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BIRDS OF THE EAST JAMES BAY COAST BETWEEN LONG POINT AND CAPE JONES [1]

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Ottawa

THIS PAPER is based on observations and collections made between June 26 and September 2, 1950, along the east James Bay coast between Long Point and Cape Jones. Our main collecting stations were at Moar Bay and Paul Bay, but shorter periods were spent at other places and notes were kept of the birds seen during our canoe journeys along the coast. Observations made during 4 days (Aug. 8-11) on Long Island and during our trips by canoe between the Moose River and Long Point in June and September will be dealt with separately. During the summer 498 birds were collected. The study of these specimens which are now in the National Museum was done by the senior author, who wishes to acknowledge the assistance received from Mr. W. E. Godfrey. We are also indebted to Mrs. T. H. Manning for typing and checking the manuscript.

Information on the birds of the inland region due east of the coastal strip covered by this paper is entirely lacking, but some idea of the probable population may be gathered from Godfrey's records (1949) at Lake Mistassini and Manning's (1949) at Kinglet Lake and Lake Bienville. The reader is also referred to these papers and to Godfrey and Wilk (1948) and Manning (1951) for range limits which have not usually been given here. Lewis and Peters (1941) give a list of birds observed by them in southern James Bay, but as yet there is no one paper in which all the available records for the region between the Moose River and Long Point have been assembled.

The first recorded ornithological collections from the region were made by C. Drexler, who obtained specimens at Fort George in 1860 and possibly in 1861. No faunal list resulted from his work, but reference to his specimens is made by Turner (1885), Packard (1891), Baird (1874), and other writers. In 1887, Bell (1879) explored the coast from Moose Factory to Cape Jones and then northward to Cape Dufferin. In a paper on the birds of Hudson Bay (Bell 1882) he gives some general ornithological information on this region, and mentions specimens collected at Fort George. Most of these specimens were not preserved (Bell 1882 p. 49), and there is occasional doubt as to the accuracy of their identification. In 1887 and 1888, Low (1889) and his assistant, J. M. Macoun, worked on the east coast and islands of James Bay, but only casual reference to the birds is made in Low's report (Low 1896b pp. 323L-328L) of these trips, and his "List of Birds of the Interior of Labrador Peninsula" seldom mentions east James Bay. In 1896, Low (1898) was accompanied by W. Spreadborough on his journey from the Moose River to Richmond Gulf. This journey lasted from June 14 to June 30, and they were in the area covered by this report from June 18 to June 24 (Low 1896a). No separate list of birds was published as a result of this journey, but a number of Spreadborough's records, including several from the area here dealt with, were used in Macoun's Catalogue of Canadian Birds, and some of Spreadborough's specimens (chiefly eggs) are still in the National Museum of Canada. Unfortunately, Spreadborough's records as published by Macoun are not always reliable. Macoun's catalogue was first published in three parts (Macoun 1900, 1903, 1904). Later they were combined in an enlarged and revised edition (Macoun & Macoun 1909). All the references given here are taken from the 1909 edition except for those to museum specimens which are listed in the first editions only.

In 1920, Fritz Johansen collected a few birds from the James Bay region while

[1] Received for publication May 28, 1951.

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working for the Biological Board of Canada. In 1926, Sutton (1932 p. 2), W. E. C. Todd, and J. B. Semple went by canoe from Moose Factory to Richmond Gulf, and in 1935, Doutt (1935), R. L. Fricke and J. K. Doutt travelled southward by canoe along this coast after collecting birds and mammals on the Twin Islands. Unfortunately, the ornithological results obtained on these expeditions, like those from other expeditions sponsored by the Carnegie Museum to the Labrador Peninsula, have not yet been published.

Description of the Area

The coastline of east James Bay is typical of low-lying Precambrian country. From Eastmain northward, there are few hills over 200 feet high, and most of the country within 10 miles of the coast is under 100 feet. Nonetheless, the greater part of it is very broken and rocky, with numerous little hills and ridges of solid granite gneiss or of glacial drift, the latter frequently taking the form of boulder moraines. Since this broken, hillocky surface continues westward beyond the coastline, and the general submarine slope is very gradual, a maze of small rock and drift islands fills most of the bays and extends seaward for about 10 miles. The points are rocky or bouldery, but toward the head of the bays there are wide, boulder-covered mud flats broken by occasional rocky tidal islands.

Between Factory River and Long Point there is a sudden change in the character of the forest along the coast. South of Long Point, balsam poplar forms large groves near the coast and even on some of the islands, while north of there it grows near the coast in sheltered places only, and the trees are dwarfed and straggly. There are, however, some well grown groves a few miles up the rivers. North of Long Point, the outer fringe of islands as well as some of the smaller islands in the bays are treeless except for a few scattered stunted spruce: even the tips of some of the points are barren. This sudden change in the dominant vegetation may be caused by lower early summer temperatures due to pack ice being trapped here by the Solomons Temple and Paint Hills islands. Thus, in 1950, the ice had left Factory River some time before our arrival on June 26, but it did not finally leave Moar Bay until July 3. On June 27 at Moar Bay, the leaves on alder and willow were only half out along the southern shorelines, and only just budding in places exposed to the northwest. A few patches of snow lay amongst the woods. Between Long Point and Attikuan Point there is no marked change in the dominant vegetation along the coast, although the islands and longer points tend to become more barren as one goes north. North of Attikuan Point, there is a narrow strip of continuous barrens along the coast. At the Roggan River, the first spruce grows about 2 miles inland in small, scattered clumps. North of the Seal River the tree line is often out of sight from the sea, and the peninsula north and west of the Salmon River appears to be entirely barren.

The forests between Long Point and the Roggan River consist principally of white spruce with a few scattered tamarack. In some of the marshy areas the majority of the scattered, sickly-looking trees, are black spruce. Between the spruce and the shore there is often a narrow band of alder 6 to 15 feet tall, while on some of the treeless islands and on the coastal barrens at the Roggan River, there are large, almost impenetrable patches of alder. A mile or two from the coast, the alder is largely replaced by willow which grows along the river banks and borders the open grass marshes.

Main Collecting Stations

MOAR BAY (south end).

June 26-July 13. 56.5 hrs. observing: (9.5 hrs. in marsh, 9 hrs. in willow and alder, 25.5 hrs. in spruce woods, 12.5 hrs. along shore at edge of alder.)

Sept. 2. 4 hrs. observing at edge of alder and in marsh.

Our first camp at Moar Bay was on the grass fringe of the shore of a small, shallow, muddy bay. Immediately behind the tent, a strip of alder about 30 feet wide, bordered the main white spruce forest which here grew on the side of a boulder moraine. The top of the moraine was almost treeless, and sloped gradually westward to a barren point about a quarter of a mile from our camp. In the spruce forest behind the moraine, about a mile northeast of our camp and a few hundred yards from another small, muddy bay, was a little lake some 300 yards across. Immediately surrounding the lake was a boggy area with willow, alder, Labrador tea, sphagnum moss, and small, sickly-looking spruce. We visited this lake several times. Half a mile east of our camp at the

head of the bay, the tidal mud flats terminated in an open grass marsh about a quarter mile in diameter and with a wet patch of bare mud in the centre. Surrounding the marsh was a fringe of tall willow and alder, and at its head was first an area of isolated willow bushes, then stunted spruce and tamarack, and finally, continuous spruce forest. We visited or passed through this marsh most days during our stay. On the south side of our little bay were some solid rock ridges 30 to 50 feet high with small treeless patches on top. Through the spruce woods beyond these ridges was a comparatively deep lake about half a square mile in area. This lake was visited on July 2. On July 11, we went to another shallow bay between our camp and the Poplar River. Here there was a larger area of marshland, but the bird population was smaller than in the marsh near our camp.

Except for the trip on July 11, and those to Sheppard Island and the Poplar River which are dealt with separately, the area included in our Moar Bay observations did not extend more than 1½ miles from our camp, but within that area all habitats typical of the mainland coastal region are found. Continuous forest, principally of white spruce with a few tamarack and some black spruce in the wetter areas, covers about 70 percent of the hinterland; 20 percent is water, and the remaining 10 percent is divided between barren, rocky ridges and open marshes. Around the shore at the head of the bays and along the rivers, marshes account for a larger area. The ground cover of about three-fourths of the open spruce forest is sphagnum moss and Labrador tea; the remaining quarter is dry country, often fairly open, with a luxuriant growth of caribou moss. In the wetter areas walking was difficult owing to Labrador tea and deadfalls. In both areas of spruce birds were scarce.

SHEPPARD ISLAND.

July 4, 8, 13-15. 28.5 hrs. observing in various habitats. Sept. 2. .25 hr. on barren N.E. point.

Sheppard Island is separated from the mainland near our first Moar Bay camp by a strait a few hundred feet wide. We visited Sheppard Island on July 4 and 8, and moved our camp to it on July 13. The central eastern part of this island consists of dry and wet spruce forest similar to that of the mainland. Amongst the forest as well as in places around the coast, are small outcrops of bare, solid rock. On the western third of the island, the spruce is small and scattered, and there is a considerable amount of dwarf birch. Along the north shore is a band of dense alder almost 10 feet tall. Most of the small points, including the one to the northeast where we camped from July 13 to 15, are barren. There are several small lakes on the island. A few partly spruce-clad islands lie in the wider part of the strait between Sheppard Island and the mainland. These were visited on July 14, and the time spent there is included in the time given above for Sheppard Island.

Most of the species seen on the mainland were also recorded on Sheppard Island and vice versa. Where the numbers of individuals were about the same, the records for the two places have been given together. On the whole, passerines were more numerous on the island.

ISLAND A.

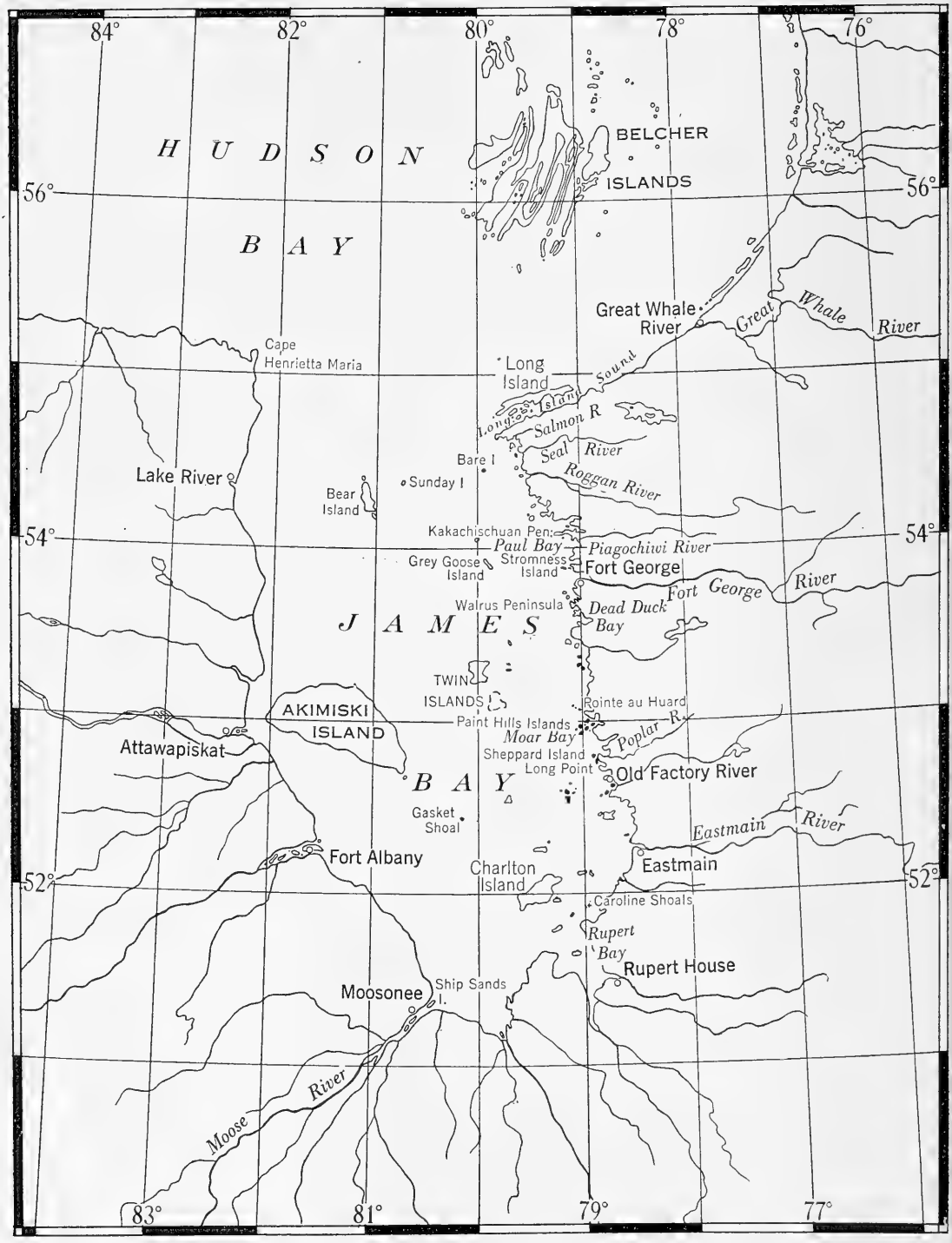
July 8. 2 hrs. observing.

On July 8, we spent an hour on Island A, which lies about half a mile north of Sheppard Island. It is only a few hundred yards long and is composed largely of bare rock. There is a small lake, some dwarf birch scrub, and a small patch of alder about 7 feet high. On July 8, the leaves were about half out on the alder. A group of similar barren islands lies a mile west of Sheppard Island, and there are others to the north in Moar Bay.

POPLAR RIVER.

July 6. 12 hrs. observing: (2 hrs. in marsh, 3.5 hrs. in spruce, 6.5 hrs. in tall willow and poplar).

A little distance within the mouth of the river, the alder which is so plentiful near the coast is replaced by willow which lines the river banks and forms thickets 15 to 20 feet high over a considerable area. On July 6 the willow was considerably more advanced than that near our camp, but was still not quite in full leaf. We visited some extensive open sedge marshes about a mile from the river mouth, and from the air photographs it appears that there may be larger ones farther inland. About 2½ miles up the river is a grove of well grown poplars. The main spruce forest was similar to and continuous with that at our Moar Bay camp.



Map of James Bay showing localities at which collections were made.

PAINT HILLS ISLANDS (Walrus Island).

July 16. 3 hrs. observing on barrens and amongst isolated spruce.

Aug. 29-Sept. 2. 17.5 hrs, observing (11.5 hrs. on barrens and near isolated spruce; 6 hrs in small spruce woods and poplar grove).

Our observations on the Paint Hills Islands were confined to the largest island which is sometimes known as Walrus Island. It is a rocky island with a 150-foot hill at its western end. A few stunted white spruce grow on some open level ground below this, and near the centre of the island there are two stands of rather short, but well-formed white spruce and a small grove of stunted balsam poplar. There is some dwarf birch, but alder is surprisingly scarce. The dry barrens are covered with *Dryas,* caribou moss, blackberry, and a carpet of crowberry. There were also patches of strawberries, dwarf raspberries, and bakeapples.

On July 16, we landed near the western end of Walrus Island and walked over and around the hill. From August 29 to September 2, we were camped near the centre of the island close to the poplar grove.

POINTE AU HUARD.

July 17. 4 hrs. observing (2.5 hrs. on barrens, 1.5 hrs. in alder, and marsh with small scattered spruce and tamarack).

Our camp was actually on the small unnamed point about 1.5 miles north of Pointe au Huard. The outer half mile of this point is barren with patches of alder and a considerable amount of dwarf birch: in fact, rather similar to Stromness Harbour island. Inland, larger areas of taller alder with some open marshes and scattered spruce and tamarack merged gradually into the spruce forest. The spruce forest was not visited.

WALRUS PENINSULA.

Aug. 27-29. 13 hrs. observing (9 hrs. in spruce, 2.5 hrs. on barrens, 1.5 hrs. in marsh).

Our camp was on the well wooded southeast point of Walrus Peninsula. Here there were both open white spruce forest with caribou moss ground cover and denser, wetter forest with sphagnum and Labrador tea. Within the forest were some small sedge and open marshes with the attendant alder and willow thickets. Macpherson also visited a larger marsh on the mainland opposite our camp. The birds seen there were essentially the same as on the peninsula, and the records have been included together. The northern and western parts of the peninsula are barren and rather rocky, with patches of alder about 7 feet high in the sheltered valley. The other vegetation on these barrens is similar to that on Kakachischuan Peninsula.

STROMNESS ISLAND.

July 18-21. 9 hrs. observing.

Aug. 25-27. 6.5 hrs. observing.

Stromness Island is a moderately rocky island not more than 30 feet high. A sixth of its surface consists of bare rock, a sixth is covered by spruce, a third by tall alder with a little willow, and the remaining third by grass and heath, including dwarf birch and Labrador tea. Most of our time was spent near the small spruce clumps where the passerines seemed most plentiful.

PAUL BAY.

July 21-Aug. 7. 63 hrs. observing (30 hrs. in spruce, 28.5 hrs. in willow, alder, and small marshes, 4.5 hrs. in larger marsh).

Aug. 18-25. 27 hrs. observing (17.5 hrs. in spruce, and 9.5 hrs in willow and alder and small marshes).

Our Paul Bay camp was on a southerly facing shore about half a mile west of the mouth of the Piagochiwi River. Immediately behind the tent was a dense alder thicket with occasional open patches and a few white spruce trees. Behind this was a fairly dry spruce forest with considerable undergrowth. About 300 yards from the tent, the first of a series of 50-foot high rocky ridges ran parallel to the shore. Only scattered stunted spruce and tamarack grew on the ridge tops, but between and surrounding these ridges was the continuous spruce forest. On the ridges were some small rock pools, and between them a few little lakes closely surrounded by spruce, heavy undergrowth, and numerous deadfalls which made walking difficult. Along the shore to the east and west of our camp was a narrow, broken strip of dense alder which gave place to willow a few hundred yards up the river. A quarter of a mile west of our camp was a stand of well grown and fairly open spruce, between which grew a deep carpet of caribou moss. Two hundred yards east of the camp was a little grove of stunted poplar

Table 1. — MAIN CANOE JOURNEYS.

Across Moar Bay	July	15	1.5	hrs. travelling.	Rough.
Moar Bay to Pointe au Huard	July	16	2.5	hrs. travelling.	Rough and foggy at times.
Pointe au Huard to Dead Duck Bay	July	17	6	hrs. travelling.	Calm.
Dead Duck Bay to Stromness Harbour	July	18	6	hrs. travelling.	Calm.
Stromness Harbour to Paul Bay	July	21	2	hrs. travelling.	Calm.
Paul Bay to Kakachischuan Point and return	Aug.	1	2	hrs. travelling.	Calm.
Paul Bay to Stromness Harbour and return	Aug.	4, 5	4	hrs. travelling.	Calm. Some fog.
Paul Bay to Seal River	Aug.	7	9	hrs. travelling.	Rough.
Seal River to Cape Jones	Aug.	8	4	hrs. travelling.	Rough and foggy.
Cape Jones to Roggan River	Aug.	11	6	hrs. travelling.	Mostly calm.
Roggan River to Kakachischuan Point	Aug.	16	5	hrs. travelling.	Calm, then rough.
Kakachischuan Point to Paul Bay	Aug.	18	1.5	hrs. travelling.	Calm.
Paul Bay to Stromness Harbour	Aug.	25	2.5	hrs. travelling.	Rough.
Stromness Harbour to Walrus Peninsula	Aug.	27	3	hrs. travelling.	Rough.
Walrus Peninsula to Paint Hills Islands	Aug.	29	11	hrs. travelling.	Moderately rough.
Paint Hills Islands to S. end Moar Bay	Sept.	2	2	hrs. travelling.	Calm.

scarcely taller than the surrounding alder. About three-quarters of a mile west of our camp a fairly deep lake about a quarter of a mile long was visited on July 24 and 25. At one end of this was a rocky scarp; at the other, an open sedge marsh with willow and scattered small black spruce. On July 31, we visited a very shallow lake about half a mile in diameter south of the Piagochiwi River. At its eastern end were some extensive sedge marshes. On August 23 and 24, the bay northwest of our camp was visited. Here a small brook flowed from a shallow lake a few hundred yards inland. At the head of this lake, ducks, shore birds, and passerines appeared more plentiful than elsewhere, although there was no obvious difference in the country or the vegetation. On most of our longer walks, we went through part of the continuous spruce forest which was similar to that at Moar Bay. In it, birds were extremely scarce, and it was not unusual to walk for an hour and see none. On July 27, we went by canoe to a peninsula about 1½ miles northwest of our camp and spent 4 hours observing there. Only about a third of this peninsula was wooded. Most of the remainder was covered by thickets of tall alder. On the same day we both spent an hour on a small island just west of this peninsula. Half of this island was open barrens (largely covered with crowberry), and the other half dense alder thickets. Both on the peninsula and on the island passerines were more numerous than in our camp areas.

Although all our observations at Paul Bay were made within a radius of about 2 miles of our camp, I think we sampled all habitats typical of the mainland region.

KAKACHISCHUAN PENINSULA.

Aug 1. 10 hrs. observing.
Aug. 7. .5 hr. observing.
Aug. 16-18. 11 hrs. observing.

Kakachischuan Peninsula is 6 miles long and is joined to the mainland by a narrow isthmus. It consists of broken, rocky country with hills up to about 40 feet. Our three visits were to the outer 4 miles of the peninsula. The greater part of this western end is covered by a short, dry vegetation including *Dryas*, blueberry, bakeapple, and crowberry, the latter being particularly plentiful and producing vast quantities of berries. In sheltered places there were also dense patches of alder about 7 feet high, and three or four stunted spruce trees. A few areas were moderately marshy, and there were three or four small lakes and one large brackish lake with a narrow exit to the sea.

ROGGAN RIVER.

Aug. 11-16. 28 hrs. observing (18 hrs. on barrens including alder patches and marshes, 2 hrs. in inland sedge marsh and amongst willow, 2 hrs. in burnt country, 1 hr. on barren inland plateau, 3 hrs. in spruce, 2 hrs. in canoe on river).

The country about the mouth of the Roggan River is covered by glacial drift and rock outcrops are rather scarce The coastal barrens consist of dry tundra with vegetation similar to that on the Paint Hills Islands, but with the addition of patches of dense, but fairly low (5 to 6 feet) alder. There is also a fair amount of marshland and several small lakes as well as tidal inlets and lagoons. Toward the edge of the main spruce there is some very wet marsh with alder patches and tall sedge. The first little clump of stunted white spruce grows about 1.5 miles inland, and the main spruce forest begins a mile beyond. On August 13, we went 6 miles up the river by canoe from our camp on the north bank at the river mouth. During the day we visited a well grown white spruce forest with a thick caribou moss carpet, a dry, barren, bouldery plateau about 100 feet high, some sphagnum bogs with scattered spruce, and an area which had been burned over 10 or more years ago and now supported a thick growth of dwarf birch and willow. I also spent two hours near the edge of a willow thicket and an open sedge marsh.

CATALOGUE OF BIRDS OBSERVED.

In the following systematic list an attempt has been made to show the population density of some of the common species by means of tables. The dates used in these tables are the first and last dates on which the species in question was observed at the station. The time in hours represents the total time spent in search of birds during our stay at the station, or the time spent in some particular habitat as indicated in the different tables. The number seen in the case of the small numbers is the sum of daily counts, and in the case of large numbers, the sum of daily estimates made during our timed observations. In the case of some of the larger birds, particularly the water birds which were also seen on canoe trips, the number seen per hour is also given to facilitate quick comparison. In the case of some of the smaller birds, an estimate has been made in round numbers of the population per square mile at their normal habitat. This estimate is based on the number seen, the time spent observing, and the distance at which the species could usually be seen. An allowance has also been made for the fact that some species are more easily seen in the fall when they are in flock than they are during the nesting season.

Common Loon, *Gavia immer immer* (Brünnich).

Common Loons were fairly numerous and evenly distributed along most of the coast. During our short stay at Pointe au Huard they were exceptionally plentiful, but at Stromness Island and Kakachischuan Point where they might have been expected in equal numbers, they were apparently scarcer than in the comparatively sheltered water at Moar and Paul Bays. At least one Common Loon visited the little tidal lagoon opposite our camp at Moar Bay almost every day, and at Paul Bay it was not unusual to see 2 or 3 on the sea outside our tent, but these have not been recorded in Table 2 unless they were actually seen during our timed walks, a circumstance frequent at Moar Bay, where we often walked along the shore to the marsh at the head of the bay. Both at Moar and Paul bays we noticed that the loons were very loath to take flight, and at Paul Bay one or two were seen which had considerable difficulty in getting off the water. This was probably due to full stomachs, as

Table 2. — POPULATION DENSITIES OF COMMON LOON.

Locality	Dates	Time	No. observed	Remarks
Moar Bay including Sheppard I.	June 27-July 14	35 hrs. in open areas	29 (.8 per hr.)	♂ collected
Paint Hills Is.	Aug. 31-Sept. 1	11½ " " " "	5 (.4 " ")	
Pte. au Huard	July 17	3 " " " "	16 (5.3 " ")	
Walrus Pen.	Aug. 27-28	4 " " " "	2 (.5 " ")	
Stromness Har.	July 20	6 " " " "	2 (.3 " ")	
Paul Bay	July 22-Aug. 3	15 " " " "	8 (.5 " ")	♂ "
Kakachischuan Pt.	Aug. 1, 17, 18	21 " " " "	5 (.2 " ")	
Roggan River	Aug. 12-15	22 " " " "	9 (.4 " ")	
Pte. au Huard to Stromness Har.	Aug. 17-18	12 hrs. travelling	14 (1.2 " ")	♀ "
Paul Bay to Kakachischuan Pt.	Aug. 1	2 " "	3 (1.5 " ")	
Paul Bay to Cape Jones and return	Aug. 7, 8, 11, 16, 18	25½ " "	38 (1.5 " ")	
Paul Bay to Stromness Har.	Aug. 25	2½ " "	2 (.8 " ")	
Walrus Pen. to Paint Hills Is.	Aug. 29	11 " "	5 (.5 " ")	

loons are seldom fat and the two specimens collected had no moulted primaries and no exceptional fat.

The measurements of 3 specimens were: ♂ taken July 10, wing chord 351 mm., culmen 86 mm., testis (20 x 6) mm.; ♂ taken July 30, wing chord 353 mm., culmen 78 mm., testis (13 x 4) mm.; ♀ taken July 17, wing chord 332 mm., culmen 83 mm., largest ovum 2.5 mm. Although none of these specimens may actually have had a nest, it seems probable that they belonged to the Quebec population.

Pacific Loon, *Gavia arctica pacifica* (Lawrence).

The Pacific Loon probably breeds on Long Island and possibly on some of the barren islands in the centre of James Bay. On the east James Bay coast we saw it only near Salmon River, where we saw four flying separately over the sea on August 11.

***Red-throated Loon,** *Gavia stellata* (Pontoppidan).

Spreadborough's observation (Macoun & Macoun 1909 p. 2) that Holboell's Grebe is common in the northern part of James Bay almost certainly refers to the Red-throated Loon which is sometimes fairly numerous on the west James Bay coast (Manning 1951) and has been recorded on the Twin Islands (Manning MS). There is no definite record for the east coast, however.

***Horned Grebe,** *Colymbus auritus* Linnaeus.

Bell (1882 p. 49) collected a Horned Grebe at Fort George, presumably in 1877. This species appears to be fairly common near the large rivers of the west James Bay and southern Hudson Bay coast (Manning 1951), so an occasional record for the present region may be expected.

American Bittern, *Botaurus lentiginosus* (Montagu).

According to Bell (1882 p. 51) the American Bittern was found on both sides of Hudson [James ?] Bay. On August 12, we obtained a single very fat male from a sedge marsh at the edge of the spruce at the Roggan River.

***Whistling Swan,** *Cygnus columbianus* (Ord).

According to Mr. Luttit, who has spent about 70 years at Fort George and Great Whale River, a few swans used to be seen on this coast, but they are now extremely

* Sight records uncorroborated by specimens.

rare, and none have been seen in recent years. Barnston (1861 p. 338) says, "Towards Eastmain James's Fort, in James's Bay, a considerable number of swans hatch; ..." Bell (1884 p. 55DD) says that the Trumpeter Swan nested on the islands off the Eastmain coast. However, since he records it also on Nottingham[2] and Marble islands, he has probably confused the two species. Nevertheless, it is not possible to be certain that the nesting swan of the James Bay region was not the Trumpeter Swan, *Cygnus buccinator* Richardson.

Ungava Canada Goose, *Branta canadensis interior* Todd.

The Canada Goose is an abundant migrant on this coast. It nests on some of the islands in James Bay (Low 1896b p. 324L; Coates 1948) and probably on the inland marshes to the eastward. Spreadborough (Macoun & Macoun 1909 p. 125) reported that it bred on both James Bay coasts, but whether he had actual evidence of nesting birds is not certain. Speaking more particularly of the west coast, Hanson and Smith (1950 p. 99) say, "Field observations and information obtained from Indian hunters indicate that few if any geese nest within 10 miles of the shore of James Bay ..." Perhaps this is because of hunting pressure. According to local information, when the migrants first arrive on this coast in the fall they spend much of their time feeding on the berries which grow in such profusion on the barren islands along the coast. When these have been eaten they move to the mud flats and marshes at the head of the bays. Between Kakachischuan Point and Cape Jones, large quantities of eel grass grow in some of the shallow bays, and this also is probably an important food item.

We saw the first Canada Geese on July 27, when a flock of about 25 landed on one of the islands between our camp at Paul Bay and Kakachischuan Point. On August 1, another 25 were seen flying over the same region. On August 18, 12 were seen from our canoe near the northern end of Paul Bay, and between August 19 and 24, we saw 30 from our Paul Bay camp, either flying over or feeding on the tide flats. Betwen August 27 and 28, about 80 Canada Geese were seen at Walrus Peninsula, and between August 29 and September 2, we counted over 150 at the Paint Hills Islands, where they were feeding on the crowberries which grow there in great quantity.

American Brant, *Branta bernicla hrota* (Müller).

Prior to very recent years, Brant used to arrive at Eastmain in small numbers about May 1 coming from the south along the coast, and departing for the north about the end of May. About the middle of May others used to arrive at Fort George from the east, that is, descending the Fort George River, and without stopping flew on in a northerly or westerly direction. In the spring of 1935, however, Brant were much scarcer in James Bay, only two flocks being seen at Eastmain and none at Fort George. The main fall flights of James Bay brant are past Cape Henrietta Maria, Akimiski and Charlton Islands, but a small flight follows the more direct course past Fort George, and often stops near Eastmain for two or three weeks. This summary of the migrations of the American Brant in the northern half of the east James Bay coast is derived entirely from Lewis (1937), who obtained his information for this area from J. W. Anderson of the Hudson's Bay Company.

Lesser Snow Goose, *Chen hyperborea hyperborea* (Pallas).

Blue Goose, *Chen caerulescens* (Linnaeus).

Both the Snow Goose and the Blue Goose migrate along the east James Bay coast in spring and fall. However, they are probably less common there than on the west coast. According to Owen Griffith (Saunders 1917 p. 335), Blue Geese outnumber the Snow Geese on the east James Bay coast. The same authority says that in spring almost every flock of wavies and some geese stop to breed in a big bay about 3 miles north of Fort George.

Our only record north of Long Point was near the Paint Hills Islands on September 1, when we saw a single adult Snow Goose amongst a flock of about 10 dark coloured geese which may have been juveniles of the snow species, Blue Geese, or even Canada Geese. Undoubtedly we left this area before the main migration, but on September 9, we found both snow Geese and Blue Geese fairly plentiful at Ship Sands in the mouth of the Moose River. Soper (1942 p. 150) says that they were exceptionally numerous at Fort George in 1936. Possibly both species

[2] On p. 30 he refers to Whistling Swans on Nottingham Island.

Table 3. POPULATION DENSITIES OF BLACK DUCK.

Locality	Dates	Time	No. observed	Remarks
Moar Bay, including Sheppard Island	June 27	35 hrs. in open areas	27 (.8 per hr.)	
Paint Hills Is.	Aug. 30-Sept. 1	11½ " " " "	55 (5.0 " ")	
Pointe au Huard	July 17	4 " " " "	3 (.7 " ")	
Walrus Peninsula	Aug. 28	4 " " " "	15 (3.8 " ")	
Stromness Har.	July 20	6 " " " "	1 (.2 " ")	
Paul Bay	July 27,31	15 " " " "	6 (.4 " ")	♀ collected
	Aug. 23,24	17 " " " "	31 (1.8 " ")	2♂♂ collect.
Kakachischuan Point	Aug. 17-18	11 " " " "	185 (16.8 " ")	
Roggan River	Aug. 12-13	22 " " " "	134 (6.1 " ")	♂ collected
Paul Bay to Seal River	Aug. 7	9 hrs. travelling	500 (44.4 " ")	
Seal R. to C. Jones	Aug. 8	4 " "	150 (37.5 " ")	
C. Jones to Roggan R.	Aug. 11	6 " "	80 (13.3 " ")	
Roggan R. to Kakachischuan Pt.	Aug. 16	5 " "	300 (60.0 " ")	
Kakachischuan Pt. to Paul Bay	Aug. 18	1½ " "	10 (6.7 " ")	
Stromness Har. to Walrus Jt.	Aug. 27	3 " "	1 (.3 " ")	
Walrus Pt. to Paint Hills Is.	Aug. 29	11 " "	200 (18.2 " ")	
Paint Hills Is. to Moar Bay	Sept. 2	2 " "	25 (12.5 " ")	

occasionally breed on the Twin Islands (Macoun 1900 p. 114) and at Cape Henrietta Maria (Manning MS), but there is no evidence that they ever nest on the Cape Jones barrens.

***Common Mallard,** *Anas platyrhynchos platyrhynchos* Linnaeus.

The Mallard is rare in this region. On August 27, we flushed three ducks which were almost certainly Mallards, accompanied by a Black Duck, from the shore of Walrus Peninsula. They were probably stragglers from southern or western James Bay, and therefore referable to *A.p.platyrhynchos.*

Black Duck, *Anas rubripes* Brewster.

Black Ducks were not very plentiful along the southern part of the coast before the beginning of August. Later they were the commonest duck, particularly amongst the small, rocky islands north of Paul Bay. We frequently saw them on these islands near the high tide line where they were probably feeding on the eel grass which had been washed up. They also appeared to feed on the barren ground berries, and at the Roggan River we sometimes saw small flocks feeding in the little lakes on the barrens. Spreadborough (Macoun & Macoun 1909, p. 80) reported that Black Ducks bred in great numbers on both sides of James Bay. We found a few nesting by the small lakes and in the marshes near the shore, but the greater part of the breeding population is probably scattered through the hinterland. Two of the adult Black Ducks seen at Pointe au Huard were females. One of these had about 7 half-grown young with well feathered wings (flightless young are not included in Table 3); the other had a nest with 8 eggs nearly ready to hatch. One seen on July 31 at the edge of the large shallow lake just south of the Piagochiwi River had at least one half-grown young.

American Pintail, *Anas acuta tzitzihoa* Vieillot.

At Fort George, Bell (1882 p. 50) obtained a duck which he calls "The long-tail *(Dafilia acuta,* Linn.)" and which in spite of the confusion of names was probably a Pintail rather than an Old-squaw as suggested by Rae (1888 p. 128). Spreadborough (Macoun & Macoun 1909 p. 89) found Pintails breeding on both sides of James Bay. We saw no evidence of their nesting in the Moar Bay region, and all of the 25 counted were in

small groups, 16 of them being seen on the small marsh near our camp between June 27 and 29. On August 12, at the Roggan River, we saw a female and 4 young (one collected) almost able to fly. Two others flew over on August 14. On August 27, we saw 4 Pintails from the canoe when we were between Stromness Harbour and Walrus Peninsula.

Green-winged Teal, *Anas carolinensis* Gmelin.

Spreadborough (Macoun & Macoun 1909 p. 85) found Green-winged Teal common and breeding on both sides of James Bay. We saw two on the small marsh at Moar Bay on July 8, and a female incubating 8 eggs was collected at Paul Bay on July 22. On August 12, a female and 9 young probably not more than a week old were seen in a marsh near the edge of the spruce at the Roggan River. On August 26 at Paul Bay, two juvenile females were collected from a group of 4 Green-winged Teal, and a juvenile male was obtained at Stromness Harbour on August 26. Eight were seen from the canoe between Walrus Peninsula and the Paint Hills Islands on August 29.

Baldpate, *Mareca americana* (Gmelin).

During our stay at Moar Bay (June 26 to July 15), 15 adult Baldpates were recorded. On July 5, a female and 10 downy young were seen on a small, shallow inlet near our camp, and on July 8, we collected her and 6 of the young, which were probably under a week old. On July 27, a male and female (female collected) were seen on a large lake 2 miles northwest of our Paul Bay camp. Four or 5 ducklings 10 days to two weeks old may have belonged to this female. Two other Baldpates were seen at Paul Bay on July 31 on another large lake just south of Piagochiwi River. On August 24, on a third large lake 2 miles north of our camp, one of 3 young Baldpates not quite able to fly was collected. These three lakes were visited only on the days mentioned. On August 29, 8 Baldpates were seen from the canoe between Walrus Peninsula and the Paint Hills Islands.

Ring-necked Duck, *Aythya collaris* (Donovan).

On June 27 at Moar Bay, 4 Ring-necked Ducks were seen and one collected. Two others were seen there on June 29, and 4 on July 6. On August 1, two were seen at Kakachischuan Point, and 6, probably of this species, at Paul Bay on August 24. Fifteen ducks seen between Paul Bay and Cape Jones on August 7 and 8 were also believed to be of this species.

Greater Scaup Duck, *Aythya marila nearctica* Stejneger.

Spreadborough (Macoun & Macoun 1909 p. 94) reported a few breeding on James Bay and in the interior of Labrador in 1896, but it is doubtful if he always distinguished between this and the Lesser Scaup Duck.

We collected the Greater Scaup Duck only at Moar Bay and Pointe au Huard and therefore all sight records from other places are here given under the smaller species. It seems probable however, that some of these may have been Greater Scaup Ducks. At Moar Bay, the Lesser Scaup Duck was thought to be the commoner of the two species, and of the total of 115 scaup ducks counted there between June 27 and July 14, probably only about 40 were Greater Scaup Ducks. We found no nests of the Greater Scaup Duck, but a female of a pair collected on July 8 had an almost full-sized yolk still attached on the ovary, and the female of another pair collected on July 14 had an egg in the oviduct and one empty follicle in the ovary. At Pointe au Huard, a single male (collected) and a pair (♀ collected) were seen on July 17. The female had a yolk in her oviduct and three empty follicles.

Lesser Scaup Duck, *Aythya affinis* (Eyton).

The Lesser Scaup Duck appeared to be the commonest nesting duck in the Moar Bay region, and almost every little lake was occupied by a pair of this or the larger species. Since Greater Scaup Ducks were collected and identified with certainty only at Moar Bay and Pointe au Huard, sight records of scaup ducks north of there have been tentatively referred to the smaller species. About 75 Lesser Scaup Ducks were seen at Moar Bay between June 27 and July 14, and 15 between there and Stromness Harbour during the next two days. Scaup ducks were not seen on any of the smaller lakes on the mainland at Paul Bay (perhaps they were too shut in by trees), but on July 25, a group of 6 females and two males were on one of the larger lakes, and a group of about 15 was flushed from another large lake on July 31. On July 27, a pair was collected from a small lake on a barren island west of our Paul Bay camp. After that date, the only scaup ducks identified were 3 seen on the way into Paul Bay on August 18, and

6 on a fairly large lake near there on August 24. On June 28, we collected a female with a yolk in her oviduct and two empty follicles. Next day another was obtained with two nearly full-sized yolks and several collapsed ones still attached to the ovary.

American Golden-eye, *Bucephala clangula americana* (Bonaparte).

At Moar Bay on July 6, 6 American Golden-eyes were seen on a lake close to the shore, and on July 11, 14 were flushed from a shallow, landlocked bay. We saw 30 at sea on August 17 between Pointe au Huard and Dead Duck Bay; 4 were seen on one of the larger lakes at Paul Bay on July 27; 15 on another lake on July 31, and 3 on a similar lake on August 24. While travelling between Cape Jones and Kakachischuan Point on August 11 and 16, we counted 15 apparently flightless Golden-eyes on the sea. A male was collected near Walrus Peninsula on August 27, 3 others were seen there on August 27 and 28, and 15 between there and the Paint Hills Islands on August 29. Both the male golden-eye in eclipse plumage collected on August 27 and the female obtained near Cape Hope on September 2 are referable to *B.clangula americana* on the bill characters given by Brooks (1920). However, a Barrow's Golden-eye has been collected on the east Hudson coast just north of Port Harrison (Manning 1949), and it is possible that some of those seen in east James Bay may have been of that species.

***Old-squaw,** *Clangula hyemalis* (Linnaeus).

Spreadborough (Macoun & Macoun 1909 p. 102) saw a pair of Old-squaws off Cape Jones in June, 1896; Lewis and Peters (1941 p. 113) saw one near Caroline Shoals in southeast James Bay on September 29, 1940; and they are known to nest at Cape Henrietta Maria (Manning 1951), Bear Island (Manning 1950) and Grey Goose Island (Coates 1948). We found them numerous in Long Island Sound between August 8 and 11, but did not definitely identify any south of Cape Jones, although there can be no doubt that they frequently occur there and a few probably nest.

Hudson Bay Eider, *Somateria mollissima sedentaria* Snyder.

Thirty of the Hudson Bay Eiders seen on July 17, and all those seen on August 27, were males. The latter were in one flock. The Hudson Bay Eider is common in Long

Table 4. POPULATION DENSITIES OF HUDSON BAY EIDER.

Locality	Dates	Time	No. observed
Pte. au Huard to Dead Duck B.	July 17	6 hrs. travelling	35 (5.8 per hr.)
Kakachischuan Pt. to Seal River	Aug. 7	7 " "	5 (.7 " ")
Seal River to Cape Jones	Aug. 8	4 " "	7 (1.8 " ")
Stromness Har. to Walrus Pen.	Aug. 27	3 " "	100 (33.3 " ")
Walrus Pen. to Paint Hills Is.	Aug. 29	11 " "	3 (.3 " ")

Table 5. POPULATION DENSITIES OF WHITE-WINGED SCOTER.

Locality	Dates	Time	No. observed
Kakachischuan Point	Aug. 17-18	On salt water lake	60
Moar Bay to Pte. au Huard	July 16	2.5 hrs. travelling	40 (16.0 per hr.)
Pte. au Huard to Dead Duck B.	July 17	6 " "	20 (3.3 " ")
Dead Duck Bay to Stromness Har.	July 18	6 " "	10 (1.7 " ")
Paul Bay to Kakachischuan Pt. and return	Aug. 1	2 " "	5 (2.5 " ")
Paul Bay to Seal River	Aug. 7	9 " "	10 (1.1 " ")
Seal River to Cape Jones	Aug. 8	4 " "	12 (3.0 " ")
Cape Jones to Roggan River	Aug. 11	6 " "	15 (2.5 " ")
Walrus Pen. to Paint Hills Is.	Aug. 29	11 " "	8 (7.3 " ")

White spruce bordered by alder at the shallow bay where the Moar Bay camp was situated. July 10, 1950.

Sheppard Island. July 4, 1950.

At the mouth of the Poplar River. Willow thickets form a border between an open marshy area and the white spruce. July 6, 1950.

Looking up the Poplar River to the first poplar stand. July 6. 1950.

Table 6. POPULATION DENSITIES OF SURF SCOTER.

Locality	Dates	Time	No. observed	Remarks
Moar Bay	July 2	On lake	20	4♀♀ collected
Moar Bay to Pte. au Huard	July 16	2.5 hrs. travelling	20 (8.0 per hr.)	
Pte. au Huard to Dead Duck Bay	July 17	6 " "	20 (3.3 " ")	
Dead Duck Bay to Stromness Har.	July 18	6 " "	10 (1.7 " ")	
Paul Bay to Seal River	Aug. 7	9 " "	8 (0.9 " ")	
Seal River to Cape Jones	Aug. 8	4 " "	8 (2.0 " ")	

Island Sound, and nests on several of the islands in James Bay, including Solomons Temple (Manning 1950), but in 1950 none appeared to be nesting on the east James Bay coast or its island fringe. In June, 1896, Spreadborough (Macoun & Macoun 1909 p. 109) found this species common from a short distance north of Moose Factory to Richmond Gulf.

***King Eider,** *Somateria spectabilis* (Linnaeus).

A King Eider was taken in James Bay, presumably on the south or east coast, by Low in June 1896 (Macoun & Macoun 1909 p. 112). King Eiders nest at Cape Henrietta Maria in west James Bay.

White-winged Scoter, *Melanitta deglandi deglandi* (Bonaparte).

Spreadborough (Macoun & Macoun 1909 p. 115) found the White-winged Scoter abundant from Moose Factory to Richmond Gulf in June 1896.

Surf Scoter, *Melanitta perspicillata* (Linnaeus).

The 20 Surf Scoters seen at Moar Bay were in a mixed flock of both sexes feeding on a large lake which was visited only on July 2. Their stomachs contained frog and fish spawn. Nearly all the scoters of all species seen at sea prior to our return south of Long Point were males. Obviously not all the dark-winged scoters seen from the canoe could be separated specifically, and on a few of our trips where only American Scoters are recorded, some may have been Surf Scoters although none were definitely identified.

Table 7. POPULATION DENSITIES OF AMERICAN SCOTER.

Locality	Dates	Time	No. observed
Moar Bay	July 11	From canoe.	20
Stromness I.	Aug. 25	On sea	1
Moar Bay to Pte. au Huard	July 16	2.5 hrs. travelling	20 (8.0 per hr.)
Pte. au Huard to Dead Duck Bay	July 17	6 " "	20 (3.3 " ")
Dead Duck Bay to Stromness Har.	July 18	6 " "	10 (1.7 " ")
Paul Bay to Kakachischuan Pt. .... and return	Aug. 1	2 " "	15 (7.5 " ")
Paul Bay to Seal River	Aug. 7	9 " "	8 (0.9 " ")
Seal River to Cape Jones	Aug. 8	4 " "	8 (2.0 " ")
Cape Jones to Roggan River	Aug. 11	6 " "	10 (1.7 " ")
Roggan River to Kakachischuan Pt.	Aug. 16	5 " "	100 (20.0 " ")
Paaul Bay to Stromness Har.	Aug. 25	2.5 " "	10 (4.0 " ")
Stromness Har. to Walrus Pen.	Aug. 27	3 " "	4 (1.3 " ")

American Scoter, *Oidemia nigra americana* Swainson.

This appears to be the commonest scoter along this coast.

***Ruddy Duck,** *Oxyura jamaicensis rubida* (Wilson).

Macoun and Macoun (1909 p. 119) record that Spreadborough saw a female with 4 young about a week old on June 21, 1896, in 'northern Labrador'. Actually on that date Spreadborough was at Fort George (Low 1896a). There appear to be no other records for James Bay, and this, together with his observation that it breeds sparingly from Richmond Gulf to Ungava probably resulted from misidentifications.

Hooded Merganser, *Lophodytes cucullatus* (Linnaeus).

On July 26, two Hooded Merganser were seen on a small lake at Paul Bay. One of these, a female and probably non-breeding bird, was collected. This is probably the normal northern limit for the species in this area, and Spreadborough's record of a pair at Clearwater Lake (Manning 1949) must be accepted reservedly.

American Merganser, *Mergus merganser americanus* Cassin.

Red-breasted Merganser, *Mergus serrator serrator* Linnaeus

A comparatively small number of the mergansers seen on the wing were identified specifically with certainty. The Red-breasted Merganser was probably the commoner, but a few American Mergansers were identified over most of the region. At Moar Bay a male American Merganser was collected on July 3, a male Red-breasted Merganser on July 2, and a female Red-breasted Merganser on July 8 and September 2. At Stromness Island, a male American Merganser and 6 of her 8 downy young were collected on July 9. The stomachs of the latter contained insects.

American Goshawk, *Accipiter gentilis atricapillus* (Wilson).

On August 24, an immature goshawk was seen at different times and in different areas at Paul Bay. On August 26, Macpherson collected an immature male which had been eating a recently killed Pigeon Hawk.

American Rough-legged Hawk, *Buteo lagopus s.johannis* (Gmelin).

Although mice of all species except possibly *Peromyscus maniculatus* were unusually scarce in the area, the Rough-legged Hawk was the commonest hawk on the east James Bay coast in 1950. Its abundance may have been due to a sudden decline in lemming numbers on the Ungava barrens sometime after the summer of 1949. We saw no

Table 8. POPULATION DENSITIES OF AMERICAN MERGANSER AND RED-BREASTED MERGANSER.

Locality	Dates	Time	No. observed
Moar Bay, including Sheppard I.	June 27-July 14	85 hrs. observing	64
	Sept. 2	4 " "	10
Paul Bay	July 22-Aug. 2	63 " "	21
Pte. au Huard to Dead Duck Bay	July 17	6 hrs. travelling	15 (2.5 per hr.)
Dead Duck Bay to Stromness Har.	July 18	6 " "	6 (1.0 " ")
Stromness Har. to Paul Bay	July 21	2 " "	2 (1.0 " ")
Paul Bay to Kakachischuan Pt. and return	Aug. 1	2 " "	6 (3.0 " ")
Paul Bay to Stromness Har. and return	Aug. 4, 5	4 " "	15 (3.7 " ")
Paul Bay to Seal River	Aug. 7	9 " "	50 (5.6 " ")
Seal R. to Cape Jones	Aug. 8	4 " "	15 (3.7 " ")
Cape Jones to Roggan R.	Aug. 11	6 " "	15 (2.5 " ")
Roggan River to Kakachischuan Pt.	Aug. 16	5 " "	10 (2.0 " ")
Stromness Har. to Walrus Pen.	Aug. 27	3 " "	1 (0.3 " ")
Walrus Pen. to Paint Hills Is.	Aug. 29	11 " "	4 (0.4 " ")

evidence that any of these hawks were breeding, although there were suitable cliffs on the Paint Hills Islands and near our Paul Bay camp. At the latter place a previous year's nest probably belonging to this species of hawk was found. At Long Island, two cliffs where Rough-legged Hawks had nested in 1949 were this year unoccupied. Most of the Rough-legged Hawks we saw during the summer were circling high over grass and willow marshes. Twenty-six Rough-legged Hawks were counted at Moar Bay between June 27 and July 13, and 25 (probably not more than 6 to 8 individuals recounted at different times during the day) at the Poplar River on July 6. The greater abundance of hawks at the latter place was doubtless due to the larger areas of open marsh. On the Paint Hills Islands we saw one Rough-legged Hawk on July 16, and one on August 31; on Stromness Island one on July 20, and another on August 26; 15 at Paul Bay between July 21 and August 5, and 2 between August 22 and 23; 2 at Kakachischuan Point on August 1, and one at the Roggan River on August 12.

Osprey, *Pandion haliaetus carolinensis* (Gmelin).

In 1950 the Osprey was the second commonest hawk along the east James Bay coast, and it is rather surprising that Spreadborough (Macoun & Macoun 1909 p. 287) should have seen no Ospreys north of Moose Factory. Every day one or more (once 4 together) flew over our camp at Moar Bay, and on several occasions they were successful in obtaining fish from the shallow, muddy inlet. They were seen less frequently at Paul Bay. If all those we saw from our camps had been counted, the numbers observed at these two places would have been more than double the figures given in Table 9 for those recorded on timed walks.

Duck Hawk, *Falco peregrinus anatum* Bonaparte.

The skeleton of a Duck Hawk was obtained at Moar Bay from one of the traps which the Indians set on the points and islands along this coast for hawks and owls. One Duck Hawk was seen at the Paint Hills Islands on July 16, and one on August 31. Two were seen together at the Roggan River on August 13.

Eastern Pigeon Hawk, *Falco columbarius columbarius* Linnaeus.

A freshly killed female Pigeon Hawk was found and collected on Stromness Island on August 26. It had been partially eaten by an American Goshawk which was also collected.

Hudsonian Spruce Grouse, *Canachites canadensis canadensis* (Linnaeus).

Between June 29 and July 14, we saw 23 adult Spruce Grouse at Moar Bay, of which almost half were on the island just west of our camp. Most of the females had eggs or young, and about 6 broods were actually seen. On June 29, a female was collected which had an egg in the oviduct and 3 empty follicles. The downies collected on July 5 were probably only 3 or 4 days old, while 4 obtained on July 13, and one from another brood on July 24, were developing wing feathers. The crops of two adult males and 3 females collected at Moar Bay contained cranberries, spruce shoots, horsetail tips, willow and alder leaves, *Vaccinium* shoots and plant buds. The crops of the downies collected on July 5 contained caterpillars. One female Spruce Grouse was seen at Pointe au Huard on July 17, and on July 24, two were collected together at Paul Bay. They were accompanied by several half grown flying young.

Table 9. POPULATION DENSITIES OF OSPREY.

Locality	Dates	Time	No. observed	Remarks
Moar Bay, including Sheppard I.	June 30-July 10	85 hrs. observing	20 (0.2 per hr.)	
Poplar River	July 6	12 " "	2 (0.2 " ")	
Paul Bay	July 21-Aug. 3	63 " "	5 (0.1 " ")	
	Aug. 22	27 " "	3 (0.1 " ")	
Paint Hills Is.	Aug. 30-31	17½ " "	2 (0.1 " ")	1 ♂ collected
Roggan River	Aug. 13-15	28 " "	3 (0.1 " ")	

Table 10. POPULATION DENSITIES OF UNGAVA WILLOW PTARMIGAN.

Locality	Dates	Time	No. observed	Remarks
Moar Bay	July 1-11	3 hrs. in habitat	Pair with nest	♀ collected
Sheppard I.	July 4, 8, 13, 14	14 " " "	24 ad. (1.7 per hr.)	2♂♂, 2♀♀ collected
Island A	July 8	2 " " "	One adult	
Paint Hills Is.	July 16, Aug. 30-Sept. 1	14½ " " "	19 ad. (1.3 per hr.)	4♂♂ collect.
Pte. au Huard	July 17	2½ " " "	3 " (1.2 " ")	2♂♂ collect.
Walrus Pen.	Aug. 28	2½ " " "	6 " (1.4 " ")	
Stromness I.	July 18-20 Aug. 26	14 " " "	14 " (1.0 " ")	♂ collected
Kakachischuan Pt.	Aug, 1, 7, 17, 18	21 " " "	150 " (7.0 " ")	4♂♂, 4♀♀ collected
Roggan River	Aug. 12-15	18 " " "	120 " (6.7 " ")	4♂♂, 4♀♀ collected

Two specimens from Lake Albanel were considered by Godfrey (1949) to be nearer *C.c.canadensis* than *C.c.canace*. Three of our birds from Moar Bay and one from Spit Island 30 miles to the south are slightly greyer and less brown than the Lake Albanel specimens, while one from Moar Bay and 3 from Paul Bay are strikingly grey. These last 4 specimens average as grey as the Yukon birds referred to *C.c.osgoodi* by Rand (1948), but differ from them in that the grey feather edging of the east James Bay birds is much purer — that is to say, less tinged with brown. However, in the absence of female specimens from other parts of Ungava, they are tentatively referred to *C.c.canadensis*.

Ungava Willow Ptarmigan, *Lagopus lagopus ungavus* Riley.

On June 26, we saw 3 Willow Ptarmigan on a small, barren island between Long Point and the Factory River, but it is doubtful if the summer range of this species extends much south of there even on the islands, and on the mainland they probably do not nest south of Long Point.

In 1896, Spreadborough first observed this species a short distance north of Fort George on June 23. On the same date Low's other assistant, A. Young, found a nest with 13 eggs pretty far advanced in incubation. North of there a few were seen every day on the islands until Richmond Gulf was reached (Macoun & Macoun 1909 p. 225). Macoun (1900 p. 206) lists 4 Willow Ptarmigan taken by Bell at Fort George.

On July 1, a pair (♀ collected) with a nest containing 9 slightly incubated eggs was seen on the barren point near our Moar Bay camp. On the barren or sparsely treed areas of Sheppard Island, Willow Ptarmigan were fairly numerous, and their ecological range occasionally overlapped that of the Spruce Grouse. One of the females collected there on July 4 had a brood of 6 downies (about 2 days old) which were collected; the other had an incubating patch, but no apparent nest or young. One other brood was seen on Sheppard Island on July 13, and a single downy, about 6 days old, was collected from it. On July 18, a brood of 8 small flying young was seen with their parents on Stromness Island, and at the Roggan River, a brood of about 8 slightly larger young was seen. On August 12, 14, and 15, the female parent and two juveniles were collected from it. On August 31, a brood of 7 young (2♂♂ collected) about two-thirds grown was seen on the Paint Hills Islands. Most of the female ptarmigan seen at Moar Bay had young, but farther north young ptarmigan were extremely scarce. It is possible that this is normal and results from a coastward movement of adults that have nested inland and lost their eggs or young. It is more probable, however, that exceptionally few broods were successfully raised in 1950. This might be due, at least in part, to predation by Rough-legged Hawks, which,

having been deprived of their normal food by the scarcity of mice and lemmings, concentrated on the downy flightless ptarmigan. We obtained no direct evidence to support this suggestion.

The measurements of our adult specimens were: Bill from anterior end of nostril to tip, 14 ♂♂, 12.2mm. (11mm.-13mm..); 11 ♀♀, 11.4mm. (10.5mm.-12.5mm.). Width at gape, 16 ♂♂, 14.9mm. (14mm.-16.2mm.), 11 ♀♀, 14.2mm. (13.8mm.-15mm.). These measurements average slightly larger than those obtained by Ridgway and Friedmann (1946) and Manning (1949) from specimens taken farther north on the Labrador Peninsula.

Rock Ptarmigan, *Lagopus mutus rupestris* (Gmelin).

Rock Ptarmigan do not nest in this area, but according to local information, they are numerous during the winter on the high nearby barren country 150 to 200 miles inland. They also winter on the coast, but are never as numerous there as the Willow Ptarmigan.

Northern Sharp-tailed Grouse, *Pedioecetes phasianellus phasianellus* (Linnaeus).

According to local information, Sharp-tailed Grouse are quite numerous in some years in the Fort George region, especially towards spring, while at the Factory River they were said to be very scarce on the coast, but fairly common inland. Spreadborough (Macoun & Macoun 1909 p. 230) was told that they were common at Fort George in the winter. According to Townsend and Allan (1907 p. 363). Low took a set of eggs at Fort George on May 20, 1889. They are not now in the National Museum, nor are they recorded by Macoun (1900). Low was not at Fort George on that date, but they might have been collected by Miles Spence. A Northern Sharp-tailed Grouse in the National Museum collection was taken by Spreadborough in 1896 somewhere on the coast, probably at Fort George, although on the date given on the label (June 18), Spreadborough was not north of the Paint Hills (Low 1896a).

On August 23, we collected a female from a patch of low scrub on a small, treeless point at Paul Bay.

***Yellow Rail,** *Coturnicops noveboracensis noveboracensis* (Gmelin).

Bell (1882 p. 51) procured a Yellow Rail at Fort George. It is locally common on the southern and eastern shores of James Bay (Todd 1943) and also occurs on the southern Hudson Bay Coast.

Semipalmated Plover, *Charadrius hiaticula semipalmatus* Bonaparte.

A few Semipalmated Plovers breed on the barren points and islands along this coast, while in spring and fall it may be a fairly common migrant on the tide flats and coastal marshes. Macoun & Macoun (1909 p. 207) record that Spreadborough found it common in 1896 from Moose Factory along the James Bay coast and northward to Richmond Gulf. A set of 4 eggs from a nest found by Low on June 18 when he was between Factory River and the Paint Hills (Low 1896a) is now in the National Museum.

Between June 27 and July 1, a loose feeding group of about 15 Semipalmated Plovers was often seen on the little bare mud flat in the marsh near our Moar Bay camp or on the nearby tide flats. These were presumably non-breeding birds. Two collected from the group on July 1 were very fat females (largest ovum, 5mm. and 3mm. respectively). After July 1, only 14 Semipalmated Plovers were seen at Moar Bay. Three of these were on Sheppard Island and 3 on Island A. One seen on July 4 on the barren point near our Moar May camp may have had a nest. On July 17, we saw 3 Semipalmated Plovers on Pointe au Huard and one on Stromness Island on July 20. On August 1, we saw 8 on Kakachischuan Point, and at Paul Bay 12 between July 21 and August 6. The latter were mostly single birds feeding on the tide flats, but one seen on the ridge behind our camp appeared to have a nest or young. Eight were seen at Walrus Peninsula on August 28.

Black-bellied Plover, *Squatarola squatarola* (Linnaeus).

The whistle of high-flying plovers was occasionally heard at the Roggan River between August 12 and 15. On August 17, a single female Black-bellied Plover was collected at Kakachischuan Point. One was heard at Stromness Harbour on August 26, and one seen at the Paint Hills Islands on August 30 and 31.

Ruddy Turnstone, *Arenaria interpres morinella* (Linnaeus).

On August 17, 12 Turnstones were seen on Kakachischuan Point in groups of 4. Possibly the same group was seen three times.

Wilson's Snipe, *Capella gallinago delicata* (Ord).

Wilson's Snipe nests in the marshes along this coast within and near the tree line, but is absent from the barren islands and probably from the Cape Jones barrens. It was seen by Bell (1882 p. 51) at Fort George.

At Moar Bay we saw Wilson's Snipe only on the small marsh at the head of the bay near our camp, although two similar but larger marshes were examined on July 6 and 11 respectively. Possibly they were attracted to the little marsh by the small patch of bare mud in the centre. On June 27, 15 snipe were counted in this marsh. All appeared to be resident and about 6 pairs probably nested. The largest ovum of a female collected on June 27 was 4mm.; another female taken on June 28 had an egg in its oviduct. On July 7, two downies a day or two old, both from the same brood and probably the only ones remaining from it, were collected. There were still about the same number of snipe in the marsh when it was last visited on July 10. We again walked through it on September 2, and 3 adult Wilson's Snipe (one ♂, 2 ♀♀ collected) were seen. On July 17, a Wilson's Snipe was seen at Pointe au Huard, and another on July 25 in a small marsh half a mile up the Piagochiwi River. On July 31, 5 (one adult female and one juvenile collected) were seen during an hour's walk in the marsh on the south side of this river, and one was seen in a marsh about 2 miles up the Roggan River on August 13.

Hudsonian Curlew, *Numenius phaeopus hudsonicus* Latham.

Two Hudsonian Curlews were seen at Moar Bay on July 14, 6 flew over our canoe just south of Dead Duck Bay on July 17, and 4 near Stromness Harbour on August 21. During 18 hours walking between August 12 and 15, 48 Hudsonian Curlews were seen on the barrens near the Roggan River. These were mostly in small flocks. Two single curlews were seen at Kakachischuan Point on August 17, and 44 in singles and small flocks at the Paint Hills Islands during 11½ hours walking on the barrens bettween August 30 and September 1.

Spotted Sandpiper, *Actitis macularia* (Linnaeus).

Spotted Sandpipers doubtless nest throughout the wooded hinterland wherever there are suitable lakes and rivers. Near the coast they are particularly numerous at the river mouths and frequently occur along the wooded shore line. Occasionally they visit the barren islands.

Forty-eight Spotted Sandpipers (♂ collected) were seen at Moar Bay between June 27 and July 14. This number includes 16 seen along the Poplar River on July 6, and 5 along the shore of Sheppard Island. Most of the others were flushed while walking along the shore of the small bay near our camp. On July 2, a nest was found with 4 eggs which had not hatched when the nest was last visited on July 11. At Paul Bay, 26 Spotted Sandpipers were seen between July 22 and August 6, and 15 between August 19 and 22. Most of these were flushed from the edge of the alder (where they were probably nesting) or seen feeding near the high tide line. On July 23, two partially downy young were collected. These had sufficient wing feathers just to flutter from the ground. When pursued they entered the water and dived, using their wings for swimming under the water. A slightly younger downy from another brood was seen at Paul Bay on July 26. On August 13, we saw 10 Spotted Sandpipers from our canoe during 2 hours spent on the Roggan River.

Eastern Solitary Sandpiper, *Tringa solitaria solitaria* Wilson.

On June 20, an apparent pair (♂, testis, 4 x 3mm., ♀, largest ovum, 1mm.) was collected from the small marsh near our camp at Moar Bay. They did not appear to be nesting. On July 1, another pair was seen in the marsh. They showed considerable agitation and may have had a nest, although they had not been seen there before. The male was collected (testis 5mm. x 3mm.) and the female was not again seen. On July 7, a single male (testis 2mm.) was collected at the same marsh. Two Solitary Sandpipers were seen on the ridge behind our camp at Paul Bay on July 21. It was thought they might have a nest or young, but were not seen there again. A pair, possibly the same, accompanied by at least two juvenile flying young, was seen in a small marsh a mile distant, on July 25. The juveniles and male parent (testis, 2mm. x 1mm.) were collected.

Table 11. POPULATION DENSITIES OF GREATER YELLOW-LEGS.

Locality	Dates	Time	No. observed	Remarks
Walrus Pen.	Aug. 28	4 hrs. in open	25 (6.3 per hr.)	♂ collected
Paint Hills Is.	Aug. 31	11½ " " "	1 (0.1 " ")	
Stromness Har.	Aug. 26	5 " " "	1 (0.2 " ")	
Paul Bay	July 31	15 " " "	5 (0.3 " ")	
	Aug. 20-24	7 " " "	160 (22.9 " ")	♀ juv., ♂ collect.
Kakachischuan Pt.	Aug. 1	10 " " "	19 (1.9 " ")	
	Aug. 17-18	11 " " "	34 (3.1 " ")	
Roggan River	Aug. 12-15	22 " " "	90 (4.1 " ")	

The wing chord of adult specimens measured, ♂♂ 124.5 mm. (121.5mm. — 126.5mm.); ♀, 125mm. The outer primaries of all specimens are immaculate.

***Wandering Tatler,** *Heteroscelus incanus* (Gmelin).

Bell (1882 p. 51) says, "...I obtained a specimen of the wandering tatler *(Heteroscelus brevipes,* Vieill.), supposed to be a western species, on the Eastmain coast..." This was almost certainly based on a misidentification (Cf. Townsend & Allen 1907 p. 362).

Greater Yellow-legs, *Totanus melanoleucas* (Gmelin).

We saw no Greater Yellow-legs at Moar Bay, indicating that this species is either more northern than the Lesser Yellow-legs or else nests inland and only arrives on the coast towards the beginning of August. Eight yellow-legs seen at Paul Bay beween July 24 and 28 were not identified specifically. Most of those seen at the Roggan River were on the barrens. They could not be approached sufficiently closely to tell whether they were adults or juveniles. About two-thirds of the Paul Bay and later records were juveniles. One hundred and fifty of the 160 seen at Paul Bay were together near the mouth of a small brook a mile north of our camp. This brook was visited only on August 24.

Lesser Yellow-legs, *Totanus flavipes* (Gmelin).

The Lesser Yellow-legs appears to be a fairly common nesting bird in the Moar Bay region. Macoun (1900 p. 173) lists a set of eggs not now in the National Museum taken in June, 1888 at Fort George by Miles Spence.

On June 27, there were 15 Lesser Yellow-legs (♂ collected testis, 3mm.) on the small marsh near our camp at Moar Bay. Next day this number had been increased to about 40 by migrant flocks, but by June 29, the total was down to 6. There appeared to be three nesting pairs which remained in the vicinity until my last visit on July 10. On that date they had moved from their usual places and the eggs had therefore presumably been hatched. On July 11, two yellow-legs were seen during an hour's walk in a larger marsh at Moar Bay, but none were observed on July 6 in the marshes about the Poplar River. One was seen on the island at Moar Bay on July 13. Eight yellow-legs were seen at Paul Bay between July 24 and 28, but were not identified specifically. Between July 12 and 14, 3 Lesser Yellow-legs were seen at the Roggan River. One of these, a juvenile female, was collected. It was very tame, but twice when I approached, it quickly swam out 2 or 3 yards from the shore on a lake by which it was feeding. The water there was about 2 feet deep, and the bird's feet could not possibly have been on the bottom. On August 28, 2 Lesser Yellow-legs (one collected) were seen at Walrus Peninsula amongst a flock of Greater Yellow-legs.

Purple Sandpiper, *Erolia maritima* (Brünnich).

Fifteen Purple Sandpipers were seen in small flocks at the Roggan River on August 15.

Pectoral Sandpiper, *Erolia melanotos* (Vieillot).

On August 15, a Pectoral Sandpiper was collected from a flock of 6 on the coastal barrens at the Roggan River.

White-rumped Sandpiper, *Erolia fuscicollis* (Vieillot).

The White-rumped Sandpiper was first recorded at the Roggan River, where 41 were seen on the tide flats between August 12 and 15. Five hundred (4 ♂ ♂ collected) were seen at Kakachischuan Point between August 17 and 18, and 12 on Walrus Peninsula on August 28.

Least Sandpiper, *Erolia minutilla* (Vieillot).

Seven Least Sandpipers were seen in the small marsh near our camp at Moar Bay on June 27, and 10 on June 29, when a male (testis, 5mm.) and a female (largest ovum, 1mm.) were collected. After June 29, their numbers decreased, and only one was seen on July 10. I doubt if any nested there, although at first two or three appeared as if they might have nests. Two Least Sandpipers were seen during an hour's walk in another marsh on July 11, but none in the marshes inland up the Poplar River on July 6. One was seen at Paul Bay on July 24, 3 at the Roggan River between August 14 and 15, and one on the Paint Hills Islands on August 30.

Semipalmated Sandpiper, *Ereunetes pusillus* (Linnaeus).

A female Semipalmated Sandpiper was collected at Fort George by Drexler on June 30 (Sharpe 1896 p. 518). Between August 14 and 15, we saw 10 (♂, ♀, collected) at Kakachischuan Point, 8 at Paul Bay on August 24, and one at the Paint Hills Islands on August 30. All were migrants feeding near the shore.

Sanderling *Crocethia alba* (Pallas).

Eight Sanderlings (♀ collected) were seen at the edge of the Paul Bay tide flats on August 24, and 4 at Walrus Peninsula on August 28.

Northern Phalarope, *Lobipes lobatus* (Linnaeus).

On July 8, 7 Northern Phalaropes (♂ collected) were seen feeding on a little lake on Island A.

Parasitic Jaeger, *Stercorarius parasiticus* (Linnaeus).

Bell (1882 p. 50) obtained a specimen of the Parasitic Jaeger at Fort George.

***Glaucous Gull,** *Larus hyperboreus hyperboreus* Gunnerus.

Under museum specimens, Macoun (1900 p. 34) lists a set of 3 Glaucous Gull eggs from James Bay. This is presumably the set (now two) in the National Museum taken by Spreadborough on June 18, 1896 when he was between Factory River and the Paint Hills (Low 1896a). The two eggs measure 73mm. x 49mm. and 76mm. x 50mm. respectively. While the possibility that they belong to this species cannot be definitely ruled out, one egg is extremely small for that of the Glaucous Gull, and their measurements are much closer to those of the Herring Gull as given by Bent (1947). Morover, both Low (1896b p. 323) and Spreadborough (Macoun & Macoun 1909 p. 36) appear to have confused the Herring and Glaucous gulls in this region (Cf. Manning 1949). The set of 3 eggs from an island near Great Whale River which Macoun (1900 p. 34) also lists under Glaucous Gull measure 75mm. x 51mm., 73mm. x 50mm., 73 mm. x 50 mm., and are also probably those of the Herring Gull.

Herring Gull, *Larus argentatus smithsonianus* Coues.

All the Herring Gulls recorded in Table 12 were in one's, two's, or occasionally three's except a flock of 15 (twice seen) at a small island in Paul Bay on July 6. Most of the Herring Gulls seen were in adult plumage or so near adult that they could not be distinguished in the distance. In spite of the numerous small islands which might be expected to be excellent nesting grounds, we found no evidence of nesting except for an old nest on Island A in Moar Bay where a pair appeared to resent our intrusion. The two specimens collected at Moar Bay were adults. The female obtained at Paul Bay was an immature, probably two years old.

***Ring-billed Gull,** *Larus delawarensis* Ord.

Bent (1947 p. 139) mentions Fort George as within the breeding range of the Ring-billed Gull. This is probably an error since there is no other definite record for James Bay (Manning MS) or for Lake Mistassini (Godfrey 1949).

***Common Tern,** *Sterna hirundo* Linnaeus.

Spreadborough (Macoun & Macoun 1909 p. 53) reported the Common Tern common from Moose Factory to Richmond Gulf in 1896. However, since he does not mention the Arctic Tern in this area, it seems very likely that some, and perhaps most of the terns he

Table 12. POPULATION DENSITIES OF HERRING GULL.

Locality	Dates	Time	No. observed	Remarks
Moar Bay, including Sheppard I.	June 27-July 14	35 hrs. in open	42 (1.2 per hr.)	2 ♂ ♂ collected
Paint Hills Is.	July 16	3 " " "	4 (1.3 " ")	
Pointe au Huard	July 17	3 " " "	2 (0.7 " ")	
Walrus Peninsula	Aug. 27	4 " " "	2 (0.5 " ")	
Stromness I.	July 18-19	6 " " "	7 (0.6 " ")	
	Aug. 26	5 " " "		
Paul Bay	July 21-Aug 6	15 " " "	35 (1.6 " ")	♀ collected
	Aug. 19-24	7 " " "		
Kakachischuan Pt.	Aug. 1	10 " " "	8 (0.8 " ")	
Roggan River	Aug. 13	22 " " "	14 (0.6 " ")	
Moar Bay camp to Poplar River and return	July 6	3 hrs. travelling	35 (11.7 " ")	
Pointe au Huard to Dead Duck Bay	July 17	6 " "	20 (3.3 " ")	
Dead Duck Bay to Stromness Har.	July 18	6 " "	6 (1.0 " ")	
Paul Bay to Kakachischuan and return	Aug. 1	2 " "	4 (2.0 " ")	
Paul Bay to Seal River	Aug. 7	9 " "	15 (1.7 " ")	
Seal River to Cape Jones	Aug. 8	4 " "	5 (1.2 " ")	
Cape Jones to Roggan River	Aug. 11	6 " "	15 (2.5 " ")	
Roggan River to Kakachischuan Pt.	Aug. 16	5 " "	15 (3.0 " ")	
Kakachischuan Pt. to Paul Bay	Aug. 18	1½ " "	4 (2.7 " ")	
Stromness Har. to Walrus Peninsula	Aug. 27	3 " "	2 (0.7 " ")	
Walrus Peninsula to Paint Hills Is.	Aug. 29	11 " "	30 (2.7 " ")	
Paint Hills Is. to Moar B.	Sept. 2	2 " "	5 (2.5 " ")	

saw were actually that species, which appears to be the more numerous in James Bay, particularly towards the northern portion. (See Arctic Tern below).

Arctic Tern, *Sterna paradisaea* Pontopiddan.

In Table 13 it has been assumed that all the terns seen were Arctic Terns. Unfortunately none were collected, and the bases for the assumption are our small collections on the west side of James Bay and

Table 13. POPULATION DENSITIES OF ARCTIC TERN.

Locality	Dates	Time	No. observed
Moar Bay, including Sheppard I.	June 27-July 14	35 hrs. in open	85 (2.4 per hr.)
Stromness I.	July 19-20	6 hrs. travelling	4 (0.7 " ")
Moar Bay N. to Pte. au Huard	July 16	2.5 " "	15 (6.0 " ")
Pte. au Huard to Dead Duck Bay	July 17	6 " "	15 (2.5 " ")
Dead Duck Bay to Stromness Har.	July 18	6 " "	10 (1.7 " ")
Paul Bay to Seal River	Aug. 7	9 " "	200 (22.2 " ")
Seal River to Cape Jones	Aug. 8	4 " "	50 (12.5 " ")

Table 14. POPULATION DENSITIES OF NEARCTIC MANDT'S GUILLEMOT.

Locality	Dates	Time	No. observed
Short canoe trips at Paul Bay	July 6-11	6 hrs. travelling	8 (1.3 per hr.)
Moar Bay to Pointe au Huard	July 15-16	4 " "	10 (2.5 " ")
Pte. au Huard to Dead Duck Bay	July 17	6 " "	200 (33.3 " ")
Dead Duck Bay to Stromness Har.	July 18	6 " "	50 (8.3 " ")
Paul Bay to Stromness Har. and return	Aug. 4-5	4 " "	1 (2.5 " ")
Paul Bay to Seal River	Aug. 7	9 " "	30 (3.3 " ")
Seal River to Cape Jones	Aug. 8	4 " "	30 (7.5 " ")
Cape Jones to Roggan River	Aug. 11	6 " "	60 (10.0 " ")
Roggan River to Kakachischuan Pt.	Aug. 16	5 " "	50 (10.0 " ")
Walrus Pen. to Paint Hills Is.	Aug. 29	11 " "	10 (9.1 " ")

on Grey Goose Island in 1947 (Manning 1951, MS) and on Gasket Shoal and Sunday Island in 1949 (Manning MS). Probably a few of the terns recorded at Moar Bay were Common Terns, but it is unlikely that they normally go much north of this. No terns' nests were found, nor were any young birds seen, but it seems probable that they nest at least in some years on the low, drift islands about the Seal River. It will be noted that although terns were numerous there on August 7 and 8, they had left before our return on August 11, while on the latter date, 400 were seen near the small islands and shoals on the south side of Long Island Sound.

Nearctic Mandt's Guillemot, *Cepphus grylle ultimus* Salomonsen.

The small, rocky, boulder-covered islands along this coast should provide excellent nesting places for guillemots, but we did not examine any of the islands about which they appeared most numerous.

Packard (1891 p. 441) records that Drexler obtained specimens at Fort George on July 17, 1861, and an adult female listed in the British Museum catalogue (Sharpe & Ogilvie-Grant 1898 p. 585) as from Fort George, British Columbia, July 15 (C. Drexler), was also probably taken at the Fort George on east James Bay. Stejneger (1884 p. 222) gives the exposed culmen length of a male and female taken by Drexler at St. [Fort] George on July 19 as 28mm. and 27mm., respectively which place them within the range of *C.g.ultimus* (Cf. Salomonsen 1944 p. 94). Seventeen specimens from Sunday Island and Bare Island are also referred to this race (Manning MSb).

***Passenger Pigeon,** *Ectopistes migratorius* Linnaeus.

According to Low (1896b p. 325L), this now extinct species was very rare in the Labrador Peninsula, but eggs were obtained at Fort George in 1887. A white egg measuring 40.5mm. x 32mm. with "Fire Hawk, 18 May, 1887, at G. Pond" pencilled on it is now in the National Museum. An accompanying label states that it is a Passenger Pigeon's egg taken at Fort George by Miles Spence. Presumably this is one of those referred to by Low.

Snowy Owl, *Nyctea scandiaca* (Linnaeus).

According to local information, the Snowy Owl is sometimes very numerous on this coast in the spring and fall. It is for this species in particular that the Indians set steel traps on the top of upright logs on the barren points and islands.

American Hawk Owl, *Surnia ulula caparoch* (Müller).

On July 8, an owl thought to be of this species was seen on Island A. On July 16, a male (testis 5mm. x 2mm.) was collected on the Paint Hills Islands. It was flushed from a lone white spruce below the rocky hill. The stomach contained the remains of a small passerine bird.

Short-eared Owl, *Asio flammeus flammeus* (Pontopiddan).

Between June 28 and July 14, 9 Short-eared Owls were seen at Moar Bay. On July 2, a male (testis, 7mm.) and a female (largest ovum, 1mm.) were collected. The stomach of the male contained the remains of a small rodent; that of the female, only fur. Both were very thin.

Richardson's Owl, *Aegolius funereus richardsoni* (Bonaparte).

A male Richardson's Owl (testis, 4mm.) was collected in a dense stand of white spruce at Paul Bay on July 25.

Northern Flicker, *Colaptes auratus luteus* Bangs.

The Yellow-shafted Flicker is moderately common in the spruce woods along this coast and probably throughout the inland region. Spreadborough (Macoun & Macoun 1909 p. 346) observed a few as far north as Fort George in June 1896.

Between June 29 and July 14, 23 adult Yellow-shafted Flickers (♂, ♀, collected) were seen at Moar Bay. On July 8, a nest was found in a hole in a dead spruce on Sheppard Island, and on July 11, we collected 3 of the 6 nestlings which were then almost ready to fly. Their stomachs contained ants and ant pupae. At Paul Bay, we saw two flickers on July 23, one on July 24, one on August 3, and one on August 20. Three were seen in the spruce woods at the Roggan River on August 13, 8 (one juvenile male collected) were seen together at Walrus Peninsula on August 27, and one was flushed from an isolated spruce on the Paint Hills Islands on August 30.

The measurements of our specimens were: adult ♂, wing chord, 156mm., tail, 101mm., tarsus, 29mm., total culmen, 35mm. Adult ♀, wing chord, 152mm., tail, 92mm., tarsus, 27mm., total culmen, 35mm. Juvenile ♂, wing chord, 153mm., tail, 100mm., tarsus, 27.5mm., total culmen, 33mm. Even after allowance has been made for the worn plumage of the adults and incomplete growth of the juvenile, these measurements agree better with those given by Ridgway for *C.a.luteus* than those for *C.a.borealis.* They are intermediate between two larger and one smaller specimen obtained by Godfrey (1949) from the Lake Mistassini region almost a degree farther south. This suggests that the size range in the Labrador Peninsula population is large, and strengthens Rand's objection (1944a) to the recognition of *C.a.borealis.*

American Three-toed Woodpecker, *Picoides tridactylus bacatus* Bangs

The American Three-toed Woodpecker was seen only at Moar Bay, where a female (largest ovum, 0.5mm.) was collected on June 30, and a male (testis, 4mm.) on July 1. Another female (largest ovum, 1.3mm.) was collected on July 3. Wing chord measurements: ♂, 112mm., ♀♀ 110mm., 114mm.

Eastern Kingbird, *Tyrannus tyrannus* (Linnaeus).

On July 1, a male Eastern Kingbird (testis, 10mm. x 7mm.) was collected in the little marsh near our camp at Moar Bay.

Alder Flycatcher, *Empidonax traillii traillii* (Audubon).

A female Alder Flycatcher (wing chord, 65.5mm.) was collected in the willow and alder thickets at the mouth of the Piagochiwi River on July 24.

Northern Horned Lark, *Eremophila alpestris alpestris* (Linnaeus).

Horned Larks undoubtedly nest on the barren islands and points at least as far south as Moar Bay. South of there nearly all the coastal islands are wooded. Spreadborough (Macoun & Macoun 1909 p. 391) found Horned Larks common and breeding on the rocky islands of the east James Bay coast, and under 'museum specimens' Macoun (1903 p. 362) lists a set of three eggs collected by

Table 15. POPULATION DENSITIES OF NORTHERN HORNED LARK.

Locality	Dates	Time	No. observed	Remarks
Small island at N. end Moar Bay ..	July 15		Total population, 4	♂♀ collected
Paint Hills Is.	July 16,	3 hrs. on barrens	6 (=15 per sq. mi.)	♂♀ "
	Aug. 29-30	11½ " " "	15 (=10 " " ")	♂ "
Pointe au Huard	July 17	2½ " " "	1 (= 3 " " ")	
Kakachischuan Pt. ...	Aug. 1	10 " " "	8 (= 6 " " ")	2♂♂, ♀ "
	Aug. 17-18	11 " " "	50 (=35 " " ")	
Roggan River	Aug. 12-15	18 " " "	10 (= 4 " " ")	♀ "

Table 16. POPULATION DENSITIES OF LABRADOR JAY.

Locality	Dates	Time	No. observed	Remarks
Moar Bay, including Sheppard Is. and Poplar River	June 27-July 14	51 hrs. in or near spruce	66 (=10 per sq.mi. of habitat)	6♂♂, 2♀♀ 1 sex ? collect.
Moar Bay	Sept. 2	3 " " "	2 (= 5 " " ")	
Walrus Pen.	Aug. 27-28	9 hrs. in spruce	12 (=10 " " ")	♂ "
Stromness I.	July 20	3 hrs, in or near spruce	1 (= 3 " " ")	
Paul Bay	July 22-Aug. 6	31 hrs. in spruce	10 (= 3 " " ")	3♂♂, 2♀♀ "
	Aug. 18-24	17½ " " "	13 (= 6 " " ")	4♂♂, 2♀♀ "
Roggan River	Aug. 31	3 " " " "	1 (= 3 " " ")	

Spreadborough on an island in James Bay on July 18, 1896. On that date Spreadborough was between Factory River and the Paint Hills (Low 1896a). This set of eggs is not now in the National Museum.

It will be seen from the table that we saw no Horned Larks at the south end of Moar Bay, although we examined some suitable terrain on Sheppard Island and Island A. Flying juveniles were first seen at Kakachischuan Point on August 1, and thereafter juveniles made up about a third of the numbers given in Table 15.

Tree Swallow, *Iridoprocne bicolor* (Vieillot).

On July 6, 5 Tree Swallows were seen flying over or near the mouth of the Poplar River.

Bank Swallow, *Riparia riparia riparia* (Linnaeus).

On August 13, 3 Bank Swallows were seen near the abandoned Hudson's Bay Company's post at the Roggan River, and an old nest was dug out of one of the several holes in the sandy cut bank of the river.

Spreadborough (Macoun & Macoun 1909 p. 580) says that this species was not common, but a few were seen in 1896 throughout the trip from Moose Factory across Ungava to the forks of the Koksoak River above Chimo. However, there may be a confusion here between this species and the Tree Swallow, since Spreadborough does not mention the latter north of Moose Factory, whereas Low (1896b p. 327L) reported that it was common in the interior of the Labrador Peninsula. At Lake Mistassini the Tree Swallow is the common swallow, and only one Bank Swallow was seen by Godfrey's party (Godfrey 1949).

Labrador Jay, *Perisoreus canadensis nigricapillus* Ridgway.

This species is a plentiful resident of the spruce forests of the coast and hinterland of this area. In 1896, Spreadborough (Macoun & Macoun 1909 p. 407) found them common throughout his journey from Moosonee to Ungava Bay. At Moar Bay we frequently saw some in the alder and willow at the spruce edge as well as around our camp. The latter, however, have not been included in the figures in the table. Juveniles comprised a little over half the total birds recorded in the table. Several jays were caught in fox and mouse traps, both at Moar and Paul bays.

Thirteen of our east James Bay specimens are in fresh fall plumage. These have been compared with two specimens of *P.c.nigricapillus* collected by D. F. Coates at Goose Bay, Labrador, on October 15, 1950, and 5 collected at Fort Chimo, Ungava Bay, by Hildebrand (1950) in March and April, 1948, as well as 6 comparable July and August specimens of *P.c.canadensis* from the Lake Mistassini region (Godfrey 1949), two from Swastika, central Ontario, taken September 15, 1950, one from the Mattawan River, P.Q., taken October 4, 1950, two from the Ottawa region, October 9, 1941, and November 6, 1933, and two from Gilmour, southern Ontario, October 4, 1941. Fresh typical *P.c.nigricapillus* as exemplified by the Chimo and Goose Bay specimens show a bluer, more slaty tinge on the dorsal surface, and are darker and more slaty below than the specimens of *P.c.canadensis* examined (Cf. Austin 1932). Our east James Bay material is somewhat intermediate, but clearly closer to *P.c.nigricapillus*.

Northern Raven, *Corvus corax principalis* Ridgway.

During our first few days at Moar Bay, two Ravens were frequently seen singly or together. These were probably a pair which were nesting near by. On July 2, 6, probably two adults and 4 young, were seen together. Some Ravens, most likely members of this family, were seen nearly every day after this, and on July 14, two juvenile males were collected. On July 6, a total of 10 Ravens were seen at different times near the mouth of the Poplar River. Between July 19 and 20, 3 flew over Stromness Island, and we saw 3 more on walks at Paul Bay between July 22 and 24. On July 27, we twice passed a small, barren rocky island 1½ miles from our Paul Bay camp. There were 3 Ravens on this island in the morning and 10 in the evening. When we again passed on August 1, there were 15, but we could find nothing there to attract them. On August 1, we also saw 5 on Kakachischuan Point. Seven Ravens were seen on August 7 and 8 between Paul Bay and Cape Jones; one at the Roggan River on August 12 and 13; 6 at Paul Bay betwen August 22 and 23; one at Walrus Peninsula on August 28; and one between there and the Paint Hills Islands on August 29.

Hudsonian Chickadee, *Parus hudsonicus hudsonicus* Forster.

Five Hudsonian Chickadees were seen together (two juvenals collected) at Paul Bay on July 22, and another on July 26. Between August 27 and 28, 4 Hudsonian Chickadees (two ♀ post-juvenals collected) were seen at Walrus Peninsula.

Red-breasted Nuthatch, *Sitta canadensis* Linnaeus.

A single female juvenile Red-breasted Nuthatch was collected in the small spruce grove on the Paint Hills Islands.

Black-backed Robin, *Turdus migratorius nigrideus* Aldrich & Nutt.

Robins are fairly common near the edge of the spruce along the coast, but probably less numerous inland. Spreadborough (Macoun & Macoun 1909 p. 749) found them common throughout his journey from Moose Factory to Fort Chimo.

Most of the robins recorded at Moar Bay were seen when they were out feeding in the marshes or other open ground, and their nests were probably in the spruce woods at the edge of the open spaces. Robins were fairly evenly distributed in suitable places in the Moar Bay region, but they were commonest on Sheppard Island, where on July 4, 7 were visible at one time feeding on the barren northeast point. We saw none at the Roggan River, perhaps because their southward movement had started before our arrival on August 11.

Our 9 June and July males from Moar and Paul Bays were compared with 3 June male *T.m.nigrideus* from Newfoundland. Five of the former agree closely with the Newfoundland birds, 3 resembled typical *T.m.migratorius* of the Ottawa region, and one is intermediate. The majority of the Moose estuary and west James Bay males are pale-backed (Manning MS), and the boundary between the two races is probably at the bottom of James Bay between the Moose River and Rupert Bay. However, typically dark-backed individuals have been

Table 17. POPULATION DENSITIES OF BLACK-BACKED ROBIN.

Locality	Dates	Time	No. observed	Remarks
Moar Bay, including Sheppard I. and Poplar River	June 27-July 14	97 hrs. observing	160 (=15 per sq.mi.)	10♂♂, 3♀♀ collected
Stromness I.	July 19-20	9 " "	4 (= 4 " " ")	
Fort George	Aug. 4		6	
Paul Bay	July 22-Aug. 6	63 " "	45 (= 6 " " ")	♀ "
	Aug. 19-23	27 " "	5 (= 2 " " ")	♂ "
Walrus Pen.	Aug. 27-28	13 " "	10 (= 6 " " ")	
Paint Hills Is.	Aug. 31	17½ " "	1	♂ "

collected near the northern extremity of the species range well to the west of Hudson Bay (Manning MS), while pale-backed robins probably occur through much of the western part of the Labrador Peninsula. Our east James Bay robins showed no correlation between dark backs and dark breasts. With one possible exception, our 5 juveniles did not show larger or darker breast spotting than comparable Ottawa specimens.

Eastern Hermit Thrush, *Hylocichla guttata faxoni* Bangs & Penard.

A female Hermit Thrush (largest ovum, 1mm.) was collected at Moar Bay on June 30, and another was seen there on July 4. Three birds, probably of this species, were seen on Stromness Island between July 19 and 20.

Olive-backed Thrush, *Hylocichla ustulata swainsoni* (Tschudi) .

In June, 1896, Spreadborough (Macoun & Macoun 1909 p. 741) found the Olive-backed Thrush along the James Bay coast as far as Fort George, and Baird (1874 p. 21) lists a specimen collected [by Drexler?] at Fort George on July 11, 1860. We saw 3 at the Poplar River on July 8, and a female (largest ovum, 4mm.) was collected.

Eastern Ruby-crowned Kinglet, *Regulus calendula calendula* (Linnaeus).

The Ruby-crowned Kinglet is one of the commonest and most evenly distributed species of the main spruce woods of the region. It is also abundant inland (Godfrey 1949; Manning 1949). It was as common on Sheppard Island as on the mainland, but we saw none amongst small isolated spruce stands such as those on Stromness Island or the Paint Hills Islands. Spreadborough (Macoun & Macoun 1909 p. 729) observed it at Fort George on June 20, 1896.

American Pipit, *Anthus spinoletta rubescens* (Tunstall).

In 1896, Spreadborough (Macoun & Macoun 1909 p. 684) found American Pipits common on the high, rocky islands in east James Bay. This may refer to the Paint Hills Islands which are the only ones near the mainland which can be called high, but it is fairly certain that the American Pipit also nests on some of the lower rocky islands.

The two American Pipits collected at Moar Bay on July 8 may have been nesting on Island A. Pipits were also very likely nesting on Stromness Island. Those seen at the Roggan River, Kakachischuan Point, and

Table 18. POPULATION DENSITIES OF EASTERN RUBY-CROWNED KINGLET.

Locality	Dates	Time	No. observed	Remarks
Moar Bay including Sheppard I.	June 27-July 14	35½ hrs. in spruce	36 (= 45 per sq.mi.)	6♂♂, ♀ collected
Paul Bay	July 22-31	31 " " "	13 (= 20 " " ")	♀ "
	Aug. 19-22	17½ " " "	10 (= 20 " " ")	
Walrus Pen.	Aug. 27-28	9 " " "	46 (=100 " " ")	1 sex ? "

Table 19. POPULATION DENSITIES OF AMERICAN PIPIT.

Locality	Dates	Time	No. observed	Remarks
Sheppard I. and Island A	July 8, 13, 14	12 hrs. on barrens	10	4♂♂, 2♀♀ collected
Sheppard I.	Sept. 2	¼ " " "	40	
Stromness I.	July 20	5 " " "	7	♀ "
Roggan River	Aug. 15	18 " " "	40	
Kakachischuan Pt.	Aug. 17-18	11 " " "	34	
Paint Hills Is.	Aug. 30-Sept. 1	11½ " " "	108	

Table 20. POPULATION DENSITIES OF NORTHERN YELLOW WARBLER.

Locality	Dates	Time	No. observed	Remarks
Poplar River	July 6	6½ hrs. in habitat	3 (= 15 per sq.mi.)	
Stromness Har.	July 19	5 " " "	3 (= 20 " " ")	♂ collected
Paul Bay (near camp)	July 24	24 " " "	1 (= 1 " " ")	♀ "
Paul Bay (pen.)	July 27	2 " " "	6 (= 90 " " ")	3♂♂, ♀ "
Paul Bay (I.)		2 " " "	13 (=150 " " ")	
Kakachischuan Pt.	Aug. 1	5 " " "	14 (= 80 " " ")	♂, ♀ "
	Aug. 18	5 " " "	2 (= 20 " " ")	
Paul Bay (I.)	Aug. 18	1 " " "	1 (= 30 " " ")	♀ "

the Paint Hills Islands were in small flocks, usually near the shore, while the 40 seen on Sheppard Island on September 2 were in one flock.

Tennesse Warbler, *Vermivora peregrina* (Wilson).

Packard (1891 p. 412) records that Drexler obtained specimens at Fort George in June and July, 1860, and Baird (1874 p. 179) lists one collected there on July 11, 1860. On July 6, we saw 6 Tennessee Warblers in the willow thickets near the Poplar River, and a male (testis, 4mm.) was collected.

Orange-crowned Warbler, *Vermivora celata celata* (Say).

On June 28, a male Orange-crowned Warbler was collected at Moar Bay, and between July 27 and August 3, 8 (3 ♂♂, ♀ collected) were seen at Paul Bay. The 4 males, probably through chance sampling, average slightly more yellow than a comparable series from Manitoba (Ilford, Douglas, and Shoal Lake). Average wing chord measurement of the 4 worn males is 60.8mm. (59.5mm.—62.5mm.), and the females, 56.5 mm.

Northern Yellow Warbler, *Dendroica petechia amnicola* Batchelder.

No Yellow Warblers were seen near our Moar Bay camp. and they were scarce or absent in the willow and alder thickets along the river and edge of the mainland spruce at Paul Bay, but in the alder thickets on the islands and on the peninsula 1½ miles west of our camp they were abundant. By August 18, their numbers had considerably decreased.

Spreadborough (Macoun & Macoun 1909 p. 624) found the Yellow Warbler common along the east James Bay coast in June 1896, and on June 23, when between Paul Bay and the Roggan River (Low 1896a) he found a nest containing 4 eggs (nest and 2 eggs now in the National Museum). Drexler obtained a specimen at Fort George on July 12, 1860 (Packard 1891 p. 412).

Table 21. POPULATION DENSITIES OF EASTERN MYRTLE WARBLER.

Locality	Dates	Time	No. observed	Remarks
Moar Bay, including Sheppard I. and Poplar River	June 27-July 14	39 hrs. in spruce	38 (= 25 per sq.mi.)	9♂♂, 4♀♀ collected
Moar Bay	Sept. 2	At edge of spruce	6	3 sex ? "
Paul Bay	July 21-Aug. 3	31 hrs. in spruce	25 (= 25 " " ")	1 sex ? 4♂♂, 4♀♀,
	Aug. 20-24	17½ " " "	46 (= 50 " " ")	
Walrus Pen.	Aug. 27-28	9 " " "	80 (=150 " " ")	♀ collected
Paint Hills Is.	Aug. 30-Sept. 1	6 " " "	35 (= 90 " " ")	

Eastern Myrtle Warbler, *Dendroica coronata coronata* (Linnaeus).

The Myrtle Warbler is a common species in the spruce forests of the coastal region and hinterland. Fifteen of the 38 Myrtle Warblers recorded at Moar Bay were seen on June 27 when they were feeding in small groups amongst the small, scattered spruce and tamarack at the head of the little marsh near our camp. None were there the next day, and after that date they were usually seen in the main spruce forests where they were one of the commonest birds, especially in late August and September, when over three-fourths of those seen were juveniles. The first juveniles were seen at Paul Bay on July 25.

The average wing chord measurement of 11 males and 8 female adults is 73mm. (71mm.-77mm.), and 69mm. (66mm.-72mm.) respectively. The males, like those from Lake Mistassini (Godfrey 1949) and the west side of James Bay (Manning MS), have breasts heavily marked with black and are clearly referable to the eastern race.

Blackpoll Warbler, *Dendroica striata* (Forster).

Baird (1874 p. 193) lists a Blackpoll Warbler taken by Drexler at Fort George on July 7, 1860. Spreadborough (Macoun & Macoun 1909 p. 645) observed one there on June 20, 1896, and two more between there and Richmond Gulf.

We collected a male at Stromness Island on July 20, one was seen at Paul Bay on July 22 and 24, and 6 adults were seen on the peninsula 1½ miles to the west of our camp on July 27: a male, a female and a nestling were collected.

Our single female can be matched both by specimens from Newfoundland and from Yukon Territory. The black dorsal streaks of the male are as wide and long and prominent as those on any specimen in a series of eight from Newfoundland. However, this character is not constant in specimens from the intervening region.

Palm Warbler, *Dendroica palmarum palmarum* (Gmelin).

Baird (1874 p. 208) lists a Palm Warbler collected at Fort George in 1861. We obtained one in post-juvenal plumage at Spit Island, 20 miles south of Long Point on September 4. It agrees well with comparable material from the Moose River estuary (Manning 1951) and from Manitoba and Saskatchewan and is therefore tentatively referred to the western race. However, the only specimen collected by Godfrey (1949) from Mistassini post has the typical yellow plumage of *D.p.hypochrysea.* Godfrey (Godfrey and Wilk 1948) considered his Lake St. John specimens somewhat less yellow than birds from the maritime provinces, and it is possible that the boundary between the two races lies in the region just east of James Bay. Farther south, however, in the Ottawa region, the breeding race is *D.p.hypochrysea* (Rand 1944b).

Grinnell's Water-thrush, *Seiurus noveboracensis notabilis* Ridgway.

Spreadborough (Macoun & Macoun 1909 p. 659) found the water-thrush common at Fort George in 1896, but rare farther north. On July 6, we saw 4 (♂ collected) in the willow thickets near the mouth of the Poplar River. Godfrey (1949) has shown that this supposedly western race breeds across the northern portion of the species range at least as far east as Lake Mistassini.

Yellow-throat *Geothlypis trichas* ssp.

One Yellow-throat was seen at Moar Bay on June 30 and on July 14, and one at Paul Bay on July 23 and 24. Presumably the same race is represented here as in the region of Lake Mistassini and Moose River estuary. Three adult males from the former region and one from the latter agree well in colour with 10 comparable but worn males from the Ottawa region. The upper parts of this group are greyer and average less yellowish than two New Brunswick males, but sufficient material is not available to check the conclusions drawn by Oberholser (1948), who has separated Ontario and Quebec birds under the names *G.t.ontarionicola* and *G.t.quebecicola.*

Wilson's Warbler, *Wilsonia pusilla pusilla* (Wilson).

Baird (1874 p. 241) lists a Wilson's Warbler collected by Drexler at Fort George on September 3, 1860, and Spreadborough (Macoun & Macoun 1909 p. 673) observed one there on June 20, 1896. He saw none north of there.

On July 19, a male Wilson's Warbler was collected on Stromness Island. At Paul Bay, 5 (3 ♂♂, ♀, 1 sex ?) were seen amongst the

The highest hill on the eastern end of Walrus Island. (Paint Hills Islands). August 30, 1950.

Looking west along the shore past the Paul Bay camp from the northern side of the Piagochiwi River. August 22, 1950.

Kakachischuan River. August 1, 1950.

Scattered clumps of white spruce about three miles inland on the coastal barrens at the Roggan River. August 14, 1950.

Table 22. POPULATION DENSITIES OF COMMON REDPOLL.

Locality	Dates	Time	No. observed	Remarks
Paint Hills Is.	Aug. 30	15 hrs. in habitat	6 (= 10 per sq.mi.)	
Stromness I.	July 20	9 " " "	10 (= 20 " " ")	♂, ♀, collect.
	Aug. 26	6½ " " "	1 (= 4 " " ")	♀ "
Paul Bay	July 24-Aug. 3	35 " " "	21 (= 15 " " ")	1 sex? "
	Aug. 19-24	15 " " "	4 (=0.7 " " ")	
Kakachischuan Pt.	Aug. 1, 7	7 " " "	27 (= 80 " " ")	3 ♂ ♂ "
	Aug. 17-18	5 " " "	8 (=40 " " ")	
Roggan River	Aug. 12	20 " " "	2 (=2.5 " " ")	

willow and alder between July 22 and 25, and 4 (♂ collected) between August 20 and 24. A fledgling was also collected at Paul Bay on July 22.

Rusty Blackbird, *Euphagus carolinus* (Müller).

On July 6, a Rusty Blackbird was seen amongst the willow at the mouth of the Poplar River, and on July 22, 15 (juvenile ♂ collected) were seen near the small marsh at Paul Bay. One was seen near Fort George settlement on August 4.

Common Redpoll, *Acanthis flammea flammea* (Linnaeus).

Ten of the 18 Redpolls recorded at Paul Bay were seen on the peninsula half a mile west of our camp or on a small island near there. Most of the others were observed on the top of the rocky ridge behind our camp. The apparent scarcity of Redpolls on Kakachischuan Point on August 17 and 18 compared to August 1 may have been due to the gale which was blowing on the former dates and which made small birds difficult to see. Drexler collected an adult female at Fort George (Sharpe 1888 p. 250).

White-winged Crossbill, *Loxia leucoptera leucoptera* Gmelin.

On July 8, two White-winged Crossbills (♀ collected) were seen on Sheppard Island. On July 25, a juvenile was collected at Paul Bay, and the next day another juvenile and an adult male were obtained. Bell (1882 p. 53) obtained a White-winged Crossbill at Fort George.

Churchill Savannah Sparrow, *Passerculus sandwichensis oblitus* Peters & Griscom.

Amongst the scrub on the small barren islands in Moar Bay, the larger barren islands and peninsulas farther north, and the mainland barrens at the Roggan River, Savannah Sparrows were the commonest birds. On the whole, however, they were less abundant than on the west James Bay Coast. We found them plentiful at the edge of the willow and alder thickets surrounding some of the marshes near the coast, but in the small marshes a mile or so inland they were much scarcer.

Spreadborough (Macoun & Macoun 1909 p. 498) found them tolerably common on the islands and shore of James Bay from Moose Factory to Richmond Gulf, but he saw none inland from there. At Paul Bay in July and early August we saw Savannah Sparrows only on our visit to the partly barren peninsula and small island a mile or two west of our camp and about the marsh surrounding the lake south of the Piagochiwi River. Towards the end of August, they were more generally distributed. At the Roggan River, Savannah Sparrows were most numerous in or near the smaller patches of alder and amongst the low dwarf birch of the barrens. In the taller alder they were outnumbered three to to one by the Tree Sparrows. A few Savannahs were seen inland of the Roggan River on August 14. A few juveniles were seen at Kakachischuan Pt. on August 1, and after that they probably accounted for about three-fourths of those recorded in the table.

Our specimens agree well both with topotypical material from Churchill and a large series tentatively referred to this race (Manning 1951) collected along the coast between there and the Moose River. Peters and Griscom (1948) also refer James Bay (Ontario) and Lake St. John specimens to *P.s.oblitus*. Godfrey (1949) refers breeding specimens from Lake Mistassini region and Lake St.

Table 23. POPULATION DENSITIES OF CHURCHILL SAVANNAH SPARROW.

Locality	Dates	Time	No. observed	Remarks
Moar Bay	June 27-July 12	31 hrs. in habitat	55 (= 35 per sq.mi.)	4 ♂♂, 5 ♀♀ collected
Sheppard I.	Sept. 2	4 " " "	15 (= 75 " " ")	2 ♂♂, 3 ♀♀ collected
Island A	July, 4, 8, 13, 14	14 " " "	29 (= 40 " " ")	
Poplar River	July 6		Total population: 25	
I. at N. Pt. Moar Bay	July 6	3 " " "	17 (=100 per sq.mi.)	2 ♂♂, ♀ "
Paint Hills Is.	July 15		Total population: 20	
Pte. au Huard	July 16	1 " " "	2 (= 40 per sq.mi.)	
Walrus Pen.	Aug. 30-Sept. 1	10 " " "	43 (= 85 " " ")	3 ♂♂, ♀ "
Stromness I.	July 17	4 " " "	60 (=300 " " ")	
	Aug. 27-28	4 " " "	8 (= 40 " " ")	
	July 19-20	9 " " "	9 (= 20 " " ")	
	Aug. 26	6½ " " "	4 (= 10 " " ")	
Paul Bay	July 27-31	13 " " "	16 (= 25 " " ")	2 ♂♂ "
	Aug. 18-24	7 " " "	33 (=100 " " ")	
Kakachischuan Pt.	Aug, 1, 7,	10½ " " "	160 (=300 " " ")	
	17, 18	11 " " "	100 (=200 " " ")	♀ "
Roggan River	Aug. 12-15	21 " " "	128 (=120 " " ")	2 ♀♀ "

John (Godfrey & Wilk 1948) to the same race. Breeding birds from Long Island, just north of James Bay, appear darker.

Slate-coloured Junco, *Junco hyemalis hyemalis* (Linnaeus).

The Slate-coloured Junco nests in the dense spruce forests of the coast and hinterland. Spreadborough (Macoun & Macoun 1909 p. 530) saw one June 18, 1896, when between Eastmain and the Paint Hills (Low 1896a), and found a pair breeding at Fort George a few days later.

Between June 27 and 30, Slate-coloured Juncos in small, loose groups were numerous at Moar Bay, especially around the small scattered patches of willow, alder, spruce, and tamarack at the landward end of the small marsh near our camp. By the beginning of July these had left, and thereafter most of the juncos seen were in the dryer parts of the main spruce woods. On July 2, a nest was found which contained an undeveloped egg and 3 young about two days old. One of these young had apparently left

Table 24. POPULATION DENSITIES OF SLATE-COLOURED JUNCO.

Locality	Dates	Time	No. observed	Remarks
Moar Bay	June 27-July 10	25½ hrs. in or near spruce	86 (= 70 per sq.mi.)	6 ♂♂, 3 ♀♀ collected
	Sept. 2	1 " " "	2	
Sheppard I.	July 4, 8, 13, 14	10 " " "	20 (= 40 " " ")	2 ♂♂ "
Poplar River	July 6	3½ " " "	1 (= 6 " " ")	
Paul Bay	July 21-Aug. 3	31½ " " "	26 (= 15 " " ")	♂ "
	Aug. 19-24	17½ " " "	36 (= 40 " " ")	♂, ♀ "
Walrus Pen.	Aug. 27-28	9 " " "	75 (=150 " " ")	
Paint Hills Is.	Aug. 30-Sept. 1	6 " " "	35 (= 80 " " ")	

Table 25. POPULATION DENSITIES OF EASTERN TREE SPARROW.

Locality	Dates	Time	No. observed	Remarks
Paint Hills Is.	Aug. 30-31	12 hrs. in habitat	8 (= 15 per sq.mi.)	♂ collected
Pte. au Huard	July 17	4 " " "	1 (= 5 " " ")	♂ "
Stromness I.	July 19-20	9 " " "	30 (= 60 " " ")	5 ♂♂, ♀ "
	Aug. 26	6½ " " "	6 (= 20 " " ")	
Paul Bay	July 26-29	30 " " "	11 (= 7 " " ")	
	Aug. 23	12 " " "	3 (= 5 " " ")	
Kakachischuan Pt. .	Aug. 1, 7,	7 " " "	54 (=150 " " ")	♂, ♀ "
	Aug. 17, 18	6 " " "	90 (=300 " " ")	
Roggan River	Aug. 12-15	21 " " "	104 (=100 " " ")	3 ♂♂, ♀ "

the nest by July 11, when the remaining two were collected.

Eastern Tree Sparrow, *Spizella arborea arborea* (Wilson).

Spreadborough (Macoun & Macoun 1909 p. 519) first observed Tree Sparrows a little north of Fort George where they became common and they were very abundant across Ungava from Richmond Gulf to Fort Chimo.

Although areas of scattered spruce and alder and dwarf birch scrub on the island at Moar Bay appeared to offer a suitable habitat for Tree Sparrows, we saw none during the breeding season south of Pointe au Huard, and it seems likely that they do not regularly nest south of that except perhaps on the Paint Hills Islands. From there northward there are many areas suitable for nesting on the points and islands, and north of the Kapsausis River they probably nest in considerable numbers back along the edge of the tree line and amongst the patches of alder on the barrens. On the barrens they liked the taller patches of alder, and were frequently seen in or near small patches of spruce, but never in the main spruce forest. About a quarter of the Tree Sparrows recorded above on August 1 and 7 on Kakachischuan Peninsula were juveniles, but the actual proportion of juveniles to adults was probably considerably larger since the juveniles kept well hidden in the dense alder. On later dates, at least three-fourths were juveniles, and the apparent increase in numbers at Kakachischuan Point on our last visit was probably due to the increased number of juveniles on the wing as well as to their being less secretive.

The specimens agree closely with a comparable series from east James Bay and southern Hudson Bay birds. The measurements of the adults are: 6 worn ♂♂, wing chord 74.5mm. (74mm.-75mm.), tail 66mm. (65mm.-67mm.); 2 worn ♀♀, wing chord 71mm. and 72mm., tail 64mm. and 65mm.; one adult ♂ in fresh fall plumage, wing chord 77mm., tail 70mm.

White-crowned Sparrow, *Zonotrichia leucophrys leucophrys* (Forster).

Spreadborough (Macoun & Macoun 1909, p. 511) first observed this species a short distance north of Fort George where they became common, and on June 23, 1896, when somewhere between Paul Bay and the Roggan River (Low 1896), he obtained a set of three eggs from an island (Macoun 1904 p. 480).

Although there appeared to be suitable habitat on Sheppard Island, we saw no White-crowned Sparrows south of the Paint Hills Islands, where they inhabited isolated scrubby spruce trees. At least two pairs nested near our camp at Paul Bay, but they were commoner on the more barren peninsulas and islands where they frequented the alder as well as scattered spruce. Their scarcity at the Roggan River was surprising, but it can be seen from Table 26 that they were less numerous at Kakachischuan on our second visit, and the majority may have left the Roggan River before we arrived. The first young were observed on Stromness Island on July 20. Two others were seen on Kakachishuan Peninsula on August 1: by that date most of the young White-crowned Sparrows had probably left their nests, but still kept themselves concealed in the dense alder. At the Roggan River and on later dates, over three-fourths of those recorded above were juveniles.

Table 26. POPULATION DENSITIES OF WHITE-CROWNED SPARROW.

Locality	Dates	Time	No. observed	Remarks
Paint Hills Is.	July 16	1 hr. in habitat	4 (= 60 per sq.mi.)	♂, ♀ collected
	Aug. 30-Sept. 1	4 hrs. in habitat	25 (=100 " " ")	3 ♂♂, ♀ "
Walrus Pen.	Aug. 28	3 " " "	6 (= 30 " " ")	
Stromness I.	July 19-20	9 " " "	16 (= 25 " " ")	3 ♂♂, ♀ "
	Aug. 26	6½ " " "	2 (= 5 " " ")	
Paul Bay	July 21-Aug. 5	33 " " "	44 (= 20 " " ")	3♂♂, 5♀ "
	Aug. 19	12 " " "	1 (= 1 " " ")	
Kakachischuan Pt.	Aug. 1	5 " " "	22 (= 60 " " ")	
	Aug. 17-18	3 " " "	6 (= 30 " " ")	
Roggan River	Aug. 14-15	18 " " "	8 (= 7 " " ")	

Of our 13 July adults, 3 (2 from Paul Bay and one from Stromness Harbour) have an uninterrupted eye stripe. The colouration of the back, however, differs in no way from the remainder of the series, nor from 3 June (migrant?) *Z.l.leucophrys* from the Moose River estuary and two comparable *Z.l.leucophrys* from Fort Chimo, Ungava Bay. One of the two specimens from the Paint Hills Islands taken in fresh fall plumage has a continuous eye stripe; the other, an interrupted one. Out of 16 specimens obtained farther north in western Ungava in 1944 and 1946, only one from Kinglet Lake had an uninterrupted eye stripe (Manning 1949). The name proposed by Todd for the eastern race has not been accepted for reasons previously given (Manning 1949).

White-throated Sparrow, *Zonotrichia albicollis* (Gmelin).

The White-throated Sparrow was a common nesting bird both on the mainland and on the island at Moar Bay, but at Paul Bay it was not seen on the outer peninsulas or islands, even though there was considerable dense spruce and alder on the former. In the vicinity of our Paul Bay camp, it occupied much the same habitat as the White-crowned Sparrow, but occasionally it was also seen farther inland up the Piagochiwi River.

Eastern Fox Sparrow, *Passeralla iliaca iliaca* (Merrem).

Fox Sparrows were observed most frequently where there was a mixture of alder patches and open or stunted spruce or dry, rocky ground. They were not, however, seen in the patches of tall alder which grew in otherwise barren areas such as Kakachischuan Peninsula. The first juveniles were seen on July 22, and after that date about half of

Table 27. POPULATION DENSITIES 0F WHITE-THROATED SPARROW.

Locality	Dates	Time	No. observed	Remarks
Moar Bay	June 27-July 11	56½ hrs. observing	60 (=15 per sq.mi.)	2♂♂, ♀ collected
	Sept. 2	4 " "	7 (=25 " " ")	
Sheppard I.	July, 8, 14, 15	28½ " "	15 (= 8 " " ")	2♂♂ "
Poplar River	July 6	12 " "	5 (= 6 " " ")	♂ "
Pte. au Huard	July 17	4 " "	4 (=15 " " ")	♂ "
Stromness I.	July 19-20	9 " "	3 (= 5 " " ")	♂ "
Paul Bay	July 21-Aug. 3	63 " "	23 (= 5 " " ")	♂, ♀ "
	Aug. 18-22	27 " "	7 (= 4 " " ")	

Table 28. POPULATION DENSITIES OF EASTERN FOX SPARROW.

Locality	Dates	Time	No. observed	Remarks
Moar Bay	June 28-July 3	56½ hrs. observing	3 (= 1 per sq.mi.)	♂ collected
Poplar River	July 6	12 " "	1 (= 1 " " ")	♀ "
Walrus Pen.	Aug. 28	13 " "	2 (= 2 " " ")	
Stromness I.	July 19	9 " "	1 (= 2 " " ")	♂ "
	Aug. 26	6½ " "	4 (= 9 " " ")	♂ "
Paul Bay	July 22-Aug. 6	63 " "	19 (= 5 " " ")	6 ♂ ♂ "
	Aug. 19	27 " "	1 (=.5 " " ")	

those recorded above were juveniles. Spreadborough (Macoun & Macoun 1909 p. 547) reported that they were common along the coast from the Moose River to Richmond Gulf.

Lincoln's Sparrow, *Melospiza lincolnii lincolnii* Audubon.

At Moar Bay, occasional Lincoln's Sparrows were seen in various habitats, but at Paul Bay they were usually observed half a mile or so inland amongst the willow which surrounded the open grass marshes about the larger lakes. At that distance inland, Savannah Sparrows were comparatively scarce, being only about equal in number to the Lincoln's.

Northern Swamp Sparrow, *Melospiza georgiana ericrypta* Oberholser.

Between June 28 and 29, 7 Swamp Sparrows (♂ collected) were seen on the mainland at Moar Bay, and 5 (♂ collected) on Sheppard Island between July 4 and 8. At Paul Bay one was seen on July 24, and a ♀ collected on July 31.

Lapland Longspur, *Calcarius lapponicus lapponicus* (Linnaeus).

A male in the British Museum collection was taken at Fort George on May 30, 1861 (Sharpe 1888 p. 584). Macpherson saw 8 Lapland Longspurs (♀ collected) on the Paint Hills Islands on September 1.

Eastern Snow Bunting, *Plectrophenax nivalis nivalis* (Linnaeus).

The Snow Bunting is known to residents as a spring and fall migrant. A male in the British Museum collection was taken at Fort George on April 26. (Sharpe 1888 p. 576).

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Table 29. POPULATION DENSITIES OF LINCOLN'S SPARROW.

Locality	Dates	Time	No. observed	Remarks
Moar Bay	June 28	56½ hrs. observing	5 (= 2 per sq.mi.)	2 ♂ ♂ collected
Sheppard I.	July 8	28½ " "	3 (= 2 " " ")	
Walrus Pen.	Aug. 28	13 " "	2 (= 3 " " ")	
Stromness I.	July 19-20	9 " "	4 (=10 " " ")	2 ♂ ♂ "
Paul Bay	July 24-30	63 " "	14 (= 5 " " ")	2 ♂ ♂, 2 ♀ ♀ "
	Aug. 19-20	27 " "	2 (= 1 " " ")	
Roggan River	Aug. 13	28 " "	1 (= .5 " " ")	

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ANNUAL MEETING OF THE OTTAWA FIELD-NATURALISTS' CLUB, 1951

Report of Council

Since the last Annual Meeting, there were four meetings of Council as follows, all held at St. Patrick's College: December 15, 1950, with 21 members present; March 9, 1951, with 20 members present; April 7, 1951, with 19 members present; November 16, 1951, with 22 members present.

Appointments were made for 1951 as follows:

Editor of the Canadian Field Naturalist — Dr. H. A. Senn.

Business Manager — Mr. W. J. Cody.

Chairman of the Publications Committee — Mr. A. E. Porsild.

Chairman of the Excursions and Lectures Committee — Miss Mary Stuart.

Chairman of the Reserve Fund Committee — Mr. Hoyes Lloyd.

Chairman of the Special Lectures Committee — Mr. R. Frith.

Chairman of the Membership Committee — Dr. V. E. F. Solman.

Chairman of the Bird Census Committee — Mr. J. S. Tener.

Chairman of the Library Committee — Mr. A. E. Porsild.

Chairman of the Macoun Field Club Committee — Mr. W. K. W. Baldwin.

Chairman of the Geological Excursion Committee — Dr. L. S. Russell.

Chairman of the Gatineau Park Committee — Dr. H. F. Lewis.

Representatives, Canadian Section, International Committee for Bird Preservation — Dr. H. F. Lewis, Mr. Hoyes Lloyd.

Report of the Publications Committee

During the period December 1, 1951, to December 1, 1951, six numbers of Volumes 64 and 65 of the Canadian Field-Naturalist were published, with a total of 233 pages. Papers, notes, and reviews were distributed as follows:

	Papers	Notes	Reviews
Botany	8	1	3
Herpetology	3	2	—
Ichthyology	—	3	2
Invertebrate Zoology	2	1	1
Mammalogy	3	6	5
Mineralogy	1	—	—
Ornithology	17	21	7
Miscellaneous	—	—	6

Thirteen maps and twenty-four other illustrations were used.

The business manager reported sales of back numbers totalling $713.45, including

one complete set and two partial sets, the largest sale of back numbers in the history of the Club.

Report of the Excursions and Lectures Committee

Four meetings of the Committee were held during the year to deal with winter programmes, summer excursions, publication of the Newsletter, and management of the Naturalists' Lodge and the three study groups.

Three indoor meetings were held as follows:

February 15 — At a meeting at the National Museum, Mr. J. Martin of Belleville spoke and showed a coloured film on the "Flora and Fauna of Repulse Bay".

April 10 — About 120 members and friends attended the annual dinner at the Central Experimental Farm. Dr. L. S. Russell spoke on "Fossil Hunters I have Known". The Tree, Bird, and Fern study groups and the Macoun Field Club provided interesting displays depicting their activities.

November 8 — At a members' night at the National Museum, Mr. W. J. Cody gave a talk on his summer spent in Alaska, and Mr. J. S. Tener on a survey he conducted on Ellesmere Island. The flora and fauna of both areas were illustrated by coloured slides.

There were eight meetings of the Bird Group, with an average attendance of about 30 members. Four early morning bird walks were held, under the leadership of Miss Mary Stuart and Messrs. A. E. Bourguignon, K. W. Bowles, and R. Frith. The breeding bird census started last year was continued, and a count of mourning doves seen in the area was taken. Miss Ann Banning was named chairman and Miss Betty Gordon, secretary, for the 1951-52 season.

Eight Saturday afternoon excursions were held at the following localities: Taylor's Hill (1); Field-Naturalists' Lodge (3); Central Experimental Farm (2); estate of the Late Rt. Hon. W. L. Mackenzie King, Kingsmere (2). Excellent leadership was provided by the three study groups, and attendance ranged from 20 to 50 persons. On May 24, the second anniversary of the Field-Naturalists' Lodge was celebrated by an all-day outing there, about 55 members attending.

The Fern Group, sponsored by Miss A. W. Anderson, met seven times. The active membership was 10 persons. Meetings of the Tree Group were held twice a month at the National Museum. During the summer, a survey was made of the native species of trees to be found on the Mackenzie King estate, and some collections were made which are to be mounted for the natural history museum being planned there by the Federal District Commission. The group has also undertaken to compile a list of the shrubs native to the Ottawa district and a field key for their identification.

The Field-Naturalists' Lodge was used extensively during the season. An official representative of the Club was at the Lodge each Sunday afternoon during June to lead informal walks.

Four copies of the Newsletter were issued during the year, totalling 28 pages with 42 articles. Reports of Council, committees, and excursions, and news items concerning members of the Club, were regular features. Assisted by the Newsletter committee, Miss Verna Ross was responsible for the first two issues, and Mrs. J. W. Groves for the last two.

Report of the Special Lectures Committee

Three Audubon Screen Tours completed the 1950-51 series. These were:

January 26 — The Riddle of Migration, by Roger Tory Peterson.

March 31 — Wilderness Mischief, by O. S. Pettingill.

April 21 — Wing Havens, by Alexander Sprunt.

The following lectures of the current season have already been held:

October 15 — Trails for Millions, by Allan D. Cruickshank.

November 24 — Canada North, by Bert Harwell.

Report of the Membership Committee

At a meeting held in February, it was decided that the committee should direct its efforts, as in 1950, toward increasing the local membership. To this end, descriptive leaflets and membership application blanks were arranged, and cards were prepared for use in a mailing list compiled from names of those present at the last screen tour. Leaflets were distributed at the birthday party at the Macoun Field Club on April 28, and with the club notices mailed out in May. Additional leaflets and application blanks were mailed to about 250 persons who

had left their names at the Audubon lecture of April 21.

Report of the Library Committee

Sales of the Club's library, handled by Mr. Bernard Amtmann, have totalled $369.00. Mr. Amtmann had originally agreed to handled this sale on a 40 per cent commission basis. It appears, however, that he grossly underestimated the difficulty and cost of selling this material, and that the single item of printing and distributing his catalogues alone cost $200.00. Approval was therefore given to the committee to accept an offer of $200.00 from Mr. Amtmann in full settlement of this transaction.

Report of the Bird Census Committee

The Christmas Bird Census was taken on December 31, 1950. A total of 33 species and 4,159 individuals was reported, including such unusual species as a winter wren, a meadowlark, and four song sparrows. A report of the census was published in Audubon Field Notes for April, 1951, and in two Ottawa newspapers. The Christmas Bird Census for all Canada was published in the March-April, 1951, issue of The Canadian Field-Naturalist.

Report of the Macoun Field Club Committee

During 1951, the M.F.C. was divided on the basis of age and experience into three groups of about 20 children each. Each group had 21 regular weekly meetings in three series, Winter, Spring, and Autumn. The two younger groups enjoyed seven excursions to points of interest in the Ottawa vicinity, while the High School group concentrated on their project area around the Champlain Bridge, being greatly helped and encouraged in the study of aquatic life through the assistance of Mr. E. Bousfield of the Museum staff.

The third anniversary of the Club was celebrated in April with a special meeting at which 19 members were presented with club badges. The speaker was the Rev. A. E. O. Anderson, and movies taken by the Canadian Wildlife Service were shown. M.F.C. exhibits were on display at the annual dinner of the O.F.N.C. A number of younger members assisted Dr. Douglas Leechman with his Eskimo lecture at the Museum by modelling Eskimo clothing and displaying implements. The first issue of the M.F.C.'s magazine "Ursa Minor — the Little Bear" has been produced, and a second issue is in preparation.

Report of the Geological Excursion Committee

About 30 persons took part in a two day geological excursion in the Ottawa district. On May 25, Dr. Morley Wilson conducted a tour which included stops at the Brucite mine of the Aluminum Company of Canada south of Wakefield, and other points of particular interest. On May 26, Dr. Alice Wilson conducted a tour of the Palaeozoic and Precambrian formations of the Ontario side of the Ottawa River. It is hoped that the outstanding success of this excursion will result in its becoming a regular annual activity of the Club.

Report of the Gatineau Park Committee

The committee has examined the Kingsmere estate on three separate occasions, and has prepared some preliminary recommendations on planting, general management, and the setting aside of about 500 acres in the more remote areas to be retained as a primaeval area.

(Signed)

J. W. GROVES, Pres. H. J. SCOGGAN, Sec.

NOTES AND OBSERVATIONS

The European Starling on Vancouver Island. — Two European Starlings (*Sturnus vulgaris*) were recorded at Victoria, B.C. on September 6, 1951, following a report by Fenwick Lansdowne of that city. The birds were roosting in a red cedar hedge when first observed, flying from there to the top of a small Garry oak where they remained under observation of the Museum ornithologist for the better part of an hour.

Due to city restrictions on the discharge of firearms, no specimen was collected on this occasion. From the number of reports received at the Museum during the past year it seems likely that the species is now established on Vancouver Island, and that specimen records will follow in short order. — *C. J. GUIGUET, Provincial Museum, Victoria, B.C.*

STATEMENT OF FINANCIAL STANDING
THE OTTAWA FIELD-NATURALISTS' CLUB, NOV. 26, 1951

CURRENT ACCOUNT

ASSETS		LIABILITIES	
Balance in Bank, Nov. 26, 1951	$2,510.29	Audubon Screen Tours (approx. guarantee)	$ 800.00
Bills Receivable	149.35	Balance	2,219.64
Lodge	360.00		
	$3,019.64		$3,019.64

Receipts			Expenditures	
Balance in Bank, Dec. 1, 1950		$3,774.69	Canadian Field-Naturalist	$2,437.00
Fees:			Editor	100.00
Current	$1,582.30		Business Manager	15.00
Advances & Arrears	173.91		Excursions & Lect. Com.	100.00
Assoc.	44.00		Newsletter	72.60
		1,800.21	Miscellaneous	173.59
Separates & Illustrations		546.40	Separates	539.73
Back Numbers		615.62	Illustrations	294.16
Miscellaneous		115.42	Postage & Stationery	246.10
Audubon Tours (net)		622.25	Bank discount	24.88
			To Reserve Fund	961.24
			Balance in Bank (Nov. 26, 1951)	2,510.29
		$7,474.59		$7,474.59

RESERVE FUND

ASSETS		LIABILITIES
Hydro-Electric Power Com. Ontario Bonds, 3%	$3,000.00	NIL
Bal. in Bank, Nov. 26, 1951	205.32	
	$3,205.32	

Receipts		Expenditures	
Bal. in Bank, Dec. 1, 1950	134.32	Purchase $1,000. H.E.P.C. Bond	$ 961.24
From Current Account	961.24	Rent Deposit Box	5.00
Bank Interest	1.00	Bal. in Bank, Nov. 26, 1951	205.32
Bond Interest	75.00		
	$1,171.56		$1,171.56

PUBLICATION FUND

ASSETS		LIABILITIES
Hydro-Electric Power Com. Ontario Bonds, 3%	$1,500.00	NIL
Bal. in Bank, Nov. 26, 1951	150.30	
	$1,650.30	

Receipts		Expenditures	
Bal. in Bank, Dec. 1, 1950	104.52		
Bank Interest	.78	Bal. in Bank, Nov. 26, 1951	$ 150.30
Bond Interest	45.00		
	$ 150.30		$ 150.30

Audited and found correct.

(Signed) HARRISON F. LEWIS,
I. L. CONNORS,
Auditors.

Nov. 27, 1951

RAYMOND J. MOORE,
Treasurer.

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Lectures on the first and third Monday evenings of each month will be held in the 4th floor Board Room of the Free Press. Friday evening lectures will be held in Room 200 of the University Extension Service, Memorial Boulevard, Winnipeg. Field Excursions are held on Saturdays or Sundays during May, June and September, and on public holidays in July and August. Membership fee: $1 a year for adults; 25 cents for juniors.

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Meetings are held at 8.15 p.m. on the first Monday of each month from October to May at the Royal Ontario Museum, unless otherwise announced. Field trips are held during the spring and autumn and on the second Saturday of each month during the winter.

VANCOUVER NATURAL HISTORY SOCIETY

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All meetings at 8 p.m., Room 100, Applied Science Building, University of British Columbia, unless otherwise announced.

McILWRAITH ORNITHOLOGICAL CLUB LONDON, ONT.

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Meetings are held at 8.00 p.m. in the Public Library building on the second Monday of each month from September to May.

Field trips are held during the spring and a special excursion in September.

PROVINCE OF QUEBEC SOCIETY FOR THE PROTECTION OF BIRDS INC.

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BIRD MIGRATION ALONG THE LAKE ONTARIO SHORE OF THE NIAGARA PENINSULA [1]

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Vineland Station, Ontario

IT HAS long been known that the Great Lakes affect bird migration, both by affording channels for waterfowl and by diverting the paths of land birds. The following notes are offered in the hope that someone will eventually correlate all the scattered data to give a more complete picture of migration routes through this region. They are based on approximately fifteen years' observations in the Niagara Peninsula, mostly at the Horticultural Experiment Station, Vineland Station, on the southern shore of Lake Ontario in Lincoln County, approximately 17 miles west of the mouth of the Niagara River and 20 miles from the western end of the lake. Except where some other locality is mentioned, all observations that follow refer to this vicinity.

WATERFOWL

Migrating water birds generally pass westward along the shore in spring and eastward in the fall. The Red-breasted Merganser, *Mergus serrator* L., outnumbering the combined totals of all other waterfowl, is the most conspicuous example. From late March until well into May and often in diminishing numbers until nearly the end of the month, many thousands pass to the west. Especially on dull rainy mornings, flock after flock will stream along for hours. This movement is interrupted from time to time when large numbers remain more or less stationary for several days, and on these occasions there may be much local movement either way or even for short periods in a predominantly eastward direction, as on April 9, 1945, when over 700 flew eastward during 40 minutes in the evening to join a large aggregation near Port Dalhousie where they presumably spent the night.

The earlier flocks are composed almost entirely of males. In 1949, when more attention was given to this point, females did not appear in any numbers until after the middle of April and never at any time exceeded the males; in that spring at least, there was apparently a considerable excess of males among the local migrants.

Large numbers of Red-breasted Mergansers pass eastward during November, although the autumn migration is never as conspicuous as the spring one.

American Mergansers, *Mergus merganser* L., while by no means uncommon, are much less numerous than the red-breasted species; both follow the same routes in spring and fall.

Next to Red-breasted Mergansers, scaups are the most abundant ducks during the migration seasons, going west in large flocks in the spring and returning eastward in the fall. Both the Greater Scaup, *Aythya marila* (L.), and the Lesser Scaup Duck, *Aythya affinis* (Eyton), are represented, but the difficulty of distinguishing them has prevented any reliable estimate of their relative numbers.

The Pintail, *Anas acuta* L., is the only marsh duck that has been noticed migrating regularly in any numbers. Nearly every spring, flocks often of considerable size pass to the west in late March or early April. None have been observed in the fall.

Several other ducks, including Redheads, *Aythya americana* (Eyton); White-winged Scoters, *Melanitta fusca* (L.); Hooded Mergansers, *Lophodytes cucullatus* (L.); Baldpates, *Mareca americana* (Gmelin); and Mallards, *Anas platyrhynchos* L., appear to follow the same routes, particularly in the spring. All these species are not seen every year and their numbers are few, but in the aggregate they give additional evidence of the local directions of migration among waterfowl.

1 Received for publication May 3, 1951.

Vol. 66, No. 1, January-February, 1952, was issued August 29, 1952.

The lack of any observed undirectional movement by some species may or may not be significant. For example, Golden-eyes, *Bucephala clangula* (L.), are common on the open lake from November to April, yet they appear to move at random at all times and no marked migratory flights are evident. Old-squaws, *Clangula hyemalis* (L.), are common winter visitors on the Niagara River and other sheltered waters, but are among the rarest of ducks along the open lake at Vineland Station. Among some species the longer flights are probably made at night. This is undoubtedly true of the Black Duck, *Anas rubripes* Brewster, Blue-winged Teal, *Anas discors* (L.), and a number of others that are known to pass through the Peninsula.

Until 1949, overland flights of ducks from the south had been noted on only two occasions: a flock of nine White-winged Scoters at Vineland Station on May 9, 1936, and 22 Pintails at Grimsby on March 2, 1948. However, on March 20, 1949, a dull cloudy day, many flocks kept coming from the south, reaching the lake just west of Jordan where most of them swung westward and continued over the lake parallel to the shore. The majority were too distant to be identified but they included pintails, mergansers (probably red-breasted), and scaups. The first flocks were noticed about 8:30 a.m. and continued at irregular intervals until about 5:00 p.m. More than 15 flocks containing a minimum of 300 birds were noted during an intermittent watch, the greater number being seen in the forenoon. The following day heavy snow obscured any movement during most of the day but a flock of unidentified ducks came from the south as soon as the weather cleared in the late afternoon. It is altogether likely that transpeninsular migration is much more common than these few records would suggest; most of it probably takes place at night.

The lake has no obvious effect on the migration of Canada Geese, *Branta canadensis* L., except in affording a resting place for occasional flocks. They pass over the Vineland district in a generally northerly direction in the spring and southward in the fall.

The flocks of Whistling Swans, *Cygnus columbianus* (Ord.), that visit the Niagara River each spring are seldom seen in the Vineland area, either because they continue on a more northerly course or because they migrate largely at night. In 1938 a flock of 20 swans flew westward over Grimsby on March 20, and on March 29 two more passed in the same direction at Vineland Station.

GULLS

The migration of Herring Gulls, *Larus argentatus* Pontopp., and Ring-billed Gulls, *Larus delawarensis* Ord., is very noticeable in some years in the spring; for days at a time during March or early April loose flocks or single birds aggregating many thousands may move predominantly to the west, but in other years their flight is less conspicuous. The return migration in the fall is usually not very evident although considerable numbers of Ring-billed Gulls have been seen travelling east in late November. The passage of gulls in both spring and fall is obscured by the large numbers that patrol the beach at all seasons and change the direction of their flight according to the weather. Both Herring and Ring-billed Gulls move freely overland between the two lakes.

The larger flocks of Bonaparte's Gulls, *Larus philadelphia* (Ord.), move westward offshore in the spring and eastward in the fall, but small groups have a greater tendency to move in either direction. This species has never been seen to travel overland across the Peninsula.

HAWKS

The spring migration of hawks is one of the most interesting features of local bird life. From early March until past the middle of May the different species pass to the west in varying numbers, sometimes as solitary birds and again in mass flights on days when the weather is particularly favourable. The numbers seen by the writer vary widely from year to year, to a great extent because many pass over during office hours; he has often been told that "the sky was full of hawks", yet he may not have seen one that day. Nevertheless there appears to be an actual variation in the numbers passing through this particular locality, especially of those species whose flight is most influenced by weather conditions. Although this migration has been known for a long time it is only within the past few years that the writer has felt competent to name the majority of those seen, and many still pass unidentified. Anyone who has tried to hold his glasses still with aching arms while focussing on a distant speck in the

sky will realize the difficulty of identifying hawks during a major flight.

Most of the hawks have been seen from the vicinity of Port Dalhousie to Grimsby, within a mile of the lake shore, but during large flights several species have been noted as far as five miles from the lake. On April 4, 1948, when numbers of Red-tailed Hawks, *Buteo jamaicensis* (Gmelin), were passing over Grimsby, the writer drove west in an endeavour to trace their route in that direction and especially to learn whether they continued to the head of the lake or took a short cut to the opposite shore somewhere along the narrowing western extremity of the lake. Nine hawks were noticed along the Queen Elizabeth Way between Grimsby and the eastern end of Hamilton Beach, and a total of seven were sighted during short stops along the Beach. The last was noted at the canal bridge within about half a mile of the northwestern shore. By that time a storm was threatening and the flight was at an end. Hamilton Beach (or Burlington Beach) is a narrow sandbar about five miles long running in a general southeast-northwesterly direction, cutting off the western end of the lake and affording a convenient route between the two opposite shores. Although other species have not been followed much farther west than Grimsby, it is likely that they follow the same course as the Red-tailed Hawks. There has never been an opportunity to trace the source of the flight east of the old Welland Canal near Port Dalhousie, so that the course followed through the eastern end of the Peninsula is not known.

Broad-winged Hawks, *Buteo platypterus* (Vieillot), although probably not as numerous as Sharp-shinned Hawks, are the most conspicuous of the local migrants because of their habit of travelling in flocks. In most seasons they have been seen on only one day, some time between April 22 and May 5, the only exceptions among the last 11 years being 1949 when flight was noticed on April 25 and 27 and May 1; and 1950 when a few were seen on April 22 in addition to a large flock on May 5. Although some undoubtedly passed through unobserved on other days in previous years, the spring migration of this species is nevertheless limited to a very short period. It is also greatly affected by weather, the major flights always occurring on calm, warm and sunny days which produce the ascending convection currents in which these soaring hawks can fly most efficiently. If the sky becomes overcast or a strong wind arises the flight soon comes to an end. In cold wet springs, days favourable for soaring may not occur during the migration period, and few or none may be seen in such seasons. Possibly they move on a broader front in these years, for even in very bad weather an occasional straggler has been seen flying low and heavily against the wind.

Some idea of the numbers of broad-wings that pass through the district may be given by the following counts: 1944.—May 1, more than 120 from 10.30 to 11:30 a.m. 1945.—May 1, 2 or 3, the exact date unfortunately not recorded, 95 from about 2:30 to 3:00 p.m. (only a fraction of the number reported to have passed that day). 1946.—April 22, Grimsby, 88 between 10.15 a.m. and 1.30 p.m. 1947.—The weather throughout the flight period that year was very cold and wet; April 25, three; May 5, three flying low. 1948.—None seen, the weather again very unfavourable. 1949.—April 25, 94 between 12:30 and 1:30 p.m.; April 27, 93 between 12:45 and 1:30 p.m., many more during the rest of the day; May 1, Grimsby, 11 about 4:00 p.m. 1950.—May 3, Jordan Station, more than 70 within ten minutes, about 12:30 p.m. The great majority of the Broad-winged Hawks must pass through this district without stopping as they are very rarely seen perched even on days of heavy migration.

The spring flight of Red-tailed Hawks is usually somewhat smaller than that of the broad-wings but extends over a much longer period. The date when the first were seen ranged from March 7 to 29 during the past 7 years, but it is very unlikely that these were actually the earliest migrants in all years. The last may pass through as late as the first of May, usually in company with Broad-winged Hawks. A few red-tails may appear at any time during the migration period, but the great majority, like the Broad-winged Hawks, are concentrated in one to three major flights on calm warm days, although Red-tailed Hawks seem somewhat less exacting in their weather requirements and sometimes migrate in considerable numbers on overcast days. On March 30, 1950, numbers were seen following the edge of the Niagara Escarpment at Grimsby, soaring in the updraft from a cold northerly wind blowing against the cliff.

The following are records of typical flights: 1945.—March 30, 12 between 2:00 and 4:00 p.m.; April 1, five between 11:00 a.m and 12:30 p.m.; April 9, 12 between 1:00-1:25 p.m. 1946.—March 10, 12 observed during an intermittent watch. 1948.—March 20, a total of 69 counted at various points from Grimsby to Jordan Harbour, 55 of them between 2:30 and 4:00 p.m.; April 4, Grimsby, 15 from 1:30 to 1:45 p.m., others seen later west to Hamilton Beach. 1949.—March 29, 29 between 12:45 and 1:30 p.m. 1950.—March 30, Grimsby, 18 from 10:45 to 12:00 a.m. On April 12, 1949, a casual look through eight-power binoculars revealed a red-tail directly overhead, so high that it was quite invisible to the unaided eye. This was the only hawk observed that day. Whether any numbers pass unnoticed at such a height is of course not known, but it is at least an interesting possibility.

The Red-shouldered Hawk, *Buteo lineatus* (Gmelin), is a comparatively scarce migrant. The only occasion when any numbers have been seen was on March 25, 1944, when 30 were counted going west at Grimsby during about an hour in the afternoon. In most years seldom more than three or four have been noticed, usually between March 10 and April 25.

The Sharp-shinned Hawk, *Accipiter striatus* Vieillot, is probably the most abundant of the migrant species. Although the numbers actually seen in most springs are considerably fewer than those of the Broad-winged Hawk, they continue over a longer period and many fly so low that they cannot be seen at any distance. Getting records of the migration has been difficult because the flights are often confined to the working hours of the forenoon, so that even when they are noticed it has usually been impossible to make accurate counts. Sharp-shins are influenced by weather to a much lesser extent than the soaring hawks. They frequently fly quite low, ascending to pass over woods and groups of trees and descending again over open spaces; against strong winds they may fly only three or four feet above the ground. However, they are quick to take advantage of thermal currents and in favorable weather will soar upward in spirals to a great height in the same manner as the Broad-winged Hawks, which they often accompany. Flight generally begins early in the day, sometimes by 8:00 a.m., and often ends by noon, although it may continue until considerably later, especially on days suitable for soaring. Late in the afternoon after the main movement to the west has ended for the day, sharp-shins are often found resting in trees or making short erratic feeding flights.

The time when this species appears in the spring has been difficult to ascertain because its migration overlaps that of Cooper's Hawk, and many birds are seen under such circumstances that they cannot be distinguished. A few Sharp-shinned Hawks have been definitely identified in several seasons early in April; a few still earlier records may possibly have been wintering birds. From about April 20 to May 10 migrants pass through more or less continually in varying numbers, with stragglers continuing until past the middle of May and rarely to the end of the month. The peak of the migration is usually on one or more days between April 25 and May 6. On May 6, 1948, 16 were seen during one hour in the forenoon. On May 3, 1944, eight passed within 10 minutes shortly after 1:00 p.m. In 1945, on one of the days from May 1 to 3, 28 were counted within half an hour in the afternoon, during the flight of Broad-winged Hawks described previously. In 1949 the major flights of the sharp-shins again coincided with those of the broad-wings; 23 Sharp-shinned Hawks were seen between 12:30 and 1:30 p.m. on April 25, and 37 from 12:45 to 1:30 p.m. on April 27.

Cooper's Hawk is a regular spring migrant but is much less numerous than the Sharp-shinned Hawk. Migration appears to begin in late March; individuals have often been seen earlier but they did not follow any consistent course and had probably wintered in the vicinity. Seldom have more than one been seen in a day, but on April 1, 1945, six were recorded between 11:00 a.m and 12:30 p.m., and on March 29, 1949, nine accompanied a flight of Red-tailed Hawks between 12:45 and 1:30 p.m. and a few more were noticed later in the day. They continue to pass through the district during the greater part of April but during the latter half of the month are hard to distinguish from the much more numerous Sharp-shinned Hawks. The manner of flight of the two species appears to be identical; Cooper's Hawks usually fly low but on days suitable for soaring they may fly high along with red-tails in the same manner as the sharp-shins often accompany Broad-winged Hawks.

A few Marsh Hawks, *Circus cyaneus* (L.), follow the westward route through the Vineland district each spring, usually flying low, but like the accipiters, at times rising to a considerable height under suitable weather conditions. The greatest number seen during one day was four, between 1:00 and 1:25 on April 9, 1945, when they were accompanying Red-tailed Hawks. Migration extends from about the last week of March to the first week in May, the last migrants passing through at least two weeks after local breeding birds have occupied territory on their nesting grounds.

On March 31, 1937, a Marsh Hawk left the shore of Vineland Station and continued due north over the lake until out of sight, the only occasion on which a hawk of any kind has been seen to do so. If many Marsh Hawks cross the lake directly it may explain their relative scarcity along the westward route followed by other species.

Sparrow Hawks, *Falco sparverius* L., are the earliest to appear in the spring, the greater part of the migration taking place in March, but its duration is difficult to determine because migrants of this species are relatively few and it is a fairly common local resident in both summer and winter.

A single Pigeon Hawk, *Falco columbarius* L., going west on April 13, 1938, and another during a flight of Red-tailed Hawks on April 1, 1945, are the only positive spring records, although others seen at a distance on several occasions were probably this falcon. There are also only two spring records of the Rough-legged Hawk, *Buteo lagopus* (Pontopp.), on March 11, 1938, and April 10, 1949 despite a special watch for this hawk. Two Bald Eagles, *Haliaeetus leucocephalus* (L.), an adult and an immature bird, accompanying a large flight of Broad-winged and Sharp-shinned Hawks on April 26, 1949 were the sole representatives of the species that appeared to be definitely migrating in a westward direction; five others seen in spring during the past 12 years have been loitering or in at least one case going eastward. Five Ospreys, *Pandion haliaetus* (L.), recorded over a still longer period were likewise going in both directions.

An interesting and quite unexpected sight was a flock of five Turkey Vultures, *Cathartes aura* (L.), going west at Vineland Station on April 14, 1946, during a flight of Red-tailed Hawks. Another group of three, also with Red-tailed Hawks, was seen west of Grimsby on April 4, 1948. On both occasions the vultures were flying much lower than the hawks. In 1950, one was seen at Grimsby and another south of Beamsville on March 30, and one at Vineland Station on April 16; all were moving west.

Hawks of any kind are quite scarce in the Vineland district in the fall. A few of the locally breeding species may occur from time to time but they do not follow any particular route. Broad-winged Hawks have never been observed at this season. Bald eagles and Ospreys occasionally appear along the lake or at Jordan Harbour late in the fall.

OTHER LAND BIRDS

There is some evidence that a few diurnal migrants among the passerines travel westward along the same spring route as the hawks. The first few Crows, *Corvus brachyrhynchos* Brehm, at the beginning of the spring migration in late February and early March, usually come from the east, but very soon they form temporary roosts and their daily comings and goings make such a confusing pattern that later migration could be detected only by more careful watch than it has been possible to keep.

While the writer was on holidays at Grimsby during the week of March 21 to 27, 1948, he noticed that the majority of the Starlings, *Sturnus vulgaris* L., were going westward. This movement was most noticeable along the lake shore, where small groups of about 3 to 20 passed every few minutes on some mornings, flying quite low. In 1949 more attention was paid to starlings, as far as time permitted, and a very definite westward movement took place from the middle to the end of March, and possibly before and after this period. As with crows, directional migration of starlings is hard to distinguish from their daily movements to and from their communal roosts. In 1950, migratory flight was not obvious until April 4; as the weather cleared after a heavy rain during the night, many flocks of Starlings, together with great numbers of Cowbirds, *Molothrus ater* (Boddaert), Red-winged Blackbirds, *Agelaius phoniceus* (L.), and Bronzed Grackles, *Quiscalus quiscula* (L.), continued to pass west throughout the morning. No return flight occurred in the evening.

Swallows are well-known day migrants and might be expected in considerable numbers during the spring migration; actually they are relatively inconspicuous. Some Barn

Swallows, *Hirundo rustica* L., Tree Swallows, *Iridoprocne bicolor* (Vieillot), and Purple Martins, *Progne subis* (L.), are seen proceeding westward with steady level flight each spring but their numbers seem small in comparison with the local breeding populations, except in the case of the Tree Swallows which are very rare breeders in this district.

The presence of the lake has no apparent influence on the numbers of nocturnal migrants; the writer has had no experience elsewhere but there is little or no evidence that the number of most species of small land birds that migrate through the Niagara Peninsula differs greatly from that in other comparable parts of Ontario. One obvious effect of the lake, however, is on the time of night when southbound migrants first pass over. When the writer was in Toronto in 1938 he frequently heard birds over the University campus during October shortly after 10 p.m.; at Vineland Station they are generally not heard during fall migration until about midnight.

DESTINATION OF LOCAL MIGRANTS

A fuller explanation of how the local paths fit into the general pattern of migration in the Great Lakes Region must be left to someone who can assemble the data from other observers and from the literature, but the immediate source and destination of the migrants passing through the Vineland district is reasonably clear. The local movements of waterfowl conform to the general northwestern trend of the spring migration in Eastern North America along recognized flyways. The ducks may reach Lake Ontario either overland directly from the Atlantic coast or indirectly from western Lake Erie by way of the Niagara River, long known as a favourite rendezvous for ducks. Those seen at Vineland Station presumably follow the southern shore to the head of Lake Ontario and thence toward the northwest. The fall migration is the reverse of the spring one.

Hawks and possibly other land birds that avoid crossing large bodies of water are probably diverted around the eastern end of Lake Erie by the northeast-southwest trend of that lake. A short distance farther north Lake Ontario lies across their path; here the stream of migrants divides. Part of them proceed eastward, as Eaton (Birds of New York) reports that large concentrations of hawks occur in spring at Rochester and other points along the southern shore of the lake in New York State. Other turn to the west and pass through the Niagara Peninsula to the western end of the lake before again continuing northward.

In the fall, the large flights of hawks that are a well-known feature of the Toronto region miss the Vineland district completely, as they apparently continue south from the western end of Lake Ontario. Swallows likely take the same route at that season.

SUMMARY

Most ducks migrating along the northern shore of the Niagara Peninsula move westward in the spring and eastward in the fall. The fall migration is generally less conspicuous. The Red-breasted Merganser is the most abundant species. Gulls follow the same route. Canada Geese do not usually follow the shore. Hawks, chiefly Broad-winged, Red-tailed, and Sharp-shinned Hawks, migrate westward parallel to the shore in the spring but the autumn migration misses this district. Some other land birds, including crows, starlings, and swallows, follow the same route as the hawks in the spring but their migrations are less obvious.

NOTES ON THE BIRDS OF THE NORTH SHORE OF THE GULF OF ST. LAWRENCE [1]

IRA N. GABRIELSON
Wildlife Management Institute, Washington, D.C.

AT 6:00 a.m., June 4, 1947, our party (Dr. Harrison Lewis, Mrs. Gabrielson and myself) arrived on the Steamer "Matane" at Seven Islands on the north shore of the Gulf of St. Lawrence. This village is a few miles northeast of the point where the 50th parallel crosses the shore of the gulf which geographers consider the westernmost point on the gulf coast of the Labrador peninsula. We travelled from there to Blanc Sablon, the furthest east point in Canadian Labrador, a

[1] Received for publication November 6, 1951.

trip, which with the return journey, lasted until July 10. After spending June 4 and 5 at Seven Islands, we left that village on the 6th by the steamer "North Shore" arriving at Mingan about 7:00 p.m. There we boarded the 38-foot cruiser "Alca," the Canadian government boat used for bird protection patrol, for the remainder of the trip.

The principal objectives were to study waterfowl populations and the system of sanctuaries for eider ducks and other water birds established along this coast by the Canadian government.

We visited many places studied by Audubon and C. W. Townsend. Dr. Lewis had previously correlated the names used by these men with current geographic and local names, and it was easy to check our observations with their earlier ones. It was interesting to compare the present numbers of the birds with the enormous colonies described by Audubon and the dearth of birds described by Townsend. While present populations do not equal those described by Audubon, they certainly are in excess of the numbers reported by Townsend. Local inhabitants still eat both eggs and the birds when they can be secured. Therefore, the increase in numbers must be due largely to the protection furnished by the sanctuaries. With few exceptions, where local sentiment protects certain bird islands, the best colonies are located in the sanctuaries where wardens are stationed during the nesting period. In some sections, especially east of Harrington Harbour, we saw few water birds outside sanctuary areas. The egging and year around hunting practices, despite the efforts to control them, continue to cause scarcity of birds in otherwise suitable habitat. Some of the areas on which great colonies existed in Audubon's time are still completely birdless. Yet good populations of nesting water birds are now established in the sanctuaries and in some additional areas.

Since the character of this coast has been described many times, this report will confine itself to the present status of the birds. There are, however, some general observations which seem to be worth recording.

On June 4, Seven Islands was filled with snowbanks and the ground was snow-covered in the surrounding forest. Lakes were still frozen and wintry conditions prevailed. During the next few days Seven Islands, Mingan, and intervening villages were filled with birds. White-crowned sparrows, olive-backed and gray-cheeked thrushes, juncos, and white-throated sparrows predominated, but there were also many warblers, all having a hard time. In Seven Islands, remains of birds were everywhere, some killed perhaps by cats, others dying from starvation. On nearly every spot of bare ground, heads, feathers, and other fragments could be found. The local people generally remarked on the abundance of small birds in the towns from Comeau Bay to Mingan. When the weather moderated and the birds disappeared from the villages, we were impressed by the abnormal scarcity of breeding birds. Lewis's personal familiarity with the area accentuated this scarcity in his mind. It was sometimes possible to walk for hours without hearing more than one or two singing birds. Subnormal breeding populations were noted among the nesting sparrows, chickadees, woodpeckers, thrushes, and warblers.

As an example, between 4:00 and 5:00 a.m. on June 14, in fine weather, Lewis walked along the road from Natashquan warf to the village, a distance of a mile and a quarter, through varied country, partly open, partly second-growth coniferous woods, with two or three scattered houses and clearings, but recorded only the following singing birds: 1 robin, 1 black-poll warbler, 1 northern water-thrush, 1 northern yellow-throat, 1 savannah sparrow, 6 white-throated sparrows, 1 fox sparrow, 1 Lincoln's sparrow. Under conditions normal for that hour and season, there would have been three or four times as many robins, black-poll warblers, savannah sparrows, fox sparrows, and Lincoln's sparrows, as well as one of two singing individuals of each of the following species: yellow-bellied flycatcher, olive-backed thrush, ruby-crowned kinglet, yellow warbler, myrtle warbler, Wilson's warbler, white-crowned sparrow, and song sparrow.

The almost complete absence of bird song in June in many areas where the environment was favorable for passerine birds was striking. In such areas, however, one might obtain an occasional glimpse of a non-singing male. In some districts where such conditions were found, there was more bird song in July, and it is possible that late migrants did not establish territories until after mid-June. The presence of small, woodland-dwelling birds in abnormal environments, such as cliffs and bare outer islands, as late

as June 18 and 21, seems to indicate such behavior. These observations also suggest, however, that small birds that survived the severe spring weather were nevertheless affected by it, presumably by an extended period of food scarcity, so that they were delayed beyond the usual time in developing territorial behaviour.

Numerous white-crowned and white-throated sparrows, juncos, and olive-backed thrushes were found dead as well as a few remains of fox sparrows that obviously had come somewhat earlier, but which had suffered the same decimation. Chickadees and woodpeckers were scarce along the entire coast. Local inhabitants were unanimous in agreeing that it was one of the latest seasons on record, and there is little doubt that a serious local destruction of breeding birds occurred. In addition to the sparrows, myrtle warblers, the only bay-breasted warbler of the trip, and numerous other bird carcasses were found.

Another indication of the conditions during the first few days of June was the fact that warblers or sparrows could be found, outside the villages, only on the beaches. There juncos, white-crowned and white-throated sparrows, yellow warblers, northern water thrushes, black-poll warblers, and others congregated, working over the beach drifts in their efforts to find food.

There was also a marked scarcity of small mammals and a complete absence of grouse. No grouse and only an occasional rabbit were noted. Squirrels and mice were scarce, and there was a marked scarcity of raptorial birds. Local inhabitants told of a complete die-off of rabbits, and Mr. Salsman of Seven Islands said that rabbits had almost completely died off in his trapping area. He has regularly trapped them for food, taking between 700 and 800 annually. In the winter of 1946-47, he took only 58 on the same area. He reported there were no owls, hawks, mice, or shrews, although in the previous winter, shrews had been almost a pest in his cabin. With little variation similar conditions were consistently reported.

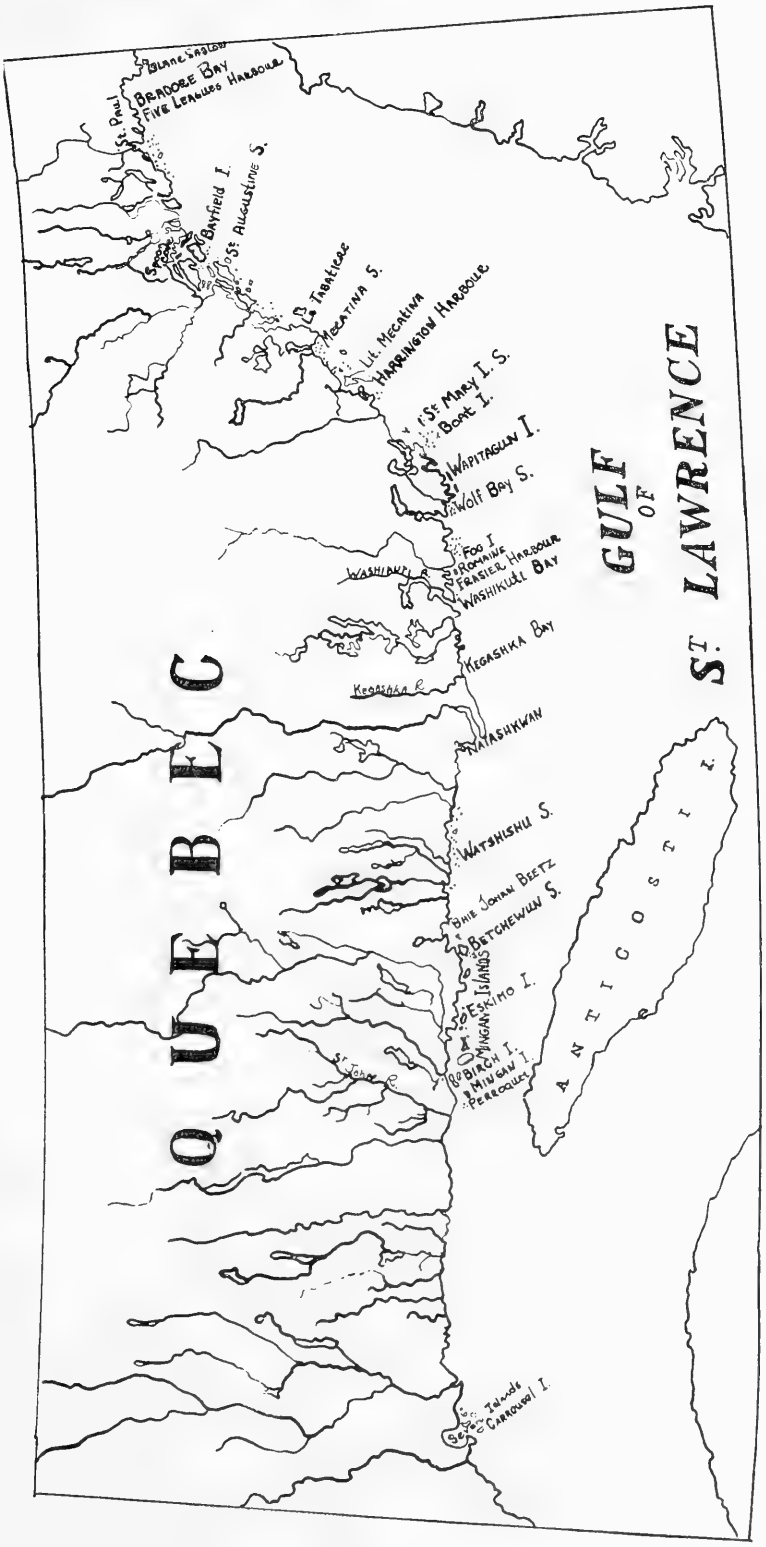
Another phenomenon frequently mentioned was the migration of foxes to the coast. Several sanctuary wardens reported an increase in fox depredations on bird islands. These foxes had crossed on the winter ice to some of the sanctuary islands and had stayed through the spring break-up. Naturally, they remained only on the larger islands which furnished cover and available food. On the first few islands visited numerous fox tracks and empty nests indicated that they were making some inroads upon the breeding gulls and eider ducks.

At La Tabatiere, well toward the eastern end of the trip, warblers and sparrows became more abundant, perhaps due to the fact that some had come via Newfoundland rather than down the St. Lawrence and along the north shore of the gulf. Apparently the decimation of the land forms did not extend to the water birds since their numbers seemed normal in the colonies visited.

The ten sanctuaries, around which our landings were centered, are, from west to east, Carrousel Island Sanctuary, near the village of Seven Islands; Birch Islands Sanctuary, in the western end of the Mingan Islands; Betchewun Sanctuary, consisting of one large and two small islands in the eastern Mingans; Watshishu Sanctuary, made up of small islands extending for eleven miles along the coast; Fog Island Sanctuary, a number of offshore islands; the Wolf Bay Sanctuary, several islands located in and near Wolf Bay; St. Mary's Sanctuary, four large islands and two small ones; Mecatina Sanctuary, a large number of islands lying off the mouth of the great Mecatina River; St. Augustine Sanctuary, again a large sanctuary covering a considerable area of coast line and including a large number of islands; and Bradore Bay Sanctuary, made up of Perroquet and Greenley Island situated on opposite sides of the point on which the village of Lourdes du Blanc Sablon is located.

On all except Bradore Bay Sanctuary eider ducks bred in numbers. These islands also contained the major colonies of the black-back and herring gulls, kittiwake, razor-billed auks, Atlantic murres, Atlantic puffins, and European cormorants. There were also a number of colonies of double-crested cormorants, ring-billed gulls, black guillemots, and terns. Although some colonies of nearly all species were located outside the sanctuaries, the great majority were concentrated on these protected areas, each with a resident warden during the nesting season. Small numbers of black ducks, pintails, green-winged teals, and red-breasted mergansers nest in some of the sanctuaries.

During the trip the weather interfered at times with observations, but it was better



Map of the North Shore of the Gulf of St. Lawrence.

than average for such country. There were comparatively few days in which the weather seriously interfered with work ashore, although occasionally storms made landings difficult and shore travel uncomfortable. However, by taking advantage of breaks in the weather, we visited many islands both in and out of the sanctuaries and made frequent stops in the mainland.

The following notes indicate the status and abundance of the birds encountered.

Gavia immer immer (Brünnich). Common Loon.

A few individuals were seen throughout the trip. Usually one or two were observed daily, although six were seen June 15 near the Washikuti River. We found no nests or evidence of breeding on the islands or mainland areas visited. The birds probably were breeding inland beyond the range of our activity but were feeding rather regularly in salt water.

Gavia stellata (Pontoppidan). Red-throated Loon.

This loon was well distributed, being seen nearly every day. Those to the westward were possibly nonbreeding birds which had not yet moved to breeding territories. A pair on Eskimo Island June 9 apparently had established territory on a little pond, but there was no evidence of a nest. The first nest was discovered June 17 on Fog Island Sanctuary, and in the next few days eight nests each containing two eggs and two with one egg each were found. All nests were on offshore islands and were built on small islets or small points in fresh water ponds. Even on the sanctuaries, the birds were wild, and only at St. Mary's Island could we approach close enough to see the incubating bird on the nest.

Morus bassana (Linnaeus). Gannet.

There were no gannet colonies on this shore, and we saw few individuals. The first were noticed east of Natashquan on the 14th where we observed seven birds. Single birds were seen on the 15th and 28th of June, and July 2. No others were noted until July 8 when a number were fishing along the long, sandy shore and shallow bays southwest of Natashquan. Gannets, kittiwakes, and terns were actively feeding in this area, the gannets presumably coming from the Anticosti Island colony.

Phalacrocorax carbo carbo (Linnaeus). European Cormorant.

We visited three colonies of these cormorants, two on islands of the Wapitagun group just east of Cape Whittle, and the third on Cliff Island in the St. Mary's group. In the first colony on Lake Island, June 18, 85 nests were counted. There were some double-crested cormorant nests on these cliffs, and we may not have seen all nests of the *carbo*. On June 19, 45 nests of the European cormorant and 30 of the double-crested species were counted on an island a mile further east.

June 19 on Cliff Island in the St. Mary's group we counted 179 nests, only six of which were double-crested cormorants. During the breeding season the conspicuous white plumes identify *P. c. carbo* readily, and the larger size is quite noticeable when the two species are flying together or standing near each other. The gular pouch is not lemon yellow in life at this season. It is a dirty white with small flecks of yellow in it, giving a general impression of a gray-white color. One must be close or have the bird in hand to see the yellow flecks. We examined some birds in the hand and looked at several hundred at close range and could only occasionally detect the yellow flecks. There is a triangular yellow patch below each eye.

Phalacrocorax auritus auritus (Lesson). Double-crested Cormorant.

There were a dozen or more cormorant nests in small spruce trees on the cliffs above the kittiwake colony on Carrousel Island. No attempt was made to reach this site, but the birds could be seen on the nests. Cormorants were scattered widely along the coast line, but we visited few colonies. Thirty-seven occupied cormorants' nests were counted on a small rocky islet in Wolf Bay in the only colony visited, except those nesting with *P. c. carbo*. We observed without landings a colony of several dozen pairs in the Fog Island Sanctuary, a second on a rock a few miles west of Natashquan, another on a small rock about five miles east of Kekashka, and one on the outermost island in the Wolf Bay Sanctuary. Lewis knew of others which were too far from our route to be visited.

Botaurus lentiginosus (Montagu). American Bittern.

Two bitterns were flushed June 11 on the river above Baie Johan Beetz.

Branta bernicla hrota (Müller). American Brant.

Seven Islands Bay is known as a place where brant congregate prior to their taking off for overland flights to Ungava Bay. At the time of our arrival no brant were present. However, on June 5, 175 arrived as we were standing on a little point at the bay entrance. This was the only group noted, and local observers said that brant had decreased markedly in the last few seasons. On June 7, 42 individuals were found in the Mingan Islands, and two birds were seen in each of two areas in the eastern Mingans on the 9th.

Anas rubripes Brewster. Black Duck.

One of the objectives of the trip was to observe the black duck breeding population. In the attempt to do so, practically every marsh of any size on the coast between Seven Islands and Blanc Sablon was visited. Breeding birds were scattered and usually seen singly. We saw no nests, although at Wolf Bay a nest could have been found if time had permitted. On Bluff Island, a pair obviously had young, but such a dense growth of buck bean covered two-thirds of the pond that it was impossible to locate young birds without spending much time. Breeding areas were underpopulated, and local observers stated that black ducks had decreased markedly. Certainly, there is room for additional breeding pairs of these birds. Numerous flocks were present on the south shore of the gulf near Rimouski June 2, and some of these birds may have nested later in this area.

Anas carolinensis Gmelin. Green-winged Teal.

We saw one bird June 15 in a little pond near the falls of the Washikuti River, four on St. Augustine Sanctuary June 24, and two in the Mecatina Sanctuary July 4. Numbers were seen on the south shore near Rimouski.

Mareca americana (Gmelin). Baldpate.

A pair of baldpates were observed on June 15 in a little pool on Parson Island, east of Kegashka Bay.

Glaucionetta clangula americana (Bonaparte). American Golden-eye.

A single bird was found at St. Charles Island in the eastern Mingans on June 9.

Clangula hyemalis (Linnaeus). Old-squaw.

Flocks of old-squaws were common from the day we arrived at Seven Islands. They were also exceedingly common the two preceding days on the south shore of the gulf and were noted from the steamer on the trip across the estuary. We saw the first individuals on the north shore at Carrousel Island June 4. They were abundant on the 6th between Seven Islands and Mingan. One hundred ninety-five flew in one direction on one side of the boat in approximately ten miles. They were common for 100 miles whenever the boat was close enough to shore to permit observations. A number were recorded on the 7th, after which date the numbers decreased, the last being seen June 11 at the Little Watshishu River.

Histrionicus histrionicus histrionicus (Linnaeus). Eastern Harlequin Duck.

Three birds were observed at Carrousel Island June 4, and seven offshore from Parson Island June 15.

Somateria mollissima dresseri Sharpe. American Eider.

The eider was the most abundant waterfowl and probably outnumbered all other species combined. Nests without eggs were first noted June 4 on Carrousel Island where birds were common. The males on this date and for some time later were engaged in almost continual cooing both day and night. June 7, on a small island in the Birch Island Sanctuary, we found many eider nests, some with 4 or 5 eggs, but more with incomplete sets. From that time, nests were abundant. Several hundred nests were examined that held from 4 to 7 eggs with 4 or 5 eggs in the greatest number of nests. The season was late, and vegetation had not started to grow in many nesting areas. This may have accounted for the apparently foolhardy positions in which some nests were found without any cover whatever and with the incubating bird plainly visible. Some were close to or even in herring gull colonies. This was not the invariable rule for many were concealed by the small semi-prostrate spruces, balsams, and junipers that grew in sheltered places on the outer islands and on some of the timbered islands, the nests were exceedingly well concealed. Nests were found on every sanctuary island except in Bradore Bay and on many other islands, although they were more abundant on the protected areas.

On Cliff Island, June 19, we found the greatest concentration of nesting eiders. Twenty-one females left a small patch of brush as we approached. We did not trample through this cover for fear of unduly disturbing the birds, and unquestionably there were others that did not flush. The caretaker who collected eider-down under permit later told us that he had found 310 nests on this island and almost as many on some of the others.

The first brood was found near Washikuti River Falls on June 15, and from that date we saw young in increasing numbers. Soon after hatching the young take to salt water and congregate in little gangs escorted by one or more hens. This appears to be an effective protective action against the rapacious black-back gulls that are continually trying to capture the ducklings. Many times we watched gulls swoop at these flocks, but as long as there were enough hens to threaten them with upraised open bills, we did not see a gull capture a young duckling. However, whenever the young became scattered, the gulls picked out a single duckling, swooped at it repeatedly, forcing it to dive until it was tired, and then caught it. We saw a number captured in this manner.

One amusing incident occurred when, in a narrow passage where we could not avoid them, our boat scatted a little convoy of ducklings. The hens took off and flew some distance. The black-backs saw an opportunity and started after the downies. However, a colony of terns on a nearby island objected in a very practical fashion by attacking the gulls in squads. One gull persisted for some time but finally gave up when the terns ganged up and dove at the marauder in such rapid succession that they looked almost like a giant ferris wheel as they dove, wheeled upward, and came down again.

Before the easternmost point of the trip was reached on June 28, the males were gathering in flocks. Beginning on the 29th, they poured eastward past Bradore Bay in flocks of 200 to 300 or more birds. These flocks passed into the Strait of Belle Isle and on to the eastward. Not all of the males left, however, since on the return trip numerous flocks were seen. They were practically absent from the inner channels and the breeding areas where they had been observed on the eastbound trip and had gathered in big flocks that were feeding over the most exposed rocky shoals. It would have been impossible to estimate the total number of eiders on this coast without spending much time, but a fine breeding population is present. This is the combined result of the sanctuaries and of the efforts of Dominion officials to interest local people in collecting and selling eider-down. Only a few are doing it, but the fact that some revenue is derived from the eiders seems to put them in a special category in the mind of the average resident, and the eiders have benefited considerably.

Melanitta fusca deglandi (Bonaparte). White-winged Scoter.

White-winged scoters were seen in fair numbers throughout the trip although there was no evidence of breeding. The greatest concentration was encountered east of Natashquan June 14. Flocks of this species estimated at more than 4,000 mixed with smaller numbers of other scoters were feeding off the sandy beaches for 25 miles east of Natashquan.

Melanitta perspicillata (Linnaeus). Surf Scoter.

This species was less common than the white-winged scoter. We saw a few around the Bay of Seven Islands June 4 and 5, and perhaps 2,500 on the 14th east of Natashquan. On July 17 we noted approximately 50 birds west of Wolf Bay in company with greater numbers of white-winged scoters.

Oidemia nigra americana Swainson. American Scoter.

This was the least common scoter. Six birds were noted at Seven Islands June 5, and they were fairly numerous in the flocks east of Natashquan on the 14th. Four birds were observed off Curlew Point on the 15th and 10 at Bradore Bay July 1.

Mergus serrator Linnaeus. Red-breasted Merganser.

This merganser was seen almost daily. The first brood was found June 14 in the mouth of the Washikuti River, and from that time broods were recorded frequently.

Accipiter striatus velox (Wilson). Sharp-shinned Hawk.

A single individual at Natashquan June 13.

Buteo lagopus s. johannis (Gmelin). American Rough-legged Hawk.

This big hawk was noted only three times: one at Seven Islands on June 5, one at Baie

Johan Beetz June 11, and two at the falls of the Little Natashquan River June 14.

Haliaeetus leucoeephalus alascanus Townsend. Northern Bald Eagle.

A single bird was watched for some time on the Little Watshishu Sanctuary June 12.

Pandion haliaetus carolinensis (Gmelin). Osprey.

An osprey was seen at Seven Islands on the 4th, two in the Birch Island Sanctuary on the 8th, two at Washikuti River on the 15th, and one in the Little Rigolet passage July 2.

Falco peregrinus anatum Bonaparte. Duck Hawk.

A fine adult was present on Perroquet Island, Bradore Bay, June 30. He had evidently been living high as we found numerous carcasses of puffins and auks, each with the feathers plucked and the breast eaten.

Falco columbarius columbarius Linnaeus. Eastern Pigeon Hawk.

Single pigeon hawks were seen at the following points: Eskimo Island across from Havre St. Pierre June 9, Baie Johan Beetz on the 11th, Little Watshishu Sanctuary on the 12th, falls of the Washikuti River on the 15th, and the head of the Blanc Sablon River on the 30th.

Charadrius hiaticula semipalmatus Bonaparte. Semipalmated Plover.

When we arrived at Seven Islands, the shorebirds were still migrating. On June 4 and 5 we saw thousands of semipalmated plovers on the mud flats, mixed with almost equal numbers of least sandpipers and fewer individuals of other species. After we left Seven Islands, semipalmated plovers were relatively scarce although a few were seen at intervals. One pair on western St. Mary's Island obviously had a nest, but a careful search failed to find it. On July 6, this same pair had young and were in the vicinity of the spot where they were first seen June 21.

Squatarola squatarola (Linnaeus). Black-bellied Plover.

Numbers of black-bellied plovers in winter plumage were present at Seven Islands June 4, mixed with the semipalmated plovers and least sandpipers. On the 17th on the Fog Island Sanctuary, two in full spring plumage were noted.

Arenaria interpres morinella (Linnaeus). Ruddy Turnstone.

This species was found on three occasions. Two were seen at Seven Islands June 4, five on the Birch Islands Sanctuary on the 7th, and one on Fog Island Sanctuary on the 17th.

Numenius hudsonicus (Latham). Hudsonian Curlew.

A flock of six flew over the boat in Wolf Bay July 7.

Actitis macularia (Linnaeus). Spotted Sandpiper.

This widely distributed shorebird was noted practically every day. A nest with four eggs was found on the 17th at Frazer's Harbour and a second nest was found in Betchewun Sanctuary July 10.

Tringa solitaria solitaria Wilson. Eastern Solitary Sandpiper.

A single individual was seen at Seven Islands on the 4th and another on the 5th.

Totanus melanoleucus (Gmelin). Greater Yellow-legs.

Single birds were observed at Seven Islands on the 5th and Thunder River on the 6th, five on the Birch Islands Sanctuary on the 7th, and three on the 8th, two June 9 on Quarry Island, three June 10 in the Betchewun Sanctuary, and one each day June 11 and July 8 at Romaine.

Erolia maritima (Brunnich). Purple Sandpiper.

Six purple sandpipers in summer plumage were observed at Carrousel Island June 4, seven much less further advanced in plumage on the Birch Island Sanctuary on the 7th, and four including one still in winter plumage at Betchewun on the 10th.

Erolia fuscicollis (Vieillot). White-rumped Sandpiper.

Five birds were watched for some time among the semipalmated sandpipers on Perroquet Island near Mingan June 8.

Erolia minutilla (Vieillot). Least Sandpiper.

Least Sandpipers were abundant at Seven Islands June 4 and 5. Thousands were present on the wide tidal mud flats although only scattered individuals were seen subsequently. Three were noted on the 8th on Perroquet

Island near Mingan, three on the 9th on Quarry Island, and two on the 15th on a small island off Curlew Point. This species was not recorded again until June 30 when near the Blanc Sablon River a nest containing four eggs was discovered. The bird put up a good and persistent display of the wounded dodge in an attempt to lead us away from the nest. The eggs were beautifully cradled in a grass-lined depression in the sphagnum moss. This nest was located about midway between two lakes on a narrow isthmus not more than 100 yards in width.

Erolia alpina pacifica (Coues). Red-backed Sandpiper.

A single red-backed sandpiper was collected on Gull Island near the mouth of the Kegashka River June 14.

Limnodromus griseus (Gmelin). Dowitcher.

Ten dowitchers were present at Seven Island June 4, five were seen on Birch Islands Sanctuary on the 7th, and two in the little salt marsh at Natashquan on the 14th.

Ereunetes pusillus (Linnaeus). Semipalmated Sandpiper.

Over 100 semipalmated sandpipers were counted on Perroquet Island June 8. Five were noted on Quarry Island on the 9th, a number in the Betchewun Sanctuary on the 10th, about twenty on Gull Island at the mouth of the Kegashka River on the 14th, and a flock of ten on Parson Island on the 15th.

Lobipes lobatus (Linnaeus). Northern Phalarope.

These beautiful phalaropes were present in small numbers. Thirty were counted on Carrousel Island June 4, while from the steamer between Seven Islands and Mingan on the 6th, one flock of eleven, one of nine, and a single bird were observed. Nine were seen on Gull Island at the mouth of the Kegashka River on the 14th and three at Parson Island on the 15th.

Stercorarius pomarinus (Temminck). Pomarine Jaeger.

Two pomarine jaegers flew by the boat at comparatively close range just after we left the village of Ile au Michon July 8.

Stercorarius parasiticus (Linnaeus). Parasitic Jaeger.

Five of these birds were around the boat for some time June 28 at Bradore Bay, and four east of Five Leagues Harbour July 1.

Larus hyperboreus hyperboreus Gunnerus. Glaucous Gull.

A glaucous gull was present at Seven Islands June 4, and a juvenile was seen from the boat July 1.

Larus marinus Linnaeus. Great Black-backed Gull.

Saddle-backs were ever present. They were scattered on their breeding territory and consequently not seen in numbers, but we seldom landed on an island without finding one or more nests. Usually they selected a prominent point, sometimes the highest point, at others a rock or a point on the edge of a cliff overlooking a large part of the island. The nests were better built than those of other gulls, which was quite a necessary precaution in the exposed sites chosen.

We travelled for some time without finding a complete set of eggs since the caretakers were under instructions to take the eggs in certain sanctuaries and permits to collect the eggs for human use on islands outside the sanctuaries had been given to a number of people along the coast. This was in an effort to hold down the numbers of this rapacious gull.

Few residents had a good word to say for it, and all the sanctuary caretakers disliked it because of its constant harrying of the downy eiders. Several told of the tactics used by these birds in catching young eiders whenever the broods had become scattered, and later we repeatedly witnessed this performance. There is little question that they are serious predators on young eiders as well as on eggs. Early in the trip, about as many eider nests had been robbed of part or all the eggs as there were undisturbed ones. Later, as the grass grew and cover became better, the number of those molested diminished. In most cases, these birds appeared guilty, at least they received much of the blame from the caretakers who insisted that the herring gulls disturbed comparatively few eider nests. The first nest was found on June 10, in Betchewun Sanctuary. Since the eggs were taken from so many nests, the young hatched late, although

"Alca" at Coacoacho. June 18, 1947.

Eider Duck nest, showing poor early cover. Little Watshishu River. June 11, 1947.

Eider Duch nest showing better cover, Wolf Island, June 18, 1947

European Cormorant nests. Wapitagun Islands. June 19, 1947.

on East Island in the St. Mary's group, June 22, one nest had three eggs, one of which was pipped. No young were seen until July 7 when several broods about one-third grown were found on Bluff Island, and a brood of three were seen standing with an adult on a rock in the Fog Island Sanctuary.

Larus argentatus smithsonianus Coues. Herring Gull.

This was by far the most abundant breeding gull. Colonies were usually located in the grass and other vegetation on the flatter spots of the islands. In some places many were built against a piece of driftwood lying on the gravel ridges pushed up by the ice along the island beaches. On the Birch Islands many nests were found on upturned stumps and dead trees, and others were built on the ground well back in the timber. Breeding colonies were present on all sanctuaries except that at Bradore Bay. The largest colony visited, that on Cliff Island, consisted of hundreds of nests. There were also many nests on Eastern St. Mary's Island in the same sanctuary. In Betchewun Sanctuary, a number of nests on Isle au Bois were placed well back in the bushes and several others were located on stumps and dead trees at least four feet from the ground. On this island, two nests with three eggs each and a fourth just outside the nest were noticed. Two colonies were inspected on the "Black Land" in Wolf Bay Sanctuary in which there were more than a hundred nests. On the Black Land June 18 we saw our first downy, a youngster half out of the shell in a nest in which the other two eggs were pipped.

Many small colonies were not visited, but several not in sanctuaries were examined. Among these was a small colony on Gull Island, off the mouth of the Kegashka River, and a big colony on Green and Parson Islands. This was the most widely distributed gull and was seen daily in numbers varying with the distance from nesting islands. It was not possible to census these colonies, but the total population was several thousand pairs. Locally, these birds are known as blue or bluey gulls.

Larus delawarensis Ord. Ring-billed Gull.

The ring-billed gull, known locally as the squeaky gull, was much less widely distributed, but good colonies were found both within and outside the sanctuaries. On Gun Island in the Betchewun Sanctuary June 10, twelve to fifteen completed nests were examined. Several of these held one or two eggs, but the majority had none. These and most other ring-billed nests, were located in the long grass in little hollows or valleys rather than on the higher land or the beaches preferred by the herring gulls. This colony was abandoned later, since we returned July 10 and found no evidence that the nests had been used successfully. Herring gull eggs had hatched and the young were everywhere, but the ring-bills had deserted the island. Approximately 300 pairs were nesting on Gull Island at the mouth of the Kegashka River, over 200 pairs on Green Island and adjacent Parson Island, about 1,500 pairs on an island at Romaine which was not in or near any sanctuary, a few dozen nests in the Fog Island Sanctuary, and several hundred pairs in the St. Augustine Sanctuary. A colony of unknown size was noted on an island off the little settlement of Belles Amours, and a small colony on an island in Mecatina Sanctuary. At this last site we found 21 nests with eggs and several times that number without. These birds seemed to be slower than the herring gulls to renest after the colonies were raided by the eggers. At least on several occasions the herring gulls had new clutches, while the ring-bills were still excited and eggless.

Rissa tridactyla tridactyla (Linnaeus). Atlantic Kittiwake.

Kittiwakes were not abundant and only two colonies were visited. Several hundred pairs were building nests on Carrousel and an adjoining island June 4, and a small colony of only seven nests and not more than thirty birds was located on Gun Island in the Betchewun Sanctuary. On June 10 two of these nests had one egg each, but by July 10 no kittiwakes were around and the nests did not seem to have been used. Obviously the colony had been destroyed or vacated by the birds though human interference was unlikely.

While these were the only two colonies seen, there were numbers of kittiwakes in Bradore Bay and about Greenley Island and Blanc Sablon on June 28. We estimated that about 2,000 birds were present, many of them sitting on two huge icebergs stranded off Greenley Island, one of the two islands

in the sanctuary at Bradore Bay. Many were in juvenile plumage as were a considerable proportion of those seen July 8 between Romaine and the Little Watshishu River.

Sterna hirundo hirundo Linnaeus. Common Tern.

Common terns were seen everywhere. During the eastward trip, groups were gathering about nesting islands, but they had not yet started to lay. In fact, we found no occupied nests until after beginning the return trip. The first eggs were found on St. Mary's Islands on the 6th of July when two nests with one egg and two others ready to receive eggs were examined. There was a colony with eggs July 8 in the Watshishu Refuge, and a colony of considerable size on Gun Island in the Betchewun Sanctuary July 10. These birds had built nests near the site of the ring-billed gull colony, but the grass was now so long that they were difficult to find. After considerable searching, we found about a dozen, each with two or three eggs.

Sterna paradisaea Pontoppidan. Arctic Tern.

Arctic terns were less abundant than common terns, although scattered individuals were seen on the Birch Islands Sanctuary July 7 and from time to time thereafter. Like the common terns, they had selected territories, but had not yet nested on our eastward journey. In fact, the only occupied nests found were on a small rocky island in the mouth of the Little Watshishu River where July 9 four nests with two eggs, two with one egg, and one with one egg, and one downy young were examined.

Hydroprogne caspia (Coues). Caspian Tern.

Caspian terns were rare. A single bird flew over our boat at the Natashquan wharf on the 13th, two were seen in Frazer's Harbour on the 15th, and a colony containing about thirty birds was visited on the Fog Island Sanctuary June 17. This colony had four nests with one egg each and was close to the nesting ring-billed and herring gulls.

Alca torda torda Linnaeus. Razor-billed Auk.

The first auks were seen June 4 on Carrousel Island where more than a hundred birds were present. In the Betchewun Sanctuary June 10, Gun Island held a colony of approximately 250 birds. There were scattered birds on the Fog Island Sanctuary, and Wolf Island where the first eggs were found had several hundred birds. There was a big colony on the Black Land where about 1,500 birds were sitting in offshore rafts. There were a few auks on the outer Wapitagun Islands and a big colony in the Boat Islands. Auks were numerous on the St. Mary's Islands, and there were approximately 1,500 on Perroquet Island in Bradore Bay. Numerous smaller colonies were scattered widely. The eggs exhibited the usual variations in color and markings, and were laid in rocky crevices with no attempt at nest building.

Uria aalge aalge (Pontoppidan). Atlantic Murre.

Murres were much less widely distributed than the auks. A single individual was seen in the Watshishu Refuge on the 12th, but no colony was found until Fog Island was reached. Here about 4,000 murres were present on a small island adjacent to the major island for which the sanctuary is named. We could not land because of the surf, but did get close enough to see many eggs. In Wolf Bay Sanctuary, several hundred murres were established on one of the outer islands, and more than a hundred eggs were scattered among 37 double-crested cormorant nests on a smaller inshore island. There were numerous murres on the Black Land, and colonies on the Boat Islands and on St. Mary's Islands. On Cliff Island, in addition to the usual cliff dwellers, a number of birds lived in a cave extending into solid rock. There were also about 200 murres in the puffin colony on Perroquet Island in Bradore Bay.

Uria lomvia lomvia (Linnaeus). Brunnich's Murre.

We saw at least two Brunnich's murres on a ledge on Cliff Island in the St. Mary's group June 19. There were two or more additional individuals that showed the white mark on the gape but lacked the other characteristics of the Brunnich's murre. Lewis returned to this ledge July 20 and saw at least two birds which he definitely identified the second time as Brunnich's murres. There has been one bird known for several years in this colony, and this year there were several others that are either this species or hybrids. Certainly there were at least four birds on the ledge with the white gape line visible. These were in the front ranks of a crowd which extended far

back into a deep crevice among which might have been additional individuals.

Cepphus grylle atlantis Salomonsen. Black Guillemot.

These birds were very common. We were moving eastward with the spring, and no eggs were found until July 4 in the Mecatina Bird Sanctuary. On the 6th we found a number of nests with two eggs each on Western St. Mary's Island, and others on the 7th on a little island off the mouth of the Etamamu River. The eggs were all laid on the gravel in crevices in the rocks or under rocks with no attempt to build a nest. Guillemots were exceedingly abundant on the 7th as we travelled through the islands from the Etamamu River mouth to Romaine. Some idea of their abundance can be gained from the fact that Lewis counted 135 from one spot while I was photographing cormorant nests on the outer Wapitagun Islands.

Fratercula arctica arctica (Linnaeus). Atlantic Puffin.

These birds, like the murres, were not found as far west as the auks. The first colony on Gun Island in the Betchewun Sanctuary July 10 held about 600 birds. There was a big colony on Wolf Island in a dense growth of rye grass, and a second seemingly almost as large in an ancient rounded boulder beach that is now elevated to the upper level of the island. There were thriving colonies on the Black Land, the Boat Islands, and the islands of the St. Mary's group. There was also a fine colony on Greenly Island and the largest colony of all on Perroquet Island both in Bradore Bay Sanctuary. According to checks made by the Canadian officials in past years, there are approximately 45,000 puffins on this 41-acre island, and the colony rivals in size some of the horned puffin cities in the Aleutian Islands and the Bering Sea.

Bubo virginianus heterocnemis (Oberholser). Labrador Horned Owl.

A single horned owl noted in the early morning of July 1 on the mainland at Bradore Bay was probably of this form. It flew from a crevice in the rock and off into the fog as we approached.

Nyctea scandiaca (Linnaeus). Snowy Owl.

The carcass of a bird that had been trapped about a week previously by the caretaker on Perroquet Island was examined on June 30. It had probably shared with the duck hawk mentioned previously the abundant living made available by this big water bird colony as some of the partially eaten birds might have been killed by this owl.

Asio flammeus flammeus (Pontoppidan). Short-eared Owl.

Lewis saw a short-eared owl at Bradore Bay June 28, and my wife and I saw one on July 1 in the same vicinity.

Megaceryle alcyon alcyon (Linnaeus). Eastern Belted Kingfisher.

Only three kingfishers were recorded. A single bird was present on Middle St. Mary's Island July 6, one on St. Charles Island in the eastern Mingans on the 10th, and one on the U. S. Army wharf at Mingan on the 11th.

Colaptes auratus luteus Bangs. Northern Flicker.

Flickers were not common. At Seven Islands, a single bird was seen June 4 and three on the 5th, while one was noted on Quarry Island June 9.

Tyrannus tyrannus (Linnaeus). Eastern Kingbird.

A kingbird was watched for some time near Wolf Bay village June 18.

Empidonax flaviventris (Baird and Baird). Yellow-bellied Flycatcher.

A yellow-bellied flycatcher was seen at Natashquan June 13, a second one at Washikuti River Falls on the 15th, two on the 23rd at La Tabatiere, and two others later in the same day along the Kecarpoui River. Single individuals were seen at Spoon Cove June 25 and at Mutton Bay July 3.

Empidonax traillii traillii (Audubon). Alder Flycatcher.

Two birds were seen in Betchewun Sanctuary June 10, and a single bird at St. Mary's Islands on the 21st.

Eremophila alpestris alpestris (Linnaeus). Northern Horned Lark.

The first horned lark was seen June 6 at Seven Islands, the second on Fog Island on the 17th, and three on Lake Island on the 18th. They became quite noticeable on the 19th and 20th on St. Mary's Islands where the males were in full song, and there were

a few on the Fog Islands on the 26th. At Bradore from June 28 to July 1, they were the most abundant land bird. By the 29th at Bradore, spotted young were out of the nest, and fledglings became numerous the next two days.

Iridoprocne bicolor (Vieillot). Tree Swallow.

This was the only common swallow. It was first seen during a short walk on June 6 at Thunder River where a number were flying over a little meadow between the wharf and the town. On the 11th there were more than 100 over the marsh and river above the village of Baie Johan Beetz. From then on they were less common. Two were seen at the mouth of the Little Watshishu River June 12; five each day at Natashquan on the 13th and 14th; two at Washikuti River Falls on the 15th; and a single individual at St. Charles Island July 10.

Riparia riparia riparia (Linnaeus). Bank Swallow.

Several bank swallows were with the tree swallows on the river at Baie Johan Beetz June 11.

Hirundo rustica erythrogaster Boddaert. Barn Swallow.

A single barn swallow was observed among the tree swallows at Baie Johan Beetz on the 11th.

Perisoreus canadensis sanfordi Oberholser. Labrador Jay.

This bird was not common. A single bird was seen on inner Birch Island June 8, three on Quarry Island on the 9th, five on the mainland at Betchewun June 10, and four above the Washikuti River Falls June 15. The last two groups each contained young birds, but the three on Quarry Island were all adults. All specimens have been identified by Dr. John W. Aldrich as this race.

Corvus corax principalis Ridgway. Northern Raven.

The raven was found largely to the east and was not abundant anywhere. Two individuals were noted at Washikuti River Falls on the 15th, two or more were seen each day on St. Mary's Islands from June 20 to 22. There were apparently four birds in the group with one pair frequenting Western and Middle St. Mary's Islands, and a second pair on East Island. A single bird was seen on the 25th on Bayfield Island and one July 4 in Mecatina Sanctuary.

Corvus brachyrhynchos brachyrhynchos Brehm. Eastern Crow.

Crows were fairly common around Seven Islands and Mingan, decreasing in numbers to the east and becoming scarce. Beyond Natashquan one was seen in Wolf Bay Sanctuary June 18, two on Wapitagun Islands June 19, and three at the Little Rigolet July 2. We saw others on the return trip, especially July 10 and 11 when we were again in the territory of greater population.

Parus atricapillus atricapillus Linnaeus. Black-capped Chickadee.

Chickadees were scarce, and while they were occasionally heard, the only ones actually seen were on June 4 at Seven Islands, and two on inner Birch Island June 8. East of Mingan, they were not sighted although an occasional call was heard.

Parus hudsonicus hudsonicus Forster. Hudsonian Chickadee.

A single bird collected above Washikuti River Falls June 15 was the only bird actually sighted although chickadees with the husky call note of this species were heard on one or two previous occasions.

Troglodytes troglodytes hiemalis (Vieillot). Eastern Winter Wren.

Winter wrens were quite numerous at Seven Islands and Mingan, and a single bird was observed at La Tabatiere June 23.

Mimus polyglottos polyglottos (Linnaeus). Eastern Mockingbird.

A single individual was watched for some time by Lewis in Seven Islands June 4. On the 5th all of us saw the bird again in almost the same part of the village. This is the first record of the species for Labrador.

Turdus migratorius migratorius Linnaeus. Eastern Robin.

Robins were well distributed and fairly numerous. They were abundant about Seven Islands and Mingan, some of which seemed to be in migration. The first fledglings were noted July 1 on the mainland at Bradore Bay. Specimens collected at Salmon Bay June 28 and at Bradore July 1 seem to be typical *migratorius*, while one taken at Betchewun June 10 is intermediate between *migratorius* and *nigrideus*.

Pipit nest, 6 eggs, Perroquet Island. June 30, 1947

Red-throated Loom nest. Fog Island Sanctuary. June 19, 1947

Hylocichla guttata faxoni Bangs and Penard. Eastern Hermit Thrush.

Hermit thrushes were noted on Carrousel Island June 4 and at Seven Islands on the 4th and 5th.

Hylocichla ustulata swainsoni (Tschudi). Olive-backed Thrush.

Olive-backed thrushes were decidedly uncommon, although we occasionally heard them singing. Several were seen at Seven Islands on the 4th and 5th, two at Mingan on the 8th, two each on Quarry Island and St. Charles on the 9th, one on the Watshishu Sanctuary June 12, two June 14 at Kegashka, four at Washikuti River Falls on the 15th, and one on the beach at Wolf Island June 18.

Hylocichla minima aliciae (Baird). Gray-cheeked Thrush.

The gray-cheeked thrush was equally uncommon. There were numbers about Seven Islands when we arrived and several dead birds were found in the streets. There were also a number about Mingan June 7. The only individuals seen east of Mingan were one at La Tabatiere on the 23rd, another at the same place July 2, and one in song at Rocky Bay June 26.

Regulus calendula calendula (Linnaeus). Eastern Ruby-crowned Kinglet.

This was one of the more common small birds. It was seen regularly in timbered country from Seven Islands east to Kecarpoui River June 23. After that date little habitat suitable for this species was visited, and the only record was a single individual seen June 24 a few miles east of that river.

Anthus spinoletta rubescens (Tunstall). American Pipit.

Migrating pipits were seen at Seven Islands, Thunder River, Mingan, and Quarry Island. They were first heard in full song June 18 at Wolf Bay. They were seen frequently after that date, but were most abundant at Bradore Bay. One nest containing six eggs was discovered on Perroquet Island June 30. Pipits were still singing the full flight song at St. Mary's Islands July 6, the last stop in good pipit territory.

Vermivora peregrina (Wilson). Tennessee Warbler.

Two Tennessee warblers were noted at Seven Islands on the 5th, three on Harbour Island at Mingan on the 8th, and one at Natashquan on the 13th.

Dendroica petechia amnicola Batchelder. Newfoundland Yellow Warbler.

Yellow warblers were not common. I saw one on Outer Birch Island, June 7, two at Baie Johan Beetz on the 11th, two at St. Mary's Islands on the 21st, six at La Tabatiere on the 23rd, two at St. Paul's River on the 27th, four at Blanc Sablon River on the 30th, one on the mainland at Bradore Bay July 1, and one at Mutton Bay on the 3rd. In addition, Lewis saw one at Washikuti River Falls June 15, and one at Harrington Harbour June 21. Many times this number should have been present, particularly in the western part of the region. A skin taken at La Tabatiere June 23 has been identified as this race.

Dendroica magnolia (Wilson). Magnolia Warbler.

Magnolia warblers were scarce. Single birds were observed at Seven Islands June 5 and Mingan on the 8th. Two were seen at Natashquan on the 14th, two at the Washikuti River Falls on the 15th, and one at Betchewun July 9.

Dendroica coronata coronata (Linnaeus). Myrtle Warbler.

Myrtle warblers were fairly common at Seven Islands. They were numerous around Mingan June 7 and 8 and fairly common throughout the Mingan Islands. East of that point, they were noted at irregular intervals. We saw one at the Little Watshishu River June 12; one at Natashquan on the 13th, and two on the 14th; four at Washikuti River Falls on the 15th; and one at La Tabatiere on the 23rd.

Dendroica virens virens (Gmelin). Black-throated Green Warbler.

This species was not common. Three were seen June 8 on Inner Birch Island, two on the 10th at Betchewun, and one on the 15th at Washikuti River Falls.

Dendroica castanea (Wilson). Bay-breasted Warbler.

Mrs. Gabrielson found a dead male of this species June 9 on Quarry Island.

Dendroica striata (Forster). Black-poll Warbler.

The black-poll was found regularly, but it was less numerous than Lewis had found it in previous years. It was numerous at Mingan June 7 and 8, but after that date only scattered individuals were seen. Six recorded July 1 on Bradore Bay were the greatest numbers, but one to three were seen on the days we visited suitable habitat.

Dendroica palmarum hypochrysea Ridgway. Yellow Palm Warbler.

Two birds were seen and several others heard singing June 5 at Seven Islands. Lewis had seen a single bird on the previous day.

Seiurus noveboracensis noveboracensis (Gmelin). Northern Water-Thrush.

Northern Water-thrushes were fairly common at Seven Islands June 4 and abundant in the Mingan Islands, particularly on Inner and Outer Birch Islands, June 7 and 8, at which time there was evidently a considerable migration movement. Occasional birds obviously nesting were recorded at Quarry Island, Washikuti River Falls, Wolf Bay, the Blanc Sablon River, and Bradore Bay.

Oporornis philadelphia (Wilson). Mourning Warbler.

One was seen on Eskimo Island June 9, one on the Black Land June 18, one at St. Mary's Islands June 22, and two at La Tabatiere on the 23rd, and one at Spoon Cove June 25.

Geothlypis trichas brachidactyla (Swainson). Northern Yellow-throat.

Three yellow-throats were observed June 11 at Baie Johan Beetz and three on the 15th at Washikuti River Falls. One was heard singing at Spoon Cove June 26, and another June 30 near the Blanc Sablon River. Lewis had additional records at Natashquan June 14 and Harrington Harbour June 20. Lewis's records show that this bird was more abundant on the eastern part of this area than in previous years.

Wilsonia pusilla pusilla (Wilson). Wilson's Warbler.

This, the most conspicuous warbler, was first seen in the Birch Islands June 8 and thereafter it was observed regularly throughout the trip. The greatest number noted in any one day was six on the 25th at Spoon Cove.

Setophaga ruticilla (Linnaeus). American Redstart.

Redstarts were seen only twice, a single male June 15 at Washikuti River Falls, and a lone female at St. Mary's Islands on the 21st.

Euphagus carolinus (Muller). Rusty Blackbird.

Rusty blackbirds were fairly common around Seven Islands June 4 and 5, and three were seen at Thunder River on the 6th.

Acanthis flammea flammea (Linnaeus). Common Redpoll.

Redpolls were first seen at Five Leagues Harbour June 28. Others were noted June 29 and 30 on the mainland shores of Bradore Bay and along the Blanc Sablon River. They were wild and difficult to approach.

Loxia leucoptera leucoptera Gmelin. White-winged Crossbill.

This species was seen only at Natashquan. On June 14 seven flew near my wife and me at the falls of the Little Natashquan River. Later in the day two flocks, one of five and one of six, flew over us at the edge of the village.

Passerculus sandwichensis labradorius Howe. Labrador Savannah Sparrow.

The savannah sparrow was the most common and widely distributed land bird and was seen in fair numbers in every suitable area. A number, all of this race, were collected. Lewis found a nest July 1 at Bradore Bay, and my wife a second. Each contained four eggs.

Junco hyemalis hyemalis (Linnaeus). Slate-colored Junco.

Juncos had suffered materially from the frigid weather, dead birds and parts of birds being found quite commonly in both Seven Islands and Mingan. They were fairly common in the Mingan Islands as far as Betchewun, but were not noted farther east.

Spizella arborea arborea (Wilson). Eastern Tree Sparrow.

A few transient tree sparrows were present at Seven Islands June 4 and 5, but this species was not again observed until June 25 at Spoon Cove. A number were seen at Bradore Bay, along the little stream beside which Audubon strolled. At the head of this

stream and adjoining the little lake at its source, there were a number of tree sparrows including one pair with newly fledged bob-tailed young. A number were noted along the Blanc Sablon River on the 30th.

Zonotrichia leucophrys leucophrys (Forster). White-crowned Sparrow.

This species suffered severely in the cold weather at Seven Islands and Mingan, although it was later found fairly common throughout the breeding range as far east as Blanc Sablon. From Wolf Bay Sanctuary eastward, it was particularly noticeable.

Zonotrichia albicollis (Gmelin). White-throated Sparrow.

White-throats were abundant about Seven Islands and Mingan but diminished in numbers to the east. They were fairly common as far east as Natashquan but scarce beyond that point. The last one was noted at St. Paul's River June 27.

Passerella iliaca iliaca (Merrem). Eastern Fox Sparrow.

Fox sparrows were fairly common about Seven Islands June 4 and about Eskimo Island on the 9th. The species was not again noted until the 20th on St. Mary's Islands when one or two were seen and a dead bird was found under the ramp to the boathouse. Numbers of singing males were first heard at La Tabatiere on the 23rd, where as many as eight individuals were heard from one spot. Farther east the birds were rather scarce, although they were seen at Spoon Cove, St. Paul's River, and Bradore Bay.

Melospiza lincolnii lincolnii (Audubon). Lincoln's Sparrow.

Lincoln's sparrow was not common, although it was conspicuous in migration on the Birch Islands June 7 and 8. It was seen at intervals, however, and heard more frequently east to Bradore Bay. It was never abundant and was difficult to see in the thick brush it frequented.

Melospiza georgiana subsp. Swamp Sparrow.

Swamp sparrows were seen only at Seven Islands June 4 and at Wolf Bay June 18. At the latter place a single bird was on the beach with a northern water-thrush and several white-crowned sparrows.

Melospiza melodia melodia (Wilson). Eastern Song Sparrow.

Song sparrows were not common. Two were noted at Thunder River June 6 and four June 8 on Inner Birch Island.

Calcarius lapponicus lapponicus (Linnaeus). Lapland Longspur.

Six longspurs were present on the beach at Seven Islands June 4.

CHRISTMAS BIRD CENSUS — 1951 [1]

St. John's, Nfld. — (City and half mile of coast at both Torbay and Witless Bay). December 26, 1951; 9.00 a.m. to 4.00 p.m.; temp. 20°F; light NW winds; overcast and intermittent snow flurries; 6 in. of snow on ground; 8 observers in 2 parties; 3 feeding station observers; total hours 51; total miles 83; (31 on foot, 52 by car). — Old-squaw, 24; Common Eider, 158 (plus); King Eider, 1; Sharp-shinned Hawk, 3; Pigeon Hawk, 1; Herring Gull, 14; Dovekie, 18; Black Guillemot, 10; Rock Dove, 310; Yellow-shafted Flicker, 3; Downy Woodpecker, 1; Raven, 5; Crow, 394 (plus); Black-capped Chickadee, 98; Brown-capped Chickadee, 15; Golden-crowned Kinglet, 12; Common Starling, 610; English Sparrow, 304 (plus); Evening Grosbeak, 8; Purple Finch, 42; Pine Grosbeak, 72. — Total 21 species; 2103 individuals (plus). (Seen in area next day, Snowy Owl, 1; Robin, 35). — Mrs. A. G. Gosling, Miss C. Furlong, Mr. & Mrs. G. Cameron, Mr. & Mrs. P. B. Rendell, Mr. & Mrs. J. S. Canning, H. H. Winter, John Macgillivray, L. M. Tuck (Newfoundland Natural History Society).

Quebec, Que. — (Quebec city, Plains of Abraham, to Sillery, Bois Gomin, Ste. Foy and Quebec bridge area, Quebec Zoological Garden and Charlesbourg, and along the St. Lawrence River from Quebec bridge to Island of Orleans bridge); town suburbs 22%, fields 16%, coniferous forest 7%, deciduous woods 26%, mixed woodlands 20%, shores 9%. — Dec. 27; 7.00 a.m. to 4.15 p.m. Light snow, partly cloudy, temp. 0° to 14°F; wind NW.

[1] Received for publication March 19, 1952.

1-3 m.p.h.; 22-24 inches snow on ground; small rivers partly frozen, exceptionally large and compact moving ice-fields on the St. Lawrence River. Twelve observers in 5 parties. Total party hours, 32 (28 on foot, 4 by car); total party miles, 61 (21 on foot, 40 by car). — Sharp-shinned Hawk, 1; Ruffed Grouse, 4; Ring-necked Pheasant, 2; Herring Gull, 6; Hairy Woodpecker, 5; Blue Jay, 1; American Crow, 2; Black-capped Chickadee, 37; Brown-capped Chickadee, 1; Brown Creeper, 1; Common Starling, 15; English Sparrow, 383; Red-winged Blackbird, 1; Evening Grosbeak, 7; Pine Grosbeak, 18. — Total 15 species, 484 individuals. (Seen in area Dec. 25: Arctic three-toed Woodpecker, 1; Snow Bunting, 50; Dec. 26: Common Redpoll, 1). — A. Fortin, P. Grenier, F. Hamel, L. Lemieux, G. Lepage, R. Lepage, Louis A. Lord, J. Lord, G. Lord, G. Moisan, H. Talbot, R. Cayouette (La Société Zoologique de Québec).

Montreal, Que. — (Mount Royal, Ville LaSalle, St. Helen's Island, Nun's Island, south shore from Jacques Cartier Bridge to Caughnawaga, and the north shore from Dorval to Victoria Bridge). — Dec. 23, 1951; 8.30 a.m. to 4.30 p.m. Bright and clear. Wind velocity 5 to 10 m.p.h. N.N.W. Depth of snow 18 to 24 inches. All creeks and marshes frozen. Ice on river very heavy. Twenty-one observers in seven parties. Total party hours, 28; (17 on foot, 9 by car, 2 by boat.) Total party miles, 76; (15 on foot, 60 by car, 1 by boat). — Black Duck, 66; Am. Golden-eye, 1170; Am. Merganser, 88; Goshawk, 1; Sharp-shinned Hawk, 2; Am. Rough-legged Hawk, 1; Sparrow Hawk, 2; Hungarian Partridge, 14; Ring-necked Pheasant, 50; Glaucous Gull, 1; Great Black-backed Gull, 9; Herring Gull, 40; Ring-billed Gull, 1; Rock Dove, not estimated; Great Horned Owl, 2; Snowy Owl, 2; Short-eared Owl, 1; Hairy Woodpecker, 8; Downy Woodpecker, 18; Horned Lark, 10; Crow, 8; Black-capped Chickadee, 47; White-breasted Nuthatch, 6; Brown Creeper, 15; Starling, 27; English Sparrow, not estimated; Evening Grosbeak, 19; Pine Grosbeak, 3; Common Redpoll, 6; Crossbill, species ?, 6; Snow Bunting, 53. — Total 31 species; 1676 individuals. — Miss Simonne Boyer, J. D. Cleghorn, Mr. & Mrs. J. D. Elliott, D. Garneau, Rev. V. Gaboriault, Miss G. Hibbard, H. Longley, Rev. Bro. Matthias, W. McBride, Ian McLaren, G. H. Montgomery, John M. Montgomery, J. Normandin, Mrs. P. Roberts, J. W. Robinson, Dan Ryan, Mr. & Mrs. L. M. Terrill, Miss M. Wilson, Richard Yates.

Ottawa, Ont. — December 31, 1951, 8.00 a.m. to 5.00 p.m. 28 observers in 12 parties. Total hours 60; total miles 205 by car, 46 on foot. — American Golden-eye, 87; American Merganser, 20; Sparrow Hawk, 2; Ruffed Grouse, 6; Hungarian Partridge, 16; Ring-necked Pheasant, 8; Rock Dove, 239; Barred Owl, 1; Pileated Woodpecker, 1; Hairy Woodpecker, 5; Downy Woodpecker, 7; Canada Jay, 2; Blue Jay, 42; Crow, 2; Black-capped Chickadee, 128; Brown-capped Chickadee, 3; White-breasted Nuthatch, 24; Red-breasted Nuthatch, 4; Brown Creeper, 1; Starling, 640; English Sparrow, 1446; Evening Grosbeak, 35; Pine Grosbeak, 79; Goldfinch, 2; Slate-coloured Junco, 2; Tree Sparrow, 6; Lapland Longspur, 2; Snow Bunting, 286. — Total 28 species, 3096 individuals. — K. Bowles, H. M. Brown, H. Lloyd, R. Frith, Wing Commander D. A. MacLulich, Mr. A. R. Taysom, W. J. Smith, B. M. Millman, P. M. Millman, Comdr. T. F. T. Moreland, Mrs. C. E. Seville, Miss V. Humphries, Miss Anne Banning, Mrs. K. Hoare, Mrs. E. Doull, Mrs. H. F. Lewis, Dr. C. Frankton, Mrs. C. Frankton, Dr. L. S. Russell, Mrs. L. S. Russell, Dr. Harrison F. Lewis, Dr. V. E. F. Solman, Mrs. V. E. F. Solman, J. S. Tener, Mrs. J. S. Tener, A. E. Bourguignon, Miss M. Flynn, Miss V. Ross.

Carleton Place, Ont. — Dec. 29, 1951; 2.00 p.m. to 5.00 p.m., overcast, temp. 29°; depth of snow 15"; time 12 hours; number of miles — 4 on foot 110 by car. — Ruffed Grouse, 4; Downy Woodpecker, 3; Hairy Woodpecker, 1; Pileated Woodpecker, 1; Blue Jay, 9; Black-capped Chickadee, 22; White-breasted Nuthatch, 2; Starling, 9; English Sparrow, 141; Evening Grosbeak, 15; Pine Grosbeak, 9; Slate-coloured Junco, 1; Snow Bunting, 66. — Total 13 species; total birds 283. (Seen in area during December Hudsonian Chickadee, 1; Goldfinch, 25; Canada Jay, 1). — Jennifer Findlay, G. E. Findlay, H. M. Brown, D. D. Findlay, E. H. Ritchie, D. K. Findlay, Mrs. D. K. Findlay, D. H. Findlay, D. G. Findlay, W. F. Findlay, Mrs. W. F. Findlay, Kate, Pete and Jeannie Findlay.

Pakenham, Lanark Co., Ont. — December 28, 1951; 7.30 a.m. to 4.00 p.m., temp. — 27°F. at start to 2°F., wind light, clear sky to intermittent snow after 2.00 p.m.; heavy mist over open water; 18 in. snow; 7 observers,

total miles 37 (12 on foot, 25 by car). — Black Duck, 1; Rock Dove, 4; Hairy Woodpecker, 3; Downy Woodpecker, 1; Blue Jay, 7; Crow, 2; Black-capped Chickadee, 5; White-breasted Nuthatch, 2; Starling, 3; English Sparrow, 89; Evening Grosbeak, 6; Tree Sparrow, 2; Snow Bunting, 56. — Total species, 13; 181 individuals. (Present in area Dec. 23-31: Hungarian Partridge, American Merganser, Pileated Woodpecker). — M. Flynn, Verna M. Ross, Edna G. Ross, A. E. Bourguignon, R. M. McKenzie, Bill McKenzie, Douglas Deugo.

Kingston, Ont. — December 26, 1951; (7½ mile radius centering on MacDonald Park, Kingston and including Cataraqui River and Creek, shores and waters of Lake Ontario and St. Lawrence River, Wolfe and adjacent Islands: farm land 30%, urban centres 4%, marshes 12%, water 30%, mixed woodlands 24%); 8:30 a.m. to 4:30 p.m., 2 feet of snow, marshes and rivers frozen, bays in Lake Ontario largely open, St. Lawrence River open; temp. 10° to 20°F., clear, wind N.W. 10-15 m.p.h. Thirteen observers in 4 parties. Total party hours 63.5; total party miles 194 (21 on foot, 169 by car, 4 by boat). — Common Loon, 2; Black Duck, 24; Greater Scaup Duck, 245; American Golden-eye, 953; Buffle-head, 1; American Merganser, 502; Red-breasted Merganser, 19; Bald Eagle, 3; Sparrow Hawk, 1; Ruffed Grouse, 11; Hungarian Partridge, 73; Ring-necked Pheasant, 8; Glaucous Gull, 1; Great Black-backed Gull, 50; Herring Gull, 358; Ring-billed Gull, 5; Great Horned Owl, 1; American Long-eared Owl, 1; Hairy Woodpecker, 2; Downy Woodpecker, 9; Blue Jay, 20; Black-capped Chickadee, 68; White-breasted Nuthatch, 7; Starling, 564; English Sparrow, 707; Eastern Meadowlark, 3; Evening Grosbeak, 1; Pine Siskin, 3; American Goldfinch, 7; Slate-coloured Junco, 1; Tree Sparrow, 10; Snow Bunting, 117. — Total 32 species, about 3677 individuals (seen in area Dec. 23 Horned Grebe, 3; Pied-billed Grebe, 1; Crow, 1; Brown-capped Chickadee, 4; Brown Creeper, 1; Cardinal, 1; Pine Grosbeak, 1. — J. Argue, A. Bell, I. Boardman, J. Cartwright, A. Hyde, I. Hyde, W. Lamb, A. Peters, S. Peters, R. Stewart, G. Stirrett (Compiler), R. Travers, L. Ward (Kingston Nature Club).

Toronto, Ont. — Dec. 23, 1951; 7.00 a.m. to 5.00 p.m.; dull and cold, no wind; temp. 9° to 19°; ground everywhere covered with 10" to 12" of snow; ponds and rivers frozen; 86 observers in 24 parties; total hours, 138. — Great Blue Heron, 4; Mallard, 373; Black Duck, 527; Pintail, 1; Redhead, 4; Greater Scaup, 2,862; Lesser Scaup, 4; American Golden-eye, 290; Buffle-head, 81; Old-squaw, 1,034; American Merganser, 95; Red-breasted Merganser, 11; Cooper's Hawk, 7; Red-tailed Hawk, 22; Rough-legged Hawk, 6; Marsh Hawk, 6; White Gyrfalcon, 1; Peregrine Falcon, 1; Sparrow Hawk, 29; Ruffed Grouse, 10; Ring-necked Pheasant, 345; Glaucous Gull, 5; Iceland Gull, 1; Great Black-backed Gull, 21; Herring Gull, 1,863; Ring-billed Gull, 21; Mourning Dove, 1; Screech Owl, 3; Horned Owl, 7; Long-eared Owl, 10; Short-eared Owl, 12; Saw-whet Owl, 2; Kingfisher, 7; Yellow-shafted Flicker, 1; Hairy Woodpecker, 45; Downy Woodpecker, 177; Arctic Three-toed Woodpecker, 1; Horned Lark, 2; Blue Jay, 133; Raven, 1; Crow, 231; Black-capped Chickadee, 779; Brown-capped Chickadee, 1; White-breasted Nuthatch, 133; Red-breasted Nuthatch, 1; Brown Creeper, 21; Winter Wren, 7; Carolina Wren, 1; Catbird, 1; Robin, 2; Golden-crowned Kinglet, 34; Starling, 6,080; English Sparrow, 2,161; Red-winged Blackbird, 1; Bronzed Grackle, 2; Cardinal, 107; Evening Grosbeak, 31; Purple Finch, 8; Pine Grosbeak, 107; Common Redpoll, 175; Pine Siskin, 10; American Goldfinch, 419; Eastern Towhee, 1; Slate-colored Junco, 246; Oregon Junco, 1; Tree Sparrow, 262; White-throated Sparrow, 5; Swamp Sparrow, 3; Song Sparrow, 40; Lapland Longspur, 16; Snow Bunting, 1,548. — Total 71 species, 20,458 individuals. — J. L. Baillie, (compiler), Robt. Bateman, Ross Bateman, D. Beacham, G. Bennett, F. Bodsworth, O. D. Boggs, A. Bunker, D. Burton, L. Butcher, W. Carrick, G. Clark, V. Clark, C. H. D. Clark, J. Comer, F. Cook, C. Davies, I. Davies, A. Dawe, M. Easto, F. H. Emery, B. Foster, G. Francis, G. Gibson, A. Gordon, W. Gunn, H. Halliday, Paul Harrington, Peter Harrington, C. Helleiner, F. Helleiner, A. Helmsley, C. Hope, R. James, F. Keim, G. Lambert, A. Lamsa, C. Leavens, B. LeVay, F. LeVay, N. LeVay, T. LeVay, C. Lennox, J. Livingston, H. Lumsden, D. Marsh, N. Martin, W. Martin, K. Mayall, L. McDougall, W. McGregor, T. McIlwraith, J. McIntyre, F. Meuller, W. Milne, A. Mitchener, R. Pannell, D. Perks, A. Reid, R. Riseborough, R. Ritchie, T. Russell, R. M. Saunders, D. Scovell, R. Scovell, J. Sherrin, T. Shortt, D. Smith, F. Smith, W. Smith, L. L. Snyder,

J. Speakman, D. Speirs, J. M. Speirs, R. Stewart, J. Strickland, A. Strong, E. Talvila, R. Tasker, S. L. Thompson, E. Thorn, L. Walden, W. Wasserfall, D. West, J. D. West, J. Woodford (Brodie Club and co-operators).

Barrie, Ont. — (Shanty Bay, Tollendal, Highway 90, Camp Borden, Lisle, Alliston, Big Bay Point, Midhurst Park and District). — Dec. 30, 1951; 8 a.m. to 5 p.m.; temp. 34°; bright; mild; wind NW; depth of snow in open country 18 in.; no open water on bay; 21 observers in 5 cars; total hours, 24.5; total miles, 125 (115 by car, 10 on foot). — Ruffed Grouse, 11; Pheasant, 1; Herring Gull, 2; Great Horned Owl, 1; Barred Owl, 2; Short-eared Owl, 1; Kingfisher, 1; Hairy Woodpecker, 4; Downy Woodpecker, 4; Blue Jay, 45; Chickadee, 118; White-breasted Nuthatch, 16; Brown Thrasher, 1; Golden-crowned Kinglet, 1; Starling, 40; English Sparrow, 389; Cardinal, 1; Evening Grosbeak, 27; Pine Grosbeak, 72; Redpoll, 26; Siskin, 31; Goldfinch, 15; Junco, 1; Tree Sparrow, 26; White-throated Sparrow, 1; Snow Bunting, 75. — Total, 26 species, 924 individuals. — Brereton Field-Naturalists' Club.

London, Ont. — (Thames River from London to Wonnacotts and a small portion of the West end of Dorchester Swamp.) Dec. 29, 1951; 8.00 a.m. to 5.00 p.m.; 28°F.; clear; 18-24" snow. Thirty-nine observers. — Mallard Duck, 1; Black Duck, 13; Greater Scaup Duck, 1; American Golden-eye, 171; Hooded Merganser, 1; American Merganser, 45; Sharp-shinned Hawk, 3; Cooper's Hawk, 5; Red-tailed Hawk, 19; Red-shouldered Hawk, 1; Rough-legged Hawk, 2; Bald Eagle, 1; Ruffed Grouse, 4; Ring-necked Pheasant, 35; Virginia Rail, 1; Herring Gull, 8; Rock Dove, 89; Mourning Dove, 23; Screech Owl, 1; Great Horned Owl, 4; Long-eared Owl, 1; Belted Kingfisher, 7; Yellow-bellied Sapsucker, 1; Hairy Woodpecker, 17; Downy Woodpecker, 64; Prairie Horned Lark, 4; Blue Jay, 76; Crow, 16; Black-capped Chickadee, 255; Brown-capped Chickadee, 2; White-breasted Nuthatch, 42; Red-breasted Nuthatch, 2; Brown Creeper, 15; Winter Wren, 6; Golden-crowned Kinglet, 31; Starling, 256; English Sparrow, 828; Cowbird, 1; Cardinal, 147; Evening Grosbeak, 10; Purple Finch, 2; Pine Grosbeak, 26; Goldfinch, 80; Slate-coloured Junco, 139; Tree Sparrow, 144; Song Sparrow, 25; Lapland Longspur, 9; Snow Bunting, 118. — Total 48 species, at least 2,753 individuals. (Species observed in the area recently: Great Blue Heron, Northern Shrike, Redpolled Linnet, American Robin, Eastern Meadowlark, Carolina Wren). — William G. Girling, The McIlwraith Ornithological Club.

Kitchener, Ont. — (Kitchener NE to Bridgeport; W. to Westmount Golf Club S. to Preston; E. to Breslau, along the Grand River to Blair.) Dec. 30, 1951; 8.00 a.m. to 5.00 p.m.; sky overcast; temp. 38° — 40°F.; no wind; deep cover of snow, 17 observers in 7 parties. Total miles on foot approximately 50. Total hours in field 30. — Mallard Duck, 12; Black Duck, 66; American Golden-eye, 23; American Merganser, 24; Cooper's Hawk, 1; Red-tailed Hawk, 2; Ruffed Grouse, 22; Ring-necked Pheasant, 29; Herring Gull, 8; Rock Dove, 60; Great Horned Owl, 1; Downy Woodpecker, 23; Hairy Woodpecker, 1; Pileated Woodpecker, 4; Kingfisher, 1; Horned Lark, 1; Blue Jay, 20; Black-capped Chickadee, 215; Brown-capped Chickadee, 2; White-breasted Nuthatch, 9; Red-breasted Nuthatch, 2; Brown Creeper, 8; Winter Wren, 2; American Robin, 1; Golden-crowned Kinglet, 9; Starling, 97; Redpoll, 2; English Sparrow, 190; Cardinal, 55; Purple Finch, 1; Pine Grosbeak, 19; American Goldfinch, 45; Tree Sparrow, 12; Song Sparrow, 3; Slate-coloured Junco, 19; Snow Bunting 20. — Total, 36 species, 1010 individuals. (Also seen during the census week — Great Blue Heron, 1; Red-shouldered Hawk, 1; Rough-legged Hawk, 1; Common Shrike, 1; Snow Bunting, 200). — E. M. Carter.

Galt, Ont. — December 26th, 1951; 1.00 p.m. to 3.30 p.m. at a feeding station near a home on the outskirts of Galt and an area stretching for 1½ miles along the west bank of the Grand River; clear, calm, temp. 20°F.; 1½' to 2' of snow, 2 observers together. — Black Duck, 65; American Golden-eye, 50; American Merganser, 8; Sparrow Hawk, 1; Ring-necked Pheasant, 40; Herring Gull, 17; Rock Dove, 14; Hairy Woodpecker, 1; Downy Woodpecker, 1; Blue Jay, 8; Black-capped Chickadee, 11; Brown Creeper, 1; English Sparrow, 15; Starling, 2; Cardinal, 8; Goldfinch, 7; Slate-coloured Junco, 11. — Total 17 species; 260 individuals. — Margaret Stuart, Mary Stuart.

St. Thomas, Ont. — (7½ mile radius centering on a point 3 miles southeast of St. Thomas; pasture 15%, deciduous woodlots 15%, creek banks 25%, evergreen plantations

10%, lake front 10%, town suburbs 25%). Dec. 30, 7.25 a.m. to 5.30 p.m. Hazy, then clear, temp. 34° to 45°; wind SW to NE, 1 m.p.h.; about 12" of snow in wooded areas; all ponds frozen, but parts of creeks open; slushy ice out to at least one mile on Lake Erie. Twenty observers in five parties, and including six feeding stations in the same area. Total party hours 36 (30 on foot, 6 by car); total party-miles, 80 (22 on foot, 58 by car). — Great Blue Heron, 2; Canada Goose, 2; Mallard Duck, 4; Black Duck, 29; American Golden-eye, 20; Red-tailed Hawk, 12; Red-shouldered Hawk, 2; Rough-legged Hawk, 3; Marsh Hawk, 1; Sparrow Hawk, 3; Ruffed Grouse, 4; Ring-necked Pheasant, 18; Herring Gull, 6; Ring-billed Gull, 4; Mourning Dove, 26; Long-eared Owl, 2; Short-eared Owl, 1; Belted Kingfisher, 1; Yellow-shafted Flicker, 2; Pileated Woodpecker, 2; Hairy Woodpecker, 9; Downy Woodpecker, 35; Horned Lark, 26; Blue Jay, 42; Crow, 2; Black-capped Chickadee, 290; Brown-capped Chickadee, 5; White-breasted Nuthatch, 25; Red-breasted Nuthatch, 7; Brown Creeper, 6; Winter Wren, 1; Golden-crowned Kinglet, 6; Starling, 263; English Sparrow, 310; Cardinal, 56; Am. Goldfinch, 295; Eastern Towhee, 2; Slate-coloured Junco, 86; Evening Grosbeak, 7; Pine Grosbeak, 5; Tree Sparrow, 79; Field Sparrow, 12; White-throated Sparrow, 2; Song Sparrow, 11; Lapland Longspur, 5; Snow Bunting, 301. — Total 46 species; about 2,051 individuals. (Seen in area Dec. 26 Tufted Titmouse, 1). — Mrs. E. Allan, C. Ashbury, L. Auckland, C. Bartlett, Mrs. F. Bell, C. Clarke, Mrs. R. Coombs, A. Curtis, Mr. & Mrs. J. Field, M. Field (Compiler), R. Foster, Mrs. W. K. Hodkinson, C. Johnson, Mrs. J. Marr, D. Neill, W. Rankin, W. Stewart, A. Strieb, D. Young (St. Thomas Field Naturalists' Club).

West Elgin, Ont. — (area within 15 mile circle centered one mile north of West Lorne; pasture land 10%, agricultural land 10%, deciduous woods 20%, conifer groves, 5%, lake shore 15%, river banks and creek gulleys 40%). Dec. 26, 1951; 7.30 a.m. to 5.15 p.m. Clear sky until mid-afternoon when complete high overcast moved in from the NW, temp. steady at 17° all day; wind NW, 8 m.p.h., 6 inches of loose snow on top of 9 inches of crusted snow with drifts up to 3 feet in depth; walking conditions very poor. Thames river frozen, except for rapids, scattered ice fields on Lake Erie. Fifteen observers in 5 parties. — Total Hours 27½; total miles, 72 (45 by car, 27 on foot). — American Golden-eye, 87; Sharp-shinned Hawk, 3; Cooper's Hawk, 1; Red-tailed Hawk, 12; Red-shouldered Hawk, 1; Rough-legged Hawk, 4; Bald Eagle, 1; Bob-white Quail, 8; Ring-necked Pheasant, 7; Ruffed Grouse, 2; Herring Gull, 3; Mourning Dove, 12; Screech Owl, 1; Horned Owl, 1; Long-eared Owl, 1; Short-eared Owl, 1; Red-bellied Woodpecker, 4; Pileated Woodpecker, 1; Downy Woodpecker, 31; Hairy Woodpecker, 10; Horned Lark, 12; Blue Jay, 8; American Crow, 10; Black-capped Chickadee, 146; Brown-capped Chickadee, 8; White-breasted Nuthatch, 5; Brown Creeper, 3; American Robin, 2; Golden-crowned Kinglet, 30; Starling, 85; English Sparrow, 220; Rusty Blackbird, 3; Cardinal, 40; Evening Grosbeak, 1; Pine Grosbeak, 32; American Goldfinch, 64; Eastern Towhee, 1; Slate-coloured Junco, 52; Tree Sparrow, 106; Song Sparrow, 4; Snow Bunting, 210. — Total 41 species, about 1,233 individuals. — (Seen recently, Marsh Hawk, Sparrow Hawk, Common Redpoll). — Jack Arnold, S. M. Lancaster, H. L. Lancaster, V. Earl Lemon, R. E. Lemon, Mr. and Mrs. H. Mylrea, Ken Mylrea, David Murray, Donald Murray, Dougald Murray, David Robinson, Miss E. Sifton, Dr. A. C. Steele, Ruth Steele (West Elgin Nature Club).

Point Pelee, Ont. — (The National Park and some agricultural land at north edge; agricultural land 25%, marshland, 20%, deciduous woods 20%, red cedar groves 15%, lake shore 20%). Dec. 29, 1951; 9.00 a.m. to 3.45 p.m. Complete overcast, temp. 26° all day; light SW wind, 5 m.p.h.; marshes frozen, creeks mostly frozen; Lake Erie frozen on west side of point, patches of ice on east side; 10 inches of snow on ground. Two observers in 1 party. Total party hours, 6¾ (3 on foot, 3¾ by car); Total party miles, 37 (4½ on foot, 32½ by car). — American Golden-eye, 21; Bufflehead, 4; American Merganser, 4; Red-tailed Hawk, 2; Bald Eagle, 3; Marsh Hawk, 3; Ring-necked Pheasant, 5; Herring Gull, 15; Mourning Dove, 3; Hairy Woodpecker, 1; Downy Woodpecker, 6; Horned Lark, 100; Black-capped Chickadee, 16; Brown Creeper, 2; Golden-crowned Kinglet, 3; Starling, 16; English Sparrow, 103; Crow, 331; Cowbird, 1; Cardinal, 23; Evening Grosbeak, 38; American Goldfinch, 3; Eastern Towhee, 1; Slate-coloured Junco, 7; Tree

Sparrow, 145; Swamp Sparrow, 1; Song Sparrow, 1; Snow Bunting, 187. — Total 28 species, approximately 1047 individuals. — Fred M. Helleiner, Alden M. Strong.

Meaford, Ont. — (east half of town, shore line two miles eastward, part of escarpment 11th line N., St. Vincent Township; feeding station in town; selected spots on Highway 26). Dec. 26, 1951; 10.00 a.m. to 4.00 p.m., 30°F, wind SW, sky clear becoming overcast in the afternoon. Seven observers in three parties. — Black Duck, 1; American Golden-eye, 3; American Merganser, 7; Ruffed Grouse, 10; Herring Gull, 200; Mourning Dove, 4; Rock Dove, 15; Screech Owl, 1; Pileated Woodpecker, 4; Hairy Woodpecker, 3; Downy Woodpecker, 11; Blue Jay, 9; Black-capped Chickadee, 52; White-breasted Nuthatch, 14; Brown Creeper, 3; Winter Wren, 1; Cedar Waxing, 1; Starling, 46; English Sparrow, 90; Pine Grosbeak, 3; Redpoll, 28; Pine Siskin, 1; Slate-coloured Junco, 15; Tree Sparrow, 6; Snow Bunting, 101. — Total 25 species; total individuals 629. — L. H. Beamer.

Peterborough, Ont. — Dec. 31, 1951; 9.30 a.m. to 3.30 p.m.; cloudy and mild in forenoon, some rain in afternoon; wind gusty 5-25 m.p.h. Temp. 34°F; 14" snow. Two observers in 1 party — 16 miles by car, 5 miles on foot. — American Golden-eye, 5; American Merganser, 2; Ruffed Grouse, 4; Pileated Woodpecker, 2; Downy Woodpecker, 1; Black-capped Chickadee, 15; White-breasted Nuthatch, 1; Brown Creeper, 1; Northern Shrike, 1; Starling, 40; English Sparrow, 50; Evening Grosbeak, 52; American Goldfinch, 2; Tree Sparrow, 1. — Total 14 species, 177 individuals. — J. L. McKeever, Derek McKeever.

Huntsville, Ont. — Dec. 23, 1951; 1.30 p.m. to 4.30 p.m.; temp. 7° to 20°F.; overcast, light snow falling; 24 inches snow lying; lakes frozen, river open; 9 observers in 4 parties; total miles, 70, mostly by car. — American Golden-eye, 3; Hooded Merganser, 2; Merganser, 5; Ruffed Grouse, 8; Herring Gull, 1; Kingfisher, 1; Pileated Woodpecker, 2; Hairy Woodpecker, 5; Downy Woodpecker, 2; Canada Jay, 1; Blue Jay, 14; Black-capped Chickadee, 14; White-breasted Nuthatch, 1; Red-breasted Nuthatch, 1; Brown Creeper, 2; Northern Shrike, 1; Starling, 1; English Sparrow, 12; Evening Grosbeak, 16; Red Crossbill, 9. — Total 20 species; 101 individuals. (Also seen in area during December — Redpoll, Pine Grosbeak, Tree Sparrow, Snow Bunting). — J. Goldthorp, C. Kay, A. May, R. May, Jean May, K. Perrin, R. Rutter, Mrs. E. G. R. Rogers, J. Walter (The Huntsville Nature Club).

North Bay, Ont. — (from city of North Bay, townships of East Ferris, Bonfield, Calvin, villages of Bonfield, Rutherglen, Eau Claire, area around Pimisi Bay, Mattawa River, Kaipuskong River, Kennedy Lake, Smith's Lake, Amable du Fond River, to 10 miles west of Mattawa, Ontario); open farmland 30%, coniferous woodlots and black spruce bog 10%, second growth mixed forest 50%, lakes and rivers 10%, settlements 10%. Dec. 31, 8.00 a.m. to 4.00 p.m., clear to freezing rain, 4 to 33 above F.; wind W. to SE, 5-15 m.p.h.; ground covered with 6 to 10 inches crusty snow; all fresh water except rapids and eddies frozen; one observer; total hours 8; total miles 43 (39 by car, 4 on foot). — American Golden-eye, 6; Pileated Woodpecker, 1; Hairy Woodpecker, 7; Downy Woodpecker, 2; Canada Jay, 3; Blue Jay, 7; Northern Raven, 2; Black-capped Chickadee, 42; White-breasted Nuthatch, 1; Red-breasted Nuthatch, 2; Brown Creeper, 1; Starling, 29; English Sparrow, 20; Pine Grosbeak, 13; Redpoll, 3; Snow Bunting, 3. — Total 16 species, about 142 individuals. — Louise de Kiriline Lawrence.

Port Arthur — Fort William, Ont. — (Bare Point to Kakabeka Falls). — Dec. 26, 1951; 9.00 a.m. to 5.30 p.m.; morning dull with scattered snow flurries, clearing in afternoon. About 2 inches snow on ground; temp. ranged between 15°F. to 12°F. Wind was Northwest from 20 to 30 miles per hour. Relative humidity at 1.30 was 69%. Mountain ash berries scarce, weed seeds easily obtainable. Twenty-six observers in 11 parties. Total party hours 40 (25 on foot, 15 by auto), total party miles — 144 (29 on foot, 115 by auto). — Ruffed Grouse, 9; Herring Gull, 31; Rock Dove, 251; Snowy Owl, 1; Hairy Woodpecker, 1; Downy Woodpecker, 1; Canada Jay, 3; Blue Jay, 18; Raven, 24; Crow, 6; Black-capped Chickadee, 67; Hudsonian Chickadee, 14; Red-breasted Nuthatch, 2; Bohemian Waxwing, 1; Starling, 112; English Sparrow, 775; Cardinal, 1 (first record of species in area); Evening Grosbeak, 17; Pine Grosbeak, 50; Common Redpoll, 262; Slate-coloured Junco, 1. — Total 21 species, 1647 individuals. —

Mr. & Mrs. P. Addison and sons Bill, Peter and Edward, Dr. & Mrs. A. E. Allin, Ken Campbell, Keith Denis (compiler) and son Norman, Mr. & Mrs. Ken Eoll, Claude Garton, Mr. & Mrs. Hanton, Dr. & Mrs. W. P. Hogarth, Mrs. M. Knowles, Mrs. Pengelley, Mr. A. Robinson, Mr. & Mrs. C. Rydholm and children Louise and Roy, Mr. & Mrs. James Thompson. (Thunder Bay Field Naturalists' Club).

Yorkton, Sask. — (area 15 miles in diameter with Yorkton as center); Dec. 26, 1951; 9.00 a.m. to 4.00 p.m.; Overcast for two hours in midday, otherwise clear; wind NW at 10 to 12 m.p.h.; Temp. 9° to 5°. Ground covered with two inches of snow. 15 observers in 6 parties. Total party hours, 13 (5½ by car, 7½ on foot); Total party miles, 55 (48 by car, 7 on foot). — Pigeon Hawk, 1; Ruffed Grouse, 1; Sharp-tailed Grouse, 10; Hungarian Partridge, 5; Snowy Owl, 1; Blue Jay, 2; Magpie, 24; Black-capped Chickadee, 10; Red-winged Blackbird, 4; English Sparrow, 373; Pine Grosbeak, 5; Redpoll, 8, White-winged Crossbill, 2; Snow Bunting, 395. — Total 14 species, approx. 841 individuals. — Norma Beck, Wayne Bjorgan, Brother Clarence, Brother Vincent, Henry Chilman, Lionel Coleman, Ronald Coleman, Dr. C. J. Houston, Dr. and Mrs. Stuart Houston, Professor Charles Lightbody, Tony Pawluck, Paul Welgan, Ronald Welgan, D'Arcy Wershler. (Yorkton Natural History Society).

Saskatoon, Sask. — (10 mile radius of Saskatoon, including Dominion Forest Nursery Station, Sutherland) December 24, 1951; 8.25 a.m. to 12.15 p.m.; partly cloudy — 14°F. at start; light south wind; 2-6 inches of snow on ground; 2 observers; together most of the time; total miles 43 (3 on foot, 40 by car). — Mallard, 2; Sharp-tailed Grouse, 2; Hungarian Partridge, 6; Chukar Partridge, 7; Snowy Owl, 1; Magpie, 3; Black-capped Chickadee, 2; Red-breasted Nuthatch, 1; Bohemian Waxwing, 130; English Sparrow, 340; White-winged Crossbill, 4; Snow Bunting, 29. — Total 12 species, 527 individuals. — F. J. H. Fredeen, J. B. Gollop.

Vernon, B.C. — (west to Okanagan Landing, north to Buckerfield's Ranch, south to Kalamalka Lake, and east to Coldstream Ranch). Dec. 30, 1951; 9.30 a.m. to 3.30 p.m. Cloudy with frequent sunny intervals; wind north, 10 m.p.h., temp. 6°; 16 inches of snow. Shore ice on Okanagan and Kalamalka Lakes; Swan Lake completely frozen over. Ten observers in three parties. Total miles by car, approx. 45. — Western Grebe, 1; Mallard, 143; Pintail, 1; Lesser Scaup, 42; American Golden-eye, 7; Old-squaw, 7; American Merganser, 4; Goshawk (?) 1; Sharp-shinned Hawk, 1; Rough-legged Hawk, 2; Ruffed Grouse, 1; California Quail, 1; Ring-necked Pheasant, 178; Coot, 26; Killdeer, 2; Wilson's Snipe, 5; Belted Kingfisher, 1; Yellow-shafted Flicker, 1; Red-shafted Flicker, 38; Hairy Woodpecker, 1; Downy Woodpecker, 3; American Magpie, 15; Raven, 2; Crow, 2; Black-capped Chickadee, 18; Red-breasted Nuthatch, 7; Dipper, 2; Long-billed Marsh Wren, 1; Robin, 124; Varied Thrush, 12; Golden-crowned Kinglet, 15; Alpine Pipit (?), 100; Bohemian Waxwing, 66; Northern Shrike, 2; Starling, 1; English Sparrow, 99; Evening Grosbeak, 327; Common (?) Redpoll, 1; Oregon Junco, 545; Tree Sparrow, 16; White-crowned Sparrow, 1; Song Sparrow, 24. — Total 42 species, approx. 1846 individuals. (Seen during period, Turkey Vulture, Mountain Bluebird, Townsend's Solitaire). — H. Baerg, J. B. Beddome, D. K. Campbell, J. T. Fowle, J. Grant, A. N. Humphries, G. Peacock, J. Quirk, D. A. Ross, B. A. Sugden.

Crescent, B.C. — (Coast and bush between the International Boundary and Nicomekl River, including White Rock pier and Blackie's Spit, Crescent) — Dec. 27, 1951; 8.00 a.m. to 4.30 p.m., temp. about 32°F. at daybreak; light NE wind, six inches of snow on ground, 3 observers in two parties, total miles 15 on foot. — Common Loon, 14; Red-throated Loon, 3; Holboell's Grebe, 3; Horned Grebe, 12; Eared Grebe, 1; Double-crested Cormorant, 1; Great Blue Heron, 3; Black Brant, 2; Mallard, 12; Pintail, 600; Green-winged Teal, 31; Baldpate, 2; Greater Scaup, 88; American Golden-eye, 15; Buffle-head, 30; Old-squaw, 3; White-winged Scoter, 90; Surf Scoter, 55; Red-breasted Merganser, 3; Hooded Merganser, 3; Ring-necked Pheasant, 9; Black-bellied Plover, 12; Least Sandpiper, 1; Red-backed Sandpiper, 167; Glaucous-winged Gull, 54; Short-billed Gull, 20; Red-shafted Flicker, 2; Hairy Woodpecker, 1; Downy Woodpecker, 3; Northwestern Crow, 24; Black-capped Chickadee, 54; Chestnut-backed Chickadee, 11; Winter Wren, 5; Bewick's Wren, 4; American Robin, 29; Varied Thrush, 24; Golden-crowned Kinglet, 26; English Sparrow, 17;

Brewer's Blackbird, 200; Pine Siskin, 25; Oregon Towhee, 13; Slate-coloured Junco, 2; Oregon Junco, 84; Fox Sparrow, 6; Song Sparrow, 15. — Total 46 species; 1780 individuals. (Seen during period Sharp-shinned Hawk; Wilson's Snipe and Purple Finch). — H. N. Clarke, M. W. Holdom, E. E. Woodford.

Comox, Vancouver Island, B.C. — Along shore line through Comox village to foot of Comox Hill, back through Comox village; distance 4-5 miles; Jan. 8, 1952; 10.30 a.m. to 2.30 p.m. Temp. 38°, bright, later clouding over; visibility good. One observer on foot. — Common Loon, 1; Pacific Loon Flock; Double-crested Cormorant, 5; Pelagic Cormorant, 2; Great Blue Heron, 3; Baldpate, 75; Mallard, 300; American Widgeon, 75; Pintail, 3; Greater Scaup and Lesser Scaup, 350; American Golden-eye, 50; Barrow's Golden-eye, 2; Buffle-head, 15; Old-squaw, 2; White-winged Scoter, 500; Surf Scoter, 150; American Scoter, 2; Red-breasted Merganser, 7; unidentified ducks, 2500; Bald Eagle, 1; California Quail, 19; Ring-necked Pheasant, 1; Coot, 2; Glaucous-winged Gull, 75; Short-billed Gull, 20; Belted Kingfisher, 1; Western Crow, 1; North Western Crow, 70; Winter Wren, 1; Oregon Towhee, 3; Seattle Wren, 1; Western Robin, 3; Brewer's Blackbird, 80; Siskin Flock; Golden-crowned Sparrow, 3; Song Sparrow, 2. — Total 35 species; 4250 (plus) individuals. — Theed Pearse.

Victoria, B.C. — Dec. 17, 1951. Victoria to Sooke Harbor, Beacon Hill, Gonzales Bay, Shoal Bay, Spoon Bay, Cadboro Bay, Elk, Beaver and Swan Lakes and flats. Dull, cloudy, temp. 39°. Wind SE to 30 m.p.h. — Common Loon, 17; Red-throated Loon, 13; Holboels' Grebe, 6; Horned Grebe, 145; Eared Grebe, 7; Western Grebe, 171; Pied-billed Grebe, 6; Double-crested Cormorant, 12; Brandt's Cormorant, 4; Baird's Cormorant, 201; Heron, 5; Mute Swan (introduced), 3; Lesser Canada Goose, 42; Mallard, 1085; European Widgeon, 1; Baldpate, 2901; Pintail, 35; G. W. Teal, 10; Mandarin (introduced), 3; Shoveller, 188; Ring-necked Duck, 50; Canvas-back, 120; Greater Scaup, 814; Golden-eye, 33; Buffle-head, 212; Old-squaw, 20; Harlequin, 110; White-winged Scoter, 72; Surf Scoter, 98; American Scoter, 1; Ruddy Duck, 3; Hooded Merganser, 4; American Merganser, 13; Red-breasted Merganser, 54; Goshawk, 1; Bald Eagle, 1; Peregrine Falcon, 1; Ruffed Grouse, 6; California Quail, 5; Ring-necked Pheasant, 5; Coot, 63; Killdeer, 12; Black Turnstone, 99; Hudsonian Curlew, 2; Glaucous-winged Gull, 512; Short-Billed Gull, 99; Bonapartes Gull, 6; Marbled Murrelet, 1; Kingfisher, 13; Northwestern Red-shafted Flicker, 28; Red-shafted Flicker, 25; Pileated Woodpecker, 2; Hairy Woodpecker, 1; Downy Woodpecker, 4; European Skylark (introduced), 12; Raven, 2; Crow, 57; Chestnut-backed Chickadee, 99; Nuthatch, 6; Creeper, 2; Winter Wren, 21; Seattle Wren, 8; Robin, 174; Varied Thrush, 5; Hermit Thrush, 2; Golden-crowned Kinglet, 95; Ruby-crowned Kinglet, 8; American Pipit, 35; English Sparrow, 35; Western Meadowlark, 3; Red-winged Blackbird, 1; Starling, 3; Siskin, 650; Red Crossbill, 15; Oregon Towhee, 9; Oregon Junco, 142; Golden-crowned Sparrow, 4; Fox Sparrow, 7; Song Sparrow, 17. — Total 77 species; 8757 individuals. — C. Guiguet, H. D. R. Stewart, J. O. Clay, A. R. Davidson, Mrs. Hobson, Mrs. Blackden.

Triple Island Lightstation, B.C. — Position 54°N, 131°W (20 miles west of Prince Rupert). Bare rock islets exposed to open sea. Approx. area 3 acres; nearest wooded island 1 mile distant. Dec. 31, overcast, temp. 22° to 27°F., wind NE 10 m.p.h., light choppy sea, good visibility. No snow or ice. Two observers. Observations made only from lighthouse dwelling with 15x binoculars and 20x telescope. Numbers given are the maximum seen at one time for each species. — Common Loon, 1; Horned Grebe, 1; Brandt Cormorant, 1; Pelagic Cormorant, 3; unidentified Cormorants, 110; Harlequin, 15; White-winged Scoter, 5; Surf Scoter, 5; American Scoter, 19; Bald Eagle, 2; Black Oyster-catcher, 6; Surf Bird, 1; Black Turnstone, 39; Aleutian Sandpiper, 62; Glaucous-winged Gull, 7; Raven, 2; Song Sparrow, 1; (wintering on the island; same banded Song Sparrow that spent the previous winter on Triple). — Total 16 species, 280 individuals. Seen in period — Red-necked Grebe, Duck Hawk, Herring Gull. — G. C. and J. M. Odlum.

NOTES AND OBSERVATIONS

Wheatears in the Mackenzie Mountains, District of Mackenzie, N.W.T.—Towards the end of July, 1944, I had the opportunity of travelling on the Canol Road from Norman Wells into the little-known Mackenzie Mountains, remaining two nights at the pump station at Mile 111, situated in the valley of Bolstead Creek. On July 25 I climbed to the highest summit within reach, lying about 8 miles northwest of the camp, and estimated it to be about 7000 ft. in elevation (roughly 64° 20' N, 128° 20' W). This summit I indicated in pencil on the relevant aerial photograph in Ottawa in 1946, and it may in due course be designated on the topographic sheets. Reference to the botanical collections made there, together with a small-scale map, may be found in Porsild's paper "The alpine flora of the east slope of Mackenzie Mountains, N.W.T." (*Nat. Mus. Canada,* Bull. 101, Ottawa, 1945).

As I came off the main ridge, covered with exfoliated stone blocks at 6000-6500 feet, I had a very good view of a Wheatear (*Oenanthe oenanthe*) in juvenile plumage, and could hear the familiar '*chack, chack*' of one or more others, unseen on the very rough ground. I noted the white rump, with the central shaft of black showing as a narrow wedge forward from the tail. The wheatear has been well known to me since childhood, being an abundant bird in the Yorkshire dales where I lived, and I had more recently seen it in the eastern Arctic. July 25 is rather too early for migrants, and there would of course be little likelihood at any time of migrants in this locality.

This extends the known range considerably to the southeast. Previous records known from northwest Canada, all in the Yukon Territory, appear to be as follows:

Aug. 18, 1901, Fortymile (J. Grinnell 1909, *Condor,* 11: 207).

Aug. 1, 1904, High ridge above Coal Creek, near Fortymile (W. H. Osgood 1909, *N. Amer. Fauna* No. 30, U.S. Dept. Agric., Wash.: 65).

June 24, 1906, King Point, Mackenzie Bay (H. T. L. Schaanning 1933, *Medd. Zool. Mus., Oslo,* No. 33: 144).

July 31, 1908, Herschel Island (R. M. Anderson 1913, in Stefansson's "*My life with the Eskimo*": 456-494).

July 15, 1943, Teepee Lake, south of Alaska highway near International Boundary (C. H. D. Clarke, unpublished, "Biological Reconnaissance of the Alaska Military Highway", etc., Ottawa: 15).

I am very grateful to Mr. W. Earl Godfrey for bringing these to my attention. The position of the present observation is 350 miles or more east or southeast of any of the places listed above. It may be noted with interest that the gap between western and eastern records of wheatears is not much more than 1000 miles (cf. J. C. Ross's record made on May 2-3, 1830, at Boothia Felix, in *App. to Ross's 2nd Voyage,* p. xxvi, Lond. 1835).

Two Snow Buntings (*Plectrophenax nivalis*) and a Grey-crowned Rosy Finch (*Leucosticte t. tephrocotis*) were seen slightly higher on the main ridge. Though these are not unexpected, they are perhaps worth recording from a region about which so little is known. The Rosy Finch is reported to extend as far east as the Franklin mountains, east of the Mackenzie (M. Y. Williams, *Can. Fld.-Nat.,* 1933, p. 30).—*V. C. WYNNE-EDWARDS, Aberdeen, Scotland.*

New Sight Records of Three Species at Pimisi Bay, Ontario.—On May 25, 1950, a Yellow-billed Cuckoo, *Coccyzus a. americanus* (Linnaeus), was seen perched in the top of a large-toothed aspen that was not yet in full leaf. I first noticed the bird because of its peculiar song, "tock-tock-tock", given at even intervals, unlike that of the Black-billed Cuckoo, *Coccyzus erythropthalmus* (Wilson), which is fairly common in the district. As the bird turned about on its lofty perch in the bright sunlight, all its distinctive field-marks came into plain view. The bird remained in the vicinity until June 10, during which time it was seen twice again under excellent conditions.

On September 13, 1951, a Virginia Rail, *Rallus l. limicola* Vieillot, emerged from the reeds at Pimisi Bay onto a flat rock, not more than 8 or 10 feet from where I stood. Identification was based mainly on my experience of having seen the species in the field on two previous occasions at Buffalo and Toronto Islands, and I later re-checked it with skins at the Redpath Museum, Montreal.

During the past two years, I have seen birds which I believed to be Connecticut Warblers, *Oporornis agilis* (Wilson), without being able to identify them positively. Mr. W. E. Godfrey, to whom I wrote for advice, then kindly sent me some skins from the collections of the National Museum of Canada for study. It is on the basis of this study that I identified a bird seen on September 20, 1951, as a Connecticut Warbler. Among a large number of passing warblers, this bird projected itself upon my attention by its very conspicuous eye-ring, its notably larger size as compared to a Black-throated Blue Warbler, *Dendroica c. caerulescens* (Gmelin), that was feeding nearby, its pale yellow underparts with the undertail coverts reaching slightly beyond the half of the tail. The dull shade and rather indefinite outline of the "hood", as well as the pinkish white patch under the chin, suggested that this bird was an adult female or an immature.

N. R. Brown, listing the birds of the Petawawa Military Reserve and surrounding district, Renfrew County, (1947, Can. Field-Naturalist, Vol. 61, pp. 47-55), about 80 miles SE of Pimisi Bay, included one August record of the Virginia Rail and three May and June records of the Connecticut Warbler. But none of the three species in question have previously been listed among the birds of the vicinity of Lake Nipissing, Ontario, by W. E. Ricker and C. H. D. Clarke, (1939, Contributions of the Royal Ontario Museum of Zoology, No. 16), or in the later revision of that list, Birds of the Vicinity of North Bay, Ontario, (including Pimisi Bay), (1947, Can. Field-Naturalist, Vol. 61, pp. 23-38) by Doris Huestis Speirs and J. Murray Speirs.— *LOUISE DE KIRILINE LAWRENCE, Rutherglen, Ontario.*

Arkansas Kingbird in Westmorland Co., New Brunswick. — On October 24, 1951 I observed an Arkansas kingbird *(Tyrannus verticalis)* in open farmland between the village of Midgic and Jollicur Lakes, about five miles north-east of Sackville, N.B. When first seen, the bird was sitting on a fence wire near the road. I was able to drive to within twenty or thirty yards of it and clearly saw the outer white tail feathers, yellowish underparts and grayish head and neck with the slightly darker band across the eyes. An unsuccessful attempt was made to collect this bird. — *G. F. BOYER, Canadian Wildlife Service, R.R. No. 1, Sackville, N.B.*

Dickcissel in Newfoundland. — While at Terra Nova on November 3, 1951, I flushed a Dickcissel *(Spiza americana)* from a small grassy field. During the next half-hour it was approached to within twenty feet on several occasions and leisurely studied with eight-power prismatic binoculars. There was only a faint suggestion of black on the throat, but other characteristics, such as the pure yellow breast, grey cheeks and yellow eyebrow-lines, convinced me that it was an adult male.

About an hour after the above observation, I found, in the immediate vicinity, the remnants of a female (possibly an immature) which had apparently been run over by the railway train during the previous night. Its wings are now being retained by the National Museum at Ottawa, where its identity has been confirmed by Mr. W. Earl Godfrey. This species has not previously been reported from Newfoundland. — *LESLIE M. TUCK, Canadian Wildlife Service, St. John's, Newfoundland.*

White-crowned Sparrow (*Zonotrichia leucophrys pugetensis*) **and Bantam Hen.**—Mr. William Gardiner, of Crescent, B.C., had a broody bantam hen. One day it disappeared and was discovered later roosting as it was thought in a patch of raspberry canes. When Mr. Gardiner returned at night he took a flashlight and went down the garden to get the hen. He found it sitting on the nest of a White-crowned Sparrow which contained four eggs. Strange to relate, the White-crowned Sparrow was sitting on the back of the hen. Mr. Gardiner picked up the sparrow, removed the hen, and replaced the bird on her eggs. Next day the bantam escaped from a coop and was again found on the nest with the sparrow perched on its back. This happened several times until finally the sparrow deserted her nest in despair. Unfortunately a camera was not available.

When I saw the nest a few days later (July 15, 1951) there were only two eggs left as the weight of the hen had broken the other two. The nest was situated about four feet from the ground and the tops of the raspberries were beaten down making a platform so that the hen could sit comfortably on the nest.

When we consider the size of the eggs it is strange that a bantam should have felt the urge to brood them.—*MARTIN W. HOLDOM, Crescent, B.C.*

REVIEWS

The Birds of Newfoundland. *By Harold S. Peters and Thomas D. Burleigh; illustrations by Roger Tory Peterson. Newfoundland Department of Natural Resources, St. John's, 1951; pp. I-XIX, 1-431, 32 colored plates, 40 text figs. ($6.00)*

With the publication of *The Birds of Newfoundland,* our newest province becomes the first Canadian province to underwrite a complete book on its birds. The Newfoundland government is to be commended for its foresight in initiating and financially supporting the preparation and publication of this handsome and very useful volume. The abundant information contained in the book is well organized, readably written, clearly printed with few typographical errors, and attractively illustrated.

The project was undertaken, the authors tell us, in compliance with a request made some ten years ago by the Newfoundland government. Both authors are officers of the United States Fish and Wildlife Service and both have had extensive field experience in Newfoundland and elsewhere. Previous to 1937 Peters visited Newfoundland six times; and later intensive investigation by both authors there, occupying a total of 304 days at all seasons in the period 1937 to 1947, fitted them admirably for producing this book. They completely circled the island by boat, visited many of the coastal islands, worked in much of the interior. The notes and specimens thus obtained, supplemented by an obviously painstaking compilation of both published and unpublished data from numerous widely-scattered sources, provided Peters and Burleigh with an impressive amount of information which they present in simple, non-technical language.

Introductory chapters deal with the physiography, climate, and tree cover of Newfoundland and an interesting history of ornithological work done there. Plumage development, song, courtship, territory, nests, eggs, incubation, food, and feeding of young are treated succinctly; and there are brief accounts of geographical distribution, migration, bird banding, and systematic classification (including a list of 24 birds that have been described from Newfoundland). A chapter devoted to the conservation and protection of birds touches on a number of problems as they apply particularly to Newfoundland. There is an interesting history of the development of game laws in Newfoundland, by H. W. Walters of the Newfoundland Department of Natural Resources.

The bulk of the text (pp. 46-399) is devoted to a well-annotated list of 227 birds known to occur in Newfoundland. An account of each bird gives its scientific and vernacular names (including local names), its appearance, field marks, voice, nest and eggs, range, status in Newfoundland, habits, food, etc. Useful counts and estimates of breeding numbers of some species are given and there also is a considerable amount of valuable information derived from banded birds. Much new distributional information is made available and that already published by others appears to have been thoroughly compiled. The authors have obviously been cautious in admitting species to the list of birds known to occur or to have occurred in Newfoundland. The hypothetical list (pp. 401-407) contains 56 forms. The evidence for the alleged occurrence of these in Newfoundland is given impartially.

As in most good books there are in this a few things not entirely above criticism. For example, *Anas albeola* Linnaeus (type locality America-Newfoundland, *ex* Edwards) is missing from the list of birds (pp. 41-43) with type locality in Newfoundland. The treatment of habitats is too brief. Although 13 types of habitat are mentioned (by name only), of which three are "slopes, hills, and higher elevations", nothing is said of such habitats, so important in Newfoundland, as beaches, marshes, cliffs, and the great expanse of open water entirely surrounding the island. These, of course, attract to Newfoundland a very considerable part of its avifauna. To the seven tree species listed as the main components of the forest might have been added aspen and white spruce, which are common and ecologically very important, especially in southern Newfoundland.

A curious discrepancy (which, however, does not affect the authors' excellent treatment of bird distribution in Newfoundland) is found in the western parts of the ranges given for the Eastern Common Nighthawk, Yellow-bellied Sapsucker, Black-backed Woodpecker, Baltimore Oriole, Bronzed Crow-blackbird, Rose-breasted Grosbeak, and White-throated Sparrow. Manitoba is given as the

western extremity of the ranges of these, whereas it is a matter of common knowledge that two of these species breed commonly west to Alberta, two as far west as British Columbia, two to Yukon, and one to Alaska.

The descriptions of the birds are beautifully and, almost without exception, very accurately supplemented by 32 colored plates, depicting 153 species, by the gifted artist-naturalist Roger Tory Peterson who did also the 40 text figures as well as the attractive end maps. The Black-backed, or Arctic Three-toed, Woodpecker is painted with four instead of three toes, obviously a *lapsus!*

Such small things little alter the fact that the authors and artist have given us an excellent and much-needed account of Newfoundland birds. The book will doubtless be the standard reference work on the area for a long time to come. Combining as it does authenticity with simplicity it is a 'must' for novice or professional ornithologists interested in Newfoundland birds. Moreover, teachers anywhere in eastern Canada or northeastern United States will doubtless find in it just the kind of information they require. The book closes with a useful bibliography. In Canada, it is obtainable from Thomas Allen, Ltd., 266 King Street, West, Toronto, Ontario. — W. EARL GODFREY.

Union Bay. (The life of a City Marsh). *By Harry W. Higman and Earl J. Larrison University of Washington Press, Seattle 5, Wash. $4.00.*

This is to me a surprising and delightful book. My wife opened it first and her preliminary curiosity led to a one session reading, clearly indicative of the absorbing nature of its contents. She tried it on the neighbor's 12-year old daughter who opened it from politeness and five minutes later subsided onto her shoulderblades and lapsed into silence. My own experience with it was no less keen, in fact I am sure it was even greater than theirs; for this is a story told with sufficient vivacity and humor to interest the young and at the same time there is a keenness of perception and an aptness of phrase that makes it possible for the reader to enjoy in proportion to his knowledge.

Starting with the thesis that it is no longer possible to ignore man in any wildlife story the authors in just over 300 pages take one again and again through this city marsh each time viewing a different facet of its teeming life, each time watching this life break and swirl around human presence like the dark water parting at the canoe prow.

There is good biology aplenty in it too but it is unobtrusive. The simon pure behaviorist may perhaps take exception to the few outbursts of anthropomorphism. These the authors acknowledge and indulge for a purpose and I think generally achieve their aims. In only one chapter, that on the phalarope, did I find it overdone.

They have had untold hours of fun, relaxation, and absorbing interest in the marsh of which they write. If you would relive some of your own most satisfying experiences, if you seek to awaken others to the fascination to be found outdoors, this book will do it. — *I. McT. COWAN.*

Bird Guide. Land Birds East of the Rockies. *By Chester A. Reed Doubleday and Company, Inc., Garden City, New York; rev. ed., 1951; pp. 1-238. (Regular edition $1.75, de luxe ed. $2.25).*

It is with real pleasure that we welcome this new edition of Reed's *Bird Guide.* Since the appearance of the first edition, in 1906, this little (5½ x 3¼) pocket guide has deservedly enjoyed great popularity. Undoubtedly few bird books have, over the years, contributed more to the popularizing of the field study of birds. The newest edition is completely revised. The colored plates are greatly improved, nomenclature and ranges are brought up to date, and there is much good advice to the beginner packed into a few pages of the introduction.

Two hundred and twenty-two species of the land birds (doves to sparrows in A.O.U. order) occurring east of the Rockies are treated. All are illustrated in color and, in cases where the sexes or young are colored differently, these different plumages are shown. There are notes on the field characters, habits, voice, nest and eggs, and ranges of the birds treated, a color key as an additional aid to identification, line drawings showing the topography of birds, and an index. Probably the reason for the popularity of this book in the past is that it combines inexpensiveness with numerous color plates, convenient size, and succinct treatment of well-chosen subject matter. It still offers all these and undoubtedly its popularity will continue. — *W. EARL GODFREY.*

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NESTING OF THE RING-NECKED PHEASANT ON PELEE ISLAND, ONTARIO [1]

K. E. Ball

TEN THOUSAND ACRE Pelee Island, in western Lake Erie, is noted for its high population of pheasants (Clarke and Braffette 1946, Stokes 1948, Ball 1950).

Nesting studies were carried on during 1947 and 1948. Acknowledgement of aid is gratefully made to the Department of Lands and Forests of Ontario for making this study possible.

Weather

For the spring months for the period 1935 to 1946 the average rainfall was 13.3 inches. The average spring rain for 30 years was 11.1; the average for 1934 to 1939 was 12.4; and the average for 1940 to 1946 was 14.1.

During April there was only one storm in the ten years 1937-1947 with over four inches of rainfall in 24 hours accompanied by a high wind. Before 1939 the rainfall was slight for several years, but during the best years for pheasants it was still above normal.

The 1948 spring was not as wet as the 1947 spring, and consequently not as many pheasant nests were under water. Mr. E. Behn, who spoke of seeing 6 or 7 nests along one of his fence rows "drowned out" in 1947, went along the same row in 1948 and none of the nests were under water. However, there were some nests under very wet conditions along the ditches in 1948. Most of these were early nests. Three such nests were observed May 18, 1948, along one road. All had large clutches (i.e., 27, 36, 19).

Non-hayfield nests

Pelee Island pheasant nests were constructed essentially as described by Hamerstrom (1936). They usually consisted of a scooped out depression lined with near-by weed stems. The lining of the nest increased as the number of eggs increased.

The early nests were along the dykes and ditches, and on the edges of wood lots. Later, as alfalfa and hay fields provided sufficient cover, nests were found there.

Eggs dropped at random were common during the early part of the spring in both years. Laying eggs at random and deserting one or two nests is thought to be typical behavior of the wild hen (Buss, Meyer and Kabat, 1951).

Table 1 shows the nesting cover for 42 nests (excluding hayfield nests) observed in 1947.

Table 1

Type cover	Number of nests	Number of successful nests
1. grass	19	4
2. hedgerow	12	4
3. wood and brushpile	5	3
4. weeds (mostly *Solidago* sp.)	5	2
5. alfalfa	1	1

Nests in woods and brushpiles were most easily found because of the contrasting color of the eggs. The number of available sites of this kind was limited in comparison to the other nesting cover. If hens flushed from grass or weeds their nests were relatively easy to locate, but if they did not, very difficult. Contrary to Leffingwell's (1926) findings, but similar to Buss's (1946), whether or not the hen flushed seemed to depend on the individual bird rather than on the

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stage of incubation. Some birds could be stroked on the nest while others flushed at (for example) 15 feet, yet both had been incubating some time.

Some birds would be less than six inches from my foot yet not flush. Finding the nests of these inconspicuous birds often depended on the hen's making some small movement such as blinking an eye. C. Hoare, a farmer, reported stepping on a hen sitting on her nest and hearing the eggs break under her.

There were several interesting nest sites chosen; one hen nested at the foot of a large elm tree, with not a weed or stem of grass near it, and right beside a cow track. Every time the cows were driven past in the evening the bird would flush, and every time return. This pheasant was said to have hatched eight eggs successfully, gone off with the brood, then later returned and hatched the remaining five.

Two nests were among the bushes of a well cultivated raspberry patch. One of these was successful. Another barren location was a roll of wire in the middle of a pasture.

One nest was located at the foot of a tombstone. The grass was kept mowed around it but the nest was successful.

Forty-two non-hayfield nests were found in 1947. Of these 33⅓ per cent definitely hatched some of the eggs. In 1948, 251 nests were located or reliably reported. Of these 74 hatched some eggs, 156 definitely had no hatch and 21 were doubtful. This is a nesting success of 29.5 per cent (see figure 1.). If hens normally lay eggs in two nests before they start laying and incubating eggs in a third nest (Buss, Meyer and Kabat, 1951) two-thirds of these nests would not have been successful. In such a case this would have produced the very successful nesting season which the subsequent open season proved it had been.

In four nests of the 74 it was not possible to tell the number of eggs hatched, although some had. In the 70 remaining nests 777 eggs were laid, giving an average clutch of 11.2. There was an average hatch of 8.3 eggs. In 1947 the non-hayfield nests produced a higher number of eggs laid (11.5) and a lower average hatch (7.6).

Many early pheasant nests are unsuccessful, but this is not necessarily detrimental to the fall population as Errington and Hamerstrom (1937), and Buss, Meyer and Kabat (1951) have pointed out. About 80 per cent of the hens will bring off broods later. Similarly Stoddard (1931) found that 60 per cent to 80 per cent of bob-white quail first nesting attempts were unsuccessful, yet few pairs were completely unsuccessful in bringing off young. This is corroborated by the work of Meyer, Kabat and Buss (1947) with ovulated follicles.

The hatching date of 50 non-hayfield nests in 1948 is known. Twenty hatched between June first and June fifteenth, 16 between June fifteenth and June thirtieth, 13 between July first and July fifteenth, and one between July sixteenth and July thirtieth. This corresponds with the hatching dates determined by summer brood observations by Buss, Meyer and Kabat (1951).

The highest nesting density I found was in an alfalfa field. This two and one-half acre field contained 20 nests, a density of eight nests to the acre.

The nesting density during the peak pheasant years on Pelee Island is illustrated by Clarke and Braffette (1946):

> "Mr. Wiebe has a garden of a few square rods and an orchard of a few trees under which the ground is kept bare by barnyard fowl, and there are a few hands-breadth of weeds along the fence. Real cover is completely lacking and the whole area on which the house stands along with fowl pens, drive sheds and other buildings, does not exceed half an acre. Mr. Wiebe found eleven nests around his house in one season, yet in other areas one would never expect a nest in such a situation."

One nest in 1948 was situated somewhat similarly to those Mr. Wiebe mentions. It was in a rock garden right against the farmhouse. The owner weeded the rock garden but left the weeds right around the pheasant's nest. It was later deserted.

During the spring and summer of 1948 I made an intensive study of one weed field of about 27 acres. One hundred and four nests were located in this field. The field consisted mainly of goldenrod (*Solidago* sp.), common ragweed (*Ambrosia elatior*), giant ragweed (*Ambrosia trifida*) and nettle

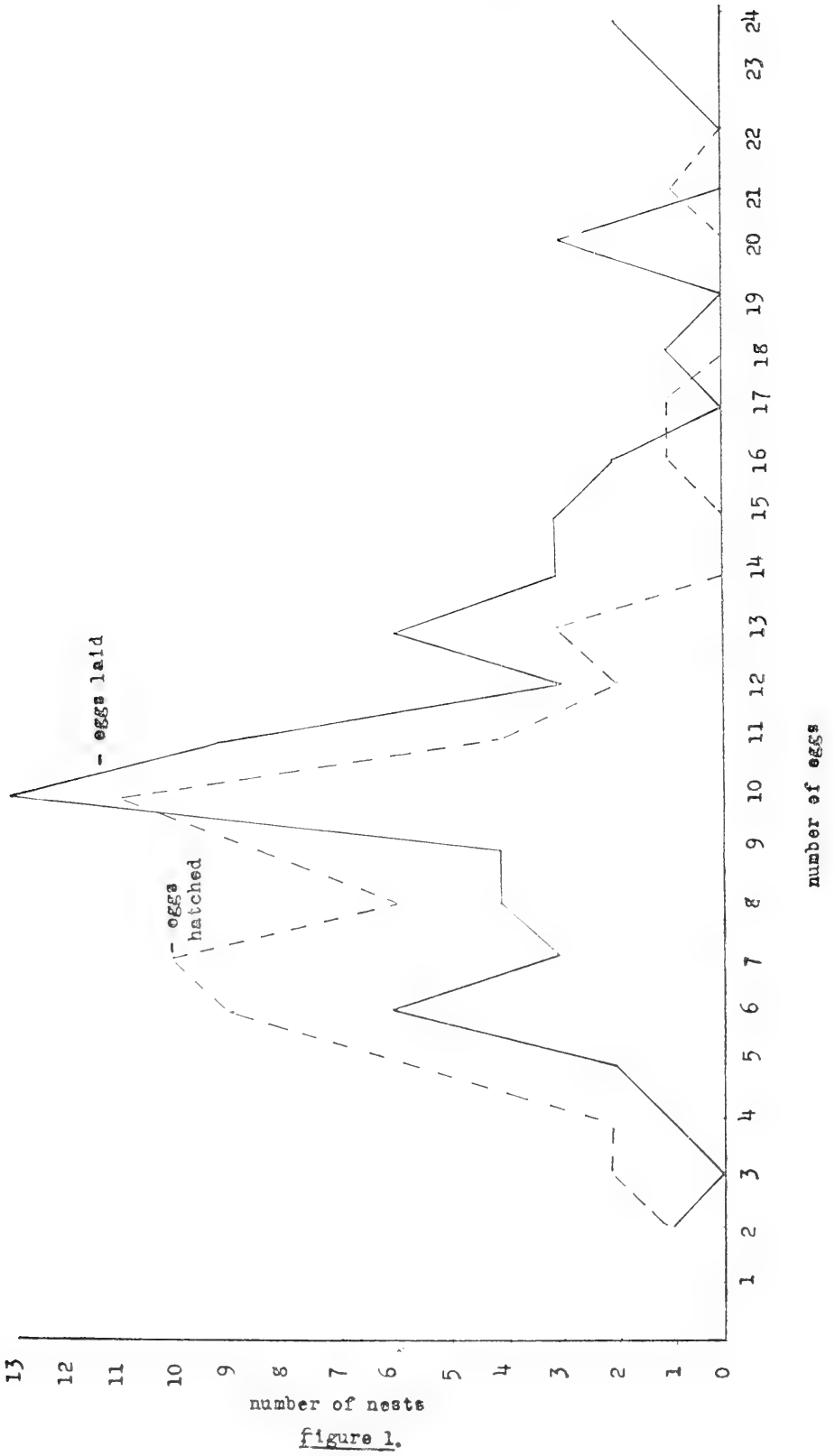
- eggs laid
- eggs hatched
number of nests
number of eggs
0 1 2 3 4 5 6 7 8 9 10 11 12 13
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

figure 1.

(*Urtica* sp.). The giant ragweed was prominent in the southeast corner of the field, reaching a height of at least 15 feet by August, making the nest hunting increasingly difficult as it grew. The nettle was limited to the northwest corner and was later plowed under, soy beans being planted in its stead.

This field was flanked on both east and west by extensive bean fields. A small woods lay to the north, and to the south a regular dyke with the usual sumach-dogwood flora.

Seventy of these 104 nests were located on May 22. A group of 20, mostly school children, aided in an organized drive of the field. The northwest and north central portions were plowed June fourth. Fortunately this area contained only five nests. The rest of the field remained in weeds during the summer.

The map of plotted nests shows that nesting occurred generally over the whole area, not with the majority of nests on the periphery as Hamerstrom (1936) and Wight (1950) found. Stoddard (1931) states that over 74 per cent of the bob-white nests studied were within 50 feet of some opening. Yeatter (1934) found a similar preference for edges shown by the Hungarian Partridge. Leedy (1940) found no such preference in Ohio pheasants.

Small metal-rimmed tags were used as nest markers in the beginning, but these were found to be only partially satisfactory. Even by using a wax pencil the figures became illegible after exposure to the elements. Winds twisted the tags around the plants, sometimes tearing them completely off. (One wind in the spring demolished 11 barns on the island). Later in the season strips of tobacco cotton were used with numbers in wax pencil. These stayed on the plants but were heavy enough to weight the plants down, in some cases till they were actually on the ground. Although "white" in the beginning they quickly became a dirty brown which did not help in their location.

If this study were to be repeated I would suggest reference markers of bamboo (such as garden stakes) be placed early in the season at frequent surveyed intervals throughout the field, and time permitting, the nests located at paced intervals in a given direction from these. The height of the markers would have to be determined by the truly luxurious growth of Pelee Island vegetation.

Twenty-four (about 23 per cent) of the 104 nests in this field hatched.

Many of the nests were lined with goldenrod stems (*Solidago* sp.) which were abundant.

Measurements of 107 Pelee pheasant eggs showed an average length of 44 mm., and an average width of 36 mm. Buss and Hawkins (1939) give the average measurements for pheasant eggs as 44 by 34 mm. Asmundson et al (1943) give measurements of 42.77 by 33.65. Pelee's pheasant eggs measure slightly above average. Westerskov (1950) gives 39 mm. as the maximum width of pheasant eggs, 37 mm. medium width, 35 mm. minimum width. Maximum width and minimum width on Pelee Island eggs were 41 mm. and 33 mm. respectively.

Sheppard (1945) noted the occurrence of a blue pheasant egg in a pheasant's nest as a rarity. I found many instances of blue pheasant eggs on Pelee Island. Some nests contained all blue eggs; others contained only one or two in a clutch.

Figure 2 shows the first dates for laying of the first egg compared to the dates Hamerstrom (1936) found in Iowa.

Eggs were laid almost every day. Some were laid in the forenoon some in the afternoon. Shick (1947) gives an average egg laying rate of 1.4 days per egg; Buss, Meyer and Kabat (1951) give an average egg laying rate of 1.3 days per egg.

Dates for the laying of the first egg were calculated on the basis of a 23 day period of incubation. Longer incubation, ordinarily of eggs which will not hatch, is not unusual.

In 1947 the following data were taken from a nest situated in a large meadow:

June	21:	bird	flushed:	1 egg
July	2:	bird	flushed:	4 eggs
	7:	bird	flushed:	4 eggs
	15:	bird	flushed:	4 eggs
	21:	bird	flushed:	2 eggs
	25:	bird	absent:	2 eggs
	31:	bird	flushed:	2 eggs

This hen evidently laid three eggs between June 21 and July 2. Then she ceased laying. Two of her eggs disappeared, yet she continued sitting on the remainder. Thus this patient bird sat on this nest a minimum of 41 days.

In 1941 a hen had begun to incubate on July 5 when a small boy pulled out some of

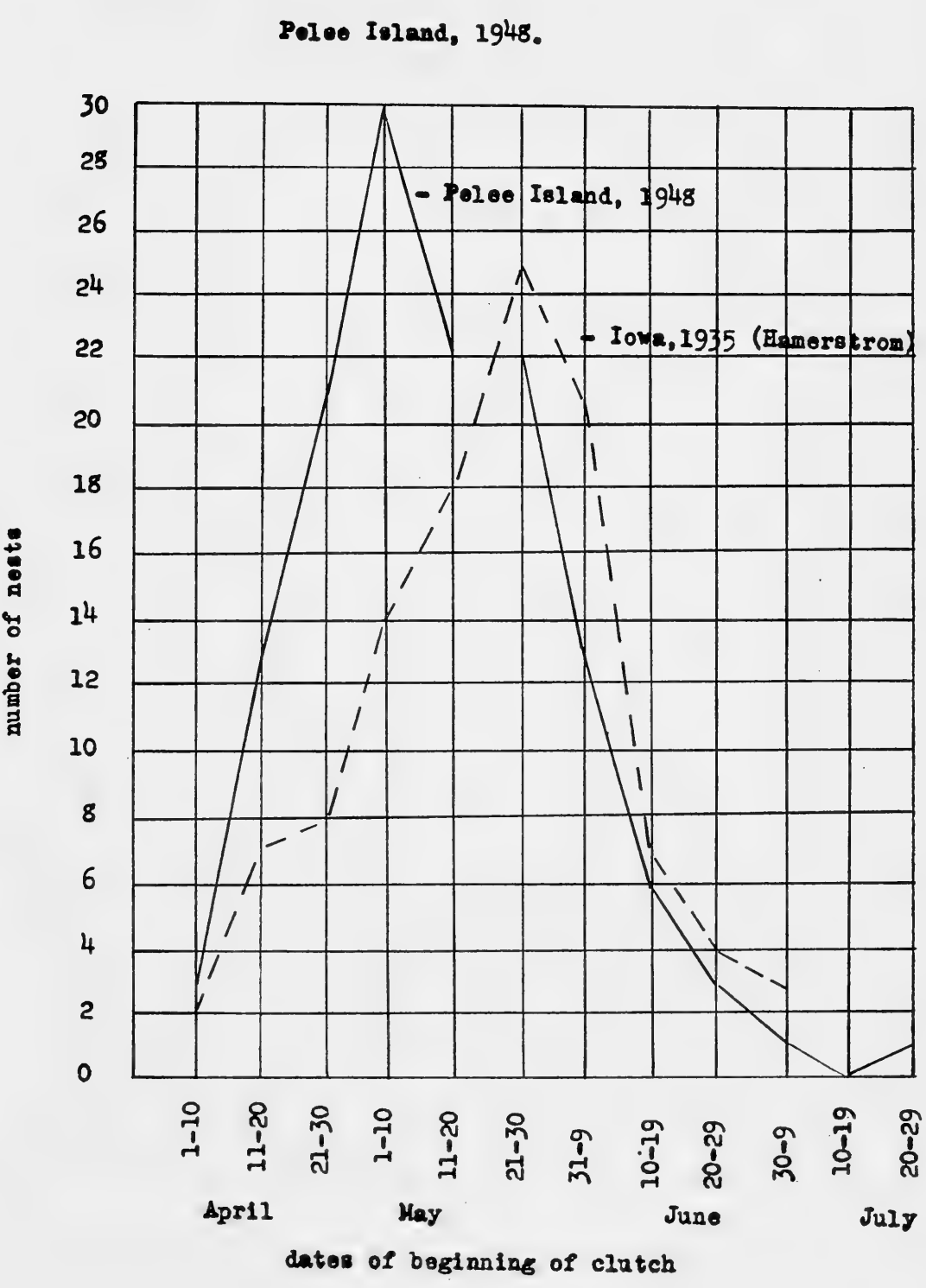
Pelee Island, 1948.
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
- Pelee Island, 1948
- Iowa, 1935 (Hamerstrom)
number of nests
1-10
11-20
21-30
1-10
11-20
21-30
31-9
10-19
20-29
30-9
10-19
20-29
April
May
June
July
dates of beginning of clutch

figure 2

her tail feathers. She was still sitting on August 4, the thirty-first day. Another hen incubated for 32 days. In both these instances the nests were later destroyed. In the latter case the number of eggs diminished with time. On July 8 there were eight eggs; July 14 only five; July 23 only four, yet the hen continued to sit. Hens sometimes knock eggs out of the nest when leaving it, but a search of the surrounding area revealed none.

One hen was observed sitting on 41 eggs, another on 32. A dump nest of 36 eggs was found in 1947. It had not been incubated, as is usually the case with such nests. Average clutch size in 1947 was 11.5, in 1948 11.2.

During the nesting season 375 eggs were opened and examined for fertility. The "ring test" recommended by the Ontario Agricultural College was used as a criterion.

These eggs were gathered from dump nests, or from nests in fields which were about to be plowed. Of these 375 eggs 21 were rotten when examined. Some of these had lain under water for at least a week. Of the remaining eggs 284, or 82.2 per cent were found to be fertile. Fifty-three, or 15 per cent, were found to be infertile, and 17 or 4.8 per cent were questionable.

Newcomb (1940) on Protection Island, Washington, found the fertility of pheasant eggs to be 83.57 per cent, approximately the same as on Pelee Island.

The Township Council thought the sex ratio of one cock to 10 hens on the island might adversely affect the fertility. This was proved not to be the case. Since that time Twining, Hjersman and McGregor (1948) have reported that game farm birds show one cock to 50 hens results in normal fertility of eggs.

Some nests showed wide range in development of embryos. Baskett (1947) found similar conditions prevailing in Iowa. The following example of an unhatched hayfield nest illustrates this point.

Nest with 12 eggs

6 eggs hatched
1 egg a 21 day embryo
1 egg a 20 day embryo
1 egg an 18 day embryo
1 egg a 5 day embryo
1 egg a 2 day embryo
1 egg infertile

Twenty-three nests in which some eggs hatched were examined and fertility of the remaining eggs determined. In these nests 201 eggs had hatched, 44 were fertile but did not hatch (at various stages of development, 33 were infertile and 21 had disintegrated too far to determine their status.

English (1941) discusses the hatchability of pheasant eggs in relation to some known temperatures. He concludes that temperature is seldom an important cause of hatching failure. Lack (1933) has suggested that in some birds (he does not mention pheasants) laying is primarily dependent on the state of the gonads, yet it is immediately controlled by the nervous system, through which nesting conditions, sudden cold, and perhaps other factors may limit breeding. The Pelee pheasants nested approximately two weeks earlier in 1948 than in 1947 which may be correlated with less rainfall in 1948.

Hayfield nests

Buss (1946), Randall (1940a), Strode (1942) and Bach (1943) have shown pheasants prefer to nest in hayfields. Fortunately the hayfield nesting sites on Pelee are limited.

Many Pelee farmers cooperated with my nesting study by informing me when they cut their hay, thus it was possible to get information on nesting densities and mortality. In 1947, 51 hayfields were observed. In 1948, 41 were seen. Mowing dates were about a week later in 1948 than 1947.

Mr. R. Stoltz mowed the first field in 1947 on June 26. This two and one-half acre field situated near the centre of the island is bordered by hedgerow, a woods, a tobacco field and a pasture. I believe this surrounding cover made possible the high density of pheasant nests found there.

I had walked through this field about a week prior to mowing and had found only one nest. Mr. Stoltz marked this nest at the time, avoided it during mowing, and later the hen returned and hatched four of the 10 eggs. During mowing two men walked before the horses to flush any birds, yet even so two hens had their feet cut off before they could take off.

The inadequacy of one person nest hunting in such a field was shown by the discovery of 20 nests during mowing; one was revealed nearly every round. No young were seen though three of the nests had hatched. The

Table 2

Date cut	Owner	Acreage	Crop	No. nests	No. hens	No. chicks
June 26	R. Stoltz	2½	alf.	20	2(i)*	0
June 28	G. Nageleisen	?	alf.	?	2(h)*	40(?)
June 30	E. McCormick	2	alf.	2	7 or 8 (h)	0
June 30	C. Crawford	1	alf.	6 or 7	3(h)	20-(h?)
July 1	E. Wiebe	¼	alf.	0	1(h)	1(k)*
		1½	alf.	2	4(h)	8(i)
						0(h)
July 1	P. Nageleisen	2	alf.	2	1(k)	0
					1(i)	
July 1	E. Callow	2	alf.	0	0	0
July 3	D. Rinkel	2½	hay	4	1(k)	1(k)
July 3	V. Solman	3	alf.	2	1(i)	0
					1(h)	
July 7	N. Garno	4	alf.	several?	4(h)	4(k)
						1(i)
						1(h)
July 8	D. Rinkel	4	clover	6-	?	?
		3½	tim.	1	?	?
July 16	Airport	20	mixed	0	1(i)	50-(h)
					24-(h)	2(k)
July 22	C. Hoare	3	tim. alf.	?	1(h)	4(k)
						est. 20 (k)
July 24	E. Behn	1	hay	4	?	1(k)
						50-60 est. (h?)
?	E. Garno	1	alf.	2	?	?

* i = injured, k = killed, h = healthy.

majority of nests were virtually destroyed, the eggs either scattered or smashed. Eight nests remained more or less intact. Eggs which had rolled out were replaced in these eight, but the only successful one of the 20 was the one marked previous to mowing.

Immediately upon cessation of mowing crows came to the field. By June 30 all eggs seen, with the exception of five near the house had been destroyed.

During the mowing of later fields mortality of chicks was high.

Table 2 summarizes the 1947 mowing operations in relation to pheasants.

Leedy (1949) found in Ohio that farmers reported three-fourths of the nests actually present in hay they cut in pre-war years ... when tractors were not used as much as they are today. In alfalfa he reported 11.6 pheasant nests per hundred acres in 1947, 29.5 in 1946 (for 702 nests) ... with an average of 30.3 for the years 1937-1940, 1946, 1947.

The difficulty in getting accurate mowing data should be emphasized at this point. One farmer insisted he had not seen any pheasants while mowing. A minute later a hen ran through the vegetation. Upon rapid investigation of the heavy mat five chicks were found beneath, none of which he suspected. There may have been more. With the possible exception of the Stoltz field, which was very carefully scrutinized, the figures in table 2 are all minimum.

Mowing operations in 1948 were slightly later than in 1947, and the birds were nesting almost two weeks later, hence much less damage to the birds from mowing occurred in 1948. Again many farmers cooperated by letting us know their mowing dates. Table 3 gives the results of the hayfield nesting data, 1948.

Egg losses

Egg losses on Pelee Island are in four categories: dropped eggs, desertion, predation, nesting parasitism.

Some hunters board their dogs at Pelee farm houses all year in order to have them available during the open season. These dogs cause desertion. I saw three examples of their killing nesting hens. Others were reported. There were 168 licensed dogs on the island in 1947. The town clerk estimated more than half of these were hunting dogs.

A municipal ordinance to keep hunting dogs tied during pheasant nesting season was of questionable effectiveness. Four mornings in April I observed two hunting dogs working the hedgerows, one on either side, as they are taught to do during the hunt.

One farmer reported waking at 1 a.m. to the sound of dogs in his yard. Before he could get out three of his chickens were dead.

Another farmer reported seeing a pack of seven dogs in his field one morning. He emptied both barrels of his shotgun into the pack, killing five and injuring one. Such drastic methods should cut down pheasant predation from this source.

The subject of predation on Pelee is a controversial one. It certainly cannot be claimed to be a predator-free area. As the nesting losses are about the same as in other areas the so-called "lack" of predators on Pelee cannot be the reason for the high pheasant population.

Aside from human beings the birds suffer considerable losses from feral cats and wandering dogs, and many exposed eggs are destroyed by crows in the spring.

Migrating hawks and fox snakes take very few eggs, and loss through them is negligible, though it is interesting to note that there were three substantiated cases of "wompers" (*Elaphe vulpina*) taking pheasant eggs in the 1948 nesting season. Hardy (1951) reports ruffed grouse nest predation by black snakes in Kentucky.

Road kills are another decimating factor. Scott (1938) in Iowa calculated an annual kill of 2.2265 birds on each mile of improved highway in pheasant range. There are approximately 60 miles of roads on Pelee Island, but only about 20 miles of highway. This would make an annual kill of about 44 birds based on Scott's figures.

Most ground-nesting birds suffer heavy nesting losses. The pheasant is no exception. In many cases of deserted nests the cause of desertion is unknown.

The disappearance of eggs is another problem. The snakes certainly take some, but they seem to stay at the nest till they have swallowed all the eggs. I suspect that the rats may be the predators but have no proof. Chipmunks do not occur on the island. McCabe and Hawkins (1946) found fox squirrels would not take Hungarian partridge eggs.

Most of the crow damage is a result of the exposure of eggs by mowing. Grackles abound, but I did not observe any egg predation by them. Several grackles were walking in the rock garden which contained the pheasant's nest, but they did not touch the eggs.

The feral cats are one of the worst Pelee predators. One farmer declared that with a dog in winter you could find six or seven of these cats hunting along the ditches. I observed several instances of mother cats feeding their kittens young pheasants daily.

I watched a Cooper's Hawk fly over a field containing at least 50 feeding pheasants. The hawk made a few darts at the birds but did not come close enough to get one. There were two nests of this species on the island.

A Marsh Hawk fed on a pheasant in the nesting-study field. Randall (1940b) found that ring-necked pheasants in Pennsylvania constituted 1.1 per cent of the food taken by Marsh Hawks. He concluded that the effect of Marsh Hawks upon the pheasant population was negligible. English (1933) found three pheasant bands in Marsh Hawk pellets. He also found that winter mortality was largely due to Great Horned Owls and Cooper's Hawks. There were no Great Horned Owls on Pelee Island.

Parasitism

Pheasant nesting parasitism has been discussed by Bennett (1936). He found ducks', rails', and European Partridges' nests parasitized by pheasants. Clarke (1939) found

Table 3

Incubated	Deserted	No. eggs	Hatched	Hatching date
X	X	11	—	—
X	X	6	—	—
X	—	7	5	June 23
X	—	11	11	prior June 29
X	—	13	—	pipped June 29
X	—	10	10	approx. June 26
X	—	9	9	approx. June 19
X	—	10	8	June 26
X	X	10	—	—
X	X	8	—	—
X	X	10	—	—
X	—	6	4	approx. June 5
X	X	10	—	—
—	X	12	—	—
X	—	8	8	June 29
—	X	14	—	—
—	X	12	—	—
—	X	7	—	—
X	X	11	—	—
X	—	10	9	July 1
X	X	9	—	—
X	—	10	7	July 2
—	X	2	—	—
—	X	9	9	—
—	X	5	—	—
X	X	8	—	—
X	X	9	—	—
—	X	18	—	—
X	—	16	10	approx. June 23
—	X	11	—	—
X	—	9	6	approx. July 7
X	—	10	9	July 3
—	X	3	—	—
X	—	13	13	July 1
X	—	12	10	July 10
X	X	6	—	—
X	X	8	—	—
X	—	10	10	July 1
X	—	8	7	July 2
X	—	7	5	approx. July 2
X	—	4	4	Approx. June 24

X — incubated, deserted re column
— not incubated, not deserted re column

pheasant eggs in a Ruffed Grouse nest. Knott, Ball and Yocom (1943) found seven of the 113 Hungarian Partridge nests they studied parasitized by pheasants.

I observed pheasant eggs in duck, chicken, and guinea hen nests on Pelee Island. I observed only one mixed brood, however, a guinea hen with four or five small guinea hens and three pheasant chicks. Eight out of 34 nests observed on Old Hen Island had chicken eggs. None of these hatched. It was later reported that three pheasant hens there had adopted broods of chickens.

Hatching

The hatching process takes about 12 hours. For about an hour or two after hatching the young remain in the nest, drying off. They then leave the nest and do not return.

A combination of hatched hayfield nests and non-hayfield nests showed the 1948 dates of hatching as follows:

June 1 — June 15 ... 21 nests hatched
June 16 — June 30... 23 nests hatched
July 1 — July 15 ... 22 nests hatched
July 16 — July 30 ... 1 nest hatched

Stokes aged broods on Pelee Island by measurements of primary wing feathers and foot lengths using the tables worked out by Trautman (1948) and by the wing molt method as described by Buss (1946). The hatching dates as derived by these methods corresponded closely with the hatching dates derived from my nesting study.

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FRASER'S OBSERVATIONS OF SCREECH OWLS AT A NEST-BOX[1]

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DURING THE WINTER of 1947-48, a screech owl roosted in a bird-box on a gable of the home of W. J. Fraser, of Toronto, Ontario. In the spring of 1948, a second owl appeared, and a pair nested in the box.

The bird-box was not more than 15 feet from a bay window on the south side of the second floor. From this window, Fraser watched the owls, and made notes on their activities from February 16 to May 16. These notes were not made with the intention of publishing them. However, since they include some details of the nest life of this species prior to the hatching of the eggs, the author has secured permission from Mr. Fraser to summarize them and publish the summary.

Due to a serious illness of his wife, Fraser was in a position to spend long periods observing the owls at all hours of the day and night. Binoculars and flashlight were employed on occasion, and one glass pane of the bay window was replaced with "Vitaglass," permitting the calls of the birds to be heard easily in the room. The roof of the bird-box was hinged, and by walking out on the verandah roof, Fraser made inspections of the box interior at irregular intervals.

Thanks are due Mr. T. M. Shortt who read the manuscript of this paper critically.

SUMMARY OF FRASER'S DIARY

February 16.	Diary began.
March 26.	Two owls instead of one around the box for the first time.
April 1 and 3.	Owls observed copulating at about 20 minutes after sunset on the bough of a nearby tree. Male (?), with wings working, on top of female.
May 3.	Part of one egg seen protruding from under sitting bird.

[1] Received for publication September 17, 1951.

May 15. One young owl in nest.
May 16. Diary ended.

Upon discovering that his screech owls were killing song-birds, Fraser ceased making notes, and desired only to be rid of the owls.

On May 22, two young owls and one egg were seen in the box. This egg remained unhatched, and the author collected the female with her two young on May 31.

DISCUSSION

There appears to be no published record of the length of time between fertilization and egg laying in this species. With Fraser's owls, the first egg was seen about 30 days, or roughly four weeks, after copulation. The first young was seen 12 days, or roughly two weeks, after the first egg. However, Bent (1938) gives 26 days, or roughly four weeks, as the average period of incubation. The eggs in Fraser's nest may have been laid several days before they were observed, but it is fairly certain that they hatched about the middle of May, since the young one observed on May 15 was the size of a newly-hatched screech owl. If the incubation period is considered to be four weeks, then it is probable that the eggs were laid about the middle of April. If it can be assumed that fertilization occurred on or about April 1 or 3 at the observed copulations, it seems justifiable to conclude that with Fraser's screech owls, the period between fertilization and egg laying was about two weeks.

Figure 1, drawn from Fraser's observations, shows that the owls using the box, both prior to and during the nesting season, frequently spent a period of "lookout" through the box entrance before setting out on the night's activities. To a lesser extent, a period of lookout was also spent in the morning after returning to the box. In the evening, this period usually commenced shortly before sunset, and ended with the bird's departure shortly after sunset. Although there are less data for the morning periods, Fig. 1 shows that there is at least a tendency to return to the box, spend a period of less than 15 minutes on lookout, and retire for the day, all before sunrise.

In addition to the periods indicated in Fig. 1, Fraser saw an owl at the box entrance for 10 minutes at mid-day on February 18, one hour in the early afternoon sun of March 1, off and on all day for a total of over 3.5 hours in the sun of March 5, and for an undetermined period during the mid-morning of March 31.

In the evening the owl may come to the entrance when the interior of the box grows dark, and wait there for darkness before setting out; but this does not explain the dawn or daytime lookouts. The lookout period may be a vigil against enemies, or an assessment of the surrounding territory as a food producing area, or merely the means of satisfying a curiosity regarding the environment of the box.

On April 16 and later nights, the male called from near the nest-box, and the female either answered him from inside the box, or joined him, or joined him after answering. Sherman (1911) records this phenomenon with a pair of nesting screech owls, and suggests that the male calls the female to go hunting with him.

SUMMARY

1. A screech owl roosted in a bird-box beside the bay window of a home during the winter 1947-48. It was joined by a second owl in the spring of 1948, and the two nested in the box.

2. The period between fertilization and egg laying was probably about two weeks with this pair of owls.

3. Both prior to the nesting period and during it, an owl frequently spent periods, usually of less than an hour each, looking out through the entrance of the box. These periods occurred at sunset, sunrise, and occasionally during the day, and may have represented periods of reconnaissance by the owl.

4. In the evenings, after the middle of April, the male frequently called near the box, and the female responded by calling from inside the box, or by joining the male outside.

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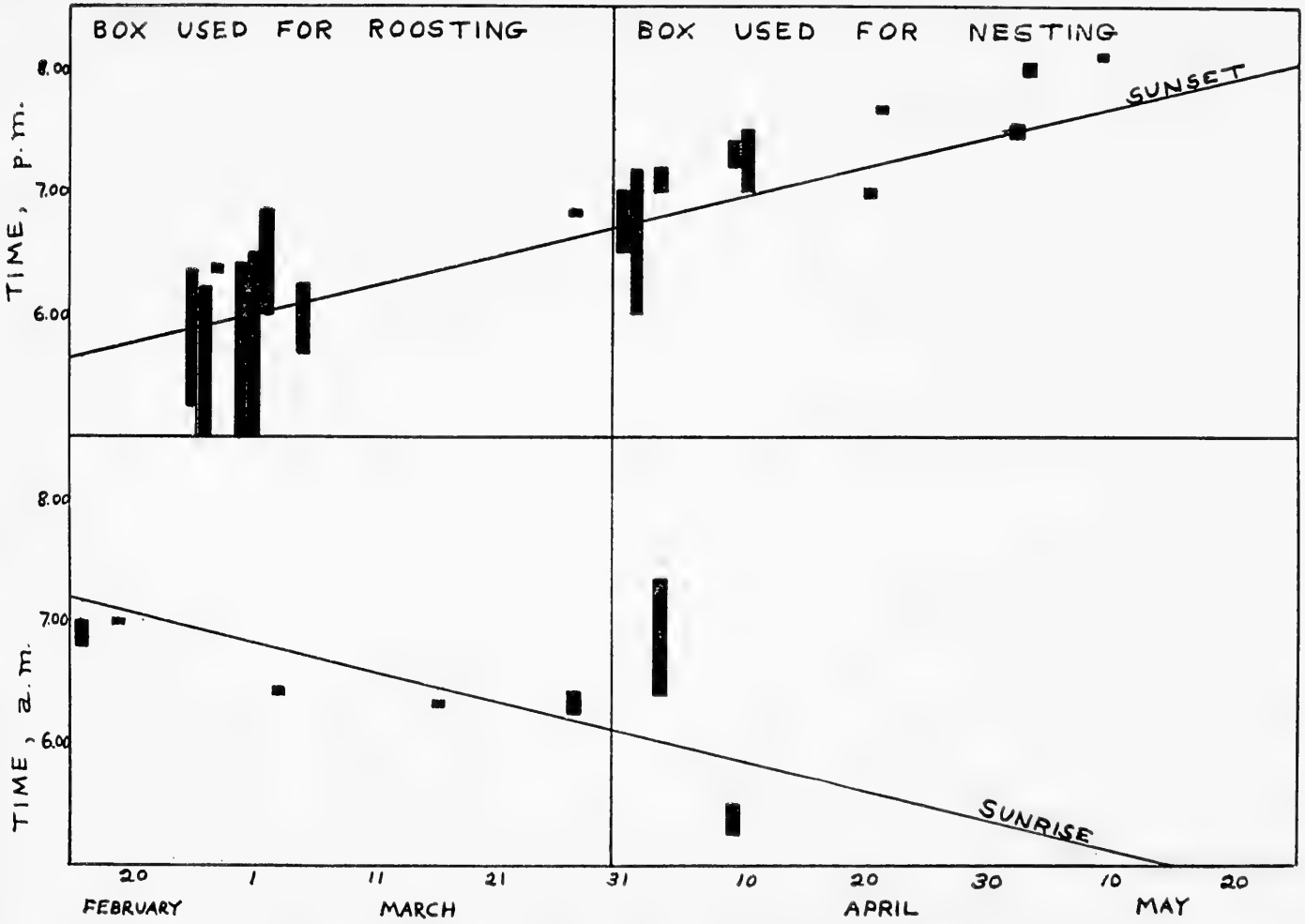

Figure 1. Periods of "lookout" through bird-box entrance by screech owl.

THE CLAM HOSTS OF *NAJADICOLA INGENS* (K.) ACARINA IN A QUEBEC LAKE[1]

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THE NORTH AMERICAN water-mite, *Najadicola ingens* (Koenike), according to the observations of Koenike (1895), Wolcott (1899), and Humes and Jamnback (1950), lives as a parasite in the gill chambers of various freh-water clams. On the basis of data then available Humes and Jamnback (1950) concluded that in the New England area *Anodonta cataracta* Say seemed to be the preferred host, *Elliptio complanatus* Solander next in preference, and *Lampsilis radiata* (Gmelin) the least preferred. They found *N. ingens* in 16 (89 per cent) of 18 *L. radiata* from Lake Massawippi, Province of Quebec, Canada. One *L. radiata* from Lake Champlain at Sandbar State Forest Park in Milton, Vermont, also contained *N. ingens*. *L. radiata* from fourteen other localities where mites were present in either *E. complanatus* or *A. cataracta* were unparasitized.

The exceptionally high incidence of the mites in Lake Massawippi indicated the desirability of further study. Accordingly, this lake was revisited and large samples of clams gathered from a strip of shoreline about 500 feet long at the southern end of the lake near the town of Ayers Cliff. On May 27, 1950, 65 *A. cataracta*, 299 *E. complanatus*, and 237 *L. radiata* were collected, and on September 1, 1951, 22 *A. cataracta*, 231 *E. complanatus*, and 141 *L. radiata* were obtained, making a total of 87 *A. cataracta*, 530 *E. complanatus*, and 378 *L. radiata*, or 995 clams in all.

The specimens of *E. complanatus*, whose average length was 74 mm. (49-93 mm.), were entirely without mites. The specimens of *A. cataracta*, whose average length was 87 mm. (57-112 mm.), were only rarely parasitized (3 out of 87 or 3.5 per cent). Only four specimens of *N. ingens* were recovered from these three clams.

Eighty-six per cent of the specimens of *L. radiata*, whose average length was 82 mm. (45-112 mm.), were parasitized (79 per cent in the 1950 group and 98 per cent in the 1951 collection). The number of *N. ingens* found in a single clam ranged from 1 to 32, with all four gills capable of harboring the mites. The distribution of the 32 mites found in a single *L. radiata* which measured 90 mm. in length was as follows: left outer gill—1 male 4 females, left inner gill—4 males 6 females, right inner gill—5 males 4 females, right outer gill—4 males 4 females. A total of 2375 mites (1235 males and 1140 females) was recovered from *L. radiata*, the average number per parasitized clam being 7.4. Humes and Jamnback (1950) reported only 1.7 mites per parasitized *E. complanatus* and 1.8 per parasitized *A. cataracta*.

Humes and Jamnback (1950) found a distinct preference in location of the mites in *A. cataracta* (where they almost invariably lived in the outer gills) and in *E. complanatus* (where they nearly always occurred in the inner gills). A preference in location exists also in *L. radiata*, where the distribution of the mites was as follows: left outer gill—478 mites, left inner gill—742, right inner gill—737, and right outer gill, 418. There is thus a tendency to live as parasites in the inner gills of *L. radiata* more often than in the outer ones, but any or all of the gills may be parasitized.

In *L. radiata* a parasitized suprabranchial chamber usually contained only a pair of mites, one male and one female, in its anterior half. The suprabranchial chamber seems to be the site for oviposition, since egg masses occurred only there. Conspicuous papillae occurred on the walls of the chamber around the mites, having been apparently induced by their feeding. Varying numbers of both sexes of mites occurred along the distal margins of the gills between the gill lamellae.

In the May 27, 1950, collection of *L. radiata* no egg masses of *N. ingens* were found. Apparently oviposition begins in Lake Massawippi sometime after that date. In the September 1, 1951, collection 38 per cent of the parasitized *L. radiata* contained already hatched or dead egg masses of the mite. These data may be compared with the observation

[1] Received for publication Nov. 19, 1951.

of Humes and Russell (1951) that *N. ingens* in a New Hampshire pond breeds in *A. cataracta* only during June, July and August.

These observations indicate that in Lake Massawippi, at least, *L. radiata* is very frequently and heavily parasitized by *N. ingens*, while *E. complanatus* and *A. cataracta*, though living side by side with *L. radiata*, are not at all or only rarely parasitized. Although the mites may parasitize all four gills, they show a definite preference for the inner gills. If mites are present in a suprabranchial chamber, they usually consist of a male and a female. Varying numbers of both sexes occur in the distal margins of the gills between the gill lamellae.

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NOTES AND OBSERVATIONS

Rough-legged Hawk Migration in James Bay Area. — While visiting Hannah Bay, on the Ontario shore of southern James Bay, on October 15, 1949, the writer observed a definite migration of the Rough-legged Hawk *(Buteo lagopus)*. The birds were passing, singly, at the rate of about one every five minutes, in a southwestward direction. The flight continued during the afternoon spent in the area by the writer.

The birds were following the shore-line and were first observed from a boat while the writer was approaching the shore to enter the Harricanaw River, after a trip across southern James Bay. No hawks were seen either over the open bay or any distance inland during a voyage of about five miles up the river.

When the attention of Constable P. Holmes, of the Royal Canadian Mounted Police, was drawn to the migration, he stated that he had seen the same kind of hawks migrating during the previous week (week of October 2) along the shores of Cabbage Willows Bay, Quebec, where he was then stationed, some thirty-six miles northeast of the mouth of the Harricanaw. The writer left Hannah Bay early on the morning of October 16, 1949, but Constable Holmes remained there all that day and observed that the hawk flight continued throughout the day. No observations were made after October 16 because Constable Holmes did not remain in the area after that date.

When the hawk flight commenced or when it terminated is not known. There was, however, a noticeable southwestward flight, both at Cabbage Willows Bay and at Hannah Bay, on the dates indicated.

At the time of observation, the flight consisted of Rough-legged Hawks only. A lone Bald Eagle was the only other species seen at that time that might have been in migration.

The origin of the hawks in this particular migartion is, of course, not known, but it may be that the Rough-legged Hawks breeding east and northeast of James Bay, in the Ungava Peninsula, migrate southward along the east coast of Hudson and James Bays. The birds we saw certainly came from the northeast to our observation points and continued along the coast in a southwestward direction. — *GEO. M. STIRRETT, Kingston, Ontario.*

1952 Cooperative Study of Fall Migration. —In the autumn of 1952, observers all over the United States will be training telescopes on the moon to obtain counts of migrating birds passing before its disc. These counts will be used to determine the volume and direction of night migration at different times and places. By the analysis of such data, it will be possible to map the flow of migration, to study the effects of weather, and to determine the hour-to-hour pattern of activity. The methods to be employed, and some of the surprising results already achieved by them have been described in a recent paper by George H. Lowery, Jr. ("A Quantitative Study of the Nocturnal Migration of Birds," University of Kansas Publications, Museum of Natural History, vol. 3, no. 2, pp. 361-472).

In a previous cooperative effort in the spring of 1948, brief and inconclusive observations were made at Pt. Pelee and at Toronto. Otherwise Canada was not represented. It is hoped that this year Canadian observers will be able to join with observers in the United States in saturating the continent with stations. The observational procedure is a simple one. Any one who has access to a small telescope, or to a large one, can participate. Interested persons are urged to write at once for further details to *ROBERT J. NEWMAN at the Museum of Zoology, Louisiana State University, Baton Rouge, Louisiana.*

Early spring occurrence of the Tree Swallow at Ottawa, Ontario. — On March 25, 1952, a companion and I observed from Billings Bridge a bird that appeared to be a swallow. When first seen it was several hundred feet downstream from the bridge and was flitting here and there over open places that had developed in the disintegrating ice of the Rideau River. With the aid of binoculars the bird was kept under observation for ten minutes or more. Suddenly it flew toward the bridge, thus coming to close range and providing an opportunity for us to observe it in detail and to identify it. Its iridescent blue upper-parts, pure white under-parts and shallowly notched tail were clearly seen as the swallow flitted near us. It was identified with certainty as a Tree Swallow (*Iridoprocne bicolor*). In my experience this species is not usually found at Ottawa at such an early date. — *CHAS. H. BENNETT, Ottawa.*

Fox Sparrow needs no crutch. — Feeding in a baited area among Sparrows and Juncos I noticed a Fox Sparrow bobbing and rolling in an unnatural manner and, upon close inspection, the cause of the peculiar motions was the lack of a right leg. However, in spite of the handicap, it was able to hop about in rough brush with agility and needed only occasional help from its wings in especially awkward situations. It had no difficulty in perching or turning about and carried out these movements with leg extended as normal birds do, not from a crouch as one might expect. It was even able to come to rest on an upright stalk without teetering enough to lose balance two out of three attempts.

When feeding rapidly in competition with others it would lose its equilibrium and to recover would stoop until the breast touched the ground and then push up in balance; these movements being performed very quickly accounted for the bobbing and rolling which first brought the bird to my attention. When foraging at leisure, seldom would it be necessary for it to bob.

Most remarkable of all, it would attack fiercely any bird encroaching on its territory and, in addition, it could and did scratch vigorously with its one leg in typical Fox Sparrow fashion at frequent intervals. — *J. MITCHELL CAMPBELL, Ottawa, Ontario.*

Townsend's Solitaire in New Brunswick.— On January 15, 1952, a bird approached our garden by way of the elm trees and took up residence for the winter in two Japanese barberries in the shrubbery under the elms.

The bird was smaller than a robin, grey breast, brownish grey back, forked tail with outer tail feathers white; bill was thrush-like. Looking it up in my books I concluded it must be a Townsend's Solitaire. (*Myadestes townsendi*).

I communicated with Mr. W. A. Squires, Curator of the Natural Science Department of the New Brunswisk Museum. He suggested it might be a Mockingbird and sent me a specimen of one that had been picked up in the province years ago. The bill ruled out the mockingbird, and there was no conspicuous white patch in flight. Rather the bird showed two buffish stripes across the wings in flight. A large eye with white eye-ring, and two light buffy patches on the edge of the wing at rest, whitish outline of the tertials all indicated the Solitaire.

On March 19, Mr. George F. Boyer, Dominion Wildlife Officer at Sackville, N.B., definitely identified the bird as a Townsend's Solitaire. He succeeded in getting a good photograph of it at three feet showing the feather pattern clearly enough for certain identification.

We had the bird under observation continuously until March 31. On that day it sang for us, a beautiful long subdued song, touching some of the robin's high notes. I think it had been singing for several days earlier as we noticed its body heaving as it perched. Mr. Boyer tried to trap it for banding but was unsuccessful and the next day it was gone.

The bird was very sparing of its barberries, but when they got too difficult for it to gather we thought of trying dried currants. These he soon ate ravenously, taking almost a quarter of a cupful in two days. We changed his feeding station to a stump where we had a closer view of him. As far as I know he ate practically nothing else until the March sun exposed the leaves on the bank, when he would go to the ground occasionally. He kept a careful eye on the berries and currants, chasing off all comers smaller than himself, and frightening a red squirrel away. His flight was most interesting and should attract anyone's notice, as it was so unusual for a winter bird.

A recent letter from Mr. Squires tells me that Mr. W. Earl Godfrey finds the record acceptable at the National Museum, based on Mr. Boyer's photograph.

Mr. Squires informs me that the most easterly report in Canada for this bird is Manitoba in 1923, and in U.S.A., Long Island, New York, in 1905.

Mrs. A. B. CONNELL,
Woodstock, N.B.

Summer observations of the Evening Grosbeak in southern Ontario and Quebec. — As several species of western birds have recently been displaying an eastward expansion of their nesting ranges, the following observations of Evening Grosbeaks, *Hesperiphona vespertina,* made by me in Ontario and Quebec during the summer of 1951, may be of interest.

MANIWAKI, P.Q.

(1) June 12 to 22, quite common, usually in flocks of from four to twenty birds.

(2) August 13 to 18, slightly less common.

SOUTHWEST ALGONQUIN PARK, ONT.

June 27 to July 12, comparatively few.
VALCARTIER, P.Q.
July 16 to August 6, fair numbers, still fewer than at Maniwaki.
LAC EDOUARD, P.Q. (north of Shawinigan)
August 7 to 10, several birds were seen in the area.
MATTAWA, Ont.
August 20 to 25, flocks of up to fifteen birds.

W. JOHN SMITH,
45 Second Ave., Ottawa, Ont.

A Northern Record for Aplodinotus Grunniens. — The freshwater drum or sheepshead, *Aplodinotus grunniens* Rafinesque, reaches its northern limit of distribution in North America in Manitoba waters. In Lake Winnipeg it reaches its greatest abundance in the southern portion, but is considered to be rare in the northern part of the lake.

In 1949 a pair of pharyngeal teeth identified as those of a freshwater drum were sent to the Royal Ontario Museum of Zoology, the fish from which they came having been caught by a trapper in Little Playgreen Lake, Manitoba. The occurrence of the species in this lake was not surprising since it is readily accessible from Lake Winnipeg. However, in September, 1951, during field studies in the lower Nelson River region for the Manitoba Department of Mines and Natural Resources, Game and Fisheries Branch, the second author heard from the local inhabitants that a bass-like fish was occasionally caught on artificial lures. The species proved to be the freshwater drum. One fresh animal was taken but only the head was procured for a specimen since the owner wished to retain the remainder for food. This particular specimen was caught at the mouth of the Limestone River where it joins the Nelson River (56° 31′ N, 94° 07′ W). It was reported by the local people that one or two are caught by angling each summer and are apparently in good condition. The head, which measures 134 mm, in length, is deposited in the fish collection of the Royal Ontario Museum of Zoology. — *W. B. SCOTT, Royal Ontario Museum of Zoology — B. KOOYMAN, Manitoba Department of Mines and Natural Resources.*

Erroneous Records of Empidonax wrightii in Manitoba and at Belvedere, Alberta. — Taverner (1927, Auk, Vol. 46, No. 2, p. 224) recorded four flycatchers from Whitewater Lake, Manitoba, as the Wright Flycatcher, *Empidonax wrightii* Baird, with the comment that "in wing measurement these fall between the Least and Wright's but, all have the outer primary shorter than the sixth, the acknowledged characteristic of this species (i.e. *wrightii*) at present." Reference to Taverner's manuscript notes shows that the specimens concerned are National Museum of Canada nos. 20007, 20012, 20112, and 20118. The writer recently examined these. Unfortunately they are all, without any doubt whatever, *Empidonax minimus* (Baird and Baird). While it is true that the tenth primary is very slightly shorter than the *fifth* in all four this is an extremely variable character in *minimus* and these Manitoba species resemble *wrightii* in no other way. *Empidonax wrightii,* therefore, should be removed from the Manitoba bird list.

From Belvedere, Alberta, also, Taverner (1928, Nat. Mus. Canada, Bull, 50, p. 96) recorded *Empidonaw wrightii,* commenting that "two birds taken June 3 and 12 have the size and wing formula of this species." Reference to the specimen catalogue and Taverner's field notes shows that two flycatchers of this genus were taken there on June 3 and two on June 12, 1926. Examination of these discloses that of the four, three are unquestionably *Empidonaz minimus,* the other *Empidonax traillii.* Taverner's 1926 field notes read, "The boys watched carefully all flycatchers this summer but saw nor heard nothing that suggested the presence of any other small species of flycatcher than the Least". — *W. EARL GODFREY, National Museum of Canada, Ottawa.*

REVIEWS

ANNOUNCING A NEW JOURNAL IN ZOOLOGY

The Society of Systematic Zoology will initiate publication this year of a new quarterly journal, SYSTEMATIC ZOOLOGY. Articles of general interest to all zoological systematists will occupy most of the space in the journal. Book notices, news items, projects, people, museum activities, lists of systematic societies, and other miscellany will round out the contents.

Occupying a hitherto conspicuous void in the coverage of zoological fields by scientific journals, the new serial has three purposes: "(1) to publish, and therefore to encourage the preparation of, contributions on basic aspects of all fields of systematic principles and problems; (2) to provide a suitable forum for discussion of the problems of the systematist and his methods; and (3) to report the other activities of the Society of Systematic Zoology as news."

The Society of Systematic Zoology was organized in 1947 and now has over a thousand members, of cosmopolitan distribution. The president for 1952 is Dr. Alfred S. Romer of Harvard University, and the Secretary-Treasurer is Dr. Richard E. Blackwelder of the U.S. National Museum. A rotating council of eight members supervises activities of the Society, and an editorial board of thirteen members (including the editor and two associate editors) will control publication policies. On a pro tem basis Dr. Blackwelder is acting as editor, with the aid of an eight-member editorial board.

Subscription rates per annum are $4.00 to members, $7.00 to non-members and institutions. A discount of $1.00 is offered to non-members making payment with order and without invoices or bills. Correspondence regarding subscriptions and membership should be addressed to the secretary of the Society, Dr. R. E. Blackwelder, Room 429, U.S. National Museum, Washington 25, D.C.

The Life of the Spider. *By John Crompton. Houghton Mifflin Company, Boston.*

Of all the groups of animals none is more fascinating and yet so little understood by the public as that containing the spiders. The ignorance on the part of the general public concerning spiders is perhaps in part due to the fact that they have little or no direct economic value. To the casual observer, spiders build webs, or tangled masses of silk, in dark corners of cellars and outbuildings. It comes as a great surprise that there are many hundreds of kinds of spiders that do not build webs but seek their prey in the manner of a carnivorous mammal.

"The Life of the Spider" by John Crompton, published by Houghton Mifflin Co., Boston, effectively presents the fascinating side of the life of spiders. The words and descriptions of the author are well chosen so that the reader is compelled to read the book from cover to cover. The book is divided into thirteen chapters dealing with such subjects as the character of the silk of spiders, the method of web construction, and the habits of various non-web-making spiders such as wolf spiders, crab spiders and trap-door spiders. In the chapter dealing with the trap-door spiders, the author inserts a fascinating account of the hunting habits of a particular species with which he is well acquainted. The method by which young spiders are dispersed is excellently described.

This book is one which should be read by all those interested in natural history. It would make an excellent reference book for students in secondary and primary schools, since it deals not only with the life history of spiders, but also brings out the importance of spiders and the fact that few of them are poisonous. — *T. B. KURATA.*

Carolina Quest. *By Richard M. Saunders. University of Toronto Press and University of South Carolina Press, Toronto and Columbia, 1951; pp. I-XI, 1-119. ($3.50).*

This is a delightful account of a first trip by two young 'Northerners' to the deep South in June. A month of enthusiastic and discerning observations on the ways of both birds and men are set forth, and these experiences are interestingly, often humorously, told. The vivid word pictures of first exciting impressions of new birds, gracious people, and enchanting scenery will be poignantly nostalgic to those who have visited South Carolina, and are entertaining reading for those who have not. Moreover, readers do not have to be dyed-in-the-wool bird enthusiasts to enjoy the book. It is well printed on good paper and is decorated by twelve attractive wood engravings by Sylvia Hahn. — *W. EARL GODFREY.*

The Dusky-footed Wood Rat. *Linsdale, Jean M. and Lloyd P. Tevis. pp. 664, illus., University of California Press, Berkeley and Los Angeles, 1951. Price $7.50.*

Dr. Jean M. Linsdale is well known to zoologists as the author of *The California Ground Squirrel,* a monograph that won wide acclaim, when it appeared in 1946, as "one of the most complete studies of a North American mammal ever made". In the present monograph he co-authors with Dr. Lloyd P. Tevis to produce a book that will be received with equal enthusiasm.

This report is the result of a study of the Dusky-footed Wood Rats in one locality, the Hastings Natural History Reservation. Observations were made over a period of ten years and data obtained on no less than 580 individuals. The chapter headings give a fairly accurate picture of the topics covered: Habitat, Houses, Animal Associates, Behaviour, Food, Reproduction, Morphology, and Population. There is also a short but adequate summary.

As the authors point out in the Introduction, they are primarily interested in the rats as individuals, rather than as mere components of an aggregation. This is perhaps the first serious attempt ever made to form a "personal acquaintanceship" with a wild animal in its native habitat. Certainly it is the first time that any biologist has succeeded in knowing the individual life histories of such a large number of wild animals. If for no other reason, this monograph should be reserved a unique place in mammalogical literature. Even in his study of the California ground squirrel, Dr. Linsdale never succeeded in knowing his subjects as intimately as he has in the case of the dusky-footed wood rat.

All of the topics are discussed in considerable detail and will prove interesting to both the mammalogist and ecologist. Perhaps, however, the chapter on behaviour will attract the greatest number of readers. Some of the findings are rather surprising. For example, although the rats can recognize the general vicinity of their homes, perhaps by sight and smell, they appeared to possess no homing ability and were completely lost when released only a short distance outside their home territory. Presumably they recognize their own houses, and those of the neighbouring rats, by their distinctive odor. However, they do not appear to recognize a house as such. If a house has been vacated for a considerable period of time so that it has lost all traces of rat odor, it is treated merely as if it were a pile of sticks! However, some rats did not even recognize their own houses after having been absent from them for less than forty-eight hours. The authors concluded that they were recent invaders to the territory. Although this might seem to indicate a short memory, rats re-trapped after a period of several months showed evidence of recalling previous experiences in the laboratory where they were weighed, marked, and measured.

The authors avoid any interpretations of observed behaviour, which seems rather unfortunate. In one case they discuss at considerable length a particular female who tried to cross a stream by climbing a rose bush and walking out on a limb that almost touched the branch of a shrub on the other side. Finding this impossible, she paused for a few moments to nibble at a leaf shoot on the rose bush. This seems to be a fairly good example of displacement behaviour. However, the authors make no comment on the possible significance of this behaviour. There are numerous other examples.

There are many observations that will interest field collectors. The authors found that the rats move about very little when there is bright moonlight and that they usually remain in their houses on rainy or stormy nights. The animals are very adverse to getting wet, and, when caught in live traps, they seem to suffer more from excess moisture than from cold. Provided they had plenty of food in the traps, they seemed to fare reasonably well in the cold weather. However, if they had access to grass or other material, they usually proceeded to construct crude shelters for themselves. It is interesting to note that although excessive moisture may prove detrimental, a drought may have a similar effect by reducing fertility.

These are but a few of the many interesting facts contained in this report. Although the study is confined to the wood rat, undoubtedly many of the remarks are equally applicable to other small rodents. If the collector will recall the occasions on which he had his best trapping results, he will probably find that they occurred on warm, dark, rainless nights.

Any naturalist interested in life history studies would do well to study this monograph carefully. Not only will it serve as a guide with regard to the type of data that should be recorded, but it will help to restrain over-enthusiastic researchers from drawing broad conclusions on the basis of a few observations. If, after studying a single species on a small area for a period of ten years, Linsdale and Tevis are unwilling to make generalizations, surely those who have conducted briefer studies should be particularly cautious.

And for those who feel that briefer studies are adequate, the following statement made by the authors is pertinent: "Even with our abundant information, many questions remain unanswered, and often we cannot understand the full significance of the details we have". — *AUSTIN W. CAMERON,*

Algae of the Western Great Lakes Area. *By G. W. Prescott. Cranbrook Institute of Science, Bull. 31, 1951, pp. i—xiii 1-946, pls. 1-136. Numerous text-figures and tables. Price $10.50 (U.S.).*

This excellent systematic treatment of the fresh-water algae (excluding desmids and diatoms) is the first of its scope to appear since Wolle's Fresh-water Algae of the United States (1887). The bulk of the work consists of keys to and descriptions of the genera and species of all algae hitherto reported from Wisconsin and Michigan. The ubiquity of the commoner species and the prevalence of similar habitats throughout most of southern Canada and the northern United States renders this work much more widely applicable than the title implies.

No one is better qualified than the author, Professor G. W. Prescott of Michigan State College, to present and discuss such a wide segment of the Plant Kingdom. Since the appearance in the mid-twenties of his first major work on Iowa algae, the author has published at least forty papers dealing with algal taxonomy and ecology. His explorations of algal habitats from Latin America to Alaska have equipped him well for a work of this kind. His familiarity with the scattered but bulky literature on algae is reflected in the bibliography of the present volume and in the recently available Bibliographia Desmidiacearum of Prescott and Brunel.

Of especial interest to the limnologist, ecologist, and general botanist are the introductory sections on the geological, physical and chemical factors affecting distribution and growth of algae. This section includes numerous text-tables and graphs.

Those interested in the identification of algae will be particularly pleased with the glossary and illustrations of morphological terms, supplementing the keys and species descriptions in the text. In addition, nearly all of the well over a thousand species are beautifully illustrated by line drawings. This volume brings together for the first time many specific and generic transfers previously recorded only in brief and specialized papers. When the author has not accepted such transfers, he has shown good judgment in including the synonymy together with explanatory notes. The usefulness of the bibliography is increased by the author's use of a superscript to indicate major works on morphology and taxonomy.

It is to be expected that the appearance of *Algae of the Western Great Lakes* so soon after the new edition of Smith's *Fresh-water Algae of the United States* will be reflected in a renewed general interest in the taxonomy, morphology, and ecology of the algae. These two complementary volumes, in addition to their extreme usefulness to the professional phycologist, provide an excellent starting point for beginners in the field.

The publishers are to be congratulated on the quality of the paper, print, and binding used in this volume. For these inflated times, the price is low, thanks to elimination of any profit to the author, publisher, or printer. — ELWYN O. HUGHES.

A Guide to Bird Finding East of the Mississippi. *By Olin Sewell Pettingill, Jr.; illustrated by George Miksch Sutton. 1951, Oxford University Press, New York. Pp. i-xxi, 1-659. ($5.75).*

Anyone expecting to make field studies of birds in personally unfamiliar parts of the eastern United States (east of the Mississippi) will find this book a most valuable piece of equipment. If your itinerary and destination are already planned, you will find listed in the book the best places to observe birds in or near the localities you visit, as well as local directions for getting there. If your itinerary is not already planned and you want to observe particular kinds of birds this book tells you where, when, and how to go.

The twenty-six states entirely east of the Mississippi are treated. In most cases a whole chapter is devoted to one state, these arranged alphabetically. Each chapter describes briefly and non-technically the physiographic regions and ecological communities of the area concerned, lists the more interesting breeding and wintering birds, gives local migratory and concentration points and other migration peculiarities. Dates given indicate the best seasons to visit any given area. The principal points of ornithological interest listed include the National, State, and Municipal parks and refuges; National forests and monuments; private sanctuaries; museums; ornithological societies; research stations; universities; libraries; zoos, and best of all, the most outstanding places to find birds. Useful local information is given including common-sense directions for reaching the points described, accommodations, etc. There is a list of references to regional ornithological publications and a good index.

The 72 pen-and-ink sketches by George Miksch Sutton are both decorative and accurate. — *W. EARL GODFREY.*

Beginner's Guide to Attracting Birds. *By Leon A. Hausman. G. P. Putnam's Sons, New York, and Thomas Allen, Ltd., Toronto, 1951; 127 pages; Illus. with drawings by Jackson Miles Abbott and the author. $2.00.*

One of the most delightful of home sports of our day is attracting wild birds with food, water and nesting-places. It can be practised in country or city; even, in some cases, by dwellers in vast apartment houses. It provides interest and cheer for the whole family, and for the birds as well. No one profits by it more than the busy housewife, for in most families she is the one who spends most hours at home. If the romances of the tree swallows or the engaging gymnastics of the chickadees take such hold of her attention that sometimes a meal is a little late, who so churlish as to mention it?

Dr. Hausman's little book is practical and convenient, an excellent guide to the subject. He speaks simply and with kindliness and a touch of humour, so that reading his book gives the impression of a pleasant chat with him. The advice presented is based on the author's long experience and has all been fully tested. Topics discussed include the maintenance of successful winter feeding-stations, nesting boxes for those birds that will accept them, storm shelters for birds, bird baths, drinking fountains, feeding birds in summer, planting to attract birds, how to deal with cats and other creatures that are out of place among bird guests and how to identify birds that are commonly seen at feeding stations. A list of books and other helpful publications and an index round out the volume.

The advice in this guide is based on conditions in the northeastern United States and southeastern Canada, but of course the book will be very useful far beyond those regions.

Our experience leads to dimensions for nesting boxes that in some cases differ somewhat from those recommended by Dr. Hausman, but that is presumably a situation to be expected. Each user of this guide will, as his experience grows, be able to refine dimensions according to his own judgment.

All in all, this book is very suitable for its purpose. It should have a wide distribution. — *HARRISON F. LEWIS.*

An Introduction to Wild Flowers. *By John Kieran, Hanover House, Garden City, N.Y., 1952; 77 pp., 100 coloured drawings. — Price, $3.29.*

The idea of the book is to get the flower-lover to look more carefully at the structure and form of the wild plants he admires, to get a fuller appreciation of their beauty and growth peculiarities. After referring to the pages, he will want to go back and look again.

An even hundred wild flowers are illustrated by coloured habit-sketches and described in fascinating, ordinary—and accurate—terms, in the lively style characteristic of the expert of "Information Please". Ninety of the flowers are to be found in Eastern Canada "They are presented more or less in the general order in which you may find them coming into bloom" from Skunk Cabbage and Coltsfoot to Aster and Gentian, and constitute a well-balanced selection for each season. A goodly proportion are common introduced plants such as Dandelion, Devil's Paintbrush, Chickory, Corn Cockle and Queen Anne's Lace, but, on account of their beauty, the author cannot come to call them weeds.

—W. G. DORE

Ecological Animal Geography. *Second edition by W. C. Allee and Karl P. Schmidt, New York, John Wiley and Sons Inc., London, Chapman and Hall, Limited, Copyright by the University of Chicago, 1951; pp. i-xiii, 1-715, 142 figs. $9.50.*

When the late Richard Hesse, Professor of Zoology of the University of Berlin, produced his "Tiergeographie auf oekologischer Grundlage" in 1924 he said in his original preface "Ecological animal geography is a young science ..... I hope that this treatment will stimulate further expeditionary researches in this field. We have had an oversupply of travel which yielded animal pelts and alcoholic material; we need rather observations on the relations between animals and their environment".

The first translation and extension of the work was done by Allee and Schmidt in 1937. Even by this time it was possible to add considerably to the literature references and to revise sections of the text in the light of new information and of conditions on the North American Continent. Dr. Hesse approved of the revisions and additions.

After an additional fourteen years Allee and Schmidt have brought out a second edition of the work, still more comprehensive both in treatment of material and in review of pertinent literature.

The second edition contains the same arrangements of 4 parts and 28 chapters as the first and a good idea of the scope of the book is given by a brief review of the parts.

PART 1. The "Ecological Foundations of Zoogeography", in which are traced the relations of the subject, the effects of environmental selection, the factors influencing distribution of animals, including barriers to, and means of, dispersal, historical zoogeography, the effects of geographic isolation and extent of range and the meaning of biotopes and biocoenoses.

PART 2. "The Distribution of Marine Animals", in which are reviewed the physical and chemical conditions of the oceans in relation to animal life, the biotic divisions and the animal communities of the sea and the geographic divisions of the animal communities.

PART 3. "The Distribution of Animals in Inland Waters, a Phase of Limnology", which discusses the environmental factors in inland waters and the nature of animal communities in all types of inland waters.

PART 4. "The Distribution of Land Animals". In this part are discussed the ecological factors connected with terrestrial life in communities ranging through forest, grassland, desert, swamp, shore, alpine, polar, island and subterranean. The final chapter on "The Effect of Man on the Distribution of Other Animals" brings out some of the more important areas of impact of human ecology on animal ecology. Most of these, unfortunately, act to the detriment of animal species and their habitats through unwise use of natural resources and through increase in pollution and other detrimental factors related to increasing human population. The creation of great national parks to preserve unchanged natural areas in various countries is mentioned at the end of the chapter as a hopeful note.

The second edition has been expanded from the 597 pages of text in the first edition to 674 pages, with similar type size and general format. The illustrative material is generally unchanged from the first edition, the original 135 figures having been increased to 142. The book is attractively printed in clear, easily-read type and is largely free from typographical errors.

Dr. Hesse's hope that his 1924 work would stimulate further researches in the field has been fulfilled, as is indicated in the wealth of information published since that time. The chapter-end bibliographies of the first edition have been much revised and are now listed in complete form and in alphabetical order by author, which is a great improvement over the abbreviated, non-alphabetical arrangement of references used in edition one. The total number of references, varying from 17 to 161 per chapter, has been increased from 1390 to 1461 through the addition of new material up to and including 1950 and the replacement of some of the older references. This replacement has not been allowed to interfere with the retention, for special values, of many of the older references.

The first edition of the book has served as a valuable text and source in zoogeography since its issue and the second edition now provides a more valuable and up-to-date treatment of this expanding and increasingly important phase of biology. — *VICTOR E. F. SOLMAN.*

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Lectures on the first and third Monday evenings of each month will be held in the 4th floor Board Room of the Free Press. Friday evening lectures wil be held in Room 200 of the University Extension Service, Memorial Boulevard, Winnipeg. Field Excursions are held on Saturdays or Sundays during May, June and September, and on public holidays in July and August. Membership fee: $1 a year for adults; 25 cents for juniors.

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THE IDENTITY OF *CAREX MISANDROIDES* FERN. WITH NOTES ON THE NORTH AMERICAN *FRIGIDAE* [1, 2]

MARCEL RAYMOND
Montreal Botanical Garden, Canada

DESCRIBED in 1915 (6) from specimens collected in Newfoundland, *Carex misandroides* Fern., was discovered 12 years later at one single station in the Gaspé Peninsula (9). When describing it, the late Dr. Fernald believed the plant to be related to *C. misandra* R. Br., which explains the choice of the name. He wrote:

> "Simulating *C. misandra* R. Br. of the Arctic, a species in which the terminal spike is staminate at base only, the scales and perigynia narrower, the latter prolonged into a slender distinctly serrate beak, the stigmas commonly 3, and the leaves broader and flat. Only one knoll of *C. misandroides* was observed during a hurried trip across the tableland of Table Mountain and the material collected shows scarcely any individuals which are clearly duplicates, so great is the diversity in length of the culms and peduncles. In one individual a tall culm (1 dm. high) bears an umbel with a nearly sessile staminate spike and 4 pistillate spikes on peduncles from 2 mm. to 3.5 cm. long; others have long slender peduncles arising from near the base of the plant, one of them bearing sessile staminate and pistillate spikes, and one extreme individual has the staminate spike essentially sessile at the base of the plant, with the long-peduncled pistillate spikes over-topping it."

A more recent description and illustration have been made available through the latest edition of Gray's Manual (8).

Meanwhile, Fernald realized the affinity of his species to western ones such as *C. petricosa* or *C. Franklinii,* for, in 1925, he wrote (7):

> The section *Frigidae* of the great genus *Carex* has two specially notable Rocky Mountain species, *Carex petricosa* Dewey and *C. Franklinii* Boott, both excessively rare plants, the two together thus far known from only three or four stations in Alberta and British Columbia. On Table Mountain on Port à Port Bay and on the adjacent St. George Peninsula in western Newfoundland and on the high cliffs above Lac Pleureuse in Gaspé County, Quebec, occurs a third species of the *Frigidae, C. misandroides* Fernald (map 16), in some of its variations closely simulating *C. Franklinii,* in others as similar to *C. petricosa,* yet differing from them both in fundamental characters of the fruit.

In 1943, Dutilly & Lepage found the plant on dolomitic cornices in the central islands of Lake Mistassini (5). Dr. Fernald, seeing the material, wanted at first to describe the Mistassini material as a new species; and on some labels one may find written the name *Carex mistassinica* Fern. A little later, in 1945, on one of his trips to Lake Mistassini, Jacques Rousseau made an ample collection of the plant in the same locality as Dutilly & Lepage. The material exhibiting identical variations in the spike-arrangments as he had observed, in 1915, on the Newfoundland plant, Fernald dropped the idea of a new species. Again in 1945, Dutilly & Lepage on another of their trips through subarctic Québec, added a new locality for the hitherto localized sedge: Larch River, about 57° lat. N., in much the same type of habitat. More recently, in July 1948, Rouleau, discovered a new locality for the species in Newfoundland.

I had always suspected, especially after having myself collected the plant with Rouleau, at Anse Pleureuse, in Gaspé, late in August 1948, the species to be very close to the rare *Carex Franklinii* Boott of the Rocky Mountains (3, 4).

Boivin, in a revision of the Canadian representatives of the FERRUGINEAE, in 1948

1 Mémoires du Jardin Botanique de Montréal, no 29.
2 Received for publication July 4, 1951.

Vol. 66, May-June, 1952, was issued October 25, 1952.

(2), expressed the same view, without elaborating the point any further.

I recently had the opportunity to see an interesting set of some 40 sheets of *C. Franklinii, C. petricosa* and *C. misandroides,* from the National Herbarium in Ottawa, as well as 12 sheets from the Gray Herbarium, including isotypes of *C. Franklinii* and the type of *C. petricosa,* from Dewey's herbarium, kindly placed at my disposal respectively by Mr. A. E. Porsild and Dr. R. C. Rollins, and a photograph of the type of *C. Franklinii* made at Kew in 1888, by Dr. L. H. Bailey, which Miss Ethel Zoë Bailey has courteously sent me. Moreover, I have had access to all specimens of *C. misandroides,* which have been collected in Quebec and which are preserved either in the Marie-Victorin Herbarium, or the Herbarium of the Montreal Botanical Garden. After close comparison, I have reached the conclusion that *C. Franklinii* and *C. misandroides* intergrade in their mutual variations.

The descriptions of the two species, taken mainly from Mackenzie (13, 14) and Fernald (6, 8) and modified whenever the material at hand necessitates it, are compared in Table I.

Concerning the disposal of the flowers in the uppermost part of the spike, Holm (11) with abundant material collected by James M. Macoun, in 1919, at or near the place along the Athabaska Trail, where Drummond first discovered *C. Franklinii* made the following observations:

> Terminal spike: mostly androgynous, very seldom purely staminate.
>
> Uppermost lateral spike: staminate or androgynous, very seldom purely staminate.
>
> Second lateral spike: pistillate, seldom androgynous or staminate.

With material of *C. misandroides* (10 herbarium sheets from Lake Mistassini, 3 from Newfoundland, 4 from Gaspé and 1 from Larch River), I reached the same conclusions. Rousseau's material collected at the end of July, is smaller, has narrower leaves, while the Dutilly & Lepage collection, from the same area, made in August, is more robust. In the Larch River material, the terminal spike is staminate (with one female flower at the base, in one specimen), and the upper lateral one pistillate.

We must then admit that the intermixing of the androgynous and the pistillate in the terminal group of spikes is in this subsection of no taxonomic value. Boivin described (2) *C. Franklinii* var. *nicholsonis* with the diagnosis "differt spica apicali floribus et masculis et foemineis intermixis," from Nicholson Island, in the Northwest Territories, a phase which Boott had already covered in his description: "spica terminalis ovata apice conspicue mascula, ad ejus basin 1-3 arcte sessiles lineares tote masculae vel flosculis foemineis paucis basi instructae..." Furthermore, the plant appears to be but a luxuriant *C. petricosa* Dewey.

Rousseau's material also shows many pistillate spikes from the base borne on the tip of long capillary peduncles. This character likewise is of no taxonomic value, as I have before me specimens of *C. membranacea* Hooker (from Alaska), *C. petricosa* Dewey (from the Rocky Mountains), *C. stylosa* C.A. Meyer (from the Aleutian Islands) and *C. Bigelowii* Torr. ex Schwein. (from Ungava) all exhibiting the same peculiarity.

As to the number of styles, Boott in Hooker's *Flora boreali-americana* (3) illustrates a specimen with two styles while in *Illustrations of the genus Carex* (4), he shows a female flower with three. His description reads "stigmatibus — 3 vel 2". Fernald's more recent description of *C. misandroides* (8) makes the following allowance: "style branches 2 (rarely 3)". In opposition to Mackenzie's statement that the achene is triangular, it should be observed that in *C. Franklinii* or in *C. misandroides,* the achene is lenticular when there are 2 stigmas, and trigonous when there are 3, since the number of stigmas commands the number of ovules as well.

Mackenzie (13) and Boivin (2) based their keys on the number of styles, a character of no value whatever in this group, as shown immediately above.

So, in these two treatments, *C. misandroides* does not appear with *C. Franklinii* and *C. petricosa,* where it rightly belongs, but is set at the end, by itself. In his description of *C. Franklinii,* Mackenzie states "stigmas 3", which is not in full harmony with established fact.

The author's conclusion is that *C. misandroides* Fern. is identical to *C. Franklinii* Boott and could, at the most, be treated as a geographical variety. Consequently, this rare and supposedly local Rocky Mountain species is actually a transcanadian one. Presumably, some day, some very closely related, if not identical, species from eastern Asia will appear and thereby add another element to a type of distribution with which we are now

Table 2. — Comparison of *Carex misandroides* Fern. and *C. Franklinii* Boott

	Carex misandroides Fern.	*Carex Franklinii* Boott
Vegetative characters:	Loosely cespitose, the rootstocks slender, elongate, descending obliquely.	Loosely cespitose, the rootstocks slender, elongate, slenderly long-stoloniferous.
Leaves:	Leaves with well-devolped blades, 4-8 to a fertile culm, clustered above the base, not septate-nodulose, the blades yellowish-green, stiff-involute, 5-10 cm. long, 1-1.5 mm. wide, long-attenuate, little roughened, as long or shorter than the culms, those of the previous years conspicuous.	Leaves with well-developed blades, 4-8 to a fertile culm, clustered above the base, not septate-nodulose, the blades light green, stiffish, usually 20-30 cm. long, 1-3 mm. wide, channelled above, much roughened toward the attenuate apex, usually shorter than the culm, those of the previous years conspicuous.
Terminal spikes:	Terminal 1-4 spikes aggregated, androgynous or staminate.	Terminal 3-4 spikes, aggregated androgynous or staminate.
Lateral spikes:	Lateral spikes 1-4, sometimes androgynous, the uppermost sessile or short-peduncled, the others on long capillary peduncles, the lower 1-2 on arcuate spreading peduncles, the lowest frequently basal or nearly so, the spikes ovoid or oblong-ovoid.	Lateral spikes 2 or 3, not approximate, the uppermost at least androgynous, erect and short-peduncled, the lower strongly separate, drooping on a slender, slightly roughened peduncle 2-4 times its own length, the spikes oblong.
Perigynia:	Perigynia 15-30, appressed-ascending in several to many rows, oblong-lanceolate, 5-6 mm. long, 1.75 mm. wide, strongly flattened, not inflated, minutely asperulous on nerves, ciliate on margins, obscurely and slenderly several-nerved, tapering at base and short-stipitate, tapering at apex, scarcely beaked.	Perigynia 20-40 appressed in several rows, oblong-ovate 4.5-6 mm. long, 2-2.5 mm. wide, strongly flattened not inflated, minutely roughened, ciliate on margins, finely many-nerved, rounded at base and short-stipitate, tapering and minutely beaked at apex, the beak 0.25 mm. long.
Scales:	Scales oblong-ovate, thin, closely-appressed, minutely roughened, shining, about the width of but exceeded by the perigynia, obtusish to short-rough-awned, purplish-black with narrow white-hyaline apex and yellowish midvein conspicuous to tip.	Scales closely-appressed, oblong-ovate, short-rough-awned to obtusish, thin, minutely roughened, light-chestnut or reddish-brown with yellowish midrib sharply defined to the tip and white hyaline margins, about the width of but exceeded by perigynia.
Stigmas:	Stigmas 2 (rarely 3), slender, blackish. Plate I, fig. 1 and 4.	Stigmas 3 (rarely 2), slender, blackish. Plate I, fig. 3 and 5.

familiar: transcanadian species transgressing into eastern Asia. According to Holm (loc. cit.), *C. cruenta* Nees, from the Himalayas, comes very close to *C. Franklinii*.

C. petricosa Dewey, in some of its extremes, is another species, very difficult at times to distinguish from *C. Franklinii* Boott. As many botanists have recently been confusing the two, for the present revision, I took the opportunity to borrow from the Gray Herbarium and the National Herbarium, all the specimens preserved there, in addition to the critical material from Alaska collected respectively by Reverend Ernest Lepage (Rimouski), and the late Louis H. Jordal (University of Michigan).

C. petricosa was collected also by Drummond in the same area as *C. Franklinii* (Summit of the Rocky Mts, *Drummond 283*, lat. about 59°), and its description has been based on a very young specimen, as Bailey (1) has pointed out, and which the author has been able to judge for himself. The type is in the Gray Herbarium, with photographs of it in the National Herbarium, Ottawa, and in the Herbarium of the Montreal Botanical Garden (plate II, fig. 1). It has been very erratically and poorly interpreted as may be seen from an examination of collections under that name in many herbaria.

In *Carex petricosa* as well as in *C. Franklinii*, the terminal group of spikes represent the same combinations of staminate and androgynous ones when intermixed. Holm (1) has likewise studied the former species. In both, the perigynia are slightly hairy with the scales roughened along the midvein. There is such variation in the arrangement of the spikes and the flowers, that very few reliable characters remain. One is the shape of the lateral spikes (usually nearly as wide as long). Another is the length of the perigynia: lanceolate, 1.5-1.75 mm. wide, tapering at the apex, in *C. petricosa* Dewey; oblong-ovate, 2-2.5 mm. wide, abruptly minutely beaked in *C. Franklinii* Boott. Stamen size, very seldom used to determine sedges, may be relied upon here. They are relatively very long (2-2.25 mm.) in *C. petricosa*, much shorter in *C. Franklinii* (circa 1 mm.). Because of the great variation in the disposition of the terminal spikes from one specimen to another, I cannot agree with Kükenthal's (12) placing them in different subsections under the FRIGIDAE.

C. petricosa Dewey is more restricted in its range, being limited to Alberta, Yukon and Alaska.

There is also *Carex distichiflora* Boivin, a species admittedly close to *C. Franklinii* Boott, in fact too close. It comes under one of the arrangements of flowers and spikes already noted by Holm.

One of the main difficulties, in working the FRIGIDAE is the great difference within the same species between mature and overripe material. Only one closely familiar with the species in the field is able to determine correctly specimens collected at the end of a season, when the material appears all greyish and with the scales or the perigynia partly fallen off.

With the material at hand, a new key has been built and the precise localities for each species given: the present clarification adds a most interesting Asiatic species to the flora of Alaska and necessitates the description of two new species of the *Carex tristis* M.B. group, one from Alaska, the other from the Northwest Territories, all three having been referred to *C. petricosa* with which, as one shall see below, they have very little in common. The results are summarized in the accompanying key.

1. CAREX ATROFUSCA Schkuhr, Riedgr. 1: 106, tab. Y, fig. 82. 1801; Kükenthal, Pflanzenr. 4 (20): 553. 1909; Lindman, Sv. Fanerogamfl. 152. 1926; Kreczetowicz, in Komarov, Fl. USSR, III: 282. 1935; Mackenzie, N. Am. Fl. 18 (6): 313. 1935; N. Amer. Cariceae, tab. 364. 1940; Hiitonen, Suomen Kasvio, 163. 1933; Polunin, Nat. Mus. Canada, 92: 124. 1940; Duman, Cath. Univ. Amer. Biol. Ser. 36: 61. 1941; Hultén, Fl. Alaska and Yukon, II: 373. 1941; Atlas Vasc. Pl. NW. Eur. fig. 398. 1950; Lid, Norsk Fl. 154. 1944. — *C. ustulata* Wahlenb., Vet. Akad. Nya H. Stockholm 24: 156. 1803; Schweinitz and Torrey, Ann. Lyc. Nat. Hist. N.Y. 1: 349. 1824; Kunth, Enum. Cyper., 462. 1837; Andersson, Cyp. Scand. 37 tab. 6, f. 68. 1849; Meinshausen, Acta Horti Petr. 18 (3): 356. 1901.

Arctic-alpine and circumpolar. Throughout arctic Canada.

1a. C. ATROFUSCA var. DECOLORATA Porsild, Sargentia 4: 20. 1943. — f. *decolorata* (Porsild) Boivin, Nat. Can. 75: 208, 1948; *C. stilbophaea* V. Krecz., Fl. USSR, III: 605. 1935.

Known in North America only from Great Bear Lake (NWT), and in Asia, from Altai, Sajan and Siberia.

1b. C. ATROFUSCA var. **major** (Boeckl.) Raymond, n. comb. — *C. ustulata* var. *major* Boeckl., Linnaea 41: 260. 1877. — *C. coriophora* Fisch. et Meyer, ex Kunth, Enum. pl.

Plate I. Fig. 1. *Carex misandroides* Fern. from Lake Mistassini. — Fig. 2. Type of *Carex Franklinii* Boott in Kew Garden Herbarium. — Fig. 3. *Carex Franklinii* Boott from the type region. — Fig. 4. Detail of fig. 1. — Fig. 5. Detail of fig. 2.

Plate II. Fig. 1. Type of *Carex petricosa* Dewey in Gray Herbarium. Fig. 2. *Carex petricosa* Dewey from the type region. — Fig. 3. *Carex petricosa* Dewey from Nordegg (Alta). — Fig. 4. *Carex petricosa* Dewey from Jasper National Park (Alta).

Key to the Canadian FRIGIDAE Fries [3]

1. One (occasionally 2) terminal spike, staminate or gynecandrous; 3 stigmas, about half the length of the perigynia; arctic-alpine species.
   2. Lateral spikes ovoid or short-oblong, round-truncate at base; perigynia 4-5 mm. long, 1.75-2 mm. wide; loosely cespitose with short stolons; leaves not recurved; reaching 78° 52' N. in Ellesmere Land.
      3. Usually 1.5-3 dm. high.
         4. Perigynia and scale purplish-black.
            1. *C. atrofusca* Schk.
         4. Perigynia and scale purplish-black at base, cinnamon-coloured at tip.
            ..... 1a. *C. atrofusca* Schk. var.*decolorata* Porsild.
      3. Taller (reaching 6 dm.); Alaska.
         ..... 1b. *C. atrofusca* Schk. var. *major* (Boeckl.) Raymond
   2. Lateral spikes linear-oblong.
      4. Leaves very short, all curled, in dense mats; lateral spikes about 1 cm. long; circumpolar and limited to arctic regions reaching 83° N. in Greenland.
         5. Perigynia brownish.
            ..... 2. *C. misandra* R. Br.
         5. Perigynia pale cinnamon.
            ..... 2a. *C. misandra* R. Br. f. *flavida* Fern.
      4. Leaves not curled in dense mats; lateral and terminal spikes 1.5-2.3 cm. long, all drooping on capillary pedicels 5-6 mm. long; northeastern Asia and westernmost Alaska (Nome).
         ..... 3. *C. stenocarpa* Turcz.

1. A group of terminal spikes, the uppermost sessile, the remainder on peduncles which increase in length towards the base so as to give the group of terminal spikes a pyramidal shape; ultimate spike androgynous, seldom purely staminate, the uppermost lateral staminate or androgynous, the second lateral pistillate, seldom androgynous or staminate; pistillate scales ciliate on the back; 2 or 3 stigmas, nearly as long as the perigynia; mostly alpine species.
   2. Lateral spikes linear-elliptic, 3-4 mm. wide, 8-25 mm. long loosely-flowered and often with empty scales at base and male flowers at top.
      3. Plants reaching 30 cm. in length; lateral spikes 8-12 mm. long; leaves 1 mm. wide, strongly curved reaching about one third of the plant; Great Bear Lake region. ..... 4. *C. magnursina* Raymond
      3. Plants reaching 60 cm. in length; lateral spikes 20-25 mm. long, linear-elliptic; leaves 2 mm. wide, not curled, reaching more than half the size of the culms; terminal spikes digitately grouped; vicinity of Nome, Alaska.
         ..... 5. *C. Lepageana* Raymond
   2. Lateral spikes ovoid, 6-9 mm. wide, 8-15 mm. long; anthers 2-2.5 mm. long.
      3. Lateral spikes nearly as broad as long; perigynia 1.5-1.75 mm. wide, dark brown.
         4. Plants relatively small (10-30 cm.); lateral spikes on relatively short (circa 2 cm.) peduncles, more or less erect; Rocky Mountains, Yukon and Alaska. ..... 6. *C. petricosa* Dewey
         4. Plants tall (circa 40 cm.); lateral spikes strongly drooping on longer and more slender peduncles; Yukon and Brooks Range in Alaska.
            ..... 6a. *C. petricosa* Dewey var. *Edwardsii* Boivin
      3. Lateral spikes much longer than broad; perigynia 2-2.5 mm. wide, yellowish-brown.

[3] To which should be added the phyllopodic Carex ablata Bailey (from B.C. to Montana, Wyoming, Utah and California).

4. Leaves 1-3 mm. wide; plants usually tall (reaching 90 cm.); no basogynous spikes; Alberta and Yukon.
..... 7. *C. Franklinii* Boott

4. Leaves narrower; plants usually smaller; basogynous spikes frequent; Ungava, Gaspé and Newfoundland; Alaska.
..... **7a.** *C. Franklinii* Boott
var. *misandroides* (Fern.) Raymond

II: 463. 1847. — *C. ustulata* Boott, Ill. Carex I: 70-71, tab. 193. 1858. — *C. atrofusca* var. *nortoniana* Boivin, loc. cit.

Known only from the Bering Sea and the Bering Straits districts in Alaska, and central and northwestern Asia (Altaï, Dahuria, Siberia). This tall phase was well illustrated and discussed by Boott, a century ago.

2. CAREX MISANDRA R. Br., in Parry Voy. App. 283. 1823; Schweinitz and Torrey, Ann. Lyc. Nat. Hist. N.Y. 1: 325. 1824; Kunth, Enum. Cyper. 435. 1837; Kreczetowicz, in Komarov, Fl. USSR, III: 92, tab. 18, fig. 1. 1935; Mackenzie, N. Am. Fl. 18 (6): 312. 1935; Polunin, Nat. Mus. Canada, 92: 125. 1940; Duman, Cath. Univ. Amer. Biol. Ser. 36: 65. 1941; Hultén, Fl. Alaska and Yukon, II: 373. 1941 (probably at the exclusion of the Nome specimens cited); Atlas Vasc. Pl. NW. Eur. fig. 397. 1950; Lid, Norsk Fl. 141. 1944. — *C. fuliginosa* Schk. Riedgr. I: 91. 1801 (as to the arctic plant only); Andersson, Cyp. Scand. 26, tab. 7, f. 90. 1849; Kunze, Suppl. Riedgr. 57. 1840-50, in part.; Boott, Illus. II. 77, tab. 212. 1860, in part.; Meinshausen, Acta Horti Petr. 18 (3): 358. 1901, in part.; Lindman, Sv. Fanerogamfl. 152. 1926; Hiitonen, Suomen Kasvio, 163. 1933. — *C. fuliginosa* var. *misandra* O.F. Lang, Linnaea 24: 597. 1851; Kükenthal, Pflanzenr. 4 (20): 557. 1909. — *C. frigida* var. B. Trev. in Ledeb. Fl. Ross. 4: 294. 1853.

Throughout arctic Europe, Asia and North America [4]), from Alaska to Greenland.

2a. f. FLAVIDA Fernald, Rhodora 36: 91. 1934; Polunin, loc. cit.

Northwest Greenland, southern Ellesmere and southern Baffin.

3. C. STENOCARPA Turcz. ex Besser, Flora 18. Beibl. 1: 27. 1834 (nomen); Kreczetowicz, in Komarov Fl. USSR, III. 291, 607 (descr.), tab. 18, fig. 2. 1935. — *C. tristis* Turcz., Bull. Soc. Nat. Mosc. 28: 349. 1855; Fl. baic.-dah. II (2): 234. 1856; C. A. Meyer, in Ledeb., Fl. Alt. 4: 228. 1833; Trev. in Ledeb. Fl. Ross. 4: 294. 1853, quoad pl. asiat.; Meinsh., Acta Horti Petr. 18 (3): 358. 1901, excl. pl. caucas.; V. Krecz., in Fl. transb. II: 131, non Marschall von Bieberstein, Fl. taurcauc. 3: 615. 1819. — *C. tristis* var. *asiatica* Litw., Trav. Mus. Bot. St. Petersb. 7: 94. 1910. — *C. sempervirens* var. Boott, III. Carex IV, 569, 1867 (quoad pl. asiat.) — *C. sempervirens* ssp. *tristis* Kükenthal, Pflanzenr. 4 (20): 569. 1909; Journ. Russ. Bot. 3-6: 155. 1911. — *C. sempervirens* ssp. *tristis* var. *asiatica* B. Fedtsch., Acta Horti Petrop. 38 (1): 217: 1924. — *C. frigida* Regel, Acta Horti Petrop. 7: 569. 1880, non Bellardi ex Allioni in Fl. Pedem. — *C. fuliginosa* Kükenthal, 1.1.c.c. 556, 151, quoad pl. Lessing. ex Sibiria. — *C. fuliginosa* ssp. *pronella* Printz, Veg. Siber. Mongol. Front. 157, tab. 5, fig. 2 et 3. 1931.

ALASKA: Dry slope of Cape Nome. Aug. 7, 1948. *Ernest Lepage 23820* (L). — Dry slope of Anvill Hill, Nome. Aug. 9, 1948. *Ernest Lepage 23900* (L, NH). Plate III, fig. 1.

ASIA: Asia Media, mountains of Altaï and Sajan, Siberia and Mongolia (Kreczetowicz, loc. cit.).

Father Lepage's remarkable find adds still another to an already imposing list of Asiatic species which transgress into Alaska.

4. **C. MAGNURSINA** Raymond, n. sp. — Planta 20-30 cm. alta, stolonibus brevibus dense vestitis foliis reductis scabris acutis basi amplectentibus; foliis mortuis numerosis curvatis; foliis omnibus basilaribus 9-15 cm. longis 1-1.5 mm. latis curvatis scabris; caulibus fructiferis gracilibus; spica terminali tam mascula, tam cum 1-2 floribus foemineis basilaribus, tam cum 1-2-3 spiculis foemineis brevibus, imis sessilibus; spicis lateralibus 5-12 mm longis, 3-4 mm. latis, laxis basi rarifloribus, pedunculatis; pedunculis tenuibus scabribus 8-20 mm. longis nutantibus; perigyniis lanceolatis 3.5 mm. longis .75 mm. latis, flavo-virescentibus demum apice cinnamomeis, enerviis, stipitatis, cum margine setuloso et rostro breve bidentato; squamis late ovatis, brunneis cum carina pallidiore sub-aequilongis aut paulo brevioribus perigyniis; akeniis 1.5 mm. longis, 0.9 mm. latis, breve stipitatis trigonis; stigmatibus tribus, 3 mm. longis.

[4] The plant from Colorado belongs to the very close alpine **C. fuliginosa** Schk. Mackenzie's plate in N. Am. Cariceae, tab. 363 (1940) represents **C. fuliginosa** not **C. misandra.**

Plate III. Fig. 1. Type collection of *Carex petricosa* var. *Edwardsii* Boivin from Yukon. — Fig. 2. First North American collection of *Carex stenocarpa* Turcz. from Nome (Alaska). — Fig. 3. Type collection of *Carex magnursina* Raymond from Great Bear Lake (NWT). — Fig. 4. Type collection of *Carex Lepageana* Raymond from Nome (Alaska).

CANADA NORTHWEST TERRITORIES: Great Bear Lake Region. In boggy valley near rapids of the Harrison River, eastern end of McTavish Arm. 30 July 1948. *Steere, Lowrey, Phillips, Shacklette & Kucyniak 3228.* (TYPE in the Herbarium of the Montreal Botanical Garden). Plate III, fig. 3.

Affinis *C. Gorodkovio* V. Krecz. sed differt foliis angustioribus et dispositione spicularum terminalium.

On first sight, *Carex magnursina* looks like some strong and robust specimen of *Carex capillaris.* But there the resemblance ends since both species do not belong to the same section.

5. **C. LEPAGEANA** Raymond, n. sp. — Planta circa 70 cm. longa, sine stolonibus (?) in specimine unico; foliis 30-35 cm. longis 1-2 mm. latis, caerulea-viridibus, numerosis, mortuis evidentibus; spiculis terminalibus tribus digitate dispositis, terminali mascula, basi foeminea, 15-20 mm. longa, basilaribus paulo brevioribus; spiculis lateralibus 20 mm. longis, 3-4 mm. latis, basi et apice attenuatis, laxifloribus, nutantibus; pedunculis 20-30 mm. longis, capillaribus; bractea ima 9 cm. longa, foliis simili, cum vagina 20-25 mm. longa, eburnea; utriculis 5 mm. longis, 1-1.25 mm. latis, fusiformibus, basi viridescentibus, apice brunneis, minute hispidulis; squamis 4-4.5 mm. longis, 1.5-2 mm. latis, brunneis, hispidis, margine nervo medioque hyalino, brevioribus sed latioribus utriculis. Akeniis trigonis 2 mm. longis, 1 mm. latis, puncticulatis, basi stipitatis; stigmatibus (an semper?) tribus.

ALASKA: Dry slopes of Anvil Hill, Nome. Aug. 15, 1948. *Ernest Lepage 24031* (TYPE in the Herbarium of the Montreal Botanical Garden). Plate III, fig. 4.

C. stenocarpae affinis, sed spiculis terminalibus digitate dispositis, majora statura, foliis longioribus, squamis hispidulis valde differt. A. *C. Gorodkovio* V. Krecz. cui consanguinea magnitudine, spicularum terminalium dispositione valde differt.

6. C. PETRICOSA Dewey, Am. Journ. Sci. 29: 246. pl. W, f. 70. 1836; Bailey, L. H., Proc. Amer. Acad. Sci. 22: 92. 1886; Holm, Amer. Journ. Sci. IV. 26: 488-491, fig. 21-24. 1908; Kükenthal, Pflanzenr. 4 (20): 570. 1909; Mackenzie, N. Am. Fl. 18 (5): 311. 1935; N. Amer. Cariceae, tab. 361. 1940; Porsild, Sargentia 4: 19-20. 1943, in minima parte, excl. numer. 4676, 4887, 6647, 6648; Raup, Sargentia 6: 135. 1947; Boivin, Nat. Can. 75: 207. 1948. — *C. Franklinii* Boott var. *nicholsonis* Boivin, loc. cit.

ALBERTA: Summits of Rocky Mountains. *Drummond 283.* Herb. Hook. (GH). Photographs in NH and JB. — BANFF NATIONAL PARK. Banff on the Peak. Alt. 8000 feet. *Macoun 7425* (GH, NH); *Samson 25498* (NH). — Rundle Mountain, 6000 feet alt. *Samson* (GH). — Vicinity of Sunshine Ski Lodge, south of Healy Creek: forested lower slopes and rocky, alpine summits between 7200 and 9300 feet elev. *Porsild & Breitung 13358* (NH). — Vicinity of Athabasca Glacier: moraines and alpine meadows, elev. 6500-7000 feet. *Porsild & Breitung 14492* (NH). — Headwaters of N. Saskatchewan River: Ridge between Mt. Athabaska and Saskatchewan Glacier, near mile 114 on Banff-Jasper highway, elev. 7000-8000 feet. *Porsild & Breitung 14541* (NH). — Upper North Saskatchewan River; alpine slopes of Mt. Saskatchewan, common in alpine tundra. *Porsild & Breitung 16053* (NH). — JASPER NATIONAL PARK. Moraines along the side of Athabaska Glacier near Columbia Icefields. *Porsild & Breitung 16330* (NH). — Athabaska Glacier, Columbia Icefield, elev. 6525 feet. *Scamman 2734* (GH). Moose Mt. Elbow River, Alt. 6700 ft. *Macoun 25533* (NH). — Nordegg, Mt. Coliseum. Alt. 4500-6500 feet. *Malte & Watson 1479* (GH, NH).

YUKON: CANOL RD.: Mackenzie Range. Bolstead Creek. Mile 111 East. Pump Station no. 4. 4420 feet. High alpine valley. *Porsild & Breitung 11830* (NH). — Rose-Lapie R. Pass: East slope of granite-schist mountain west of mile 118; alpine screes and rocky chimneys. Forming small colonies on dry gravelly slope, 5000 feet. *Porsild & Breitung 10113* (NH). — Arctic Coast: Liverpool Bay, Nicholson Island about 70° N., 129° W. Edge of summer-dry tundra pool. *A. E. & R. T. Porsild 2840* (NH). (Type of *C. Franklinii* Boott var. *nicholsonis* Boivin).

ALASKA: Edge of a cliff. Toglat River. McKinley Park. *Lepage 25510* (L.).

6a. var. EDWARDSII Boivin, Nat. Can. 75: 207. 1948. Plate III, fig. 1.

MACKENZIE DISTRICT: Lone Mt.: lower N. Nahanni R. 6 miles above confluence with Mackenzie R.; steep wooded slopes and cliffs from base to summit, 2500 feet. *Porsild 16625* (NH). — Lone Mt. near the confluence of the North Nahanni R. and the Mackenzie. *Wynne-Edwards 8438* (NH). TYPE. — North peak of Nahanni Mt., near the confluence of North Nahanni R. and the Mackenzie; elevation 2700 feet. *Wynne-Edwards 8439* (NH). CANOL RD.: Mountain Range west of Head of Bold-

stead Creek, 6 m. northwest of Pump Station No. 4. Mile 111 East. *Wynne-Edwards 8251* (NH).

ALASKA: BROOKS RANGE. Loose clumps in clayey open ground. Lowlands near Arctic Village. *Louis H. Jordal 3608* (MICH; JB).

7. C. FRANKLINII Boott, in Hooker, Fl. bor.-am. II: 217, tab. 218. 1839; Illus. Carex II: 77, tab. 211. 1860; Bailey, L. H., Proc. Amer. Acad. Sci. 22: 93. 1886; Kükenthal, Pflanzenr. 4 (20): 542. 1909; Holm, Amer. Journ. Sci. 49: 195-200, fig. 1-4. 1920; Mackenzie, N Am. Fl. 18 (5): 311. 1935; N. Amer. Cariceae, tab. 362. 1940; Boivin, Nat. Can. 75: 206. 1948. — *C. distichiflora* Boivin, loc. cit.

ALBERTA: BANFF NATIONAL PARK. Rocky Mountains. *Drummond 293.* Isotypes from Herb. Hook. and Herb. Dewey in GH. Type in Kew. Photographs at the herbarium of the Bailey Hortorium, at the Gray Herbarium and in the Herb. of the Montreal Botanical Garden (Plate I, fig. 2). — North Saskatchewan River: flood plains and dry river banks near junction with Howse R. *Porsild & Breitung 16083* (NH). — Upper drainage of N. Saskatchewan R.: valley of Mistaya R., between Saskatchewan crossing and Water-fowl Lakes. elev. 4500-7000 feet. Common on river flat. *Porsild & Breitung 14672* (NH), *14673* (NH), *14674* (NH), *14676* (NH). — Jasper. *Malte 123959* (NH), *123960* (NH),*94208* (NH) — Jasper Park, Right bank of Athabaska Riv. about ¾ mile above bridge. *J. M. Macoun 97623* (NH). — Along north side of Athabaska River. Across the river. *J. M. Macoun 97625.* — Along the Athabaska River. Near Buffalo Prairie. Alt. 3600 ft. *J. M. Macoun 97624* (NH, GH). — Along the Athabaska River at discharge of Beauvert Lake. Alt. 3300 feet. *J. M. Macoun 97621* (NH). — Raised alluvial bank (same loc. as *97621*). *J. M. Macoun 97622* (NH).

YUKON: CANOL RD.: Rose-Lapie R. Pass. Southwest slope of granite mountain west of mile 116. Alpine slopes from road to below summit. Elev. 4000-6000 feet. *Porsild & Breitung 10054* (NH).

MACKENZIE DIST. MACKENZIE RANGE. Sekwi R., mile 174 E. Pump Station 5, elev. 3625 feet. *Porsild & Breitung 11848* (NH). Type of *C. distichiflora* Boivin.

7a. var. **misandroides** (Fernald), Raymond, n. comb. — *C. misandroides* Fernald, Rhodora 17: 158. 1915; Gray's Manual, 8th ed. 352, fig. 673. 1950; Mackenzie, N. Am. Fl. 18 (6): 317. 1935; N. Amer. Cariceae, tab. 370. 1940; Boivin, Nat. Can. 75: 207. 1948; Dutilly & Lepage, Contrib. Arct. Inst. Cath. Univ. Amer. Washington 1 F: 89, fig. 9. 1948; Scoggan, Nat. Mus. Canada, 115: 136. 1950. — *C. mistassinica* Fernald, in sched. (GH).

ALASKA: Brooks Range, Battles River, 20 m. NE of Wiseman. *Jordal 2271* (JB).

NEWFOUNDLAND: Table Mountain, Port à Port Bay. *Fernald & St. John 10801* (GH). — Green Gardens, Cape St. George. Dry limestone barrens. *Mackenzie & Griscom 11010* (GH, photograph in NH). — Humber District. Goose Arm, William Wheeler Point (east of): dry limestone ledges at the summit of the talus. *Rouleau 184* (MV).

UNGAVA: Lac Mistassini et îles du centre. *Dutilly & Lepage 11556; Rousseau 1895, 1866, 1821.* — Rivière aux Mélèzes, au 56° N., 70° W. *Dutilly & Lepage 14589* (MV, NH). — Riv. Koksoak, Lat. 57° 42'. *Dutilly, Lepage & Duman 28128* (JB).

GASPE: Lac Pleureuse. East shore. *Kelsey & Jordan 48* (GH, NH); *Scoggan 1786* (NH); *Raymond & Rouleau 485* (JB).

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NOTES ON THE FLORA OF CHESTERFIELD INLET, KEEWATIN DISTRICT, N.W.T. [1, 2]

D. B. O. SAVILE and J. A. CALDER

ONE OF THE AUTHORS (D.B.O.S.) spent the summer of 1950 at Chesterfield Inlet (63°21'N 90° 42'W), Keewatin District, on the northwest coast of Hudson Bay, engaged in botanical work under the auspices of the Defence Research Board, Canada Department of National Defence. Polunin (1940) notes that a number of botanists have collected at Chesterfield, and lists a total of nearly 160 species, varieties, forms, presumptive hybrids, etc., from the locality.

The purpose of this paper is to present a number of additions to the flora recorded for this station and to discuss the status of a few plants already noted from it. All collections listed below were made within about 8 miles of the settlement, and nearly all within about 4 miles. No mention will be made of plants that have clearly been recorded from Chesterfield by Polunin under names other than those applied to the present collections, but a few will be included for which there is an element of doubt.

Discounting plants possibly reported under other names, and including entities described as new, the present report adds 20 species, varieties or forms to the known flora of Chesterfield Inlet; 13 of these are unrecorded in Polunin's district 10; and 9 are not reported by Polunin from the Canadian eastern arctic as defined by him.

Numbers cited without name are those of D.B.O. Savile and C. T. Watts. All specimens are in the herbarium of the Division of Botany and Plant Pathology, Science Service, Canada Department of Agriculture, Ottawa.

Festuca brachyphylla Schultes f. **flavida** Polunin

This yellow form, reported by Polunin only from Lake Harbour and Sugluk, was mixed with the typical purple form in one colony (1550).

Calamagrostis lapponica (Wahl.) Hartm.

Plants from Chesterfield *(1582)* exactly match a specimen from Frobisher Bay *(Calder 2155)* identified by Père Louis-Marie as *C. lapponica* var.? Dr. W. G. Dore notes that both these collections differ from Scandinavian specimens of *C. lapponica* in having culms smooth or, at most, puberulent with minute ascending-appressed hairs on and just below the lowest node of the panicle, rather than scabrous; and in having shorter callus hairs. This is possibly the plant reported by Polunin under *C. deschampsioides* Trin.

Eriophorum brachyantherum Trautv.

A few plants were found in three locations *(1229, 1325, 1347)* in habitats varying from bog to moist slope. Not recorded by Polunin, but this Division has specimens from Coral Harbour (Cody), Ross Bay (Cody) and Repulse Bay (Bruggemann).

Eriophorum russeolum Fries var. **leucothrix** (Blomgr.) Hultén

This plant proved to be moderately common *(1109, 1277, 1437)*. It has probably passed as *E. chamissonis* C. A. Meyer f. *albidum* (Nylander) Fern. and, as such, may have been collected at Chesterfield.

1 Contribution No. 1119 from the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.
2 Received for publication August 16, 1951.

Carex rotundata Wahl.

Duman (1941, p. 65) has recorded *C. membranacea* Hook. from Chesterfield on the basis of a number of collections made by Father A. Dutilly and himself. Their No.*1751*, a sheet of which we have at hand, should be referred to the above species, and as such is new to the Canadian eastern arctic as defined by Polunin.

Luzula groenlandica Böcher var. **fuscoatra** Böcher

Recently described (Böcher, 1950) from West Greenland, this species has been sparingly collected from the Canadian eastern arctic, including Chesterfield, generally as *L. sudetica* (Willd.) DC. Böcher indicates that little is known of the ecology of var. *fuscoatra*. It may, therefore, be noted that one collection (*1399*) was made on a muddy gravel flat beside a brackish pond, and a second (*1454*) on moist, but apparently fresh, grassland.

Salix brachycarpa Nutt. var. **sansonii** Ball

A single small collection *(1207)* was made on rocky ground; det. Carleton R. Ball. Not reported by Polunin from the eastern arctic.

Salix fullertonensis Schn.

This species has been collected several times at Chesterfield; but, as Mr. Ball has remarked on the unusual height (up to 12 in.) of some of our collections, some explanation is desirable. When growing on gravel beaches, which are generally swept bare of snow, *S. fullertonensis* is usually completely prostrate, probably as a result of snow abrasion; but it often grows in pockets of the bedrock near the coast, in which situations the snow cover is usually adequate, and it is then about 6-12 in. high. Even in prostrate plants no indication of adventitious roots on the twigs was noted. This species, like others in sect. *Glaucae*, is probably erect when conditions permit.

Salix fuscescens Anderss. var. **reducta** Ball (*S. arbutifolia* Pall. fide Hultén)

Single plants or small colonies were found at four stations *(913, 1230, 1359, 1419)*. It was determined by Carleton R. Ball who remarks that it "was supposed to be confined to Alaska and adjacent Yukon but here are four collections from Chesterfield Inlet, and Father Lepage of Rimouski has just sent one collection from near Fort George in Ungava, on the east side of Hudson Bay. Strange that it escaped collectors so long."

Salix myrtillifolia Anderss. var. **brachypoda** Fern.

Two small colonies *(1090, 1102)* were found at the edge of the settlement and a third *(1212)* about 4 miles inland. Mr. Ball states "never have I seen it so prostrate and depauperate." Raup (1943) shows the typical variety as occurring north to Churchill, but these specimens seem to constitute a great range extension for var. *brachypoda*.

Salix richardsonii Hook.

Polunin reports this species from Chesterfield, but it may be of interest to note that the one shrub found within several miles of the settlement *(912, 1178, 1533)* was hermaphroditic, every catkin having a scattering of stamens among the pistils.

Arenaria rubella (Wahl.) Sm.

Reported, in Polunin's district 10, only from Eskimo Point; but a large colony occurs on a gravel beach adjoining the settlement at Chesterfield *(1100)*, and four small colonies were located at distances up to 3 miles *(966, 982, 1148, 1429)*.

Arenaria uliginosa Schleich.

A single colony *(1387)* was found on a muddy flat near a brackish pond. Not reported by Polunin from district 10. It is possible that it was overlooked elsewhere at Chesterfield owing to its similarity in habit to *Sagina intermedia* Fenzl. See, however, under *Gentiana tenella*.

Stellaria laeta Rich. (*S. longipes* sensu Polunin p.p.)

Occasional, three small colonies being found *(1145, 1224, 1453)*. See under next species.

Stellaria monantha Hultén var. **monantha**

Abundant. This is presumably, at least in large part, the plant reported by Polunin from Chesterfield as *S. longipes*, but *S. laeta* may also have been collected there under this name.

Ranunculus hyperboreus Rottb.

This species was so variable in leaf form at Chesterfield Inlet that a detailed study was made of it. Chesterfield is the type locality of the plant described by Polunin as var. *turquetilianus*. It soon became clear that plants on rock or sand with little enrichment were always assignable to the typical form, whereas those fringing rich, stagnant muck pools were generally var. *turquetilianus*. In

intermediate habitats, notably a fertile, slightly brackish sand flat with appreciable leaching, remarkable intergradations occurred between the typical form, var. *turquetilianus*, and the form described below. The same correlation between habitat and leaf form is suggested by specimens from Coral Harbour and Fort Chimo. It thus appears that the variation is ecological rather than genetic. In view of the complete intergradation that may occur within a few yards the following recombination is proposed:

Ranunculus hyperboreus Rottb. f. **turquetilianus** (Polunin) Savile & Calder stat. n. (*Ranunculus hyperboreus* Rottb. var. *turquetilianus* Polunin l. c. p. 211).

A much scarcer, but fully as striking, variant was seen in which the leaves were never truly lobed, but were broadly ellipsoid and either entire or with a shallow notch near the apex on one or both sides. It is proposed to call this plant:

Ranunculus hyperboreus Rottb. f. **integrescens** Savile & Calder f. n. Differt foliis ab integris ovatisque tridentatis. At edge of muck pool, 8 mi. south of Chesterfield Inlet, Keewatin, 16 Aug. 1950, *D.B.O. Savile (1464) and C. T. Watts* (TYPE). One other collection has been seen that clearly belongs to this form, *W. J. Cody (1547)*, Coral Harbour, Southampton I.

The following Chesterfield collections are assignable to f. *turquetilianus: 1329*, from a pool near the Mission that may have been the source of Monsignor Turquetil's specimen, agreeing well with Polunin's description and illustration; *1198*, from 3 mi. southwest, in which the narrowness and toothing of the lobes is even more extreme; and *1187*, tending slightly toward the typical form. One specimen from Coral Harbour *(Cody 1236)* is also much closer to f. *turquetilianus* than to the typical form.

Chesterfield collections belonging to the typical form are: *1030, 1176, 1337*, and *1407*. Three collections from the brackish sand flat mentioned above are: *1017* and *1189*, intermediate between the typical form and f. *turquetilianus;* and *1566*, with almost equal tendencies to the typical form, f. *turquetilianus* and f. *integrescens*. One specimen from Coral Harbour *(Cody 1545)* and one from Fort Chimo, Que., *(Calder 2141)* are intermediate between the typical form and f. *turquetilianus*.

Ranunculus pallasii Schlecht.

Dense colonies, 10 by 30 ft. and 30 ft. diameter, were found in ponds about ¾ of a mile apart *(1349, 1438, 1545)*. The free water in August varied from ½ to 8 in. in the colonies, below which was a tangle of moss and debris up to 12 in. deep in which the plants were rooted. Flowering and fruiting plants were abundant.

Polunin reports *R. pallasii* from Lake Harbour, Baffin I.; Fort Harrison and Mosquito Bay, Que.; and Okak, Labrador. The Division also has specimens from Frobisher Bay, Baffin I., Fort George, Que., and Eskimo Point, Keewatin. The National Museum of Canada has specimens from Cape Henrietta Maria and Lake River, James Bay, Ont., in addition to a number from the Mackenzie District coast. Hultén (1944) cites specimens from the Mackenzie coast and Churchill, Man., in addition to various Alaska records. All North American records appear to be coastal or virtually so, but the species occurs far inland in Siberia. Where plants in one of the colonies at Chesterfield intermingled with *Colpodium fulvum* (Trin.) Griseb. they bore aecia of a rust. Heteroecious grass rusts do not generally persist north of about tree-line; and it is thought that rust spores, blown in from the south in 1949, established telia on the *Colpodium* plants, which in turn infected the *Ranunculus* in 1950 but too late for reinfection of the grass to occur. If, as is quite quite probable, the rust is a form specialized to these two hosts, the inference is that *Ranunculus pallasii* must be relatively abundant, in association with *Colpodium fulvum*, in parts of the virtually unexplored country to the southwest.

Cochlearia officinalis L. var. **oblongifolia** (DC.) Gelert

Two collections *(959, 1122)* are assignable to this variety and one *(1248)* to var. *groenlandica* (L.) Gelert. The latter is reported from Chesterfield, but the former only from Rankin Inlet in district 10.

Draba alpina L. var. **alpina**

A single colony was found on a gravel beach northeast of the settlement. Reported in district 10 only from Whale Point and Marble I.

Saxifraga tricuspidata Rottb. f. **ligulata** Savile & Calder. f. n. Differt a varietate typica petalis angustis ligulatisque, ca. 8.0 mm. long., ca. 1 mm. lat. Gravel beach, Chester-

field Inlet, Keewatin, 29 July, 1950, *D.B.O. Savile (1185) and C. T. Watts* (TYPE). Unfortunately only a single clump of this form could be found despite a prolonged search. The petals are strikingly different from those of the typical species, and appear to be amply distinct from those of any entities already named.

Potentilla hyparctica Malte var. **hyparctica** f. **tardinix** (Polunin) Savile & Calder comb. n. *(Potentilla emarginata* Pursh f. *tardinix* Polunin l. c. p. 275).

As indicated by Fernald (1943), the name *P. emarginata* is invalid; the above transfer is accordingly necessary. This form was described from Cape Dorset, Baffin I. It was fully developed in some plants of one colony at Chesterfield *(1074)*. Intermediates, normal plants and f. *tardinix* occurred close together in the same colony with absolutely no difference in exposure, soil or any other evident environmental factor. A few intermediate plants were seen in a second colony. The intermediate plants flowered sparsely, but those with the most extreme foliage modification were completely sterile. This form has the appearance of being due to infection by a virus, but will have to be maintained until proof can be secured. The presence of several potential insect vectors at Chesterfield, including three species of aphids, one cicadellid and one fulgorid, indicate such an explanation to be feasible.

Potentilla palustris (L.) Scop. var. **parvifolia** (Raf.) Fern. & Long

Polunin reports *P. palustris* from Burwell, River Kovik and Chesterfield, but states that it is "very rare, and no more than local and occasional in its three stations." It may, therefore, be noted that it was found in 1950 along nearly all creeks and was abundant, occasionally dominant, in the flood zone of most muddy or sandy ponds, both at the settlement and at distances up to 8 miles.

Primula egaliksensis Wormsk.

Reported by Polunin only from northern Quebec and from south of Eskimo Point. *P. egaliksensis* f. *egaliksensis* was found 8 mi. south of the settlement *(1455)*, and f. *violacea* Fern. was common in two areas within 2 mi. of the settlement *(1181, 1421)*.

Armeria maritima (Mill.) Willd.

This species is well known from Chesterfield. Almost all colonies in the area appear to be typical *A. maritima* var. *labradorica* (Wallr.) Lawrence *(A. labradorica* Wallr.) *(958, 1026, 1068, 1273)*, but a single small colony with noticeably flattened and broad leaves *(1386)* proved closer to var. *sibirica* (Turcz.) Lawrence. See discussion under *Gentiana tenella.*

Gentiana tenella Rottb.

Not recorded by Polunin from the Canadian eastern arctic. Determined by Mr. J. M. Gillett, who cites specimens at the Missouri Botanical Garden from Kotzebue, Alaska, and southern Greenland. Raymond (1950) has recently reported this species from Stony Point, Ungava Bay, Que., about 75 miles south of Polunin's limits. The Chesterfield colony *(1391)* consisted of seven very small plants 2-4 cm. high, largely without basal branches, on a muddy gravel flat near a brackish pool 2 mi. WNW of the settlement. This site is at the side of a valley that connects the settlement with the inlet and forms part of the winter trail between Chesterfield and Baker Lake. The fact that *Arenaria uliginosa, Epilobium davuricum, Armeria maritima* var. *sibirica* and the present species were found only on this site suggests that some, at least, of them may have been transported, in mud on a sled runner, from some point inland.

Limosella aquatica L.

This species, unreported by Polunin, was found at the bottom of a dried-up rock pool in the settlement *(1404, 1507)*. The pool is one of two that harbour *Ranunculus flammula* L. var. *filiformis* (Michx.) Hooker, recorded by Polunin. It is possible that both have been introduced from further south. This record adds a third annual plant to the eastern arctic, those previously reported being *Koenigia islandica* L. and *Montia lamprosperma* Cham.

Pinguicula villosa L.

A single, scattered colony on hummocks in a marsh west of the settlement *(1106)*. New to the eastern arctic.

Senecio congestus (R. Br.) DC.

Two small colonies were seen on the mainland near the settlement *(1184, 1567)*, and the overwintered stems were abundant on Fairway I. early in the season. Reported, under *S. palustris*, from Whale Point and Depot I. by Polunin.

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TWO PREDATORS AS PREY[1]

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WHILE collecting biting flies in northern Manitoba, two rather unusual instances of predatory insects falling prey to other predators were encountered. In both instances, attention was drawn to the event by the violence of the struggle taking place close to the ground, in rather short grass.

The earlier and more interesting instance was at Wabowden on August 6, when a female dragon-fly, *Sympetrum,* probably *rubicundulum* Say, had been captured and was finally overcome by a worker of *Vespula maculata* (L.). The specimens were taken with a net and transferred to a killing tube, by which time the dragon-fly had already lost its head and one wing but was still struggling violently. The wasp apparently did not use its sting, relying on the mandibles as an offensive weapon.

The second instance was at Mafeking on August 11, when a worker of *Vespula vulgaris* (L.) was captured on the wing by a female asilid, *Promachus bastardii* Macq. The wasp was a rather small specimen and although struggling violently when taken in the net, was completely immobilised by the time it was transferred to the killing tube. That wasps fall victim to asilids has long been known (Aaron 1894, Cockerell 1894) but the list of species is probably far from complete, and the rapidity of action of the asilid poison, although also previously reported (Whitfield 1925) is of perennial interest.

Other more normal prey taken by representives of these groups were also observed during the summer: workers of *Vespula norvegica* var. *albida* (Sladen) were often seen to capture *Chrysops nigripes* Zett. and other species of *Chrysops* on the wing at Churchill, Manitoba, July 28 to August 1. The wasp would alight, rapidly trim off the legs and wings of the deer-fly, and then take off again with the dressed carcass, presumably returning to the nest. This species was also observed to capture black flies (Simuliidae) on the wing. Richards (1951) has recently reported the South American vespid *Polybia occidentalis* (Oliv.) collecting simuliids off cows.

I am indebted to Messrs. C. D. F. Miller and J. F. McAlpine, Division of Entomology, Ottawa, Canada, for confirmation of the species mentioned.

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1 Received for publication December 6, 1951.

KEY TO THE GENUS RUBUS OF THE OTTAWA VALLEY [1]

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DURING the past five years (1946-51) the writer had occasion to study the genus *Rubus* in the Ottawa valley (Ontario and Quebec). In most *Rubus* species, the canes represent a biennial succession of growth, very dissimilar in aspect during the two seasons; sterile the first year (primocanes), flowering and fruiting the second (floricanes) after which they die. Consequently, it was necessary to secure adequate primocane and floricane specimens, as previous collections were few and incomplete.

Approximately 200 herbarium numbers were collected consisting of from one to several duplicates. The first set of specimens is deposited in the herbarium of the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa. Another set is in the Bailey Hortorium, Ithaca, New York.

In identifying the collections, the writer consulted the following references: Gentes Herbarum, Vol. 5: 1-932, 1941-5, and Gray's Manual of Botany, 8th ed., 1950.

Resulting from the study, 28 different species of *Rubus* have been recognized in the area. Of this number, the following three species were not previously recorded from Canada: *Rubus complex*, *R. perfoliosus*, and *R. pugnax*.

For additional usefulness, data as to habitat and locality of rare and localized species are included in the following key.

Key to *Rubus* species in the Ottawa Valley

A. Leaves simple; flowers rose-purple, 3—5 cm. across ..... **R. odoratus** L.

A. Leaves compound; flowers white, 1—3 cm. across.

a. Stems unarmed, semi-herbaceous, without definite primocane and floricane succession ..... **R. pubescens** Raf.

a. Stems armed, woody, with definite primocane and floricane succession.

b. Ripe berry readily separating from the receptacle or core.

c. Canes erect, bristly; leaves, when having more than 3 leaflets, pinnate; inflorescence racemiform; fruit red ..... **R. strigosus** Michx.

c. Canes arching, tip-rooting, prickly; leaves, when more than 3 leaflets, quinate; inflorescence cymiform; fruit black ..... **R. occidentalis** L.

b. Ripe berry not separating from the receptacle.

d. Armature more or less prickly.

e. Canes erect or merely arching.

f. Inflorescence and leaves, especially the undersurfaces, soft pubescent.

g. Leaves of the primocanes usually 5-foliolate.

h. Inflorescence glandular-pubescent.

i. Pedicels subtended by large leaf-like bracts which often exceed the pedicels in length.

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j. Primocanes densely covered with short, gland-tipped bristles, interspersed by weak prickles of different lengths ..... **R. glandicaulis** Blanch.

j. Primocanes sparsely armed with simple, strong prickles. Sand dunes. Constance Bay, Ontario .... **R. alumnus** Bailey

i. Pedicels without subtending leaf-bracts.

k. Canes armed with scattered prickles ..... **R. allegheniensis** Porter

k. Canes armed with numerous, crowded prickles. Sandy soil. Chalk River, Ontario ..... **R. pugnax** Bailey

h. Inflorescence pubescent, without gland-stalked hairs.

l. Leaves thin, terminal leaflet of primocane leaves 8—10 cm. long, longer than broad, gradually acuminate; inflorescence greatly overtopped by the long-petioled leafy bracts ..... **R. recurvans** Blanch.

l. Leaves thick; terminal leaflet of primocane leaves 5—7 cm. long, nearly as broad as long, abruptly acuminate; inflorescence corymbiform, not exceeded by the leafy bracts.

m. Leaf-margins cut-toothed or jagged; canes mounding, often tip-rooting. Sand dunes. Constance Bay, Ontario ..... **R. pensilvanicus** Poir.

m. Leaf-margins sharply and evenly serrate; canes erect or ascending. Sand dunes. Constance Bay, Ontario ..... **R. perfoliosus** Bailey

g. Leaves of the primocanes usually 3-foliolate ..... **R. attractus** Bailey

f. Inflorescence and leaves glabrous or nearly so.

n. Terminal leaflet of the primocane leaves 9—12 cm. long; flowers 9—25, racemiform ... **R. canadensis** L.

n. Terminal leaflet of the primocane leaves 5—8 cm. long; flowers 4—7, corymbiform ... **R. kennedyanus** Bailey

e. Canes prostrate, trailing, tip-rooting.

o. Primocane leaves prevailingly 5-foliolate.

p. Flowers 3—6; leaves glabrous ..... **R. flagellaris** Willd.

p. Flowers 1—3; leaves pubescent beneath .... **R. baileyanus** Britt.

o. Primocane leaves prevailingly 3-foliolate.

q. Leaves glabrous, firm, margins deeply cut-toothed, terminal leaflet obovate; flowers 3—5; pedicels 3—6 cm. long, erect . **R. maltei** Bailey

q. Leaves pubescent beneath, thin, margins closely serrate, terminal leaflet broadly obovate; flowers several, pedicels 2—3 cm. long, spreading. Sand dunes. Constance Bay, Ontario ..... **R. complex** Bailey

d. Armature bristly.

r. Primocanes erect, ascending or mounding; floricanes reclined or even prostrate, not tip-rooting.

s. Leaves of the primocanes mostly 5-foliolate.

t. Canes densely armed with bristles of different lengths ..... **R. setosus** Bigel.

t. Canes sparsely armed with simple bristles or weak setae.

u. Armature of stiff bristles; leaflets longer than broad.

v. Canes erect; pedicels spreading ..... **R. vermontanus** Blanch.

v. Canes mounding; pedicels ascending . **R. tardatus** Blanch.

u. Armature of weak setae; leaflets nearly as broad as long. Swamp. Chalk River, Ontario ..... **R. univocus** Bailey

s. Leaves of the primocanes mostly 3-foliolate.

w. Primocanes bristly; leaves thinly pubescent; inflorescence compact, 2—4-flowered, overtopped by large, long-petioled floral leaves. Gravelly soil. Aylmer, Quebec ..... **R. jaysmithii** Bailey

w. Primocanes almost unarmed; leaves glabrous; inflorescence several-flowered, pedicels slender, not overtopped by the floral leaves ..... **R. recurvicaulis** Blanch.

r. Primocanes and floricanes prostrate, trailing, tip-rooting.

x. Primocane leaves generally 5-foliolate.

y. Inflorescence glabrous or nearly so, leafy-bracted ..... **R. plicatifolius** Blanch.

y. Inflorescence villous; only the lowest pedicel subtended by a large leafy bract. Sandy pine barrens. Chalk River, Ontario ... **R. licens** Bailey

x. Primocane leaves generally 3-foliolate.

z. Leaves of the primocanes dark glossy-green, leathery, persistent over winter; pedicels without aciculae ..... **R. hispidus** L.

z. Leaves of the primocanes light green, thin, not persistent over winter; pedicels aciculate. Sandy soil. Chalk River, Ontario **R. trifrons** Blanch.

NOTES AND OBSERVATIONS

Lawrence's Warbler in Canada. — There is apparently no museum specimen of the hybrid form that is known as Lawrence's Warbler *(Vermivora lawrencei)* taken in Canada, and its existence and status in Canada rest upon two sight records, neither of which has been published.

On June 20, 1947, at Morton, Ontario, some twenty-five miles north of Kingston, I saw and heard one of these warblers in the roadside growth of a comparatively young mixed forest. The bird was sitting in a small white spruce tree and was singing lustily. I listened and had a close-up view for some fifteen mintues. Its song resembled that of the Golden-winged Warbler and until I saw the bird I thought I had discovered one of that species.

In the bird I had discovered, the black eye patch and throat markings were about the same size as in the Golden-winged Warbler but, unlike the condition in that bird, the facial markings surrounding the eye patch, the breast and the underparts were an intense yellow colour. The forehead was yellow as in the Golden-winged Warbler. The bird lacked the yellow wing patch of the Golden-winged Warbler and, although whitish wing bars were present, they were not conspicuous.

Although I am not particularly adept in interpreting the song of birds, as soon as I heard the song I mistook it for that of the Golden-winged Warbler which I had heard many times in southwestern Ontario. It was lazily given in the low pitch characteristic of the song of the Golden-wing. It could be interpreted phonetically, like the song of the Golden-winged Warbler, as *bee zee zee zee.* The four-syllabled songs were repeated continually while I listened, with but short pauses between songs.

The other record was made by Wm. W. Smith of Toronto. Mr. Smith saw and heard a Lawrence's Warbler singing at Highland Creek, near Toronto, on the evening of May 20, 1951. This bird also gave the typical Golden-winged Warbler song. Mr. Smith was searching for Golden-wings, which were known to frequent this particular swamp. He was surprised to find a bird with golden-yellow underparts and facial markings instead of one with the typical colour markings of the Golden-winged Warbler. — *GEO. M. STIRRETT, Kingston, Ontario.*

A new North American host for the fish parasite *Triaenophorus nodulosus* (Pallas). — A plerocercoid of the pseudophyllidean cestode *Triaenophorus nodulosus* was found encysted in the liver of a Miller's thumb, *Cottus cognatus.* The cyst was spherical, approximately 3 mm. in length, and opaquely white in colour. Only 1 of 48 fish of this species examined had this parasite. The fish were taken with emulsifiable rotenone, September 4, 1951 at Heming Lake, Manitoba, Canada, approximately 54° 53' N. lat., 101° 7' W. long.

T. nodulosus has not been previously reported in *C. cognatus* and it is concluded this is a new North American host record. At least 15 species of North American fishes have been reported to harbour *T. nodulosus* while European investigators have found that 35 species possessed this parasite. European literature reported that *Cottus gobio* occasionally contained *T. nodulosus* plerocercoids. —*G. H. LAWLER, Central Fisheries Research Station, Fisheries Research Board of Canada, Winnipeg, Manitoba.*

UNUSUAL FOOT COLOURATION IN PINTAILS (ANAS ACUTA) AND NOTE ON EUROPEAN RECOVERIES. — The normal foot colour of the Pintail *(Anas acuta)* has been described as "greyish blue to olive grey with dusky webs". (Kortright, 1943. Ducks, Geese and Swans of North America, p. 189).

Since 1948 the writer has banded nearly 2,000 Pintails in widely separated parts of Canada and the United States. The Kortright description of foot colouration has held true in all but four instances.

From August to September 1951 the Canadian Wildlife Service operated a waterfowl banding station at Tinker Harbour, Labrador, Newfoundland. A total of 108 Pintails were banded during this period; of these, four immature birds were noted to lack the characteristic grey webs. Instead, the colour varied from white to a fleshy pink. The courses of the blood vessels were easily traced by their vivid red colour which showed up clearly through the translucent flesh. The plumage of these birds, when compared with other immature specimens of the same species, showed no albinistic features.

One of these birds, an immature male, was banded September 7, 1951 with band number 506-65268. It was retrapped several times,

the last being September 16, 1951, when the station was closed.

On September 25, 1951 this bird was shot by Mr. J. L. Hunt at Nudeford, Christchurch, Hants, England. Mr. Hunt wrote that the bird was "in poor condition but in good health, very strong on the wing. The weather during the previous two weeks was characterized by southeast gales and winds."

This is the second European recovery for a Pintail banded at Tinker Harbour. The first was a bird which Alex Reeve of the Northeast Wildlife Station, banded on August 19, 1948. It repeated again on August 25, 1948. On September 15, 1948, the bird was shot in South Devon, England, approximately 100 miles northeast of Nudeford. — **GRAHAM COOCH, Department of Conservation, Cornell University, Ithaca, New York.**

Mortality of Coregonid Fish in Lake Simcoe during Spring temperature warm-up. — A mortality took place in Cook's Bay, Lake Simcoe, Ontario, on June 10th, 1950. By June 13 the distribution of dead fish was noted along 5 miles of the east shore of the bay and over a large area of the bottom in shallow water. A rough estimate of the total number of fish killed set the mortality at a million or more. The fish were about 80 per cent ciscoes *(Leucichthys* sp.) and 20 per cent whitefish (*Coregonus clupeaformis*). There was no evidence of disease in the specimens examined. The stomachs contained normal food.

The days preceding the mortality had been warm and clear and it is tentatively concluded that these fish had been resident in the bay during the winter and spring and thus became acclimated to low temperature, and that the sudden warming in this confined shallow bay subjected them to lethal temperatures. In support of this theory it perhaps should be mentioned that similar mortalities of small extent have occurred previously in certain localities from time to time in Lake Simcoe during the spring warming. — *H. R. McCRIMMON, Department of Lands and Forests, Toronto.*

Winter Records of the White-throated Sparrow in Western Ontario.—The White-throated Sparrow, *Zonotrichia albicollis* (Gmelin), is a common summer resident of northwestern Ontario including the area surrounding Fort William and Port Arthur. The average arrival date, 1938-1952, is April 27, the earliest, April 17, 1952, and the latest, May 6, 1951. In the fall the majority have left by early October. Until the season of 1951-52, there were no winter records.

On January 12, 1952, we were observing birds at a feeding station in Neebing Township, west of Fort William, being particularly interested in the presence of an Eastern Cardinal *Richmondena cardinalis cardinalis* (Linnaeus), a newcomer to the Lakehead, which had been reported at this station by members of the Thunder Bay Field Naturalists' Club taking the Christmas Bird Census, December 26, 1951. Two white-throated sparrows were noted feeding on a compost heap. This feeding station is situated at the edge of the valley of the Kaministiquia River. The heavily wooded slopes would offer shelter for the wintering birds. Subsequently we learned that a white-throated sparrow was spending the winter at a feeding station at Caramat, 200 miles northeast of Port Arthur in relatively unsettled bush country. This bird was still present in mid-February and apparently found protection in a large brush heap. It should be noted that the snow fall for this winter was relatively light, and the winter could be considered mild. Nevertheless, an early cold wave had brought a foot of snow by November 3 when the temperature was seven degrees below zero. Few summer residents had remained after that date.

Due to our location, it is difficult to compare our observations with comparable Ontario stations but the white-throated sparrow does not appear particularly hardy. For Duluth, Minnesota, 200 miles southeast, there are only two winter records, January 12, 1924 and a bird which remained throughout the winter of 1924-25. (Roberts, Thomas S. The Birds of Minnesota, Vol. 2, p. 427. Univ. Minn. Press, 1932.) Winter records for Western Canada are also unusual. In the 30-year history of "Chickadee Notes," a weekly nature column appearing in the Winnipeg Free Press, there are but two winter records, viz. Winnipeg, January 5, 1932, and Minitonas, December 19, 1939.—*A. E. ALLIN, Fort William, Ontario.*

YELLOW-BREASTED CHAT IN NEWFOUNDLAND. — An adult male Yellow-breasted Chat was found dead in a field at Cappahayden on February 8, 1951, and was sent to me by Mr. Harold Lawlor of that place. Another Chat (a post-juvenal female) was found dead on January 5, 1952, near the feeding station of Mrs. A. G. Gosling, Waterford Bridge Road,

St. John's. Remnants of both these specimens were sent to the National Museum, where Mr. W. Earl Godfrey confirmed their identification and stated that they belonged to the eastern race, *Icteria virens virens*. It may be of interest to relate the information relevant to these specimens.

Mrs. A. G. Gosling reported to me at odd intervals between January 14 and 20, 1951, that a Yellow-breasted Chat was appearing at her feeding station. She felt quite sure of the identity as there were numerous opportunities to observe it at close range. It was seen to feed on suet. This bird was not seen after January 20, and it would appear incredible that the Cappahayden specimen (90 miles southeast) mentioned above was the same bird.

On October 31, 1951, a Yellow-breasted Chat appeared at Miss Caroline Furlong's feeding station on Winter Avenue, St. John's. During the next several weeks I had the opportunity to study it within several feet. It did not have the distinct eye-ring of the Cappahayden specimen, and I felt it might be an immature or at least a female. I watched this bird on a number of occasions as it fed on beef suet. Miss Furlong last reported this bird on November 23.

Nearly two weeks later (December 4), Mr. H. H. Winter saw a Yellow-breasted Chat in some shrubbery in his garden on Robinson's Hill, St. John's. On December 18, Mrs. A. G. Gosling again reported that a Chat was at her feeder.

We all felt that these recent observations were of the same bird. It was interesting to speculate on its route (presuming it held to shrubbery) from one end of the city to the other. It now ignored (or was not seen at) the suet station, preferring instead bread crumbs, and although there was always some competition from the more aggressive English Sparrows, the Chat usually remained aloof and preferred to eat while the sparrows were elsewhere. It seemed to have two favourite perches, one in a sparse hedge of *Symphoricarpos* and the other in a thicket of the same plant, where it undoubtedly spent the nights. It probably had a daily route which it followed as it appeared in the feeding area every day at roughly the same time. On December 27, it remained all morning and most of the afternoon in the thin hedge, coming down to the ground now and again to feed on bread crumbs. The day was sunny, and it made the most of the available sunshine to fluff its feathers and preen from time to time. It was last recorded alive on December 30, still feeding on bread crumbs.

On January 1, a severe snow storm occurred, temperatures dropped thirty degrees to -4°F. and several days of blustery, wintry weather followed. This storm was presumably the cause of the chat's death as, on January 5, its solidly frozen carcass was found not far from its favourite perch.

The occurrence of at least two, possibly three, of these birds wintering so far outside the normal range seems noteworthy. The Yellow-breasted Chat has not heretofore been recorded from Newfoundland. — *LESLIE M. TUCK, Dominion Wildlife Officer, St. John's, Newfoundland.*

Snipe at Sea. — In crossing the Atlantic ocean from Manchester to Montreal (on the Manchester Merchant) a Snipe *(Capella* sp. ?) was spotted by me on a lower deck. I had a copy of Taverner's "Birds of Canada" with me and was able to be quite definite in deciding it was either a "Wilson's" or "Common Old World".

I firstly noted its appearance around 2.30 p.m., May 4, 1951, some 1,000 miles from Newfoundland long. (W) 27.0 lat. (N) 53.8 and its arrival appeared recent from its apparent tired state. The Snipe was around the following day when I saw it in flight (some 21 hrs. later). I could not discern the colour of under-wing surface well enough to be able to decide the actual species. Two junior officers told me the bird was around the ship for a day or two and reported the 7th as the day when last seeing same — personally, the 5th (noon) was the last occasion when seen by the writer. — *L. W. H. MILBOURN, Elmers Court, Surbiton, England.*

NOTICE

The annual meeting of the Ottawa Field-Naturalists' Club will be held on Tuesday, December 2 at 8.00 p.m. at Carleton College, cor. First Avenue and Lyon Street, Ottawa.

BOOK REVIEWS

The Birds of Greenland. *Text by Finn Salomonsen: illustrations by Gitz-Johansen. Part 2, pp. 159-348. Ejnar Munksgaard. Copenhagen, Denmark, 1951. ($9.00).*

The excellence that characterized Part 1 of this splendid work on Greenland birds, which was reviewed in *The Canadian Field-Naturalist,* 1951, Vol. 65, p. 124, is fully maintained in Part 2, here reviewed. The second part deals with the Rock Ptarmigan, the plovers, sandpipers, phalaropes, jaegers, gulls, and the Arctic Tern. As in Part 1, the text is in both Danish and English arranged in parallel columns. The species accounts are unusually full, the information given is definite, and the nature of the subject matter chosen demonstrates a refreshing ability on the author's part to separate "wheat" from "chaff". Treatment of the species concerned includes a description of each subject, its taxonomy, detailed distribution in Greenland, seasonal and numerical status, habitat requirements, behaviour, food, nesting, eggs, young, voice, enemies, etc. Data on taxonomy, food, the reproductive cycle, and local distribution are particularly full. The account of the Rock Ptarmigan, for example, occupies 22 pages yet there is no redundancy, the information given being pertinent and succinctly written. This book contains a great deal of first-hand information and that derived from other sources is well-documented. The illustrations, by Gitz-Johansen, are handsome. Some of his birds are excellent but a few are a little faulty in posture or structural detail. — W. EARL GODFREY.

The Zygnemataceae. *By Edgar Nelson Transeau. The Ohio State University Press. Columbus. 1951; pp. i-xiv, 1-327. pl. 41.*

Nearly all biology students are exposed at least once to the filamentous green alga, *Spirogyra,* and perhaps also to the related genera *Mougeotia* and *Zygnema.* However it comes as a surprise to most of them to learn that several other genera and more than 500 species are included in the family. The genus, *Spirogyra,* alone accounts for nearly 300 of these species.

Dr. E.N. Transeau, Professor Emeritus of Botany at the Ohio State University, has long been recognized as the world authority on this group. For many years students of the family have been dependent on his mimeographed keys for identification of the species. The present volume, completed during the early years of the author's retirement, is the result of a life-time study of the Zygnemataceae and the first monograph of the family to appear in the English language.

The scope of the work is world-wide. Thirteen genera are recognized, although "three genera *(Hallasia, Pleurodiscus* and *Entransia)* are tentatively and purposely defined to emphasize the need for further study of (their) development and reproduction." Keys are provided to the species of all genera. Each species is fully described and illustrated, and distributional data are given. Reference is made to the original description of each species and to later transfers and emendations. In the words of the author, "No attempt has been made to guess at the synonymy of all previously published species names. — In the absence of complete descriptions, or of the actual specimens, such conjectures seem gratuitous."

Confidence in this monograph is inspired by the knowledge that thousands of collections have been examined by the author and his colleagues at the Ohio State University. These collections, from all parts of the world were sent in by other phycologists, many of them former graduate students. It is "to the Graduate Students who discovered many new species and extended the known range of many other Zygnemataceae" that the author dedicates his work. — ELWYN O. HUGHES.

Flowering trees of the Caribbean. *Paintings by Bernard and Harriet Pertchik. Introduction by William C. White. i-xii. 125 pp. 29 coloured plates. Rinehart & Co. Inc., New York. Price $10.00.*

Travellers in the American subtropics and tropics, whether they are botanists or casual tourists, are invariably impressed by the beauty of some of the flowering trees. They exult over the avenues of flamboyants in southern Florida or Cuba and the striking specimens of shower of gold *(Cassia fistula),* the African tulip tree *(Spathodea campanulata)* or the queen of flowers *(Lagerstroemia speciosa).*

Here is a book to bring back memories of tropical visits, to leaf over when winter's snows are piled high outside our windows.

The book consists primarily of 29 coloured reproductions of paintings by Bernard and Harriet Pertchik. The subjects chosen are all cultivated trees of the Caribbean area (chiefly the West Indies, the Guianas, and Venezuela). The task of choosing which species to include must have been difficult; there are other species one would like to have seen so superbly illustrated, for example *Erythrina crista-galli.* But many of the best known trees are included along with some that are usually seen only in botanic gardens or on large estates. The quality of the paintings is outstanding. There is an almost photographic reproduction of detail and yet each plate is most satisfying artistically. The six-colour process used in printing has resulted in very accurate portrayal of colour, notable especially in the flowers of the cannon-ball tree *(Couroupita guianensis)* and in the blue-violet flowers of the fern tree *(Jacaranda filicifolia).*

About two pages of text accompany each plate. This includes a brief account of the folk-lore and legends that have grown up around each tree, a description of the chief characteristics of the tree, and notes on its uses, habitat and distribution. Botanists and plantsmen of the New York Botanical Garden and of some of the Caribbean countries have assisted in providing information for the text and the artwork. The volume concludes with a bibliography and a glossary of the technical terms used.

Flowering trees of the Caribbean is not intended as a botanical text though it contains much useful and accurate information. It is not the sort of book you carry with you for quick identification of unfamiliar trees but it is a volume that will help the reader relive his visual memories of brilliant flowering trees of the tropics.—*HAROLD A. SENN.*

A New Flora of the Lake Erie Islands: *The Flora of the Erie Islands; an Annotated List of the Vascular Plants, by Earl L. Core, Ohio State University, Franz Theodore Stone Laboratory, Contribution no. 9, VIII + 106 pages, 43 illustrations. 1948.*

This is a most welcome and useful addition to the rapidly growing series of local Floras covering in a detailed manner limited areas of Canadian territory. Actually the present publication covers the 21 islands of Lake Erie, 9 of which, including Pelee Island, are Canadian territory. Under each entity recognized are listed the island or islands where it is known to occur. Thus it is possible to extract from this book a list of the known flora of each one of the 21 islands. The list itself is preceeded by 40 pages of text giving a description of each island and a good ecological description of the major associations and more important habitats to be found in the archipelago, with shorter chapters on the history, geology, soils and climate of the area. Some 43 illustrations, mostly photographs, enliven the text and actually render it much more intelligible.

Under most entities also appears a brief statement of the habitat where each species grows. This is a very useful and valuable feature of the Flora. The total number of entities reported is stated as being 818, but their author has not actually seen all of them and quite a number of them are included on the basis of previous mentions in the botanical literature. There are no keys or descriptions.

The area concerned has long been the subject of floristic studies and the botanical literature on those islands is fairly considerable. The last major previous study was an Annotated List of Flowering Plants and Ferns of Point Pelee, Ont., and Neighbouring Districts, by R.C. Dodge, in 1914. The flora prepared by Core adds well over 100 species to the flora of the area, but there still remains quite a lot of exploration to be done before the list is anywhere near completion. As pointed out by Core himself, Pelee Island is larger than all the other islands together, but its known flora is less than that of the much smaller Kelley's Island and over 100 species less than the flora of the still smaller South Bass (or Put in Bay) Island. This is due to the fact that for various reasons some of the islands have been subjected to much more intensive botanical exploration than others.

Core's flora has brought up to date the nomenclature of the flora of the area and this is invaluable as Dodge's list was becoming rather outdated. This book will undoubtedly prove very useful to people interested in the flora of the Lake Erie Islands, some of which represent the southernmost extension (lat. 42° 40') of Canadian territory. — BERNARD BOIVIN.

American Wildlife and Plants. *By Alexander C. Martin, Herbert S. Zim and Arnold L. Nelson. McGraw-Hill Book Company, Inc., New York, 1951, Pp. IX, 1-500. $10.25.*

In the Preface to "American Wildlife and

Plants" it is stated that the book is "planned not only for wildlife technicians, sportsmen, naturalists, bird students, and all others directly interested in wildlife, but also for foresters, landscape gardeners, botanists, and additional groups concerned with the vegetation upon which our country's wildlife depend." The authors have been most successful in achieving their goal. The text is clearly written and at the same time presents a vast amount of data in compact form for ready reference.

The book is a compilation of food habit studies from many sources, in large part from records of the former United States Biological Survey and related programs. In general concept it somewhat resembles Cottam's "Food Habits of North American Diving Ducks" and Martin and Uhler's "Food of Game Ducks in the United States and Canada". It covers, however, a vastly broader field in a more compact and convenient form, although references to plants in Canada are the most pertinent material has been omitted.

The authors have introduced maps, graphs, abbreviations and star and numerical systems of rating to reduce to a minimum the written descriptions required and to make the information quickly available. There are no pages devoted to a long and comprehensive bibliography, but references are given although of necessity in less detail. All but with the topics to which they pertain.

While the data are compiled primarily from observations in the United States and are presented to apply to that part of North America, mention is usually made of those animal ranges which extend into Canada, throughout the text immediately associated few. The book is still of use, however, to many people in Canada, since for ease in presentation of data the United States is divided into 5 major vegetation-wildlife districts. In Canada the southern and populus areas, at least, are easily related to those United States areas immediately adjacent.

The book is divided into three parts. The first gives a brief general discussion of the relations of wildlife to its food, including such topics as the value of plants as food and cover, the problem of the "good, bad, or indifferent" values of wildlife to the farmer, and the methods of food habits studies.

The second part of the book deals with animals and their food. There are brief general discussions of the diets of bird and mammal families which are almost entirely carnivorous, and fish, amphibians and reptiles are treated in a short chapter. The section is principally devoted, however, to detailed data on more than 200 species of birds (divided into waterbirds, marshbirds and shorebirds, upland gamebirds and song birds) and some 75 species of mammals (fur and game mammals, small mammals, and hoofed browsers). Although the amount of information varies, these data usually include a range map, a graph of the proportions of plant to animal food eaten during each of the four seasons of the year, a general listing of the types of animal food eaten, if any, and brief notes on matters of special interest. Frequently there is a sketch of the animal in a typical pose. In most cases the bulk of the treatment is given over to a list of the plant foods taken in each region where the animal occurs and from which data are available. For each region the plants are listed according to their star rating of use. The number of animal specimens examined in each season, the season the plants are taken and the parts used are also indicated.

The third part of the book is, in a sense, a cross indexing of the data of the second section, using the plants as the basis for presentation and listing the animals which use them. The plants are treated most often as genera, sometimes as species. For each plant there are notes of interest, often a range map, frequently a sketch, and a ratio of the total number of use stars to the total number of users, which indicates in a general way the degree of importance that the plant has as an animal food. Finally, there is a list of the actual users with their star ratings and the regions in which the plant is used by them. Some 100 woody plants, 100 upland weeds and herbs, 30 marsh and aquatic plants and 20 cultivated plants are treated in this way. The book concludes with a summary of this part in the form of a series of tables of wildlife plants ranked according to their approximate food-use values.

A wealth of valuable information concisely presented, careful editing and attractive presentation make this a reference book of great interest to both amateur and professional naturalists. — *RUTH H. SOLMAN.*

Arizona and its Bird Life. *By Herbert Brandt. Illustrated by 20 color plates by Brooks, Peterson, Sutton, and Shortt; 25 photographs; numerous pen-and-ink drawings. 1951. The Bird Research Foundation, 2425 North Park Boulevard, Cleveland, Ohio. Pp. 1-725. ($15.00).*

Rarely is a bird book written that appeals alike to novice and expert as well as to people not particularly interested in birds. Herbert Brandt has shown in the past, notably in books on birds in Alaska and Texas, that books with such broad appeal can be written, and he has done it again in his latest volume ARIZONA AND ITS BIRD LIFE. The author is one of the most discerning observers on this continent and so has much to tell, and, being an unusually gifted writer, he knows how to tell it.

In selecting southeastern Arizona as a study area the author chose to work in one of nature's great wonderlands. Fascinating birds in fantastic surroundings are common by the standards of most bird enthusiasts, and rarities include certain species that there overflow into the United States from the rich avifauna of Mexico. It is a land of abrupt altitudinal variation and of correspondingly abrupt ecological changes. One can travel quickly by car on good roads from the heat and cactus of the desert to the cool and conifers of the mountain tops. In travelling between these great extremes, he passes through three additional life zones each with its characteristic plant-animal associations. In that intriguing outdoors laboratory it is scarcely surprising that the author devoted considerable attention to the ecology of the area concerned. In introductory chapters he combines features of the 'life zone' and 'biome' concepts of life distribution. To these he adds his original 'life island' concept which is fully and simply explained and is illustrated by a carefully-devised chart of his own making.

The bulk of the book is devoted to the author's bird adventures in Arizona. In vivid writing, now narrative, now discoursive, he takes the reader in turn through the wonders of desert, grassland, foothills, and mountains, emphasizing numerous intriguing aspects of the birds he encounters, their home life, and their relationship to the habitats they frequent. Little-known and new facts appear on many a page. Various other subjects such as the climate, vegetation, and certain mammals, notably man, are often touched upon. Occasional bits of the colorful history of the country gain vividness as he tells of them. Especially delightful is his account of famous old Fort Lowell. One is impressed by his sustained good literary style and vigorous, infectious enthusiasm.

His investigations in Arizona were very prolific of new information. A new bird subspecies, the Sahuaro Martin *Progne subis oberholseri,* is described in the volume here reviewed and another new race, the Apache Wren *Troglodytes brunneicollis vorhiesi,* although described elsewhere, was also a result of Brandt's Arizona studies. Nests of the Richmond Becard, Spotted Screech Owl, Mexican Chickadee, and Apache Wren were located and are described in detail, apperently for the first time. The appendix comprises (a) an annotated list of 170 birds known to breed in southeastern Arizona; and (b) a supplemental list of possibly breeding birds.

ARIZONA AND ITS BIRD LIFE is a sumptuous example of modern book making. It is well-printed on excellent paper, is handsomely and durably bound, and is superbly illustrated by paintings and drawings of some of the best artists of this continent as well as by numerous photographs of usually outstanding quality and interest. There are twenty full-page bled-to-the-edge color plates, nine of which are some of the last and best work of the late Allan Brooks. Paintings and drawings by Sutton, Peterson, and Shortt represent these outstanding artists at their erstwhile best.

Anyone, whether he knows a little or a lot about birds or is just plain interested in the out-of-doors, will find it a source of great pleasure, profit, and inspiration. The traveller to Arizona will get ineffably more out of his stay there for having read this thoroughly delightful volume and its graphic story of adaptation and survival. — *W. EARL GODFREY.*

How I Draw Birds. A Practical Guide for the Bird-Watcher. *By Roland Green, Macmillan Co. of Canada Ltd. 1951. 96 pp. Price $3.25 Canada.*

Desiring to record the features of some elusive bird, or to effectively describe some

odd posture, every bird-watcher has at one time or another wished that he were able to draw. Here is a book that will aid him in learning a few basic techniques that will make his drawings more useful and artistic. Although it will prove especially helpful to the novice in bird portraiture, every bird student will value it as an aid in expanding his own general information and capabilities. There is no question of the fact that the ability to sketch is invaluable to the naturalist.

Roland Green, one of the most eminent of British bird artists, is to be complimented for taking us "behind the scenes", so to speak, to show us, in clear and readily understood terms, how he paints birds. He has taken the more common species as examples in illustrating his instructions as to how to paint birds. Fortunately, many species depicted are familiar to bird students in this country, such as, — golden eagle, mallard, barn owl, coot, cormorant and many others.

This book differs from, or rather is an improvment on the usual "how to draw" books by the thoroughness with which it covers the salient features of the subject. It begins with pertinent information on anatomy, plumage, beaks and heads, etc. Following this, there are sections devoted to ducks, waders, and song birds, covering in a general way most of the species that one is likely to encounter.

There are no portraits resembling "stuffed birds" in this book. The writer wisely advocates sketching in the field. Brief but sound instruction is given in field practice. The ground work, i.e., the structure of birds, is then followed by elementary lessons on wash and pen drawing, both media being easily obtained and handled by the beginner. Although the many illustrations are largely rapid sketches taken directly from the artist's field note book, the masterful treatment makes them most instructive. A combination of effective art work and accuracy are rare enough and I feel that the artist has distinglished himself in this respect.

In all I feel confident in recommending this book to beginners in bird painting to shorten the arduous path to proficiency and to all bird-watchers who at one time or another are required to record their observations by graphic illustrations. — *JOHN A. CROSBY.*

Stalking Birds with Color Camera. *By Arthur A. Allen. The National Geographic Society, Washington, D.C., 1951, pp. I-VII, 1-328, 424 illustrations. ($7.50 U.S.).*

The 424 cleverly-captioned photographs in this book, 331 in natural color, 93 in monochrome, are nothing short of magnificent. They show intimately 266 species of North American birds. The majority are close-ups illustrating plumage detail and color, soft-parts coloration, posture, and often nests, eggs, and young. The many action photos are truly amazing. With the aid of the recently adapted speed flash apparatus (permitting flashes of 1/5000 of a second) the details of a swiftly-flying bird, even the wing tips are as sharply recorded as if the subject were motionless. One of the many impressive pictures 'stops' a Cooper Hawk, with a plucked bird in its beak, in the last few inches of its plunge to the nest and young. Even the hawk's eye color is faithfully recorded. The 55-a-second wing beats of hummingbirds are 'frozen' and details of the spread wing are registered with remarkable clarity. This collection of bird photographs surpasses in quality and beauty anything of its kind heretofore seen by this reviewer. Two hundred and sixty-four of the pictures are from the camera of the internationally-known author himself.

The text is divided into 13 chapters, of which 12 are written by the author. They are extremely readable popular accounts of many aspects of birds and of the travels, tribulations, and triumphs afield of this master wildlife photographer and ornithologist. One chapter tells the fascinating story of the 1948 discovery in Alaska by a party under Dr. Allen's leadership, of the nest of the Bristle-thighed Curlew. This was the last North American bird species to relinquish to man the secret of the locality of its breeding grounds.

Most of the photographs and articles brought together here were originally published in the *National Geographic Magazine.* Obviously it would have been impossible otherwise to produce this outstanding book at anything like the price asked for it. — *W. EARL GODFREY.*

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THE NATURAL HISTORY

OF THE

DOUBLE-CRESTED CORMORANT

(Phalacrocorax auritus auritus (Lesson)).

by

HARRISON F. LEWIS

The Ottawa Field-Naturalists' Club has a limited number of copies of this very useful paper. These are available free of cost to interested libraries and institutions.

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The Canadian Field-Naturalist

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ORDOVICIAN FOSSILS FROM WASWANIPI LAKE, QUEBEC [1,2]

T. H. Clark and D. A. W. Blake

DURING THE SUMMER of 1949 the junior author, while mapping the areal geology of Waswanipi Lake Area (east half) for the Department of Mines of Quebec (1, p. 5), collected fossils from three exposures of horizontally bedded limestone on the shores of the lake and from boulders distributed across the intervening terrain. Though boulders of Ordovician limestone have been reported from this area, the first outcrop was not found until 1948. The distribution of boulders suggests that limestone is fairly widespread in this district, possibly underlying an area about the south-central part of the lake some 40 square miles in extent.

The collection consists of seven lots of medium grey crystalline limestone, which weathers light grey and contains patches of buff dolomite. Some argillaceous material occurs scattered along bedding planes, allowing the rock to break easily, and exposes these as thin dark shaly films. Otherwise bedding is rarely apparent. There is no reason to suppose that the exposures and boulders from which the collection was taken represent more than one formation.

Identifiable species of fossils are none too plentiful in the collection. Nevertheless, the following list provides enough information for a sure correlation of the limestone.

Receptaculites oweni Hall
Halysites gracilis Hall
Streptelasma corniculum Hall
or *S. rusticum* Billings
Plasmopora lambi Schuchert
Pleurocystis sp.
Heterocrinus? sp.
Rafinesquina alternata (Emmons)
R. sp., cf. *R. trentonensis* (Conrad)
Strophomena incurvata (Shepard)
Platystrophia sp.,
cf. *P. extense* McEwan
Dalmanella sp.
Hormotoma major (Hall)
Liospira angustata Ulrich & Schofield
Lophospira augustina (Billings)
Maclurites crassus (Ulrich & Schofield)
Maclurina manitobensis (Whiteaves)
M. cuneata (Whitfield)
Triptoceras sp.
Actinoceras sp.
Lambeoceras sp.

Though at first sight this fauna seems to be of Trenton age, very few of its species occur in the Trenton beds of the Ottawa—St. Lawrence lowland area. Instead, one finds in the Liskeard formation of Lake Timiskaming (200 miles southwest of Lake Waswanipi, see map) a fauna almost completely embracing that of the present report. Hume (5, p. 24) gave a list of 37 species for the upper Liskeard limestone, and with few exceptions the Waswanipi species occur in this list. Unless further collecting should show sedimentary types differing lithologically from the beds described by Hume, or other important relevant information, it seems best to refer the Waswanipi beds to the upper limestone horizon of the Liskeard formation.

Hume determined the Liskeard limestone to be of Trenton age largely because of the similarity of its fauna with that of the Galena limestone of Minnesota. Since Hume's work doubt has been expressed as to the Trenton age of the Galena limestone beds (9, p. 18; 4, p. 146) and, although it now appears (7, p. 82) that the Galena is to be correlated with the Trenton, parts of its fauna recur in the Arctic Richmond.

Nelson (6, p. 130), as part of a thorough discussion of the correlation of the Richmondian rocks of Central Canada, concludes that "The Waswanipi fauna appears to be very close to that of the Red River formation of the Lake Winnipeg area . . . " The Nelson River and Shamattawa limestones of Hudson Bay, (600 miles northwest of Lake Waswanipi), the Red River and Stony Mountain limestones of Manitoba (750 miles west of Waswanipi lake), and the Liskeard limestone of Lake Timiskaming are now all dated

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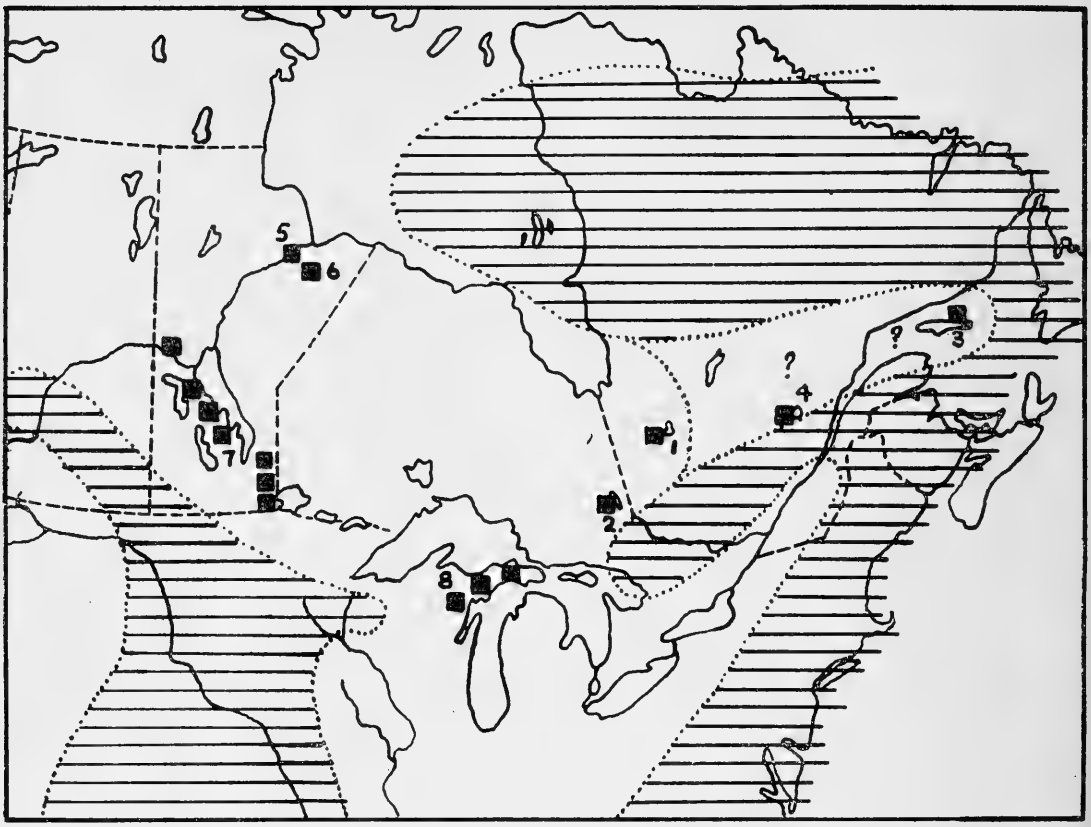

Paleogeographic map of part of North America during Richmond time showing the locations of the exposures mentioned in the text, and the suggested distribution of land (ruled) and sea (plain). 1. Waswanipi Lake. 2. Lake Timiskaming. 3. Anticosti Island. 4. Lake St. John. 5. Nelson River. 6. Shamattawa River. 7. Lake Winnipeg. 8 Galena limestone.

as Richmond (2, p. 186; 6). This means that the Waswanipi Lake exposures carry the area of outcrop of this western (Arctic) type of Richmond 150 miles further east than has hitherto been recognized, and as a consequence a correction in the standard paleogeographic maps of North America for Richmondian time should be made. It is customary (e.g. 3, p. 154) to show a land area from James Bay extending southwestwards across the International Border. The assumption of such a land barrier is rendered untenable by the reasonable lithologic and faunal correlation of the Richmond limestone from Lake Winnipeg, Nelson River, Lake Timiskaming and Waswanipi Lake. Few faunal and fewer lithological characteristics of the Richmondian beds of southern Quebec and of the Lake St. John outlier recommend them as correlatives of the Liskeard Richmond beds of Waswanipi Lake or of Lake Timiskaming. However, further research may still extend the Liskeard sea eastward possibly as far as Anticosti, a prediction made by Twenhofel (8, p. 67) as a result of his finding so great a faunal, though not lithologic, similarity between the Vaureal formation of Anticosti and the Stony Mountain beds of the Lake Winnipeg area. Such an extension would indicate a land barrier between the Liskeard sea and the St. Lawrence-Cincinnati sea. These paleogeographic speculations are indicated on the accompanying map. The Lake St. John outlier is shown to be north of this barrier, though it may have lain to the south of it because its fauna is more closely related to that of the St. Lawrence lowland than to either the Arctic or the Anticosti faunas. The Gaspé embayment is not shown.

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ON THE CYCLIC ABUNDANCE OF ANIMAL POPULATIONS [1]

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A CRITICAL EXAMINATION of cyclic abundance in animal populations reveals the fact that all such are not basically similar. In the cases of such animals as the varying hare, *Lepus americanus;* the field mouse, *Microtus montanus canescens;* the ruffed grouse, *Bonasa umbellus umbelloides,* and many others, the populations over periods of years vary regularly from relatively few to very large numbers of individuals. Each peak of abundance is followed by an interval in which there is a rather sudden decrease in numbers and this in turn by a lengthy period of increase, slow at first but accelerating with the years. Each growth period of the population should be capable of being illustrated by a sigmoid curve which is characteristic of population growths in general (Pearl and Reed, 1920). Each decline of the population should be represented by a line of steep slope. The period of years from peak to peak or from depression to depression is remarkably constant and constitutes the cycle. For the varying hare the period is approximately 9.7 years; for the mouse 4 years; for the ruffed grouse 10 years.

With these animals there may be one or more litters or broods per year and the individuals may live several years with the result that there is a mixed population through the interbreeding among the individuals of the various litters and broods. The whole population follows a cycle of growth and decline as outlined.

On the other hand consideration of the cycles in abundance of certain fishes, insects and other animals shows that it is not mixed populations that are involved but pure year-classes. One of the best examples is that of the pink salmon, *Oncorhynchus gorbuscha.* This species of Pacific salmon has a two-year life-history, that is, the individuals mature invariably at two years of age, spawn and die. In view of this invariability of maturing and dying there can be no mixed population. In some regions of British Columbia no pink salmon appear in the alternate years. In other regions pink salmon do appear in the even as well as in the odd numbered years, but the two populations must be as distinct as though they spawned in widely separated streams.

The data available on the pink salmon run to McClinton creek, Queen Charlotte islands, as published by Pritchard (1948) may be used to illustrate the year-class cycle.

As stated previously the pink salmon spawns without exception at two years of age and all individuals die. The next generation is represented first by a relatively large number of eggs deposited in the gravel of the streams, six months later by fry proceeding to sea reduced to approximately 14 per cent of the number of eggs and 18 months later by adult fish reduced by natural and fishing mortalities to approximately one per cent of the fry which went to sea. Figure 1 illustrates these features. It will be seen

[1] Received for publication December 29, 1951.

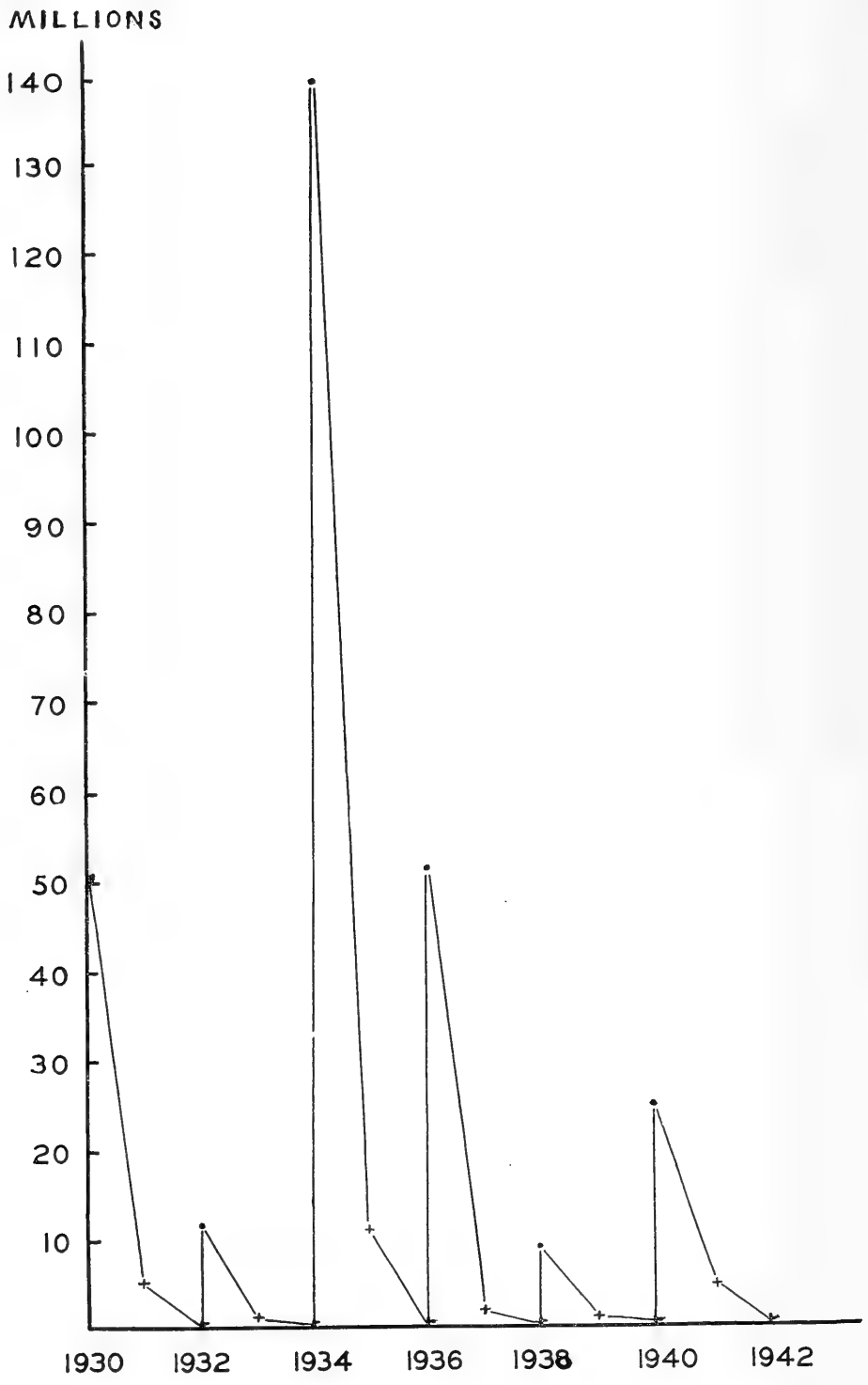

Fig. 1. Year-class fluctuations in abundance of pink salmon, *Oncorhynchus Gorbuscha*, in McClinton Creek, British Columbia.

• = number of eggs; + = number of fry; •• = number of adults.

that there is no regularity in the abundance of the fish comprising the year-classes either as eggs, fry or adults. While there could be a long-term cycle superimposed on these year-class cycles, it is doubtful if such actually occurs in view of the extreme variations in climatic conditions from year to year.

Coho salmon *(O. kisutch)* which, with very few exceptions, reach sexual maturity at three years of age, spawn and die, illustrate the year-class cycle.

Sockeye salmon *(O. nerka),* which mature predominately at four years of age also demonstrate this feature. For example, the large run of sockeye every fourth year to the Fraser river in the early days was due to the fact that the fish which proceeded to the upper Fraser river areas matured almost exclusively at four years of age. For some reason the cycle 1897-1901-1905-1909-1913 was particularly successful and attracted attention. The other three year-class cycles, that is, 1898-1902-1906-1910, etc; 1899-1903-1907-1911, etc; 1900-1904-1908-1912, etc. were smaller in numbers of individuals. Since the Hell's Gate disaster of 1913, the first mentioned population has been greatly reduced in numbers and the second mentioned, the 1898-1950 cycle, has been represented by the largest numbers (Clemens, 1938). But each cycle is essentially independent of the others and each shows irregular fluctuations with no evidence of a superimposed long-term cycle of abundance.

In some regions of British Columbia sockeye individuals resulting from a given spawning may mature at three, four and five years of age (Clemens, 1935). Here, there is undoubtedly a mixture of year-classes and clear-cut year-class cycles do not exist. At the same time, it has not been possible to demonstrate mixed population cycles for these.

Other species of animals show year-class cycles. Among the insects, the seventeen-year cicada, *Cicada septemdecem,* in Canada is an excellent example. The fairy shrimp, *Eubranchipus,* with a one-year cycle, is a further illustration.

In view of the fact that a great deal of study is being given to animal populations, it has seemed pertinent to call attention to the phenomenon of the year-class cycle and to point out how it differs from that of the mixed population cycle of abundance.

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THE GREENLAND COD *(GADUS OGAC)* IN CAPE BRETON ISLAND, NOVA SCOTIA [1]

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IN 1948 and 1949 I was studying the incidence of *Porrocaecum decipiens* (Krabbe), an ascarid parasitic in the flesh of the Atlantic cod *(Gadus callarias* L.), in the Bras d'Or Lake, Cape Breton Island. On May 28, 1948, four Greenland cod, *Gadus ogac* Richardson, were caught on line trawl set in 50 to 100 fathoms of water at Lat. 46° 02'N., Long. 60° 44'W. On June 24, 1949, five Greenland cod were caught in the same locality. The following water temperatures were recorded: in 1948 at 50 fathoms, 0.5° C; in 1949 at 50 fathoms, 0.4° C and at the bottom, approximately 100 fathoms, 0.2° C. Similar temperatures were observed at the end of

[1] Received for publication December 17, 1951.

August in 1950. The species is not included in Vladykov and McKenzie's (1935) account of the marine fishes of Nova Scotia and these records are apparently the first from Nova Scotian waters. The known range of *G. ogac* is thus extended southwards.

The nine fish were adult females ranging in fork length from 46 to 72 cm. They were infested, although less heavily than *G. callarias,* with the same species of ascarid. The identification of the Greenland cod is simple when one is familiar with the Atlantic cod. The most important specific characters have been stated by Vladykov (1933, 1945). A striking internal feature not mentioned by him is the jet-black peritoneum and the bluish-black coloration of the ovaries. Two specimens were preserved, one in the museum of the Atlantic Biological Station, St. Andrew's, New Brunswick, and the other in the Royal Ontario Museum of Zoology, Toronto, Ontario.

This species apparently occurs in greatest abundance in eastern Canadian Arctic waters, particularly in the Hudson Bay region (Vladykov, 1933), and in the area off the West Greenland coast (Jensen, 1948). In these regions its distribution seems to be associated with cold Arctic water and within recent years it has withdrawn northwards following the intrusion of warmer Atlantic water into Davis Strait (Jensen, 1939; Hansen, 1949). This change in distribution suggests that even the cold North Atlantic temperatures do not provide a suitable environment for *G. ogac.* Nevertheless Vladykov (1945) has reported its presence in some numbers along the north shore of the Gulf of St. Lawrence; this is probably due to the influence of the cold Labrador current in this region.

The irregular bottom of the Bras d'Or Lake presumably provides adequate thermal conditions for *G. ogac.* Although the lake is relatively shallow throughout most of its area, there are isolated deep gullies where the bottom temperatures remain close to O° C throughout the summer. The Greenland cod has not been taken in shallow water in the summer probably because of the high temperatures prevailing in the shallow water. The deep holes therefore provide a summer refuge from unsuitable temperatures. In the winter when the shallow water has become cold the Greenland cod is sometimes taken in four or five fathoms. This species is thought by local fishermen to be large individuals of the tomcod, *Microgadus tomcod* (Walbaum), to which it bears a superficial resemblance.

The occurrence of this species in the same restricted locality in two successive years and its wider distribution during the winter hint that the Greenland cod is not merely a straggler from northern waters but is rather a small permanent part of the fauna of the Bras d'Or Lake.

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THE AMPHIBIANS AND REPTILES OF NOVA SCOTIA[1]

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DURING THE SUMMER of 1950, a survey of amphibians and reptiles was conducted in the Province of Nova Scotia. In addition, collections were made during the winter and spring at Wolfville, Kings County, and from April 9 to 14, 1951, in Queens and Annapolis Counties. This is believed to be the first provincial survey of its kind to be made in Canada. A detailed study of this survey was printed in a 126 page thesis entitled "The Distribution and Taxonomic Relationships of the Amphibians and Reptiles of Nova Scotia", presented to Acadia University in May, 1951, in partial fulfillment of the requirements for the degree Master of Science.

It is believed that the information presented in the following annotated check list will be found of interest and of value. Comparison with the works of other authors has shown some of the data to be new.

Triturus viridescens viridescens Rafinesque — spotted newt.

Not reported as occurring in Nova Scotia by R. C. Mills in his "Check List of Amphibians and Reptiles of Canada" (1948).

Distribution: Common throughout the province.

Data: The mean length of 30 males in millimeters is 92.5 ± 1.62, with extremes of 76.2 and 114.3 mm. The mean length of 49 females in millimeters is 86.3 ± 1.61, with extremes of 69.8 and 123.8 mm.

Comparison of the average lengths of males and females collected in Nova Scotia with those collected by Bishop (1941) in New York State revealed the Nova Scotia specimens to be larger; the females by 7.95 mm. and the males by 10.82 mm.

Ambystoma jeffersonianum (Green) — Jefferson's salamander.

Not reported from Nova Scotia by Mills.

Distribution: To date, this species has been found only at four places on the mainland, but the four stations represent a wide distribution, from Antigonish County in the north through Colchester and Hants Counties in the centre of the province to Queens County in the south. There are no records from Cape Breton.

Data: The larvae winter over. Larvae 58.7 to 73.0 mm. long were collected in July 1951. One specimen transformed in 12 days, and four others in six days when kept at room temperature.

Ambystoma maculatum (Shaw) — spotted salamander.

Distribution: Common throughout the province.

Data: The larvae winter over and are active beneath the winter ice. They were collected from November 11, 1950, (length 52 to 53 mm.) through to July, 1951, (54 to 61.9 mm.). The winter larvae transformed within 14 to 29 days when kept at room temperature. Those taken in July transformed in six days.

The first eggs are laid in late April.

Plethodon cinereus (Green) — red-backed salamander.

Distribution: Common throughout the province.

Data: The costal groove count for Nova Scotian red-backs is usually 17 with extremes of 15 to 18. Bishop (1941) reports 18 costal grooves with extremes of 17 to 20.

The first eggs are laid in July.

From 141 specimens a ratio of 6.05 red-backs to 1 lead-back phase was obtained for the province.

Hemidactylium scutatum (Schlegel) — four-toed salamander.

Not reported from Nova Scotia by Mills.

Distribution: One adult male collected in Queens County. This is the first Canadian record of this species outside of Ontario.

Bufo terrestris americanus (Holbrook) — common toad.

Distribution: Confined to the Annapolis Valley.

Data: The first eggs are laid in late May. The tadpoles transform from mid-July to late August.

Bufo terrestris copei (Yarrow and Henshaw) — Cope's toad.

Not reported from Nova Scotia by Mills.

Distribution: Common throughout the province, except in the Annapolis Valley.

Data: The presence of these two subspecies in Nova Scotia was determined in the following manner. Upon examination of all the Nova Scotia toad specimens it was noticed

1 Received for publication January 29, 1952. The author's address is now National Museum of Canada, Ottawa.

that on some the dark spots on the ventrum were confined to the pectoral region. The others possessed large spots and/or black reticulations all over the ventrum. The specimens were thus separated into these two obvious groups and then their distribution reviewed. None of the toads with ventral spots in the pectoral region only were from outside the Annapolis Valley. This discovery was investigated further by a comparative study of the length and width of the parotoid glands, and the body length/foot length ratio. Both categories proved to be significantly different in the two groups. The mean for the figure obtained by dividing length of the parotoid gland by its width is 1.84 ± 0.0319 for *B. t. americanus* and 1.95 ± 0.0434 for *B. t. copei* The degree of probability is 0.05. The means for the body/foot ratios of *B. t. americanus* and *B. t. copei* are 2.25 ± 0.043 and 2.485 ± 0.0473 respectively, with a degree of probability of less than 0.01. Having thus established the existence of two distinct groups of toads in Nova Scotia it was apparent that they should correspond to the two subspecies known to occur in eastern Canada. The Annapolis Valley group has been assigned to *Bufo terrestris americanus*. The measurements of this subspecies by Blair (1941) and the descriptions by Wright and Wright (1949) agree with the Annapolis Valley specimens.

Since the second group has been shown to differ both in extent of pigmentation and in measurements, then it must be assigned to *Bufo terrestris copei*. The specimens agree with this subspecies in having black spots and/or black reticulations over the ventrum, relatively shorter feet, and long, narrow parotoid glands. However, no specimen has the brilliant orange and red coloration observed in the inguinal region of so many of the toads found north of 50°N.

Climatically the Annapolis Valley differs markedly from the rest of Nova Scotia, and this is reflected in its flora, fauna, and its agricultural practices. The writer believes that these toads are an additional illustration of the effect on the fauna of the varied environmental conditions found in this province.

Hyla crucifer crucifer Wied — spring peeper.

Not reported from Nova Scotia by Mills.

Distribution: Common throughout the province, but are rarely observed except during their spring breeding season.

Data: The breeding choruses of this species were heard from late April until early July.

The mean length of 27 males is 27.8 mm. with extremes of 25.4 to 31.8 mm. Other authors (Wright and Wright, 1949) quote 18 to 29 mm. as extremes for males.

Transforming tadpoles were collected from mid July to late September. In the eastern United States transformation dates are July 1 to August 1, according to Wright and Wright, 1949.

Rana catesbeiana Shaw — bullfrog.

Distribution: In the south central region of the province it is the dominant species, but north of there it is found only in certain isolated inland ponds and valleys.

Data: The tadpoles overwinter for two winters transforming in July of the third summer.

Rana clamitans Latreille — green frog.

Distribution: This is Nova Scotia's most common and abundant Rana.

Data: The tadpoles overwinter and transform during late July and August of the second summer.

Rana palustris LeConte — pickerel frog.

Note reported from Nova Scotia by Mills.

Distribution: Found throughout the province.

Data: The tadpoles overwinter and transform during July and August of the second summer.

The labial teeth formula for tadpoles is 1/3, with a few 2/3.

The average number of dorsal spots (from snout to anus and between the dermal plicae) is 11.95 with extremes of 6 to 18.

Rana pipiens Schreber — grass or leopard frog.

Not reported from Nova Scotia by Mills.

Distribution: Common throughout the province.

Data: The tadpoles transform late in August.

The labial teeth formula is 2/3 and 1/3. Wright and Wright have reported the formula as 2/3 and 3/3.

The average number of dorsal spots is 14.36 with extremes of 8 to 27. Reports from Vermont and Oklahoma (Moore, 1943) give averages of 5.2 and 9.7 spots respectively.

Rana septentrionalis Baird — mink frog.

Not reported from Nova Scotia by Mills.

Distribution: One 2¾ inch female collected in Hants County.

Rana sylvatica sylvatica LeConte — wood frog.

Distribution: Common throughout the province, but are rarely in evidence except during their spring breeding season.

Data: The first eggs are laid in late April, and the tadpoles transform during August.

The ventrum of every specimen has small dark spots in the pectoral region, and on many there are large spots on the sides below the costal folds. This is characteristic of *Rana sylvatica cantabrigensis.*

Diadophis punctatus edwardsii (Merrem) — ring-necked snake.

Distribution: Common in the southern portions of the province but only collected as far north as Halifax.

Data: The ventral scale number for females varied from 156 to 166, and the subcaudal count from 53 to 57.

Opheodrys vernalis vernalis (Harlan) — smooth green snake.

Distribution: Found throughout the province, but less common in the north and on Cape Breton Island.

Data: The ventral scale count for males varied from 116 to 125, and the subcaudal count from 76 to 79. One female specimen has 136 ventrals and 72 subcaudals. Schmidt and Davis (1941) give the ventral scale count as not exceeding 131 in the males and 140 in the females.

Storeria occipitomaculata (Storer) — red-bellied snake.

Distribution: This species was found throughout the province but is less common in Cape Breton Island.

Data: The ventral scale count for males varies from 118 to 123 and the subcaudal from 51 to 52. The females have 123 to 132 ventrals and 40 to 51 subcaudals.

Thamnophis sauritus sauritus (Linnaeus) — ribbon snake.

Not reported from Nova Scotia by Mills.

Distribution: The only known locality where the ribbon snake can be found in Nova Scotia is in the immediate environs of Caledonia, Queens County. This is the first record of this species in Canada outside of Ontario.

Data: The ventral scale count for three females and one male varies from 151 to 157. Only one specimen, a female, has an entire tail and its subcaudal count is 104. Schmidt and Davis (1941) report that the ventral scale count varies from 150 to 172.

Thamnophis sirtalis sirtalis (Linnaeus) — common garter snake.

Distribution: This species is Nova Scotia's most common and abundant snake.

Data: The extremes in ventral scale counts for females are 137 to 149, and for subcaudals 51 to 64. The males varied from 144 to 154 in their ventral scale counts, and from 59 to 70 in their subcaudal counts. Extremes in ventral scale count according to Schmidt and Davis are 137 to 167, and for subcaudals 54 to 84.

Chelydra serpentina serpentina (Linnaeus) — snapping turtle.

Distribution: This species and the garter snakes are the dominant reptilian species in the south central part of the province. The snapping turtle is occasionally found in the Annapolis Valley and rarely in the northern parts of the mainland. It is not known to occur on Cape Breton Island.

Clemmys insculpta (LeConte) — wood turtle.

Distribution: The wood turtle has been collected only in Kings, Hants, Cumberland, and Halifax Counties. Its true distribution and abundance are unknown.

Data: A female taken on April 19 had 10 shelled eggs of three-quarter inch diameter and an additional 10 large yolks of one-half inch diameter.

Chrysemys picta picta (Schneider) — eastern painted turtle.

Distribution: This species is abundant in both the centre of the southern region of the province and in the Annapolis Valley. North of these areas it is confined to the Gay River and Musquodobit Valley in Halifax County, and to the valley of the West River Saint Mary's in Guysborough County.

Data: A female taken on May 27 had eight shelled eggs in her oviducts, each one and one-quarter inches long. In addition, 10 yolks of three-quarter inch diameter were in the ovaries.

Discussion

The greatest number of species and of individuals of those species occur in the south central region of Nova Scotia. There the bullfrog, garter snake, snapping and painted turtles abound. The Annapolis Valley places second as a population centre, with its great numbers of green and leopard frogs, spring peepers and painted turtles. Only an occasional snapper is found there and garter snakes are not too common. Over the rest of the province a few isolated pockets of thriving populations were found but only in such

places as small weather-protected ponds rich in aquatic plants, and in some of the warmer inland valleys (i.e. West River Saint Mary's in Guysborough County; Guy River in Halifax County; and the valley of the Black River in Cumberland County).

The author believes that the present distribution of the amphibians and reptiles of Nova Scotia is the result of the cooling temperatures which followed the warm sub-Boreal period of 5,000 to 3,000 years ago (Clements and Chaney, 1936). During the warm period the amphibians and reptiles probably became well established over the Maritime Provinces. With gradually cooling temperatures, they were forced down through New Brunswick to the eastern United States, and down along the peninsula of Nova Scotia into its broad southern portion. Thus the Nova Scotia population became isolated and has managed to survive only in the more favourable habitats of inland valleys and small ponds. The maritime climate of Nova Scotia is less severe than the more continental climate of New Brunswick and northern Maine. The exceedingly poor herpetofauna of New Brunswick is evidence of this. The fact that the nearest region to Nova Scotia where the four-toed salamander and the ribbon snake have been found is southern Maine further suggests that these species in Nova Scotia are relics of a formerly more extensive maritime herpetofauna.

Through the years of gradual cooling, the amphibians and reptiles that were isolated in southern Nova Scotia eventually became subjected to cooler temperatures than the same species on the mainland which were able to migrate southwards with the retreating isotherms. The effect of this is evident in the increased dark pigmentation in the frogs and toads as compared with their United States relatives; fewer costal grooves in *Plethodon cinereus;* fewer ventral scales on the snakes; overwintering of the larvae of *Ambystoma maculatum, Ambystoma jeffersonianum,* and *Rana palustris;* and a shorter cooler summer season affecting all species through slowing their developmental rates.

The spotted newt and spring peeper, however, are larger than eastern United States specimens. This same phenomenon has been observed for the northern range of *Eurycea bislineata bislineata* where in Quebec the larger form has been named *E. b. major.* The author can offer no explanation for this northward gradient (if it proves to be such) of increase in size.

Mills reports the black snake *(Coluber c. constrictor)* and the blue-tail skink *(Scincus fasciatus)* from Nova Scotia. There are two old reliable records (Piers) and several eye witness accounts of the black snake but no specimens were seen by the author. No skink records were found and on checking the record quoted by Mills (Cope, 1888, skink from St. Catharines, Nova Scotia) neither the reference nor the town could be located.

The author is indebted to Mr. D. K. Crowdis, Director of The Nova Scotia Museum of Science, Halifax, for making this survey possible. All the information and specimens collected during the survey are now in that museum.

Summary

1. Twenty-one species and one subspecies of amphibians and reptiles are reported from Nova Scotia, nine of which were not listed by R. C. Mills in 1948.
2. There is evidence of geographic gradients, placing Nova Scotia in an intermediate position between Quebec and eastern United States.
3. Overwintering of larvae was observed in *Ambystoma maculatum, A. jeffersonianum,* and *Rana palustris.*
4. The Nova Scotian herpetofauna is peculiar in having both northern affinities and relic populations of southern species.

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THE BLACK TERN AS AN INSECT-EATER [1, 2]

R. W. SHEPPARD
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A REGULAR SPRING and late summer migrant through the area, the Black Tern, *Chlidonias nigra surinamensis,* becomes exceedingly abundant on the upper reaches of the Niagara River every year for a period of about six weeks from the latter part of July until sometime in September; the exact length of its stay varying somewhat from year to year. On the spring passage, it is much less common on the River, but occurs sparingly with a fair degree of regularity, from the latter part of April to the middle of May, or beyond.

For a number of years, the feeding habits of this migrant tern which may occur literally in thousands during August on the upper reaches of the River near Fort Erie, have been watched with much interest; an interest which has been given added impetus by recent inquiries into the Caddis-fly nuisance at Fort Erie for it is a significant fact that the peak of Black Tern incidence on the River coincides very closely with the peak emergence periods for the several species of Caddis-fly adults upon which they so obviously feed in their constant flutterings, and passage to and fro, just above the surface of the water.

Although it has not been found practicable to prove this Caddis-fly feeding on the part of the Black Tern by collecting and subsequent examination of stomach contents, it can be affirmed with a fair degree of certainty that the Black Tern when on the Niagara is practically one hundred percent insectivorous for in all my years of experience in watching this species of tern on the River, it has never been seen to take anything but flying insects. In some years, on occasion, when shoals of minnows or other fish fry are running in myriads for all to see, and the Common Terns are frantic with excitement and eagerly diving, or snatching the small fish from just below the surface, the Black Terns, frequently in greater numbers than their white relatives, and seemingly with complete indifference to the feast of the noisy, excitable Common Terns, go calmly on with their insect hawking, even in the immediate vicinity of the abundant fish.

On other occasions, usually under high pressure conditions in clear fine weather, the Black Terns will apparently follow the flights of Caddis-flies some hundreds of yards inland for at such times they may be seen hawking high over the town of Fort Erie, or away over the fields adjacent to the River as far down stream as a point near the confluence of Black Creek, or almost exactly half way between Fort Erie and Niagara Falls. Again at other times, under similar weather conditions, they have been observed to join flocks of Ring-billed Gulls, and Bonaparte Gulls as they wheel high overhead snapping up the soaring ants from the winged broods of *Lasius niger, L. americanus,* or other species of *Formicidae* which in some years occur in such abundance on the land adjacent to the upper Niagara. Caddis-flies (Trichoptera), probably chiefly the species *Hydropsyche bifida,* or other Hydropsychids and Chaumatopsychids (Munro, E. G. Can. Ento. LXXXIII No. 3, March, 1951, p. 69), are also apparently taken by both gulls and terns at such times for swarms of both ants and Caddis-flies (Sheppard, R. W., Wilson Bull. Vol. 57, No. 3, Sept. 1945, p. 204) have been present, and flying high, on occasions of that nature.

[1] Received for publication November 16, 1951.
[2] Contribution No. 94, Division of Plant Protection, Science Service, Department of Agriculture, Ottawa.

A REGISTER OF LICHENOLOGICAL WORKERS AND CONTRIBUTORS[1]

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THE PURPOSE of this Register is to bring together the names and addresses of professional workers in lichenology, as well as those who have actively supported lichenological research by contributing valuable collections. The former are known by their many publications. The latter rarely publish but are frequently cited as collectors, although many have more than a passive knowledge of lichens, as their acumen in the selection of specimens amply proves. The list also includes physiologists, chemists, ecologists, economic botanists, and bibliographers; all have made contributions to lichenology. An effective address has been provided whenever possible, to which has been added a brief summary of the individual's interests or published research.

The list is far from complete and probably contains errors, since verification of addresses has been difficult. Under present conditions, further delay would aggravate the problem; therefore, the Register is published in its current status. It is offered in the spirit of co-operation and better understanding—to my colleagues in lichen research and the allied fields of botany, but especially to beginners and amateurs who, not having the necessary information and publications, do not always know where to turn for advice and encouragement in the study of lichens. In the matter of determinations, it would be desirable to write to your correspondent before forwarding any plant material so that he may have an opportunity to indicate his preference. In the event that the address given is erroneous, this would provide a safeguard against loss of specimens.

The Register is a compilation of 314 names and addresses from 39 countries. Lichen research has long been a speciality in Northern Europe, so it is not surprising that the majority of workers are Europeans. The Scandinavians excel in numbers of professionals, capable amateurs, and publications. From about 1865[2] to the beginning of World War II, Germany and Austria were equally prominent. The war destroyed their valuable libraries, herbaria, and the leisure that afforded study; yet these countries still enjoy the capabilities of a few interested workers. With more opportunities but less tradition, the United States has produced relatively few lichenologists and for many years depended upon Europeans for determination of even the most ubiquitous species.

Lichenology has long been dominated by systematic research. This trend has been closely paralleled by ecological and particularly habitat studies. Phanerogamic botanists, especially Europeans, normally include lichens in ecological analysis. The advent of chemical and antibiotic research in lichens has received considerable support from the studies of higher plant substances. It is interesting to note that the workers in these latter fields are generally those in the Irish Free State, India, the United States, Switzerland or Spain.

Appended to the Register is a list of lichenologists who have died since 1936; lichenology lost many valuable workers during World War II.

Since beginning work on this Register in 1947, the author has had the pleasure of assistance and advice from many colleagues. Mr. Lars Fagerström, Mr. Maurice Choisy, Mr. Skytte-Christiansen, Dr. Bouly de Lesdain, and Dr. Gunner Degelius have supplied addresses. Dr. I. M. Lamb, Dr. J. W. Thomson, Dr. Vitus Grummann, and Dr. Carroll W. Dodge have been kind enough to read the manuscript. All errors, however, are the responsibility of the author; corrections or additions should be addressed to him.

Ackerley, Miss M. E.: ENGLAND — Long Preston Vicarage via Skipton, Yorkshire. Lichens of Yorkshire.

Agsteribbe, E.: NETHERLANDS — Galileiplantsoen 5 hs., Amsterdam—Lichens of Netherlands.

Aguilar, Pedro G. F.: PERU — Departamento de Botânica, Facultad de Ciências, Universidad San Marcos, Lima — Contributor, lichens of Peru.

Ahlner, Dr. Sten: SWEDEN—Naturhistoriska Riksmuseet, Botaniska Avdelningen, Stockholm 50—Lichen floras of various Swedish Provinces, i.e., western Jämtland, Värmland, Västergötland, Småland, Ångerman-

1 Received for publication January 4, 1952.
2 See—F. Mattick, Die Lichenologie in Deutschland seit 1870 und ihre Zukunftsaufgaben. **Sydowia** 5 (1-2): 154-156. 1951.

land, and northern Finland, central and western Norway; taxonomy of *Alectoria,* ecology of coniferous forest lichens, geographical distribution of boreal lichens, monograph of Scandinavian Caliciaceae.

Aidinyan, R. Kh.: USSR—(Address unknown) —Material exchange and formation of mineral colloids in the first stages of soil formation on massive crystalline substances. (In Doklady Akad. Nauk S.S.S.R. 67: 729-731. 1949).

Albertson, Dr. Nils: SWEDEN—Universitets Växtbiologiska Institution, Uppsala—Ecology, Swedish calcareous lichens of Öoland, Upland, etc.

Algar, Joseph: IRISH FREE STATE—Chemical Department, University College, Upper Merrion Street, Dublin—Chemistry of Irish lichens.

Allan, Dr. H. H.: NEW ZEALAND—Dept. of Scientific and Industrial Research, Plant Research Bureau, Botany Division, 8 The Terrace, Wellington—Epiphyllous lichens of New Zealand; collections for Zahlbruckner's "Lichenes Novae Zelandiae." (1941)

Allard, Dr. A. A.: UNITED STATES—3000, 7th Street, North Arlington, Virginia — Cladoniae of Virginia; numerous collections from the Appalachian Mountains, and South America.

Almborn, Dr. Ove: SWEDEN — Universitets Botaniska Museum, Lund — Distribution and ecology of south Scandinavian lichens, bark microlichens, i.e., *Pertusaria, Phlyctis, Graphis,* etc.

Asahina, Dr. Yasuhiko: JAPAN—Pharmaceutical Institute, University of Tokyo, Tokyo —Authority on chemical analysis of lichens, lichen acids and crystals, microchemical methods; monographer Japanese *Cladonia,* contributor to lichens of Japan, Eastern Asia, India.

Barkman, J. J.: NETHERLANDS—Kamerlingh Onneslaan 21, Leiden—Bryologist, phytosociology of lichens.

Barry, Dr. Vincent C.: IRISH FREE STATE—Medical Research Council of Ireland, Trinity College, Dublin—Physiological activity of lichen substances, anti-tubercular.

Bauchiero, Dr. Horacio: ARGENTINA—Museo Argentino de Ciencias Naturales, Angel Gallardo 470, Buenos Aires—Chemistry of lichens.

Bedford, C. M.: ENGLAND—Taunton School, Taunton, Somerset—Collector of Cornish lichens.

Behr, Otto: GERMANY — Gewerbeoberlehrer, Michelstadt im Odenwald, Heinrich — Artzstr.—German lichens.

Bergstrom, Sixten: SWEDEN — Handlands, Arket, Bäckefors.—Swedish lichens.

Berner, L.: FRANCE—59, rue de la République, Marseille.—Notes on *Lobaria pulmonaria.*

Berry, Dr. Edward Cain: UNITED STATES—Department of Bacteriology, South Dakota State College, Brooking, South Dakota — Monographer, *Parmelia* of North America, lichens of Missouri, antibiotics.

Bhatia, Dr. Kanwal K.: INDIA—Botany Hons. School, Punjab University, Amritsar, India —Collector of Himalayan lichens.

Bhargava, Dr K. S.: INDIA—Government Degree College, Naini Tal, U.P.—Contributor, Himalayan lichens.

Bibby, P.: AUSTRALIA—Melbourne Botanic Garden and National Herbarium, South Yarra, S.E.I. Victoria—Australian lichenological history, lichens of Victoria, critical studies of Parmeliaceae, Cladoniaceae.

Bioret, Abbé Georges F. Marie: FRANCE — Laboratoire de Botanique, Université Catholique, Maine-et-Loire, Angers—Taxonomy of bark lichens, microlichens (Graphideae); synopsis lichen literature 1910-1919.

Blake, Dr. Sidney F.: UNITED STATES—Division of Plant Exploration, Department of Agriculture, Plant Industry Station, Beltsville, Maryland — Studies of *Cladonia,* North America.

Böcher, Dr. Tyge W.: DENMARK—Universitets Planteanatomiske Laboratorium, Gothersgade 140, København K—Ecology of Danish lichens, dunes, beaches, offshore islands.

Bogusch, Dr. E. R.: UNITED STATES—Department of Botany, Texas College of Arts and Industries, Kingsville, Texas — Physiological techniques for pure algal cultures from lichens.

Bolus, Mrs. L.: UNION OF SOUTH AFRICA —Curator, Bolus Herbarium, University of Cape Town, Rondebosch, Cape — Lichen collections for specialists revising world genera.

Borel, M.: FRANCE—32, rue du Faubourg d'Arras, Lille—French lichens.

Bouly de Lesdain, Dr. Maurice: FRANCE—32, Place Sebastopol, Lille-Nord — Taxonomist, lichens of France, Belgium, Cuba, Guadeloupe, Mexico, New Mexico, Louisiana, Kerguelen, etc.; ecology of lichens, unusual habitats, substrates.

Brack, A.: SWITZERLAND — Basle 13 — Physiologist, antibiotics of lichens.

Breaden, T.W.: IRISH FREE STATE — St. John's, Wynberg Park, Stradbrook, Black-

rock, Co. Dublin—Chemist, chemical analysis and structure of lichen acids.

Breen, J.: IRISH FREE STATE — Chemical Department, University College, Upper Merrion Street, Dublin — Chemistry of lichens.

Brown, Dr. Babette I.: UNITED STATES — Biological Laboratories, Eastman Building, University of Rochester, Prince Street Campus, Rochester, New York—Ecology and distribution of New York State bog epiphytes, including lichens.

Burkholder, Dr. Paul R.: UNITED STATES—Osborn Botanical Laboratory, Yale University, New Haven, Connecticut—Antibiotic activity of lichens.

Burn, R.: ENGLAND — 118 Walton Street, Oxford—Collector of lichens in the Midlands and Wales.

Bustinza, Dr. Florencio: SPAIN — Instituto Botanico 'Antonio Jose Cavanilles', Plaza de Murillo 2, Madrid—Physiologist, antibiotic substances of lichens.

Caballero-Lopez, Dr. A.: SPAIN — Instituto Botanico 'Antonio Jose Cavanilles', Plaza de Murillo 2, Madrid—Physiologist, antibiotic substances of lichens.

Cain, Dr. Roy F.: CANADA—Department of Botany, University of Toronto, Toronto 5, Ontario—Bryologist, collector of lichens.

Cash, Miss Edith K.: UNITED STATES—Division of Mycology and Disease survey, Plant Industry Station, U.S. Dept. of Agriculture, Beltsville, Maryland — Assistant Curator, C. C. Plitt Lichen collection, editor for Lichens in *Biological Abstracts*.

Castellanos, Dr. Alberto: ARGENTINA — Fundacion Miguel Lillo, Agüero 2406, Buenos Aires—Contributor, lichens of Argentina.

Castle, Dr. Hempstead: UNITED STATES—Osborn Botanical Laboratory, Yale University, New Haven, Connecticut—Physiologist, lichen-fungi cultures.

Cernohorsky, Dr. Zdeněck: CZECHOSLOVAKIA—Leninova 70, Praha XIV—Taxonomist, lichens of Iceland, Middle Europe, fluorescence of lichens in ultra-violet light.

Cheetham, C. H.: ENGLAND—Austwick near Lancaster—Lichens of Lancaster.

Choisy, Maurice: FRANCE—15, rue Carrier, Lyon 7e, Rhône—Taxonomist, Gyrophoraceae, Lecanoraceae, Roccellaceae, phylogeny and morphology; author "Icones Lichenum Universalis"; lichens of France.

Chopra, G. L.: INDIA—Professor of Biology, D.A.V. College, Jullundur City, East Punjab—Taxonomist, lichens of the Himalayas.

Christiansen, cand. mag. M. Skytte: DENMARK—Universitets Botaniske Museum, Gothersgade 130, København K—Taxonomist, Danish Verrucariaceae, West Greenland and Peary Land lichens (in progress), ecology of Danish shores and islands.

Christiansen, W.: GERMANY—Eckernforder Allee 18, Kiel 6—German lichens.

Ciferri, Prof. R.: ITALY — Instituto d'Orto Botanico dell 'Universita, Casella Postale 165, Pavia—Antibiotic activity of lichens.

Cirne, Carlos R. L.: BRAZIL—Colegio San Jose, Pareci, Montenegro, Rio Grand do Sul—Contributor.

Clauzade, M.: FRANCE — St. Joseph Apt., Vancluse—Lichens of France.

Cooke, Dr. William B.: UNITED STATES—425 Loveland Avenue, Loveland, Ohio — Ecologist, mycologist, ecology of cryptogams of forest plots in Pacific Northwest.

Cottereau, Abbé: FRANCE—Conbblans-Amille, par St. Calais, Sarthe—Local flora.

Craft, James H.: UNITED STATES—Division of Science & Mathematics, Adams State College, Alamosa, Colorado—Collector of lichens.

Crigman, Alex T.: CANADA—Royal Ontario Museum of Zoology, Queens Park at Bloor Street, Toronto, Canada—Animal ecologist, working on caribou and lichen relationship.

Crossland, F.: ENGLAND—Eton House, Palmerston Street, Derby—Local flora.

Culberson, William L.: UNITED STATES—3257 Broadwell Avenue, Cincinnati 11, Ohio —Collector, lichens of Eastern Kentucky, synopsis of lichen literature.

Da Costa Neto, J. P.: BRAZIL—Laboratorio de Biologia Agricola, Secretaria da Agricultura, Porto Alegre, Rio Grande do Sul—Contributor.

Dahl, Cand. mag. Eilif: NORWAY—Universitets Botaniske Museum, Trondheimsveien 23, Oslo—Lichens of Norway, Southwest Greenland; phytogeography, ecology, relict areas of Arctic lichens, lichen acids.

Danilov, A. N.: USSR—Spezialist am Botanischen Garten, Dozent an der Militär-Medizinischen Akademie, Leningrad—Lichen pastures.

Darlington, Dr. H. T.: UNITED STATES — Michigan State College, East Lansing Michigan—Lichens of Porcupine Mountains, Michigan.

Darrow, Dr. Robert A.: UNITED STATES—Agricultural & Mechanical College of Texas, College Station, Texas — Lichen flora of Arizona.

Daubenmire, Dr. R. F.: UNITED STATES—Department of Botany, State College of Washington, Pullman, Washington—Ecologist, epiphyllous lichens of Idaho.

Davidson, V. E.: IRISH FREE STATE—Chemical Department, University College, Upper Merrion Street, Dublin—Chemistry of Irish lichens.

Degelius, Dr. Gunnar: SWEDEN—Universitets Växtbiologiska Institution, Uppsala—Taxonomist, lichens of Sweden, Norway, Azores, Eastern North America, the Aleutians; monographer Scandinavian *Collema;* phytogeography, phytosociology, boreal and oceanic lichens of Europe.

Dennis, Dr. R. W. G.: ENGLAND—The Herbarium, Royal Botanic Gardens, Kew — In charge, lichen collections.

Des Abbayes, Dr. Henry: FRANCE—Faculté des Sciences, Université de Rennes, Ile-et-Vilaine, Rennes—Monographer *Cladonia,* with phytogeographical and ecological studies; taxonomy. Lichens of Azores, Mediterranean region, Hawaii, South Africa, Australia, Antilles, Spain, Belgian Congo, Tristan da Cunha, France.

Diatchkov, N. N.: U.S.S.R.—(Address unknown, published in Acad. Sci. USSR, 1945) —Economic uses of lichens, reindeer grazing studies.

Diehl, Dr. W. W.: UNITED STATES—Division of Mycology and Disease Survey, Plant Industry Station, U.S. Dept. of Agriculture, Beltsville, Maryland—Lichens of Washington, D.C., Maryland; nomenclature.

Digilio (Grassi) Mrs. Marta M.: ARGENTINA—Instituto Miguel Lillo, Calle Miguel Lillo 205, Tucumán—Taxonomist, lichens of Tucumán, check list of Argentine lichens.

Dix, W. L.: UNITED STATES — Starruca, Pennsylvania—*Cladonia* of Pennsylvania, lichens of Keewatin (Canada), Peru.

Dodge, Dr. Carroll W.: UNITED STATES—Missouri Botanical Garden, 2315 Tower Grove Avenue, St. Louis 10, Missouri — Taxonomist, Antarctic and tropical lichens, lichens of Costa Rica; monographer Stereocaula; Curator of Lichens, American Bryological Society; historian, bibliographer of American lichenology.

Doidge, Dr. Ethel M.: UNION OF SOUTH AFRICA — The Division of Botany and Plant Pathology, Department of Agriculture, Pretoria—Mycologist, lichenologist, bibliographer, "The South African Fungi and Lichens."

Doignon, Dr. Pierre: FRANCE—17, Boulevard Orloff, Fontainebleau, Seine-et-Marne — Ecologist, succession of lichens after fire.

Doppelbaur, cand. nat. Hans: GERMANY—Menzingerstr. 67, (13b) München — Taxonomy, *Parmelia, Arthopyrenia.*

Ducos, F.: FRANCE — 63 Cours Mirabeau, Bouches-du-Rhône, Aix-en-Provence — Taxonomist, lichens of France and ecology.

Dughi, Raymond: FRANCE — Chargé de recherches du C.N.R.S., 11, rue d'Arpille, Bouches-du-Rhône, Aix-en-Provence—Physiologist, symbiosis, cytology of lichen-algae, chemical (color) reactions of lichens, morphology of cephalodia, local floristic studies.

Duncan, Miss Ursula: SCOTLAND—Parkhill, Arbroath, Angus—Alpine lichens.

Dunston, Captain A.: ENGLAND—Burltons, Donhead St. Mary, Wiltshire—Local flora.

Du Rietz, Dr. G. Einar: SWEDEN — Universitets Växtbiologiska Institution, Uppsala—Taxonomist, *Alectoria, Sticta, Usnea, Parmelia, Oropogon, Cetraria, Cornicularia,* etc.; terminology, morphology, phytogeography, ecology and sociology of lichens; West Swedish coast rocks, Scandinavian bogs, Kamchatka, New Zealand, Java, etc.

Duvigneaud, Paul: BELGIUM: 28, Avenue P. Heiger, Université de Bruxelles—Taxonomist, lichens of Africa, Belgium, etc; systematics, morphology, phytogeography of *Cladonia;* chemical studies of *Usnea;* European Usnea, calcium content of earth and epiphyllous lichens.

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Ertl, Dr. Leopold: GERMANY — Pflanzenphysiologischen Institut, Göttingen—Physiologist, transmission of light through lichens.

Espinosa (Bustos), Dr. Marcial R.: CHILE—Seccion Criptogamica, Museo Nacional de Historia Natural, Casilla 787, Santiago — Lichens of Chile.

Evans, Dr. Alexander W.: UNITED STATES—Osborn Botanical Laboratory, Yale University, New Haven, Connecticut—Taxonomist, authority North American Cladoniaceae, floristic and chemical studies of world *Cladonia;* systematics and ecology of New England, etc., *Cladonia.*

Evenari, Dr. Michael: ISRAEL — Dean of the Faculty of Natural Sciences & Mathematics, Hebrew University, Jerusalem — Lichens of the Negev.

Eyerdam, Walter: UNITED STATES — 7531, 19th Avenue, Northeast, Seattle, Washington — Collector, Alaska (Southeast and Aleutians), Kamchatka, Andes, Washington State.

Faegri, Dr. Knut: NORWAY — Botanisk Museum, Universitets i Bergen, Bergen — Ecologist, distribution of *Lichina* in northern Europe, lichen associations of the Norwegian flora.

Fagerström, cand. mag. Lars: FINLAND — Botanical Institute of the University, Unioninkatu 44, Helsinki — Taxonomist, lichens of Finland, *Dermatocarpon* studies; ecology and phytogeography, i.e. southern limits of northern lichens.

Faurel, L.: ALGERIA—Faculté de Botanique Générale et Appliquée, Université d'Alger —Taxonomy, Lichens of Algeria, Tunisia, Morocco.

Feldman, Dr. Jean: FRANCE—Rue Gay-Lussac 72, Paris V — Taxonomist, marine (micro-) lichens, lichens of Algiers; morphology of algae, fungi parasitic on marine algae.

Florovskaya, E. F.: U.S.S.R.—(Address unknown)—Studies of range lichens, Sarancpaul State Reindeer Farm, (in Bot. Zeit. 1939).

Flössner, Willy: GERMANY—Dörfelstr. 5, Olbernhau i. Erzgebirge—Taxomonist, flora of Erzgebirge, Saxony, geographical distribution of crustose lichens.

Foriss, Ferenc: HUNGARY — Huba utca 9, Miskolc—Taxonomist, lichens of Hungary; author exsiccatii "Lichenes Bukkenses."

Frank, Dr. Robert L.: UNITED STATES — 15-D, Lake Shore Drive, Lake Geneva, Wisconsin—Chemistry of lichen acids.

Frey, Dr. Eduard: SWITZERLAND—Hubelmattstrasse 42a, Bern — Taxonomist, lichens of Switzerland, South Africa, South and North America, etc.; ecology of alpine lichens, phytogeography of Umbilicariaceae; morphologist; monographer, *Umbilicaria, Stereocaulon.*

Frisendahl, Dr. Arvid: SWEDEN—Björngardsgatan 13^{iv}, Stockholm — Taxonomist, lichens of Bohuslän.

Fulford, Dr. Margaret M.: UNITED STATES —Department of Botany, University of Cincinnati, Cincinnati, Ohio — Cladoniae of Kentucky, Ohio.

Galløe, Dr. Olaf: DENMARK—Nybrovej 176, Lyngby — Taxonomist, lichens of Denmark, Northeast Greenland, Iceland; ecology, distribution, systematics of Danish lichens; illustrator of lichens.

Gams, Dr. Hellmut: AUSTRIA — Botanisches Institut der Universität, Innsbruck-Hötting—Phytosociology.

Gardner, Dr. Gerard: CANADA—Ecole des Hautes Etudes Commerciales de Montréal, 535 Avenue Viger, Montréal 24—Ecology and distribution, lichens of Manitoba, Hudson Bay and Strait.

Garside, Sidney: UNION OF SOUTH AFRICA —Bolus Herbarium, University of Cape Town, Rondebosch, Cape — Taxonomist, South African *Roccella, Teloschistes, Sticta, Lobaria.*

Geesteranus, Dr. R. A. Maas: NETHERLANDS Rijksherbarium, Nonensteeg 1, Leiden — Taxonomist, monographer Parmeliaceae of Netherlands.

Geitler, Dr. Lothar: AUSTRIA—Rennweg 14, Wien III (Russian Zone) — Physiologist, morphology haustoria, hymenial algae algal-fungal relationship.

Gelting, Dr. Paul: GREENLAND — Dansk Arktisk Station, Godhavn c/o Grønlands Styrelse, Slothomsgade 10, København K, Denmark — Taxonomist, Greenland lichens, Sweden, Denmark.

Genty, Dr. Paul: FRANCE—Directeur, Jardin Botanique de la Ville, Avenue Garibaldi 15, Côte-d'Or, Dijon — Taxonomist, lichens Côte d'Or.

Gerola, Dr. M. B.: ITALY—Instituto ed Orto Botanico dell 'Universita, Via Celona 2, Milano — Morphologist, antimitotic action of lichen extracts.

Giacomini, Dr. V.: ITALY—Instituto ed Orto Botanico dell 'Universita, Casella Postale 165, Pavia—Antibiotic activity of lichens.

Gray, Rev. Fred W.: UNITED STATES — Phillipi, West Virginia — Taxonomist, *Cladonia.*

Groenhart, Dr. P.: INDONESIA—Herbarium Bogoriense, Bogar — Taxonomist, lichens of Java, Malaysia, phytogeography.

Grønningsaeter, Børre I.: NORWAY—Valldal —Local lichen flora.

Grummann, Dr. Vitus Johannes: GERMANY —Liliencronstr. 16^{II}, Berlin-Steglitz (U.S. Zone) — Taxonomist, lichens of Germany, morphology and anatomy of lichens, principally variations in formation; editor of Hillmann's and Lettau's posthumous reports.

Guilaumot, Abbé M.: FRANCE — Limonest Nièvre 57—Lichens of France (in preparation).

Gunckel, Prof. Hugo L.: CHILE—Calle Juan Soldado 410 (Recolata) Santiago—Lichens of Chile.

Haglund, Dr. Gustaf: SWEDEN—Naturhistoriska Riksmuseet, Stockholm 50 — Swedish lichens.

Håkansson, J. W.: SWEDEN — Lidingö — Lichens of Central Sweden.

Hakulinen, Dr. R.: FINLAND—Kyrö—Monographer of *Candelariella.*

Hale, Mason E., Jr.: UNITED STATES—Department of Botany, University of Wisconsin, Madison, Wisconsin — Taxonomist, lichens of Connecticut, Baffin Island (Canada), ecology Wisconsin forest.

Hall, R. H.: ENGLAND—2 Hartington Terrace, West Rd., Buxton, Derbyshire—Local lichen flora.

Hartley, J. W.: ENGLAND—Mill Head House, Carnforth—Taxonomist, lichens of the Isle of Man, Manx Sand-dune Flora.

Hasselrot, lit. Torsten: SWEDEN—Naturhistoriska Riksmuseet, Stockholm 50 — Taxonomist, Umbilicariaceae, contribution to Swedish lichens, distribution of boreal lichens.

Håugsjå, Dr. Paul K.: NORWAY — Skien — Swedish lichens.

Havaas, Johan J.: NORWAY—Granvin, Hardanger—Taxonomist, contributions to Norwegian lichens, ecology, plant succession.

Häyrén, Dr. Ernst: FINLAND—Mannerheimvägen 33, Helsinki—Ecology, distribution and systematics Finnish lichens.

Hedlund, Lennart: SWEDEN — Götgaten 4a, Uppsala—Local lichen flora.

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Wattam, W. E. L.: ENGLAND—Cartref, 302 Newsome Road, Huddersfield — Taxonomist, lichens of Yorkshire.

Weise, Dr. Rudolph: GERMANY—Würzburgerstr. 45, Veitzhöchheim — Ecology of lichens.

Werner, Dr. Roger Guy: FRANCE — 30bis rue Sainte Catherine, Nancy, Meurthel-et-Moselle—Taxonomist, lichens of French North Africa, morphology of lichen spores, lichen synthesis.

Wilson, A.: WALES — Tir-y-coed, Roe Wen, near Conway, Carnarvonshire — Taxonomist, lichens of Westmoreland, West Lancashire, Perthshire, alpine vegetation on Ben-y-Cloe.

Woess-Tschermak, Dr. Elizabeth: AUSTRIA—Botanisches Institut und Botanischer Garten der Universität, Rennweg. 14, Wien (Russian Zone)—Physiologist, physiology of lichen parasites, fungus-alga relationship.

Wolfe, Dr. John N.: UNITED STATES—Department of Botany, Ohio State University, Columbus, Ohio — Ecologist, micro- and macroclimate influence, lichens of Ohio.

Yarman, Dr. Lawrence E.: UNITED STATES —Dept. of Botany, Ohio State Univ. Columbus, Ohio — Physiology (water relations) of lichens.

Ziegenspeck, Dr. Hermann: GERMANY — Apothekergässchen 2, Augsburg i.B. — Lichens of Germany.

APPENDIX A

Lichenologists Who Have Died Since 1936

Anders, Jósef — B.-Leipa, Czechoslovakia — 1936.
Auer, A. V.—Turku, Finland—1945.
Bachmann, E.—Dresden, Germany—1937.
Bucek, Jan—Brno, Czechoslovakia—1946.
Cengia-Sambo, Dr. M.—Prato, Italy—1940.
Cretzoiu, P.—Bucharest, Rumania—1946.
Eklund, Ole, Dr.—Helsingfors, Finland—1946.
Elenkin, A. A., Dr.—Leningrad, U.S.S.R.—1942.
Erichsen, C. F. E.—Hamburg, Germany—1945.
Eriksson, Efraim—Sundsvall, Sweden—1943.
Gluck, Hugo, Dr. — Heidelberg, Germany — 1940.
Gresino, Giacomo, Rev.—Savona, Italy—1947.
Hedvall, Bertil—Vaxjo, Sweden—1942.
Hilitzer, Alfred, Dr. — Praha, Czechoslovakia —1941.
Hillmann, Johannes—Berlin, Germany—1943.
Knowles, Miss Matilda C.—Dublin, Irish Free State—1932.

Köfaragó-Gyelnik, Vilmos, Dr. — Budapest, Hungary—1945(?).
Krawiec, Feliks—Poznan, Poland—1939.
Krieger, Hans, Dr.—Berlin, Germany—1943.
Laurila, Matti—Turku, Finland—1946.
Lettau, Georg, Dr.—Lörrach, Germany—1951.
Linder, D. H., Dr.—Cambridge, Masschusetts, U.S.A.—1945.
Linkola, K., Dr.—Helsinki, Finland—1942.
Lösch, Alfred—Freiburg, Germany—1946(?).
Lynge, Bernt, Dr.—Oslo, Norway—1942.
Maheu, Jacque—Paris, France—1937.
Malme, Gustaf—Stockholm, Sweden—1937.
Mattirolo, Oreste, Dr.—Torino, Italy—1947.
Meylan, C., Dr.—Vaud, Switzerland—1941.
Nikolsky, P. N.—Leningrad, U.S.S.R.—1939.
Paasio, Ilmari—Helsinki, Finland—1941.
Parlin, John C.—Canton, Maine, U.S.A.—1947.
Rapp, Severin—Sanford, Florida—1941.
Redinger, K., Dr.—Wien, Austria—1940.
Reed, Frederick M. — Riverside, California, U.S.A.—1939.
Sandberg, Carl—Borås, Sweden—1945.
Sandstede, Heinrich, Dr.—Bad Zwischenahn, Germany—1951.
Sernander, Rutger, Dr.—Uppsala, Sweden—1944.
Smith, Annie Lorrain — London, England — 1937.
Stenholm, Carl, Capt. — Göteborg, Sweden — 1939.
White,[5] Dr. Lawrence E.—Cambridge, Mass., U.S.A.—1952.
Zahlbruckner, A., Dr.—Wien, Austria—1938.
Zschacke, Hermann, Dr.—Bernburg, Germany —1937.

[5] Late Curator Farlow Herb., Harvard Univ., Cambridge Mass.

NOTES ON THREE ADDITIONS TO THE RODENT FAUNA OF ALBERTA[1]

J. E. MOORE
Dept. of Zoology, University of Alberta, Edmonton

STUDIES OF MAMMALS in the prairie region of southern Alberta during the summer of 1951 have led to the recognition of three rodents which have not been previously recorded for the area. Data for all three were obtained during a general study of terrestrial vertebrates carried out by Mr. R. Lister and the writer under a grant from the General Research Fund of the University of Alberta. Additional information on two of the species has been kindly provided by Mr. W. S. Haynes who was engaged in a Rocky Mountain Spotted Fever and Sylvatic Plague Survey for the Alberta Department of Public Health.

Marmota flaviventris

While working in the southeastern portion of the province we received numerous reports of large rodents which had recently made their appearance in certain rocky coulees associated with the Milk River valley. From descriptions furnished by local residents it was apparent that the species in question was a marmot of some type. Several habitats were investigated but no such animals were observed, presumably because of unfavorable weather conditions prevailing at the time. However, through the kindness of Mr. J. M. Griffiths, the skin and skull of a specimen taken on his property near Aden were forwarded to this Department. It was then possible to determine that we were dealing with *Marmota flaviventris nosophora* Howell, a race which does not seem to have been reported before in Canada[2].

Our information indicates that golden mantled marmots have moved into southeastern Alberta during the last ten years. Presumably they have come in from neighboring parts of the State of Montana and have now spread north to the Milk River valley at least between Aden and Verdegris Coulee. It is of interest to note that Wright and Conaway (The Murrelet, Vol. 31, No. 2, p. 32, 1950) have reported a northward extension of the range of *nosophora* in northwestern Montana. Investigations in the central part of northern Montana could be expected to reveal a similar condition.

Perognathus fasciatus

In trapping for small mammals on the north bank of Chin Coulee near Foremost we obtained two specimens of the pocket mouse, *Perognathus fasciatus fasciatus* Wied

1 Received for publication February 23, 1952.
2 It may be noted that Brown (Ent. Soc. Amer. Ann. 37, p. 210, 1944) in a study of Alberta fleas and their hosts, has reported **M. flaviventris avara** from Waterton, Alta. Holland in "The Siphonaptera of Canada" p. 119, 1949 intimates that the subspecies is more likely to have been **nosophora.** The skin of Brown's specimen is in our collection and is considered to be **M. flaviventris** cf. **nosophora** — a conclusion that has been confirmed by Dr. H. W. Setzer of the United States National Museum.

One of these had its burrow in an area of clay covered by a scattered growth of spear grass, winter fat, sage and June grass. The cheek pouches of this specimen were filled with ripened seeds of a June grass which Dr. E. H. Moss of the Botany Department, University of Alberta, has identified as *Koeleria gracilis*. The carcass of a third animal was picked up on the road leading to Etzikom Coulee which lies a few miles south of Foremost. Its pouches were packed with kernels of wheat which had obviously spilled from a passing truck.

Details for the Chin Coulee specimens and for two others procured at Manyberries and Medicine Hat by Mr. Haynes are:

Chin Coulee, Alta.,
Aug. 11, 1951. ♂ 130-60-17.5 mm. 11.9 g.
Chin Coulee, Alta.,
Aug. 12, 1951. ♂ 139-60-18 mm. 11.2 g.
Manyberries, Alta.,
May 12, 1951. ♂ 130-65-15 mm.
Medicine Hat, Alta.,
June 30, 1951. ♀ 103-55-15 mm.

A review of the literature indicates that *P. f. fasciatus* has been recorded from at least four localities in southwestern Manitoba (Aweme, Oak Lake, Treesbank and junction of Antler and Souris rivers). With the discovery of this race in Alberta it seems quite certain that it must also occur in the intervening prairie region of southern Saskatchewan.

Reithrodontomys megalotis

The third addition to the rodent fauna is the harvest mouse, *Reithrodontomys megalotis dychei* Allen. We took a single specimen at Medicine Hat and Mr. Haynes collected another at Milk River. Data for these are: Medicine Hat, Alta.,

July 16, 1951. ♀ 147-62-17 mm. 15.2 g.
Milk River, Alta.,
May 28, 1951. ♂ 105-49-14 mm.

The female contained six embryos, each approximately 4 mm. in length.

Although the related race *R. m. nigrescens* occurs in British Columbia (Holland, G. P. — The Murrelet, Vol. 23, No. 2, p. 60, 1942), these appear to be the first records of *dychei* for Canada. Another harvest mouse, *R. humulis,* has been reported for Alberta (Dowding, E.S.—Can. Jour. Res., E. 25: 195-206, 1947) but in our opinion this was a case of misidentification involving specimens of the common house mouse.

I am indebted to Dr. David H. Johnson of the United States National Museum for confirming the subspecific determinations of our material. Study skins of the specimens involved are deposited in the Department of Zoology Collection, University of Alberta. The material collected by Mr. Haynes is in the Museum of the Alberta Department of Public Health.

NOTES AND OBSERVATIONS

HUDSONIAN GODWITS FOUND NESTING AGAIN AT CHURCHILL. — One day early in July, we were exploring a wide expanse of tundra a few miles out of Churchill, Manitoba, and were pleased to discover a pair of Hudsonian Godwits. They alighted on the margin of one of the numerous shallow ponds. A few days later we were tramping about in the same area when the Godwits appeared circling about and calling their Burt-like note. Directly they were joined by another pair which flew about adding to the excitement. While I searched about an area of tundra bordering a pond, one pair seemed much perturbed and repeatedly one flew toward me not far above my head as though threatening me. We searched the area very thoroughly but no nest could we find. A couple of days later when we were watching a pair of Hudsonian Curlews, hoping to locate their nest, the Godwits again appeared and behaved in a way that seemed to indicate that we had invaded their nesting area. Again we made a careful search of the place, which was not far from the area we had searched before, and again we found no nest though the Godwits kept up their excited actions. But good fortune was in store for us. We had found the Curlew's nest. While we were watching the birds and trying to get a line on the nest location, partner, (Mrs. C.) who has proven to be very adept at nest finding, saw a Stilt Sandpiper fly near and alight. Watching, she saw the Sandpiper go to a hummock and settle down where it was hidden by the sparse growth of grass. When we went to the spot, the Stilt Sandpiper flushed from her nest on top of the hummock. The nest held four beautiful eggs. After spending a couple of days at

nests of the Curlew, Golden Plover, Smith's Longspur and others, we returned to the Stilt Sandpiper's nest to take photographs of the birds. The Sandpiper was very co-operative and readily returned, walking through the grass and approaching her nest by a circuitous route. The picture taking was interrupted by a rising wind and rain and we set out across the tundra toward the roadway. We had gone only a short distance when a pair of Godwits appeared and flew about calling and acting as though very much concerned over our presence. That place would receive a thorough searching on the morrow!

Hudsonian Godwit nest at Churchill, Man.

Next morning the weather broke clear and we started out. With us were two young people who were attached to the Defense Research Laboratory. They were interested in ornithology and wished to take pictures at the Stilt Sandpiper's nest which we had located. I led the way toward the place where the Godwits had acted so concerned the previous afternoon and when we came near, the birds appeared as before, acting very much perturbed as we entered a moderately wet grass-grown marshy area. We all felt that here must be the location of their nest and we started a systematic search. We had covered quite a large area when suddenly my eye caught a glimpse of broken egg shells on a low hummock. Bending over, I discovered a little downy baby hidden in the grass blades on the edge of the nest! Overjoyed at the discovery I called to the others who were nearby and, directly, on approaching the spot, Ann discovered another downy youngster a few feet from the nest! The parent Godwits flew about coming close to us and making quite a fuss. We carried the cunning downy youngsters from the marshy place to a nearby border of tundra where the girls could kneel down and hold the young on the mossy turf, giving me an opportunity to take pictures of the Godwit parents as they came near to see what was happening to their captive babies. One of the parents flew about alighting a little way from us, then taking wing again and coming to alight a little nearer to her cheeping babies. The old bird kept up a frequently repeated call note. When the bird alighted on a near mound, wings held high above the body, the white of the upper tail coverts showed in striking contrast to the darker coloration of the back, and the rusty red coloration of the breast completed a beautiful picture. After a little while we released one of the youngsters and the parent came closer, calling to the chick which went to her and cuddled under the protecting body. Finally, we took the two youngsters back to the nest where we photographed them and then left them to the care of the handsome and deeply interested parent.

The discovery of the nest of the Hudsonian Godwit with downy young, was a thrilling experience and the high spot of two summers of photographing the birds of Churchill.

R. T. CONGDON, M.D. and
MRS. CONGDON, Wenatchee, Wash.

Dead opossum on Point Pelee, Ont., shore. —On October 3, 1949, during a visit to Point Pelee National Park, I discovered the carcass of a mammal amid driftwood and other debris on the east beach only a few hundred yards from the extreme southern tip of land. It had apparently been cast upon the shore along with other drift material. (I was accompanied on this trip by Mr. R. J. K. Murphy, Assistant Zone Forester, Department of Lands and Forests, Chatham.)

The carcass was in an advanced stage of putrefaction and practically all the hair and

fur had sloughed off. I tentatively identified it as an opossum (*Didelphis virginiana*) and removed the head for further checking.

Upon presenting the skull to the Royal Ontario Museum, Mr. S. C. Downing informed me that it definitely was an opossum skull and that my original identification had been correct.

This incident might raise the interesting question as to the possibility of an opossum, dead or alive, crossing Lake Erie from Ohio to Ontario, by land and water, aided by lake currents, through the Erie Island Archipelago. — C. HAROLD ZAVITZ, *Aylmer, Ont.*

An Indigo Bunting in Alberta.—The Indigo Bunting, *Passerina cyanea*, must be a very rare visitor to Alberta, since Taverner, in his "Birds of Canada" mentions only one record for this province and one for Saskatchewan. Professor W. Rowan informs me that he had a bird of this species obtained at Sullivan Lake, Alberta, and this record is presumably additional to that mentioned by Taverner.

In view of these facts the following recent observation of an Indigo Bunting seems worthy of being reported. On June 21, 1952, while staying at Elkwater, at the foot of the Cypress Hills in southeastern Alberta, I twice caught brief glimpses of a bird which appeared, to the naked eye, blue above and whitish below. I returned to the spot, an area of bushes and trees, with 8 x 30 binoculars and soon had another good view of the bird. It appeared to be a little larger than a Yellow Warbler, was blue all over, darker above than below, except for the wings which were a very dark brown. The bill was dark grey and was about the shape of a Song Sparrow's. The bird was clearly a male Indigo Bunting, probably not quite mature in view of the wing colour. Its call was a sharp "tsit." I looked for the bird again later the same day and the following morning, but did not see it again. It would hardly appear to be possible to confuse this species with any other, but I may add that I am quite familiar with the Mountain Bluebird and have seen the Lazuli Bunting, the only western birds which at all resemble the Indigo Bunting in the field.— *E. O. HOHN, Department of Physiology, University of Alberta.*

New Records of Millipeds from Southern Ontario.—It was recently my privilege to identify the millipeds in the collection of the Royal Ontario Museum of Zoology and Palaeontology. The following list, although representing only part of that collection, is of interest because the records are new for the localities indicated. More extensive collections, made especially during the late summer and early fall months and with care to get small specimens, should yield interesting information about the northern limit of distribution of Canadian species, some of which are known as far south as Texas and Tennessee.

Cleidogona sp. Fort Severn, Ont., July 21, 1940, larvae, willow swale.

Dixidesmus branneri (Bollman 1887). Pottageville, York Co., Ont., June 8, 1934.

Scytonotus granulatus (Say 1821). Peterborough, Ont.

Oriulus venustus Wood (1864). Palermo, Ont., Sept. 26, 1936; Kettleby Kabin, York Co., Ont., June 3, 1934.

Aniulus bollmani Causey 1952. Palermo, Ont., Sept. 26, 1936; Seaforth, Huron Co., Oct. 29, 1940, sugar maple woods. This species has been incorrectly referred to as *Aniulus impressus* (Say) by many writers.

Uroblaniulus immaculatus (Wood 1864). Palermo, Sept. 26, 1936; King Twopence, York Co., Ont., Sept. 20, 1941; Palermo, Ont., Sept. 26, 1936; Rattlesnake Point, Milton, Halton Co., Ont., Nov. 1, 1941; Cache Lake, Algonquin Park, Nipissing Dist., Ont., July 1935 and Aug. 8, 1936.

Uroblaniulus canadensis (Newport 1844). Turkey Point, Norfolk Co., Ont., Aug. 25, 1940; Seaforth, Huron Co., Ont., Sept. 29, 1940.

Uroblaniulus sp. Sanfield, Manitoba, July 16, 1939, larvae; Manitoulin Is., Ont., larvae.

Ptyoiulus sp. Rattlesnake Point, Milton, Halton Co., Ont., June 29,1940.

Polyzonium bivirgatum (Wood 1864). Rattlesnake Point, Milton, Halton Co., Ont., Nov. 1, 1941; Cache Lake, Algonquin Park, Nipissing Dist., Ont., July 1935 and Aug. 8, 1936.

Polyzonium mutabile Causey 1951. Minesing, Ont., May 19, 1934. This species is known to occur also in Illinois and Wisconsin.

—NELL B. CAUSEY,
Fayetteville, Arkansas.

The Clay-colored Sparrow in Southeastern Ontario.—On July 1, 1951, while watching a pair of Field Sparrows *(Spizella pusilla)* at their nest in an old, bushy pasture near Merrickville on the Rideau River (Lanark County), my wife drew attention to an unfamiliar song and we soon traced the source to a Clay-colored Sparrow *(Spizella pallida)* perched in the top of a hawthorn bush about twelve feet from the ground. It continued to

sing the insect-like *bzzz-bzzz-bzzz-bzzz* peculiar to this species. Before we found that the singer was within fifty feet of us, the song suggested somewhat the disconnected singing of the cicada heard at a distance early in the season before the insect is in full voice, but of course lacked the strident quality of the cicada's drone heard near at hand.

Unlike the Field Sparrow, which had quite an extensive singing range, the Clay-colored Sparrow was heard singing only within a radius of little more than a hundred feet. Its territory appeared to lie within a radius of about 225 feet. It sang most persistently from the hawthorn where we first heard it and less frequently from perches eight to fifteen feet high in the tops of three other hawthorns. It also sang occasionally from the tips of lone spruce and cedar saplings, never more than eighteen feet in height, and sometimes close to the ground from the tops of dead mullein stalks.

We visited this area on numerous occasions from July 1-10 and were always greeted with the song of the Clay-colored when we came within range. It was not audible until we were quite close to its habitat in contrast with the songs of two other associates, the Chipping Sparrow *(Spizella passerina)* and Vesper Sparrow *(Pooecetes gramineus)* which often sang from isolated trees, such as oak and elm, scattered throughout the pasture. This sloped gradually from wooded land to more or less open fields. Prominent amongst the undergrowth were patches of raspberry and gooseberry, scrubby cedar shrubs and barberry bushes. The thin, sandy soil, with many rock outcroppings, maintained a rather sparse growth of mullein *(Verbascum)*, blueweed *(Echium vulgare)*, ragwort *(Senecio pauperculus)*, St. John's-wort *(Hypericum perforatum)* and several cinquefoils, especially a depauperate form of the silvery cinquefoil *(Potentilla argentea)*, probably dwarfed by overgrazing. There were also many rounded mats of waxberry *(Symphoricarpos albus)* both in the open pasture and encircling the hawthorns. This plant we thought might have special significance. The compactly matted growth, less than a foot high, probably provided the best nesting cover for the Clay-colored Sparrow in this dry area. Several times we saw it fly to the ground where it generally disappeared either in grassy cover beneath the hawthorns, in raspberry tangles or in patches of waxberry. We were unable to observe its actions in the undergrowth but concluded that it was merely feeding there. A search of the cover revealed no sign of nest and although we watched the bird closely for lengthy periods it exhibited no sign of alarm nor was there any indication of the presence of a mate. It always returned to one or other of its singing perches in a very few minutes.

Singing seemed to be this Clay-colored Sparrow's principal occupation. Once it sang seventy-one times successively from its favourite hawthorn at the rate of eight to nine songs per minute. Four evenly-spaced buzzes, less commonly three, composed the usual song. Once when we startled the singer the song ended abruptly with the first note. Only one other variation was noted — a song of five notes. Occasionally the bird would alight in the thick of a bush then move up to the top to sing. Between songs it would often spread a wing, preen a moment or fidget as if about to fly, then compose itself, jerk its tail, throw up its head and sing again. On several occasions it was observed to fly to a densely foliaged cedar upwards of 200 feet from the principal singing perch and give chase, almost immediately, to a Chipping Sparrow which it followed persistently from perch to perch. This appeared to be an aggressive action. It is understandable that the Clay-colored would show more antipathy towards a Chipping Sparrow than towards an Indigo Bunting *(Passerina cyanea)* which sang several times from one of the singing perches of the Clay-colored Sparrow while the latter was singing unperturbed twenty feet away. Apparently Chipping Sparrows were not tolerated near its singing perches.

Most Chipping Sparrows observed in the district were engaged in feeding young out of the nest, but a few were incubating or had young in the nest. Three Field Sparrows' nests held respectively, three young, three eggs, and three eggs of the sparrow and one of the Cowbird. These were believed to be second nestings.

The persistent singing of this Clay-colored Sparrow in a very restricted area suggested that it was breeding there, or was it a stray looking for a mate? We visit-

ed this locality in June, 1952, hoping to learn something definite regarding its status but failed to find the bird.

Merrickville is approximately 100 miles farther east than the previous most easterly Canadian record for this sparrow — a male taken July 10, 1930, near Golden Lake, Renfrew County, by Hoyes Lloyd (Canadian Field-Naturalist, 47:36, 1933). — *LEWIS McI. TERRILL, Montreal.*

REVIEWS

The Birds of Greenland. *Text by Finn Salomonsen; illustrations by Gitz-Johansen. Part III, pp. 349-608, 16 pls. Ejnar Munksgaard, Copenhagen, Denmark, 1951.*

This, the third part of *The Birds of Greenland,* fully maintains the high standard of excellence that characterized the two preceding parts of that important work. Subject treatment is similar to that of Part I, which was reviewed in *The Canadian Field-Naturalist,* 1951, Vol. 65, p. 124. The third part deals with the auks, guillemots, puffins, hawks, owls, Greenland Wheatear, Fieldfare, pipits, White Wagtail, redpolls, Lapland Longspur, and Northern Raven.

In addition, Part III contains (pp. 561-575) the complete list of Greenland birds, including the rarities and accidentals. This list comprises 224 species and subspecies known to occur or to have occurred in Greenland. The status of each form is given in general and for details there are one or more citations to the literature. Numerous foot-notes give taxonomic and other pertinent information. Also, there is an imposing bibliography which is intended to contain reference to all publications concerning the birds of Greenland. An index completes this handsome and scholarly work. A useful map, showing Greenland localities mentioned in the text has been prepared by the Danish Geodetic Institute and the author of *The Birds of Greenland.* It is obtainable from the publisher for ten Danish kroner and may be inserted in the work. — *W. EARL GODFREY.*

This Fascinating Animal World. *By Alan Devoe. McGraw-Hill Company of Canada, pp. 1-303, 1951. Price, $4.75.*

Here is a book that every amateur naturalist will want to acquire for his library. Not only will it provide plenty of entertaining reading, but it will also serve as a useful reference. There are many fine natural history books that have succeeded in serving one purpose or another, but this is the first that has come to this reviewer's attention which seems to accomplish both objectives. Perhaps this is not surprising in view of the fact that Alan Devoe is one of the foremost nature writers in the United States. He has been writing popular articles for many years and is probably better qualified than most naturalists to write a book for the general reader.

As a well-known naturalist who receives many requests for information from the reading public, Mr. Devoe could see the need for a book that contained within its covers the answers to the majority of questions the amateur is likely to ask. As he points out in his Introduction, it is often necessary to consult a whole library in order to find the answer to even the most simple question. And it sometimes happens that even the most exhaustive treatments on a given subject may fail to do so, or, if they do, they may be so technical as to be of little value to the average person. Where, for example, would one find the answers to such questions as: what do animal die of? could a fish drown? how do sea birds manage to get fresh water to drink? why don't sleeping birds fall off the perch?

The entire book is devoted to questions such as these. Each topic is discussed in a readily understandable non-technical language. There is a complete index so that it is a simple matter to turn up any topic desired. In any case, it is well for the reader to consult the index as many interesting bits of information are discussed under headings other than those in which one would expect to find them. The author digresses a good deal in his writing, a feature which gives it a conversational tone that would otherwise be lost.

The information contained in the book appears to be technically correct and there is very little that can be criticized. Naturally, many topics could have been discussed more fully, but considering that the information is intended for the amateur rather than the professional, this is understandable. The line drawings add greatly to the attractiveness of the book.—AUSTIN W. CAMERON.

Check-list of North American Birds and Synopsis of the North American Mammals. *Condensed and compiled by J. E. Keays, 1952. London Typesetting Co., London, Ontario. 55 pp. ($1.50).*

The unwary are told that the bird list presented in this publication is condensed and compiled from the American Ornithologists' Union Check-list of North American Birds, fourth edition, 1931. Actually the sequence of order families, and apparently in most cases the species also, is that of the *second* edition which was published in 1895! Why any compiler, with the latest edition before him, should copy instead the obsolete arrangement of 1895 and attempt to sell the results to amateurs of today is a mystery indeed.

Without any explanation whatever and with no warning to the inexperienced user of this list, the compiler has placed the English Sparrow and European Tree Sparrow (both clearly shown in the A.O.U. Check-list, fourth edition, to belong to the family Ploceidae) in, of all places, the Icteridae between the meadowlarks and orioles!

The species names are, as the compiler claims, those of the A.O.U. Check-list, fourth edition, but many of them are obsolete. Apparently the compiler was unaware that no less than eight supplements to the A.O.U. Check-list have appeared since the 1931 edition was published.

The least that one can expect from a list of this kind is that the correct spelling of the names be given. The very first generic name in the list is mispelled and this sets the pattern throughout. The many strange combinations of letters that follow are absolutely inexcusable, above all in a list that is purported to be "a handy reference for students of Ornithology". In a number of instances generic or subfamily names are used where family names were intended and, in the mammal list, the family name Sciuridae is listed ten times as a generic name. Fortunately annotations on the birds are few. The reader is given the erroneous impression that there have been no reports of the Eskimo Curlew since 1926; or of the California Condor since 1931; and that the Trumpeter Swan is close to extinction.

Pages 39-55 are devoted to mammals of North America. The classification and arrangement of the orders and families are those of D. G. Elliott, 1901! Nomenclature is pathetically obsolete. Vernacular names, except in a few cases, are not given. Many familiar mammals such as the Varying Hare and Cottontail seem to be missing entirely from the list while space is wasted in an utterlly futile hodgepodge of irrelevant or out-dated information. We are told that the first edition is small which would appear to be the best that can be said for it. — *W. EARL GODFREY.*

Conservation in Canada. *By Dr. O. M. McConkey. J. M. Dent & Sons (Canada) Limited, 1952; pp. 215, with 70 photographs, 6 diagrams and endpaper maps. (Price, $3.50).*

Here is a book which will be welcomed by all who are concerned about the proper use of land in Canada. For the first time in book form, the problems of conservation in Canada are set forth clearly and fully by an author who views our situation from a world-wide background of practical experience and study. Farmers, cattlemen, foresters, engineers, hunters, naturalists, teachers, and those responsible for legislation on conservation, have all much to gain from this important book.

Professor McConkey deals first with the basic factors in land use. Practical applications are emphasized as the author turns to each of the basic industries of Canada. Farming, pasturing and forestry are given most attention. The text is nicely supplemented with maps, diagrams and photographs which will be valuable aids to teachers of conservation theory and practice. By clear and simple use of words and pictures the author has managed to compress a wealth of facts and figures into a short book. Author and publisher deserve praise for a handsome and well designed book.

Bad patterns of land use have had disastrous results when successive generations have followed poor traditional practices. We have been warned that the exhaustible resources of Canada have been dangerously wasted by extravagant practices. Dr. McConkey urges every Canadian, in no uncertain terms, to learn the lessons of older lands, to "tend his forest, cultivate his fields, and maintain a balance with nature, or he will destroy his heritage and perish". Promising beginnings have been made in Canada with certain aspects of conservation. What is needed now is a sustained effort which, Dr. McConkey believes, requires "a national plan, an oper-

ation map, and a national classification of the soils of Canada according to type and use."

"Conservation in Canada" deserves a wide audience and it is recommended both as a review of the present situation of land use in Canada, and as a reference book on the principles and practice of conservation.

—W. K. W. BALDWIN.

HUNTERS AND HUNTED. *By Stephen Collins, Canadian Wildlife Service, Department of Resources and Development, Ottawa, 1952; illustrations by Ted Ingram; pp. 19.*

The demand for well-written, accurate literature on natural history subjects far exceeds the supply. This is particularly true of inexpensive booklets and pamphlets that are within the financial means of the average student. Most of those available have been written by professional writers who are often careless about their facts, or by scientists who have little to recommend them from the literary standpoint. It is an unfortunate fact that "those who know about science can't write about it and those who can write about it don't know about it."

It is a pleasure, threfore, to review the present pamphlet. It seems to have achieved that rare quality of literary excellence combined with scientific accuracy. Although obviously written for students in the intermediate and senior grades, it should provide pleasant and informative reading for the adult who has an interest in wildlife conservation.

"Hunters and Hunted," as the title implies, deals with the relationship that exists between predators and their prey. The author sets out to answer the question, "Are predators, in the long run, detrimental to man's interests?" This is a very pertinent question that is almost certain to arise in any discussion on wildlife conservation. Most of us, unfortunately, are biased in favour of the prey. From the days of bedtime stories onward, we have been taught to look upon the wolf, the bear, and the hawk as blood thirsty killers that deserve the harsh treatment meted out to them by farmers, trappers, and hunters. Personal experience is unlikely to change our attitude greatly. When we see a fox run down and kill a rabbit, our reaction is unfortunately emotional rather than rational and the episode serves only to strengthen our preconceived ideas. In this day and age, however, it is time we relinquished our prejudices and considered the problem from a disinterested vantage point. "Hunters and Hunted" will provide a good basis for such a reconsideration.

By means of well-chosen illustrations based on scientific evidence the author points out that (1) predators play an important role in the "balance of nature," and their existence is necessary in order to maintain a proper balance between herbivorous species and the latter's food supply, (2) since the number of herbivorous species resident in an area is strictly limited, the excess population must be removed by predators and other factors, (3) predators are the natural, and, therefore, most effective means of limiting the density of prey species, (4) each predator is especially adapted for the capturing and killing of a certain type of prey, and it is, therefore, capable of doing so much more effectively than any means devised by man, (5) if the proper balance between predator and prey is upset through the partial or complete elimination of predators, many prey species may increase to such an extent that they constitute a serious threat to man's interests (examples: meadow mice, rabbits, squirrels, etc.), (6) predators are often accused of killing domestic and game species, when in fact, the necessary evidence is lacking, or at least wrongly interpreted. And most important of all, it must not be forgotten that man himself is the most effective and, at the same time, the most despicable predator there is.

The excellent illustrations by Ted Ingram add immeasurably to the value of the pamphlet as a teaching aid.—AUSTIN W. CAMERON.

NOTES ON THE BOBCATS (LYNX RUFUS) OF EASTERN NORTH AMERICA WITH THE DESCRIPTION OF A NEW RACE. *By Randolph L. Peterson and Stuart C. Downing. Contributions of the Royal Ontario Museum of Zoology and Palaeontology, No. 33, p. 23, illus.*

The present study is a review of the taxonomic status and distribution of the bobcats (*Lynx rufus*) in eastern North America, with the description of a new race, *Lynx rufus superiorensis* from the area around Lake Superior. Heretofore only two forms, *rufus* and *gigas* have been recognized from eastern Canada and their taxonomic status has been poorly understood. Consequently, the thorough study carried out at the Royal Ontario Museum of Zoology and Palaeontology will be welcomed by mammalogists who have had to deal with this perplexing genus.

As many mamalogists have long suspected, *gigas* is shown to be conspecific with

rufus. Examination of specimens from western New Brunswick, Maine, Vermont, and New Hampshire revealed that this region is a zone of intergradation between the two forms. The Nova Scotia bobcat, *gigas*, is a well-defined race, but the characters separating it from *rufus* are bridged by specimens in the area of intergradation.

The three races, *rufus*, *gigas*, and *superiorensis* are separable on the basis of several morphological characters, but the investigators found that the cranial differences are the most constant and reliable. *L. r. superiorensis* has a relatively smaller upper third premolar than *rufus* and a relatively wider and shorter palate than *gigas*. *L. r. rufus* differs from *gigas* in averaging smaller and in having a relatively broader skull. Other less striking differences are mentioned in the paper. These three races differ from the western subspecies in the structure of the auditory bullae.

The authors set forth the interesting theory that *gigas* was the original bobcat in most of Ontario and that *rufus* was restricted to the extreme southern tip of the province. So far as is known, the three races have not come into contact with one another. It has been assumed that *gigas* was a form that arose in the Maritime Provinces region, east of the Alleghenies, but this raises the possibility that it may have evolved in the region north of *rufus*.

In addition to several photographs of skins and skulls, there are two maps, one showing the distribution of the three races occurring in eastern North America and another showing the distribution and spread of bobcats in Ontario. — AUSTIN W. CAMERON.

Under the Sea-Wind. *By Rachel L. Carson. (Oxford University Press, New York, 1952) 2nd ed. — 314 pp., $4.00.*

In the new edition of 'Under the Sea-Wind' Rachel Carson uses the imaginative yet highly informative style of her extraordinary book 'The Sea Around Us' to depict the endless struggle of life over death in the marine environment. In the first section of the book Miss Carson introduces the reader to the sand beaches of North Carolina where gulls, terns, skimmers, herons, and sandpipers compete with one another for the young fishes, shrimps, sand bugs, and other marine creatures which form their food. On the wings of a champion long-distance migrant, the sanderling, it is but a few days' journey to the arctic tundra where lemmings, rock ptarmigans, and tiny shore birds fight to survive the dangers of blizzards and cold, as well as the ever-present snowy owls, foxes, and other predators.

The second part of the book tells the story of Scomber, the mackerel. Beginning with the egg and embryo that drifts helplessly with other minute organisms of the ocean plankton and is preyed upon by comb jellies, crab larvae, and larger fish, the author follows the hazardous life cycle of the mackerel to the young adult stage that feeds in large schools on the swarms of copepods near the surface, and is in turn in constant danger of attack by large cod, dogfish, and man himself. The third section of the book portrays the life of Anguilla the eel in freshwater lakes and streams, and describes its long journey down the rivers into the sea, to spawn and die in the deep abyss of the Atlantic off Bermuda.

Miss Carson briefly but skilfully works into the main theme of each section the complex ecological relations of such widely differing members of the animal kingdom as comb jellies, copepods, fiddler crabs, mullets, turtles, and petrels. She plunges the reader very realistically into the vast gold and green fluidity of the sea, through the changing conditions of coastal waters and estuaries, and even pauses for a few paragraphs in the unique man-made environment of a big inlet buoy. In illustrating the rapidity with which the 'precious elements of life are passed on and on in endless chains, she condenses into a single paragraph an entire food chain — beach flea to ghost crab to channel bass to shore debris to beach flea again. Mindful of the great need for conservation of our marine resources, the author has depicted man himself as a formidable source of danger to coastwise fishes; his efforts are sometimes successful, sometimes wasteful of the bounteous sea-life, but often in the face of great hardship and wariness of the prey they meet with failure. In adding to the educational value of the book the author has also included an illustrated glossary of terms.

Miss Carson is to be commended on her ability to translate our limited knowledge of the vast numbers and kinds of sea creatures into a story that cannot fail to hold the attention of all who read it, young and old alike. — **E. L. BOUSFIELD, National Museum of Canada.**

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THE NATURAL HISTORY

OF THE

DOUBLE-CRESTED CORMORANT

(Phalacrocorax auritus auritus (Lesson)).

by

HARRISON F. LEWIS

The Ottawa Field-Naturalists' Club has a limited number of copies of this very useful paper. These are available free of cost to interested libraries and institutions.

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CHIMNEY SWIFT BANDING AT KINGSTON, ONTARIO FROM 1928 TO 1947 [1]

R. I. Bowman
Berkeley, California

BECAUSE of widespread interest in the migratory habits of the Chimney Swift (*Chaetura pelagica*) by birdbanders in eastern North America, it has been deemed appropriate to report on the results of 16 years of banding at Queen's University, Kingston, Ontario, one of the oldest permanent banding stations on the continent. The writer expresses his thanks to Mrs. Amelia R. Laskey of Nashville, Tennessee, and Mr. Ben B. Coffey, Jr. of Memphis, Tennessee, who have supplied complete data on Chimney Swift recoveries from their respective stations. Mr. Coffey has also carefully read the manuscript and made many valuable suggestions.

Early swift banding operations have been reviewed by Calhoun (1938), Coffey (1938), and Calhoun and Dickinson (1942), thus making a further summary of the literature up to 1942 somewhat superfluous. Lowery (1943) reports on the dispersal of 21,414 Chimney Swifts banded at Baton Rouge, Louisiana, from 1937 to 1939. In a review of Lowery's paper, Coffey (1944) noted an interchange of Louisiana banded swifts with 20 other stations including 10 at Kingston. In 1944, Lincoln published an account of the recovery of 13 North American banded Chimney Swifts killed by Indians in northern Peru, probably during November or December 1943, thus establishing the wintering area of this species. Details of circumstances surrounding the discovery in Peru are related by Ganier (1944), Beck (1948), and Brackbill (1950). One of the 13 swifts was banded at Kingston, Ontario. Hitchcock (1945) banding at London, Ontario, trapped 2 flocks of swifts totalling 845. Swifts banded in Georgia and Blind River, Ontario, were among a flock of 758 captured at London during September 1940.

At Queen's University, Kingston, Ontario, banding of Chimney Swifts was started in the spring of 1928 by the late R. O. Merriman. In recent years the banding program has been under the supervision of the Department of Biology. The writer has participated in banding from 1945 to 1947 and is especially grateful to Miss Ida Merriman and Dr. H. W. Curran for help and encouragement during many phases of the work. Except for a three-year period (1941-1944), Chimney Swifts have been banded every year from 1928 to 1947, involving 45 banding operations. Only on two occasions has banding been attempted in the fall of the year, since swifts rarely roost in large flocks in the Kingston area during that season.

The swift trap used at Kingston is similar in design to that described by Lincoln (1947). (See Figure 1.) The birds were collected in 6 wire screen covered cages, each about the size of an orange crate. The open end of the cage was equipped with a cotton sleeve which could readily be slipped over the bottom of the stove-pipe funnel leading from the trap. As many as 75 birds were placed safely in one collecting cage. For many years the trap was set in place during the dark hours just before sunrise, but later it was found to be more convenient, and perfectly safe for the birds, to cover the chimney in the evening, shortly after the birds had entered.

Many devices were employed in efforts to arouse the trapped swifts within the chimney. A cowbell proved to be most effective. Some difficulty was experienced with large flocks where the "flow" of birds was frequently stopped by means of a door, to prevent overcrowding of the cages. After several interruptions of this nature the birds were usually reluctant to rise.

Great care was exercised in handling individual birds while banding for it was noticed that an "alarm" note from one swift would cause considerable unrest among those still remaining in the cages. During the 16 years

1 Received for publication February 22, 1952.

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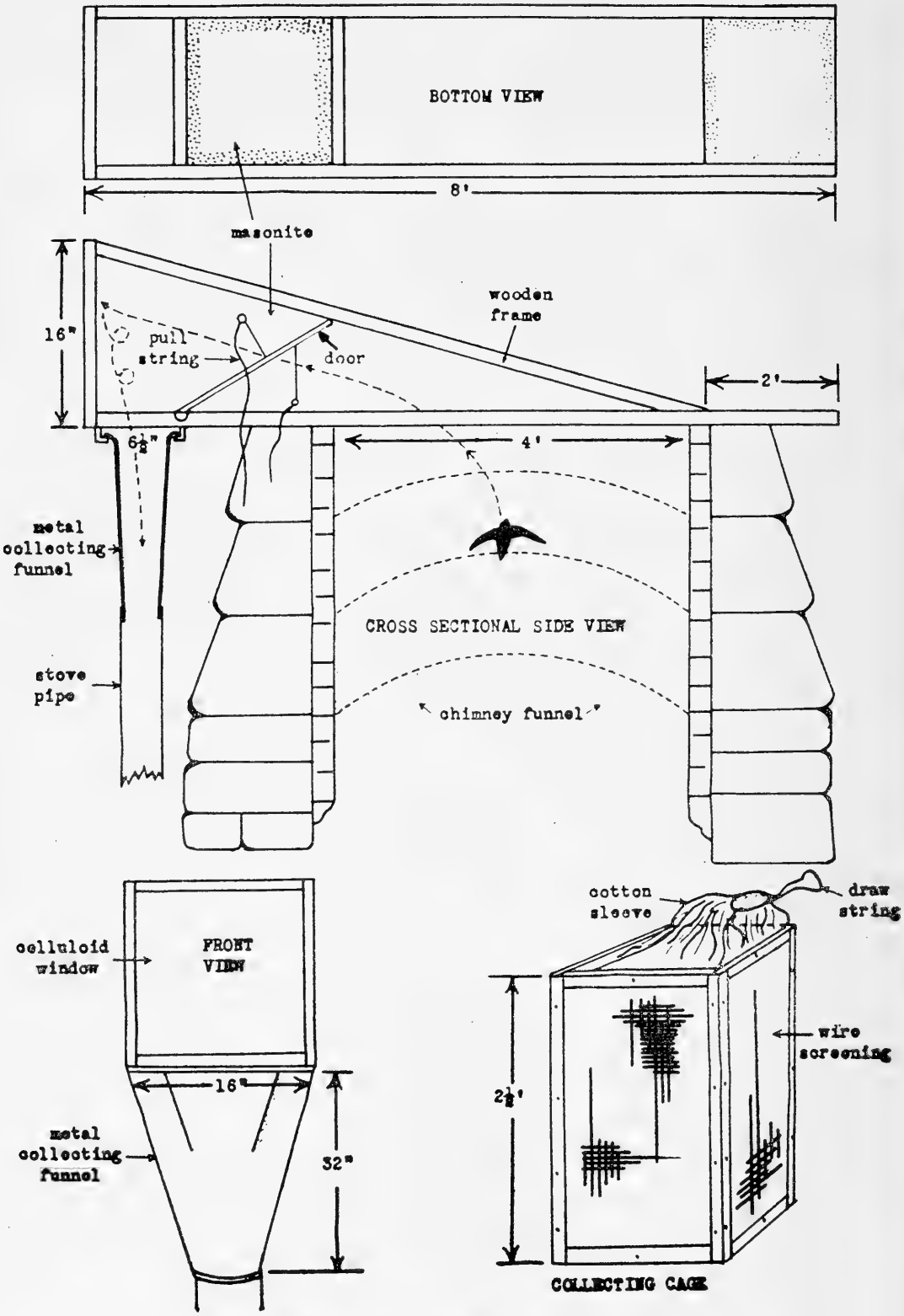

Fig. 1. Design of Chimney Swift trap and collecting cage.

of banding, less than 50 birds have been killed accidentally.

The following method of holding a swift for banding has been found to be most satisfactory. (See Figure 2.) With the bird placed ventral side up in the palm of the hand, the protruding wing and tail feathers are pressed firmly between the index and second fingers. In this position the bird is not compressed yet it is unable to move. The tip of the index finger with the aid of the thumb is still relatively free to hold the tarsus while attaching the band with the other hand. Bands were closed with the fingers alone so that an experienced bander working by himself could handle as many as three birds per minute.

Banding operations were not always attempted on the days that swifts were known to be roosting in one of the campus chimneys. Usually banding was done only as free time allowed and then only if the flock contained at least 200 birds. Thus only a small fraction of the total swift population migrating through Kingston in the spring has been trapped, banded, and released.

The largest flock of swifts to be trapped at one time contained 3,967 birds (May 18, 1945), only 1,000 of which were banded, while the remainder were examined for returns.

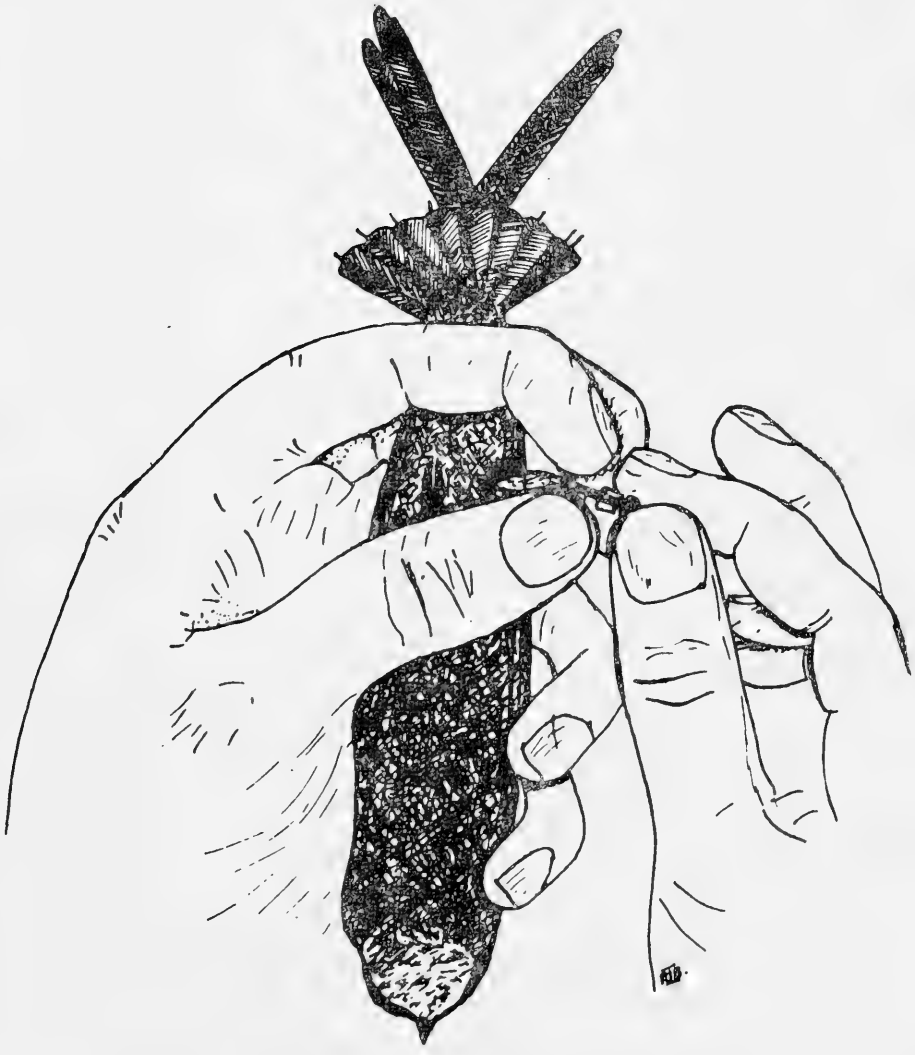

Figure 2. Method of holding a Chimney Swift while banding.

TABLE 1

SUMMARY OF RETURNS ON CHIMNEY SWIFTS BANDED AT KINGSTON, ONTARIO, FROM 1928 TO 1947 COMPILED FROM DATA RECEIVED UP TO APRIL 1, 1948.

Year	Day	No. birds banded	No. of returns*	Percent return	No. of swifts recaptured two or more times *				
					2X	3X	4X	5X	6X
1928	June 9	271	22	8.1	3	1			
	July 20	232	31	13.4	3	2			
1929	May 10	222	10	4.5	2				
	June 7	435	40	9.2	9	1			1
1930	May 10	87	11	12.6	4	2			
	May 24	218	42	19.3	8	1			
	June 7	157	37	23.6	5	4	3	1	
1931	May 16	81	21	25.9	6		1		
	June 6	202	51	25.2	15	1			
1932	May 7	469	20	4.2	10	1			
	May 16	127	26	20.5	5				
	May 29	1260	48	3.8	6	2			
	June 9	662	77	11.6	15	3			
1933	May 5	591	46	7.8	4		1		
	May 16	460	62	13.5	10	3		1	
	May 31	64	14	21.8	2				
1934	May 12	1141	86	8.0	15	7			
1935	May 8	303	33	10.8	3	1			
	May 12	451	66	14.6	12	4			
	May 16	337	25	7.4	5	2	2		
	May 24	1606	108	6.7	25	7			
1936	May 10	247	52	21.1	6	1			
	May 16	856	120	14.0	20	5			
	May 24	394	99	25.1	22	3			
	May 30	538	71	13.2	4	7	1		
1937	May 16	1259	122	9.7	11	2			
	May 23	352	64	18.1	10	7			
	June 6	288	108	37.5	21	6	1		
	Sept. 20	464	50	10.7	10	1			
1938	May 15	226	31	13.7					
	May 22	488	88	18.0	11	1			
	May 29	524	112	21.3	16	1	1		
1939	May 14	420	70	16.6	1				
	May 28	180	37	20.5	2	1			
1940	May 12	1100	54	4.9	3				
	May 16	236	28	11.8	1				
	May 19	600	46	7.7	2				
	May 22	200	24	12.0	2				
1941	May 6	200	12	6.0	2				
	May 12	200	15	7.5	4				
1945	May 18	1000	43	4.3	1				
	May 29	218	1	0.5					
1946	May 7	527	18	3.4					
1947	May 15	1892	1	0.0					
			145**						
1928 - 1947		21,930	2142	9.76	316	77	10	2	1

* All "returns" and "recoveries" are included in these figures; "repeats" are not.

** This figure includes miscellaneous banded birds on which no recoveries have been reported.

The average flock size is 500 birds, although on 7 occasions flocks of over 1,000 have been trapped.

On May 14, 1947, a flock estimated to contain about 10,000 swifts was seen migrating over Kingston. Large flocks of Chimney Swifts have been observed at other stations. During the fall at Baton Rouge, Louisiana, flocks of swifts have been observed by Lowery (1943) numbering in excess of an estimated 7,000 individuals. Bent (1940) cites an account given by Audubon (1840) of Chimney Swifts roosting in a hollow tree in Louisville, Kentucky during July. Audubon estimated that 9,000 birds roosted in this single tree. Peters (1937) banding in Georgia during the fall of 1936, captured 6,025 birds from one chimney at one time! At Memphis, Tennessee, approximately 350 airline miles due north of Baton Rouge, Coffey has reported flocks numbering over 5,000 swifts in the fall, while Groskin (1945) has observed many flocks between 5,000 and 10,000 at Ardmore, Pennsylvania, also in the fall. Hitchcock (1945) at London, Ontario, trapped a flock containing 758 birds in late September.

On the average, the peak of the Chimney Swift migration at Kingston is reached about the third week of May. When the month of May is warm and dry, the swift migration appears to be steady, with regular nightly roosting in Fleming Hall chimney. During rainy weather small flocks arriving at the chimney apparently remain there until the weather clears. As many as 4,000 swifts have been observed to accumulate over a 3 or 4 day rainy period.

The large chimney on Fleming Hall, although never used for smoke, is connected with the basement of the building and serves as a warm air flue. The temperature within the chimney on one occasion was found to be 65°F. The smokeless warm air and large inner surface area makes the chimney attractive to swifts, especially on cool, damp nights in April and early May.

During the 20-year period (1923-1947), 21,930 Chimney Swifts have been banded at Queen's University. (See Table 1.) Up to April 1, 1948, a total of 2,142 swifts have been heard from as returns at Kingston or as recoveries at other localities.[2] During the same period there has been a recovery of 46 swifts originally banded at a station other than Kingston. The average per cent return for all swifts banded at Kingston during the 20-year period is 9.7.

All flocks of swifts trapped at Queen's University are examined for returns and repeats.[2] Table 2 analyzes the data on flock composition for the years 1935 to 1947. In particular, it should be noted that there is a high percentage of returns toward the end of the migration season which is taken to mean that the late flocks are composed largely of younger birds.

Many swifts have been recovered at Kingston after a lapse of more than one breeding season subsequent to banding. For example, 312 swifts have been captured at Kingston two or more years after banding. (See Table 3.) One swift has been captured as a return no less than 6 times. An interesting record is that of a swift banded at Kingston on September 2, 1928, which was recovered 12 days later at Charleston, W.Va., and again the following spring on May 10 at Kingston. One of the most striking multiple recaptures is that of a swift banded at Baton Rouge, Louisiana, on September 24, 1938, which was trapped and released at Campbellton, New Brunswick, on June 11, 1939, and again at a point 15 miles southwest of Upsalquitch, New Brunswick, on August 22, 1940. Such records as these clearly demonstrate that a Chimney Swift may return year after year to the same locality.

An attempt has been made to construct a form of life table for the Chimney Swift, based on 2,480 returns and recoveries of Kingston banded birds. Pond (1940), in a review of Green's paper (1940), analyzes 627 returns and recoveries of swifts banded at Chattanooga, Tennesssee. Both series of data are presented in Table 4. Returns and recoveries have not been segregated in the calculations for Kingston or Chattanooga. Even so, these data are not strictly comparable because Green banded for only a three-year period (1928-1930) and hence could not obtain any returns after 1930, although recoveries would continue to be reported after this time. The almost continuous banding program at Kingston (1928-1947) has resulted in the accumulation of recoveries and returns throughout the entire period. Thus, data for Kingston

2 A "return" is a recapture of a bird at the same station where banded, or within 5 miles of that station if more than 3 months after banding. A "repeat" is the same as a return except that the time between banding and recapture must be less than 3 months. A "recovery" is a recapture of a bird at any time if more than 5 miles away from the point of banding.

TABLE 2

COMPOSITION OF CHIMNEY SWIFT FLOCKS TRAPPED AT KINGSTON, ONTARIO, 1935 - 1947

Year	Date	No. banded	Misc.*	No. returns in flock**	Flock total	Percentage of returns in flock
1935	May 8	303	25	86	414	20.8
	May 12	451	9	43	503	8.5
	May 16	337	15	14	366	3.8
	May 24	1606	43	8	1657	0.5
1936	May 10	247	14	56	317	14.8
	May 16	856	50	260	1166	22.3
	May 24	394	6	11	411	2.7
	May 30	538	13	18	569	3.2
1937	May 16	1259	431***	315	2005	15.8
	May 23	352	11	3	366	0.8
	June 6	288	18	2	308	0.6
	Sept. 20	464	—	97	560	17.3
1938	May 15	226	—	144	370	30.6
	May 22	488	—	104	592	17.6
	May 29	524	25	51	600	8.5
1939	May 14	420	—	218	638	34.2
	May 28	180	—	1	181	0.6
1940	May 12	1100	53	193	1346	14.3
	May 16	236	28	27	291	9.3
	May 19	600	40	153	793	19.3
	May 22	200	7	9	216	4.2
1941	May 6	200	50	157	407	38.6
	May 12	200	—	69	269	34.5
1945	May 18	1000	2772***	95	3967	9.5
	May 25	none	2028***	19	2047	0.9
	May 29	218	17	2	237	0.9
1946	May 7	527	40	79	656	12.1
1947	May 15	1892	100	50	2042	2.4

* These figures include accidental kills, escapes, and "repeats".
** These figures include all "returns" and "recoveries".
*** Swifts released without banding.

include a greater proportion of returns than the data for Chattanooga. It will be realized that for any one banding, recoveries depend upon the total number of birds banded, while returns depend upon the amount of subsequent retrapping.

Table 4 is not so imposing when it is understood that in making the calculations for the Kingston data it was assumed (1) that the decrease in returns during subsequent years is the result of mortality, (2) that the mortality rate is the same for all age groups, and (3) that all birds at banding are the same age. In order to construct a more meaningful life table for the Chimney Swift, it will be necessary to conduct a comprehensive program of nestling banding or devise some method of identifying first-year birds.

Green (1940) states that few swifts live to be more than four years of age and that the majority of the birds die between 2 and 3 years of age. Comparative data for Kingston do not support this conclusion nor could we justly expect these data to settle this matter in view of certain inherent fallacies in calculation mentioned above.

Only 5 Chattanooga banded swifts were reported alive 6 years after banding. According to Pond's calculations this figure is increased to 8. At Kingston, 177 banded swifts were reported alive 6 years after banding.

TABLE 3

ANALYSIS OF RETURNS* ON CHIMNEY SWIFTS 1 TO 11 YEARS SUBSEQUENT TO BANDING AT KINGSTON, ONTARIO.

Year	Date	Year of recapture subsequent to banding										
		1	2	3	4	5	6	7	8	9	10	11
1928	June 9	2	3	2	4	9	2	1				
	July 20	3	8	1	8	5	4	—	1	1		
1929	May 10	1	1	6	1	1	1					
	June 7	12	4	14	11	4	2	3	1			1
1930	May 10	1	7	4	3	1		2				
	May 24	9	13	14	3	7	2	1				
	June 7	11	20	9	7	5	3	2				
1931	May 16	11	7	4	3	4	1					
	June 6	25	20	11	5	6	1					
1932	May 7	9	9	3	—	1						
	May 16	12	12	9	3	5	1	1	15	6		
	May 29	24	8	4	7	4	2		1			
	June 9	33	29	12	14	6	1					
1933	May 5	21	18	9	1	2	1					
	May 16	30	19	12	6	2	2	3	1			
	May 31	5	4	4	4							
1934	May 12	28	31	18	2	1	9	1				
1935	May 8	25	9	3								
	May 12	48	18	7	6	7	1					
	May 16	16	8	3	—	1						
	May 24	78	29	11	9	7	5					
1936	May 10	38	12	8	5	5					1	
	May 16	90	15	16	15	6				1	1	
	May 24	81	15	9	10	4				1		
	May 30	49	12	8	9	1						
1937	May 16	36	24	28	13				3			
	May 23	42	7	15	5				5	2		
	June 6	71	14	22	10				5	1		
	Sept. 20	25	14	13	5				4			
1938	May 15	39	11	2				12				
	May 22	27	39	18				3	1	1		
	May 29	39	53	23				8	2	1		
1939	May 14	45	15				7	2	1			
	May 28	21	7				4	5	1			
1940	May 12	30				15	9					
	May 16	18				4	3	1				
	May 19	25				10	4	1				
	May 22	11				8	4	2				
1941	May 6					14						
	May 12					8	7	2				
1945	May 18	35	5									
	May 29		1									
1946	May 7	15										
Totals		1141	521	312	191	138	71	48	41	14	2	1

* These figures include all "returns" and "recoveries"

TABLE 4

NUMBER OF CHIMNEY SWIFTS RECOVERED 1 TO 11 YEARS SUBSEQUENT TO BANDING AT CHATTANOOGA, TENNESSEE AND KINGSTON, ONTARIO.*

No. of years subsequent to banding	Chattanooga** Tennessee		Kingston*** Ontario	
	Totals	Percentages	Totals	Percentages
1	406	65.9%	1141	46.0%
2	147	23.2	521	21.0
3	20	3.4	312	12.5
4	11	1.8	191	7.7
5	17	2.8	138	5.5
6	8	1.3	71	2.9
7	3	0.5	48	1.9
8	—	—	41	1.7
9	3	0.5	14	0.6
10	1	0.3	2	0.08
11	1	0.3	1	0.004

* Totals include "returns" and "recoveries".
** Totals as calculated from Green's data (1940) by Pond (1940).
*** Totals from table 3.

Green's age record is 11 years 6 days, i.e. banded October 16, 1928, recaptured October 22, 1939. The age record for Kingston is 11 years less 19 days, i.e. banded June 7, 1929, recaptured May 19, 1940. In fact this bird was at least about 10 months older since it was banded in the spring and not in the fall of the year as was Green's record bird.

Bent (1940) states, "Every ten years or so the swifts do not appear about our house in the spring. Something has gone wrong on their journey northward. Our chimneys will be empty this year. . ." Examination of the somewhat scanty data on flock size and per cent return (Table 1) reveals no evidence in support of a ten-year population fluctuation as suggested by Bent.

A continuous record of repeats was not kept at Kingston although a few complete records are available and these are presented in Table 5. From these meager data it seems that there is a decided shift in the local population of swifts every few days, if not daily. For example, on May 25, 1945, only 2.2% (22) of the 1,000 swifts banded 7 days previously were retrapped as "repeats". The change in flock composition may be due primarily to a mass immigration and emigration of birds and secondarily to local movements within the Kingston area. There is need for additional trapping stations in the Kingston area in order to determine the nature of flock turnover during migration.

In general, the breeding range of the Chimney Swift extends from Newfoundland across southern Quebec to southeastern Saskatchewan south to Florida and eastern Texas. Kingston banded swifts have been recovered over a considerable part of this range. (See Figure 3.) The most northerly as well as easterly point of recovery in North America is Kamouraska, Quebec, located on the south shore of the St. Lawrence River, approximately 300 miles northeast of Kingston. The most westerly point in Canada is Blind River, Ontario, on the northwestern shore of Lake Huron. In the United States, the most westerly recovery point is Beeville, Texas. Gainesville, Florida, is the most southeasterly recovery point. One notable Kingston banded swift was recovered in Peru, South America, near the Yanayaco River, in the region between Putamayo and Napo rivers.

It is interesting to note that no Kingston banded swift has been recovered west of a line running from Baton Rouge, Louisiana, to Chicago, Illinois, exclusive of two records in the Gulf region. Calhoun and Dickinson (1942) banding at Charlottesville, Virginia, and Hitchcock (1945) at London, Ontario, likewise reported no recoveries west of the aforementioned line. By contrast, banders in Memphis, Nashville, and Chattanooga, Tennessee, as well as in Baton Rouge, Louisiana, have recoveries both east and west of the Mississippi River. This suggests that the

TABLE 5

ANALYSIS OF REPEATS ON CHIMNEY SWIFTS AT KINGSTON, ONTARIO.

Year	Date banded	No. banded	Date of repeat	No. of repeats	Percentage repeats
1928	June 9	271	July 20	30	11.0%
1935	May 8	303	May 12	3	1.0
			May 16	3	1.0
			May 24	2	0.7
1936	May 10	247	May 16	39	16.0
			May 24	2	0.8
			May 30	2	0.8
	May 16	856	May 24	4	0.5
			May 30	4	0.5
	May 24	394	May 30	8	2.0
1938	May 15	226	May 22	2	0.9
			May 29	3	1.3
	May 22	488	May 29	11	2.3
1945	May 18	1000	May 25	22	2.2
			May 29	1	0.1

eastern "flyways" are relatively stable, with little or no diffusion with more westerly ones.

From an analysis of the returns of Chimney Swifts banded at Baton Rouge, Louisiana, Lowery (1943) states that the Lower Mississippi Valley is an area of convergence as shown by the recovery of birds in Nova Scotia, New Brunswick, Ontario, Manitoba, and South Dakota.

Calhoun and Dickinson (1942) suggest that in the spring, Chimney Swifts passing through Charlottesville, Virginia, ". . . follow a route which seems to be limited on the east of the Appalachian Mountains to the Piedmont Region, lying at an elevation between 500 and 1,000 ft. This flyway between Alabama and southern New York is designated the Piedmont Flyway." They conclude that part of the migrants use the Mississippi flyway in the fall migration, ". . . but they nearly always use the Piedmont Flyway in the spring."

Recoveries of Kingston banded swifts during the fall are, interestingly enough, equally numerous at points both east and west of the Appalachian Mountains (Tables 6 and 7). These data would support Calhoun and Dickinson's conclusion that part of the swifts using the Piedmont flyway in the spring, use the Mississippi flyway in the fall migration. The fact that there are so few recoveries west of the Appalachians during the spring is probably explained by the fact that there are few banding stations in this region, and what few there are operate chiefly in the fall of the year. To a lesser degree this also applies to the area east of the Appalachians. Thus our data at present strongly suggest that swifts use the Mississippi and Piedmont flyways to about the same extent during the autumn, but due to a paucity of records east and west of the Appalachians during the spring, little can be said about flyway preference for that season.

For a discussion of the probable migration routes of the Chimney Swift between North and Central America, the somewhat controversial papers of Lowery (1943, 1945, and 1946) and Williams (1945, 1947, 1950a, and 1950b) should be consulted.

Within the Province of Ontario there has been an interchange of birds between Kingston and Blind River, between Blind River and London; however, there are none between London and Kingston. One Toronto banded swift has been trapped at Kingston, and vice versa, banding and recapture in both cases occurring in different years.

In correlating the data on banding recoveries with possible migration routes, it is often useful to have a general picture of the rate of advance and retreat of a species throughout its range. With this in mind, the writer has prepared a tentative isochronal map which shows the rate of dispersal of the

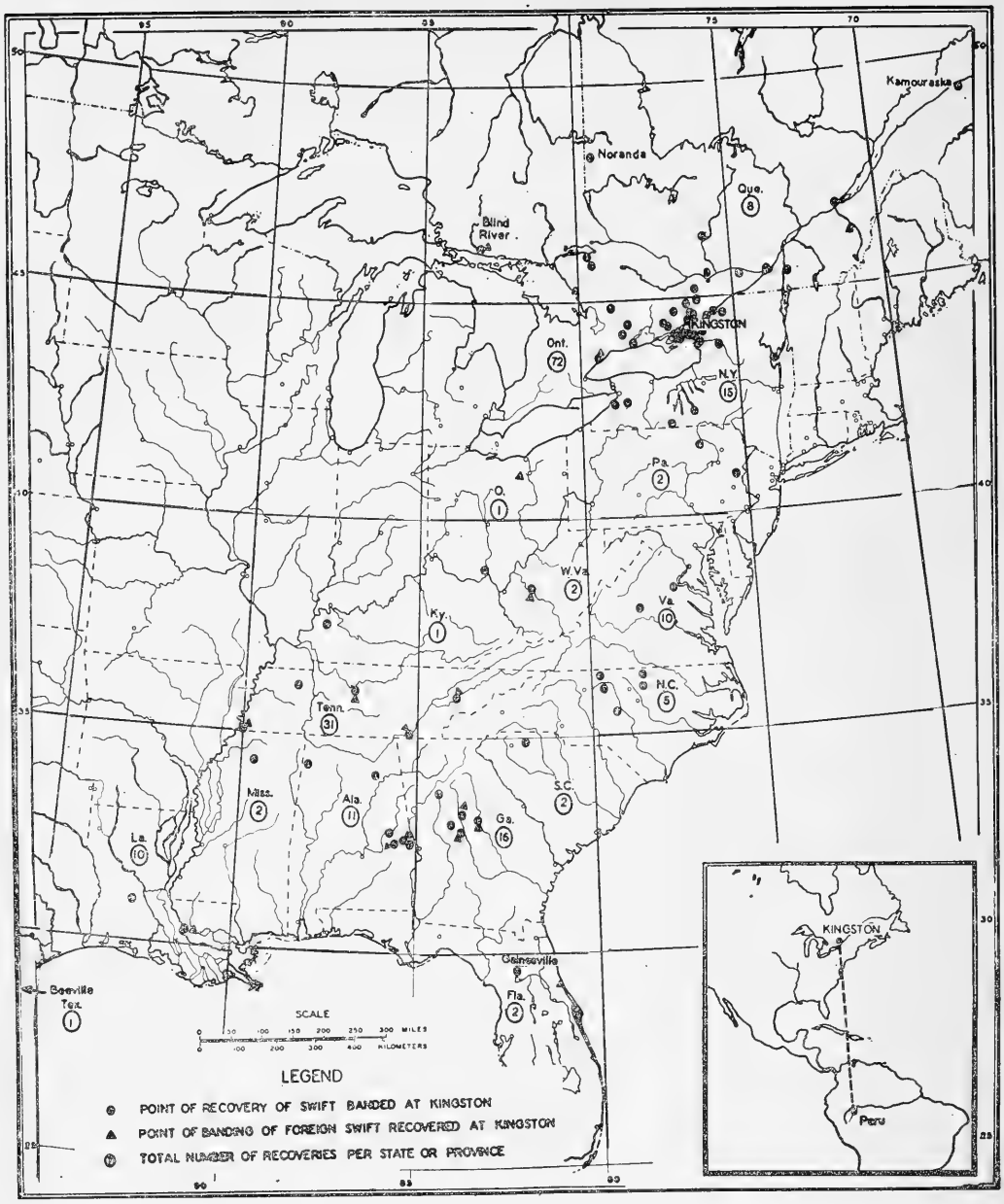

Figure 3. Distribution of recoveries of Chimney Swifts banded at Kingston, Ontario.

Chimney Swift in North America in the spring (Figure 4).

In preparing the map, two types of spring migration records were used: (1) an average of several years' records of earliest spring arrival dates obtained by one or more observers in the same area (the bulk of the records), and (2) a record of first appearance for any one year. There are many single records of first arrivals not marked on the map for the reason that they duplicated the data for a station close by, but nevertheless were considered when establishing the position of an "isochrone" in the area concerned. The records were obtained directly from observers and from the literature, but in areas where data were unavailable, extrapolation was resorted to.

Isochronal lines have been drawn at 5-day intervals. The Chimney Swift disperses over

TABLE 6

RECOVERIES OF KINGSTON BANDED SWIFTS EAST OF THE APPALACHIAN MOUNTAINS DURING THE SPRING AND FALL

Locality	Spring	Fall
ALABAMA:		
Auburn	—	4 (2S)*
Collinsville	—	1
Camp Hill	—	1 (S)
Opelika	—	3
Redbay	—	1
Salem	—	1
FLORIDA:		
Gainesville	—	2 (1S)
GEORGIA:		
Atlanta	—	2 (1S)
Forsyth	—	2 (2S)
Macon	1	6 (1S)
Milledgeville	1	2
NORTH CAROLINA:		
Franklinton	1	—
Greensboro	—	1 (S)
Henderson	—	1 (S)
Leaksville	—	1
Sanford	—	1
SOUTH CAROLINA:		
Spartanburg	2	—
PENNSYLVANIA:		
New Albany	1	—
Bushkill	—	1
VIRGINIA:		
Charlottesville	3	6 (2S)
Fredericksburg	—	1
TOTALS	9	37 (12S)

* S indicates the number of birds banded and recovered during the same year.

most of its breeding range in North America on the average from March 21 to May 24, roughly 2 months. The distinctive cone-shaped "isochrones" of the lower Mississippi Valley suggest that the movement of swifts is more rapid along the axis of the cone, i.e. the Mississippi River, than at the periphery. The Mississippi delta is probably a focal point for the northward dispersal of swifts arriving from Central America. Undoubtedly a funnelling of swifts occurs along other river valleys throughout the country, e.g. along the Hudson, Mohawk, and Delaware rivers in New York State, where slightly cone-shaped "isochrones" exist.

The average records of first arrivals in Baton Rouge, Louisiana, and Memphis, Tennessee, differ at the most by only about 5 days. This means that the Chimney Swift advances as much as 60 miles in one day. The same rate applies to the period April 19-24 although at other times the pace is considerably slower. The fairly rapid rate of advance of this species seems entirely plausible in view of an interesting record mentioned by Coffey (1944). A swift banded

TABLE 7

RECOVERIES OF KINGSTON BANDED SWIFTS WEST OF THE APPALACHIAN MOUNTAINS DURING THE SPRING AND FALL

Locality	Spring	Fall
KENTUCKY:		
Madisonville	—	1
MISSISSIPPI:		
Brookhaven	—	1
Watervalley	1	—
OHIO:		
Portsmouth	—	1
TENNESSEE:		
Chattanooga	—	5 (1S)*
Knoxville	—	3
Memphis	—	10 (6S)
McKenzie	—	1
Nashville	—	12 (3S)
Viola	—	1 (S)
WEST VIRGINIA:		
Charleston	—	2 (2S)
TOTALS	1	37 (12S)

* S indicates the number of birds banded and recovered during the same year.

at Lexington, Mo., on September 23, 1938, arrived at Baton Rouge, Louisiana, on September 26, 1938. A rate of 200 miles per day would be necessary to cover the 600 airline mile distance in 3 days. Calhoun (1938) remarks on a swift banded at Baton Rouge, Louisiana, on September 27, by G. H. Lowery, Jr., which was captured 5 days later at a point 460 miles north-northwest. Thus the bird must have flown about 100 miles a day in order to cover the distance. Green (1940) reports that a swift banded a Chattanooga, Tennessee, was recovered on the same day, 100 miles distant. Rapid travelling such as this may help to explain why arrival dates along the Gulf coast have no regular pattern. For example, Williams (1945) gives the following dates for the Chimney Swift: in 1940 they were first seen at Rockport on March 29; at Kemah, 170 miles north of Rockport, on March 30; at Cover, 190 miles northeast of Rockport, on March 24, and at Pensacola on March 27.

It is interesting to note that the records of swift arrival in Florida are later than those in Texas and Louisiana. This fact, correlated with the paucity of recoveries of banded swifts, is taken to mean that the Chimney Swift reaches the continental United States by a route other than through Florida.

In general, the isochronal lines of April 14 and May 14 correspond reasonably well with the average 50 degree F. isotherms for April and May. The average arrival date for the swift in Baton Rouge, Louisiana (March 21, 9 year record) corresponds more closely to the average 60 degree F. isotherm for March. This suggests that the arrival of this species in the Gulf region is adjusted to a time which will assure the birds an adequate supply of aerial insect food, presumably when the 60 degree isotherm has reached the north Gulf coast.

SUMMARY

This paper reports on the results of Chimney Swift banding at Kingston, Ontario, from 1928 to 1947. During the 19-year period, 21,930 Chimney Swifts have been banded with 2,142 returns and recoveries reported up to April 1, 1948. The average per cent return on Kingston-banded swifts is thus 9.7. Band-

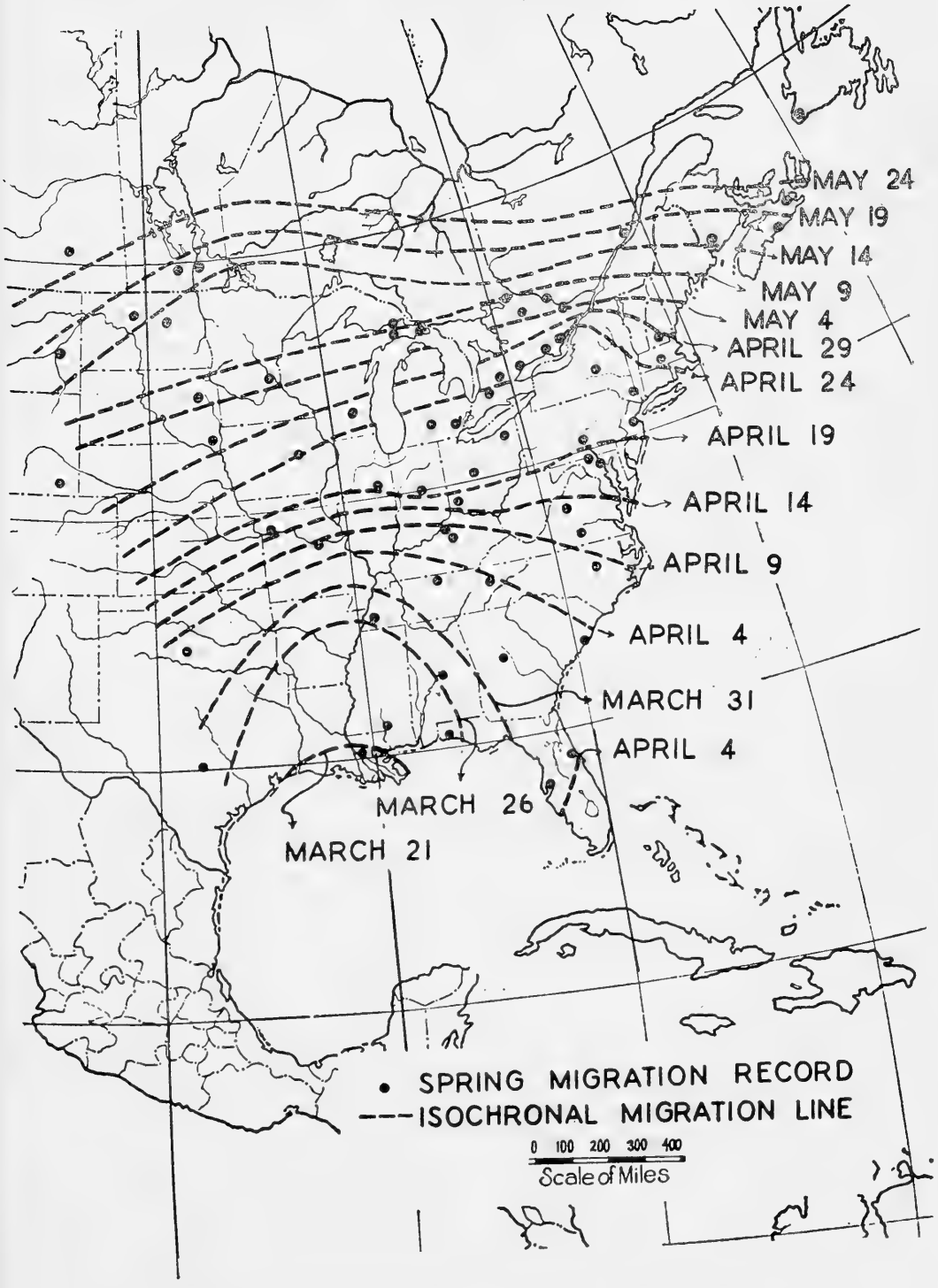

Figure 4. Isochronal map for the Chimney Swift in North America.

ing at Kingston has been done almost exclusively in the spring of the year. Only a small fraction of the total swift population passing through Kingston in the spring has been trapped, banded, and released. The peak of the Chimney Swift migration in Kingston is reached on or about the third week of May. The largest flock of swifts to be trapped at one time contained 3,967 birds. In view of the higher percentage of returns in flocks trapped toward the end of the migration season, it has been assumed that the late flocks are composed largely of younger birds. The age record for a Kingston-banded swift is approximately 12 years. A rapid turnover of the swift population in the Kingston area during the spring migration is suggested by the data on repeats. A map showing the distribution of recoveries of Kingston-banded swifts is included. Birds have been recovered in 15 states, 2 provinces, and in Peru, South America. A form of life table for the Chimney Swift is presented with a discussion of its limitations. Recovery data strongly suggest that swifts use the Mississippi and Piedmont flyways to about the same extent during the autumn, but due to a paucity of records east and west of the Appalachian Mountains during the spring of the year, little can be said about flyway preference for this season. A tentative isochronal map for the Chimney Swift is included. The Chimney Swift disperses over most of its breeding range in North America on the average from March 21 to May 24, roughly 2 months.

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VASCULAR PLANTS FROM MILL ISLAND, HUDSON STRAIT[1]

NICHOLAS POLUNIN

Gray Herbarium of Harvard University, Cambridge, Mass.

DURING July and August, 1951, some time was spent on Mill Island by Dr. Deric O'Bryan and Mr. Daniel Rogers of the Arctic, Desert and Tropic Information Center, Research Studies Institute, Air University, Maxwell Air Force Base, Alabama, U.S.A. The main object of their visit was archaeological, the work being under the auspices of the Arctic Institute of North America under contractual agreements with the Office of Naval Research and undertaken with the co-operation of the United States and Royal Canadian Air Forces; but the opportunity was fortunatelq taken to collect some plants. These appear to have been the first to be gathered on this little-known island, and, as the vascular species among them were recently sent to me for identification, I feel it incumbent upon me to record them.

Mill Island and the adjacent smaller Putnam Island lie around lat. 64°N. and long. 78°W. near the western outlet of Hudson Strait into northeastern Hudson Bay (*see* map). From a distance they look dark and hummocky, the coast-line being rugged and the bedrock igneous. According to notes kindly supplied by Mr. Rogers, the plants were collected at "Morrissey Harbor, Mill Island, July to August 1951"—some of them "in the immediate vicinity of the camp site" where "The soil was sandy without humus . . . There was no bedrock and permafrost could not be found at five feet . . . The rest of the plants, except those marked as coming from 'meadows', were collected in the sandy area over a humus type of black soil. The flowering plants were generally associated with moss-covered soil. In thie area there was permafrost or bedrock within eighteen inches of the surface. The soil was very damp and cold. The plants collected from the . . . 'meadows' were found in very marshy type of soil."

There follows an annotated list of the 28 species of vascular plants which I have determined in this material from Mill Island (whether from orthodox specimens or mere chance scraps) and arranged according to my 'Botany of the Canadian Eastern Arctic. Part I, Pteridophyta and Spermatophyta',[2] the nomenclature being brought up to date where necessary, and it may be noted that each is not merely a commonly recognized arctic species but is already recorded in that work as widespread and usually plentiful in such adjacent regions as have been botanically explored.

EQUISETACEAE

Equisetum variegatum Schleich. Recorded from most adjacent areas that have been actively botanized, and probably overlooked in the others.

LYCOPODIACEAE

Lycopodium selago L. Plentiful probably throughout this general region.

GRAMINEAE

Trisetum spicatum (L.) Richt. Plentiful probably throughout the general region.

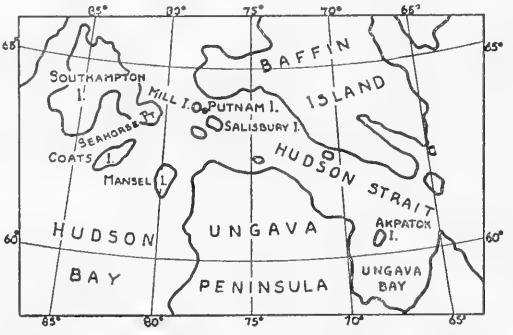
Poa arctica R. Br. Abundant probably throughout the general region.

Puccinellia phryganodes (Trin.) Scribn. & Merrill. Widely overlooked owing to its unattractive matted habit and salt-marsh habitat, but recorded from nearby Southampton Island and both sides of Hudson Strait, and probably abundant along sea shores in the general region.

Elymus arenarius L. var. **villosus** E. Meyer. Plentiful along shores in the general region.

CYPERACEAE

Eriophorum scheuchzeri Hoppe. Abundant probably throughout the general region.



Sketch map showing location of Mill Island.

1 Received for publication March 2, 1952.

2 National Museum of Canada Bulletin No. 92, pp. vi + 408, 1940.

Carex misandra R.Br. Plentiful probably throughout the general region, and very likely abundant, but the records are not as numerous as for many species—presumably owing to its unassuming grass-like form.

C. membranacea Hook. Abundant probably throughout the general region.

SALICACEAE

Salix reticulata L. Abundant probably throughout the general region, but represented by only a few loose and withered leaves in the present collection.

S. herbacea L. Abundant probably throughout the general region.

S. arctica Pall., *s.l.* Abundant in several of its numerous forms probably throughout the general region.

S. calcicola Fernald & Wiegand. Plentiful in at least some adjacent areas.

POLYGONACEAE

Oxyria digyna (L.) Hill. Abundant probably throughout the general region.

Polygonum viviparum L. Abundant probably throughout the general region.

CARYOPHYLLACEAE

Silene acaulis L. var. **exscapa** (All.) DC. Abundant probably throughout the general region.

Lychnis apetala L. Abundant probably throughout the general region.

Cerastium alpinum L., *s.l.* Abundant in one or another of its various forms probably throughout the general region.

Stellaria humifusa Rottb. Appears to be recorded among the islands of Hudson Bay and Strait only from Southampton Island (and an immediate satellite), but this is probably owing to its diminutive form and restricted salt-marsh habitat, as it has been found almost everywhere along shores in the general region that have been searched by a sufficiently ecologically minded collector.

PAPAVERACEAE

Papaver radicatum Rottb. Abundant probably throughout the general region.

CRUCIFERAE

Draba alpina L. Abundant in various forms probably throughout the general region. The presence of only a single species of this usually well represented family suggests that the collecting in 1951 was largely fortuitous.

SAXIFRAGACEAE

Saxifraga cernua L. Abundant probably throughout the general region.

S. oppositifolia L. Abundant probably throughout the general region.

S. tricuspidata Rottby. Plentiful probably throughout the general region.

ROSACEAE

Dryas integrifolia M. Vahl. Abundant probably throughout the general region.

ONAGRACEAE

Epilobium latifolium L. Although there are rather few reports of this handsome species from the islands of Hudson Strait and Bay, it may yet prove to be plentiful thereon, as it is in the adjacent parts of the mainland and on Baffin Island.

ERICACEAE

Cassiope tetragona (L.) D.Don. Abundant probably throughout the general region.

COMPOSITAE

Erigeron humilis Graham (*E. unalaschkensis* (DC.) Vierh.). Even though there are not many reports of this species from the Islands of Hudson Strait and Bay (apart from southern Baffin Island), it is probably plentiful throughout the region, being often overlooked owing to its characteristic 'late-snow' habitat and diminutive form.

In addition there were collected on gravelly soil near the shore at Seashore Point, which is the easternmost extremity of Southampton Island and the nearest point of that considerable land-mass to Mill Island (*see* map), the following 6 phanerogams—all of which have previously been recorded from Southampton Island where indeed each one is plentiful and widespread: *Salix herbacea* L., *Oxyria digyna* (L.) Hill, *Silene acaulia* var. *exscapa* (All.) DC., *Saxifraga tricuspidata* Rottb., *Dryas intergifolia* M. Vahl, and *Pedicularis lanata* Cham & Schlecht.

For such reasons as the very poor representation, or even omission, of some of the larger families and genera, and their frequency in the better-known areas of the same general region, it seems safe to conclude that the above list of plants from Mill Island, although useful as a start, indicates only a small proportion of the total vascular flora, while the lower cryptogams are doubtless far more numerous. In this and other connections it may be of interest to list the special vascular *florulae* that in recent years have

been published of islands in Hudson Bay and Strait; although most of the relevant information was gathered together and the data revised in my work already cited, much of significance has been added since.

On Southampton Island we have H. M. Raup's "Pteridophyta and Spermatophyta of Southampton Island" *(Memoirs of the Carnegie Museum,* vol. 12, part 3, pp. 17-30 1936), the present writer's "The flora of Southampton Island, Hudson Bay" (*Journal of Botany,* vol. 76, pp. 93-103, 1938) and "Additions to the floras of Southampton and Mansel Islands, Hudson Bay" (*Contributions from the Gray Herbarium of Harvard University.* No. 165, pp. 94-105, 1947), and W. J. Cody's "Additions and annotations to the flora of Southampton Island, Northwest Territories, Canada" (*Canadian Field-Naturalist,* vol. 65, pp. 140-3, 1951); on Mansel Island, we have the present author's "Vascular plants from Mansel (Mansfield) Island, N.W.T." *(ibid.,* vol. 52, pp. 5-9, 1938) as well as his "Additions" cited above; on Salisbury Island, we have the present writer's "On some plants from Salisbury Island, collected by Major L. T. Burwash in 1924 and by the Hon. J. N. S. Buchan in 1938" (*ibid.,* vol. 54, pp. 9-10, 1940), and on Akpatok Island we have his earlier "The flora of Akpatok Island, Hudson Strait" (*Journal of Botany,* vol. 72, pp. 197-204, 1934).

Besides the gentlemen mentioned above to whom is owed this opportunity to offer a preliminary florula of Mill Island, it is a pleasure to thank the John Simon Guggenheim Memorial Foundation for a research fellowship and Harvard University for a renewed honorary appointment to help me continue my various studies in arctic botany and ecology.

PHYTOPLANKTON OF SOME MARITIME LAKES [1]

ELWYN O. HUGHES [2]

IN an earlier paper (Hughes, 1950) the author has reviewed the literature on the fresh-water algae of the Maritime Provinces. Since most of the species reported in that paper were found in collections taken from the littoral regions of lakes, ponds, and streams, the strictly limnetic phytoplankton is not adequately described. Professor C. W. Lowe's list of algae from Lake Jesse, Nova Scotia, (M. W. Smith, 1938) appears to be the only previous record of freshwater phytoplankton from the Maritime Provinces.

From Dr. M. W. Smith of the Atlantic Biological station, the author has received 22 collections[3] of phytoplankton taken over a period of several years from eight small lakes in Charlotte County, N.B. The algae were collected by towing a No. 20 bolting silk net to a depth of one metre. Names of the lakes and dates on which collections were made are:

Bonaparte Lake—July, 1948.

Crecy Lake—Aug. and Sept. 1942; June 1948.

Gibson Lake—Sept. and Oct. 1947; June, Aug. and Sept. 1948.

Kerr Lake (North Lake)—July 1948.

Limeburner Lake—June 1948.

Potter's Lake—May, June, July, Sept. and Oct. 1938.

St. Patrick Lake—July 1948.

Welch Lake—Aug. and Sept. 1942; July 1948.

The limnology of seven of these lakes (excluding Potter's) is described in detail by M. W. Smith (1952). In general it may be stated that they all lie in a Devonian granite region and that their waters are stained to varying degrees by bog drainage. The lakes are low in carbonates (mean value of bound CO_2, 3.3 ml. per 1.) with a surface pH of 6.8-7.0. Calcium content is low (2.4-4.3 p.p.m.) and total phosphorus content averages about 0.015 p.p.m. Physical and chemical characteristics of the lakes are similar to the soft-water lakes of northern Michigan and Wisconsin (Prescott, 1951).

The primary concern of the author has been the specific identification of the algae present in the Charlotte County lakes. It was evident that dominance in the collections was restricted primarily to six genera (excluding diatoms). These genera were *Anabaena, Microcystis, Ceratium, Dinobryon, Botryococcus* and *Staurastrum.* The same six

1 Manuscript received March 11, 1952.
2 Division of Applied Biology, National Research Laboratories, Ottawa, Ontario.
3 Species identified from eight of these collections are also being reported by Smith (1952).

genera were also the most widespread, each of them occurring in at least five of the lakes examined. Over half of the species identified were desmids, the long-armed species of *Staurastrum* being especially numerous.

The sparsity of Chlorococcales (excepting *Botryococcus* which may not belong in this order) and the great variety of the desmid flora leads one to assign the phytoplankton to the Caledonian type (G. M. Smith, 1950). This interpretation is in keeping with the low pH and calcium content of the waters, and with the geology of the region.

Further examination of some of the author's collections from a small lake in Nova Scotia has revealed the presence of several previously unidentified dinophyceans. For the sake of the record, these species (identified by Dr. R. H. Thompson of the University of Kansas) are included in the appended catalogue.

All genera in the taxonomic list are described in G. M. Smith's "Fresh-water Algea of the United States", in which are also contained useful references for identification of species. Most of the species are illustrated by Smith (1920, 1924), Irénée-Marie (1939), or Prescott (1951). Additional references where necessary are cited in the catalogue of species.

The list includes 119 species and varieties of algae, 45 of which are new records for the Maritime Provinces, six new to Nova Scotia, and 74 new to New Brunswick. Distribution is indicated by the initial letter of the name of the lake or lakes in which each species has been found.

CATALOGUE OF SPECIES

* New to New Brunswick
** New to the Maritime Provinces

Myxophyceae

** *Anabaena flos-aquae* (Lyngb.) Bréb. (B,G, K,W)
** *Aphanocapsa elachista* W. & G. S. West (S,L)
** *A. elachista* var. *planctonica* G. M. Smith (L)
* *A. delicatissima* W. & G. S. West (G)
** *Aphanothece clathrata* W. & G. S. West (S)
A. stagnina (Sprengel) A. Braun (G)
* *Chroococcus limneticus* Lemm. (G)
Coelosphaerium naegelianum Ung. (L,P)
** *Gomphosphaeria aponina* Kütz. (L)
Microcystis aeruginosa Kütz. (B,G,L,K,S, W)
Reasons for the retention of the name *Microcystis* rather than *Polycystis* are given by Prescott (1951).
** *M. incerta* Lemm. (G,W)
** *Rhabdoderma sigmoidea* Carter (W)

Dinophyceae

All dinophyceans reported as new records from the Maritime Provinces (**) were collected from a small artificial lake near Charleston, Queen's County, Nova Scotia. *Peridinium cinctum* (O. F. M.) Ehrenb. (?) listed by Smith (1952) from St. Patrick Lake should be excluded.

* *Ceratium carolinianum* (Bailey) Jorgensen (W)
Ceratium hirundinella (O. F. M.) Schrank (B,G,K,S,W)
C. hirundinella fa. *robustum* Amberg (W)
** *Cystodinium iners* Geitler
** *Glenodinium penardiforme* (Lind.) Schiller
** *G. palustre* (Lemm.) Schiller
** *Peridinium centenniale* (Playf.) Lefev.
P. limbatum (Stokes) Lemm. (P)
** *P. umbonatum* Stein
** *Raciborskia bicornis* Wolosz.

Chrysophyceae

* *Chrysosphaerella longispina* Laut. (W,P)
** *Dinobryon bavaricum* Imhof (B,C,G,K,S, W)
D. cylindricum Imhof (L,S)
* *D. divergens* Imhof (B,G,K,L,S)
D. sertularia Ehrenb. (P,S,W)
Mallomonas caudata Iwanoff (P,S)
Synura uvella Ehrenb. (P,S)

Bacillariophyceae [4]

Asterionella formosa Hass. (B,G,L,K,P,S)
Cyclotella compta (Ehrenb.) Kütz. (S)
Diatoma elongatum (Lyngb.) Agardh (G)
Eunotia pectinalis (Kütz.) Rabenh. (L)
Eu. robusta Ralfs (S)
Fragillaria crotonensis Kitton (G)
Melosira granulata (Ehrenb.) Ralfs (G,P)
Tabellaria fenestrata (Lyngb.) Kütz. (L,S)
T. flocculosa (Roth) Kütz. (G)

Chlorophyceae

Volvocales
** *Eudorina elegans* Ehrenb. (S,W)
* *Pandorina morum* Bory (S,W)
Chlorococcales
Botryococcus braunii Kütz. (G,K,L,S,W)
* *Coelastrum cambricum* Archer (G)
Crucigenia irregularis Wille (P)
Dictyosphaerium pulchellum Wood (G,S)
* *Dimorphococcus lunatus* A. Br. (L)

4 Identified by Ivan L. Ophel.

Kirchneriella lunaris (Kirch.) Moeb. (G,S)
** *Oocystis borgei* Snow (G)
** *O. lacustre* Chodat (G)
Pediastrum araneosum Racib. (G,S)
P. araneosum var. *rugulosum* (G. S. West) G. M. Smith (G,K)
P. boryanum (Turp.) Menegh. (G,P)
** *P. duplex* var. *clathratum* (A. Br.) Lagerh. (L)
Scenedesmus armatus (Chod.) G. M. Smith (G)
Scenedesmus quadricauda (Turp.) Bréb. (S)
Selenastrum bibraianum Reinsch (G)
S. bibraianum var. *gracile* (Reinsch) Ahl. & Tiff. (G)
Sorastrum americanum (Bohl.) Schmidle (G)
** *Westella botryoides* (W. West) de Wildm. (G,L)

Tetrasporales

** *Gloeocystis gigas* (Kütz.) Lagerh. (C,G,S)
** *Tetraspora lacustris* Lemm. (?) (L)
This material is distributed throughout the collection but because of partial disintegration the identification is uncertain.

Desmidiales

All the following species of *Arthrodesmus* and one of the *Staurastrum* species (*St. cuspidatum* Bréb.) have been transferred by Teiling (1948) to the genus *Staurodesmus*. There is sound argument for the recognition of this genus, created to contain the monospinous species of *Arthrodesmus* and *Staurastrum*. The name has not been adopted in this paper chiefly because extensive nomenclatural changes would be involved if the author did not choose to follow the infra-specific concepts introduced by Teiling.

* *Arthrodesmus incus* (Bréb.) Hass. (B)
A. incus fa. *minor* W. & G. S. West (S)
* *A. incus* var. *extensus* Andersson (C)
** *A. ralfsii* var. *brebissonii* (Racib.) G. M. Smith fa. **limnophilus** (Teil.) comb. nov. (C)
syn. *Staurodesmus glabrus* (Ehrenb.) Teil. subsp. *brebissonii* (Racib.) Teil. fa. *limnophilus* Teiling 1948
** *A. subulatus* Kütz. (W)
** *A. triangularis* Lagerh. var. *inflatus* W. & G. S. West fa. *robustus* W. & G. S. West (K)
A. triangularis var. *rotundatus* (Racib.) G. M. Smith (P)
* *A. triangularis* var. *subtriangularis* (Borge) W. & G. S. West (W)
Differs from previously published descriptions by a slight convergence of the spines.
Closterium archerianum Cleve (P)
Cl. costatum Corda (P)
Cl. costatum var. *westii* Cush. (P)
Cl. kuetzingii Bréb. (P)
Cl. moniliferum (Bory) Ehrenb. (P)
Cosmarium contractum Kirch. (P)
** *C. moniliforme* (Turp.) Ralfs (W)
** *C. moniliforme* fa. *punctata* Lagerh. (C,W)
C. monomazon var. *polymazum* Nordst. (P)
C. panamense Prescott var. *smithii* Hughes (P)
* *Desmidium grevillii* (Kütz.) de Bary (C)
Euastrum didelta (Turp.) Ralfs (P)
Eu. elegans (Bréb.) Kütz. (P)
Eu. humerosum Ralfs var. *parallelum* Krieg. (P)
Eu. verrucosum Ehrenb. (P)
Hyalotheca dissiliens (J. E. Smith) Bréb. (K,W)
* *H. mucosa* (Dillw.) Ehrenb. (W)
* *H. neglecta* Racib. (W)
** *Micrasterias fimbriata* Ralfs (G)
M. mahabuleshwarensis Hobs. var. *ringens* (Bail.) Krieg. (P,W)
* *M. muricata* (Bail.) Ralfs (C)
M. radiata Hass. (C,S)
* *Onychonema filiforme* (Ehrenb.) Roy & Biss. (W)
Pleurotaenium ehrenbergii (Bréb.) de Bary (P)
* *Sphaerozosma excavatum* Ralfs (C,G,K)
** *Sph. exiguum* Turner (S)
Spondylosium planum (Wolle) W. & G. S. West (P,W)
Staurastrum anatinum Cooke & Wills (G,P)
** *St. anatinum* var. *curtum* G. M. Smith (G)
** *St. anatinum* var. *denticulatum* G. M. Smith (K)
* *St. ankyroides* Wolle (C,K,S,W)
* *St. ankyroides* var. *pentacladum* G. M. Smith (W)
St. arctiscon (Ehrenb.) Lund. (C,P)
** *St. avicula* Bréb. (G)
* *St. brachiatum* Ralfs (S,W)
** *St. brasiliense* Nordst. var. *lundellii* W. & G. S. West (W)
** *St. breviaculeatum* Bréb. (G)
* *St. brevispinum* Bréb. fa. *majus* W. West (K)
* *St. cerastes* Lundell (W)
* *St. cuspidatum* Bréb. (C,G,S)
** *St. furcatum* (Ehrenb.) Bréb. (W)
** *St. grallatorium* Nordst. var. *forcipigerum* Lag. (W)

St. johnsonii W. & G. S. West (P,W)

** *St. johnsonii* var. *depauperatum* G. M. Smith. (C)
Processes more divergent than in Smith's (1924) or Irénée-Marie's (1939) drawings.

** *St. johnsonii* fa. *parvum* G. M. Smith (G)

** *St. lacustre* G. M. Smith (G,K)

* *St. leptacanthum* Nordst. (W)

* *St. leptocladum* Nordst. (K,S,W)

* *St. leptocladum* var. *denticulatum* G. M. Smith (G,K)

** *St. leptocladum* var. *insigne* W. & G. S. West (C,G)

** *St. leptocladum* var. *sinuatum* Wolle (B)
A specimen of this variety was found with one semi-cell identical to G. M. Smith's forma *planum*.

** *St. longipes* (Nordst.) Teiling (1946) (S)
(syn. *St. paradoxum* Meyen var. *longipes* Nordst.)

* *St. megacanthum* Lund. (B,G)

* *St. paradoxum* Meyen (C,G,S)

* *St. pentacerum* (Wolle) G. M. Smith (B, G)

St. pseudopelagicum W. & G. S. West (P)

St. rotula Nordst. (P,S,W)

** *St. subnudibrachiatum* W. & G. S. West var. *incisum* G. M. Smith (G,W)

** *St. tohopekaligense* Wolle var. *brevispinum* G. M. Smith (G)

** *St. wolleanum* Butler var. *kissimmense* Wolle (P)
This species was listed and described as *Staurastrum* sp. by Hughes (1950).

Xanthidium antilopaeum (Bréb.) Kütz. (S)

* *X. antilopaeum* var. *polymazum* Nordst. (C,G,W)

Netrium digitus (Ehrenb.) Itz. & Rothe (P)

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The author is indebted to Dr. M. W. Smith for supplying the collections and to Dr. R. H. Thompson and Mr. I. L. Ophel for their kindness in identifying dinophyceans and diatoms.

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NOTES ON FISHES COLLECTED FROM LAKE WINNIPEG REGION [1]

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THE MOST RECENT CHECKLIST of Manitoban fishes is Hinks (1943). It is based partly on literature records, some of which are disputed (Hubbs, 1945). The distribution of many species is generalized which tends to conceal our ignorance of their precise occurrence. The cautious presentation of Manitoban distributional records in Dymond (1947) reveals the paucity of collected material. For these reasons, collecting fishes from this region is worthwhile.

Field studies for a research project of the Central Fisheries Research Station, Winnipeg, provided the opportunity for collecting specimens. The majority of the fish were

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collected by J. E. Matheson and the writer. The contribution of specimens by L. C. Hewson, K. G. Roberts and K. H. Doan is gratefully acknowledged. Useful suggestions for the improvement of the manuscript were provided by R. M. Bailey and G. H. Lawler.

The species list which follows is based on the specimens listed in Table 1 and does not contain all the species collected. Commercial fish generally are omitted and four other abundant species are not treated. These are *Notropis hudsonius,* spot-tail minnow, *N. atherinoides,* emerald shiner, *Percopsis omiscomaycus,* trout-perch and *Boleosoma nigrum,* Johnny darter. The table presents for each locality the number of fish, range in length and the date collected. Length is the straight line distance from the tip of the snout to the end of the middle caudal fin rays. The latitude of the localities are as follows: Red River, 49° 48′ and 50° 6′, Victoria Beach, 50° 42′, Black Island, 51° 12′, Loon Straits, 51° 32′, Bullhead, 51° 35′ Black Bear Island, 51° 46′, Dauphin River, 51° 58′ Spider Island, 53° 30′ and Warren Landing 53° 42′.

All fish listed in Table 1 have been deposited in the Royal Ontario Museum of Zoology and Palaeontology.

1. Ichthyomyzon castaneus Girard — Chestnut lamprey.

The lamprey from the Red River was collected between Selkirk and St. Andrews Locks. It was attached to a pike which was caught by angling. The Black Island specimen was caught in a commercial gill-net. This species appears to have a very limited Canadian distribution. Hubbs and Trautman (1937) report it from Lake Manitoba, and accept literature records from the Assiniboine and Red Rivers. Hinks (1943) states that it is abundant in the Winnipeg River.

2. Hiodon tergisus Le Sueur — Mooneye.

The mooneye and goldeye, *Amphiodon alosoides* both occur in Lake Winnipeg.

3. Rhinichthys cataractae (Valenciennes) — Longnose dace.

Approximately 10 individuals collected at Black Bear Island possessed a bright orange tinge on the pectoral fins and premaxillary. At every locality these minnows were seined on a rocky bottom.

4. Notemigonus crysoleucas (Mitchill) — Golden shiner.

The two specimens were collected in four feet of water at the mouth of the Mukatawa River. This record extends the Manitoban range since Hinks (1943) reports the occurrence of the golden shiner only "around the southern half of Lake Winnipeg."

5. Ictalurus punctatus (Rafinesque)—Channel cat.

These fish, collected in gill-nets, are uncommon at Victoria Beach. The explanation for the change in the trivial name of this species is given in Speirs (1952).

6. Ameiurus nebulosus (Le Sueur) — Brown bullhead.

Schools of young bullheads frequently are observed in quiet bays at Victoria Beach. Hinks (1943) states that *A. melas,* the Black bullhead also occurs in Manitoba. Dymond (1947) does not give any Manitoban distributional records for this species. Specimens if collected should be retained.

7. Schilbeodes mollis (Herman) — Tadpole madtom.

This species was collected by still fishing with earth-worms at the junction of the Red and Assiniboine Rivers, Winnipeg. One fish at Black Bear Island was taken at a depth of 33 feet. The others were obtained at the surface in shallow water. Hubbs and Lagler (1947) list this species from the Red River system of North Dakota. Hinks (1943) notes that it occurs occasionally in the Red and Assiniboine Rivers. The Lake Winnipeg record is an extension of known distribution.

8. Imostoma shumardi (Girard)—River darter.

The Mukathawa River specimens were collected either in the river mouth or the river proper. There is no record of the exact date collected but it was between June 15 and July 31, 1947. Another fish taken in the river in 1947 was identified by Dr. W. B. Scott, Toronto. These records extend the northern distribution given by Hinks (1943). *Etheostoma guntheri* Eigenmann and Eigenmann is treated by Hinks (1943) as a synonym of *Hadropterus maculatus* (Girard), the Black-sided darter. This appears to be in error since Hubbs and Greene (1928) and Carlander (1941) regard *guntheri* as synonymous with *Imostoma shumardi.*

9. Percina caprodes (Rafinesque)—Log-perch.

At Victoria Beach this species was collected from a sandy bay; at the other localities it occurred on rocky bottom.

10. Poecilichthys exilis (Girard)—Iowa darter.

The single specimen was obtained from a small pool at Black Bear Island.

Table 1. Records of fish collected from Lake Winnipeg region

Species and locality	No. of fish	Range in length	Date collected
I. castaneus			
Red River	1	245	4/18/51
Black Island	1	255	1/ 9/52
H. tergisus			
Victoria Beach	10	47-61	7/21/51
R. cataractae			
Bullhead	23	36-68	7/29/51
Black Bear Island	30	35-73	7/21 & 28/51
Warren Landing	9	39-94	7/15/51
N. crysoleucas			
Mukatawa River	2	93-95	6/30/47
I. punctatus			
Victoria Beach	5	248-356	9/2 — 28/51
A. nebulosus			
Victoria Beach	5	32-42	8/23/47
S. mollis			
Red River	5	82-98	5/10/51
Black Bear Island	3	91-100	7/ 8 — 26/51
I. shumardi			
Bullhead	3	51-57	7/29/51
Mukatawa River	6	32-36	—/—/47
P. caprodes			
Victoria Beach	5	36-51	8/21/51
Bullhead	9	54-80	7/29/51
Black Bear Island	14	55-82	7/21 & 28/51
P. exilis			
Black Bear Island	1	44	7/28/51
C. bairdi			
Loon Straits	2	42-49	6/18/51
Black Bear Island	24	43-82	7/21/51
Dauphin River	1	71	2/ 7/45
Mukatawa River	1	76	7/22/50
C. ricei			
Mukatawa River	1	—	—/—/47
P. pungitius			
Loon Straits	3	41-44	6/18/51
Black Bear Island	1	33	7/21/51
Mukatawa River	2	49-58	6/29/49
Spider Island	4	44-57	6/12/51
E. inconstans			
Black Bear Island	4	30-38	7/28/51

11. Cottus bairdi Girard—Muddler.

All were taken in Lake Winnipeg. The Dauphin River fish was caught in a gill-net one mile off the river mouth, while the Mukatawa River sculpin was collected 7 miles west of the river mouth in 54 feet of water.

12. Cottus ricei Nelson—Rice's sculpin.

This sculpin was found dead on the river bank about 5 miles upstream from the mouth of the Mukatawa River.

13. Pungitius pungitius (Linnaeus)—Ninespine stickleback.

No pertinent observations were noted.

14. Eucalia inconstans (Kirkland)—Brook stickleback.

This species was collected in the same small pool at Black Bear Island as the Iowa darter.

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NOTES AND OBSERVATIONS

Wayne's Long-billed Marsh Wren in New Brunswick.—Until the recent discovery of a breeding colony of Long-billed Marsh Wrens *(Telmatodytes palustris)* at Midgic, only three specimens of this species had been collected in New Brunswick. The earliest was taken, according to the label, on the "Shore op. Meogone I. near Carleton, St. John." It was collected by William H. Moore on October 3, 1895, and is now in the collection of the Teachers' College at Fredericton, N.B. On October 8, 1930, Allan Brooks and Allan L. Moses collected two Long-billed Marsh Wrens near Castalia, Grand Manan (Brooks, 1933, *Can. Field-Naturalist,* 47: 71). One of these specimens is now with the Brooks collection at the Museum of Vertebrate Zoology, Berkeley, California. Brooks *(loc. cit.)* described both of the specimens simultaneously, implying that the two were alike, and stating definitely that they were both "unlike anything I have seen of this species."

I have been permitted to examine the 1895 specimen through the courtesy of Melvin B. Moore, and the 1930 specimen through the courtesy of Alden H. Miller. I have not seen the other Grand Manan specimen, and I am not aware of its present location. I am assuming Brooks to have been correct in considering the two 1930 specimens to have been of the same form.

C. E. Addy of the U.S. Fish and Wildlife Service kindly loaned me a breeding specimen of *Telmatodytes* which he collected at Midgic on July 5, 1949. It is an adult female just beginning its post-nuptial moult. Although very worn and faded, it is a fairly good match for breeding specimens of the Marsh Wren of New England, central New York and eastern Ontario, of which I have had access to a large series while attempting a partial revision of this species. The *breeding* Long-billed Marsh Wren of New Brunswick, then, may be known as *Telmatodytes palustris dissaëptus* Bangs.

The two October specimens examined are very different. Brooks *(loc. cit.)* stated of his two Grand Manan specimens: "They are very black and white birds most nearly resembling the form recently named *waynei* from North

Carolina by Sprunt and Dingle. They are even darker than this form of which I have two September birds taken by A. T. Wayne." Although the darkness of the two specimens examined, especially the Grand Manan bird, is indeed striking, the most significant feature of the plumage of these two birds is the black barring on the rump and upper tail coverts. This is an important diagnostic character among the subspecies of *Telmatodytes palustris*. Such barring is absent in all of the Long-billed Marsh Wrens which breed east of the Rocky Mountains and north of North Carolina, but is typical of the southern and western races. In color, the two New Brunswick specimens are a good match for *T. p. waynei*, the breeding form of the coast of North Carolina. As noted above, Brooks compared his specimens with only two examples of *waynei*, and failed to appreciate the range of variation within the latter subspecies. Actually the 1895 specimen is rather lighter in color than the 1930 specimen examined, but both fall within the extremes of *waynei*. The subspecies most nearly resembling *waynei* in color is *marianae* of the west coast of Florida; this subspecies does not have the immaculately white underparts characteristic of *waynei* and emphasized by Brooks *(loc. cit.)* in describing his specimens. The rest of the subspecies with barred upper tail-coverts are quite different in color and need not be considered.

The presence of these peculiar Marsh Wrens in New Brunswick in October may be explained in three different ways. The first possibility to be considered is that these individuals represent mutant variants of the expected subspecies *dissaëptus*. This explanation seems improbable because of the number of differences, certainly involving several genes. It seems unlikely that a chance accumulation of mutations in a *dissaëptus* population would reproduce the very different *waynei* so exactly.

A second possibility involves the postulation of an undiscovered breeding population of *waynei*-like Long-billed Marsh Wrens somewhere to the north of New Brunswick. This too, seems unlikely. Surely more specimens would have been detected over the years of collecting in the Maritime Provinces and the northeastern United States if such a colony actually existed. Again, it would stretch credulity to suppose that such a northeastern colony would duplicate in its striking colour characters the far-distant *waynei* of the North Carolina coast.

The third possibility supposes that these specimens actually represent individuals from the Carolina breeding population of *waynei* which have found their way somehow to New Brunswick. In view of the many remarkable authenticated accidental occurrences of birds far from their normal ranges, this suggestion seems the most probable. The fact that these stray wrens have upon two separate occasions come to the attention of ornithologists who have preserved the specimens need not excite surprise. The Long-billed Marsh Wren has been considered so rare in New Brunswick that an effort would have been made to collect almost any individual of this species seen. Brooks *(loc. cit.)* mentioned that upon the occasion of his collecting the two strange wrens, "a Long-billed Marsh Wren of the ordinary brown type as in Ontario birds was seen but not secured." Mr. George F. Boyer informs me that this species is now a fairly regular fall migrant at Midgic; "during mid October it is not unusual to see six or seven at one time" (letter of November 25, 1952). These birds are presumably also of the "ordinary brown type" of Brooks (=*dissaëptus*), although it would be desirable to have specimens of these fall migrants.

My first thought was that these wrens might have been carried from North Carolina to the Bay of Fundy region by tropical hurricanes, since these storms are most frequent at the time of year when the wrens were collected. Many such hurricanes follow a path which would make the deposition on the coast of New Brunswick of a bird from coastal North Carolina quite credible. However, Tannehill (1943, *Hurricanes, their nature and history*, Princeton Univ. Press), in his historical summaries, showed no hurricanes with North Carolina—New Brunswick tracks for either 1895 or 1930. The possibility still remains that the wrens were transported to New Brunswick by a meteorological disturbance of less than hurricane (wind force 12 on the Beaufort scale) intensity. A weak flyer like a wren might well be carried involuntarily by winds well below the 75 m.p.h., minimum required by the definition of a hurricane.

It thus seems that the best disposition to be made of these specimens is to list Wayne's Long-billed Marsh Wren *(Telmatodytes palustris waynei)* as an accidental visitor to New Brunswick.—*KENNETH C. PARKES, Laboratory of Ornithology, Cornell University, Ithaca, New York.*

A Hooded Warbler from Churchill, Manitoba.—A fine male Hooded Warbler, *Wilsonia citrina,* was received this summer from Mrs. R. M. Beckett of Churchill, Man. The bird was found dead in an open shed in the vicinity of the townsite of Churchill, on June 10, 1952.

The specimen was fresh when received, and was in good flesh, though the stomach was empty. Mrs. Beckett notes that extreme cold prevailed for three days prior to the finding of the bird, suggesting exposure as the cause of death.

This constitutes the first verifiable record of this species for Manitoba, and its occurrence in such a northern latitude makes it doubly interesting. The specimen is now in the study collection of this museum.—R. W. SUTTON, *Manitoba Museum, Winnipeg.*

Scarlet Tanager near Yarmouth, Nova Scotia.—On May 1 and 2, 1952, I saw a male Scarlet Tanager *(Piranga olivacea)* at the home of Mr. Lawrence Perry, on his farm in Central Chebogue, three miles southeast of the town of Yarmouth, Nova Scotia. This bird, in brilliant plumage, was watched by me for minutes at a time, at close range, on each of the dates mentioned. A binocular (x6) was used as much as was convenient. The tanager spent a large part of its time about the manure pile in the barnyard, where it presumably obtained some insects.

Members of the Perry family have informed me that this Scarlet Tanager appeared at Mr. Lawrence Perry's home about the middle of April and remained there until about the middle of May.—*HARRISON F. LEWIS, West Middle Sable, Shelburne Co., N.S.*

REVIEWS

Variation in Anas cyanoptera. *By L. L. Snyder and H. G. Lumsden. Occasional Papers of the Royal Ontario Museum of Zoology, No. 10; August 10, 1951; 18 pp., 3 figs.*

This interesting study indicates that there is considerably more geographical variation in the Cinnamon Teal than had heretofore been realized. The nominate race is restricted to southern South America mainly from Uruguay west to Chile and south to Patagonia. Our North American bird is thus left without a name and the name *Anas cyanoptera septentrionalium* is proposed for it by the authors. Two additional races, *A.c.borreroi* and *A.c.tropicus,* are described from Colombia; and the large form *A.c. orinomus* (Oberholser) is recognized. Plumages of this duck are profitably discussed in some detail. — *W. EARL GODFREY.*

Waterfowl and Their Food Plants in Washington. *By Charles F. Yocom. University of Washington Press, Seattle. 1951. Pp. i-xvi, 1-272, 63 figs., 48 pls. $5.00.*

This attractive and durable volume contains information collected by the author and his associates during ten years of field work. The present study has been prepared, according to the author, to lay the groundwork for future research on waterfowl in Washington. To this end, pertinent features of the geography and climatology of the State are set forth, and the status of the various waterfowl species is defined on the basis of all available records. An attractive series of photographic figures well reflects the diversity of waterfowl habitat in Washington. An abundance of data are presented in the text and in tables. The results of studies of nesting and brood survival are given in detail. A study of sex ratios based on autumn and winter counts of over 9,000 ducks, a preponderance of which were mallards, is recorded. Results of an investigation of waterfowl hunting, based mainly on questionnaires, are also given. While such data will afford a useful basis of comparison for future studies of waterfowl, particularly in western North America, much of the present discussion is rather tentative, and one wonders if it should best have been published in the relatively expensive format at hand.

The latter portion of the book, which deals with the results of analyses of 251 duck stomachs, and lists and illustrates the most important waterfowl food and cover plants found in Washington, will prove consistently useful to many workers, including the reviewer. Data on stomach contents are presented in such a manner that initial refer-

ence may be made either to waterfowl species or plant species, according to the interest of the reader. Keys for the identification of families, genera and species are provided: in some cases, seeds may be identified with the aid of the keys. For each group of plants there are notes on propagation, distribution (there are also some specific distribution maps) and utilization by waterfowl. The line drawings depicting plants and seeds are of excellent quality and definition, although their usefulness is somewhat reduced by the lack of any reference to scale in habit sketches and detail drawings of vegetative parts. The scale of seed drawings is clearly indicated. A useful feature is the separate index referring to plants. — **DAVID A. MUNRO. Canadian Wildlife Service, Department of Zoology, University of British Columbia, Vancouver.**

The Unvanquished Buffalo. *By Henry H. Collins, Jr., Blue Heron Press, Box 236, Bronxville, N.Y. Price 25 cents.*

Much has been written about the history of the North American Buffalo or Bison but few accounts are as complete and authentic as that contained in this booklet. In brief, it is the story of the bison from the time of the early settlers, when sixty million roamed the plains, up to the present day. Not only are the factors responsible for the decline of this magnificent animal discussed in considerable detail, but also such topics as past and present ranges, migration routes, food habits, breeding and herding behaviour, enemies, etc.

A perusal of the various chapter headings give some indication of the scope of the treatment: Physical Characteristics, Family Life, Natural Enemies, Pioneers and the Buffalo, The Incredible Multitude, The Buffalo and the Indian, The Great Slaughter, The Buffalo in Canada, etc. Particular emphasis is placed on the factors responsible for the rapid decline of a species which is believed to have once attained a density greater than that of any other large mammal in the world.

The author cites a number of incidents in this epic of wholesale slaughter which seem almost incredible. For example, one man alone killed 4,280 in 18 months to supply a construction camp, and 500 were killed in a single hour by a small group out for a day's "fun". Little wonder that by 1883 only 10,000 animals remained, and that by 1889 this was reduced to 541. Concern over the fate of the buffalo was almost too late to save it from extinction. At the eleventh hour the few remaining animals were transferred to refuges and slowly but surely the herd was built up. Today in Canada alone there is an estimated 13,000, compared with only 1,200 in 1922. Thanks to the protection extended to the buffalo by the governments of the United States and Canada its survival now seems assured.

There are a number of photographs and three colored plates which add immeasurably to the appearance of the booklet.

As a concise account of the North American buffalo, the present booklet can be highly recommended. Teachers will find it especially useful as a reference for nature study and conservation education classes. — **AUSTIN W. CAMERON**

A Pocket-Book of Lesser-Known British Birds. *By Wilfred Willett and Charles A. Hall. 1952. Adam and Charles Black, 4, 5, and 6 Soho Square, London, England. The MacMillan Co. of Canada, Toronto. 97 pp., 47 color plates, 1 diagram. Price, $2.00.*

This little volume, a companion to *A Pocket-Book of Common British Birds,* deals with 64 British birds that are uncommon, but not rare, in the British Isles. The British status, appearance, voice, nest and eggs, and food are given succinctly for each species. Forty-eight species are illustrated in 47 full-page plates in color and the topography of birds is clearly shown in a pen drawing. This compact, adequately illustrated, and inexpensive little book will be particularly useful to bird-minded travellers to the British Isles and to others who need a brief popular treatment of the species treated.—W. EARL GODFREY.

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