

A STUDY OF THE BIRDS OF NORTH FISHTAIL BAY

by

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New York, N. Y.

A report of an original field study conducted
as a requirement for Advanced Ornithology (Zoology 119),
University of Michigan Biological Station.

Submitted August, 1941

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Introduction

An ornithological study of the area about which this paper is written had not been undertaken in any great detail until this summer. The students at the University of Michigan Biological Station have always found this an interesting place for birds--enough to warrant a more intensive investigation. The purpose of our study was threefold: to find out what birds inhabit the area, especially those nesting; to determine the approximate number of each species; and to collect data on unusual or interesting avian activity observed there.

The area studied covers about one-third of a square mile, located on the southeast shore of North Fishtail Bay, Douglas Lake, Cheboygan County, Michigan. (Figure 1.) The study was conducted from July 2 to August 8, during which time fourteen trips were made totaling forty-five hours spent in the territory.

We wish to thank Dr. Theodora Nelson for her many helpful suggestions and aid in connection with our work, and Dr. Olin Sewall Pettingill, Jr., for his criticism of this paper. We are indebted to Miss Ruth Gilreath, Dr. Nelson, Dr. Pettin-gill, and Wayne Porter for finding some of the nests whose data are included in this paper, and to William Brokaw for aiding us during the night field trip.

Location and Description of Region

Location

The area studied is bounded on the north and northwest by Douglas Lake and includes that part of the lake itself extending about 170 yards from shore. The main part of the western boundary is the road from the Biological Station to East Point, the eastern boundary is an old north-south base line, while the southern boundary may be designated as an imaginary line approximately 100 yards south of Wayne Porter's path. All studies were made within this area except those of the Indigo Bunting and Eastern Goshawk whose nests were found within a few yards of our boundary and are therefore included in this paper. (Figure 2.)

Description

The region may be divided into four parts: the Aquatic Association, the Cedar Bog Association, the Aspen Association, and the Swamp or Beach-pool Association. (Figure 3.) The divisions were made to show the difference in the distribution of birds in these four habitats since the environmental conditions were not the same in each locality.

The Aquatic Association includes the region along the lake shore back to the beginning of the woods, the width of the beach strip varying from a few feet to twenty yards, plus the portion of the lake inside the north and northwest boundary of the area.

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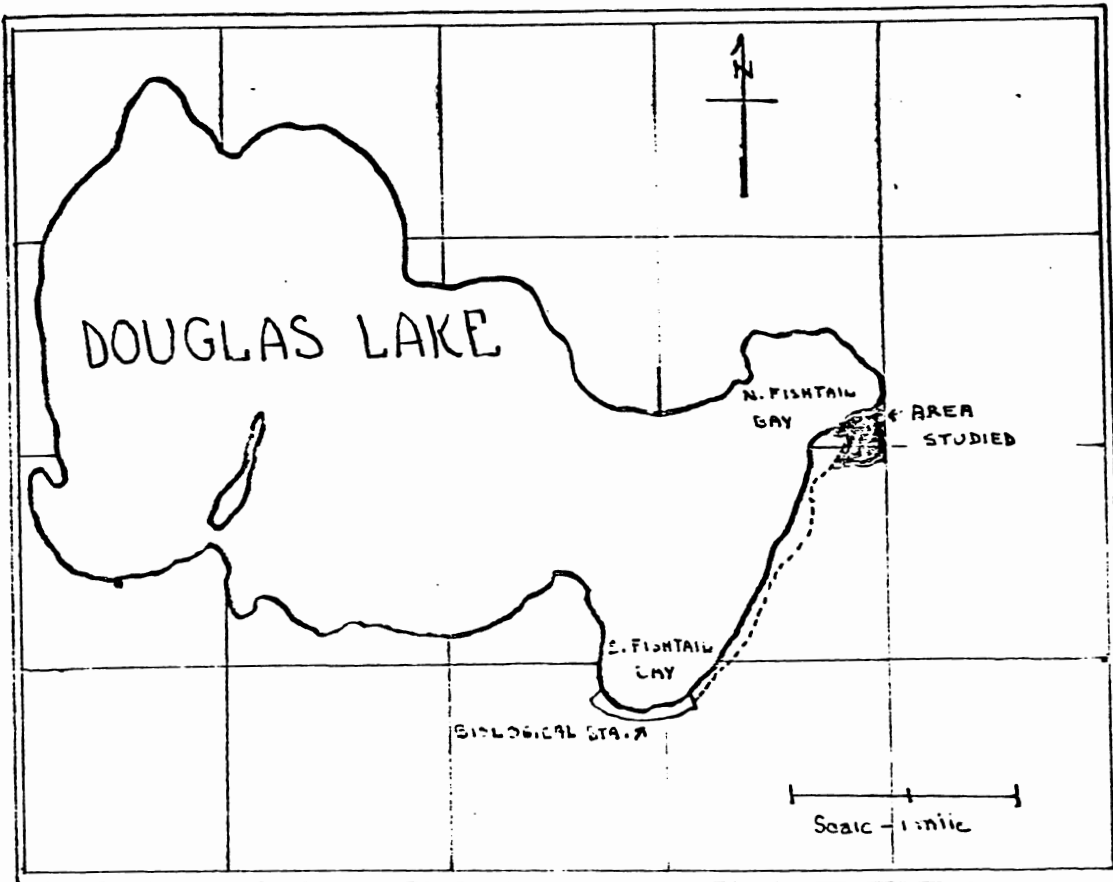


Fig. 1. Map of Douglas Lake to show location of the area studied.

(Thuja occidentalis), spruce (Picea mariana), white pine (Pinus strobis), beech (Fagus grandifolia), balsam (Abies balsamea), and hemlock (Tsuga canadensis).

The Aspen Association occupies a large portion of the southern part of our area. It is a type of vegetation which has replaced the coniferous woods flourishing there before the fire in 1901. The ground covering is mainly Pteris aquilina while the tree population consists largely of the trembling aspen (Populus tremuloides), large toothed aspen (Populus grandidentata), white birch (Betula alba), and the pin cherry, (Prunus pennsylvanica.) The boundaries between this association and the Cedar Bog Association is not well defined and often the aspens extend in patches far back into the Cedar Bog Association. A dense aggregate of aspens was found in one portion of the Cedar Bog and weaker growths along the back pools and old north-south base line. (Figure 3.)

The Swamp or Beach Pool Association is found in two places. The first is a well defined beach pool at East Point. This part usually has several inches of water but due to a dry season was merely very damp in 1941. The lowland thickets surrounding and interwoven in the beach pool is sometimes referred to as a separate association but is here included with the Beach Pool as this type of vegetation is quite sparse. The second place is in the middle of the cedar bog, an old beach pool somewhat drier than the first.

Methods Used in Study

Construction of Routes

To facilitate studying this area, which in spots was

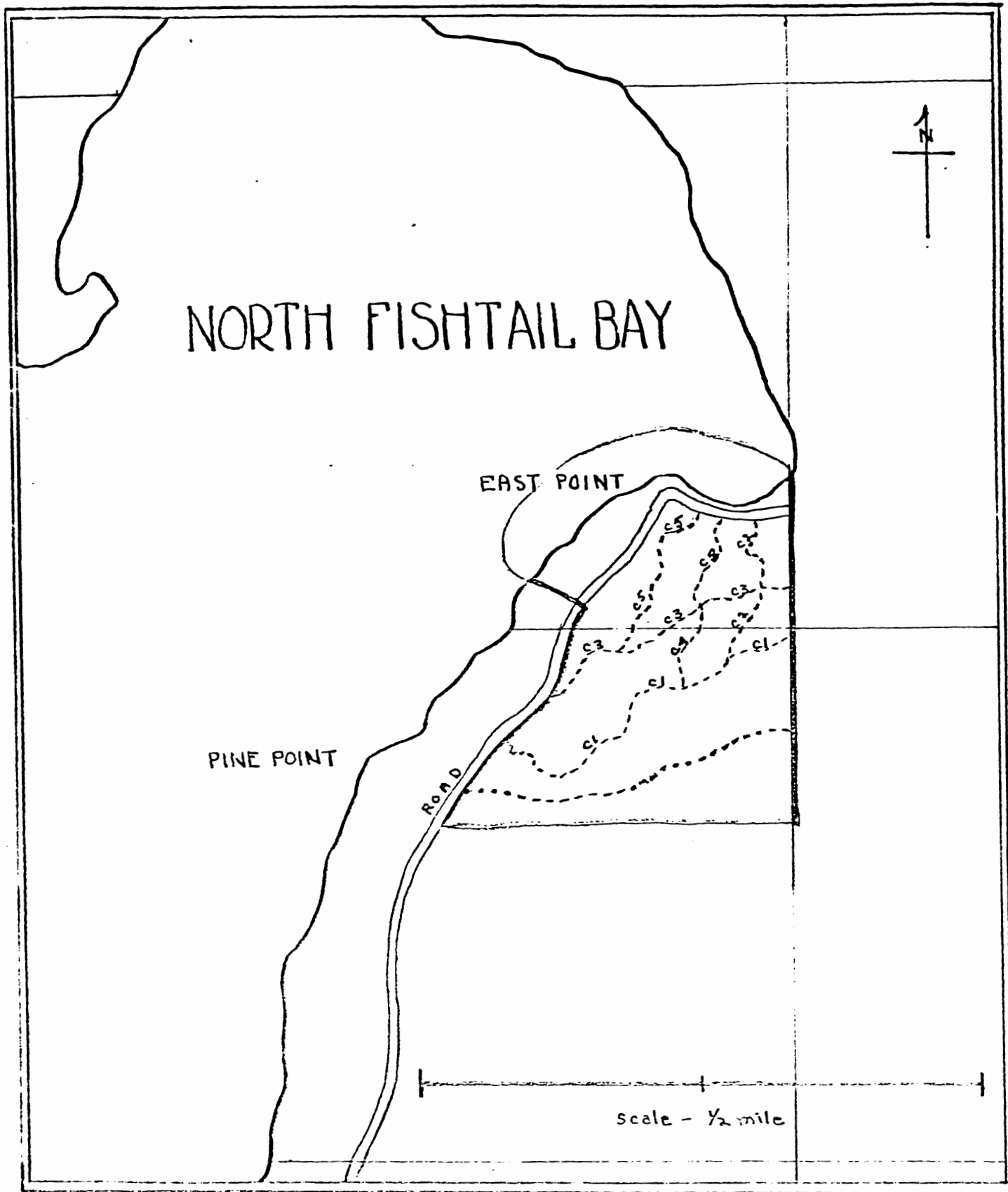


Fig. 2. Map of North Fishtail Bay showing area studied.

- Boundary of area
- Routes made by Demman and Clark
- Path made by Wayne Porter

so dense it was easy to lose one's bearings, we made rough paths --three running north and south and two east and west, forming a checkerboard pattern across our area. (Figure 2.) We called these paths Routes C1, C2, C3, C4, and C5--the C before the numbers to avoid confusion between our tags and the foresters' cards which were labeled 1, 2, 3, etc. About every fifteen feet, and in very dense parts every five feet, we tied a tag to a limb overhanging the path. The tags were about one inch square and had been dipped in yellow, red, and blue vinylite solutions.* The red tags were hung along routes C2 and C5, the blue along C4, the yellow along C3, and the plain white tags along C1. Wayne Porter's path ran through Aspen territory and, being well travelled, was easy to follow without having any markings. This method of tagging was found to be quite successful. The colored vinylite solutions gave a gloss to the tags which were easily seen from some distance. At night especially, they stood out conspicuously when a flashlight was shone on the paths. With this system we could quickly find our way in and out of the different parts of the area, the locations of nests could be placed quite accurately on maps, and by making certain digressions from the labelled paths we could be sure of covering every part of the area at least once. The making of these paths took up a great deal of time at the beginning of our study. However, once they were completed they were found to be of much value.

* The commercial name for the solution is Synflex Coating, a product of the Gorden-Lacey Chemical Products Co.

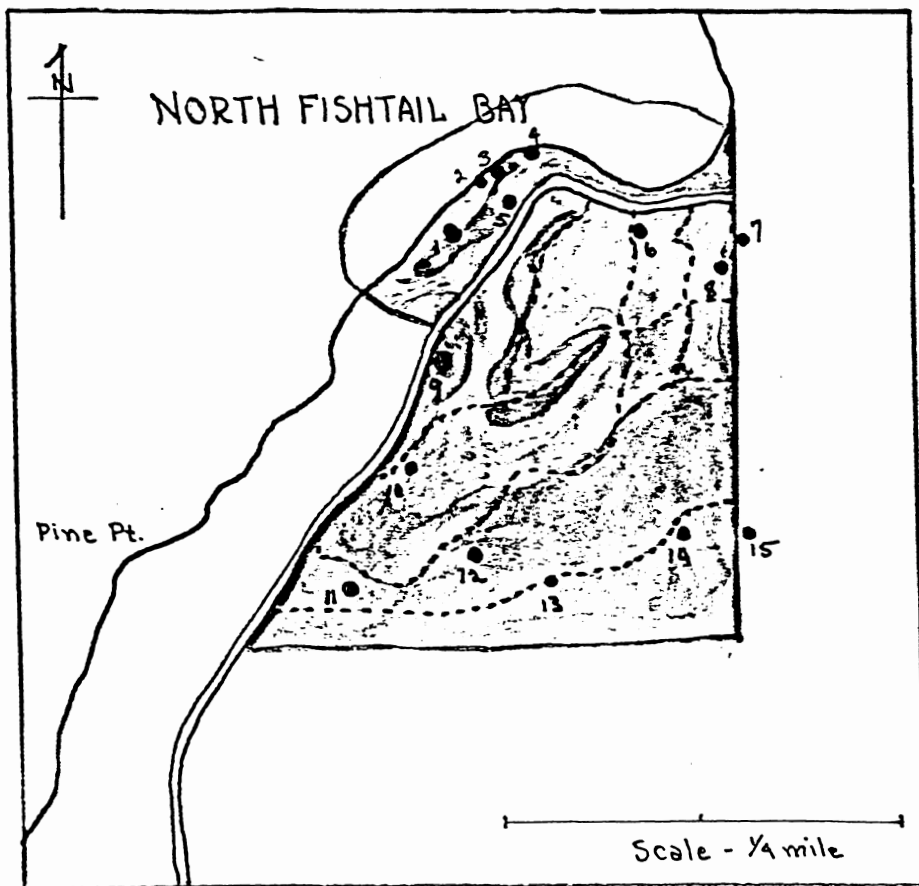





Fig. 3. Map of area studied showing the different types of plant associations and the location of the nests found there.

-  Cedar bog association
-  Aspen association
-  Beach pool association

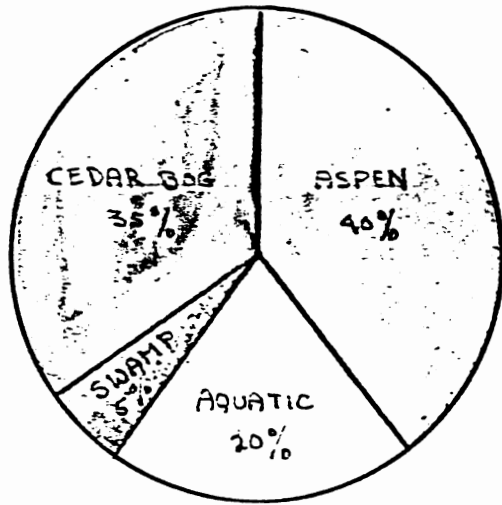
Nests

1. Mallard
2. Spotted Sandpiper
3. Spotted Sandpiper
4. Spotted Sandpiper
5. Wood Thrush
6. Blue Jay
7. Indigo Bunting
8. Rose-breasted Grosbeak
9. Hairy Woodpecker
10. Pewee
11. Black and White Warbler
12. Red-eyed Towhee
13. Oven-bird
14. Goshawk
15. Goshawk

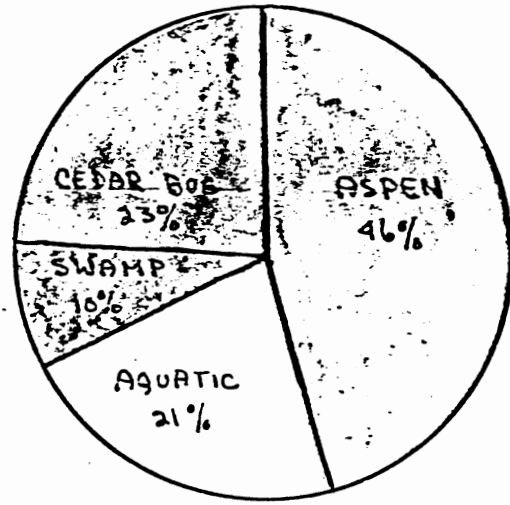
Conduction of Field Trips

Most of the trips to the area were taken in the mornings from 7:00 to 11:00. Bird activity before that time was very slight except during the first two weeks. We usually separated, taking different routes in order to cover the whole territory each time. On July 16 we made one afternoon field trip from 1:30 to 4:30. There was little activity although this may have been due to a high wind (20 m.p.h.)

We stayed overnight August 7th. Our tent was pitched about twelve yards in from the road at East Point in the Cedar Bog Association. We started recording bird activity from 8:30 p.m. The last Robin was heard singing at this time from deeper in the cedar bog while two Nighthawks flew overhead. In the next ten minutes three Whip-poor-wills were heard which kept singing at intervals until 2:15 a.m. At 10:30, William Brokaw, who accompanied us on this trip, flushed a Woodcock along the shore at East Point. From 11:00 p.m. to 12:30 a.m., we went through the wooded parts of our area but did not find any bird activity except occasional Whip-poor-wills and Nighthawks. Between 12:40 and 12:45 we found Killdeer and Spotted Sandpipers active on East Point. This was probably due to the bright full moon which increases nocturnal activity among shore birds.



A



B

Fig. 4. Diagram for the comparison of the % of the area covered by the four associations and the % of species of birds found in each.
 A - Approximate % of the area covered by each of the four associations.
 B - % of species in each association. Number of species in each association totaled together represents 100%. This total exceeds the total number of species for the area as a whole as some species were found in more than one association.

Ecological Associations of Birds

The Aquatic Association included those birds that feed along the lake shore and the non-aquatic birds that feed over the water. The birds found were: The Ring-billed Gull, Herring Gull, Common Tern, Caspian Tern, Belted Kingfisher, Great Blue Heron, and American Merganser (female only). The birds along the lake shore were: The Spotted Sandpiper, Killdeer, Woodcock, Purple Martin, and Bank Swallow. A Bald Eagle was also seen flying along the lake shore.

The Beach Pool or Swamp Association included many birds frequently found in other ecological divisions and therefore not limited to this habitat. Those representing this association were: The Cedar Waxwing, Song Sparrow, Northern Yellowthroat, Catbird, Mallard, Chickadee, and Kingbird.

The Aspen Association, which included a great area of our survey, was plentiful with individual birds, although not with species. Birds characteristic were: Cedar Waxwing, Black-capped Chickadee, Flicker, Oven-bird, Rose-breasted Grosbeak, American Redstart, Phoebe, Wood Pewee, Goshawk, Black-billed Cuckoo, Red-eyed Towhee, Scarlet Tanager, Red-eyed Vireo, Indigo Bunting, Hairy Woodpecker, Nighthawk, Blue Jay, Crested Flycatcher, Downy Woodpecker, Eastern Kingbird, Robin, Baltimore Oriole, Brown Thrasher, Least Flycatcher, White-throated Sparrow, Crow, Whip-poor-will, Northern Yellowthroat, and Black and White Warbler.

The Cedar Bog Association presented some difficulty because of the dense growth of plant vegetation and quickness of

the birds to hide themselves, but nevertheless there were large numbers of birds found there. Again, the abundance was with individual birds, not species. The birds seen were: The Black-capped Chickadee, Wood Thrush, Black-throated Green Warbler, Black-throated Blue Warbler, Black and White Warbler, Winter Wren, Canada Warbler, American Redstart, Parula Warbler (?), White-breasted Nuthatch, Ruffed Grouse, Rose-breasted Grosbeak, Hermit Thrush, Oven-bird, and Flicker.

List of Species

1. Great Blue Heron. Ardea herodias. It was seen once on lake shore, July 23.

2. Mallard. Anas platyrhynchos. This bird was found nesting in a beach pool near lake shore (Figure 3 Nest 1). on June 6 by Wayne Porter. There were nine eggs but only two hatched.

3. American Merganser. Mergus americanus. The one bird observed was a female first seen on July 23. It was also seen swimming around the lake at 9:00 P.M., August 7.

4. Goshawk. Astur atricapillus. Last year's nesting Goshawks were a Station record. Goshawks returned again this year and Wayne Porter who with Harry Wilcox had found and observed the first nest, discovered two other nests on June 23. Nest 15 (Figure 3) was occupied but Nest 14 (Figure 3) was empty when found and therefore it is uncertain whether it had been previously used. The birds were recorded in the area until July 12.

5. Bald Eagle. Haliaeetus leuc^ocerhalus. One was seen flying over lake shore on July 20.

6. Ruffed Grouse. Bonasa umbellus. One adult and three young were seen on July 2. Groups of four and five adults, however, were flushed several times in various sections of the area.

7. Killdeer. Oxyechus vociferus. These birds were observed to be quite active on the bright moonlight night of August 7.

8. Woodcock. Philohela minor. William Brokaw flushed a bird at 10:15 P.M. on August 7 but was unable to determine whether it was a Wilson's Snipe or a Woodcock. The lack of records of Snipes found in this area would increase the possibility of its being a Woodcock. Also a whistling was heard as the bird flew off, confirming the identity of the Woodcock.

9. Spotted Sandpiper. Actitus macularia. Three nests were found on the lake shore (Figure 3 Nest 2, 3 and 4). Nest 2 and 3 were found on June 6 and 7 by Ruth Gilreath. Both contained four eggs - Nest 2 hatching after 21 days incubation and Nest 3 hatching 11 days after it was discovered. Nest 4 was found by Dr. Theodora Nelson on June 21, and also had four eggs.

10. Herring Gull. Larus argentatus. Surprisingly few of these birds were observed ; July 31 and August 3 being the only two days that they were listed.

11. Ring-billed Gull. Larus delawarensis. This species was found in large numbers in the vicinity of East Point. The group usually included a few Herring Gulls.

12. Common Tern. Sterna hirundo. Eight of this species were recorded on our personal check list and then only

in small numbers.

13. Caspian Tern. Sterna caspia. Caspian terns were also few in number, although seen more frequently than the Common Tern.

14. Black-billed Cuckoo. Coceyzus erythrophthalmus. It was heard more than it was seen and found nesting several hundred yards south of our territory. Observations on the Cuckoos were made by Ruth Spencer.

15. Whip-poor-will. Antrostomus vociferus. This bird was not recorded on our list until the night of August 7. Barrows, 1912, page 374, states that the Whip-poor-will "sings" until the young are well grown. Bicknell, however, says that the note is seldom heard after the middle of the year (last of June), although it is well known to sing in the Autumn. Accordingly it was quite late to hear Whip-poor-wills.

16. Nighthawk. Chordeiles minor. It was seen flying overhead July 9 and again observed the night of August 7.

17. Belted Kingfisher. Megaceryle alcyon. One bird flew over East Point on July 10 and again July 31.

18. Flicker. Colaptes auratus. It was quite common in both Aspen and Cedar Bog Associations.

19. Hairy Woodpecker. Dryobates villosus. Observed mostly in Aspens combined with some hardwood. A freshly-made hole was found in a dead birch on July 23. The Woodpecker constantly flew back to the spot and acted so nervous that we concluded that the hole must have been a nest. It was impossible to climb up the tree and see if anything was in the nest.

20. Downy Woodpecker. Dryobates pubescens. It was also seen mainly in Aspen Association.

21. Eastern Kingbird. Tyrannus tyrannus. The bird was not as common in our area as might be expected. It was observed only two days, July 23 and 26, in Aspen and Beach Pool Associations.

22. Crested Flycatcher. Myiarchus crinitus. Crested Flycatchers were seen frequently in Aspen Associations. They were not common but a fairly good number of them were observed.

23. Phoebe. Sayornis phoebe. Phoebe was never seen but heard July 2 in the aspens.

24. Wood Pewee. Myiochanes virens. Although rarely seen, it was heard often. Singing birds, however, were recorded as only one individual because the actual number could not be asserted^{guaranteed}.

25. Least Flycatcher. Empidonax minimus. Two birds were observed on July 31. They were more common farther south of the area.

26. Bank Swallow. Riparia riparia. Two species were reported on July 31.

27. Purple Martin. Pogon subis. Purple Martins were nesting at South Fishtail Bay but only one was recorded on July 16 at North Fishtail.

28. Blue Jay. Cyanocitta cristata. Blue Jays were common in the aspens but one or two species strayed over to the edge of the Cedar Bog. We found a nest 10 feet up in balsam (Abies balsamea) unoccupied but with part of a dead adult Blue

Jay underneath the nest. The bird was probably attacked by the Goshawks in the area.

29. Crow. Corvus brachyrhynchos. Crows were not as common as might be expected in this area. A few were heard but only two were seen on July 31.

30. Black-capped Chickadee. Penthestes atricapillus. This was the most abundant bird in the territory, observed practically every day and widely distributed in the Aspens, Cedar Bogs, and Beach Pool Associations.

31. White-breasted Nuthatch. Sitta carolinensis. A seemingly rare bird, it was observed once, on July 23.

32. Winter Wren. Nannus hiemalis. The Winter Wren was heard almost every day but only seen twice. The bird which was observed on July 23 acted quite nervous and gave several scolding notes. We were, however, unable to find any evidence of a nest. The last nest recorded near this area was on July 15, 1915 by Norman A. Wood. While searching for the nest we realized that the territory of the Winter Wren was exceedingly large - one bird started singing at the intersection of C1 and C4 and at the finish of the chase was singing at the opposite end of C4 by the Shore Road. (Figure 2 for Routes C1 and C4 and Shore Road). Roberts, 1932, page 94, mentions that the Winter Wren is elusive and jumps from one neighboring plant or tree to another but there isn't any statement of its having a large territory.

33. Baltimore Oriole. Isterus galbula. One individual was seen on July 23. They are quite common around South

Fishtail Bay but rarely seen past Pine Point.

34. Robin. Turdus migratorius. Four of the species were observed in the actual territory but many were flying along the main road.

35. Wood Thrush. Hylocichla mustelina. This bird was found nesting in the cedar bogs (Figure 3 Nest 5) by Dr. O. S. Pettingill, Jr. on July 2. The nest was in a balsam (Abies balsamea) eight feet from the ground and constructed of twigs and grasses and the lining of mud rather than the usual fine rootlets. The mud is invariably an inner shell, or lining upon which an incomplete lining of rootlets is laid. The measurements of the nest were 80mm. outside diameter, 69mm. smallest inside diameter, and 60mm. depth.

36. Hermit Thrush. Hylocichla guttata. A single bird was heard the whole summer and this one on July 2. This species was also noticed to be rare by Oscar Root, 1941.

37. Cedar Waxwing. Bombicilla cedrorum. It was found mostly in the Beach Pool Associations, although occasionally seen in the aspens.

38. Red-eyed Vireo. Vireo olivacea. The bird was heard singing in the aspens frequently.

39. Black and White Warbler. Mniotilta varia. It was the second most abundant bird in the area. We discovered a nest July 9, at the base of a sapling (Figure 3 Nest 11). The nest was covered with fresh leaves to make it as inconspicuous as possible. It was so well hidden that when searching for the nest it escaped our vision. A young garter snake

(Thamnophis sirtalis) found the nest before we did and apparently ate one nestling. The snake had a lump in its body which had not been present when first noticed. We realized that the nest must be located at the spot where the snake had come from and discovered the nest with only one young but a warm depression where another must have lain. Upon returning one hour later, the nest was empty - the snake probably returned for more food. The nest was made of bark and dead leaves lined with grass and rootlets. The measurements were 68mm. outer diameter, 57mm. largest inside diameter, and depth 43mm. The one nestling measured 20mm. wide and 48mm. long, which was quite large for a Warbler, but could have been a young Cowbird.

40. Parula Warbler (?). Compothlypis americanus. The one bird seen was a juvenal, as it fitted the description of a Parula without the coloration on the back. Since a Parula had been reported last year by Dr. O. S. Pettingill, Jr., it is perfectly possible that it might have been one.

41. Black-throated Blue Warbler. Dendroica caerulescens. Two specimens were seen on July 31, which date was the first time these birds were observed. Since it was late in the season, there is a possibility that they were migrants.

42. Black-throated Green Warbler. Dendroica virens. It was seen frequently in the Cedar Bog Association.

43. Oven-bird. Seiurus aurocapillus. This bird was very common in the both Aspens and Cedar Bogs. A nest was discovered by Wayne Porter on July 6, (Figure 3 Nest 13) which contained four eggs.

44. Northern Yellowthroat. Geothlypus trichas.

Three were seen in the Beach Pool Association and one in the thickets bordering the Aspens.

45. Canada Warbler. Wilsonia canadensis. It was observed on July 20 and 23 in two different sections of the area.

46. American Redstart. Setophaga ruticilla. This bird was of another common species found in both Aspens and Cedar Bogs.

47. Brown Thrasher. Toxostoma rufum. This was a rare bird at North Fishtail Bay, seen once on July 23.

48. Catbird. Dumetella carolinensis. It was not as abundant as expected; found in Beach Pool Association.

49. Scarlet Tanager. Piranga erythromelas. The Scarlet Tanager was seen frequently at edge of Aspen and sometimes wandering into the Cedar Bogs. Both males and females were observed but we were unable to find any nesting birds.

50. Rose-breasted Grosbeak. Hedymeles ludoviciana. This bird was found in both Aspens and Cedar Bog Associations. A nest was discovered by Ruth Gilreath on June 23 with three young (Figure 3 Nest 8). The birds soon left the nest because of human interference.

51. Indigo Bunting. Passerina cyanea. A nesting bird was located in the raspberry bushes (Rubus ideaus) (Figure 3 Nest 7) on June 23 by Ruth Gilreath. There were four eggs - one did not hatch, one young disappeared, one young was found dead, in the nest, and one egg hatched. It is uncertain what happened to the surviving nestling as the young was gone and the bottom of the nest torn out. The nest consisted of grasses and dead

leaves lined with rootlets and slender grasses. These were the only birds reported in the area.

52. Red-eyed Towhee. Pipilo erythrophthalmus. This bird was found nesting in Aspens Associations (Figure 3 Nest 12) on June 7, by Wayne Porter. The nest contained eggs.

53. White-throated Sparrow. Zonotrichia albicollis. One specimen was observed on July 31 and because of the late date believed to be a possible migrant.

54. Song Sparrow. Melospiza melodia. This bird was frequently found near the Beach Pool.

Role of Environment in Relation to Number of Birds Observed.

Temperature, humidity, and velocity of the wind all play a large part in the life of the bird, affecting not only its singing but the rest of its activities of the day.

Temperature seems to affect the activity of the birds as too hot or too cold weather made bird life quite passive. Figures 5 and 6 show the effect of temperature on the birds' activity. At 80° and 91° they were abundant but above 91° the number started decreasing. Apparently the birds became more quiet as the temperature rose. 94° was the hottest field trip so the graph would be unable to include a further decrease if there was one. 91° would seem to be too warm for much activity, but instead, one of our best check lists of the whole area was obtained that day. 80° seems to be a perfect temperature for observing many birds and it worked accordingly on the graph.

Rain is another factor that tends to keep the check

list low; due not only to the inactivity of the birds, but also to poor vision because of the precipitation. All our field trips were conducted on clear or slightly overcast days as there was a dry season the summer of 1941. Therefore our graphs do not show the numbers of birds on rainy days.

A windy day also appears to affect the number of birds observed. Song will be carried away with the wind and birds will be difficult to see because of moving foliage. On Figures 5 and 6, point 2 indicates the few birds that were observed the day of a strong wind. Besides the increased wind velocity, the temperature had dropped considerably, with a corresponding effect on the activity of birds.

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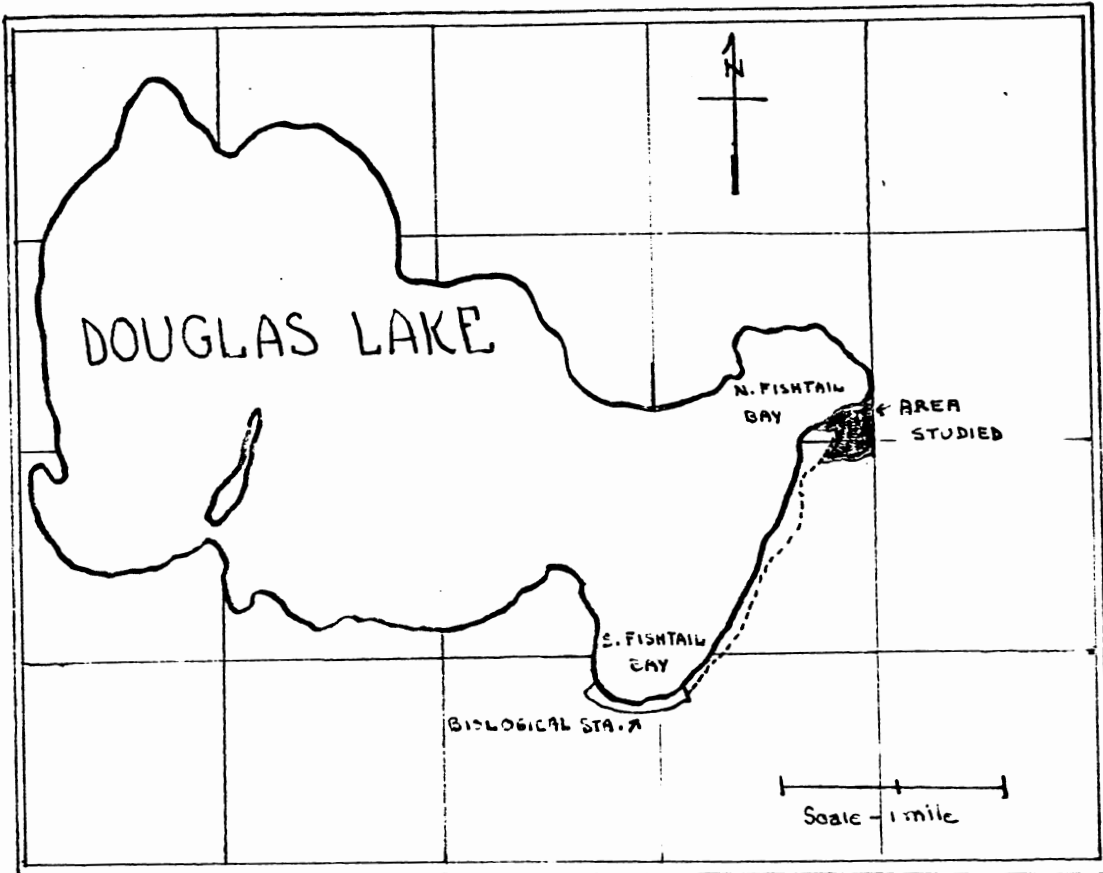


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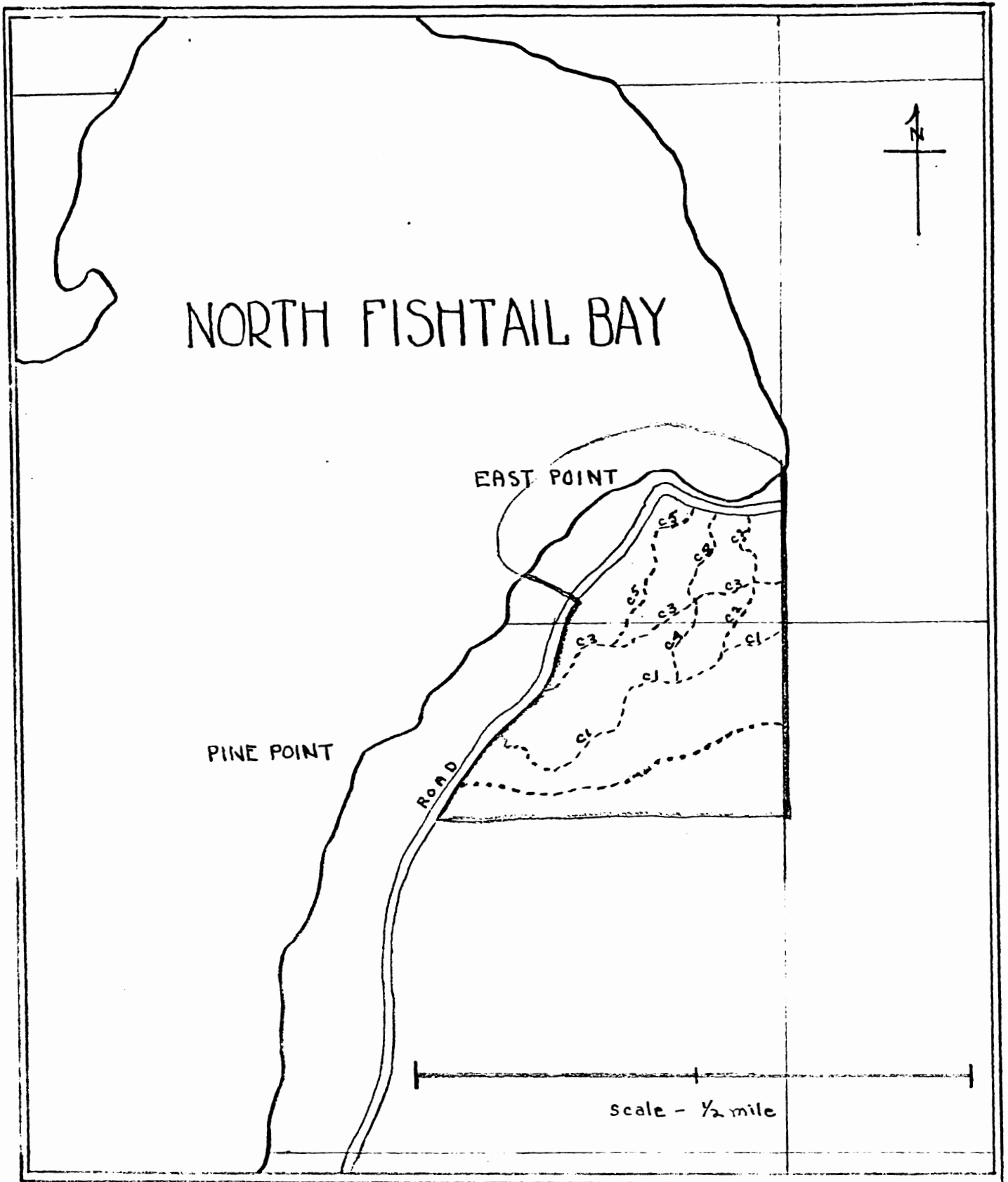


Fig. 2. Map of North Fishtail Bay showing area studied.

- Boundary of area
- Routes made by Demman and Clark
- Path made by Wayne Porter

so dense it was easy to lose one's bearings, we made rough paths --three running north and south and two east and west, forming a checkerboard pattern across our area. (Figure 2.) We called these paths Routes C1, C2, C3, C4, and C5--the C before the numbers to avoid confusion between our tags and the foresters' cards which were labeled 1, 2, 3, etc. About every fifteen feet, and in very dense parts every five feet, we tied a tag to a limb overhanging the path. The tags were about one inch square and had been dipped in yellow, red, and blue vinylite solutions.* The red tags were hung along routes C2 and C5, the blue along C4, the yellow along C3, and the plain white tags along C1. Wayne Porter's path ran through Aspen territory and, being well travelled, was easy to follow without having any markings. This method of tagging was found to be quite successful. The colored vinylite solutions gave a gloss to the tags which were easily seen from some distance. At night especially, they stood out conspicuously when a flashlight was shone on the paths. With this system we could quickly find our way in and out of the different parts of the area, the locations of nests could be placed quite accurately on maps, and by making certain digressions from the labelled paths we could be sure of covering every part of the area at least once. The making of these paths took up a great deal of time at the beginning of our study. However, once they were completed they were found to be of much value.

* The commercial name for the solution is Synflex Coating, a product of the Gorden-Lacey Chemical Products Co.

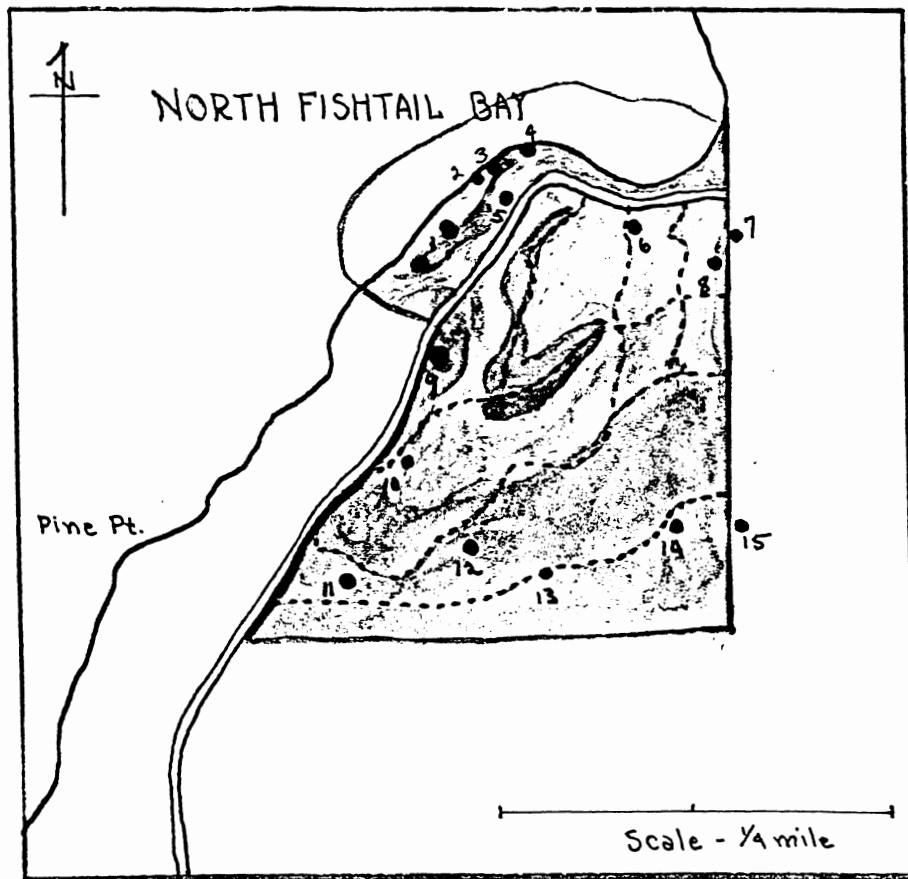





Fig. 3. Map of area studied showing the different types of plant associations and the location of the nests found there.

-  Cedar bog association
-  Aspen association
-  Beach pool association

Nests

1. Mallard
2. Spotted Sandpiper
3. Spotted Sandpiper
4. Spotted Sandpiper
5. Wood Thrush
6. Blue Jay
7. Indigo Bunting
8. Rose-breasted Grosbeak
9. Hairy Woodpecker
10. Pewee
11. Black and White Warbler
12. Red-eyed Towhee
13. Oven-bird
14. Goshawk
15. Goshawk

Conduction of Field Trips

Most of the trips to the area were taken in the mornings from 7:00 to 11:00. Bird activity before that time was very slight except during the first two weeks. We usually separated, taking different routes in order to cover the whole territory each time. On July 16 we made one afternoon field trip from 1:30 to 4:30. There was little activity although this may have been due to a high wind (20 m.p.h.)

We stayed overnight August 7th. Our tent was pitched about twelve yards in from the road at East Point in the Cedar Bog Association. We started recording bird activity from 8:30 p.m. The last Robin was heard singing at this time from deeper in the cedar bog while two Nighthawks flew overhead. In the next ten minutes three Whip-poor-wills were heard which kept singing at intervals until 2:15 a.m. At 10:30, William Brokaw, who accompanied us on this trip, flushed a Woodcock along the shore at East Point. From 11:00 p.m. to 12:30 a.m., we went through the wooded parts of our area but did not find any bird activity except occasional Whip-poor-wills and Nighthawks. Between 12:40 and 12:45 we found Killdeer and Spotted Sandpipers active on East Point. This was probably due to the bright full moon which increases nocturnal activity among shore birds.

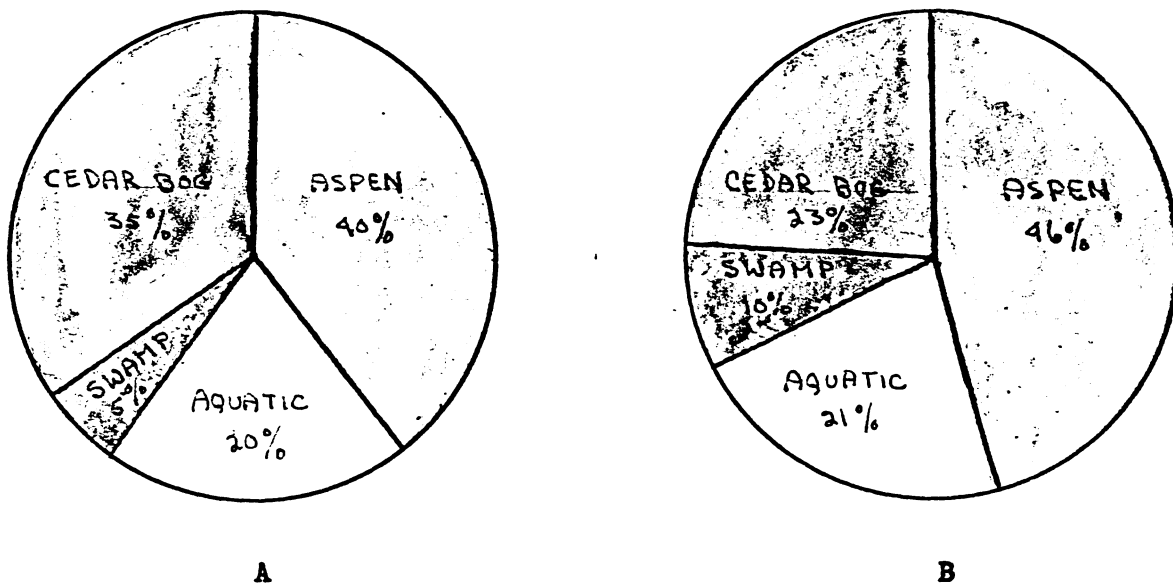


Fig. 4. Diagram for the comparison of the % of the area covered by the four associations and the % of species of birds found in each. A - Approximate % of the area covered by each of the four associations. B - % of species in each association. Number of species in each association totaled together represents 100%. This total exceeds the total number of species for the area as a whole as some species were found in more than one association.

Ecological Associations of Birds

The Aquatic Association included those birds that feed along the lake shore and the non-aquatic birds that feed over the water. The birds found were: The Ring-billed Gull, Herring Gull, Common Tern, Caspian Tern, Belted Kingfisher, Great Blue Heron, and American Merganser (female only). The birds along the lake shore were: The Spotted Sandpiper, Killdeer, Woodcock, Purple Martin, and Bank Swallow. A Bald Eagle was also seen flying along the lake shore.

The Beach Pool or Swamp Association included many birds frequently found in other ecological divisions and therefore not limited to this habitat. Those representing this association were: The Cedar Waxwing, Song Sparrow, Northern Yellowthroat, Catbird, Mallard, Chickadee, and Kingbird.

The Aspen Association, which included a great area of our survey, was plentiful with individual birds, although not with species. Birds characteristic were: Cedar Waxwing, Black-capped Chickadee, Flicker, Oven-bird, Rose-breasted Grosbeak, American Redstart, Phoebe, Wood Pewee, Goshawk, Black-billed Cuckoo, Red-eyed Towhee, Scarlet Tanager, Red-eyed Vireo, Indigo Bunting, Hairy Woodpecker, Nighthawk, Blue Jay, Crested Flycatcher, Downy Woodpecker, Eastern Kingbird, Robin, Baltimore Oriole, Brown Thrasher, Least Flycatcher, White-throated Sparrow, Crow, Whip-poor-will, Northern Yellowthroat, and Black and White Warbler.

The Cedar Bog Association presented some difficulty because of the dense growth of plant vegetation and quickness of

the birds to hide themselves, but nevertheless there were large numbers of birds found there. Again, the abundance was with individual birds, not species. The birds seen were: The Black-capped Chickadee, Wood Thrush, Black-throated Green Warbler, Black-throated Blue Warbler, Black and White Warbler, Winter Wren, Canada Warbler, American Redstart, Parula Warbler (?), White-breasted Nuthatch, Ruffed Grouse, Rose-breasted Grosbeak, Hermit Thrush, Oven-bird, and Flicker.

List of Species

1. Great Blue Heron. Ardea herodias. It was seen once on lake shore, July 23.

2. Mallard. Anas platyrhynchos. This bird was found nesting in a beach pool near lake shore (Figure 3 Nest 1). on June 6 by WAYNE PORTER. There were nine eggs but only two hatched.

3. American Merganser. Mergus americanus. The one bird observed was a female first seen on July 23. It was also seen swimming around the lake at 9:00 P.M., August 7.

4. Goshawk. Astur atricapillus. Last year's nesting Goshawks were a Station record. Goshawks returned again this year and Wayne Porter who with Harry Wilcox had found and observed the first nest, discovered two other nests on June 23. Nest 15 (Figure 3) was occupied but Nest 14 (Figure 3) was empty when found and therefore it is uncertain whether it had been previously used. The birds were recorded in the area until July 12.

5. Bald Eagle. Haliaeetus leucocephalus. One was seen flying over lake shore on July 20.

6. Ruffed Grouse. Bonasa umbellus. One adult and three young were seen on July 2. Groups of four and five adults, however, were flushed several times in various sections of the area.

7. Killdeer. Oxyechus vociferus. These birds were observed to be quite active on the bright moonlight night of August 7.

8. Woodcock. Philohela minor. William Brokaw flushed a bird at 10:15 P.M. on August 7 but was unable to determine whether it was a Wilson's Snipe or a Woodcock. The lack of records of Snipes found in this area would increase the possibility of its being a Woodcock. Also a whistling was heard as the bird flew off, confirming the identity of the Woodcock.

9. Spotted Sandpiper. Actitus macularia. Three nests were found on the lake shore (Figure 3 Nest 2, 3 and 4). Nest 2 and 3 were found on June 6 and 7 by Ruth Gilreath. Both contained four eggs - Nest 2 hatching after 21 days incubation and Nest 3 hatching 11 days after it was discovered. Nest 4 was found by Dr. Theodora Nelson on June 21, and also had four eggs.

10. Herring Gull. Larus argentatus. Surprisingly few of these birds were observed ; July 31 and August 3 being the only two days that they were listed.

11. Ring-billed Gull. Larus delawarensis. This species was found in large numbers in the vicinity of East Point. The group usually included a few Herring Gulls.

12. Common Tern. Sterna hirundo. Eight of this species were recorded on our personal check list and then only

in small numbers.

13. Caspian Tern. Sterna caspia. Caspian terns were also few in number, although seen more frequently than the Common Tern.

14. Black-billed Cuckoo. Coceyzus erythrophthalmus. It was heard more than it was seen and found nesting several hundred yards south of our territory. Observations on the Cuckoos were made by Ruth Spencer.

15. Whip-poor-will. Antrostomus vociferus. This bird was not recorded on our list until the night of August 7. Barrows, 1912, page 374, states that the Whip-poor-will "sings" until the young are well grown. Bicknell, however, says that the note is seldom heard after the middle of the year (last of June), although it is well known to sing in the Autumn. Accordingly it was quite late to hear Whip-poor-wills.

16. Nighthawk. Chordeiles minor. It was seen flying overhead July 9 and again observed the night of August 7.

17. Belted Kingfisher. Megaceryle alcyon. One bird flew over East Point on July 10 and again July 31.

18. Flicker. Colaptes auratus. It was quite common in both Aspen and Cedar Bog Associations.

19. Hairy Woodpecker. Dryobates villosus. Observed mostly in Aspens combined with some hardwood. A freshly-made hole was found in a dead birch on July 23. The Woodpecker constantly flew back to the spot and acted so nervous that we concluded that the hole must have been a nest. It was impossible to climb up the tree and see if anything was in the nest.

20. Downy Woodpecker. Dryobates pubescens. It was also seen mainly in Aspen Association.

21. Eastern Kingbird. Tyrannus tyrannus. The bird was not as common in our area as might be expected. It was observed only two days, July 23 and 26, in Aspen and Beach Pool Associations.

22. Crested Flycatcher. Myiarchus crinitus. Crested Flycatchers were seen frequently in Aspen Associations. They were not common but a fairly good number of them were observed.

23. Phoebe. Sayornis phoebe. Phoebe was never seen but heard July 2 in the aspens.

24. Wood Pewee. Myiochanes virens. Although rarely seen, it was heard often. Singing birds, however, were recorded as only one individual because the actual number could not be asserted.^{signed}

25. Least Flycatcher. Empidonax minimus. Two birds were observed on July 31. They were more common farther south of the area.

26. Bank Swallow. Riparia riparia. Two species were reported on July 31.

27. Purple Martin. Pogone subis. Purple Martins were nesting at South Fishtail Bay but only one was recorded on July 16 at North Fishtail.

28. Blue Jay. Cyanocitta cristata. Blue Jays were common in the aspens but one or two species strayed over to the edge of the Cedar Bog. We found a nest 10 feet up in balsam (Abies balsamea) unoccupied but with part of a dead adult Blue

Jay underneath the nest. The bird was probably attacked by the Goshawks in the area.

29. Crow. Corvus brachyrhynchos. Crows were not as so common as might be expected in this area. A few were heard but only two were seen on July 31.

30. Black-capped Chickadee. Penthestes atricapillus. This was the most abundant bird in the territory, observed practically every day and widely distributed in the Aspens, Cedar Bogs, and Beach Pool Associations.

31. White-breasted Nuthatch. Sitta carolinensis. A seemingly rare bird, it was observed once, on July 23.

32. Winter Wren. Nannus hiemalis. The Winter Wren was heard almost every day but only seen twice. The bird which was observed on July 23 acted quite nervous and gave several scolding notes. We were, however, unable to find any evidence of a nest. The last nest recorded near this area was on July 15, 1915 by Norman A. Wood. While searching for the nest we realized that the territory of the Winter Wren was exceedingly large - one bird started singing at the intersection of C1 and C4 and at the finish of the chase was singing at the opposite end of C4 by the Shore Road. (Figure 2 for Routes C1 and C4 and Shore Road). Roberts, 1932, page 94, mentions that the Winter Wren is elusive and jumps from one neighboring plant or tree to another but there isn't any statement of its having a large territory.

33. Baltimore Oriole. Isterus galbula. One individual was seen on July 23. They are quite common around South

Fishtail Bay but rarely seen past Pine Point.

34. Robin. Turdus migratorius. Four of the species were observed in the actual territory but many were flying along the main road.

35. Wood Thrush. Hylocichla mustelina. This bird was found nesting in the cedar bogs (Figure 3 Nest 5) by Dr. O. S. Pettingill, Jr. on July 2. The nest was in a balsam (Abies balsamea) eight feet from the ground and constructed of twigs and grasses and the lining of mud rather than the usual fine rootlets. The mud is invariably an inner shell, or lining upon which an incomplete lining of rootlets is laid. The measurements of the nest were 80mm. outside diameter, 69mm. smallest inside diameter, and 60mm. depth.

36. Hermit Thrush. Hylocichla guttata. A single bird was heard the whole summer and this one on July 2. This species was also noticed to be rare by Oscar Root, 1941.

37. Cedar Waxwing. Bombcilla cedrorum. It was found mostly in the Beach Pool Associations, although occasionally seen in the aspens.

38. Red-eyed Vireo. Vireo olivacea. The bird was heard singing in the aspens frequently.

39. Black and White Warbler. Mniotilta varia. It was the second most abundant bird in the area. We discovered a nest July 9, at the base of a sapling (Figure 3 Nest 11). The nest was covered with fresh leaves to make it as inconspicuous as possible. It was so well hidden that when searching for the nest it escaped our vision. A young garter snake

(Thamnophis sirtalis) found the nest before we did and apparently ate one nestling. The snake had a lump in its body which had not been present when first noticed. We realized that the nest must be located at the spot where the snake had come from and discovered the nest with only one young but a warm depression where another must have lain. Upon returning one hour later, the nest was empty - the snake probably returned for more food. The nest was made of bark and dead leaves lined with grass and rootlets. The measurements were 68mm. outer diameter, 57mm. largest inside diameter, and depth 43mm. The one nestling measured 20mm. wide and 48mm. long, which was quite large for a Warbler, but could have been a young Cowbird.

40. Parula Warbler (?). Compsothlypis americanus. The one bird seen was a juvenal, as it fitted the description of a Parula without the coloration on the back. Since a Parula had been reported last year by Dr. O. S. Pettingill, Jr., it is perfectly possible that it might have been one.

41. Black-throated Blue Warbler. Dendroica caerulescens. Two specimens were seen on July 31, which date was the first time these birds were observed. Since it was late in the season, there is a possibility that they were migrants.

42. Black-throated Green Warbler. Dendroica virens. It was seen frequently in the Cedar Bog Association.

43. Oven-bird. Seiurus aurocapillus. This bird was very common in the both Aspens and Cedar Bogs. A nest was discovered by Wayne Porter on July 6, (Figure 3 Nest 13) which contained four eggs.

44. Northern Yellowthroat. Geothlypus trichas.

Three were seen in the Beach Pool Association and one in the thickets bordering the Aspens.

45. Canada Warbler. Wilsonia canadensis. It was observed on July 20 and 23 in two different sections of the area.

46. American Redstart. Setophaga ruticilla. This bird was of another common species found in both Aspens and Cedar Bogs.

47. Brown Thrasher. Toxostoma rufum. This was a rare bird at North Fishtail Bay, seen once on July 23.

48. Catbird. Dumetella carolinensis. It was not as abundant as expected; found in Beach Pool Association.

49. Scarlet Tanager. Piranga erythromelas. The Scarlet Tanager was seen frequently at edge of Aspen and sometimes wandering into the Cedar Bogs. Both males and females were observed but we were unable to find any nesting birds.

50. Rose-breasted Grosbeak. Hedymeles ludoviciana. This bird was found in both Aspens and Cedar Bog Associations. A nest was discovered by Ruth Gilreath on June 23 with three young (Figure 3 Nest 8). The birds soon left the nest because of human interference.

51. Indigo Bunting. Passerina cyanea. A nesting bird was located in the raspberry bushes (Rubus ideaus) (Figure 3 Nest 7) on June 23 by Ruth Gilreath. There were four eggs - one did not hatch, one young disappeared, one young was found dead, in the nest, and one egg hatched. It is uncertain what happened to the surviving nestling as the young was gone and the bottom of the nest torn out. The nest consisted of grasses and dead

leaves lined with rootlets and slender grasses. These were the only birds reported in the area.

52. Red-eyed Towhee. Pipilo erythrophthalmus. This bird was found nesting in Aspens Associations (Figure 3 Nest 12) on June 7, by Wayne Porter. The nest contained eggs.

53. White-throated Sparrow. Zonotrichia albicollis. One specimen was observed on July 31 and because of the late date believed to be a possible migrant.

54. Song Sparrow. Melospiza melodia. This bird was frequently found near the Beach Pool.

Role of Environment in Relation to Number of Birds Observed.

Temperature, humidity, and velocity of the wind all play a large part in the life of the bird, affecting not only its singing but the rest of its activities of the day.

Temperature seems to affect the activity of the birds as too hot or too cold weather made bird life quite passive. Figures 5 and 6 show the effect of temperature on the birds' activity. At 80° and 91° they were abundant but above 91° the number started decreasing. Apparently the birds became more quiet as the temperature rose. 94° was the hottest field trip so the graph would be unable to include a further decrease if there was one. 91° would seem to be too warm for much activity, but instead, one of our best check lists of the whole area was obtained that day. 80° seems to be a perfect temperature for observing many birds and it worked accordingly on the graph.

Rain is another factor that tends to keep the check

list low; due not only to the inactivity of the birds, but also to poor vision because of the precipitation. All our field trips were conducted on clear or slightly overcast days as there was a dry season the summer of 1941. Therefore our graphs do not show the numbers of birds on rainy days.

A windy day also appears to affect the number of birds observed. Song will be carried away with the wind and birds will be difficult to see because of moving foliage. On Figures 5 and 6, point 2 indicates the few birds that were observed the day of a strong wind. Besides the increased wind velocity, the temperature had dropped considerably, with a corresponding effect on the activity of birds.