

AN ECOLOGICAL STUDY OF AN AREA ON DOUGLAS LAKE

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Introduction

This study has been made as a part of the work for the class in Advanced Ornithology at the University of Michigan Biological Station under the direction of Dr. O.S. Pettingill, Jr. and Dr. Theadora Nelson. The area was studied during the summer session, actual dates being from July 5 when the first survey was made for mapping to August 15, 1939.

The writer has taken ecology to mean the relationship of all living things to each other and to the physical environment in which they find themselves. Some things are recorded here which seemingly have no bearing on bird life in the area but a more thorough study of the problem might bring out a close relationship; hence, everything noted in the area has been recorded.

Description of the Area

The area studied is located on the east shore of South Fishtail Bay, Douglas Lake, Cheboygan County, Michigan. Beginning on the shore at an old log lab, used prior to 1929 by the Biological Station, and going along the shore in a N.N.E. direction for approximately seven hundred yards the eastern boundary is a typical wind-swept sandy shore with very few aquatic plants able to withstand the strong wave action. At the northern end of the area a large bed of Scirpus occidentalis, Giant Bulrush, indicates a more favorable position for plant growth in the shallow water off shore.

The northern point was chosen due to a change of the vegetation at this place to a woods of richer humus and richer plant life. Evidence of this is in the presence of the Yellowthroat and Song Sparrow which were heard singing here but were never found in the other area.

The boundary line extends for about twenty-one yards through the woods to a road running parallel to the shore. The road is the western boundary, following S.S.W. to the lot back of the old lab.

The area is, then, a narrow strip of woodland, bordered on one side by the shore of Douglas Lake and on the other side by a road which was cut through some years ago. The area varied in width from twenty-one yards at the northern border to fifty yards roughly at the southern end. The wider part, used for camping sites by students at the station, is a little more open although the vegetation differs very little from the rest of the area. It is about one twenty-fifth of a square mile. (total area)

The forest was originally pine, *Pinus Strobus* and *Pinus resinosa*, but was lumbered prior to 1890. A few trees along the shore were left because they were not suited for ~~the~~ lumber. Some trees were twisted or had more branches on the shore side thus spoiling the shape of the tree for the purposes of the lumbering industry. These trees are important and have been through the history of the area since they are the seed trees for the pines which have come in since that time.

The area was subjected to fire several times, the last being about 1921. The pines along the shore and nearby escaped the fires due to their large size but the smaller ones died. The fires were followed by the Birch-Aspen association with *Betula papyrifera* and *Populus grandidentata* dominant of the trees. On the ground *Pteris aquilina* is dominant. The pines are coming in again, many of them almost reaching the tops of the *Populus grandidentata*. When this happens, the *Populus* will fall and a different bird and plant association may be expected.

The region lies in the transition zone of the Northeast Coniferous Forest Province and the Central Eastern Deciduous Forest Province. The elevation above sea level is about seven hundred feet. The temperature is temperate, going as low as -38 degrees F. in February and as high as 101 in July. The yearly precipitation amounts to 28.57 inches distributed throughout the year, the least amount being in the colder months. The growing season is short, lasting from May 20 to June 15 to September 10 to 15. Snowfall is heavy here, forming a blanket over the vegetation. The winds are prevailing westerlies.

The weather for the season has not been unusual. The winter of 1938-39 was mild compared to the preceding one. This may or may not have been a factor in the vegetation for this growing season.

Plant Life in the Area

The trees and high shrubs listed here are generally distributed over the area except the pine trees as mentioned before.

Abies balsamea
Acer rubrum
Acer saccharum
Alnus incana
Amelanchier canadensis
Betula papyrifera
Pinus resinosa
Pinus Strobus
Populus balsamifera
Populus grandidentata
Populus tremuloides
Prunus pennsylvanica
Quercus borealis
Rhus glabra-borealis

Sambucus racemosa

Ulmus americana

The ground plants differed some in their distribution. The Vacciniums were in the more open spaces toward shore although not confined to that area. Rhus toxicodendron had a similar habitat. Pteris aquilina grew everywhere, that is, in all conditions of soil and light. The height varied somewhat. The plants are these:

Apocynum cannabinum

Aralia hispida

Aralia nudicaulis

Aster laevis

Comandra umbellata

Diervilla lonicera

Gaultheria procumbens

Poa compressa

Pteris aquilina

Rubus allegheniensis

Solidago hispida

Vaccinium pennsylvanicum

Vaccinium canadense

Cornus canadense

Rhus toxicodendron

Clintonia borealis

Fragaria virginiana

The ground cover consists of dead leaves, pine needles, some mosses and grasses not identified.

Mammals and Reptiles

No mammals were seen but evidence of their presence was found in tracks on the beach and firelanes, and droppings. Dr. Donald Ameel of the faculty of the Biological Station has very generously helped in making out this list. Of these mammals some have been trapped by Dr. Ameel, others found dead, still others identified by tracks.

- Muskrat
- Raccoon
- Mink
- Skunk
- Short-tailed Shrew
- White-footed mouse
- Jumping mouse
- Porcupine
- Red Squirrel
- Grey Squirrel
- Chipmunk

These mammals are of great importance to such a study as this because they are enemies and food rivals of the bird in the area. This problem is discussed later under other topics.

Two snakes were found, both being fairly large specimens of the Garter snake. Tracks of a turtle were found on the beach. Dr. Creaser of the Station faculty was of the opinion that the turtle was either a Snapping turtle or Painted Turtle and had come to the shore from another part of the lake.

Food for Birds

Insect food was plentiful in the area this summer. A very high percentage of the Acer rubrum trees were infested with the larvae of the Dryocampa rubicunda, Rosy Maple Moth. This species of tree is generally found throughout the area and few trees escaped defoliation except those along the shore. A few trees of Populus grandidentata were infested too when they were in proximity to a defoliated Acer rubrum. Photograph number 1 shows an Acer rubrum which has been defoliated and is in contrast with the other trees in the picture but which is putting out new leaves even though the end of the growing season is near.

The effects of the infestation are not entirely apparent this year. Dr. Hungerford believes the infestation will be heavier next year although parasites of the larva may hold it in check. These parasites are hymenopterous insects and their work may be observed in the trees where the larvae have pupated. The trees are able to withstand defoliation for several years if it does not come too early in the season. Of course the Acer rubrum trees may be wiped out of this region by a prolonged infestation but it is extremely unlikely. The effect on the forest association would not be of much importance since it is not a dominant tree.

According to estimate there were no more than two pairs of cuckoos in the area. There was food for more. The Kingbird and Red-eyed Vireo were observed feeding on these larvae. A study in 1940 of the same area might reveal if the number of birds feeding on them, that is numbers per species, have increased due to the increased food supply. There might be an increase in numbers of species also.

Other insects observed in large enough numbers to be of importance in the food supply are these:

Larvae of the Imperial Moth

Larvae of White Tussock Moth

Larvae of Back-swimmer (Notonectidae)

Ants and Ant lions (Myrmelionidae)

Several species of Robber flies (Asilidae)

Several species of grasshoppers

Cicadaidae

Several species and no doubt families of the order Ephemeroidea

The Mayflies were very abundant the first of the period. The cast off skins were part of the drift on which the Spotted Sandpiper feeds.

Many species of Diptera and Hymenoptera.

One of the chief sources of food directly from the vegetation in the area is the fruits of various plants and shrubs. Some of the important ones are these:

Amelanchier canadensis	Berries
Prunus pennsylvanica	Pin cherries
Rhus glabra-borealis	Berries
Rubus allegheniensis	Blackberries
Vaccinium pennsylvanicum	Blueberries
Vaccinium canadense	Blueberries
Rhus toxicodendron	Berries
Fragaria virginiana	Wild Strawberry

There are no doubt others which serve as food for birds and mammals but I have not read of their use nor observed them being taken.

Very little was learned by observation about the food rivals of the birds here. A Robin and Chipmunk were seen eating berries from the same Amelanchier bush. However, the food habits of the mammals mentioned have been studied by specialists in that field and they show some similarity with bird food. How great this rivalry would become would depend upon the numbers of the bird and mammal competing, the supply of food, and the variety of the diet of each and availability of the other food.

The White-footed Mouse feeds on berries, insects, seeds, and nuts. It then becomes a food rival of ^{berry} seed eating birds as the Cedar Waxwing, and also of the insect eaters as the Flycatchers.

The Raccoon feeds on clams, crawfish, frogs, birds, eggs, nuts, fruit, and mussel shells. It would be greater rival of the marsh birds, Herons and Bittern particularly, than of any in the area under observation but it also consumes fruit.

This one phase of ecology, food rivals, would make a very interesting study and might throw considerable light on some of the problems of distribution of birds and mammals.

The part that birds play in the pollination of flowers was not studied. There is a definite relationship there as in the distribution of seeds.

The Ruby-throated Hummingbird and Yellow-bellied Sapsucker were not seen in the area so that the use of sap as food can not be considered.

Birds of the Area

The birds will be divided into three groups:

- A. Bird Nesting in the Area
- B. Birds Seen Which May Have Nested There
- C. Other Birds

A. Birds Nesting in the Area

Sixteen nests were found representing six species of birds. They were these: Yellow-billed Cuckoo, Belted Kingfisher, Roughwinged Swallow, Robin, Cedar Waxwing, and Red-eyed Vireo.

It is believed, however, that a number of others nested here because they were found feeding young, carrying fecal sacs, and giving broken wing act or similar ruse to protect the nest or young.

The number of pairs was determined partly by a count of the singing males in the early morning, and by repeated observations of pairs or families in certain locations.

The list follows:

Name	Number of Pairs	Nests or Activities
Black Duck	1	Broken wing act
Ruffed Grouse	1	Seen with young
Spotted Sandpiper	1	Seen with young
Yellow-billed Cuckoo	1	Nest
Belted Kingfisher	1	Nest
Flicker	1	Seen with young
Eastern Kingbird	3	Seen with young
Wood Pewee	1	Food in mouth
Least Flycatcher	1	Food in mouth
Rough-wing Swallow	1	Nest
Black-capped Chickadee	3	Feeding young
Brown Thrasher	2	Feeding young

Robin	5	Feeding young
Cedar Waxwing	3	Feeding young
Red-eyed Vireo	5	Feeding young
Redstart	1	Carrying fecal sac
Baltimore Oriole	1	Seen with young
Cowbird	?	Young with Vireos
Chipping Sparrow	1	Seen with young

The nests which were found were located as follows:

Yellow-bill Cuckoo	Pine, lower branches
Cuckoo sp.	Clump of Acer rubrum
Cedar Waxwing	Pine
Robin	Pine
Belted Kingfisher	Bank
Rough-wing Swallow	Bank

B. Birds Seen Which May Have Nested There

Some of these birds may have nested in the area or in the similar habitat across the road. The count is by individuals.

Name	Number of Individuals
Black-bill Cuckoo	1
Nighthawk	1
Whip-poor-will	1
Hairy Woodpecker	1
Downy Woodpecker	1
Crested Flycatcher	4 (2 pairs)
Purple Martin	3
Hermit Thrush	1
Black-throated Green Warbler	2

Pine Warbler	2 (pair)
Oven Bird	2 (singing)
Goldfinch	2
Vesper Sparrow	1

C. Other Birds

Some birds were seen only once. Others were seen whose nesting sites must necessarily be out of the area due to different habitats. Still others were believed to be migrating since they were seen in numbers, (more than one) or flying high and southward, and were not seen in the area until the third week of August.

Name	Different Habitat(Nest)	Migrants
Great Blue Heron	x	
Herring Gull	x	
Ring-billed Gull	x	
Caspian Tern	x	
Kildeer		x
Mourning Dove		x
Crow	x	

Enemies

No evidence of birds' enemies was observed. The food habits of the Red Squirrel and of the Raccoon, birds and eggs, would make them enemies. These two mammals are known to be present in the area but the problem as to whether they prefer other food to birds and eggs is not answered.

Snakes can be considered as potential enemies since they do eat eggs and young birds.

No birds were collected so no examinations for parasites could be made.

Although no hawks were observed, there is no particular reason why they would not select food. I of course refer to these species which take smaller birds.

Man does not act as an enemy to the birds of this area except as the nests or young are disturbed for study purposes and this is probably negligible. In the winter when the Biological Station is not open there may be some illegal hunting which would affect the Grouse.

Notes on Special Observations

Great Blue Heron

I saw the tracks of this bird on the beach once, and saw it flying high overhead. It may have fed on small fish along the shore.

Black Duck

Earlier in the season than this study was started, Mr. Walter Gibbs of the Ornithology class saw the Black Duck with young in the area. Another observer, Miss Evelyn Bradley, witnessed the broken wing act of an adult bird and believed there was a nest nearby but she did not find it. I saw the ducks in the water near shore several times and followed the tracks into the woods but could not locate either a nest or feeding ground. Just before dusk one night I flushed a group of Black Ducks from the beds of Scirpus occurring at the upper end of the territory. They may have been of the same family as that observed by Mr. Gibbs. I tried to find if the Black Ducks were feeding on acorns as suggested by Martin and Uhler in their bulletin, Food of Game Ducks, but I was unable to do so.

Ruffed Grouse

Two adults with eight or more young, nearly full grown, were flushed while they were feeding near the upper end of the area.

Spotted Sandpiper

An adult with two young were seen on the first trip through the area. After that only two were seen, and later just one. I believe the nest to have been near the end of the first fire lane.

The tracks of the Spotty along the shore suggest their feeding activities when not under observation. They seem to feed along the line of drift, getting Mayflies, small fish, and other insects attracted by the decaying vegetable matter. At more or less regular intervals the tracks led away from the drift, suggesting their retreat before a wave.

Belted Kingfisher

In an eroded bank, caused perhaps by the piling up of the ice during the winter months and the gouging out of the shoreline in the spring thaws, Mr. Wayne Porter found the nests of the Kingfisher and Rough-wing Swallow. At the time he found the burrows they were occupied with young. That was two weeks before the station opened. The young were gone from the nests when I examined them. The Kingfisher was seen often along the shore and had a perching point on a dead limb extending out over the water at Pine Point.

Hermit Thrush

This bird was never seen but was heard singing during the early part of the study. July 30 was the last day when song was noted.

Black-capped Chickadee

A Chickadee was observed trying to eat a live and singing Cicada. The bird struggled for about a minute and a half to get the wings of the insect down at the sides and then either released it or lost its hold.

Red-eyed Vireo

In all but one observation of Red-eyed Vireos feeding young there was a young Cowbird among the young of the Vireo. No other bird seemed to have been parasitised by the Cowbird.

While a young Vireo was being fed by an adult, a male Black-throated Green Warbler flew into the same tree and began feeding on small larvae. The Warbler paid no attention to the Vireo which kept a foot or so away. The Vireo did not feed until after the Warbler flew away.

Pine Warbler

The warbler was found on only two consecutive days and then only in Pines. The bird went from tree to tree along the shore and then returned over the same route. It frequented the upper branches, seldom coming down to the middle or lower limbs.

Goldfinch

The Goldfinch was seen flying over the tree tops at the time when the same species elsewhere in the camp area were establishing territory.

Vesper Sparrow

Along the road where the trees and undergrowth have been cut back, a suitable nesting site for the Vesper might be found. In such a spot, dry and open, a Vesper was flushed twice but the nest could not be found.

Bird Population

Total number of species seen or heard -----	39 (Pairs)
Number of nesting species -----	19
Total pairs nesting -----	33

Total individuals ----- 29

Total of all birds ----- 95

These figures are estimates but are made as carefully as possible under the conditions. Only adults were counted.

The most abundant birds were the Robin and Red-eyed Vireo.

Conclusions

A study of this kind should be carried on over a period of several years in the same territory in order to observe and interpret fluctuations in bird numbers, food supply, effect of weather, etc.

This report represents only the beginning in such a study since the first step is the listing of the plants, animals, insects of the area. The next step, relationship of these, is the important one and offers problems like these:

What is the effect of the wind (velocity and direction) in the construction of the nests in the area?

What is the cause for much of the area having practically no bird life?

Does the Black Duck feed on land: if so, ^{for} what?

What will be the effect on the diet of birds in this area if the Acer rubrum infestation continues?

None of these questions can be answered now.

The presence of the Pine and Black-throated Warbler indicates Pine as the dominant association in time. As the small pines grow larger and furnish nesting sites for these and other warblers of the evergreen forests, more of them may be found in the area. Certain of the present birds will be lost; Brown Thrasher, Robin, Cedar Waxwing. This assumption is based on records from other forests changing over a period of years.

ILLUSTRATIONS



Photo by J. Dickson

Acer rubrum defoliated by larvae but putting
out new leaves.

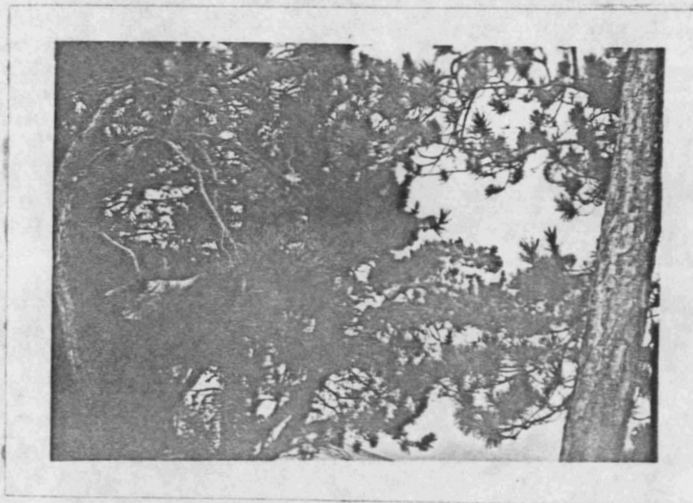


Photo by J. Dickson

Location of Cedar Waxwing nest in heavy clump of
Pine branches

ILLUSTRATIONS



Photo by J. Dickson

Eroded bank showing location of Kingfisher and
Rough-wing Swallow burrows

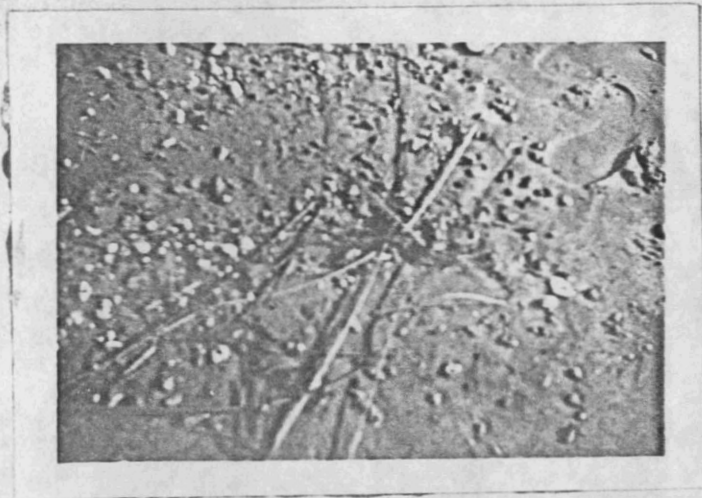


Photo by J. Dickson

Beach drift providing food for Spotted Sandpiper
and other birds

I am indebted to several people for help in this report. To Drs. Ameel and Creaser for identification and notes on mammals and reptiles of the area.

To Dr. Hungerford and Mr. Sailer for identification of the larvae of the Imperial Moth and Dryocampa rubicunda

To Dr. Gates for an opinion about the future of the Acer Rubrum trees in the area.

To Drs. Pettingill and Nelson for suggestions and direction.

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