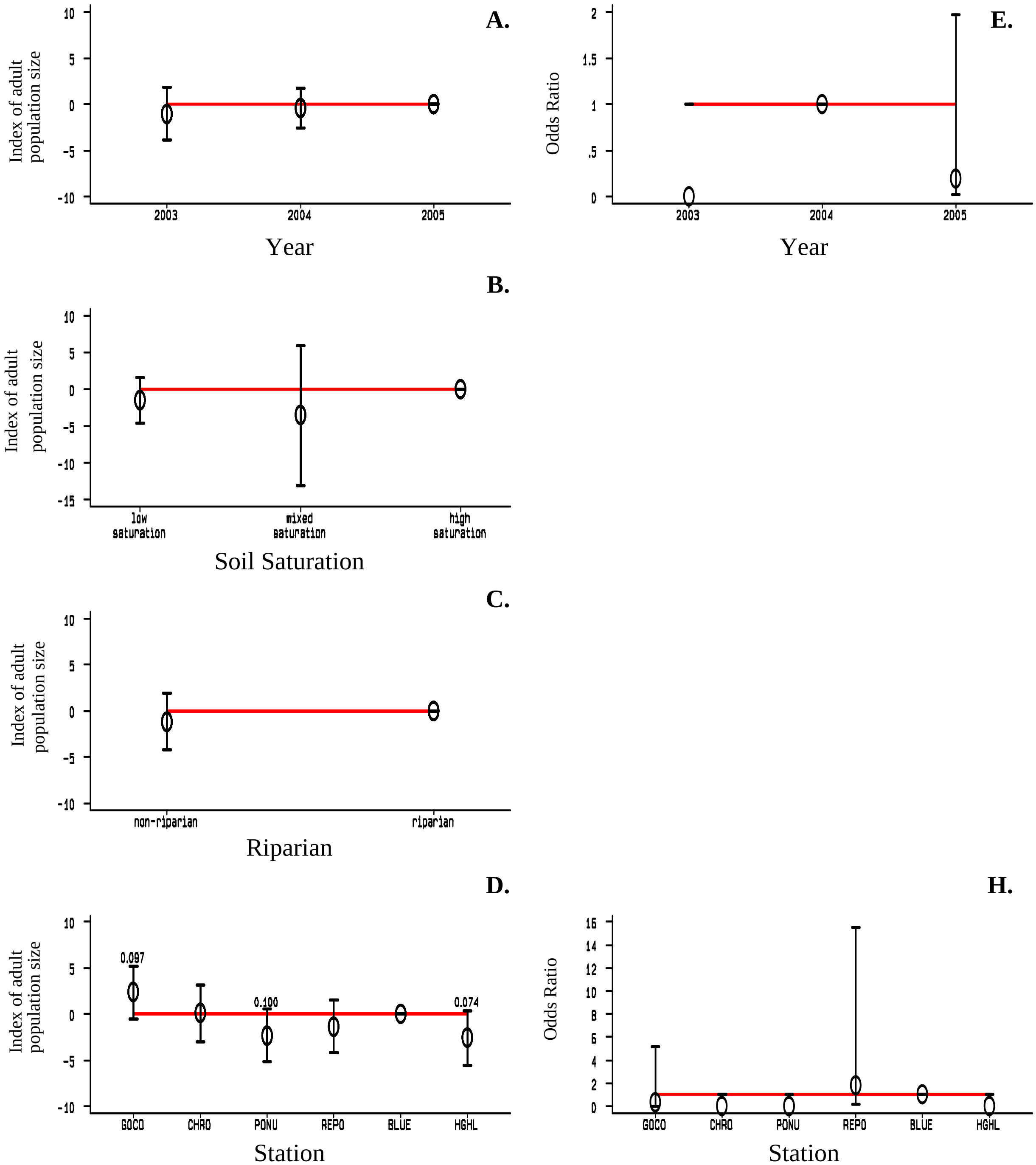

Figure 16. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E and H), with 95% confidence intervals, for **Common Yellowthroat**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours and elevation), and odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included were year, soil saturation, and presence of a riparian zone for figures A-C or year and station for figures D, E, and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

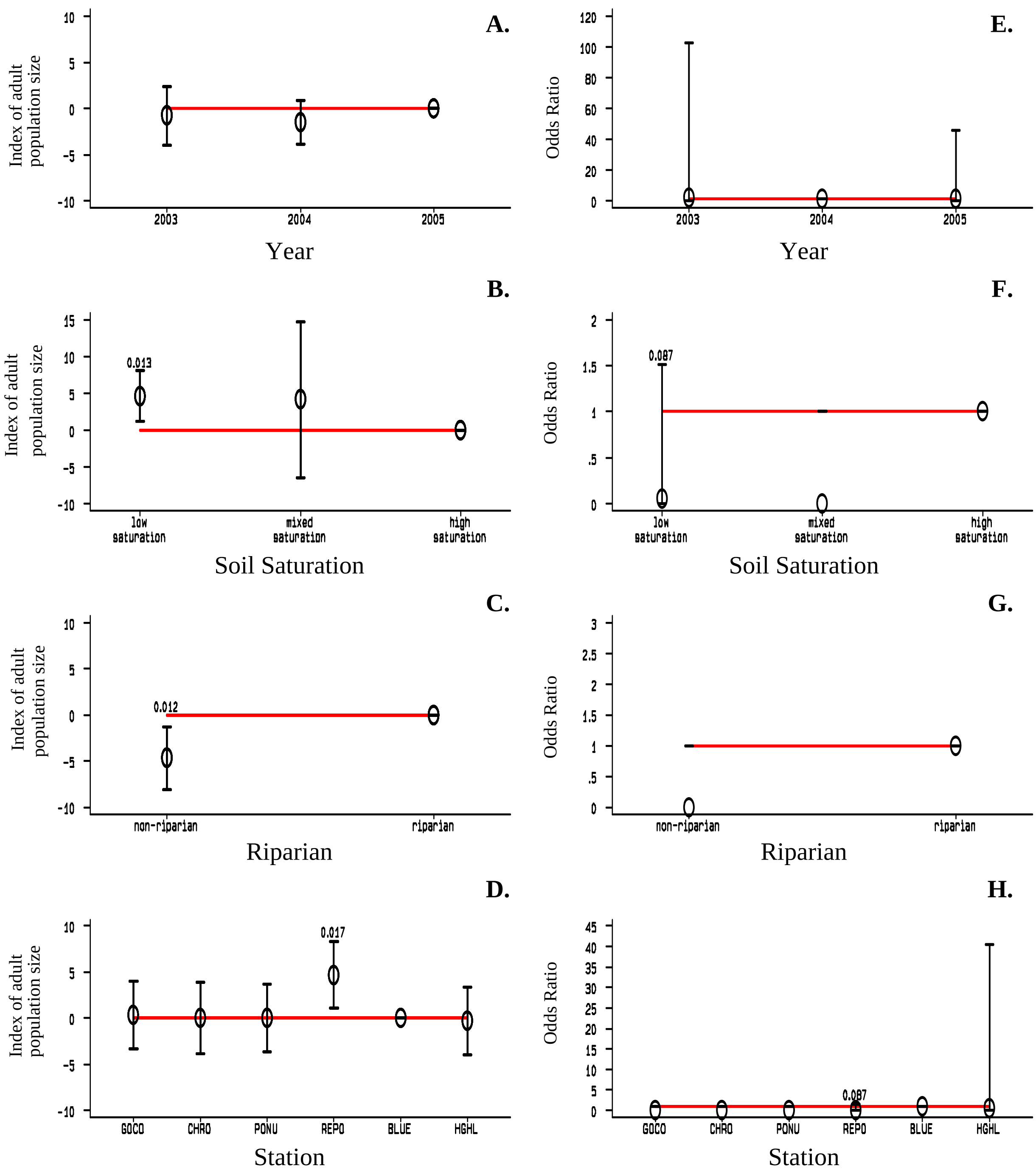

Figure 17. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E-H), with 95% confidence intervals, for **Canada Warbler**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours) and the odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included, after controlling for elevation, were year, soil saturation, and presence of a riparian zone for figures A-C, E-G or year and station for figures D and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

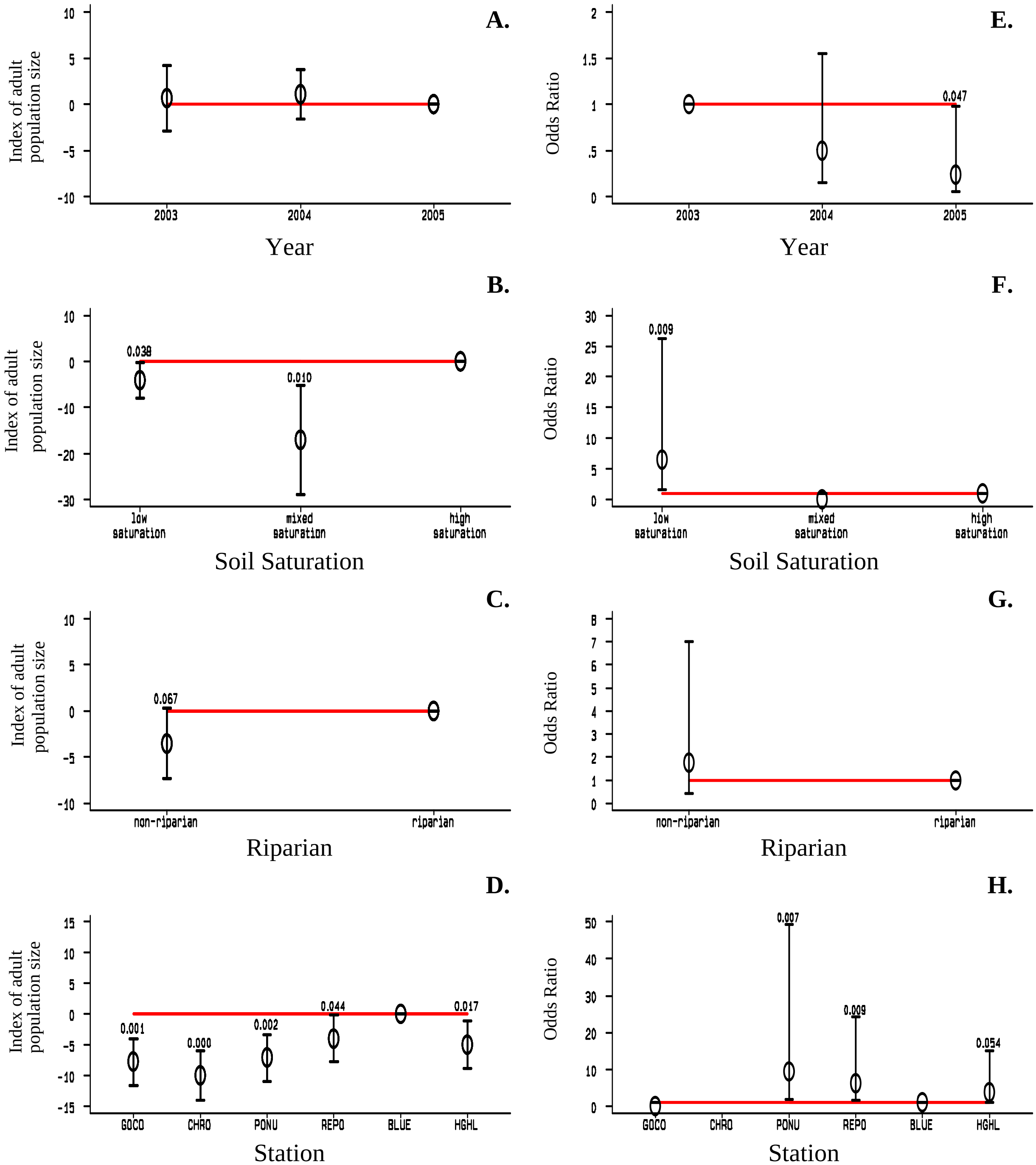

Figure 18. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E-H), with 95% confidence intervals, for **White-throated Sparrow**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours) and the odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included, after controlling for elevation, were year, soil saturation, and presence of a riparian zone for figures A-C, E-G or year and station for figures D and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

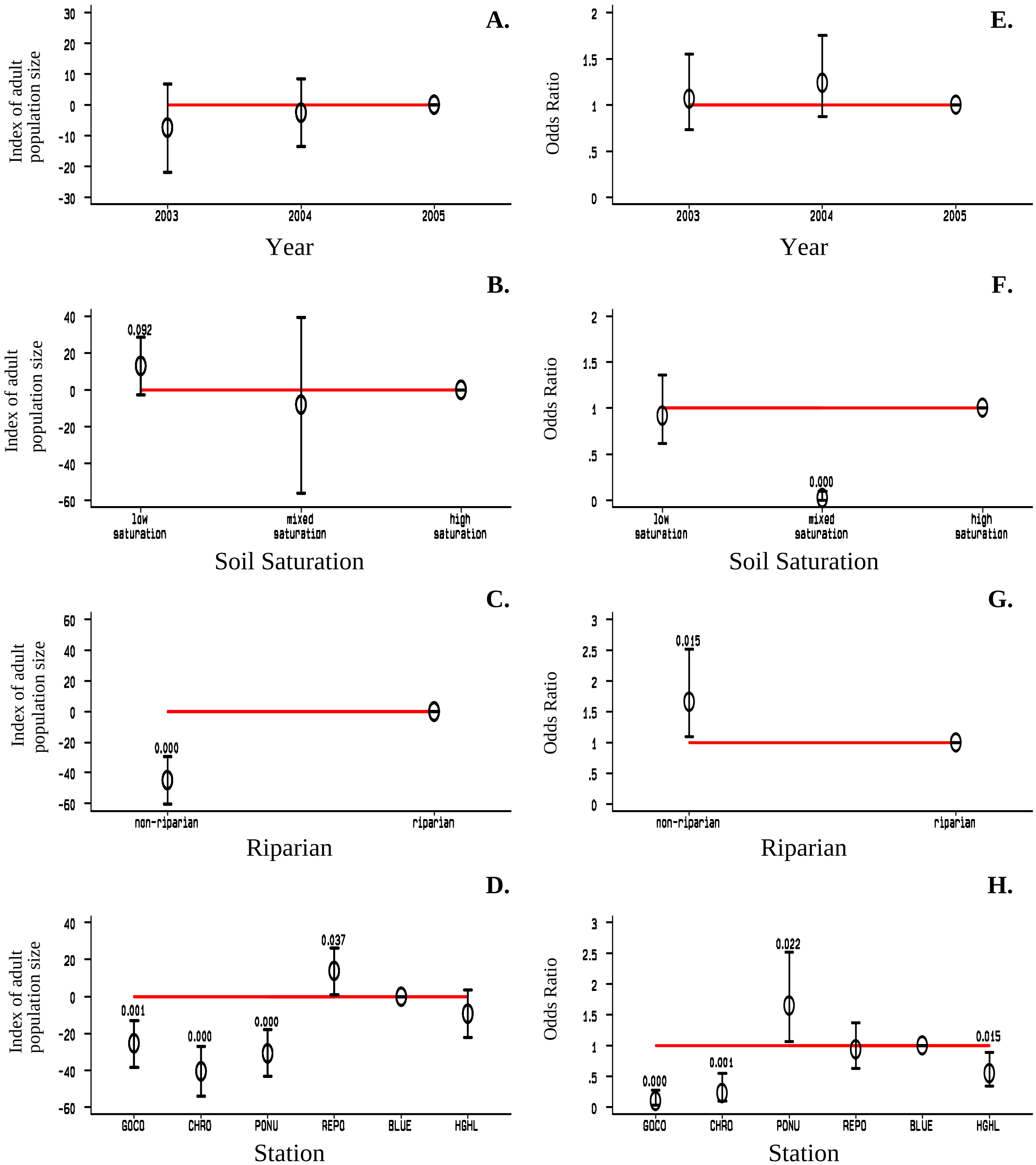

Figure 19. Relative mean numbers of adults (A-D) and odds ratios for productivity indices (E-H), with 95% confidence intervals, for **ALL SPECIES POOLED**, captured at six stations on Naval Air Station Brunswick and Redington Training Facility. Relative mean numbers were estimated using multivariate ANOVA (controlling for the number of net hours) and the odds ratios for each design variable were estimated using multivariate logistic regression, thus controlling for the other variable while calculating the differences in the target variable. The variables included, after controlling for elevation, were year, soil saturation, and presence of a riparian zone for figures A-C, E-G or year and station for figures D and H (see text). For each variable, the estimates are compared to a reference point (lacking a 95% confidence interval), and the reference point and a reference line are plotted for ease of comparison. GOCO - Golf Course, CHRO - Chinmey Rock, PONU - Potato Nubble, REPO - Redington Pond, BLUE - Blueline Trail, and HGHL - Highland.

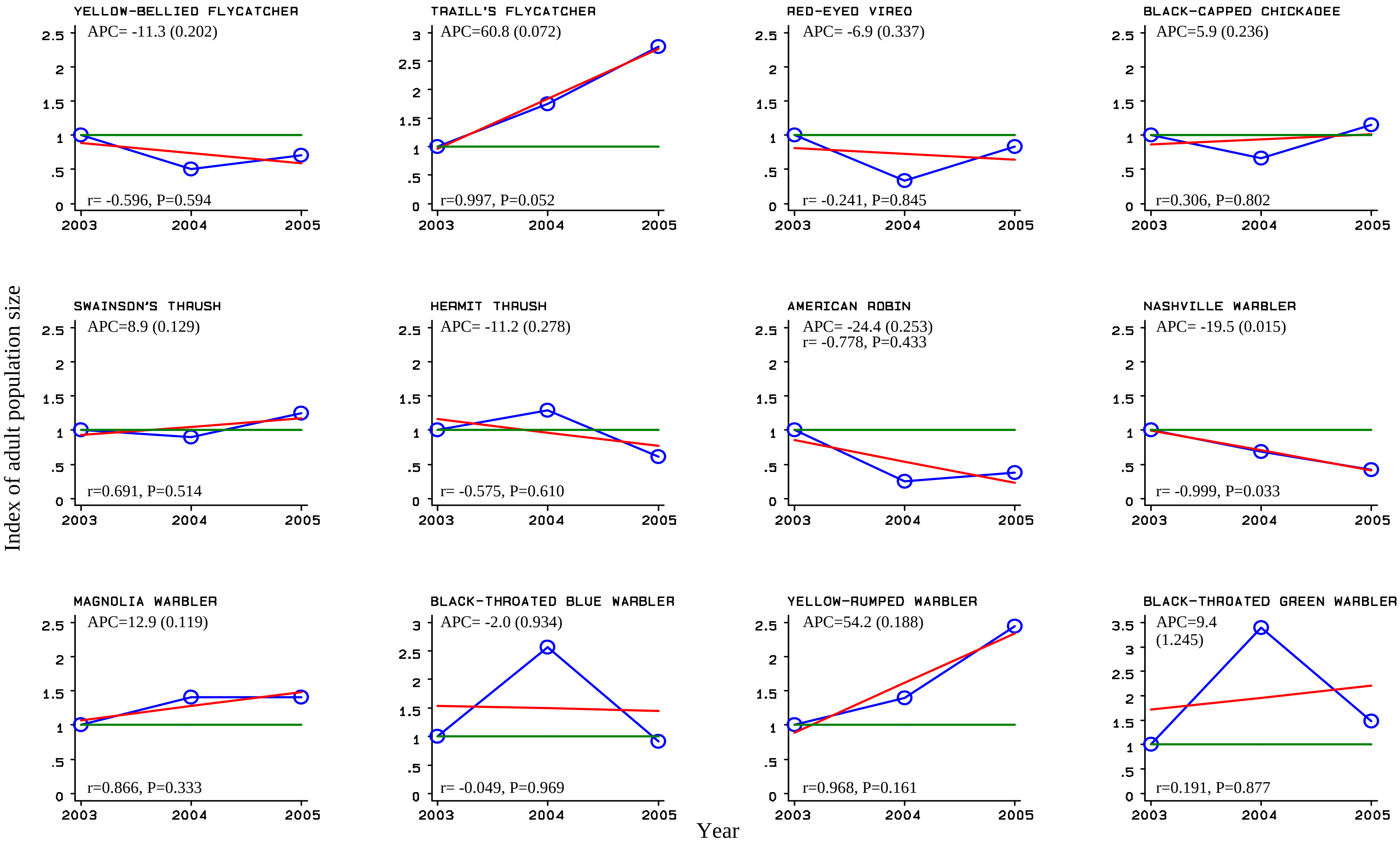

Figure 20. Population trends for 18 species and all species pooled on Naval Air Station Brunswick and Redington Training Facility over the three years 2003-2005. The index of population size was arbitrarily defined as 1.0 in 2003. Indices for subsequent years were determined from constant-effort between-year 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.

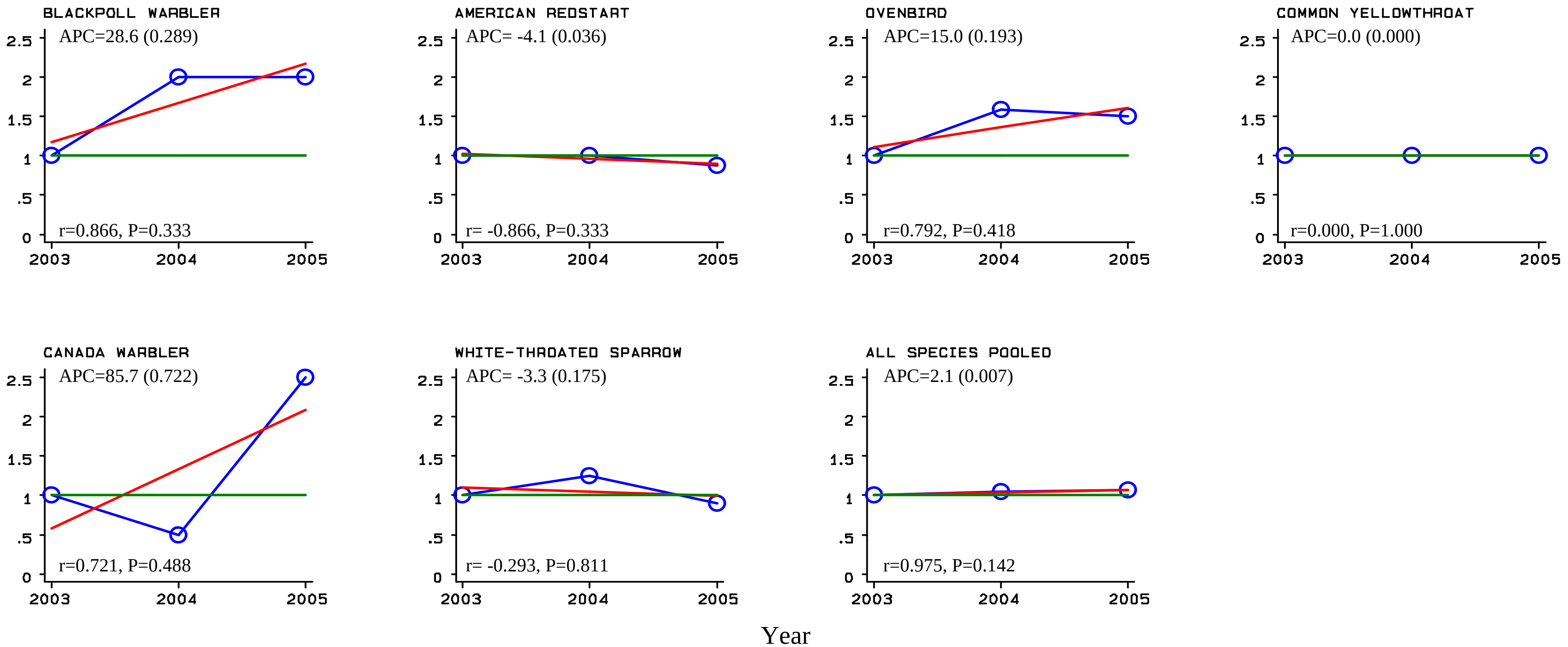

Figure 20. (cont.) Population trends for 18 species and all species pooled on Naval Air Station Brunswick and Redington Training Facility over the three years 2003-2005. The index of population size was arbitrarily defined as 1.0 in 2003. Indices for subsequent years were determined from constant-effort 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.

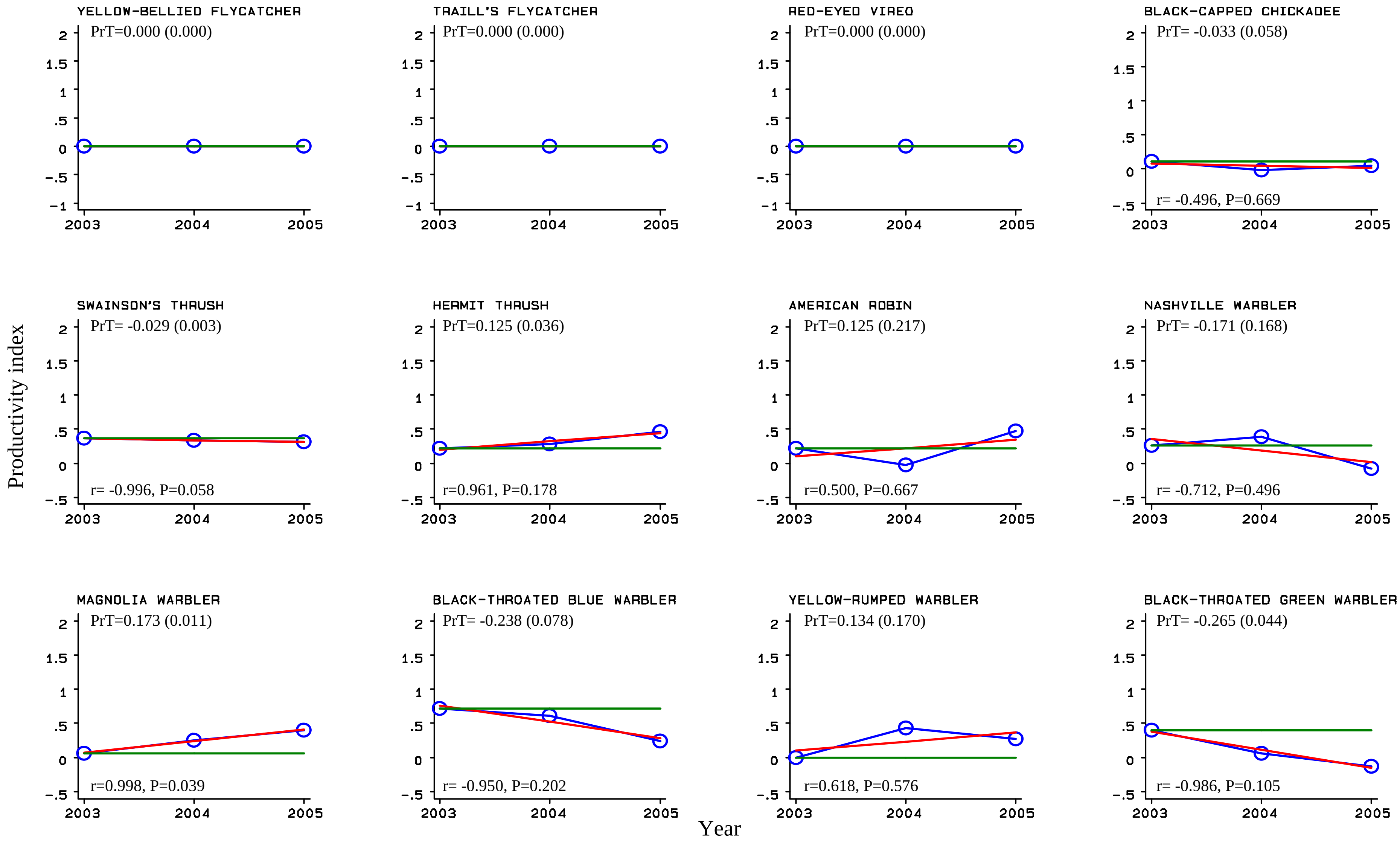

Figure 21. Trend in productivity for 18 species and all species pooled on Naval Air Station Brunswick and Redington Training Facility over the three years 2003-2005. The productivity index was defined as the actual productivity value in 2003. Indices for subsequent years were determined from constant-effort 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.

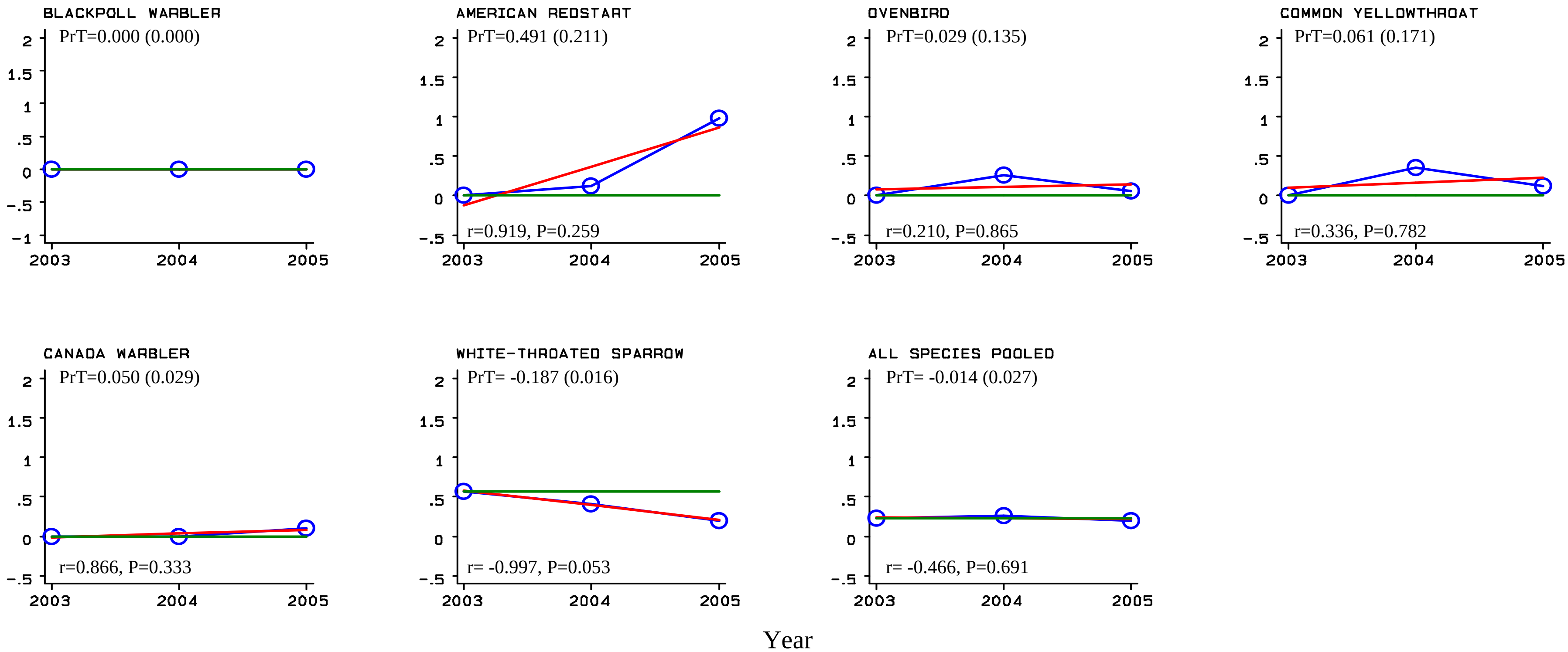

Figure 21. (cont.) Trend in productivity for 18 species and all species pooled on Naval Air Station Brunswick and Redington Training Facility over the three years 2003-2005. The productivity index was defined as the actual productivity value in 2003. Indices for subsequent years were determined from 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.

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 three years, 2003-2005, of the MAPS Program on the six stations operated on Naval Air Station Brunswick and Redington Training Facility.

NUMB	**SPEC**	**SPECIES NAME**
00100	COLO	Common Loon
00860	DCCO	Double-crested Cormorant
01010	GBHE	Great Blue Heron
01300	TUVU	Turkey Vulture
01460	CANG	Canada Goose
01620	ABDU	American Black Duck
01630	MALL	Mallard
01680	BWTE	Blue-winged Teal
01980	COME	Common Merganser
02020	OSPR	Osprey
02130	BAEA	Bald Eagle
02200	SSHA	Sharp-shinned Hawk
02210	COHA	Cooper's Hawk
02400	BWHA	Broad-winged Hawk
02460	RTHA	Red-tailed Hawk
02640	MERL	Merlin
02940	RUGR	Ruffed Grouse
03040	WITU	Wild Turkey
03780	KILL	Killdeer
04020	SPSA	Spotted Sandpiper
04490	AMWO	American Woodcock
04710	HERG	Herring Gull
04940	COTE	Common Tern
05570	MODO	Mourning Dove
06400	BBCU	Black-billed Cuckoo
06410	YBCU	Yellow-billed Cuckoo
06950	BADO	Barred Owl
08630	RTHU	Ruby-throated Hummingbird
09110	BEKI	Belted Kingfisher
09580	YBSA	Yellow-bellied Sapsucker
09650	DOWO	Downy Woodpecker
09660	HAWO	Hairy Woodpecker
09710	BBWO	Black-backed Woodpecker
09800	YSFL	Yellow-shafted Flicker
09860	PIWO	Pileated Woodpecker
11390	EAWP	Eastern Wood-Pewee
11450	YBFL	Yellow-bellied Flycatcher
11475	ALFL	Alder Flycatcher
11475	TRFL	Traill's Flycatcher

Appendix I. continued.

NUMB	SPEC	SPECIES NAME
11475	WIFL	Willow Flycatcher
11500	LEFL	Least Flycatcher
11610	EAPH	Eastern Phoebe
11760	GCFL	Great Crested Flycatcher
12030	EAKI	Eastern Kingbird
12720	BHVI	Blue-headed Vireo
12760	WAVI	Warbling Vireo
12780	PHVI	Philadelphia Vireo
12790	REVI	Red-eyed Vireo
12910	GRAJ	Gray Jay
12930	BLJA	Blue Jay
13190	AMCR	American Crow
13300	CORA	Common Raven
13410	TRES	Tree Swallow
13540	BARS	Barn Swallow
13570	BCCH	Black-capped Chickadee
13610	BOCH	Boreal Chickadee
13660	TUTI	Tufted Titmouse
13690	RBNU	Red-breasted Nuthatch
13700	WBNU	White-breasted Nuthatch
13730	BRCR	Brown Creeper
14110	WIWR	Winter Wren
14240	GCKI	Golden-crowned Kinglet
14250	RCKI	Ruby-crowned Kinglet
14560	EABL	Eastern Bluebird
14780	VEER	Veery
14810	SWTH	Swainson's Thrush
14820	HETH	Hermit Thrush
15000	AMRO	American Robin
15130	GRCA	Gray Catbird
15370	EUST	European Starling
15550	CEDW	Cedar Waxwing
15650	TEWA	Tennessee Warbler
15670	NAWA	Nashville Warbler
15730	NOPA	Northern Parula
15760	CSWA	Chestnut-sided Warbler
15770	MAWA	Magnolia Warbler
15790	BTBW	Black-throated Blue Warbler
15800	MYWA	Myrtle Warbler
15830	BTNW	Black-throated Green Warbler
15860	BLBW	Blackburnian Warbler
15910	PIWA	Pine Warbler

Appendix I. continued.

NUMB	SPEC	SPECIES NAME
15960	BBWA	Bay-breasted Warbler
15970	BLPW	Blackpoll Warbler
16030	BAWW	Black-and-white Warbler
16040	AMRE	American Redstart
16080	OVEN	Ovenbird
16090	NOWA	Northern Waterthrush
16130	MOWA	Mourning Warbler
16150	COYE	Common Yellowthroat
16290	WIWA	Wilson's Warbler
16300	CAWA	Canada Warbler
16495	UNWA	Unidentified Warbler
16830	SCTA	Scarlet Tanager
18020	CHSP	Chipping Sparrow
18230	SOSP	Song Sparrow
18240	LISP	Lincoln's Sparrow
18250	SWSP	Swamp Sparrow
18270	WTSP	White-throated Sparrow
18320	SCJU	Slate-colored Junco
18335	UNSP	Unidentified Sparrow
18560	NOCA	Northern Cardinal
18600	RBGR	Rose-breasted Grosbeak
18720	BOBO	Bobolink
18730	RWBL	Red-winged Blackbird
18850	RUBL	Rusty Blackbird
18870	COGR	Common Grackle
18960	BHCO	Brown-headed Cowbird
19160	BAOR	Baltimore Oriole
19350	PUFI	Purple Finch
19370	HOFI	House Finch
19430	PISI	Pine Siskin
19510	AMGO	American Goldfinch
19580	EVGR	Evening Grosbeak