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DISTRIBUTION, CO-OCCURRENCE, AND LAND COVER ASSOCIATION PATTERNS OF FIVE FOREST-BREEDING NEOTROPICAL MIGRANT BIRDS IN MIDDLE TENNESSEE

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ABSTRACT. The presence of breeding birds was sampled with 2,021 point counts across a 5,000 km^2 area of north-central Tennessee. Five species of forest-breeding neotropical migrant birds (Scarlet Tanager *Piranga olivacea*, Wood Thrush *Hylocichla mustelina*, Acadian Flycatcher *Empidonax virescens*, Red-eyed Vireo *Vireo olivaceus*, and Eastern Wood-Pewee *Contopus virens*) and one grassland breeding species, used as a control species (Eastern Meadowlark *Sturnella magna*), were further analyzed. Their distributions were mapped and probability of occurrence and co-occurrence patterns were assessed at different spatial scales. The five forest-breeding species tended to be distributed across the study area in areas of forest and not around urban areas. The probability of occurrence of all five forest breeding species exhibited increases with amount of forest cover and decreases with the amount of urban land cover. The association patterns between species and land cover and among species were expected to vary with the scale of the analysis. However, Scarlet Tanagers, Wood Thrushes, Acadian Flycatchers, and Red-eyed Vireos were consistently significantly positively associated with forest cover at all spatial scales of analysis, whereas Eastern Wood-Pewees were not. The co-occurrence results indicate that at a spatial scale of 2,580 ha and larger, all species, even the grassland breeding specialist, tended to co-occur similarly. The 2,580 ha scale may be a study area appropriate scale to make inferences about the landscape mosaic pattern, breeding-bird diversity, and bird distribution patterns. Distribution and multi-scale studies can help provide insight into conservation priority areas that exist in landscapes that are continually being affected by urban/suburban development.

INTRODUCTION

Forest breeding neotropical migrant birds (NTMB) in eastern North America, in particular, have shown population declines since the middle of this century (Robinson et al. 1995; Flather and Sauer 1996; Rosenberg et al. 1999a). Much of this decline has been linked to habitat loss and fragmentation (Hoover et al. 1995; Robinson et al. 1995; Trine 1998). However, habitat loss and fragmentation occur within the context of the larger landscape matrix (Forman 1995). The context in which habitat degradation and change occur has impacts on neotropical migrant breeding birds (Askins 1995; Friesen et al. 1995). One landscape that is impacting avian populations is urban and suburban growth (Askins 1995; Butler *In Press*).

Urban and suburban development continues to expand throughout much of the United States (U.S. Bureau of the Census 2000). In the Bureau's East-South-Central region (the region that includes Tennessee), from 1990–1999, metropolitan population-growth outpaced non-metropolitan growth with increases of 10.8% and 7.2%, respectively, and there was an 18% population increase in the metropolitan fringes surrounding the central cities, which only grew by 1.9% (U.S. Bureau of the Census 2000). In this region, Nashville, Tennessee is one of the largest urban areas. Presently over 1.2 million people live in the greater Nashville area, a 25% increase from 1990 (U.S. Bureau of the Census 2000). With population growth there is a concomitant increase in urban/suburban development. Metropolitan growth and sprawl replace existing landscapes, and in the Nashville area the native landscape was generally composed of mixed mesophytic forest types (Braun 1950).

If urban/suburban development were replacing forest habitats then forest-breeding birds in the area would be expected to be impacted. Assessing urban/suburban landscape development impacts on forest breeding NTMB in this area during a period of human population growth could help elucidate urban effects on these birds and provide urban/suburban growth guidelines that could better preserve forest breeding neotropical migrant birds in this area.

Avian distribution studies are important because species distribution patterns can be related to land-use and land cover, patterns of distributions may indicate species conservation needs, relative conservation value of sites could be assessed through distribution patterns, and baseline information is generated against which future changes can be framed (Bibby et al. 1992). An important factor that affects the conclusions drawn from distribution studies is the spatial scale of the study (Wiens 1989; Bibby et al. 1992). Often, opposing conclusions can be drawn on bird distributions when different spatial scales are used in the assessments (Wiens 1987). One method that can better elucidate avian distribution and land cover assessments is to use multiple spatial scales in the research design. Multi-scale analyses can better frame the scales at which ecological processes function, in turn revealing more information about ecological systems than may have otherwise been gained (Levin 1992).

I assessed forest-breeding NTMB distribution patterns, probability of occurrence as a function of amount of land cover, and co-occurrence patterns at different spa-

tial scales. Five forest-breeding NTMBs were used in the analyses: (1) Scarlet Tanagers SCTA (*Piranga olivacea*), (2) Wood Thrushes WOTH (*Hylocichla mustelina*), (3) Red-eyed Vireos REVI (*Vireo olivaceus*), (4) Acadian Flycatchers ACFL (*Empidonax virescens*), and (5) Eastern Wood-Pewees EAWP (*Contopus virens*). These forest-breeding species are habitat associates (DeGraaf and Rappole 1995; Rosenberg et al. 1999a) and were relatively common in the study area (Butler 2001). In addition to these five avian species, I included a "control" species in the analyses, the Eastern Meadowlark EAME (*Sturnella magna*). I chose the Eastern Meadowlark because it prefers grasslands for breeding (DeGraaf and Rappole 1995). Thus, I would expect it to be negatively associated with forest cover, which would provide a comparison for the forest-cover trends for the previous five bird species.

My key research hypothesis was that results would vary depending on the scale of the analysis. This, in turn, could help elucidate the spatial scale(s) at which landscape components differentially impact avian distribution patterns that could lead to better understanding of urban/suburban development impacts to breeding birds.

METHODS

Study Area — This research is part of a larger study that assessed all observed breeding bird species that were surveyed across a broad-scaled area of north-central Tennessee (Butler 2001). The study area is 5,000 km^2 of north-central Tennessee (Fig. 1). Nashville is in its southeastern corner, and the town of Dickson is in its southwestern corner. Much of this area was originally forest (Braun 1950) but now it is composed of forest, farmland, and urban/suburban landscapes.

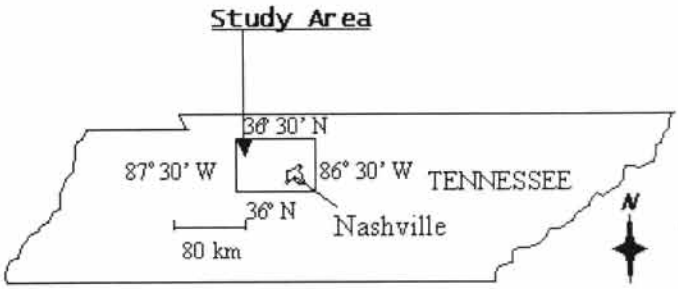

Figure 1. The study area in north-central Tennessee.

Field Methods — I conducted bird surveys along low traffic roads at 2,021 sites greater than 0.8 km from each other, in good weather, from 15 May to 17 July 1993 - 1995 between 0500 and 1000 hours (Butler 2001). Each site was sampled once for three minutes. All sampling was suspended when precipitation fell or when wind speed was greater then ~25 kmh^{-1}. Over 90% of the roadside locations occurred along light-duty, two-lane county, or dirt roads.

The goal of the sampling design was to randomly select locations, not excluding any terrestrial land cover, while simultaneously producing a relatively even study area distribution (Butler 2001). Random site selection provides better statistical robustness and an even distribution of points provides a better analytical foundation for avian distribution analysis. To accomplish this, the entire study area was divided into 18,432 equal-area "tiles." A total of 2,021 of these tiles were randomly selected, overlain onto USGS 7.5' Topographic quadrangle maps, and a mark was made on a road nearest the centroid (central location of a geographic object) of the tile. The survey order of the 7.5' quadrangles was randomly selected. Furthermore, only half of a given 7.5' quad could be sampled in any one year. This sampling protocol was adopted to reduce the potential effects of year-to-year variation in breeding bird distribution patterns.

I located the mapped locations in the field, and then I recorded bird species within a 300 m radius recording any visual or auditory contact. In addition I documented land cover attributes at each site. All points were digitized into a Geographic Information System (GIS) linked by bird and land cover data.

Spatial Scales — There are a number of different spatial scales included in the analyses (Fig. 2). The smallest is a 36 ha circular area (n = 2,021), followed by a 430 ha scale (n = 1,066), 2,580 ha scale (n = 192), and 15,480 ha scale (n = 32; 7.5' USGS Topographic quadrangles) (Nicholson and Hamel 1986). These scales were chosen because they span several orders of magnitude; the 430 ha, 2,580 ha, and 15,480 ha scales are all derived from well established mapping standards in the United States and thus would be easily reproducible; and the smallest scale represents a study area average limit to bird detection. Because distances that birds could be detected would vary depending on local land cover factors, 300 m from the observer was the maximum estimated distance that birds could be recorded in the field.

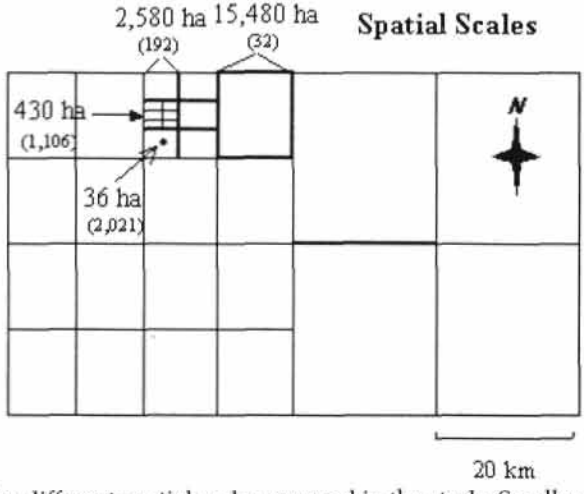

Figure 2. The different spatial scales assessed in the study. Smaller scale elements overlapped with larger elements but not with elements of the same scale.

To derive the smallest scale, a scale that represents the "sampling space" from which I recorded avian species in the field, 300-meter buffers were created using the IDRISI geographic information system (IDRISI 2001). Buffers are GIS elements that extend some user-defined distance from a target location in the GIS. In this case, each target location was the digitized geographic position from which I had recorded birds in the field. Satellite images are raster entities (discrete and not continuous data). Thus, each buffer formed a circle whose radius was a number of pixels (the "picture element") in length that best approximated 300 m. The Landsat image I had acquired had a pixel resolution of 28.5 m. Thus, each pixel was square and 28.5 m on a side. When the 300 m buffer was processed in the GIS, a total of 448 pixels were included in each buffer area for a total of 36.4 ha per buffer. Furthermore, each scale element did not overlap with others in their respective spatial-scale class, but larger scale elements did overlap with smaller scale elements (Fig. 2).

Land Cover Classifications — I acquired and classified an August 1993, Landsat 5 Thematic Mapper (TM) satellite image (Butler 2001). I conducted a supervised classification of the image because I was familiar with the area and each one of my avian sampling sites could act as a ground truthed site to help digitally classify the image (Jensen 1986). I incorporated both parallelpiped and maximum likelihood algorithms to classify the satellite image by using seed sites (Jensen 1986; Butler 2001). Seed sites are known locations on the satellite image that are assigned the ground truthed classification.

I used three land cover classifications in my analyses: forest, urban, and grasslands. Forest was classified from 46 seed sites where tree canopies formed a continuous layer. This classification is comprised of deciduous forest as well as mixed and small areas of coniferous forest types. Urban was classified from 97 seed sites. These sites contained roads, Tarmac, rooftops, concrete, or railroad yards. Even though Urban is a homogeneous land-use category, the hard, human-made surfaces that characterize it have varying degrees of reflectivity and the density of these surfaces can vary from almost a complete covering in "downtown" regions of cities to relatively sparse in suburban areas. As a result, what constitutes an urban landscape in suburban settings could include small patches of trees, lawns, and/or overgrown lots as well as roofs and roads. This mix of land-cover classes in suburban areas produces a complex urban landscape matrix. However, because hard, human-made surfaces are indicative of urban areas, I focused on classifying hard, human-made surfaces to represent urban land-cover. The grassland class was composed of fields and pastures as well as sites in early successional stages that were comprised of herbaceous cover and very little woody plant cover. I used 32 seed sites to classify this land cover class.

I performed a pixel level accuracy assessment between the digitally classified image and ground truthed land-cover information. I selected 200 locations that covered the study area and could be accessed from a road without penetrating too deeply onto private lands. Across all land-cover classes, just over 82% of the pixel

classifications corresponded correctly with the ground truthed land-cover information. The accuracy of Urban was just over 90% and forest was classified correctly ~80% of the time.

Avian Distributions, Probability of Occurrence, and Co-occurrence — Each of the species distributions were overlain onto the classified land cover image. I calculated the probability of species occurrence as a function of proportion land cover at four spatial scales: 36 ha, 430 ha, 2,580 ha, and 15,480 ha and performed regression analyses between these two variates at each spatial scale. Co-occurrence was defined in two ways. The first definition was when two species were observed at the same roadside location (36 ha) they also co-occurred in the 430 ha, 2,580 ha, and 15,480 ha scaled elements in which the survey location was found. The second definition was when any two roadside points within the 430 ha, 2,580 ha, or 15,480 ha scale elements contained the different species.

The probabilities are conditional probability of occurrence. Formally, this conditional probability is:

$$Ps(SL) = F/TSL$$

where Ps(SL) is the probability of observing one of the species at a survey location (SL), F is the frequency of the species (number of survey locations at which the species was observed for a given proportion of land cover), and TSL is the total number of survey locations at which the species was observed (Fruend 1973).

At the 36 ha scale, land-cover information is virtually a continuous function. Thus, any given roadside location, or even all of them, could have unique land cover proportion values resulting in the same probability of occurrence for a species for any given amount of land cover. To reduce this effect, land cover at this scale was grouped into ten evenly spaced land cover proportion clusters with the resulting probability of occurrence for each of these land-cover clusters being calculated for each species. At the 430 ha, 2,580 ha, and 15,480 ha scales, the conditional probabilities model the likelihood of observing a species at a roadside location per scale element given the level of forest or urban land cover found within each of the scale elements at the different spatial scales.

I subjected each of the pair-wise trends between probability of occurrence and proportion of land cover to regression analyses. When a large number of correlation or regression trials are carried out the generally accepted significance level of $P \leq 0.05$ is reduced to reduce the likelihood of any single statistical trial being significant merely by chance, a Bonferoni correction. Thus, statistical significance was considered when $P \leq 0.008$ because there was a comparison of six different bird species.

I utilized Kulczynski's 2(K2) similarity measure to assess the co-occurrence patterns between all six avian species at four spatial scales: 36 ha, 430 ha, 2,580 ha, and 15,480 ha (SPSS 1999). Kulczynski 2 yields the average conditional probability that a bird species is present in one block given that the other species is present. This measure is an average over both species that in turn acts as a predictor. Kulczynski

2 produces a coefficient between 0 and 1: a 0 means the two species are never found together and 1 means the two species are always found together. The coefficients are independent of statistical significance but can be used to indicate relative co-occurrence patterns between species.

RESULTS

At the pixel level, the distribution of roadside point counts within the different land covers is 443 in forest (22%), 178 in urban (8.7%), and 585 in grasslands (29%). Overall the study area pixel level land cover profile was 31% forest, 5.7% urban, 22.5% grassland (n = over 8×10^6 pixels). At the 36 ha scale (n = 2021), the land-cover percentage profile was 23% forest, 7%, urban, and 28% grassland.

Overall, I recorded 105 species of birds, including migrants, in over 20,000 avian observations (Butler 2001). Neotropical migrant breeding birds comprised 48%, short-distance migrants 31% and residents 21% of the total species. Northern Cardinal (*Cardinalis cardinalis)* was the most commonly sighted at 1,345 roadside locations.

Acadian Flycatchers (ACFL) were observed at 152 roadside locations. They were found more often in 36 ha sites with greater than 50% forest cover than sites with less than 50% (Table 1). If Acadian Flycatchers were randomly distributed, 125 sightings would be expected at 36 ha sites with less than 50% forest and at 27 sites greater than 50% forest (Table 1). All sightings of this species, at the 36 ha scale, were at sites that were less than 10% urban land cover (Table 1). If this species was randomly distributed, it would be expected at 30 sites with greater than 10% urban land cover.

The non-random distribution of Acadian Flycatchers is exhibited by the study area distribution pattern (Fig. 3A). Many of this species' sightings occur in the densely forested central portion of the study area with other sightings extending west and north (Fig. 3A). A large area devoid of Acadian Flycatcher sightings occurs in the eastern portion of the study area (Fig. 3A).

Eastern Wood-Pewees (EAWP) were observed 359 times during the study. At the 36 ha scale, they were found more often in sites that were less than 50% forest cover than in sites greater than 50% (Table 1). However, if this species was randomly distributed, there would be a greater number of sightings (296 vs. 265) expected at sites with less than 50% forest and fewer sightings (64 vs. 94) expected at sites with greater than 50% forest (Table 1). As opposed to the Acadian Flycatcher, some EAWP sightings occurred at roadside locations with greater than 10% urban land cover (Table 1). However, there would be a total of 70 sightings expected at locations with greater than 10% urban land cover if this species was randomly distributed (Table 1).

Eastern Wood-Pewees were readily observed in the central, forested portion of the study area in addition to being reasonably well distributed throughout the northern and western portions (Fig. 3B). As compared to the Acadian Flycatcher, EAWP was observed more often in the eastern edge of the study area but was still missing from a large area of the study area's eastern portion (Fig. 3B).

Red-eyed Vireos (REVI) were observed at 152 locations and were almost evenly distributed at sites with respect to percent forest cover at the 36 ha scale (Table 1). However, if this species was randomly distributed, it would be expected at over 1.5 times as many roadside locations with less than 50% forest cover as observed and almost one-third fewer roadside locations with greater than 50% forest cover than observed (Table 1). Less than 3% of the sightings (4) occurred at 36 ha locations that were greater than 10% urban land cover as compared to a random expectation of 30 sites (Table 1).

Red-eyed Vireos display a similar distribution pattern to Acadian Flycatchers (Figs. 3A and C). This species was also observed relatively frequently in the central forested portion of the study area as well as being observed in the western and northwestern portions of the study area (Fig. 3C). As in the previous two species distributions, REVI were not observed in much of the eastern and southeastern portions of the study area (Fig. 3C).

Almost 57% of the 86, 36 ha Scarlet Tanager (SCTA) sightings occurred where there was more than 50% forest cover present (Table 1). If Scarlet Tanagers were randomly distributed, almost twice as many sightings (72 vs. 37) would be expected at roadside locations with less than 50% forest and less than one-third as many sightings (15 vs. 49) would be expected in sites greater than 50% forest as compared to the observed (Table 1). No SCTA sightings occurred in sites that contained more than 10% urban land cover (Table 1).

Scarlet Tanagers were observed, to a large degree, in the densely forested regions of the study area (Fig. 3D). There were some additional sightings in some western areas of the study area as well as fewer sightings along the study area's northern region (Fig. 3D). Similar to the previous three bird species, Scarlet Tanagers were not observed in much of the eastern and southeastern portions of the study area (Fig. 3D). In the case of the Scarlet Tanager, they were not observed over a relatively larger area in the eastern portion of the study area as compared to the previous three species, even compared to all bird species in the present study.

Wood Thrushes (WOTH) tended to be found more often in 36 ha sites that were less than 50% forest as compared to sites with greater than 50% forest cover (Table 1). However, the number of observed WOTH sightings in 36 ha sites with less than 50% forest is less than would be expected if this species was randomly distributed, 94 vs. 143, respectively (Table 1). Furthermore, the observed number of Wood Thrushes observed at 36 ha sites with greater than 50% forest cover is over twice as many as would be expected based on random distribution assumptions, 80 vs. 31, respectively (Table 1). Following the pattern of the other four species, virtually all the 36-ha scale WOTH sightings occurred where there was less than 10% urban land cover (Table 1).

The Wood Thrush distribution exhibits a similar pattern to that of the Scarlet Tanager (Fig. 3D and E). Both of these species tended to be observed primarily in the densely forested portions of the study area with other observations occurring in the western and northern portions of the study area (Fig. 3D and E). In contrast,

Wood Thrushes were observed relatively more often than Scarlet Tanagers in the eastern and southeastern portions of the study area (Fig. 3D and E).

Overall, a main distribution pattern exhibited by the five forest-breeding species is the general lack of points where these species were observed in the southeast corner of the study area with another main pattern being the tendency to observe these species in the central and western portions of the study area (Fig. 3A - E). The most widespread of the five species was the Eastern Wood-Pewee (Fig. 3B).

Eastern Meadowlarks, in contrast to the previous five bird species' distribution patterns, tended to be found less often in the central portion of the study area and more often in the western and northern portions (Fig. 3F). Furthermore, EAME were observed relatively more often along the eastern edge of the study area as compared to the five forest-breeding bird species (Fig. 3A – F).

Probability of Occurrence — Two general trends were found for all five forest-breeding species. Their probability of occurrence increases with increasing forest cover and decreases with increasing urban land cover (Fig. 4A – E). (Note: Results for 430 ha scale were similar to those for the other scales, so to avoid redundancy, graphs are not shown for this scale.)

At the 36-ha scale, ACFL, REVI, SCTA, and WOTH exhibited statistically significant (Pair-wise regression, $P \leq 0.008$) positive associations between probability of occurrence and proportion of forest cover (Fig. 4; Table 2). The Scarlet Tanager trend between probability of occurrence and proportion of forest cover displayed an exponential relationship (Fig. 4A). Eastern Wood-Pewees exhibited a positive association between probability of occurrence and proportion of forest that was statistically not significant ($P = 0.02$, Table 2). The 36-ha scale association patterns between probability of occurrence and proportion of urban land cover were all negative for the five forest breeding species (Fig. 4A – E). Statistically only the Eastern Wood-Pewee, among the forest-breeding bird species, exhibited a significant negative association with urban cover at the 36-ha scale ($P = 0.005$, Table 2). Eastern Meadowlark probability of occurrence at the 36 ha scale was significantly negatively associated with proportion of forest and urban land cover and positively associated with proportion of grassland (all $P < 0.0001$, Fig 4F and Table 2).

At the 2,580 ha scale, the probability of occurrence of all five forest-breeding bird species were significantly positively associated with proportion of forest cover (Fig. 4A – E, Table 2). Also at this spatial scale, Acadian Flycatchers and Eastern Wood-Pewees had statistically significant negative associations with urban land cover (Table 2). Eastern Meadowlarks were significantly negatively associated with forest cover and positively associated with the amount of grassland present but were non-significantly associated with urban land cover (Fig. 4F; Table 2).

At the 15,480 ha scale, the probability of occurrence for Acadian Flycatchers, Red-eyed Vireos, Scarlet Tanagers, and Wood Thrushes were significantly associated the amount of forest cover (Fig. 4, and Table 2). Eastern Wood-Pewees exhibited a relatively strong non-significant relationship ($P = 0.03$) and the trend for ACFL exhibited an exponential pattern (Fig. 4A). At this scale, ACFL and EAWP exhibited

significant negative associations with urban land cover (Fig. 4A and B, Table 2). Red-eyed Vireos and Scarlet Tanagers exhibited relatively strong negative relationships with urban land cover and Wood Thrushes were the least associated with urban land cover among the five forest breeding species (Table 2). Eastern Meadowlarks, at this spatial scale, exhibited a statistically significant positive association with amount of grassland and non-significant associations with forest and urban land cover (Fig. 4F, Table 2).

Multi-scale Co-occurrence Patterns — The K2 co-occurrence measure provides an assessment of each bird species' co-occurrence pattern with all other bird species. Therefore, each species can be viewed as a predictor of observing the other species. The general pattern exhibited by the co-occurrence results is that as the spatial scale of the analysis increases, the probability that any two species will co-occur increases (Fig. 5). This is a well-know co-occurrence pattern found in ecological systems. Even though the general co-occurrence pattern exhibited by these bird species is congruent with the expected pattern, an understanding of the relationship between these birds and the landscape can be gained by observing which species exhibit differential co-occurrence relationships at different spatial scales and at which scales co-occurrence relationships undergo transitions.

Acadian Flycatchers were least likely to be observed with Eastern Meadowlarks and most likely to co-occur with Red-eyed Vireos at the 36 ha and 430 ha scales (Fig. 5A). Acadian Flycatcher co-occurrence with EAME, WOTH, SCTA, REVI, or EAWP was relatively similar to one another at the 2,580 ha and 15,480 ha spatial scales (Fig. 5A).

Eastern Wood-Pewees more often co-occurred with Scarlet Tanagers and least often with Acadian Flycatchers at 36 ha and 430 ha spatial scales (Fig. 5B). Eastern Wood-Pewee co-occurrence patterns with Scarlet Tanagers was less than the other species, however, at the 2,580 ha and 15,480 ha spatial scales (Fig. 5B). At these two scales, Eastern Wood-Pewees and Acadian Flycatchers and EAWP and Eastern Meadowlarks were found together relatively more often than were EAWP and SCTA (Fig. 5B).

Red-eyed Vireos tended to co-occur with Scarlet Tanagers and Acadian Flycatchers more often than with Eastern Wood-Pewees and Wood Thrushes at the 36 ha spatial scale (Fig. 5C). Also at this spatial scale, Red-eyed Vireos tended to be found more often with Eastern Meadowlarks than Wood Thrushes (Fig. 5C). At the 430 ha spatial scale, Red-eyed Vireos co-occurred more often with SCTA, ACFL, and WOTH than with either EAWP or EAME (Fig. 5C). At the 2,580 ha and 15,480 ha spatial scales, Red-eyed Vireo co-occurrence patterns with the other species tend to be relatively similar (Fig. 5C).

In addition to Scarlet Tanagers co-occurring more often with Wood Thrushes than any other species at the 36 ha scale, they co-occurred more often with Acadian Flycatchers, Eastern Wood-Pewees, and Red-eyed Vireos than with Eastern Meadowlarks at the 36 ha and 430 ha spatial scales (Fig.5D). At the 2,580 ha scale, the presence of Scarlet Tanagers tended to be a relatively even predictor of also observ-

ing any of the other four forest-breeding bird species as compared to the 430 ha spatial scale (Fig. 5D). At the 15,480 ha spatial scale, Scarlet Tanager co-occurrence was less with EAWP and EAME than with REVI, and WOTH (Fig. 5D).

Wood Thrushes co-occurred to a relatively larger degree with Scarlet Tanagers than any of the other species at the 36 ha and 430 ha spatial scales (Fig. 5E). At the 2,580 ha scale Wood Thrush presence predicted the occurrence of EAWP better than other species. At the 15,480 ha spatial scale, Wood Thrushes tended to co-occur with the other species similarly (Fig. 5E).

Lastly, Eastern Meadowlarks tended to be found least often with Acadian Flycatchers than with the other bird species at the 36 ha and 430 ha spatial scales (Fig. 5F). At the 2,580 ha and 15,480 ha spatial scales, Eastern Meadowlarks tend to co-occur more often with Eastern Wood-Pewees than with the other bird species (Fig. 5F).

DISCUSSION

Several conclusions appear to be supported by this study. The first is that the locations where these five forest-breeding birds species were observed strongly correspond to the distribution of forest-cover in the study area and not with urban land cover (Fig. 3). Similarly, locations where the grassland species was observed correspond to the distribution of grassland cover and not with urban or forest land cover (Fig. 3). Bird distribution patterns can provide a broad-scale assessment where one is likely to observe and not observe bird species (Bibby et al. 1992). Given this geographic data set, areas where these species occur and co-occur could identify sites where forest-breeding neotropical migrant breeding bird diversity could be relatively species rich. Furthermore, these data could also indicate the importance of forest patches for breeding NTMB species in a metropolitan setting. For example, all species except the Scarlet Tanager were observed in the string of forest parks and preserves (Radnor Lake, Percy and Edwin Warner Parks) to the south and southwest of Nashville (Fig. 3) in spite of clear negative associations with urban land cover (It is possible that SCTA were present and just were not recorded during the three-minute count period.). The presence of four of the five forest-breeding birds in these areas is likely a strong indicator of forest-breeding NTMB diversity there. This, in turn, indicates that these areas are important conservation areas for forested lands and breeding bird diversity in metropolitan Nashville. Similar type assessments could be made for other parts of the study area as well. This, in turn, illustrates the importance of recording the geographic location of bird species in environmental studies (Cooper 2002).

A second conclusion is that in contrast to the research hypothesis, some of the bird species exhibited consistent association patterns across all spatial scales in the analyses (Fig. 4; Table 1). The probabilities of occurrence for Acadian Flycatchers, Red-eyed Vireos, Scarlet Tanagers, and Wood Thrushes were consistently significantly positively associated with the amount of forest cover at all study scales as was the probability for Eastern Meadowlarks with grassland cover (Table 2). Thus, across different spatial scales spanning several orders of magnitude in size, these

bird species were consistently positively associated with amount of a land cover (Table 2).

A third conclusion indicated by the analyses is that even relatively small amounts of urban land cover as compared to forest cover are negatively associated with the probability of occurrence of these five forest-breeding birds at the different spatial scales (Fig. 4; Table 2). At the 36 ha scale, when urban land cover occupies more than just 10% of the area, these forest breeding birds as well as the EAME, tend not to be found (Table 1). However, the forest-breeding bird species can be found in a 36 ha site that is less than 10% forest. Similar land cover disparity trends occur at the 2,580 ha and 15,480 ha spatial scales as well (Fig. 4, Table 2). It appears that at the smallest scale, it may be that total amount of preferred habitat is more important in determining breeding-bird site selection than presence of unsuitable habitat, at least up to a point. It may be that as long as enough suitable habitat is present, birds may be relatively insensitive to the presence of unsuitable habitat as long as that type of habitat remains below what appears to be a threshold level at small spatial scales (Tables 1 and 2). Nesting site selection by individual birds likely requires more than just amount of preferred habitat and includes such decisions as density of conspecifics and predator densities (Wiens 1989). However, nesting site selection generally occurs at smaller spatial scales and the amount of preferred habitat at local spatial scales is likely a strong influence guiding site selection by breeding birds.

The non-symmetrical differences between the amounts of forest habitat that is positively associated with these forest-breeding bird species and the amounts of urban land cover being negatively associated with them indicate that much less urban cover results in negative associations, similar in magnitude to the positive association found with forest cover (Fig. 4). What could be occurring is that urban land cover may have an effect that is greater than the areal amount may indicate (Butler 2003 in press). Urban areas are largely comprised of human-made impervious surfaces (concrete, roofs, Macadam, roads) that contribute to greater runoff and disrupt flow patterns of nutrients and water, animal movement, and plant dispersal (Sukopp 1998). Furthermore, urban development tends to increase local temperatures, modify airflow, disrupt air mass movement around urban areas, increase airborne pollutant concentrations, and compact soils (Sukopp 1998). This results in urban development impacting much of the surrounding environment. Thus, proximity of even relatively large forest patches to urban development may present a landscape context that is less suitable for forest breeding neotropical migrant bird species (Askins 1995). For example, the distribution of Scarlet Tanagers in the study area indicates that they were less often observed in the forest periphery around Nashville than the other four forest-breeding species (Fig. 2). Scarlet Tanagers were shown to be relatively strong positive associates with forest cover and relatively strong negative associates with urban land cover as compared to the other four forest-breeding bird species. This distribution pattern and forest asso-

ciation tendency may indicate that Scarlet Tanagers prefer relatively large and/or undisturbed forest patches as compared to the other forest breeding bird species in the present study. Thus, forest patches within an urban landscape matrix may be less suitable for Scarlet Tanagers than otherwise may be expected if they were in a more natural landscape (Rosenberg et al. 1999b). The apparent Scarlet Tanager preference for relatively large, undisturbed forest patches coupled to this species' occurrence being a relatively better predictor of also observing other forest-breeding birds indicate that this species may be a reasonable indicator species of forest patch quality and avian diversity (Fig. 3 and 5).

A fourth conclusion is that the multi-scale co-occurrence patterns between bird species can offer insight into spatial scales of conservation importance and the general land-cover mosaic pattern found in the study area. A well-understood function is that as the spatial scale of assessment increases so does the probability that a species will be observed. Related to this function is that as the spatial scale of assessment increases so does the likelihood that different species are found to co-occur. In the present study, the probability that species co-occur increases with the spatial scale of the analysis (Fig. 5). It may not be that co-occurrence increases with increasing scale are important indicators, but the pattern of this increase is important for conservation inference. For example, the pair-wise co-occurrence patterns between the five forest-breeding species, except SCTA, has the greatest increase from the 430 ha to 2,580 ha scale (Fig. 5). This could indicate that within the study area, the 2,580 ha scale is sufficiently large to reasonably expect to find all these bird species consistently. Thus, this indicates that in this area smaller spatial scales (<430 ha) may be insufficient in areal extent to expect to conserve forest-breeding bird species diversity, and larger spatial scales may not provide much additional conservation benefit. This is important because understanding the proper scale for conservation measures in a region could help balance the multiple land use pressures that many areas experience.

The 2,580 ha spatial scale, however, superimposes on the landscape mosaic pattern of the study area. And what this study suggests is that at the 2,580 ha scale the probability of observing Eastern Meadowlarks with any of the five-forest breeding birds was virtually the same as any forest-breeding bird being observed with any other forest-breeding species (Fig. 5). It appears that at the 2,580 ha within this study area there is a sufficient mix of forest and grassland that species preferring either can readily co-exist. Thus, continuous forest patches in the study area likely tend to be less than 2,580 ha and probably average smaller. Even at the 430 ha scale, some forest-breeding species co-occur with EAME as often as other forest-breeding species (Fig.5). Thus, the 2,580 ha in this study area may represent a spatial scale that could provide sufficient habitat for many species of birds with different habitat needs. Only long-term population analyses could effectively assess the viability of different sized areas. However, the present study indicates a range of possible spatial scales to better assess, manage, and conserve forest-breeding NTMB

in the study area region. Spatial scales ranging from 430 ha to 2,580 ha may better assess forest-breeding NTMB population trends as well as forming reasonable sized bird conservation areas.

These results could be influenced by habitat preferences for some of these birds and the minimum observation distance that I used. For example, EAWPs can be found in more open forest and woodland than the other forest-breeding birds (DeGraaf and Rappole 1995), and by using 300 m as the minimum observation distance, I could have included more individuals that were on the edge of their respective habitats where other species might also occur. This could account for the relatively strong co-occurrence relationship between EAWPs and EAMEs (Fig. 5). Edge effects might also account for the surprising result of REVIs co-occurring more often with EAMEs at 36 ha than for Wood Thrushes (Fig. 5). Again, Red-eyed Vireos can be found in more open forest or even where shade trees provide fairly contiguous canopy habitat types (DeGraaf and Rappole, 1995) that intermix with grasslands where Eastern Meadowlarks breed. If variable circular plot survey techniques were used, maybe some of the co-occurrence noise could have been reduced. However, given the broad-scale nature of this analysis local variation would likely tend to even out because of the breadth of the analytical spatial scales and the large sample size at the 36 ha scale.

Another factor that could affect these bird distribution patterns is that the roadside locations were sampled once and for three minutes. At local scaled areas, longer bird surveys and multiple visits to a site will likely reveal more accurate appraisals of avian diversity. However, spending less time per point count location and conducting a greater number of counts gains a better understanding of avian diversity at larger spatial scales as compared to conducting fewer counts for longer durations each (Smith et al. 1993). Thus, the large point count sample size and the multiple-scale assessment in the present study form a robust analytical foundation to make inferences about forest-breeding neotropical migrant breeding birds.

Migrating birds are adapted to traveling large distances to find breeding and wintering sites. The adaptations that allow for migration might also develop into multi-scale decision traits that help these birds identify and make use of areas based on broad-scale information. For a bird to find a breeding site it must first find the proper biome and then an ecosystem within the biome finally settling in a local breeding spot. Even though there is a spatial sequence to locating breeding sites, concurrent decisions regarding the different spatial aspects of a breeding site may be occurring. The result of this may manifest as a species being sensitive to preferred habitat/land cover at a variety of spatial scales.

Forest breeding bird research that incorporates multiple spatial scales in the research design can provide insight into landscape factors affecting birds. Conservation of forest-breeding neotropical migrant birds may require more than forest breeding habitat preservation and include managing urban/suburban land-cover growth even when it does not explicitly replace forest cover.

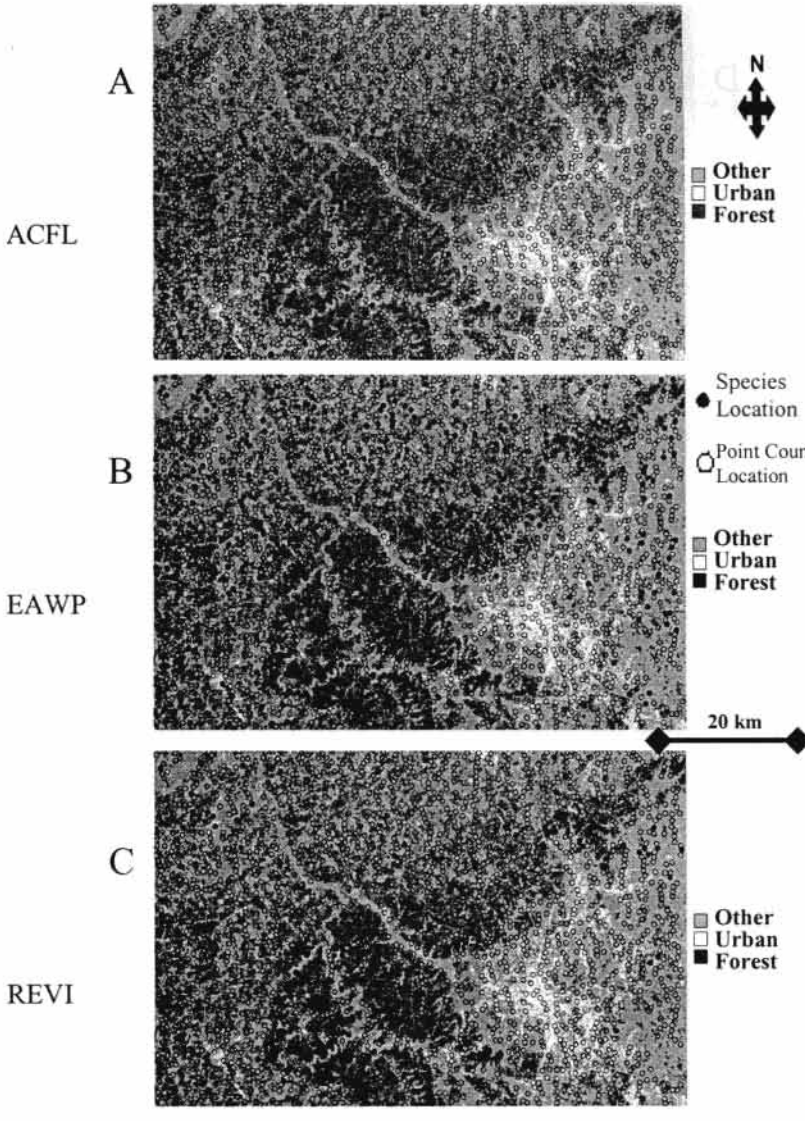

Figure 3A - C. The study-area distributions of three forest-breeding Neotropical migrant birds: ACFL Acadian Flycatcher, EAWP Eastern Wood-Pewee, and REVI Red-eyed Vireo.

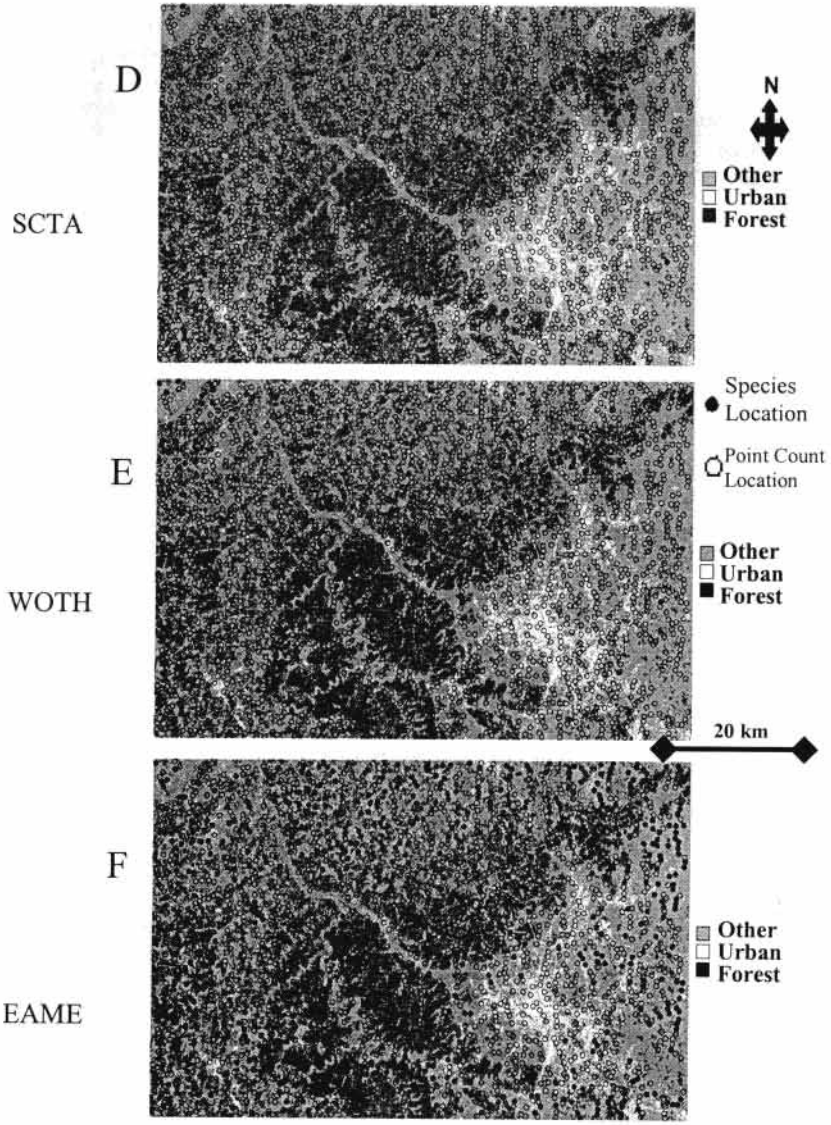

Figure 3D - F. The study-area distributions of two forest-breeding Neotropical migrant birds and a grassland breeding control species: SCTA Scarlet Tanager, WOTH Wood Thrush and EAME Eastern Meadowlark.

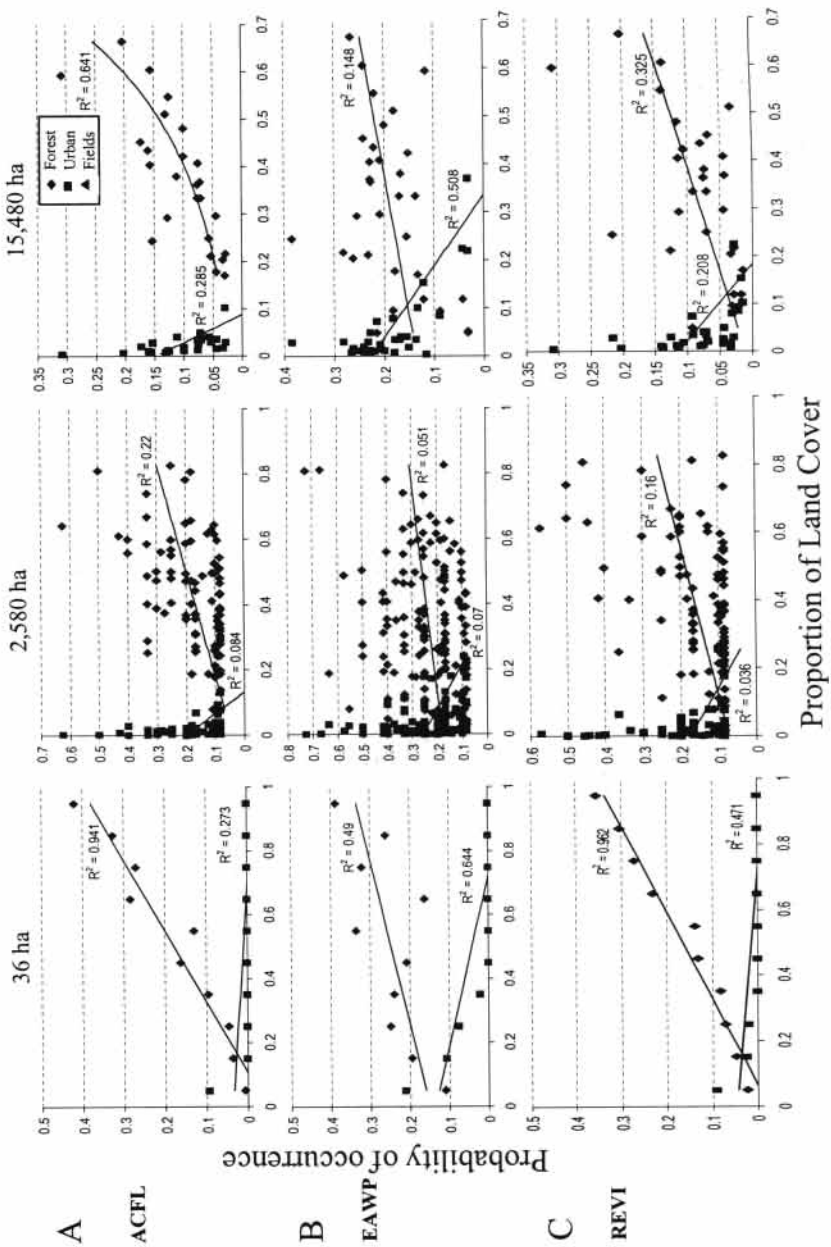

Figure 4A - C. Multi-scale probability of occurrence vs. proportion of land cover (forest, urban, grasslands) at three different spatial scales.

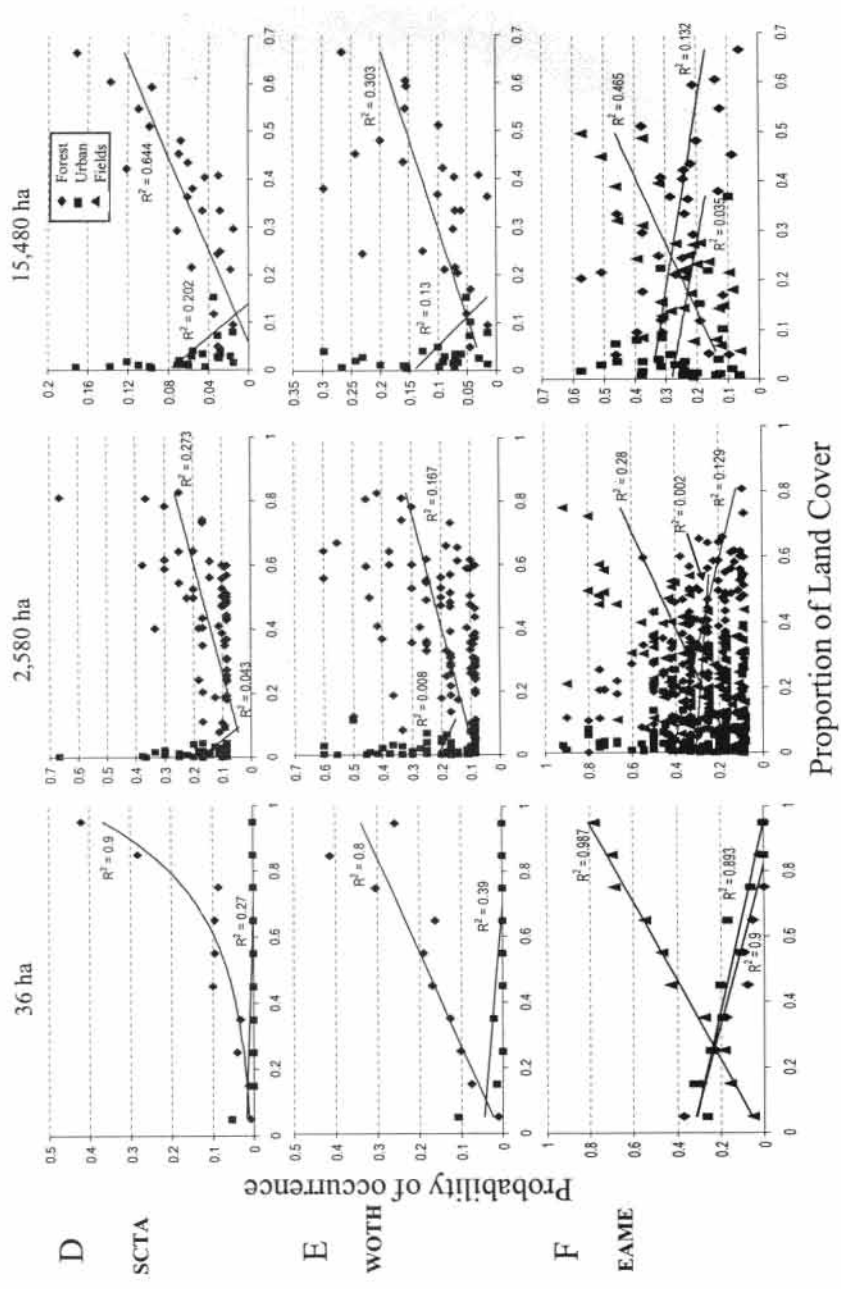

Figure 4D - F. Multi-scale probability of occurrence vs. proportion of land cover (forest, urban, grasslands) at three different spatial scales.

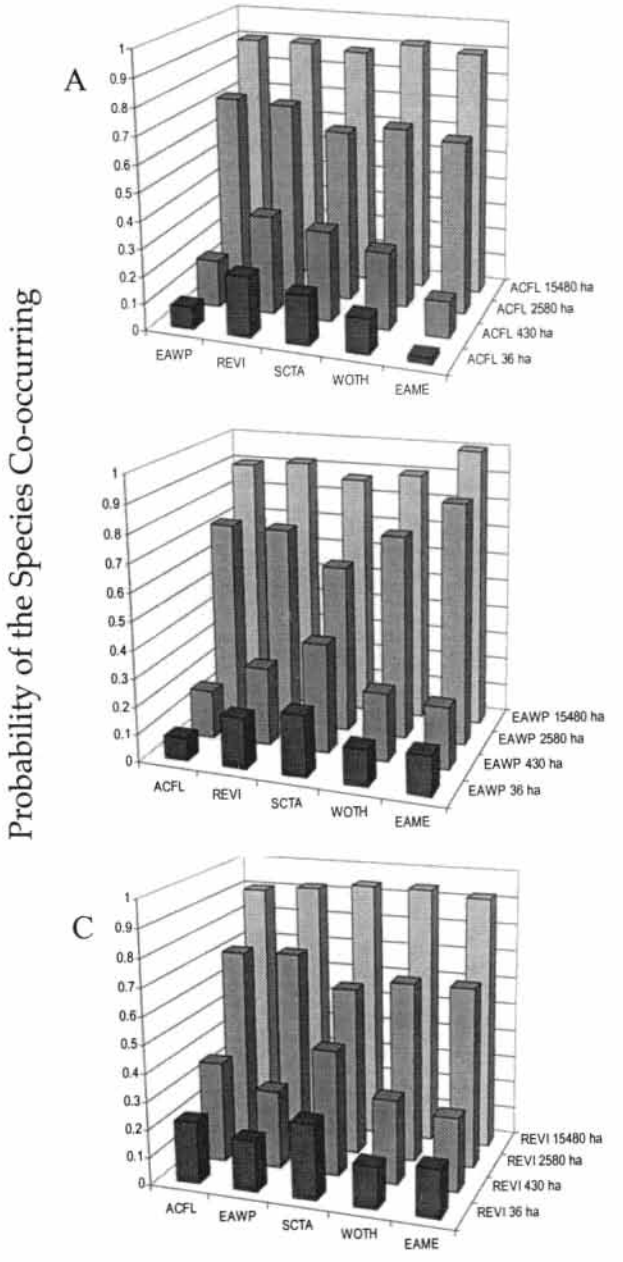

Figure 5A - C. Multi-scale co-occurrence analysis results based upon the Kulczynski's 2 similarity measure (the average conditional probability of observing species X (X-axis) given that species Y (Z-axis) was observed).

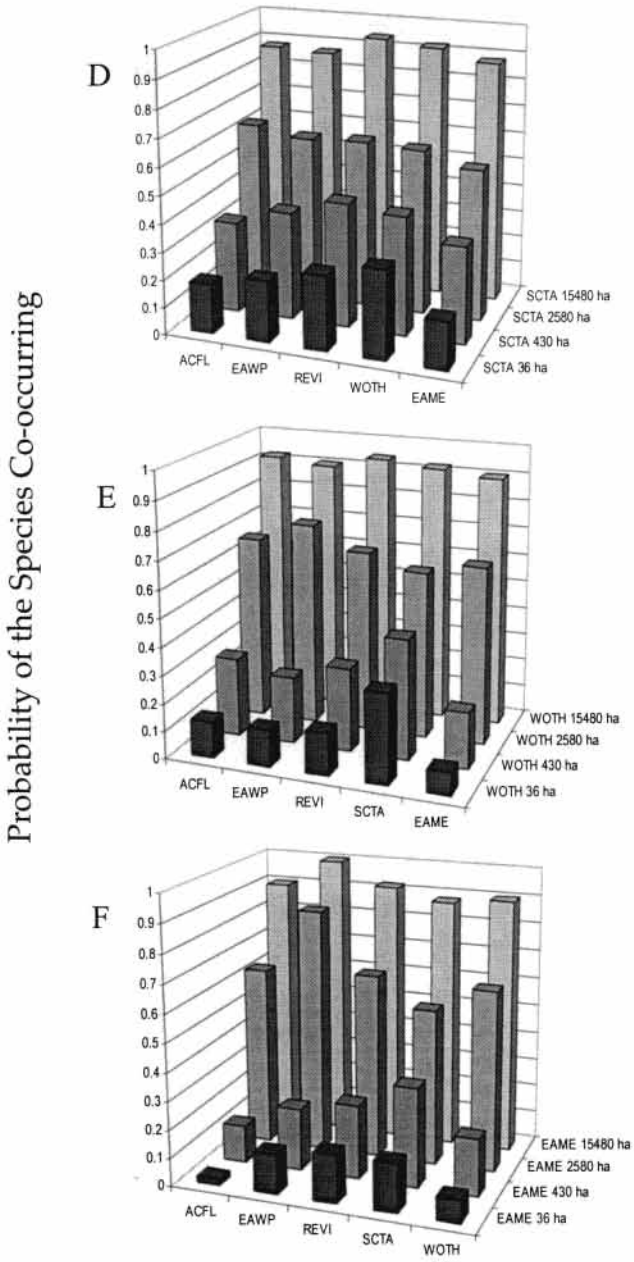

Figure 5D - F. Multi-scale co-occurrence analysis results based upon the Kulczynski's 2 similarity measure (the average conditional probability of observing species X (X-axis) given that species Y (Z-axis) was observed).

Table 1. Frequency of detection of five forest-breeding NTMB species as a function of proportion forest and urban land cover at the 36-ha scale.

Species	No. Points [1]	% Forest	No. Points [1]	% Urban
Acadian Flycatcher	5	0 - 10%	152	0 - 10%
(n=152) [2]	11	10 - 20%	0	10 - 20%
(63) [3]	11	20 - 30%	0	20 - 30%
	15	30 - 40%	0	30 - 40%
	21	40 - 50%	0	40 - 50%
	17	50 - 60%	0	50 - 60%
	23	60 - 70%	0	60 - 70%
(89) [4]	18	70 - 80%	0	70 - 80%
	17	80 - 90%	0	80 - 90%
	14	90-100%	0	90-100%
Eastern Wood-pewee	92	0 - 10%	341	0 - 10%
(n=359) [2]	59	10 - 20%	13	10 - 20%
(265) [3]	49	20 - 30%	4	20 - 30%
	38	30 - 40%	1	30 - 40%
	27	40 - 50%	0	40 - 50%
	39	50 - 60%	0	50 - 60%
	12	60 - 70%	0	60 - 70%
(94) [4]	19	70 - 80%	0	70 - 80%
	12	80 - 90%	0	80 - 90%
	12	90-100%	0	90-100%
Red-eyed Vireo	20	0 - 10%	148	0 - 10%
(n=152) [2]	14	10 - 20%	3	10 - 20%
(78) [3]	14	20 - 30%	1	20 - 30%
	13	30 - 40%	0	30 - 40%
	17	40 - 50%	0	40 - 50%
	16	50 - 60%	0	50 - 60%
	17	60 - 70%	0	60 - 70%
(74) [4]	16	70 - 80%	0	70 - 80%
	14	80 - 90%	0	80 - 90%
	11	90-100%	0	90-100%
Scarlet Tanager	7	0 - 10%	86	0 - 10%
(n=86) [2]	4	10 - 20%	0	10 - 20%
(37) [3]	8	20 - 30%	0	20 - 30%
	5	30 - 40%	0	30 - 40%
	13	40 - 50%	0	40 - 50%
	11	50 - 60%	0	50 - 60%
	7	60 - 70%	0	60 - 70%
(49) [4]	5	70 - 80%	0	70 - 80%
	13	80 - 90%	0	80 - 90%
	13	90-100%	0	90-100%

Species		No. Points [1]	% Forest	No. Points [1]	% Urban
Wood Thrush		9	0 - 10%	171	0 - 10%
(n=174) [2]		23	10 - 20%	2	10 - 20%
	(94) [3]	20	20 - 30%	0	20 - 30%
		20	30 - 40%	1	30 - 40%
		22	40 - 50%	0	40 - 50%
		22	50 - 60%	0	50 - 60%
		12	60 - 70%	0	60 - 70%
	(80) [4]	18	70 - 80%	0	70 - 80%
		19	80 - 90%	0	80 - 90%
		9	90-100%	0	90-100%
All Points		838	0 - 10%	1616	0 - 10%
(n=2,021) [2]		302	10 - 20%	131	10 - 20%
		196	20 - 30%	53	20 - 30%
		159	30 - 40%	47	30 - 40%
		130	40 - 50%	25	40 - 50%
		116	50 - 60%	28	50 - 60%
		74	60 - 70%	12	60 - 70%
		59	70 - 80%	16	70 - 80%
		46	80 - 90%	8	80 - 90%
		31	90-100%	15	90-100%

[1] Number of points with given percent forest or percent urban land cover at which the species was observed.

[2] Numbers in parentheses are total number of points at which species was observed.

[3] Number of points with less than 50% forest cover at which species was observed.

[4] Number of points with greater than 50% forest cover at which species was observed.

Table 2. Significance of association of five forest-breeding and one grassland breeding bird with proportion forest, urban, and grassland land cover at three spatial scales. All significant P-values ($P \leq 0.008$) are in bold type.

Species	Scale	Number	Forest	Urban	Field/Pasture Cover
Acadian Flycatcher	36 ha	n = 10	**P < 0.0001**	P = 0.122	na
	2,580 ha	n = 91	**P < 0.0001**	**P = 0.005**	na
	15,480 ha	n = 25	**P < 0.0001**	**P = 0.006**	na
Eastern Wood-pewee	36 ha	n = 10	P = 0.02	**P = 0.005**	na
	2,580 ha	n = 154	**P = 0.005**	**P = 0.0009**	na
	15,480 ha	n = 32	P = 0.03	**P < 0.0001**	na
Red-eyed Vireo	36 ha	n = 10	**P < 0.0001**	P = 0.028	na
	2,580 ha	n = 95	**P < 0.0001**	P = 0.065	na
	15,480 ha	n = 29	**P = 0.001**	P = 0.013	na
Scarlet Tanager	36 ha	n = 10	**P < 0.0001**	P = 0.125	na
	2,580 ha	n = 60	**P < 0.0001**	P = 0.113	na
	15,480 ha	n = 24	**P < 0.0001**	P = 0.027	na
Wood Thrush	36 ha	n = 10	**P = 0.0005**	P = 0.054	na
	2,580 ha	n = 89	**P < 0.0001**	P = 0.41	na
	15,480 ha	n = 26	**P = 0.004**	P = 0.07	na
Eastern Meadowlark	36 ha	n = 10	**P < 0.0001**	**P < 0.0001**	**P < 0.0001**
	2,580 ha	n = 163	**P < 0.0001**	P = 0.53	**P < 0.0001**
	15,480 ha	n = 32	P = 0.04	P = 0.3	**P < 0.0001**

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2002 TENNESSEE NORTH AMERICAN MIGRATION COUNT

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A record 187 observers surveyed 19 counties this year on May 11, North American Migration Count day. Bledsoe and Morgan Counties were censused for the first time. Participants found 54,244 individual birds representing 205 species for the state (Table 1). Long-tailed Duck, Black Rail, Laughing Gull, and Bachman's Sparrow were new species for the count, bringing the all time total species for the Tennessee North American Migration Count to 252.

Some amazing finds were recorded, such as 30 Henslow's Sparrows in Montgomery County and 2 Fish Crows in Hamilton County. American Wigeon, Virginia Rail, Alder Flycatcher, Bewick's Wren, American Pipit, and Connecticut Warbler appeared on the count for only the second time. Participants also managed to find all 37 species of wood warblers for the first time in count history. Some notable misses included Western Kingbird, Common Raven, Marsh Wren, Painted Bunting, and Red Crossbill. The totals for the following species represented new state high totals for this count: Pied-billed Grebe, Double-crested Cormorant, Great Blue Heron, Black-crowned Night-Heron, Canada Goose, Peregrine Falcon, Spotted Sandpiper, Rock Dove, Eurasian Collared-Dove, Yellow-billed Cuckoo, Ruby-throated Hummingbird, Pileated Woodpecker (tied for high), Acadian Flycatcher, Least Flycatcher (tied for high), Cliff Swallow, Barn Swallow, Red-breasted Nuthatch (tied for high), Carolina Wren, Northern Mockingbird, American Pipit, Philadelphia Vireo, Northern Parula, Yellow-throated Warbler, Prairie Warbler, Swainson's Warbler (tied for high), Hooded Warbler, Chipping Sparrow, Field Sparrow, Savannah Sparrow, Grasshopper Sparrow, Henslow's Sparrow, Eastern Meadowlark, Brown-headed Cowbird, House Finch, and House Sparrow.

COUNTY SUMMARIES

Anderson County – 0650-2015. Weather: cool in the a.m., but no rain or wind; temperatures ranged from 58-82. A couple of traditional areas were not covered this year, so the total species count of 102 was the lowest ever recorded. The birds/party hour, however, were much higher (168) than the historical average (94). Common Snipe was a new species for the count, bringing the all time species total for the count to 145. Species found in unusually low numbers for the count were Turkey Vulture and Kentucky Warbler. Species appearing in record high numbers for this count were Ruby-throated Hummingbird, Northern Mockingbird, and Brown Thrasher. Participants: Ron Hoff (compiler: 282 Hackworth Ln., Clinton, TN 37716; *dollyron@icx.net*) and Dollyann Myers.

Bledsoe County – No times given. Weather: no data. This was the first NAMC for Bledsoe County. An American Woodcock was one of only 3 found in the state.

Twelve Whip-poor-wills represented a state high total. Other good finds included Cattle Egret, Eurasian Collared-Dove, Loggerhead Shrike, Canada Warbler, Dickcissel, and Grasshopper Sparrow. Participants: Debbie and Roi Shannon (compiler: Rt.3, Box 458, Jones Gap Rd., Soddy Daisy, TN 37379).

Blount County – No times given. Weather: low 60s to mid-80s, with fog early, then partly cloudy. Overcast all day in the mountains. This was the only count to produce a Brown Creeper. Green Heron, Broad-winged Hawk, and Blue-headed Vireo all represented state high totals. Other nice finds were 2 Least Flycatchers (2 of 6 recorded in the state), a Red-breasted Nuthatch (only recorded in 2 counties), Veery, and a Swainson's Warbler. Participants: Jean Alexander (compiler: 3908 Riverview Dr., Maryville, TN 37804; *jjadmj@infi.net*), Mary Laura French, David Johnson, Tony Koella, Charlie Muise, Rachelle and Wes Seigrist, and June Welch.

Campbell County – 0600-2100. Weather: clear and sunny with temperatures from 68 to mid 80s. Four species were new to the count this year. They were Double-crested Cormorant, Solitary Sandpiper, Barred Owl, and Blue Grosbeak. Thirty-seven Tree Swallows represented a state high total. Other finds of interest were Warbling Vireo, Willow Flycatcher, and Swainson's Warbler. A colony of Cliff Swallows were found nesting on the bridge at Doak's Creek. Participants: Bob Collier, Ken Cutsinger, Tony Headrick, Nell Moore (compiler: P.O. Box 642, Caryville, TN 37714; *jimimoore@juno.com*), and Boyd Sharp.

Cheatham County – 0500-2000. Weather: partly cloudy to mostly cloudy with temperatures from 53-84. Winds were NE 5 to SSW 16. Notable species found included Bald Eagle, Bank Swallow, Philadelphia Vireo, Mourning Warbler, and Lincoln's Sparrow. Common Snipe and Cliff Swallow represented state high totals. Participants: Jerry Drewry and Joe Stone. Results compiled by Jan Shaw.

Davidson County – 0445-1900. Weather: partly cloudy to mostly cloudy with temperatures of 53-84. This count turned up one of only two Common Loons found in the state as well as the state's only sightings of Laughing Gull, Herring Gull, and Caspian Tern. State high totals were recorded for Black-crowned Night-Heron, Philadelphia Vireo (10!), Magnolia Warbler, Bay-breasted Warbler, Blackpoll Warbler, Mourning Warbler, Wilson's Warbler, Canada Warbler, and Lincoln's Sparrow. An unusual miss was Broad-winged Hawk. Participants: Sandy Bivens, Gary Casey, Phillip Casteel, Richard Conners, Camille Crenshaw, Carrie and David Dortch, Troy Ettel, Francis Fekel, Mark Hackney, Barbara Harris, Susan Hollyday, Linda Kelly, Diana McLusky, Mohan Pattanayek, Elizabeth O'Conner, Robert Rich, Sarah Scott, Joy Seal, Jennifer Serrano, Jan Shaw (compiler: 5019 Timberhill Dr., Nashville, TN 37211; *JanKShaw@aol.com*), Chris Sloan, Michael Smith, and Mary Zimmerman.

Hamilton County – 0515-2000. Weather: partly cloudy with temperatures from 62-86 and no rain. Hamilton County lived up to its reputation as one of the state's best birding counties. Birders found one of two Common Loons in the state. This was also the only count to produce Least Bittern, Black Rail, Virginia Rail, and Sora. Twelve species on this count represented state high totals. Maybe even more

amazing were two Fish Crows. Participants: David Aborn, Jeff Basham, Harold Birch, Kevin Calhoon (compiler: 934 Craven's Terrace, Lookout Mtn., TN 37409; *KAC@tennis.org*), Janice Chadwell, Jim Castella, Anita and Danny Gaddy, Bill Haley, John Henderson, Daniel Jacobson, Bonnie Johnson, Marty Paige, Tom Patton, Judy Newsome, Harold Sharpe, Jimmy Wilkerson, and Libby Wolfe.

Jefferson County – Although this county was only birded for 2 hours, it produced some nice finds. Included were seven species of shorebirds, one of only two Barn Owls found in the state, a couple of Bank Swallows, and a Pine Siskin (only found in two other counties). Participant and compiler: K. Dean Edwards, 1615 Meadow Chase Ln., Knoxville, TN 37931; *kde@utk.edu*.

Knox County – 0930-1100. No weather data given. This was only a partial count, but managed to turn up a nesting House Wren. Participant: K. Dean Edwards.

Lake County – 0600-2000. No weather data given. Lake County again led the state with 158 species found on count day. State high totals were tallied for 28 species. American Bittern, Northern Shoveler, Lesser Scaup, Hooded Merganser, Red-breasted Merganser, Short-billed Dowitcher, Alder Flycatcher, Sedge Wren, and Orange-crowned Warbler were only found on this count. Connecticut Warbler was another good find. Participants: Bob Foehring, Mark Greene (compiler: 2881 Central Ave., Humboldt, TN 38343; *mgreene@devap.com*), Ken Leggett, Don Manning, Nancy Moore, Mike Todd, and Jeff Wilson.

Montgomery County – No times given. Weather: mostly sunny all day with some light wind; temperatures ranged from 59-86. Birders had a great day, finding state high totals for 17 species. They also found the state's only Hermit Thrush, the state's only Henslow's Sparrows (an amazing 30!), and a new species for the state count, a Bachman's Sparrow. More good finds were American Woodcock, Connecticut Warbler, and a Lark Sparrow. Participants: Joe Allen, Danielle Evans, Paul Evans, Elaine Foust, Jim Giocomo; Andrew, Joe, Joyce, and Matthew Hall; Debbie and Steve Hamilton, Ken Haskins, Annie Heilman, Heather Hollis, Rebecca Houtman, Thurston Lee, Bill and Gloria Milliken (compiler: 861 Vaughn Rd., Clarksville, TN 37043), Daniel Moss, Sally Noel, Louise Podell, Joe and Sally Schiller, David Snyder, and George Wade.

Morgan County – No times given. Weather: no data. Morgan County is new to the count, but it was only partially covered. No unusual species were recorded, but the observer did manage to find a nice assortment of wood warblers for only 4 hours coverage. Participant and compiler: David Trently (1029 Morrow Rd., Knoxville, TN 37923).

Putnam County – 0315-2015. Weather: clear in the a.m. and mostly clear in the p.m. with no rain; wind 0-15 and temperatures of 55-75. Participants logged over 10,300 individuals for the highest county total in the state. This count was also responsible for state high totals for 50 species! The Long-tailed Duck was the 193rd species ever recorded on this count and also represented a new species for the state

count. It was also the second Putnam Co. record and potentially the latest spring record of this species in Tennessee. Forster's Tern was the 194th species for this count. The Barn Owl had 3 young. Olive-sided Flycatcher was the 195th species for this count. Brown-headed Nuthatches were the 196th species for this count and constitute the only known population in Tennessee north of I-40 and west of the Cumberland Plateau. Chimney Swift and House Finch represented highest ever totals for this spring count. House Wren, Yellow-throated Warbler, Prairie Warbler, Hooded Warbler, Eastern Towhee, and Field Sparrow represented highest ever totals for the county as well as this spring count. Participants: Daniel L. Combs, D. Ann Davis, Ginger K. Ensor, Louann I. Gum, Jane Herrin, Graham S, Kash, Nancy S. Layzer, Ken Morgan, Michael P. O'Rourke, John Owens, Tom Roberts, Richard W. Simmers, Jr., Barbara H. Stedman, Stephen J. Stedman (compiler: 2675 Lakeland Dr., Cookeville, TN 38507; *sstedman@tntech.edu*), and Winston A.Walden.

Roane County – 0730-1200. Weather: partly cloudy. Despite minimal coverage, participants found a state high 9 Ospreys. Other finds of interest were a Wild Turkey, Pectoral Sandpiper, Red-headed Woodpecker, Willow Flycatcher, and 4 Grasshopper Sparrows. Participants: Jim Evans and Dev Joslin (compiler: 112 Newcrest Ln., Oak Ridge, TN 37830; *jdjoslin@esper.com*).

Rutherford County – 0330-1930. Weather: partly cloudy with temperatures from 56 to 83. Some difficult to find species included Pied-billed Grebe, Yellow-crowned Night-Heron, Eurasian Collared-Dove, the state's only Bewick's Wren, Veery, Golden-winged Warbler, Northern Waterthrush, and one of only 2 Lark Sparrows found in the state. Participant: Jay Desgrosellier (compiler: 2111 Erin Ln., Nashville, TN 37221; *jay.desgrosellier@mcmail.vanderbilt.edu*).

Sevier County – 0645-1830. Weather: temperature range was 58-85. This count was once again responsible for several high altitude species not found elsewhere in the state. These included Black-capped Chickadee, 5 of 6 Red-breasted Nuthatches found in the state, Winter Wren, Golden-crowned Kinglet, and Dark-eyed Junco. Participants: Susan Hoyle (compiler: P.O.Box 8421, Knoxville, TN 37996; *hoyle@cs.utk.edu*), Kristine Johnson, and Martha Rudolph.

Shelby County – 0615-2030. Weather: cloudy in the a.m. and partly cloudy in the p.m., with winds of 0-15 out of the south; temperature range was 60-86. Party hours included 3 by horseback (6 miles). As always, Shelby County produced some nice finds, including the state's only Black-necked Stilts and White-crowned Sparrows. Participants also recorded state high totals for 24 species. Other species of note included Eurasian Collared-Dove, Scissor-tailed Flycatcher, Vesper Sparrow, and Pine Siskin. Painted Buntings were not recorded this year. Participants: Charles Askew, David Blaylock, Bob Browne, Carolyn Bullock, Judy Dorsey, Temple Douglas, Kate Gooch, Marty Haraway, Van Harris, Anne and Janie Hooper, Margaret Jefferson, Dianna and Rusty Johnson, Charles McCrary, Gerry Papachristou, Rob Peeples (compiler: 8205 Meadow Glen Dr., Germantown, TN 38138;

wpeeples@midsouth.rr.com), Dick and Don Preston, Forrest Priddy, Virginia Reynolds, Agnes Stark, Ed Thomas, Martha Waldron, and Dick Whittington.

Sumner County – 1330-1800. Weather: 80 degrees and mostly sunny. Although this was only a partial count in the afternoon, birders managed to find Double-crested Cormorant, Great Blue Heron, and Common Grackle in state high numbers. They also found a Black-billed Cuckoo, one of only 5 found in the state on count day. Participants: Jim Hiett and Chris Sloan. Statistics compiled by Jan Shaw.

Williamson County – 0630-1500. Weather: partly cloudy to mostly cloudy, with temperatures ranging from 53-84. Notable finds included Veery, Loggerhead Shrike, Blue-winged Warbler, and two Dickcissels. Participants: Susan Bradfield, Trae Bradfield, Bob Brown, David Buchanan, Jean Buchanan, Ed Byrne, Richard Conners, Camille Crenshaw, Bob and Pandy English, Francis Fekel, Betsy Barber, Ed Gleaves, Linda Kelly, John Leader, Joy Mayfield, Sarah Scott, and Jan Shaw (compiler: 5019 Timberhill Dr., Nashville, TN 37211; *JanKShaw@aol.com*).

ERRATA

A mistake was made by this compiler when totaling the species for the 2001 Spring NAMC. The following list shows the corrected state totals for each species concerned. Double-crested Cormorant = 186; Green Heron = 101; Turkey Vulture = 420; Common Nighthawk = 61; Acadian Flycatcher = 245; White-eyed Vireo = 419; Red-eyed Vireo = 1186; American Crow = 1502; Tree Swallow = 143; House Wren = 63; Eastern Bluebird = 1137; Northern Mockingbird = 950; Cerulean Warbler = 107; Louisiana Waterthrush = 50; Common Yellowthroat = 877; Summer Tanager = 375; Eastern Towhee = 527; Chipping Sparrow = 477; Song Sparrow = 542; Blue Grosbeak = 137; Indigo Bunting = 2845; House Sparrow = 653. The total number of individuals for Putnam County should be 10, 606. The total number of individuals for the state should be 55,466.

Table 1. Results of the 2002 Tennessee North American Migration Count conducted 11 May 2002.

Species Counties:	And	Bled	Blunt	Camp	Cheat	Dvdsn	Hamil	Jeff	Knox	Lake	Mont	Morg	Putn	Roan	Rutfd	Sevier	Shel	Sumn	Wilms	Totals
Common Loon	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2
Pied-billed Grebe	-	-	-	-	-	-	1	-	-	6	-	-	1	-	1	-	3	-	-	12
Double-crested Cormorant	-	-	4	2	3	15	2	-	-	6	5	-	1	3	-	-	1	355	-	397
American Bittern	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Least Bittern	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Great Blue Heron	24	1	5	6	4	17	146	3	-	97	23	-	8	23	5	46	23	153	3	587
Great Egret	-	-	-	1	-	-	1	-	-	74	-	-	1	-	-	-	17	3	-	97
Snowy Egret	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	12	-	-	15
Little Blue Heron	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	6	-	-	9
Cattle Egret	-	1	-	-	-	-	-	-	-	15	-	-	-	-	-	-	19	50	-	85
Green Heron	4	1	13	4	3	1	9	-	-	8	6	-	8	-	3	-	9	-	4	73
Blk-crowned Night-Heron	-	-	-	-	11	203	-	-	-	1	-	-	-	-	2	10	-	150	-	377
Ylw-crowned Night-Heron	-	-	-	-	-	-	-	-	-	1	-	-	1	-	1	-	3	-	-	6
Black Vulture	2	4	2	4	30	30	12	-	-	7	70	7	18	11	3	3	1	9	10	223
Turkey Vulture	4	9	19	16	20	26	31	-	1	17	93	24	55	4	12	3	3	3	9	349
Canada Goose	110	41	97	21	40	134	239	-	3	-	76	2	91	43	4	11	265	36	10	1223
Wood Duck	-	4	14	4	5	6	15	-	-	25	30	-	35	8	5	-	8	1	-	160
American Wigeon	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Mallard	4	2	24	4	3	14	54	-	-	86	18	-	10	5	5	20	37	25	18	329
Blue-winged Teal	-	-	-	-	-	4	2	-	-	8	-	-	-	-	-	-	2	-	-	16
Northern Shoveler	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	4
Lesser Scaup	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Long-tailed Duck	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Hooded Merganser	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	5
Red-breasted Merganser	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	2

Species Counties:	And	Bled	Blunt	Camp	Cheat	Dvdsn	Hamil	Jeff	Knox	Lake	Mont	Morg	Putn	Roan	Rulfd	Sevier	Shel	Sumn	WUms	Totals
Osprey	1	-	2	-	-	1	-	-	-	1	-	-	1	9	1	-	-	-	-	16
Mississippi Kite	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	26	-	-	29
Bald Eagle	-	-	-	-	1	-	-	-	-	3	1	-	-	-	-	-	-	-	-	5
Sharp-shinned Hawk	-	1	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	-	4
Cooper's Hawk	-	-	-	-	1	2	4	-	-	-	3	-	2	-	-	-	-	1	-	16
Accipiter sp.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Red-shouldered Hawk	1	4	1	1	4	3	6	-	-	7	6	-	11	-	-	-	3	-	-	47
Broad-winged Hawk	1	2	6	3	2	-	2	-	-	1	1	1	4	-	-	2	-	-	-	25
Red-tailed Hawk	4	3	2	3	8	13	20	-	1	11	14	-	8	1	2	-	6	3	7	106
American Kestrel	-	1	-	-	3	3	1	-	-	4	9	-	14	-	2	-	-	-	-	37
Peregrine Falcon	-	-	-	-	-	-	4	-	-	1	-	-	-	-	-	-	-	-	-	5
Wild Turkey	-	-	-	1	7	-	23	-	-	1	12	-	3	1	-	1	3	-	-	52
Northern Bobwhite	2	11	5	6	9	6	-	-	-	22	91	-	18	-	6	-	15	-	3	194
Black Rail	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Virginia Rail	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Sora	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
American Coot	-	-	2	3	-	5	1	-	-	6	1	-	1	1	-	-	5	-	-	25
Semipalmated Plover	2	-	-	-	-	-	1	1	-	23	-	-	-	-	-	-	-	1	-	28
Killdeer	2	14	11	1	3	7	17	3	2	38	65	-	29	5	9	17	73	3	-	299
Black-necked Stilt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37	-	-	37
Greater Yellowlegs	-	-	-	-	-	-	-	-	-	37	-	-	1	-	-	-	4	-	-	42
Lesser Yellowlegs	-	-	-	-	-	-	1	2	-	44	-	-	-	-	-	-	4	-	-	51
Solitary Sandpiper	-	3	-	1	-	2	6	3	1	19	1	-	5	-	1	-	2	-	-	44
Spotted Sandpiper	3	1	2	4	-	6	2	2	1	10	4	-	4	-	3	-	22	1	1	66
Semipalmated Sandpiper	-	-	-	-	-	-	1	1	-	35	1	-	-	-	-	-	-	4	-	42
Least Sandpiper	6	-	-	-	14	1	-	5	-	55	1	-	-	-	12	-	103	-	-	197
Pectoral Sandpiper	-	-	-	-	-	-	-	-	-	43	-	-	-	5	-	-	-	1	-	49
Short-billed Dowitcher	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-	-	-	-	-	15
Dowitcher sp.	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	4
Common Snipe	1	-	-	-	4	-	-	-	-	1	-	-	-	-	1	-	-	-	-	7

Species Counties:	And	Bled	Blunt	Camp	Cheat	Dvdsn	Hamil	Jeff	Knox	Lake	Mont	Morg	Putn	Roan	Rutfd	Sevier	Shel	Sumn	Wilms	Totals
American Woodcock	-	1	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	3
Sandpiper sp.	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	8
Laughing Gull	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Ring-billed Gull	-	-	-	-	-	2	10	-	-	3	1	-	-	3	1	-	-	2	-	22
Herring Gull	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Caspian Tern	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Forster's Tern	-	-	-	-	-	-	-	-	-	7	-	-	1	-	-	-	2	-	-	10
Rock Dove	3	-	83	6	12	20	91	2	-	27	91	-	65	-	6	3	239	-	10	658
Eurasian Collared-Dove	-	6	-	-	-	-	8	-	-	1	-	-	-	-	1	-	6	-	-	22
Mourning Dove	69	44	122	22	25	32	116	20	17	345	255	11	269	5	35	60	205	1	28	1681
Black-billed Cuckoo	-	-	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-	1	-	5
Yellow-billed Cuckoo	6	4	6	2	4	26	6	-	-	21	22	-	5	1	18	2	58	1	7	189
Barn Owl	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	2
Eastern Screech Owl	1	-	6	-	1	-	2	-	-	1	-	-	4	-	2	-	1	-	-	17
Great Horned Owl	1	2	-	-	-	-	2	-	-	1	1	-	2	-	-	-	-	-	1	10
Barred Owl	5	-	2	1	-	4	2	-	-	8	8	-	2	-	1	-	1	-	-	34
Common Nighthawk	3	-	3	-	1	4	3	-	-	3	8	-	7	-	6	-	2	-	1	41
Chuck-will's-widow	12	-	-	-	2	-	1	-	-	-	1	-	3	-	2	-	8	-	-	29
Whip-poor-will	-	12	2	-	5	-	1	-	-	-	8	-	8	-	2	-	3	-	-	41
Chimney Swift	38	26	126	21	70	125	65	50	25	53	75	11	191	3	36	19	54	15	9	1012
Ruby-throated Hummingbird	7	2	6	2	5	10	6	-	-	28	24	1	15	3	1	2	21	-	3	136
Belted Kingfisher	1	-	2	4	4	8	7	-	-	3	5	-	9	2	1	-	2	-	-	48
Red-headed Woodpecker	-	-	-	-	1	1	8	-	-	18	13	-	7	2	-	-	23	3	5	81
Red-bellied Woodpecker	17	4	21	2	4	37	35	-	1	27	66	2	60	4	6	8	59	-	9	362
Downy Woodpecker	4	2	14	3	4	22	20	-	1	18	19	3	27	2	4	2	26	-	6	177
Hairy Woodpecker	1	2	3	4	-	3	9	-	-	2	13	-	4	1	2	-	1	-	-	45
Northern Flicker	6	-	4	3	2	6	20	1	1	14	18	-	22	3	-	1	12	3	-	116
Pileated Woodpecker	7	4	14	6	7	11	14	-	-	9	9	3	29	4	1	2	11	-	4	135
Olive-sided Flycatcher	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	2
Eastern Wood-Pewee	5	4	10	10	5	40	18	-	1	26	67	2	81	2	9	4	76	5	6	371

Species Counties:	And	Bled	Blunt	Camp	Cheat	Dvdsn	Hamil	Jeff	Knox	Lake	Mont	Morg	Putn	Roan	Rutfd	Sevier	Shel	Sumn	Wilms	Totals
Acadian Flycatcher	3	1	9	1	2	24	4	-	-	19	20	-	62	2	-	2	98	-	-	247
Alder Flycatcher	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	2
Willow Flycatcher	-	-	1	2	-	1	3	-	-	1	-	-	1	1	-	-	-	-	-	10
Least Flycatcher	-	-	2	-	-	1	-	-		-	-	-	-	-	-	-	2	-	-	5
Eastern Phoebe	10	5	27	12	4	21	11	-	-	6	33	7	58	5	4	11	3	1	3	221
Great Crested Flycatcher	11	1	12	6	3	22	24	-	-	15	60	1	41	3	11	4	54	1	11	280
Eastern Kingbird	14	23	12	18	6	20	35	1	2	33	65	3	71	-	13	9	34	7	5	371
Scissor-tailed Flycatcher	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	2
Loggerhead Shrike	1	1	-	-	-	1	1	-	-	9	1	-	-	-	-	-	9	1	2	26
White-eyed Vireo	9	6	6	11	6	38	31	-	-	26	56	4	146	12	4	2	63	-	7	427
Yellow-throated Vireo	3	-	2	5	2	6	5	-	-	2	8	1	34	2	3	-	11	-	-	84
Blue-headed Vireo	1	6	12	-	-	1	1	-	-	-	2	2	8	-	-	6	-	-	-	39
Warbling Vireo	-	-	-	1	5	6	-	-	-	50	16	-	-	-	4	-	12	6	2	102
Philadelphia Vireo	-	-	-	-	1	10	-	-	-	2	-	-	-	-	-	-	1	-	-	14
Red-eyed Vireo	24	19	66	36	10	90	94	-	2	22	32	10	556	33	19	31	69	-	7	1120
Blue Jay	31	12	50	18	4	60	151	5	20	28	154	5	150	3	26	15	41	2	18	793
American Crow	33	11	77	29	24	55	295	10	20	40	226	14	284	23	17	15	36	4	14	1227
Fish Crow	-	-	-	-	-	-	2	-	-	36	-	-	-	-	-	-	13	-	-	51
Horned Lark	-	-	-	2	-	-	-	-	-	113	4	-	7	-	1	-	8	-	-	135
Purple Martin	12	16	10	1	50	19	113	-	2	61	69	4	89	-	12	5	90	22	-	575
Tree Swallow	15	-	19	37	1	23	4	-	1	16	4	-	20	3	4	1	10	8	-	166
N. Rough-winged Swallow	15	6	19	18	30	35	19	1	-	22	97	10	68	2	4	12	130	1	3	492
Bank Swallow	-	-	-	-	3	-	3	2	-	15	-	-	-	-	-	-	40	-	-	63
Cliff Swallow	100	-	60	55	600	-	237	-	-	20	388	-	4	-	-	28	41	2	30	1365
Barn Swallow	53	32	50	24	12	28	84	6	-	45	191	1	199	15	20	19	428	3	14	1224
Black-capped Chickadee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Carolina Chickadee	15	16	34	19	15	108	119	-	4	30	45	4	102	13	16	17	46	3	13	619
Tufted Titmouse	18	6	28	14	10	67	141	-	4	32	81	2	123	19	15	18	113	-	20	711
Red-breasted Nuthatch	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	6
White-breasted Nuthatch	4	7	16	4	4	13	15	-	2	4	23	3	16	2	1	-	27	-	4	145

Species Counties:	And	Bled	Blunt	Camp	Cheat	Dvdsn	Hamil	Jeff	Knox	Lake	Mont	Morg	Putn	Roan	Rutfd	Sevier	Shel	Sumn	Wilms	Totals
Brown-headed Nuthatch	-	-	-	-	-	-	3	-	-	-	-	-	5	-	-	-	-	-	-	8
Brown Creeper	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Carolina Wren	21	21	52	19	8	78	107	-	4	33	98	9	212	17	9	16	140	2	8	854
Bewick's Wren	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
House Wren	1	-	2	2	-	5	3	-	1	1	11	-	40	-	-	4	-	2	-	72
Winter Wren	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3
Sedge Wren	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Golden-crowned Kinglet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Ruby-crowned Kinglet	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	2
Blue-gray Gnatcatcher	17	11	38	14	24	77	95	-	-	28	85	8	155	21	23	-	118	7	11	732
Eastern Bluebird	50	29	63	28	20	62	111	3	8	20	232	8	244	10	28	35	34	7	28	1020
Veery	2	-	2	-	-	4	1	-	-	1	-	-	1	-	1	5	-	-	2	19
Gray-cheeked Thrush	-	-	-	-	-	4	1	-	-	3	-	-	-	-	-	-	5	-	-	13
Swainson's Thrush	3	-	1	-	-	43	2	-	-	4	15	-	8	-	11	2	58	1	-	148
Hermit Thrush	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Wood Thrush	27	3	12	14	3	28	19	-	-	10	28	1	118	4	12	8	40	-	4	331
American Robin	100	28	151	36	60	73	273	4	4	37	447	12	384	4	37	55	101	4	5	1815
Gray Catbird	5	-	6	6	2	2	2	-	1	5	4	5	37	2	5	4	6	-	1	93
Northern Mockingbird	42	30	37	27	18	62	142	6	4	25	245	3	148	4	16	21	42	7	19	898
Brown Thrasher	24	13	9	11	12	13	59	-	-	9	67	2	79	3	5	2	8	-	1	317
European Starling	170	39	177	45	75	513	312	40	90	207	482	49	1050	38	195	120	207	263	78	4150
American Pipit	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	3
Cedar Waxwing	45	17	179	46	10	118	66	-	15	486	172	-	48	5	9	35	231	-	40	1522
Blue-winged Warbler	-	-	-	-	1	3	2	-	-	-	2	-	22	1	-	-	-	-	2	33
Golden-winged Warbler	-	-	-	2	-	-	1	-	-	1	-	-	-	-	1	-	-	-	-	5
Tennessee Warbler	-	-	2	1	4	82	1	-	-	52	69	-	12	-	3	-	105	-	8	339
Orange-crowned Warbler	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Nashville Warbler	-	-	-	-	-	3	1	-	-	-	-	-	-	-	-	-	2	-	1	7
Northern Parula	3	-	16	2	6	14	2	-	-	14	25	3	36	11	-	1	64	-	1	198
Yellow Warbler	-	-	1	2	4	5	1	-	-	12	20	-	38	2	1	2	3	-	-	91

Species Counties:	And	Bled	Blunt	Camp	Cheat	Dvdsn	Hamil	Jeff	Knox	Lake	Mont	Morg	Putn	Roan	Rutfd	Sevier	Shel	Sumn	Wilms	Totals
Chestnut-sided Warbler	3	-	-	12	1	10	1	-	-	2	14	-	1	2	2	6	7	-	-	61
Magnolia Warbler	-	-	-	1	3	63	1	-	-	11	1	-	2	-	7	-	19	-	4	112
Cape May Warbler	-	2	-	3	-	8	1	-	-	8	3	-	3	-	1	-	-	-	3	32
Black-throated Blue Warbler	-	-	1	-	-	2	1	-	-	-	5	-	-	-	-	3	-	-	1	14
Yellow-rumped Warbler	10	1	1	1	-	9	7	-	-	3	5	2	11	4	5	-	2	-	-	61
Black-throated Green Warbler	3	2	21	9	1	5	26	-	-	1	1	2	5	-	-	10	2	-	-	88
Blackburnian Warbler	-	-	-	2	1	1	1	-	-	2	-	-	1	-	1	-	4	-	-	13
Yellow-throated Warbler	4	2	16	2	8	1	7	-	-	2	12	5	30	6	-	-	1	-	4	100
Pine Warbler	1	-	5	3	-	1	23	-	-	-	8	-	34	2	4	2	8	1	1	93
Prairie Warbler	12	21	1	2	3	5	33	-	-	-	58	4	131	5	8	-	-	1	1	285
Palm Warbler	-	4	-	-	1	13	1	-	-	1	9	-	5	-	-	-	-	-	-	34
Bay-breasted Warbler	-	-	-	-	-	6	1	-	-	1	2	-	2	-	1	-	-	-	2	15
Blackpoll Warbler	2	1	2	9	1	59	6	-	-	32	3	2	6	-	18	-	5	1	5	152
Cerulean Warbler	3	-	-	17	1	1	-	-	-	-	-	-	34	-	-	-	27	-	-	83
Black-and-white Warbler	3	1	8	9	1	5	5	-	-	2	2	6	108	-	-	2	1	-	1	154
American Redstart	4	7	3	26	-	19	4	-	-	6	5	-	51	2	1	-	60	-	-	188
Prothonotary Warbler	-	1	-	3	6	3	5	-	-	31	21	-	2	2	7	-	26	-	-	107
Worm-eating Warbler	1	-	7	3	2	2	8	-	-	-	5	3	25	-	-	2	4	-	-	62
Swainson's Warbler	1	-	1	2	-	-	-	-	-	1	-	-	-	-	-	-	6	-	-	11
Ovenbird	17	9	22	18	4	3	6	-	-	2	1	5	133	-	-	34	2	-	-	256
Northern Waterthrush	-	-	-	-	-	1	-	-	-	2	1	-	-	-	1	-	1	-	-	6
Louisiana Waterthrush	-	1	4	1	3	6	1	-	-	-	6	2	18	-	-	2	6	-	1	51
Kentucky Warbler	1	-	-	5	2	11	7	-	-	2	19	2	53	5	3	-	36	-	2	148
Connecticut Warbler	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	2
Mourning Warbler	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Common Yellowthroat	4	11	22	21	15	56	27	-	-	35	89	5	231	7	32	5	31	-	5	596
Hooded Warbler	4	5	7	14	3	16	9	-	-	2	-	14	130	9	-	9	14	-	-	236
Wilson's Warbler	-	-	-	-	-	5	-	-	-	-	-	-	1	-	-	-	-	-	-	6
Canada Warbler	-	1	-	-	1	6	2	-	-	1	-	-	1	-	1	1	3	-	-	17
Yellow-breasted Chat	15	11	16	10	6	34	48	-	-	10	56	5	112	12	6	4	13	1	9	368

Species Counties:	And	Bled	Blunt	Camp	Cheat	Dvdsn	Hamil	Jeff	Knox	Lake	Mont	Morg	Putn	Roan	Rutfd	Sevier	Shel	Sumn	Wilms	Totals
Summer Tanager	5	3	3	2	12	34	9	-	-	19	30	-	63	-	18	1	57	-	7	263
Scarlet Tanager	21	4	6	23	5	24	12	-	1	1	16	4	62	3	2	7	10	-	3	204
Eastern Towhee	7	6	3	19	8	55	107	-	1	3	114	3	161	5	21	6	1	1	21	542
Bachman's Sparrow	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Chipping Sparrow	22	41	22	18	12	23	45	-	-	-	74	8	201	-	6	5	11	2	2	492
Field Sparrow	17	39	6	39	4	79	21	-	1	41	114	2	174	7	24	6	7	-	12	593
Vesper Sparrow	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	-	-	3
Lark Sparrow	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	2
Savannah Sparrow	3	-	-	-	-	-	11	-	-	101	-	-	-	-	-	-	32	-	-	147
Grasshopper Sparrow	2	6	-	15	-	1	2	-	-	51	32	-	6	4	3	-	-	1	-	123
Henslow's Sparrow	-	-	-	-	-	-	-	-	-	-	30	-	-	-	-	-	-	-	-	30
Song Sparrow	23	16	48	28	7	1	74	1	3	7	6	12	237	23	2	22	-	5	-	515
Lincoln's Sparrow	-	-	-	-	1	3	-	-	-	1	-	-	-	-	-	-	1	-	-	6
Swamp Sparrow	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	1	-	-	3
White-throated Sparrow	-	-	1	2	-	2	-	-	-	-	9	-	1	-	1	-	2	-	1	19
White-crowned Sparrow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	4
Dark-eyed Junco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	11
Northern Cardinal	51	22	45	26	40	217	209	5	8	46	345	13	352	24	46	28	125	8	46	1656
Rose-breasted Grosbeak	-	-	1	-	1	7	5	-	-	6	18	-	5	-	2	-	5	-	-	50
Blue Grosbeak	2	3	2	3	1	3	2	-	-	2	10	-	30	1	3	1	1	1	1	66
Indigo Bunting	57	51	99	42	120	131	202	-	-	274	215	13	632	10	88	23	307	8	30	2302
Dickcissel	-	7	-	-	-	-	-	-	-	460	116	-	-	-	-	-	149	-	2	734
Bobolink	-	-	-	-	-	-	45	-	-	46	88	-	-	-	-	-	65	-	-	244
Red-winged Blackbird	40	51	94	26	60	43	78	-	1	501	289	15	362	45	150	70	352	3	14	2194
Eastern Meadowlark	55	45	27	55	12	31	106	15	2	177	206	6	288	7	22	12	42	5	22	1135
Common Grackle	55	32	76	28	120	249	144	30	40	57	226	15	209	6	55	110	204	257	9	1922
Brown-headed Cowbird	31	2	18	17	6	68	230	8	-	33	82	3	152	9	78	9	232	7	11	996
Orchard Oriole	1	2	2	3	2	25	11	-	-	49	32	-	71	2	10	6	10	5	2	233
Baltimore Oriole	-	-	-	3	1	1	-	-	-	38	3	-	2	-	-	-	16	3	-	67
House Finch	16	10	82	4	12	42	65	10	-	7	87	2	96	2	3	6	20	9	12	485

Species Counties:	And	Bled	Blunt	Camp	Cheat	Dvdsn	Hamil	Jeff	Knox	Lake	Mont	Morg	Putn	Roan	Rutfd	Sevier	Shel	Sumn	Wilms	Totals
Pine Siskin	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	4	-	-	6
American Goldfinch	39	30	138	18	45	106	149	3	-	30	205	7	157	13	18	22	51	2	24	1057
House Sparrow	5	17	13	9	40	52	37	10	3	82	114	8	156	-	55	11	77	5	3	697
Total individuals	1779	1042	2718	1292	1939	4242	5445	255	299	5167	7610	406	10380	631	1449	1168	6131	1510	777	54244
Total species	102	90	105	108	110	132	141	32	38	158	132	63	135	80	107	83	138	66	82	205
Effort Data:																				
Observers	3	2	8	5	2	24	18	1	1	7	25	1	15	2	1	3	25	2	18	163
Parties	1	1	-	2	1	5	-	1	1	3	8	1	6	2	1	1	7	1	3	45
Party hours	10.6	11	20.33	15	14	34	78.5	1	1.5	36	122.42	4	66.75	6	16	11	44	4.5	12.5	509.1
Hours by car	8.6	-	8 92	10	6	8.25	33	0.5	1	17	72.42	-	51	1	12	9.5	14	3.5	2	258.69
Miles by car	188	111	153.5	158	110	123.5	455	15	42	231	848.1	-	533	15	231	155	180	49	10	3608.1
Hours by foot	2	-	11.41	5	8	25.75	45.5	0.5	0.5	19	50	4	15.75	5	4	1.5	27	1	10.5	236.41
Miles by foot	3	3.5	13.5	-	3	18.5	39	0	0	6	29	2	12	4	3	1.25	14	0	4.5	156.25
Hours owling	1	2.17	2.75	1	1	-	2	0.25	-	-	-	-	3	-	-	-	0.5	-	-	13.67
Miles owling	15	26	12	-	10	-	27	0	-	-	-	-	48	-	-	-	3	-	-	141
Feeder observers	2	-	4	-	-	-	-	1	1	-	5	-	1	1	-	-	1	-	-	16
Feeder hours	1	-	14.5	-	-	-	-	0.75	0.5	-	8.92	-	0.75	1	-	-	0.5	-	-	27.92

The Migrant 73 (4): 102-108, 2002

2002 SPRING FIELD DAY REPORT

RON HOFF
282 Hackworth Lane
Clinton, TN 37716

This report summarizes the traditional Spring Field Days that were conducted on a date other than May 11, when the North American Migration Count was run (Table 1). Also different about some of these counts is that the area covered is not necessarily confined to one county, as is the NAMC.

Columbia – 26/27 April, 2002; no times given. Weather: very cool in the morning, warming up in the afternoon; cloudy with some rain; temperatures ranged from 40-75. Some of the more interesting finds were Cattle Egret, Hooded Merganser, 66 Wild Turkeys, Virginia Rail, Sora, 12 Greater Yellowlegs, a Barn Owl, Brown Creeper, 10 Blue-winged Warblers, Fox Sparrows and Rusty Blackbirds. Observers: Janet Brown, Bob and Jennifer Cardenas, Phyllis Coble, Tommy Edwards, William Fuqua, William Jernigan, Allyn Lay, Anne and Bedford Lochridge, Cleo and George Mayfield (compiler: 999 Sunnyside Dr., Columbia, TN 38401).

Elizabethton – 27 April, 2002; 0500-2300. Weather: temperatures ranged from 38-72; skies were cloudy to mostly sunny by the afternoon; winds varied from 0-20 mph, being light in the morning from the east, picking up in the afternoon from the southeast. Some locations experienced some very light sprinkles. This count produced many interesting species and totals, including a Northern Saw-whet Owl and a Lincoln's Sparrow. Summer Tanager was not found this year. Several warbler species were found in large numbers. Observers: Jennifer Bauer, Janet Brown, Wallace Coffey, Joy and Mark Crass, Gil Derouen, Martha Dillenbeck, Glen Eller, John Hackett, Don Holt, Valerya Hyrne, Reece Jamerson, Barney Keffer, Rick Knight, Howard P. Langridge, Larry McDaniel, Joe McGuiness (compiler: 20 Quail Hollow Rd., Erwin, TN 37650), Charles Moore, Patsy Reading, Bryan Stevens, Kim Stroud, Allen Trently, and Gary Wallace.

Greeneville – 20 April, 2002; no times given. Weather: temperatures ranged from 63-87; cloudy skies with a trace of rain and 0-10 mph winds out of the west in the a.m.; partly cloudy, with no rain and 0-15 mph winds out of the west in the p.m. Some of the more interesting finds were American Black Duck, Peregrine Falcon, 8(!) Barn Owls, 26 Grasshopper Sparrows, and Rusty Blackbirds. Observers: Mark, Orland, and Phine Britton, Howard Earnest, King and Margaret Gaut, Ruth Greenwood, Don Holt, Jim Holt (compiler: 311 Colonial Circle, Greenville, TN 37745), Don Miller, Fawn and Velda Moore, Mary Borden Neas, Richard and Willie Ruth Nevius, Linda Northrop, JoAnne and Larry Routledge, Lou Simmons, Helen Spees, Allen Trently, Virginia Williams, and Karen Zimmerman.

Knoxville – 28 April, 2002; 0000-0030, 0615-2020. Weather: Temperatures ranged

from 63-84; very windy with scattered showers in the a.m., turning to severe thunderstorms with hail and tornado warnings in the p.m.; winds were WSW, up to 25 mph sustained. This was the third year in a row this count produced 127 species. Some of the highlights included Northern Harrier, Least Flycatcher, Warbling Vireo, and 30 species of warblers. Some notable misses were Great Horned Owl, Common Nighthawk, Eastern Wood- Pewee, Bank Swallow, and Grasshopper Sparrow. Observers: Jane Beintema, Frank Bills, Sharon Bostick, Howard Chitwood, Meredith Clebsch, Marcia Davis, K. Dean Edwards (compiler: 615 Meadow Chase Ln., Knoxville, TN 37931; *kde@utk.edu*), Carole Gobert, Tony Headrick, Ron Hoff, Susan Hoyle, Wes James, Kristine Johnson, Dollyann Myers, Dan and Laurie Mooney, Chuck Nicholson, Holly Overton, Truett Patterson, Martha Rudolph, Elizabeth Schilling, Boyd Sharp, David Trently, Chris Welsh, and Elizabeth Mei Wong.

Nashville – 11 May, 2002; 0330-2000. Weather: temperatures ranged from 53-84; skies were partly cloudy to mostly cloudy, with winds NE 5 to SSW 16. Highlights included Laughing Gull, Eurasian Collared-Dove, Bewick's Wren, 11 Philadelphia Vireos, Lark Sparrow, and a couple of Dickcissels. Observers: Sandy Bivens, Susan and Trae Bradfield, Bob Brown, David and Jean Buchanan, Ed Byrne, Gary Casey, Phillip Casteel, Richard Conners, Camille Crenshaw, Jay Desgrosellier, Carrie and David Dortch, Jerry Drewry, Bob and Pandy English, Troy Ettel, Francis Fekel, Betsy Garber, Ed Gleaves, Mark Hackney, Barbara Harris, Jim Hiett, Susan Hollyday, Linda Kelly, John Leader, Joy Mayfield, Diana McLusky, Mohan Pattanayek, Elizabeth O'Conner, Robert Rich, Sarah Scott, Joy Seal, Jennifer Serrano, Jan Shaw (compiler: 5019 Timberhill Dr., Nashville, TN 37211; *jankshaw@aol.com*), Chris Sloan, Michael Smith, Joe Stone, and Mary Zimmerman.

Table 1. Results of the traditional Tennessee Spring Field Days counts conducted in 2002.

Species	Columbia	Elizabethton	Greeneville	Knoxville	Nashville
Common Loon	-	10	-	-	1
Pied-billed Grebe	2	-	-	5	1
Double-crested Cormorant	68	3	-	62	373
Great Blue Heron	63	14	19	95	182
Great Egret	2	-	-	-	3
Cattle Egret	2	-	-	-	50
Green Heron	13	8	5	5	11
Black-crowned Night-Heron	1	-	-	17	366
Yellow-crowned Night-Heron	-	3	-	-	1
Black Vulture	114	25	37	15	82
Turkey Vulture	131	136	103	62	70
Canada Goose	216	188	84	100	224
Wood Duck	37	49	36	29	17
Gadwall	2	-	-	2	-
American Black Duck	-	-	1	-	-
Mallard	8	142	28	23	65
Blue-winged Teal	15	3	10	-	4
Lesser Scaup	-	1	-	-	-
Bufflehead	-	3	-	-	-
Hooded Merganser	1	-	-	-	-
Osprey	4	9	7	7	2
Bald Eagle	-	-	-	-	1
Northern Harrier	-	-	-	1	-
Sharp-shinned Hawk	4	2	-	1	-
Cooper's Hawk	5	4	2	3	4
Accipiter sp.	-	-	-	2	-
Red-shouldered Hawk	-	-	-	4	7
Broad-winged Hawk	3	5	2	1	2
Red-tailed Hawk	21	12	16	10	32
American Kestrel	16	8	7	6	8
Peregrine Falcon	-	-	1	-	-
Ruffed Grouse	-	11	8	-	-
Wild Turkey	66	13	46	8	8
Northern Bobwhite	31	6	18	6	24
Virginia Rail	1	-	-	-	-
Sora	2	-	-	-	-
American Coot	8	1	-	-	5
Semipalmated Plover	-	-	-	-	1
Killdeer	80	35	43	18	22
Greater Yellowlegs	12	-	-	-	-
Lesser Yellowlegs	8	1	-	-	-
Solitary Sandpiper	42	27	7	2	3
Spotted Sandpiper	14	18	-	10	11
Semipalmated Sandpiper	-	-	-	-	4
Least Sandpiper	8	-	1	2	27

Species	Columbia	Elizabethton	Greeneville	Knoxville	Nashville
Pectoral Sandpiper	4	-	-	-	1
Common Snipe	4	6	13	-	5
American Woodcock	2	-	-	-	-
Laughing Gull	-	-	-	-	1
Ring-billed Gull	-	16	-	-	5
Herring Gull	-	-	-	-	1
Caspian Tern	-	-	-	-	1
Rock Dove	179	86	92	58	43
Eurasian Collared-Dove	-	-	-	-	1
Mourning Dove	182	199	250	205	144
Black-billed Cuckoo	1	1	-	-	1
Yellow-billed Cuckoo	8	1	-	3	61
Barn Owl	1	1	8	-	-
Eastern Screech Owl	3	6	-	2	3
Great Horned Owl	4	3	-	-	1
Barred Owl	9	1	2	1	5
Northern Saw-whet Owl	-	1	-	-	-
Common Nighthawk	7	-	-	-	12
Chuck-will's-widow	17	3	1	1	4
Whip-poor-will	3	8	15	-	7
Chimney Swift	94	183	106	100	280
Ruby-throated Hummingbird	21	23	9	5	19
Belted Kingfisher	16	11	10	6	13
Red-headed Woodpecker	14	1	1	-	10
Red-bellied Woodpecker	76	46	38	39	56
Downy Woodpecker	45	25	39	13	36
Hairy Woodpecker	8	7	5	5	5
Northern Flicker	7	18	23	12	11
Pileated Woodpecker	40	44	16	4	23
Eastern Wood-Pewee	11	4	1	-	65
Acadian Flycatcher	4	1	-	-	26
Willow Flycatcher	-	-	-	-	1
Least Flycatcher	-	4	-	1	1
Eastern Phoebe	41	44	36	13	33
Great Crested Flycatcher	16	3	6	11	48
Eastern Kingbird	58	33	24	37	51
Loggerhead Shrike	6	1	1	-	4
White-eyed Vireo	17	9	15	21	55
Yellow-throated Vireo	1	4	4	2	11
Blue-headed Vireo	-	62	27	2	1
Warbling Vireo	1	5	-	1	23
Philadelphia Vireo	-	-	-	-	11
Red-eyed Vireo	58	116	83	62	117
Blue Jay	116	186	219	120	110
American Crow	195	356	229	166	114

Species	Columbia	Elizabethton	Greeneville	Knoxville	Nashville
Common Raven	-	14	-	-	-
Horned Lark	-	-	-	-	1
Purple Martin	183	87	147	9	103
Tree Swallow	135	69	64	16	36
Northern Rough-winged Swallow	157	96	38	50	73
Bank Swallow	-	-	-	-	3
Cliff Swallow	216	139	25	10	632
Barn Swallow	243	147	196	51	77
Carolina Chickadee	80	121	121	99	155
Tufted Titmouse	91	116	122	72	112
Red-breasted Nuthatch	1	1	1	-	-
White-breasted Nuthatch	31	19	5	4	22
Brown Creeper	1	-	-	-	-
Carolina Wren	97	93	96	111	105
Bewick's Wren	-	-	-	-	1
House Wren	11	23	34	7	5
Winter Wren	-	3	1	-	-
Golden-crowned Kinglet	2	8	-	-	-
Ruby-crowned Kinglet	5	21	-	4	-
Blue-gray Gnatcatcher	92	48	66	37	139
Eastern Bluebird	224	127	190	69	145
Veery	-	7	-	3	7
Gray-cheeked Thrush	-	-	-	-	4
Swainson's Thrush	1	1	-	6	55
Hermit Thrush	-	-	-	1	-
Wood Thrush	46	65	13	41	47
American Robin	232	580	231	274	179
Gray Catbird	10	17	2	19	10
Northern Mockingbird	163	102	137	83	122
Brown Thrasher	88	23	48	40	31
European Starling	593	830	824	569	1124
Cedar Waxwing	144	188	41	249	141
Blue-winged Warbler	10	2	-	5	6
Golden-winged Warbler	-	4	-	-	1
Tennessee Warbler	5	-	-	11	97
Orange-crowned Warbler	-	-	-	2	-
Nashville Warbler	6	1	-	3	4
Northern Parula	29	11	3	2	21
Yellow Warbler	20	12	1	5	10
Chestnut-sided Warbler	4	79	-	3	13
Magnolia Warbler	-	-	-	1	77
Cape May Warbler	-	-	-	-	12
Black-throated Blue Warbler	-	69	11	1	3
Yellow-rumped Warbler	120	44	18	87	14
Black-throated Green Warbler	2	55	54	15	6

Species	Columbia	Elizabethton	Greeneville	Knoxville	Nashville
Blackburnian Warbler	-	6	-	1	3
Yellow-throated Warbler	17	6	-	1	13
Pine Warbler	7	7	4	2	7
Prairie Warbler	20	-	8	9	18
Palm Warbler	17	3	-	24	14
Bay-breasted Warbler	-	-	-	3	9
Blackpoll Warbler	2	1	-	2	83
Cerulean Warbler	3	1	-	-	2
Black-and-white Warbler	2	43	21	9	7
American Redstart	1	12	-	2	20
Prothonotary Warbler	39	-	11	3	16
Worm-eating Warbler	14	24	7	9	4
Ovenbird	4	87	64	14	7
Northern Waterthrush	10	-	-	3	2
Louisiana Waterthrush	9	21	-	1	10
Kentucky Warbler	52	6	1	2	18
Mourning Warbler	-	-	-	-	3
Common Yellowthroat	71	24	90	56	108
Hooded Warbler	4	123	39	21	19
Wilson's Warbler	-	-	-	-	5
Canada Warbler	1	6	-	3	8
Yellow-breasted Chat	33	3	2	23	56
Summer Tanager	58	-	1	2	71
Scarlet Tanager	43	31	13	34	34
Eastern Towhee	101	127	114	67	106
Chipping Sparrow	40	85	72	8	45
Field Sparrow	128	33	95	47	119
Lark Sparrow	-	-	-	-	1
Savannah Sparrow	20	5	-	5	-
Grasshopper Sparrow	1	1	26	-	5
Fox Sparrow	4	-	-	-	-
Song Sparrow	10	278	147	117	15
Lincoln's Sparrow	1	1	-	-	4
Swamp Sparrow	23	8	1	10	-
White-throated Sparrow	156	89	101	156	4
White-crowned Sparrow	13	18	17	3	-
Dark-eyed Junco	-	88	9	-	-
Northern Cardinal	240	223	216	246	357
Rose-breasted Grosbeak	16	8	2	9	10
Blue Grosbeak	7	2	7	13	9
Indigo Bunting	213	33	32	115	377
Dickcissel	-	-	-	-	2
Bobolink	-	-	-	16	-
Red-winged Blackbird	1430	229	309	259	270
Eastern Meadowlark	184	80	286	55	92

Species	Columbia	Elizabethton	Greeneville	Knoxville	Nashville
Rusty Blackbird	80	-	6	-	-
Common Grackle	287	283	952	232	690
Brown-headed Cowbird	81	63	63	68	170
Orchard Oriole	49	26	6	30	44
Baltimore Oriole	3	2	-	2	5
Purple Finch	3	4	1	-	-
House Finch	32	98	82	38	78
Pine Siskin	-	33	-	-	-
American Goldfinch	367	338	167	106	195
House Sparrow	63	108	38	21	155
Total individuals	9270	8144	7253	5192	9914
Total species	145	141	109	127	156
Effort Data:					
Observers	12	23	18	25	40
Parties	-	9	10	15-17	10
Party hours	-	85.5	67.5	53.75	81
Hours by car	-	-	50	11.75	31.75
Miles by car	-	-	597	119.5	523.5
Hours by foot	-	-	14.5	42	49.25
Miles by foot	-	-	9.5	37.5	29
Hours owling	-	6	1	1.5	1
Miles owling	-	-	-	2	10
Feeder Observers	-	-	5	-	-
Feeder Hours	-	-	20	6.5	-

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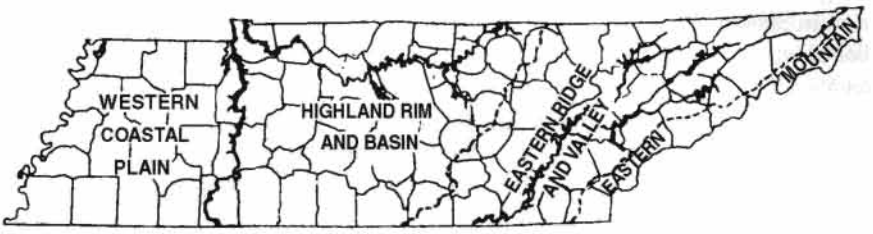
THE SUMMER SEASON

RICHARD L. KNIGHT, Editor



1 JUNE-31 JULY, 2002

The summer season was generally warmer than usual all across the state. East Tennessee was quite dry for the whole period. Similarly, the two western regions received less rainfall than average in June, but had a significantly wetter July.

Many notable birds were reported this season. Both North American species of whistling-ducks were observed in the far western part of Tennessee, while both North American pelicans were seen in the Ridge and Valley region. Scissor-tailed Flycatchers nested in the two western regions, while Peregrine Falcons again nested in the two eastern regions. Species of very limited summer-time distribution in the state were found in all regions. Painted Bunting and Bachman's Sparrow nested in the Western Coastal Plain. Bewick's Wren and Henslow's Sparrow were found in the Highland Rim and Basin. Rose-breasted Grosbeak appeared on the Cumberland Plateau, while Bobolink and Savannah Sparrow occurred in the Ridge and Valley. Mourning and Yellow-rumped Warblers were noted in the high Eastern Mountains. We continue to be amazed and intrigued by the ever-changing population dynamics of our avifauna.

Standard Abbreviations

ad - adult
Co - County
Cr. - Creek
ers - earliest reported sighting
et al. - and others
f - female
fide - reported by
im - immature
Is. - Island
L - Lake
lrs - latest reported sighting
m - male
max - maximum count
m.ob. - many observers
Mtn - Mountain
R - River
SP - State Park
WMA - Wildlife Management Area
yg - young

WESTERN COASTAL PLAIN REGION — Temperatures this season were slightly above average. While June received less than half its typical rainfall, July's precipitation amount was normal. Of interest this period were the 13 species of ducks

summering, including very unusual records of both kinds of whistling-ducks. Also, 15 species of shorebirds (including nesting Killdeer and Black-necked Stilts) were found in June, with a Reeve providing a new record for the month of July. Western Kingbirds and Scissor-tailed Flycatchers, fast becoming almost regular, returned to nest in Shelby and Lake Counties, respectively. Finally, a Black-throated Green Warbler heard in Shelby County on 7 June was not only a record late spring date for West Tennessee, but the first found here during that month.

Loon - Stork: **Common Loon:** 2 Jun (1) Hwy 79W (JRW). **Pied-billed Grebe:** 2/16 Jun (1 nesting/4 yg) Mud L (WGC, KL, BL, JRW); 12 Jun (1) Eagle Lake WMA (WRP); 29 Jun/2 Jul (2/1 yg) Black Bayou (KL, BL/MCT). **American White Pelican:** 16 Jun (1) EARTH Complex (VBR, CHB, WRP); 30 Jun (63) Mud L (KL, BL, JRW); 7 Jul (8) Tiptonville, Lake Co (KL, BL); 20 Jul (100) Everett L, Dyer Co (JSD, CAS). **Double-crested Cormorant:** 2-16 Jun (8-1) Lake Co (WGC, KL, BL, JRW); 5-16 Jun (5-1) Dyer Co (WGC, MAG); 2 Jul (40) Is 13 (KL, NaM); 4/20 Jul (1) Robco L, Shelby Co (JRW). **Anhinga:** 6 Jul (1) Great River Rd., Dyer Co (MAG); 13-14 Jul (1 m) Eagle Lake WMA (JRW et al.). **Least Bittern:** 5-8 Jun (1) Mud L (WGC, MAG, DMa, MCT). **Little Blue Heron:** 30 Jun (320) White's L. Refuge (JRW et al.), max. **Tricolored Heron:** 6 Jul (1) White's L. Refuge (MAG); 28-31 Jul (1) Black Bayou (NaM et al.). **Black-crowned Night-Heron:** 11-16 Jun/6 Jul (1/32) White's L. Refuge (WGC, MAG). **White Ibis:** 29 Jun-14 Jul (1-4 im) White's L. Refuge (JRW, NaM, KL, MAG, MCT, Bettie Sumara). **Wood Stork:** 20 Jul (1 im) White's L. Refuge (JSD, CAS).

Waterfowl: **BLACK-BELLIED WHISTLING-DUCK:** 8 Jun (5) North L., Shelby Co (JRW). **Fulvous Whistling-Duck:** 2 Jun (2) near Mooring, Lake Co (JRW); 3 Jun-8 Jul (2) Mud L (WGC, KL, NaM, MAG, MCT, WRP et al.). **American Wigeon:** 5/6 Jun (2 pair/1 pair) Mud L (WGC, KL, BL, DMa, NaM, MCT). **Blue-winged Teal:** 5-16 Jun (up to 4 m, 1 f) Mud L (WGC); 30 Jun (1 f & 6 yg) Hwy 79W & (1 f & 5 yg) Dyer Co (JRW, KL, BL). **Northern Shoveler:** 11 Jun (2 m) White's L. Refuge (WGC); 7 Jul (1) Shelby Farms (WRP). **Canvasback:** 9 Jun (1) Mud L (JRW, NaM). **Ring-necked Duck:** 2 Jun (1 f) Mud L (JRW); 20 Jul (1) Eagle Lake WMA (JRW); 31 Jul (1) Phillipy, Lake Co (MCT). **Lesser Scaup:** 2/6 Jun (1 m) Reelfoot L (JRW, WGC, KL, BL); 16 Jun (1) Mud L (KL, BL). **Hooded Merganser:** 2-30 Jun (up to 19, including 13 yg) Mud L (JRW, WGC, KL, BL); 6 Jun (9) Black Bayou (WGC); 15 Jun (2) EARTH Complex (MAG). **Red-breasted Merganser:** 5 Jun (3) Mud L (WGC). **Ruddy Duck:** 5-30 Jun (up to 74) Mud L (WGC, KL, MCT et al.); 22 Jun (1) Shelby Farms (WRP).

Osprey - Coot: **Osprey:** 8 Jun/20 Jul (1) EARTH Complex (JRW). **Mississippi Kite:** 5 Jun (1) Henry Co (MCT, DMa), unusual location. **Bald Eagle:** 1 Jun (1 im) Dyer Co (WGC); 5 Jun (1 ad) Reelfoot L (WRP, William Peeples); 11 Jun/24 Jul (1 im) Is 13 (WGC, KL); 23 Jun (1) Mud L (KL, BL). **Northern Harrier:** 8 Jun (1) EARTH Complex (JRW). **Sharp-shinned Hawk:** 9 Jun (1) Humboldt (MAG); 10/25 Jun (1) Dyer Co (KL, NaM). **Merlin:** 31 Jul (1) Gibson Co (MAG). **Peregrine Falcon:** 19 Jul (1) Memphis (Martha Waldron). **King Rail:** 20 Jul (1) Eagle Lake WMA (JSD, CAS, JRW); 23 Jul (1) Dyer Co (KL). **American Coot:** 6 Jun (20) Mud L (WGC, NaM); 29 Jun (1) Black Bayou (KL, BL).

Shorebirds: **Black-bellied Plover:** 1 Jun (1) Dyer Co (WGC). **American Golden-Plover:** 16 Jun (2) Mud L (WGC, KL, BL); 29 Jun-28 Jul (1) EARTH Complex (JRW et al.). **Semipalmated Plover:** 5 Jun (2) Lake Co (WGC, MCT), lrs; 14 Jul (2) EARTH Complex (CHB, VBR), ers. **Piping Plover:** 28/31 Jul (1/2) Is 13 (KAC, Bonnie Johnson, Judy Newsome/MCT). **Black-necked Stilt:** 1-16 Jun (up to 8) Lake Co (WGC, KL, BL, NaM et al.); 13 Jul (307) EARTH Complex (JRW), max; 14 Jul (34 ad, 15 yg) North Plant, Shelby Co (MaJ, Ed Thomas); 23/31 Jul (5) White's L. Refuge (KL, NaM, MCT). **Greater Yellowlegs:** 4 Jun (1) Lake Co (WRP), lrs; 14 Jul (1) EARTH Complex (CHB, VBR), ers. **Lesser Yellowlegs:** 16 Jun (1) Mud L (WGC); 29 Jun (1) EARTH Complex (JRW). **Willet:** 6 Jul (1) Is 13 (JRW, KL, NaM); 14 Jul (1) Shelby Forest (JRW). **Whimbrel:** 6-7 Jul (1) Is 13 (JRW, KL, NaM). **Ruddy Turnstone:** 31 Jul (3) Is 13 (MCT). **Sanderling:** 31 Jul (3) Lake Co (MCT). **Semipalmated Sandpiper:** 16 Jun (1) Mud L (WGC), lrs. **Western Sandpiper:** 13 Jul (2) EARTH Complex (JRW), ers. **Least Sandpiper:** 15/22 Jun (4/5) EARTH Complex (JSD, CAS/JRW). **White-rumped Sandpiper:** 9 Jun (30) Lake Co (MAG, MCT et al.); 16 Jun (8) Mud L (WGC), lrs. **Baird's Sandpiper:** 20-27 Jul (1) EARTH Complex (JRW). **Pectoral Sandpiper:** 22 Jun (6) EARTH Complex (JRW); 30 Jun (4) Mud L (JRW, KL, BL). **Dunlin:** 1/2 Jun (up to 6) Lake/Dyer Cos (JRW, WGC). **RUFF:** 20-28 Jul (1 f) EARTH Complex (JRW, m.ob.). **Short-billed Dowitcher:** 22 Jun (1) EARTH Complex (JRW). **Long-billed Dowitcher:** 20/25 Jul (2/1) EARTH Complex (JRW et al.); 31 Jul (1/1) Is 13/Obion Co (MCT). **Wilson's Snipe:** 16 Jun (2) Mud L (WGC, KL, BL). **American Woodcock:** 6-7 Jun (2-1) Black Bayou (WGC, NaM). **Wilson's Phalarope:** 23-31 Jul (1) EARTH Complex (JRW et al.)

Gull - Owl: **Laughing Gull:** 11 Jun (1) White's L Refuge (WGC). **Ring-billed Gull:** 5 Jun (2) Dyer Co (WGC); 20 Jul (1) Robco L, Shelby Co (JRW). **Caspian Tern:** 30 Jun (4) Lake Co (NaM, Hap Chambers); 20 Jul (2) Mud Is., Shelby Co (JRW). **Common Tern:** 2 Jun (1) Hwy 79W (JRW). **Forster's Tern:** 1/6 Jun (2/1) Lake Co (WGC). **Least Tern:** 1 Jun (265) Lake & Dyer Cos (WGC), max. **Black Tern:** 15 Jun (2) Paris Landing SP, Henry Co (JSD, CAS); 14 Jul (2) Shelby Forest (JRW); 27 Jul (40) EARTH Complex (JRW et al.); 29 Jul (3) Shelby Farms (VBR). **Eurasian Collared-Dove:** now verified in Weakley Co (MCT). **Black-billed Cuckoo:** 8 Jun (1) EARTH Complex (JRW). **Barn Owl:** 29 Jun (1) Ridgley, Lake Co (Dick Preston); 30 Jun (1) Wolf River WMA, Fayette Co (Susan McWhirter, Martha Waldron); 20/23 Jul (1) Covington, Tipton Co (Dick Preston).

Flycatcher - Bunting: **Willow Flycatcher:** 2 Jun (2 at 2 sites, 1 carrying nest material) Great River Rd., Dyer Co (JRW); 30 Jun (1) White's L Refuge (JRW, KL, BL). **Western Kingbird:** 1 Jun-14 Jul (3 nesting pairs & 8 yg) EARTH Complex (JRW, CHB, VBR, m.ob.). **Scissor-tailed Flycatcher:** thru period (nesting pair & 1 yg) near Wynnburg, Lake Co (NaM, KL, BL, MCT, m.ob.). **Fish Crow:** 15 Jun (2) Gibson Co (MAG), unusual location. **Tree Swallow:** 5/16 Jun (1) Mud L (WGC); 23 Jun (7) Black Bayou (KL, BL). **Bank Swallow:** 2 Jun (23) Is 13 (WGC, KL, BL). **Cliff Swallow:** 23 Jun (500+ nests) Memphis (VBR). **Yellow Warbler:** 2 Jun (1) Humboldt (GeP). **Black-throated Green Warbler:** 7 Jun (1) Overton Park, Shelby Co (Robert Ilardi,

MaJ, GeP), see comments in intro. **Blackpoll Warbler:** 2 Jun (2) Humboldt (GeP), lrs. **Black-and-white Warbler:** 17 Jul (1) Millington, Shelby Co (Van Harris). **Worm-eating Warbler:** 12 Jun-14 Jul (1-2) Shelby Forest (MAG, WRP); 15 Jun (1) Overton Park, Shelby Co (Van Harris, MaJ). **Scarlet Tanager:** 12 Jun-14 Jul (1-2) Shelby Forest (MAG, WRP). **Bachman's Sparrow:** 15 Jun (2, 1 carrying food) McNairy Co (JRW). **Lark Sparrow:** 2 Jun (1) Silerton, Hardeman Co (VBR, CHB); 5 Jun (1) Weakley Co (MCT, DMa). **Song Sparrow:** 23-29 Jun (up to 8) Black Bayou (KL, BL); thru Jul (up to 3) EARTH Complex (m.ob.); 30 Jul (1) Gibson Co (MAG). **Painted Bunting:** thru period (1 m, plus 1 f on 20 Jul) Shelby Farms (WRP, VBR, Barbara Priddy, m.ob.); thru period (at least 1 pair & 2 broods) EARTH Complex (JRW, m.ob.); 2 Jun (1 im) Silerton, Hardeman Co (VBR, CHB).

Locations: Black Bayou - in Lake Co; Eagle Lake WMA - in Shelby Co; EARTH Complex - in Shelby Co; Hwy 79W - in Lake Co; Humboldt - in Gibson Co; Is. 13 - in Lake Co; Mud L - in Lake Co; Reelfoot L - in Lake & Obion Cos; Shelby Farms/Forest - in Shelby Co; White's L. Refuge - in Dyer Co.

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HIGHLAND RIM AND BASIN REGION — The two summer months in middle Tennessee were generally mild and wet. June and July were 1.8 and 1.0 degrees warmer than usual, respectively. In Nashville over half of the June precipitation occurred on the last day of the month, producing a normal total, while July had 50% more rain than average.

Loon - Dove: **Common Loon:** 25 Jul (1) Old Hickory L., Davidson Co (JKS, Gary Casey). **Pied-billed Grebe:** 1 all summer was joined by a second on 24 Jul at Cane Cr. Park, Putnam Co (SJS). **Great Egret:** 5 Jul (2) Percy-Priest WMA, Davidson Co (JKS, Gary Casey). **Osprey:** 7 Jun (nesting pair) Smyrna airport (JKS, HKC). **Black Tern:** 18 Jun (4) Long Hunter SP, Rutherford Co (PDC, Rita Venable). **Eurasian Collared-Dove:** 16 Jun (2) Walterhill, Rutherford Co (JRW).

Flycatcher - Wren: **Willow Flycatcher:** 14 Jun (2 singing) Shelby Bottoms (PDC). **Scissor-tailed Flycatcher:** 22 Jun (pair nesting) Smyrna airport (JKS, Kevin Breault), fledged 3 yg, also nested here last year; 7 Jul (1) Hwy 231, western Rutherford Co (JKS, Richard Connors). **Warbling Vireo:** 1 Jun (1) Williamson Co (JKS); 17 Jul (1) Shelby Park (PDC). **Bewick's Wren:** 8 Jun (1) Crieve Hall, Nashville (Richard Connors); 20 Jul (2) Rutherford Co (TJW et al.).

Warbler - Dickcissel: **Yellow-throated Warbler:** 17 Jul (1) Shelby Park (PDC). **Prairie Warbler:** 18 Jun (5) Couchville Cedar Glade, Wilson Co (PDC, John Froeschauer, Rita Venable). **Black-and-white Warbler:** 25 Jun (1) Shelby Park (PDC). **Lark Sparrow:** 16 Jun (3) Rocky Hill Rd., Rutherford Co (JRW). **Grasshopper Sparrow:** 1-18 Jun (5+, with 2 ad feeding 1 yg on latter date) Williamson Co (JKS, HKC, Kevin Breault); 14 Jul (7) Warren Co (Susan McWhirter), max there. **Henslow's Sparrow:** 16 Jun (5+) Montgomery Co (CAS, JSD, JRW). **Blue Grosbeak:** 7 Jun (pair nesting) Williamson Co (JKS, HKC). **Dickcissel:** 13 Jun (4+) Williamson Co (JKS, PDC); 15

Jul (1) Livingston, Overton Co (Susan Ford).

Locations: Shelby Park/Bottoms - in Davidson Co; Smyrna airport - in Rutherford Co.

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CUMBERLAND PLATEAU/RIDGE & VALLEY REGION — This summer was characterized by very hot temperatures and unseasonably dry conditions. These resulted in Brainerd Levee being completely dry for most of the period, but another Hamilton County wetland (Standifer Gap Marsh) remained wet and held Least Bittern, King & Virginia Rails that were likely breeding. July sightings of Soras in Hamilton County were probably of early migrants. An early June hike yielded impressive totals for several forest songbirds, including some high elevation species, on a 16 km transect in the Frozen Head State Natural Area. A Brown Pelican near Chattanooga was an exciting find. Other notables included two species of unexpected waterfowl and two separate American Avocets.

Loon - Ibis: **Common Loon:** 29 Jul (1) Chickamauga L (Jim Costello). **American White Pelican:** 12 Jun (1) Rankin Bottoms (MBS, LJG, James Brooks). **BROWN PELICAN:** 5-11 Jul (1 im) Chickamauga L (m.ob.), first for southeast Tenn. **Double-crested Cormorant:** 27 Jul (1) Kingston Steam Plant (DHM). **Least Bittern:** 2 Jun (1) Standifer Gap Marsh (DP). **Great Egret:** 1 Jun (2 carrying sticks) Rankin Bottoms (MBS, LJG). **Little Blue Heron:** 19 Jul (1 im) Rankin Bottoms (MBS, LJG); 22 Jul (1 im) Standifer Gap Marsh (David Spicer). **Cattle Egret:** 16 Jul (9) Baylor L., Hamilton Co (Bill Haley); 25 Jul (1) Eagle Bend Fish Hatchery, Anderson Co (NeM). **Black-crowned Night-Heron:** 1-14 Jul (1-2) Greene Co (DHM); 19 Jul (26) Rankin Bottoms (MBS, LJG); 27 Jul (14) Kingston Steam Plant (DHM). **Yellow-crowned Night-Heron:** thru season (1) Hamilton Co (KAC); 15 Jul (1) Knox Co (fide David Trently); 19 Jul (1) Rankin Bottoms (MBS, LJG). **White Ibis:** 9 Jun (1 im) Amnicola Marsh, Hamilton Co (Bill Haley); 27 Jun (1 im) Brainerd Levee, Hamilton Co (m.ob.).

Goose - Sandpiper: **Snow Goose:** 7 Jun (1) Kingston Steam Plant (TJW), appeared uninjured. **Common Goldeneye:** 23 Jul (1 m) Chickamauga L (Dan Williams). **Osprey:** 14 Jul (5) Rankin Bottoms (DHM). **Sharp-shinned Hawk:** 9 Jun (1) Greene Co (DHM). **Peregrine Falcon:** thru season (2 ad, 2 yg) railroad bridge below Chickamauga Dam (m.ob.). **King Rail:** 20 May/2-9 Jun (1) Standifer Gap Marsh (DP). **Virginia Rail:** 9/14 Jun (3/1) Standifer Gap Marsh (DP/James Brooks). **Sora:** 9 Jul (1) Brainerd Levee, Hamilton Co (DP); 16 Jul (1) Amnicola Marsh, Hamilton Co (DFV). **American Avocet:** 14 Jun (1) Greene Co (DHM); 23 Jul (1) Chickamauga L (Dan Williams). **White-rumped Sandpiper:** 7 Jun (1) Greene Co (DHM).

Tern - Woodpecker: **Caspian Tern:** 7 Jun (2) Kingston Steam Plant (TJW). **Black Tern:** 22 Jul (1) Standifer Gap Marsh (David Spicer). **Chuck-will's-widow:** 12 Jun (5) Greene Co (DHM). **Whip-poor-will:** 4 Jun (45) Big South Fork in Fentress, Pickett & Scott Cos (SJS). **Red-headed Woodpecker:** 9/10 Jun (1/1) separate Greene Co sites (DHM); 19 Jun (pair nesting) near Jefferson City (Howard Chitwood).

Flycatcher - Waxwing: **Willow Flycatcher:** 2 Jun (1) Morgan Co (SJS); 9-10 Jun (4) Greene Co (DHM). **Least Flycatcher:** 2 Jun (2) Frozen Head (SJS), at 3000 ft elevation. **Loggerhead Shrike:** 2 Jun (2 ad, 2 yg) Greene Co (DHM), plus 1 -2 at 3 other Greene Co sites in Jun. **Blue-headed Vireo:** 2 Jun (18) Frozen Head (SJS). **Tree Swallow:** 18 Jun (pair with yg in nest box) Morgan Co (Jeanne Richardson fide SJS). **Brown-headed Nuthatch:** 21 Jul (20) near Dayton, Rhea Co (Tanya Iles). **Veery:** 2 Jun (6) Frozen Head (SJS). **Cedar Waxwing:** 4 Jun (ad on nest) Bandy Cr. Visitor Center, Big South Fork, Scott Co (SJS), apparently first breeding evidence for park.

Warbler - Bobolink: **Black-throated Blue Warbler:** 2 Jun (4) Frozen Head (SJS). **Blackburnian Warbler:** 2 Jun (5) Frozen Head (SJS). **Cerulean Warbler:** 2 Jun (60) Frozen Head (SJS); 3/21 Jul (2 m/1 f) Craven's House, Hamilton Co (KAC). **American Redstart:** 2 Jun (75) Frozen Head (SJS). **Prothonotary Warbler:** 1 Jun (approximately 30) Rankin Bottoms (MBS, LJG), including active nest in nest box. **Swainson's Warbler:** early Jun (1) Leatherwood Ford, Scott Co (NeM). **Canada Warbler:** 2 Jun (1) Frozen Head (SJS). **Savannah Sparrow:** thru 17 Jul (1) Greene Co (DHM). **Rose-breasted Grosbeak:** 2 Jun (5) Frozen Head (SJS); 5 Jun (1 f-building nest) strip mine above Caryville, Campbell Co (NeM). **Dickcissel:** 9-10 Jun (2-4) Greene Co (DHM). **Bobolink:** 5 Jun (1 m) Conklin, Washington Co (Fred Alsop).

Locations: Chickamauga L - in Hamilton Co; Frozen Head - a State Natural Area in Morgan Co; Kingston Steam Plant - in Roane Co; Rankin Bottoms - in Cocke Co; Standifer Gap Marsh - in Hamilton Co.

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EASTERN MOUNTAIN REGION — The state's first nesting attempt by the Yellow-rumped Warbler was recorded on Unaka Mountain. A territorial Mourning Warbler was present for the second year in a row on Roan Mountain. This year the territory seemed to be completely on the Tennessee side of the Appalachian Trail.

Grebe - Sapsucker: **Pied-billed Grebe:** 8 Jul (1) Steele Cr. Park, Bristol (Kevin Hamed). **Little Blue Heron:** 5/22 Jul (2 im/1 im) South Holston L., Sullivan Co (Ken Hale/JWC). **Yellow-crowned Night-Heron:** 2+ all season at Elizabethton (BKS, Gary Wallace). **Osprey:** 11 Jul (1) South Holston R. weir, Sullivan Co (Michelle Brown). **Swallow-tailed Kite:** 26 Jul (1) Hiwassee R., Polk Co (John Champion). **Peregrine Falcon:** 7 Jun (2) Alum Cave, Gr. Smoky Mtns (TJW). **American Woodcock:** 8 Jun (1) near Whigg Meadow, Monroe Co (DFV); 11 Jul (2) Hampton Cr. Cove (AJT). **Black-billed Cuckoo:** 11 Jun (1) Starr Mtn, Monroe Co (Tommie Rogers). **Yellow-bellied Sapsucker:** 4 Jun (1) Appalachian Trail on Holston Mtn, near Hwy 421, Sullivan Co (Kevin Hamed).

Flycatcher - Siskin: **Alder Flycatcher:** 10 Jun (15) Carver's Gap to Grassy Ridge, Roan Mtn (BKS, H.P. Langridge), very high count. **Willow Flycatcher:** 22 Jun (1) Elizabethton (BKS). **Least Flycatcher:** 31 May/3 Jun (nest-building/nest complete, ad. on) Hampton Cr. Cove (AJT). **Red-breasted Nuthatch:** 1/24 Jun (1) Round Knob, Greene Co (DHM); 22 Jun (1) near Whigg Meadow, Monroe Co (DFV). **Brown**

Creeper: 12 Jun (1) Roan Mtn (Vin Stanton). **Veery:** 11 Jul (nest with 2 yg) Hampton Cr. Cove (AJT). **Hermit Thrush:** 12 Jun (5) Roan Mtn (Vin Stanton), max. **Yellow-rumped Warbler:** 18 Jun (pair & unoccupied nest) Unaka Mtn, Unicoi Co (AJT), first nest for state. **Blackburnian Warbler:** 2 Jun (1) McQueen Gap, Johnson Co (JWC, Tom Horsch, Chris O'Bryan). **Mourning Warbler:** 6-29 Jun (1 m) Grassy Ridge, Roan Mtn (AJT, m.ob.). **Vesper Sparrow:** 24/30 Jun (1/2) Roan Mtn (AJT). **Pine Siskin:** scattered reports of small numbers on Roan Mtn & Gr. Smoky Mtns.

Locations: Gr. Smoky Mtns - Great Smoky Mountains National Park; Hampton Cr. Cove - near Roan Mtn, Carter Co.

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SPECIES INDEX TO VOLUME 73

INSTRUCTIONS TO AUTHORS

The Migrant records observations and studies of birds in Tennessee and adjacent areas.

SUBMISSIONS: The original and two copies of the manuscript should be sent to the Editor: Christopher J. Welsh, 5337 Hickory Hollow Road, Knoxville, TN 37919. Manuscripts that have been published in other journals should *not* be submitted. Electronic copies on disk or sent by e-mail to <cwelsh@utk.edu> are greatly appreciated.

MATERIAL: The subject matter should relate to some phase of Tennessee ornithology. It should be original, factual, concise, and scientifically accurate.

STYLE: Both articles and short notes are solicited; recent issues of *The Migrant* should be used as a guide in the preparation of manuscripts. Where more detail is needed, reference should be made to the *CBE Style Manual;* this book is available at many public libraries and from the Council of Biology Editors, Inc., 111 East Wacker Drive, Suite 3200, Chicago, IL 60601-4298.

COPY: Manuscripts should be typed *double-spaced* on 8.5 x 11" paper with adequate margins for editorial notations. Tables and figures should be prepared on separate sheets with appropriate headings; see *CBE Style Manual* for examples of appropriate form for tables. Photographs intended for reproduction should be sharp with good contrast on glossy white paper; black-and-white photographs will usually reproduce better than color photographs. Weights, measurements, and distances should be in metric units. Dates should be in "continental" form (e.g., 16 March 1997). Use the 24-hour clock (e.g., 0500 or 1900).

NOMENCLATURE: The scientific name of a species should be given after the first use of the full common name in the text. The scientific name should be underlined and in parentheses. Names should follow the *A. O. U. Check-list of North American Birds* (seventh edition, 1998, or supplements).

TITLE: The title should be concise, specific, and descriptive.

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LITERATURE CITED: List all literature citations in a "Literature Cited" section at the end of the text. Text citations should include the author and year.

IDENTIFICATION: Manuscripts including reports of rare or unusual species or of species at atypical times should include: date and time, light and weather conditions, exact location, habitat, optical equipment, distance, behavior of bird, comparison with other similar species, characteristic markings, experience of observer, other observers verifying the identification, and reference works consulted.

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