

BIRD POPULATION IN VARIOUS ECOLOGICAL COMMUNITIES.

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Report on nesting data of the Advanced Ornithology
class from June 29 - July 6, 1946.
(Zoology 377--S. Charles Kendeigh)

Bird Population In Various Ecological Communities.

Introduction.

The Ornithology Class of The Biological Station, Cheboygan Michigan, under the direction of S.C. Kendeigh visited a representative group of six plant communities during the summer of 1946. These trips were made between June 29 and July 6th to determine the bird population of a given area during the nesting season and to note so far as possible the reasons for their presence.

Methods.

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The class working in two groups cruised through the selected area about 20 feet apart and recorded all birds seen and heard in a measured period of time. The average distance traveled was 1 mile per hour. The population was determined by converting the actual count taken into the number that would be seen in ten hours in the same area. Since this was the nesting season it was assumed that each male seen also meant the presence of a female and thus the final figures as given on the accompanying chart denote the potential number of pairs of birds for each community. A similar count was worked out by Dr. Kendeigh for a linear distance of 10 miles rather than the number for 10 hours.

Grassland Area

This grassy field on the Pellston road bordered on one side by the road and on the other by a young Aspen growth has a species list of 6 grassland birds and 7 low shrub birds of the forest edge. The herbaceous plants include *Asclepias syriaca*, *Potentilla recta*, *Hypericum perforata*, *Verbascum thapsus* and *Epilobium angustifolium*.

The low shrubs somewhat scattered near the young Aspens were *Cornus Stolonifera*, *Rubus allegheniensis* and *Salix* species.

The ground nesting birds Marsh Hawk, Upland Plover, Vesper Sparrow, Meadowlark and Bob-o-link find plenty of nesting material in the form of dry grass and leaves, weed stalks and strips of bark from the neighboring low shrubs. The Vesper Sparrow nest found here was 3 in. in diameter, made of grasses and cup shaped. It contained 3 small bluish eggs speckled with brown. The Prairie-Horned Lark presumably nested on some of the bared ground in this grassy plot as contrasted to the Meadow Lark whose nest is usually found among the grasses and roofed over with them. The Upland Plover makes a small depression in the ground and lines it with dry grass. The Marsh Hawk and Bob-o-link use the available materials and shape a nest in proportion to their size.

Of the forest edge birds Bluebirds and Starlings were present because of the dead *Prunus pennsylvanica* in which the Starling nest was found and the fence posts on three sides of the field where the Bluebirds probably nested. The Goldfinch and Mourning Dove were probably nesting in the low bushes at the edge, while the Kingbird in this case chose the top of a stump on which to rear his family. The presence of the Cowbird, as is their custom, is due to the presence of a group of nesting birds whose nests she can use for laying her eggs. This she does in a sly manner when the nest is temporarily unoccupied. The Barn Swallow was not nesting in the immediate vicinity, is quite certain in the absence of buildings for its supported nest. It is more likely to be searching for food which he does by flying nearer to the ground than the other swallows do. This open field provided ample room for maneuvering which factor is also important to the Upland Plover whose circling, rising flight

often extends over most of the field, and ^{to} the Marsh Hawk when he soars over the field in search of food and then dives earthward. The food of the Marsh Hawk consists almost entirely of field mice, snakes, gophers, and insects which would account for its choice of community. In this grassland the population seems to be the result of nesting requirements for the main part and food requirements in a few species.

Young Aspen Area

Elevated song posts not requirements several species have flight songs, other sing from ground or low weeds.

The young aspens along the grassy field were for the most part *Populus tremuloides*. The low shrubs were *Betula papyrifera*, and *Cornus stolonifera*. *Pteris aquilina* and *Rumex acetosella* and *Poa* species were dominant in the ground cover. Of the 9 species of birds seen here the Vesper Sparrow, Goldfinch and Bluebird were also present in the grassy field though ordinarily the latter two are essentially woods edge birds. The Clay-colored Sparrow was abundant in this small area and one could say almost exclusive to the area. Its nest is commonly made of grasses lined with long hairs and is found on the ground or in low bushes. No nests were identified positively by the class but three were found in low bushes about 15 inches from the ground that were thought to belong to the Clay Colored. The Chipping Sparrow here is in its natural habitat of low shrubs and nests usually from 5 to 20 feet above the ground. The Nighthawk since it makes no nest apparently selects a territory because of the available food. In this case the low shrubs and trees of the forest edge and the open field supply the desired insects. In the open areas the bird may make a depression for eggs or lay them directly on the ground. In cities they frequently select the tops

of buildings. In this area as well as in the adjoining grassland the nesting sight and material seems to be a determining factor in selecting a community.

Aspen -Pine Area.

The sandy upland near the fire tower of the Station is an area of *Populus grandidentata* and *Acer rubrum* as dominant species, and *Pinus resinosa* as a secondary species. The ground plants for the most part consist of *Pteris aquilina* and *Vaccinium* species. The heavy leaf and needle cover limit the number of ground plants. There is no definite low shrub or high shrub area but merely scattered plants representing this layer. The absence of these plants limits the number of woods edge birds. The largest population count is that of the Red-eyed Vireo and the Oven ~~Bird~~. The Vireo makes a pendant nest in the fork of a tree usually on Maple, while the Oven Bird selects the forest floor and makes a slight depression which he lines with grass and fine hair. Both of these birds feed on insects they find among the ^{ground - oven bird?} trees. Another ground nesting bird the Hermit Thrush eats animal matter, mostly insects, wild fruit and seeds. It prefers an evergreen forest probably because of its early spring arrival and late fall departure.

Of the tree nesting birds the ~~Peewee~~, Robin, Redstart, Crow and Black ~~-~~filled Cuckoo are mainly insect eaters and get their food for the most part from the forest floor and forest edge. Birds nesting in holes in trees or stumps are Tree Swallow, Flicker, Chick ~~-~~adee and Crested Flycatcher ^{They} are mainly insect feeders. The Purple Finch and Pine Warbler nest in Pine trees and both eat insects though the Purple Finch much prefers seeds. The Purple Martins were present because of the proximity of the area to the Martin house on the beach of Douglas Lake, they were apparently searching for food in the area.

The niche requirements of most of the tree nesting birds besides food and nesting materials includes a singing post which may or may not be higher or lower than their nesting site, depending on the species. Ground nesting species as the Hermit Thrush and Oven Bird likewise require singing posts and, or perching posts for defending their territory. This associates provides nesting, feeding and singing sites for 3 coniferous forest species, 13 low shrub forest edge species and 6 deciduous forest species.

Red Pine- White Pine-Aspen Area

This aspen associates located near Maple River has *Populus tremuloides* as a dominant species and *Pinus strobus* and *P. resinosa* as sub dominant species. The ground plants in the herbaceous layer include the *Aster* sp., *Cornus Canadensis*, *Fragaria virginiana* and *Gaultheria procumbens* as the dominant species. Of the low ground shrubs, *Vaccinium canadense*, *Diervilla lonicera* and *Rosa blanda* were most abundant. At the high shrub level *Cornus stolonifera*, *Salix bebbiana*, *Pinus strobus*, *P. resinosa* and *Tsuga canadensis* were frequently found.

In this area the Vesper Sparrow, though it has been found in the grassland and young aspens, is again noted in this more mature association. This is probably do to a need for a singing post and to the presence of plants bearing seeds for his diet. These are usually found on the forest edge.

The coniferous forest birds here are the Hermit Thrush, Purple Finch, Myrtle Warbler and Black-Throated Green Warbler. Of these the Warblers are insect eaters, the Myrtle choosing high bushes or lower tree branches for her nest and the Black Throated Green selecting the higher branches for its nest and song.

Of the deciduous forest birds Crested Flycatcher, Wood Peewee, Chick-a-dee, Red-Eyed Vireo and Oven Bird have been discussed and

their presence here indicates a similarity of niche requirements in food, nesting materials, song and flight. The total population in this area is somewhat less though the actual species number is a bit larger. This decrease would be due to some lack of niche requirements the most obvious one here being that of food. The acid condition of the soil in coniferous areas and the slow decay of the needle cover makes the soil unproductive in plant life and likewise in insect life ordinarily found in the duff layers of the forest. The Downy Woodpecker prefers an area of tall trees for insect hunting but nest lower in a tree hollow or dead tree. The Blue Jays roam far from their nest of woven rootlets in the high shrub society in search of their varied diet of vegetable and animal material. The Ruffed Grouse finds a protective place for his nest in this dense wooded area with an occasional fallen log for a drumming stand. The ground plants and tree fruits help make up his food.

The low shrub society has 12 representative species of which the Brown Thrasher, Towhee and Slate-Colored Junco were not found in an area without coniferous trees, this may be just coincidence since the Brown Thrasher is a forest edge bird and I have seen a nest with young in this vicinity in 1945 built on the ground under a loose brush pile. The Junco though it nests on the ground chooses the tall *Pinus resinosa* as its singing post and for this reason alone might have chosen this area.

In general the presence of pines in the Aspen association seems to provide more shelter, singing posts, new type of ground cover and a variation in the available seeds and insects; these factors would directly mean the introduction of new species.

Reese's Bog Area

Reese's bog, located at the North end of Burt Lake, is an example of a mature bog area. It has a reestablished Thuja association in which no trees date back any further than 1870. The Carex, Chamaedaphne, high bog shrub and Larix associations have become extinct, the latter as a result of cutting and burning. The Picea association is represented by the P. glauca and mariana species but, with the Thuja growing out at the top, the Picea will soon be replaced. In some places ^{non-}selective, indiscriminate cutting has opened up the area and will lead to eventual destruction of the remaining trees through wind action. The trees in this bog land have shallow root systems and when swayed by the wind will either be uprooted or snapped off at the top. Some portions of the area were opened up to permit the growth of orchids and have been very successful. The fosse at the North end of the bog has become filled with vegetation and sand. There are streamlets and underground drainage from Douglas Lake flowing through the area but all indications of open water have been removed.

The coniferous forest species make up about a half of the population count of this area. Of these the Purple Finch was found in all areas containing Pine, Spruce or Hemlock. The Myrtle Warbler and the Black Throated Green Warbler appear in the two most dense areas studied. The Myrtle nests in an evergreen at high shrub level and the Black Throated Green in the higher branch or tree top level as does the Blackburnian Warbler. The Parula chooses a site among the lichens on an evergreen tree about 5 to 30 feet above the ground. In this same group of Coniferous species the "Tree Trunk Society" as described by A.C. Twomey in

The Bird Population Of An Elm-Maple Forest, included the Yellow-bellied Sapsucker, Hairy Woodpecker, Red-breasted Nuthatch, White-breasted Nuthatch and Brown Creeper. These birds all nest in holes in trees and feed on insects found on the bark of trees with the exception of the Sapsucker. This group of birds prefers coniferous forests though they may be found in other trees. The Winter Wren has adapted to the habitat and will be found nesting in the tangled roots of the upturned tree trunks and singing from the branches of these fallen trees. The sunny spaces which have opened up because of cutting have increased the number of feeding and singing areas. The Wood Thrush, Veery, Scarlet Tanager and Black-throated Blue are birds that are exclusive to deciduous forest but are found here where the Aspens are on the decline and Thuja is the dominant species. The niche requirements of an open area for sunning and feeding which are usually found on the forest edge may also be found in the bog. The decrease in actual population with an increase in species number points toward a decrease in food of both animal and vegetable material. The ground vegetation along the fosse and stream is quite dense and as such one would expect more humus and ground duff for insects. In the other portions of the bog ground vegetation is at a minimum because of the lack of light and the slow decay of the needle cover combined with an acid condition of the soil which is prevalent in most coniferous areas.

Beech- Maple- Hemlock Area

The Colonial Point Hardwoods as this area is called is on Burt Lake and has as its dominant trees *Acer saccharum* and *Fagus grandi-*

folia with an occasional *Tsuga canadensis* ranging in size from 5 to 80 cm. in diameter. These are relic species which remained after the pine was lumbered off in 1840. The high shrub and low shrub layers are for the most part saplings of the dominant species. The ground cover of herbaceous plants includes *Smilacina racemosa*, *Maiantnemum canadensis*, *Trillium grandiflorum* and *Viola eriocarpa* all of which are exclusive in hardwoods climax areas and indicate a good fertile humus soil layer. In this study it would thereby indicate a good crop of ground insects and larvae.

The dominant bird community here is that of a deciduous forest. New species characteristic of this area only are White-breasted Nuthatch, Least Flycatcher, and Barred Owl. For explanation of the niche requirements of the Least Flycatcher other than those of food, nest and song sites. Other deciduous forest birds found here and in all other forested areas we studied are the Red-eyed Vireo, Oven-Bird, Chickadee, Pewee and Crested Flycatcher. Their manner of getting food from the flat leaf surfaces, of finding rather conspicuous singing posts and of finding nesting sites in trees (all but the Oven Bird) are adequate reasons for their inhabiting the area.

The only coniferous birds found in this hardwoods are the Blackburnian Warbler, Golden-crowned Kinglet, Black-throated Green Warbler and Purple Finch, the latter is found in all areas studied except the Grassland.

A few low shrub community species include such birds as the Cowbird, found in all areas, the Robin and the Mourning Dove.

Of the 22 species found in the hardwoods as compared to 37 in Reese's bog and 23 and 25 respectively in the other two areas the population here is greater by approximately 50% than that of any of the other areas. This increase I would attribute to the increased

density of vegetation in a deciduous forest climax as compared to the climax of a Bog area or to the developmental stages of the aspen association. The wide variation in nesting and singing sites of these birds listed would hardly lead to competition over territories.

Summary and Conclusions.

1. A study of six different plant communities yielded four bird communities namely:
 - Grassland community with 6 species.
 - Shrub, low trees, forest edge community with 25 species.
 - Coniferous forest community with 14 species.
 - Deciduous forest community with 19 species.
2. Each bird community has similar niche requirements ^{for all species} which may vary with different species. An adequate food supply, nesting material, nesting site and singing perch are the factors to be considered. Because of these requirements certain birds are restricted in their habitat to a limited area in a plant community.
3. Birds of the forest edge were seen in the grassland either in a song flight or a flight for food.
4. Some birds have no definite niche as the cowbird which is found in all communities. Other birds as the Purple Finch, Flicker, Peewee, Crested Flycatcher, Robin, Red-Eyed Vireo, Oven Bird, and Chick-a-dee were found in all of the last four areas described.
5. The presence of a certain species in more than one plant community suggests either an adaptation to the habitat or a similarity in one or more of the requirements of that species for survival.
6. The greatest number of bird species are found in the "apple-Beech climax area because it is an "all age" forest with seedlings and saplings growing in the shade of the parent tree.
7. The population in actual numbers decreases with an increased number of conifer trees because the plants compete for light and their absence on the ground surface and the shrub layers means a decrease in the insect population as well.

Field Data - June 29 - July 6

Number of possible pairs for each community per 10 hours observation.

| Area Number - | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------------------------|---|-----------------|-----------------|---|-----------------|-----------------|
| Hours of observation - | 6 | 4 $\frac{1}{2}$ | 3 | 3 | 1 $\frac{1}{2}$ | 2 $\frac{1}{2}$ |
| Miles walked (approximately) - | 4 | 3 $\frac{1}{2}$ | 2 $\frac{3}{4}$ | 3 | 1 $\frac{1}{2}$ | 2 $\frac{1}{2}$ |

| Type of forest - | Beech Maple Hemlock | Cedar Balsam Aspen | Aspen Pine | Grass- land | Aspen repro- duction | Pine Aspen Hemlock |
|------------------|---------------------------|--------------------------|---------------|----------------|----------------------------|--------------------------|
|------------------|---------------------------|--------------------------|---------------|----------------|----------------------------|--------------------------|

| Locality - | Colonial Point W. of Burt Lake | Reese's Bog | Biological Station Area | Two miles E. of Pellston | Two miles E. of Pellston | Bryant's NE. of Pellston |
|------------|---|----------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|
|------------|---|----------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|

| | | | | | | |
|---------------------------------|----|----|----|---|--|----|
| American redstart | 92 | | 4 | | | 4 |
| Red-eyed vireo | 87 | 2 | 83 | | | 4 |
| Ovenbird | 84 | 11 | 79 | | | 58 |
| Veery | 45 | 2 | | | | |
| Wood peewee | 37 | 2 | 19 | | | 22 |
| Least flycatcher | 28 | | | | | |
| Black-throated green warbler | 23 | 53 | | | | 4 |
| Scarlet tanager | 17 | 4 | | | | |
| Crested flycatcher | 12 | 13 | 11 | | | 4 |
| Red-breasted nuthatch | 8 | 4 | | | | |
| Blackburnian warbler | 8 | 15 | | | | |
| Cowbird | 8 | 11 | 26 | 7 | | 9 |
| Wood thrush | 5 | 4 | | | | |
| Black-capped chickadee | 3 | 19 | 23 | | | 31 |
| Robin | 3 | 25 | 41 | | | 26 |
| Purple finch | 3 | 8 | 4 | | | 4 |
| Cooper's hawk | 2 | | | | | |
| Ruffed grouse | 2 | | | | | 4 |
| Flicker | 2 | 6 | 4 | | | 13 |
| Golden crested kinglet | 2 | 38 | | | | |
| Black and white warbler | 2 | 15 | | | | |
| Barred owl | 2 | | | | | |
| Parula warbler | | 21 | | | | |
| Nashville warbler | | 19 | | | | |
| Blue jay | | 15 | | | | 4 |
| Winter wren | | 13 | | | | |
| Blue-headed vireo | | 11 | | | | |

| Area Number - | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------------------------|---|---|----|----|-----|----|
| Mourning dove | | 8 | 15 | 7 | | |
| Cedar waxwing | | 8 | 34 | | 10 | 9 |
| White-throated sparrow | | 8 | | | | |
| Nighthawk | | 4 | 8 | | 20 | 9 |
| Myrtle warbler | | 4 | | | | 13 |
| Slate-colored junco | | 4 | | | | 18 |
| Yellow-bellied sapsucker | | 2 | | | | |
| Brown creeper | | 2 | | | | |
| Ruby-crested kinglet | | 2 | | | | |
| Canada warbler | | 2 | | | | |
| Black-throated blue warbler | | 2 | | | | |
| Vesper sparrow | | | 8 | 90 | 80 | 4 |
| Prairie horned lark | | | | 33 | | |
| E. meadow lark | | | | 13 | | |
| Kingbird | | | 8 | 4 | | |
| Barn swallow | | | | 10 | | |
| Goldfinch | | | 10 | 10 | | |
| Marsh hawk | | | | 3 | | |
| Upland plover | | | | 3 | | |
| Bluebird | | | 10 | 3 | | |
| Starling | | | | 3 | | |
| Bobolink | | | | 3 | | |
| Clay-colored sparrow | | | | | 100 | |
| Chipping sparrow | | | 19 | | 40 | 18 |
| Tree swallow | | | 4 | | 10 | |
| Crow | | | 23 | | | 13 |
| Hermit thrush | | | 15 | | | 31 |
| Purple martin | | | 8 | | | |
| Black-billed cuckoo | | | 4 | | | |
| Pine warbler | | | 4 | | | |
| Indigo bunting | | | 4 | | | |
| Red-eyed towhee | | | | | | 4 |
| Brown thrasher | | | | | | 18 |
| Downy woodpecker | | | | | | 9 |
| | | | | | | 4 |

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