

## DISTRIBUTION OF CERTAIN BIRDS IN VARIOUS TYPES OF VEGETATION

By DAVID E. DAVIS AND IRVIN R. SAVIDGE

During the course of an extensive study of the bird population in a central Pennsylvania woodlot (Savidge and Davis, this issue), data pertaining to the details of local distribution of several species were collected. Since the vegetation in the woodlot area is very heterogeneous, an opportunity was provided to investigate the occurrence of several common birds within the various vegetation types.

Ornithologists know that certain species of birds occur in certain types of vegetation but lack quantitative data that compare abundance in vegetation types at the same time and place. This analysis permits comparison of numbers caught in nets in several categories of vegetation. Since comparison of captures in each season did not suggest changes from April through October, all captures are analyzed together.

The study area, consisting of approximately 160 acres, is located in Centre County, Pennsylvania, one mile north of State College on Pennsylvania State University property. A portion of the area is regularly irrigated with effluent from the State College sewage facility. For further details concerning the irrigation program and the history of the study area see Parizek, *et al.*, 1967. *Penn State Studies* 23: 1-71.

The heterogeneous vegetation in the study area includes several 25-to 30-year-old plantations of red pine (*Pinus resinosa*), white pine (*Pinus Strobus*) and spruces, the predominant being white spruce (*Picea glauca*). The northern corner of the area is a natural oak-hardwood community and the most homogeneous portion of the entire study area. Between the conifer plantings and the oak-hardwood region are several old fields in various stages of succession from what is termed "open field" to "aspen" and "locust dense understory." In addition there are numerous roads through the area resulting in a transitional region best termed "edge habitat" or an ecotone.

Birds were captured during the spring, summer, and fall months of 1963 through 1966 on an 8 x 8 permanent grid of 64 mist nets placed 300 feet apart. The nets (9 m x 2 m) were arranged in the usual manner, suspended by vertical metal poles at each end. A net in low vegetation could sample the whole vertical extent but a net in (for example) pines would sample only the lower 2 meters and might not adequately sample birds living in the tree tops. An area (50 feet radius) around each net was examined to determine the vegetation type present at each site. A net which extended at least one third from one vegetation type to another is placed in the

<sup>1</sup>Supported in part by GM 00736, a Public Health Service Training Grant.

TABLE 1. PROPORTIONAL CAPTURES OF 6207 BIRDS DURING 1963-66 IN 64 NETS IN VARIOUS TYPES OF VEGETATION

| Vegetation                  | Percent of<br>64 nets | Percent of<br>6207 birds | Difference |
|-----------------------------|-----------------------|--------------------------|------------|
| Red pine                    | 26.6                  | 15.3                     | - 11.3     |
| White pine                  | 4.6                   | 3.8                      | - 0.8      |
| Spruce                      | 6.3                   | 5.0                      | - 1.3      |
| Oak hardwood                | 23.4                  | 16.0                     | - 7.0      |
| Aspen                       | 4.6                   | 7.7                      | + 3.1      |
| Locust-dense understory     | 3.1                   | 6.8                      | + 3.7      |
| Scrub                       | 1.6                   | 4.5                      | + 2.9      |
| Grass scrub                 | 7.8                   | 14.6                     | + 6.8      |
| Grass                       | 3.1                   | 3.7                      | + 0.6      |
| Red pine-scrub              | 3.1                   | 2.3                      | + 1.2      |
| Oak hardwood-red pine       | 1.6                   | 1.6                      | 0          |
| Red pine-aspen              | 1.6                   | 2.1                      | + 0.5      |
| Red pine—other deciduous    | 1.6                   | 1.4                      | - 0.2      |
| Spruce—red pine             | 1.6                   | 1.4                      | - 0.2      |
| Grass scrub-white pine      | 1.6                   | 1.5                      | - 0.1      |
| White pine—dense understory | 1.6                   | 2.1                      | - 0.5      |
| White pine—aspens           | 1.6                   | 1.7                      | + 0.1      |
| Spruce—grass scrub          | 1.6                   | 1.8                      | + 0.2      |
| Spruce—scrub                | 3.1                   | 5.7                      | + 2.6      |

category of edge vegetation.

With the few exceptions mentioned below, the terms denoting the vegetation categories of Table 1 are self-explanatory. The category referred to as "locust dense-understory" consists, predominantly, of black locust with a dense, impenetrable understory of small woody shrubs and herbaceous vegetation. The term "grass scrub" differs from "scrub" in that the former is an open field with few or no woody shrubs present whereas the latter contains many small woody shrubs. The descriptive terms (Table 1) will give the reader an impression of the character of the vegetation and its significance for birds. The appendix lists some of the conspicuous plants in each type to characterize better the vegetation.

For a more detailed analysis, scrub, grass-scrub and grass were merged and the 12 nets on edges were merged.

#### RESULTS

It is apparent (Table 1) that nets in Red Pine and Oak-hardwood did not capture their proportionate share of birds. In contrast nets in grass scrub, in aspen, and in locust, capture more than their share. Nets in other types captured approximately the appropriate

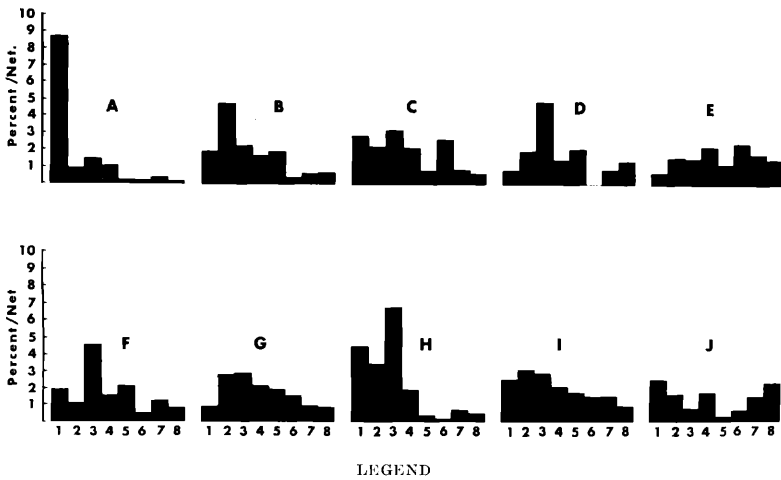


Figure 1. The percentages of birds per net in 8 types of vegetation (see table 2 for details). The abscissa gives the vegetation type: 1-grass scrub; 2-aspen; 3-locust; 4-edge; 5-oak-hardwood; 6-spruce; 7-white pine; 8-red pine. The birds are: A-Field Sparrow; B-Red-eyed Vireo; C-Towhee; D-Titmouse; E-Wood Thrush; F-Scarlet Tanager; G-Ovenbird; H-Catbird; I-Chickadee; J-Robin.

proportions.

To consider the captures of 10 common species the reduced number of vegetation types is appropriate. All species show departures from randomness in the number of captures, which should (Table 2) be in proportion to the number of nets. The differences are more readily visualized when the percentage of a species captured per net is given by vegetation types (Fig. 1). It is no surprise that Field Sparrows are captured in the grass-scrub vegetation. For Scarlet Tanagers the distribution is rather general (the nets in locusts may have been a special location). The Red-eyed Vireos were partial to aspens and were found randomly in the oak-hardwood. Ovenbirds showed their preference for edge and brush vegetation and avoidance of conifers. The Towhees also lived in edge vegetation (the high value of spruce may be due to one net in an opening in spruces). Catbirds showed strong preference for edge and brushy vegetation and even avoided the hardwoods. Titmice frequented hardwoods but other brushy vegetation even more. Chickadees also lived in secondary vegetation and even were scarce in the oak-hardwood. The Wood Thrush was very evenly distributed, except for the grass-scrub. The Robin, although generally distributed, presents a perplexing preference for grass-scrub and for red pine. The numbers caught in the hardwood are surprisingly small.



## SUMMARY

From April to October during 1963-1966, 6207 birds were captured in 64 mist nets operated on a regular schedule so that each net had an equal opportunity to capture birds. The vegetation around each net was classified and the captures by vegetation types determined. Nets in red pine and oak-hardwood vegetation captured few birds while nets in grass-scrub, scrub and aspen captured many. All of 10 selected species showed differences in occurrence in vegetation types.

## TECHNICAL NAMES OF AVIAN SPECIES

|                        |                                |
|------------------------|--------------------------------|
| Black-capped Chickadee | <i>Parus atricapillus</i>      |
| Tufted Titmouse        | <i>Parus bicolor</i>           |
| Catbird                | <i>Dumetella carolinensis</i>  |
| Wood Thrush            | <i>Hylocichla mustelina</i>    |
| Robin                  | <i>Turdus migratorius</i>      |
| Red-eyed Vireo         | <i>Vireo olivaceus</i>         |
| Ovenbird               | <i>Seiurus atricapillus</i>    |
| Scarlet Tanager        | <i>Piranga olivaceus</i>       |
| Rufus-sided Towhee     | <i>Pipilo erythrophthalmus</i> |
| Field Sparrow          | <i>Spizella pusilla</i>        |

## APPENDIX

1. Red Pine (*Pinus resinosa*). Very similar to White Pine but usually more open.
2. White Pine (*Pinus Strobus*). About 30 years old, planted about 3 m apart. Usually self pruned. Almost no undergrowth except on edges.
3. Spruce (*Picea*). About 30 years old with very dense growth of branches to the ground. An occasional opening due to death of 1-2 trees.
4. Oak hardwood. A mature stand, somewhat culled, of *Quercus alba*, *Q. velutina* and *Q. rubra* with many *Cornus florida*. Some *Tsuga canadensis* on north-facing slopes.
5. Aspen (*Populus grandidentata*). Natural growth of small trees about 5-7 m high. Much herbaceous growth (*Solidago*) underneath.
6. Locust-dense understory. A thick brush of *Robinia pseudoacacia* with undergrowth of grasses (*Poa*, *Dactylis*) goldenrods, blackberries (*Rubus*) and scattered jewel weed (*Impatiens*).
7. Scrub. Impenetrable growth of bushes (*Cornus racemosa*, *Viburnum lentago*) 3-4 m high with grass openings long enough for a net in between clumps.
8. Grass scrub. A miscellaneous category for old fields that were not planted to trees and have kept a cover of grass with invasion of *Rubus*, *Cornus*, *Betula*.
9. Grass. Open field of *Dactylis glomerata*, *Rubus* and *Solidago* on very poor soil. White and Red Pines were planted in some areas during 1964.
- 10-19. The edges can be described by reference to their components. Since usually only 1 net was involved the data were grouped together for most analyses.

North Carolina State University, Raleigh, North Carolina 27607