

1924 Notes on the Birds of Douglas Lake, Michigan, Region

106 species seen

122 fresh or occupied nests of

32 species.

Jan 1925

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These notes were made in the vicinity of the Biological Station of the University of Michigan on Douglas Lake, Michigan between June 9, 1924 and August 17, 1924. During the first three weeks, before the opening of the Station, an average of two hours each day was spent in the field. During the school session, an average of four full days per week was put in in the field.

On the list, the names and numbers are those of the A.O.U. abridged check-list of North American Birds - 1910. Corrections could not be made because the various supplements to the check list were not available when this was written.

The number in parentheses after the name of each bird is the number of days during the season on which that bird was seen. The total number of days spent in the field was fifty. One hundred and six species of birds were found. Nests were found of thirty two of these species. One hundred and twenty two nests were seen during the season.

6. Podilymbus podiceps (1) Pied-billed Grebe

Three of these Grebes were seen feeding in the open water at Nichols' Bog on August 6.

51 Larus argentatus (6) Herring Gull

Individuals were seen flying over the Lake on several days after June 29.

54 Larus delawarensis (6) Ring-billed Gull

Flying over the Lake on July 4 and five other days.

66 Sterna Caspia (24) Caspian Tern

First noted on the Lake on June 20. More numerous toward end of season.

70 Sterna hirundo (17) Common Tern

First seen on the Lake on July 4. Seen daily after July 30. Young were being fed by parents on the Lake on August 11. Adults were feeding young on Mud Lake on August 12.

129 Mergus americanus (7) American Merganser

An adult ♀ was found with twelve from June 9 to August 11 when the young were practically grown and were able to fly.

133 Anas rubripes (2) Duck

Three were flushed in Marl Bay on July 7. Eight young were found near the mouth of Bessey Creek on July 14. They were nearly grown. When disturbed they swam into open waters of the Lake. One parent was calling nearby.

190 Botaurus lentiginosus (4) Bittern

Two were found at the west end of Douglas Lake on July 14. One at Black Lake on July 23, one at Nichols' Bog on August 6 and two at Nichols' Bog on August 6.

194 Ardea herodias herodias (10) Great Blue Heron

A colony of nesting Great Blue Herons was reported by a farmer at the mouth of Black River on Black Lake, July 23. The ground was not visited, but birds were seen flying toward from it.

212 Rallus virginianus (1)

One was flushed at the edge of the Lake near the mouth of Bessey Creek on July 7. On August 6 a young rail in black down was seen at Nichols' Bog which may have been one of this species.

214 Poryzana carolina (1)

One was flushed at the edge of the Lake near the mouth of Bessey Creek on July 7.

228 Philohela minor (1)

One flushed at the edge of Carp Creek above bridge, August 5.

230 Gallinago delicata (3)

One flushed near mouth of Frog Creek at west end of Lake July 7.  
One at Black Lake July 23, Two at Nichols Bog August 6.

242 Pisobia minutilla (1)

Four were feeding in shallow beach pools at Big Stone Bay, August 2.

263 Actitis macularia (36)

On June 16, a pair with young was found twenty-five feet from the water at the entrance to Camp Davis, adults were calling excitedly and when one of the young was caught, both parents used the 'crippled wing' ruse.

June 17 a nest was found fifty feet from the water on Pine Point. The lining was of grass, large Pinus strobus shaded the nest. It had four eggs. On the same day two young were seen with one adult one half mile north of camp. They were in the grass twenty-five feet from the water.

June 26, a nest with four eggs was found along a road through the aspens, one hundred and fifty yards east of the south end of camp. It was not well shaded. The young were in a new nest near the location of the old one on July 7.

A nest with four eggs was found fifteen feet from the water in North Fishtail Bay on July 7. It was in the grass and unshaded.

July 12 a young bird about one week old accompanied by parents ran into weeds from the shore at the north end of Fairy Island.

273 Oxyechus vociferus (20)

July 23 a young Killdeer, two or three days old, was seen running along a road west of Black Lake.

August 15 a flock of about ten was feeding along the shore one mile north.

277 Agelaius meloda (1) Piping Plover

Two small young were caught, by two members of the Botany expedition from the Station to Big Stone Bay, near Temperance Point, August.

300 Bonasa umbellus umbellus (20) Rock Bass

Flocks of young with parents were found on June 17, 18, 22, and 30, July 6, 8, 22, and 24, and on August 11. They were found in hardwood second growth, in aspens, and in Thuja logs.

316 Zenaidura macroura carolinensis (21) Mourning Dove

June a nest with two eggs was found by Dr. Ekker one half mile south in the aspens. It was on a stump three feet high. An adult was on the nest which was made of grass stems and pine needles.

331 Circus hudsonius (4) Marsh Hawk

One was flying over Reeder Bog July 6, July 14, one was seen near the mouth of Bessey Creek. Two were at Bryant's Bog on July 30 and two at Nichols Bog on August 6.

332 Accipiter velox (2) Sharp-shinned Hawk

One was calling excitedly at the edge of the T. Luj's Bog east of Mud Lake on July 10 and again on August 12.

334 Aster stricapillus tricapillus (2) Grackles

One was watched closely in the woods east of North Fielded Bay on June 27 and another was seen flying near Bust Lake on July 8.

339 Buteo lineatus lineatus (1) Red-tailed Hawk

One on Emmet County Game Preserve, July 19.

352 Haliaeetus leucocephalus leucocephalus (1) Eagle

One at Big Stone Bay August 2.

360 Falco sparverius sparverius (3) Sparrow Hawk

On the aspens on June 20, July 12, and August 12. On August 12 an adult was seen near the carp creek bridge, catching grasshoppers. It took these to the top of a tall dead pine where it fed them. A part of them it carried to a hole in the stump about eight feet below the top. The bird perched at the opening of this hole for a few seconds on several trips, but whether or not it actually fed young could not be determined.

369 Lanius borealis carolinensis (7) Osprey

Fishing on Douglas and Bust Lakes frequently. On June 22, bird was seen on a nest in the top of a tall dead stump near the mouth of Carp Creek. Another bird was flying nearby.

375 Bubo virginianus virginianus (3) Great Horned Owl

Steel trap set in the timber along carp creek by C. M. Davis caught an adult on July 5, and a young bird on July 8. One was heard calling in Reeder Bog at dusk on the evening of August 11.

388 Coccyzus erythrophthalmus (12) Black-billed Cuckoo

Found in the aspens. On July 2, 9 a nest was found three feet from the ground in a clump of Acer rubrum along the road to Chazy and one half mile inside the aspen area. An adult was brooding three eggs.

390 Ceryle alcyon (28) Kingfisher

On June 16 one was heard calling in a cut just north of Camp Davis. There was a nesting hole half way to the top of a ten-foot bank of the cut. On July the young were feathered and nearly ready to leave the nest.

On July 1, adults were carrying food into a nest hole one and one half miles west of camp. The hole was two feet from the top



of the bank and fifteen feet above the water.

393 Dryobates villosus villosus (4) Hairy Woodpecker

Found in the timber along Carp Creek.

394c. D. villosus pubescens medianus (4) Downy

clm burned timber west of the Lake and in timber along Carp Creek.

402 Sphyrapicus varius varius (3) Yellow-bellied Sapsucker

June 29 one was seen in second growth hardwood at the base of Grapevine Point. On July 6 a pair was feeding young in a hole thirty feet from the ground in a dead tree  $\frac{1}{2}$  mile above Beaver pond and on the north side of Carp Creek. The tree was fifty yards from the creek and on dry ground. On July 23 one was seen in hardwoods at Black Lake. It was picking at some holes that had previously been bored into the tree.

406 Melanerpes erythrocephalus (5) Red-headed Woodpecker

Along road to Cheboygan and in burned timber west of the Lake. On August 12 an adult with one young out of the nest was seen in a dead tree at the edge of Wolf's Bog.

412a Colaptes auratus luteus (36) Flicker

On June 9 an adult was flushed from a hole fifteen feet from the ground in a burned stump 1 mile north east of camp. Another nest was found on June 9 in a stump west of house number 32; it was twelve feet from the ground. Adults were feeding young. Young were in the nest on June 19.

Adults were feeding young in a nest fifteen feet from the ground in a stump east of house number fifteen on June 19.

417 Antrostomus vociferans vociferans (35) Whip-poor-will

Calling in the aspens nearly every evening.

420 Chordeiles virginiana virginiana (46) Whistl-throat

clm the aspens. Frequently found perched in large Pinestrees. Usually fly over the lake and lake shore in the evening.

423 Chaetura pelagica (12) Chimney Swift

Flying over camp and over other groups of buildings around the lake.

428 Archilochus colubris (1) Ruby-throated Hummingbird

a ♂ was seen July 1 in the hardwood second growth at the base of Grapevine Point.

444 Tyrannus tyrannus (44) Kingbird

June 22 a nest six feet from the ground in a small birch tree one hundred yards south east of flagpole south of Camp Davis had four eggs. Another nest found nearby on the same day was eight feet from the

ground in a birch and had four eggs.

June 28 a pair was building a nest on a horizontal limb of a pine tree thirty five feet from the ground and in the center of camp.

June 29 a nest was found on top of a bare stump twenty feet from the ground and one half mile south of camp.

A nest was found on June 30 in a dead birch along the state road through the aspens and twenty feet from the ground. A bird was on the nest.

July 7 a nest was found on the top of a fallen dead tree at the west end of the Lake. The nest was empty and lined with moss. On July 14 there were three eggs in the nest.

452 Myiarchus crinitus (6) Crested Flycatcher

July 14 - Nest eight feet from the ground in stump ten feet high, in aspens along Bessey Creek near angleside. The nest was nine inches below the opening. There were three feathered young nearly ready to leave the nest.

456 Sayornis phoebe (20) Phoebe

On June 9 a pair was building a nest at the end of a raft on the north side of the kitchen. On June 16 there were four eggs in the nest and June 19 the adult was brooding.

June 29, a nest was found under the camp creek bridge. An adult flew from the nest when the bridge was crossed.

On July 7 an adult was feeding young in a nest in the porch of the hotel at angleside.

A bird was sitting on a nest with five eggs, under the eaves of a deserted house near the old saw mill on Burr Lake on July 8.

459 Mniotilta borealis (2) Olive-sided Flycatcher

One was calling from the tops of tall dead trees near Camp Creek bridge July 6.

July 20, two were calling in the tops of dead trees in recently cut-over bog at Big Stone Bay.

461 Myiochanes virens (25) Wood Pewee

An adult was building a nest on a horizontal fork of a limb thirty feet from the ground near the road going into the gorge on June 22.

July 7 a nest was found fifteen feet from the ground in a horizontal limb of a dead tree one hundred and fifty yards back from the shore at Marl Bay. The adults were calling in the vicinity and returned to the nest as soon as the intruders left.

July 19 an adult was seen on a nest thirty feet from the ground in a birch near the stream at Big Stone Bay in the Emmet County Game Preserve.

One was calling near an empty nest on Grapevine Point on July 27.



466 a Empidonax traillii aliorum (1) Alder Flycatcher

July 30, one was calling and flying into willows and alder thickets at the edge of Bryant's Bog.

467 Empidonax minimus (12) Least Flycatcher

June 15 a nest was found seven feet from the ground in a crotch of birch near the entrance to Camp Davis. June sixteenth there were four white eggs and an adult was brooding.

A nest was found eight feet from the ground in a birch at the southwest edge of Camp Davis. There were young birds in down in the nest. Adults brought food and called, but not excitedly.

474 b. Otocoris alpestris praticola (7) Prairie Horned Lark

Seen along the roads near cultivated fields in the region.

477 Cyanocitta cristata cristata (25) Blue Jay

A young bird just able to fly and with tail feathers about half grown was caught in timber along Carp Creek below the bridge on July 6.

488 Corvus brachyrhynchos brachyrhynchos (38) Crow

Several used nests were seen in tall coniferous trees near the camp. A young bird just out of the nest was found about July 1.

494 Dolichonyx oryzivorus (4) Bobwhite

Seen in fields along roads through farmland.

495 Molothrus ater ater Cowbird

Eggs or young of this species were found in nests of Spizella passerina, Junco h. hyemalis, Pipilo e. erythrophthalmus, Passerina cyanea, Bombus cedrorum, Vireosylva swainsoni, Sialia sialis, and Setophaga ruticilla.

498 Agelaius phoeniceus subsp.? (3) Plover

Young out of the nest were being fed by parents on August 3 at Smith's Bog. Several empty nests were seen on that day.

501 Sturnella magna magna (9) Meadowlark

along roads through farming country. A bird was seen carrying food in a pasture north of the Lake August 12. An empty nest apparently belonging to a Meadowlark was found in the same pasture on that day.

511 b. Quiscalus quiscula senous (11) Bronzed Grackle

July 7 some young just out of the nest were found in willows near the mouth of Bessey Creek. Several adults were carrying nesting material into the low bushes back from Mark Bay. Several adults carrying food were seen at Bryant's Bog on July 12.

517 Carpodacus purpureus purpureus (8) Purple Finch

Found in aspens and in the open places in Reecer's Bog, Bryant's Bog, Mud Lake, and at Big Stone Bay.

529 Astragalinus tristis tristis (35) Goldfinch

July 30 a nest was found six feet from the ground in an Acer rubrum sprout along the road to Smith's Bog. a ♀ was sitting on four eggs. On August 3 there were three young and one egg in the nest. The ♀ was brooding.

533 Spinus pinus (2) Pine Siskin

One was seen on July 20 and one on July 21 in coniferous trees along the shore at Big Stone Bay. They were calling.

540 Pooecetes gramineus gramineus (28) Vesper Sparrow

A nest with three eggs was seen on the side of the hill back of Camp Davis on June 22. July 5 an adult was flushed from a nest one hundred yards south of the flagpole at Camp Davis. The nest held three just hatched young and one egg. On July 6 a nest was found one hundred yards south east of the flagpole which had four eggs. A nest with three eggs found by Dr. F. H. Blanchard was seen July 22. It was on the ground as were the others and was near the camp mail box.

542a Passerculus sandwichensis savanna (3) Savanna Sparrow

Found on July 20 and 21 at Cecil Bay and August 12 in a pasture north of Douglas Lake.

558 Zonotrichia albicollis (4) White-throat

Seen in Reecer's Bog on July 3 and at Big Stone Bay on July 20 and 21.

560 Spizella passerina passerina (4) Chipping Sparrow

Nests were found on,

June 15 - in brush pile 1 ft above ground and seventy-five feet from the kitchen with three eggs and one couched egg. Another egg was added June 19.

June 19 - eight feet from the ground in Acer south part of camp. One egg on ground under nest.

June 19 - ¼ mile north - 6 ft. from ground in pine branch. Young in nest.

June 20 - ½ mile north - 5 ft. from ground in Pine - 4 young.

June 22 - South of camp Davis - 5 ft. from ground in F. agrus - 4 eggs.

June 22 ½ mile north along shore - 7½ ft from ground in Pine - 1 young + 2 eggs.

June 26 - North east of Camp Davis gate - 5½ ft from ground in Acer. 2 eggs + 1 couched egg.

June 29 - Back of Camp Davis - 10 ft from the ground in B. betula - 1 egg.

July 12 along road at Bryant's - 10 ft from ground - 3 eggs.

- July 12 - Bryant's Bog - 5 ft. from ground in Picea - 4 young.
- July 21 - Big Stone Bay - 4 ft. from ground in Picea - 2 eggs.
- July 21 - Big Stone Bay - 3 ft. from ground in Pines - 3 young.

561 Spizella pallida (2) Clay-colored Sparrow  
 A single individual was seen and heard at the same place in the aspens along a road two miles south west on July 12 and 18.

563 Spizella pusilla pusilla (1) Lutes Sparrow  
 One was heard along the road to Topinabee on July 23.

567 Junco hyemalis hyemalis (25)  
 June 12 a nest was found on the ground under a small burned log 1/4 mile east of camp. It had two eggs. The nest was empty on June 19. There was a Cowbird egg buried in the lower part.  
 A nest was found on the ground and covered with dead grass fifteen yards from the bare line and north east of the kitchen. It had one egg and two cowbird eggs. July 6.

Another nest was found July 6 on the ground one hundred and fifty yards from the head of the branch of the George had two eggs and two cowbird eggs.

xxx Passer domesticus (10) English Sparrow  
 July 1 a nest was seen under the eaves of a barn on the Burr farm three miles north east of the station.

581 Melospiza melodia melodia (39) Song Sparrow  
 Young just able to fly were found near the entrance to Camp Dain on June 16. Nests were found on these dates,

- June 26 - Rose bush 8 inches from ground near Camp Dain gate. 4 eggs July 5 three eggs and one egg. July 8 - four young
- June 29 - 3 ft. from ground in bush 1/2 mile along lake north west - 5 eggs.
- July 8 - 2 ft. from ground in Tundra - 1 3/4 miles along north west shore - 2 eggs.
- July 8 - On ground fifteen feet from water in north Frontal Bay - 3 eggs. 5 eggs July 10
- July 10 - In a clump of grass east of Mud Lake - 4 eggs.
- July 10 - 1 ft. from ground in Picea mariana at Mud Lake - 4 eggs.
- July 17 - 2 1/2 ft. from ground in Ases rubra - Deer Point 4 eggs
- July 17 - 4 inches from ground in Sirpus atrivestris - Deer Point - 2 eggs.
- July 18 - On ground at edge of Smith's Bog - 4 eggs.
- July 21 - 2 1/2 ft. from the ground in Tundra Big Stone Bay along road. 3 eggs
- July 21 - 3 ft. from ground in Picea Big Stone Bay along road. 4 eggs.
- July 30 - 2 ft. from ground in Picea mariana Bryant's Bog - 3 young 1 week old

587 Pipilo erythrophthalmus erythrophthalmus (39) Towhee.  
 June 18 a nest was found on the ground 1/4 mile north in the aspens.

There were eight eggs. On June 29 three eggs were left in the nest.  
July 5 a nest was found on the ground on top of the hill north east  $\frac{1}{2}$  mile. It had four eggs.

July 26 a nest was found 2  $\frac{1}{2}$  feet from the ground along Carp Creek below the bridge. It was in a Ground Hemlock, a ♀ was brooding three eggs.

598 Passerina cyanea (12) Indigo Bunting

June 30 a nest was found three feet from the ground in an oak sprout near the road east of camp. It had one egg and two cowbird eggs.

608 Piranga erythromelas (8) Scarlet Tanager

Found in aspens and in hardwoods.

611 Progne subis subis (5) Purple Martin

Seen in towns in the region.

612 Petrochelidon lunifrons lunifrons (2) Cliff Swallow

Along the road to Cheboygan July 1 and at Augleside on July 7. Six nests were under construction or were just finished under eaves of the barn and hotel at Augleside on July 7. An adult was seen in one.

613 Hirundo erythrogastra (12) Barn Swallow

Along roads in cultivated parts of the region. On July 7, three nests under the roof of a shed at Augleside had young that were feathered and ready to leave. They were crawling at the edge of the nests.

614 Chelidonichthys bicolor (4) Tree Swallow

July 1 along the road to Cheboygan. July 21 and Aug 2 at Cecil Bay and July 23 in flocks along road near Mullet Lake.

616 Riparia riparia (2) Bank Swallow

At Cecil B. on July 21.

617 Stelgidopteryx serripennis (20) Ring-billed Gull

June 9 a nest was found, halfway up an eight foot bank one mile north along the shore, by Philip Holmes. The adult flew out. On June 12 one of the adults was caught and positively identified. A light flashed into the hole showed a nest made of sticks but only one egg. On July 5, a pair was feeding young in the nest. After dark a light flashed into the hole showed no birds.

619 Bombus cecidivorus (42) Cedar Wasp

Nests were found on these dates,

June 22 - 4  $\frac{1}{2}$  ft. from ground in Acer rubrum  $\frac{1}{4}$  mile north east no eggs June 29 2 eggs

June 30 - 6 ft. from ground in Quercus borealis sprout  $\frac{1}{4}$  mile east 3 eggs + 1 cowbird egg.

July 2 - 5  $\frac{1}{2}$  ft. from ground in Acer rubrum  $\frac{3}{4}$  mile south - 4 eggs.

July 21 - 10 ft. from ground in Pine - Bug Stone Bay, 4 eggs.

Aug. 11 - 4 ft from ground in Acer rubrum -  $\frac{1}{4}$  mile south west along road - 5 young.

August 11 - 12 ft. from ground in Pinus strobus at edge of Reed's Bog - at least 3 young.

August 17 - 6 ft from ground in Quercus borealis -  $\frac{1}{2}$  mile south east - 4 naked young.

August 7 - 6  $\frac{1}{2}$  ft. from ground in Acer rubrum -  $\frac{1}{2}$  mile north of Chugside - 2 eggs.

August 17 - 7 ft. from ground in Acer saccharum at edge of Mudd Lake hardwoods - 5 eggs.

622c. Lanius ludovicianus migrans (4) Skinkie

along roads in cultivated parts of the region.

624 Vireosylva olivacea (36) Red-eyed Vireo

These nests were found;

June 30 - 10 ft from the ground in aspen  $\frac{1}{2}$  mile north. 3 eggs + 1 cowbird egg.

July 5 - 4 ft. from ground in Quercus - east of camp in aspen - partly finished.

July 8 - 6 ft. from ground in Acer rubrum - 2 eggs and 1 cowbird egg.

July 22 - 6 ft from ground in Acer rubrum - Gopherie Point - 1 egg.

July 22 - 10 ft from ground in Quercus borealis - Gopherie Point - 1 egg + 1 cowbird egg.

July 24 - 6 ft from ground in Populus grandidentata N. Fish Tail Bay. 3 eggs + 1 cowbird egg.

636. Amotilla varia (13) B. + W.

in hardwood second growths and in Liriodendron forests.

648 Comptothlypis americana usneae (1) Parula

in coniferous trees at Big Stone Bay on July 20.

652 Dendroica aestiva aestiva (2) Yellow

at west end of Lake in thickets on July 7 and July 25. On July 25 an adult was carrying a caterpillar in the shrubs at the head of Melle River and was calling excitedly.

654 Dendroica caerulescens caerulescens (3) B. T. D.

One was singing in timber at North Fish Tail Bay on June 22. Found at Big Stone Bay on July 20 and 21. A nest was found at Big Stone Bay by Francis Harper on July 20. It was twenty meters from the ground in Picea canadensis along a path in the timber. There were three eggs. The ♀ was on the nest. On July 31 there were two young and one egg in the nest.

655 Dendroica coronata (?) Myrtle

June 22 a nest was found in a crotch of a birch ten feet from the ground. The tree was on top of a hill back of Camp Davis. There were 4 eggs. In July 8 the ♀ was brooding young in the nest.

July 20 an adult was seen with young in coniferous timber along the shore at Big Stone Bay.

July 24 a ♂ was feeding a young with tail feathers half grown and just able to fly in Pines near North Fish Tail Bay. August 4 an adult with four young was seen one mile north along the shore. The adult was catching insects and feeding the young.

657 Dendroica magnolia (7) Magnolia

Found in timber along Carp Creek and back from the shore at Big Stone Bay.

659 Dendroica pennsylvanica (6) Chestnut sided

Found in the aspens and in hardwood sprouts. Not seen after July 7.

662 Dendroica fusca (3) Blackburnian

July 19, 20, and 21 in timber at Big Stone Bay.

667 Dendroica virens (17) Black Throated Green

August 1 an adult was feeding young near observation tower on Game Preserve in Emmet County. Young were seen in Leech's Bog on August 16.

671 Dendroica vigorsii (3) Pine?

June 22 in aspens back of camp. July 4 and 5 in Pines in center of camp.

674 Sciurus arcticus (29) Arctic

Last seen on August 2.

June 19 a nest was found on the ground  $\frac{1}{4}$  mile north east of camp. There were five eggs some of which were Cowbird eggs.

July 20 a nest was found by Francis Harper half way from Lake to observation tower on Emmet County Game Preserve. It had four downy young. The brooding adult fluttered away.

A nest found by Dr. F. H. Blanchard near the mailbox back of camp had one egg and two young just hatched on July 22.

679 Oporornis philadelphia (4) Mourning Warbler

One in brush on Grapevine Point on July 1.

West of the Lake on July 7 and 14. On July 14 an adult was seen carrying food at the west end of the Lake.

Two were seen in a recently cut-over bog at Big Stone Bay on July 20. This pair called nervously as if they had young nearby.

681 Geothlypis trichas trichas (9) Yellowthroat

July 28 a nest was found one foot from the ground in a clump of Carex at the east edge of Leech's Bog. It was at the side of a large log. Three young were about half grown. On August 3 a feathered young bird was leaving this nest and the adult ♀ was calling excitedly in the vicinity.

686 Wilsonia canadensis (4) Canada

July 5 and 6 in the gorge. Pair was carrying food into a brushy patch back of Marsh Bay on July 7. One was seen in burned timber at west end of the Lake on July 14.

687 Setophaga ruticilla (23) Redstart.

July 19 a nest was found eight feet from the ground in a partly dead Betula along the creek at Big Stone Bay near its mouth. Adults were feeding a nearly grown cowbird in the nest.

704 Dumetella carolinensis (4) Cowbird

at the west end of the Lake in brush July 14. August 8 a nest was found three and one half feet from the ground in Alex verticillata east of open water at Mud Lake, in high bog shrub association. Two young with feathers showing and two unhatched eggs were in the nest. Adults were calling nearby in the dense undergrowth.

705 Toxostoma rufum (34) Brown Thrasher

June 19 a nest was found on the ground about two hundred yards east of camp. There were four eggs. June 12 slaty gray downy young were in the nest. Wing quills were showing on the young on June 16. The parent was brooding. On June 22 the nest was empty.

On June 15 an adult without a tail was carrying nesting material  $\frac{1}{2}$  mile south in the aspens.

June 18 a young thrasher just able to fly was seen in the brush  $\frac{1}{2}$  mile north east of camp.

a young bird just out of the nest was found between camp Davis and the Biological Station on July 8.

July 12 a nest was found on the ground two miles south west in the aspens. It was under a Quercus borealis sprout. An adult was brooding three eggs. The nest was all above ground.

July 13 the nest was empty.

721 a. Troglodytes aedon aedon (20) House Wren

Around buildings and in recently burned ground. A nest was seen in a box on top of a post seven feet high in a farm yard on the way to Cheyogan July 1. An adult was singing nearby.

July 19 a nest was found on loose paper hanging from the ceiling of a room in a deserted house at Cecil Bay. Several young in the nest were nearly half grown. The nest was about two inches deep and was open on top.

July 20 a nest was found in the top of a stump three inches in diameter. The hole was two and one half feet from the ground and five inches deep. At least four young with feathers showing were in the nest. It was  $\frac{1}{4}$  mile from the lake in a recently cut over bog at Big Stone Bay. Adults were carrying food to the young.

722 Mannus hiemalis hiemalis (11) Winter Wren

Found in Thuja bog forests.

726 Certhia familiaris americana (4)

July 20 and 21 in timber at Big Stone Bay. August 13 two were seen in the hardwoods on Colonial Point. August 16 one was seen in Reeces Bog.

727 Sitta carolinensis carolinensis (9) White-breasted Nuthatch

Found in hardwoods and in aspens.

728 Sitta canadensis (6) Red-breasted Nuthatch

at Big Stone Bay July 19, 20, 21, & 31 and August 1. Reeces Bog August 16

735 Penthestes atricapillus atricapillus (22)

More frequent in late part of season than earlier.

748 Regulus satrapa satrapa (9) Golden-crowned Kinglet

Found in Thuja bogs. July 19 a pair was seen carrying nest material in Picea and Thuja in Reeces Bog.

Young out of the nest were seen at Big Stone Bay July 20 and in Reeces Bog August 16.

756 Hylocichla fuscescens fuscescens (5) Willow Shrike

West of Lake July 7 and 19 singing. On Fairy Island July 12 and at Big Stone Bay July 19 and 20.

758a. Hylocichla ustulata swainsoni (3) Olive-backed Shrike

Singing at Big Stone Bay July 19, 20, and 21.

759b. Hylocichla guttata pallasi (37) Hermit Shrike

Singing all summer in aspens and bog forests.

761 Planesticus migratorius migratorius (44) Robin

		Nests found.			
date	height from ground	kind of tree	location	contents	
June 14	2 feet	Pile of lumber	in camp	1 egg	
June 15	8 feet	Betula	1/4 mile south	unfinished	
June 19	7 feet	Betula	south part of camp	2 eggs	
June 22	7 feet	Betula	1/4 mile south camp Davis	3 eggs	
July 5	6 feet	Aspen suburn	between camps	4 eggs	
July 6	5 1/2 feet	End of log	in laboratory in camp	3 eggs	
July 9	10 feet	Quercus borealis	at edge of bog	unfinished	
July 10	4 feet	Aspen	black lake hardwood	3 eggs	
July 23	13 feet	Picea	Black Lake hardwood	5 eggs	
July 23	6 feet	Betula	Black Lake hardwood	4 eggs	
July 24	30 feet	Pinus strobus	in camp	1	
August 7	4 1/2 feet	dead tree in aspen	2 miles north of log cabin	3 grown young	
August 9	9 feet	Betula	Camp Davis	young	



766 Sialia sialis sialis (20) Blue bird

In aspens and along roads in cultivated land.

July 20 a nest was found twelve feet from the ground in a hole in a dead stump nine inches in diameter. An adult was brooding four downy young in the nest.  $\frac{1}{4}$  mile from lake in recently cut over land at Big Stone Bay.

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John Lintell

*Charles E. Burt  
Theodore D. Nelson*

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A METHOD OF SHOWING RELATIVE FREQUENCY OF  
OCCURRENCE OF BIRDS

WITH THREE GRAPHS

By JEAN M. LINSDALE

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## A METHOD OF SHOWING RELATIVE FREQUENCY OF OCCURRENCE OF BIRDS

WITH THREE GRAPHS

By JEAN M. LINSDALE

**F**IELD ORNITHOLOGISTS are probably unanimous in holding the opinion that it is desirable to express the results of their studies in a more exact form than has been done, generally, in the past. However, in spite of the general agreement that the results of field investigation should be so presented as to command analysis on a basis comparable with those of some other branches of science, ornithologists have, so far, made too little progress in this direction. The reasons for this apparent neglect of an opportunity to progress in field ornithology are obvious to all persons who have even a slight experience in the field study of birds. Even if it be granted that it is at present impracticable to attempt to reduce all field observations to a mathematical basis, it seems that some phases of the field study of birds could be, and should be, made more useful by more quantitative methods. It is particularly necessary that some attention be given to developing methods whereby the relative frequencies of occurrence of bird species in a given unit of habitat may be expressed in such a way as to be intelligible and at the same time comparable with the results of similar studies in other localities.

It is the purpose of the present paper to illustrate the application of a method for expressing the relative frequency of birds, which proved to be useful in analyzing the results of certain local surveys of birds. With slight modification this procedure

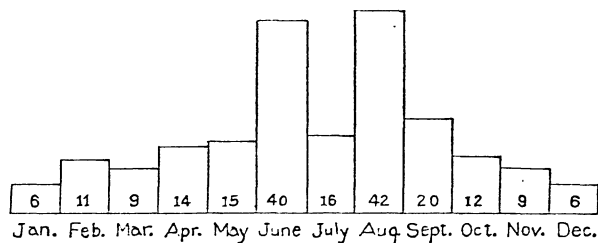


Fig. 69. CHART SHOWING DISTRIBUTION OF FIELD DAYS BY MONTHS.

might be adapted to clarify great masses of detailed information that have been gathered by many local observers. The use of the particular method described here resulted from an acquaintance with a somewhat similar method used by botanists in analyzing the frequency of occurrence of plants and which has given rise to a generalization commonly referred to as Raunkaier's law of frequency. The following quotation from Kenoyer (*Ecology*, VIII, 1927, p. 343) explains briefly the chief points of this law as it is applied in studies of vegetation.

"Raunkaier summarizing the conclusions obtained in eleven different pieces of work carried on in different sections of Europe by himself and others deduced what he calls the Law of Frequency. The percentage of frequency of a given species is the percentage ratio which the plots on which the species occurs bears to the whole number of plots taken. On an ordinary Michigan lawn the percentage of frequency of blue grass would be 100; that of the dandelion, assuming that it is found in four out of

five sample plots, would be 80. In practically all such surveys the species of least frequency are by far the most numerous. Raunkaier points out that, as we proceed to the greater frequencies, the number declines steadily, then, as the highest frequency is reached, increases slightly. In other words the curve expressing numbers of the different frequencies has two peaks, a high one expressing the least frequency, and another, considerably lower, expressing the greatest frequency. If we group in five classes, which we designate as A, B, C, D, and E, the species of frequencies of respectively 1-20 per cent, 21-40 per cent, 41-60 per cent, 61-80 per cent, and 81-100 per cent, then the law of distribution might be expressed  $A > B > C = D < E$ ."

As a result of a consideration of several possible methods of presentation of the kinds of results considered here it was decided that whatever method was adopted should possess, at least, the following requirements:

1. It should involve simple calculations.
2. It should be a by-product of field work. It is in regard to this factor that, it seems to me, the present method has its chief advantage over any method which re-

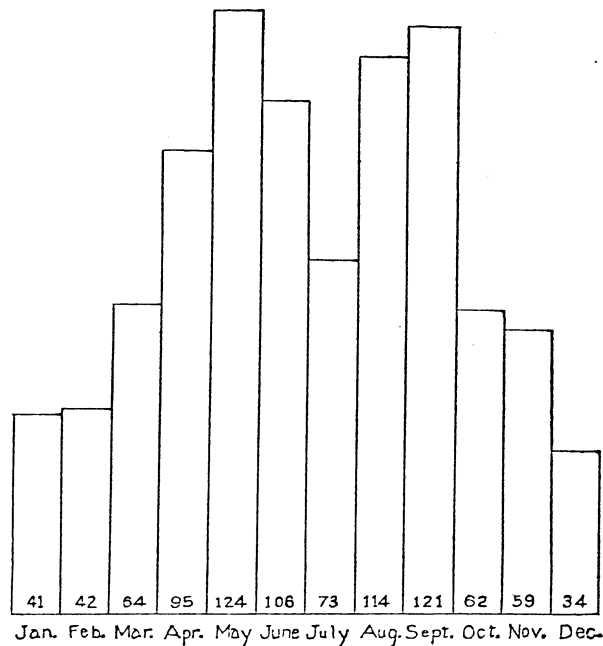


Fig. 70. CHART SHOWING NUMBER OF SPECIES PRESENT ON AREA EACH MONTH.

quires the counting of individual birds for the purpose of determining relative frequency. Usually it is desirable to spend every minute of available time in the field in making and recording life-history observations, so that it would seem to be a waste of time to give undivided attention to counting individuals of birds if the same result could be secured by some other method. It is unlikely that it is justifiable to devote full time in the field if the only result of such work would be the determination of the frequency of occurrence of the several species of birds.

3. Its expression should be concise and the results should be easily represented graphically so that the order of frequency of species in one locality, season or year could easily be compared with that in another locality, season or year.

4. It must give proper evaluation to the more frequent species.

As an illustration of the method herein considered in a particular problem in frequency of occurrence of birds it is desirable to enumerate the steps that were used in its application:

1. An area was chosen for study and definite boundary limits were decided upon. All the area was within one and one-half miles of the old townsite of Geary, Doniphan County, Kansas.

2. In addition to the usual field notes, records of the presence of birds were kept in a type of note book but slightly modified from that described by Chapman (*Handbook of Birds of Eastern North America*, 1920, p. 10).

3. Since this area included a variety of habitat, being made up of samples of nearly all the types of habitat to be encountered in the region, an effort was made to divide each day's time so that a portion could be spent in each type.

4. Two hundred full days of field work, not consecutive, but scattered over a period of nearly four years (1921-25), were occupied in making observations upon the

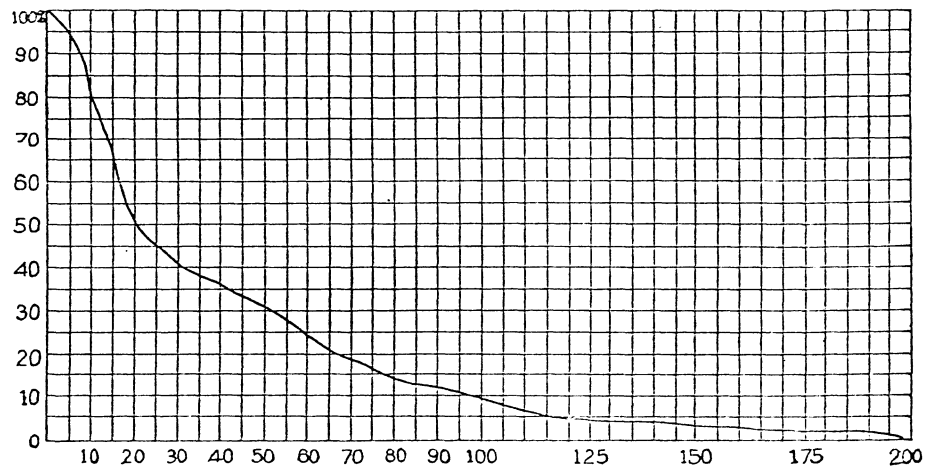


Fig. 71. GRAPH SHOWING RELATIVE FREQUENCY OF OCCURRENCE OF THE 194 SPECIES OF BIRDS THAT WERE RECORDED ON THE SURVEYED AREA.

birds of the area. The days for study were selected with a view to working more days in months when more species were present and fewer days in seasons when fewer species were to be encountered and when there was less activity. (Compare charts, figures 69 and 70.)

5. Records were kept of all species seen each day, the aim being to find all that were present each day.

6. The total number of days each species was observed in this area was divided by the total number of days (200) on which observations were made in the area. This gave a percentage of frequency for the species concerned. This figure differs from that used in botanical studies in that it is based on time units rather than on areal units (quadrats). Some such departure from the original procedure seems necessary because of the nature of the organisms involved. Birds being so highly motile, it seems more nearly representative of their frequency to use units of time rather than of space.

The 194 recorded species were arranged in a list, as here presented, with the most frequent first and the others following in order of their frequency of occurrence. Then, the percentages of frequency were plotted on a graph (fig. 71). This curve shows graphically and, I think, accurately the degrees of frequency of occurrence of the species concerned on the particular area worked and during the period of the study.

The 194 percentages of frequency are distributed in the five classes of the Raunkaier formula thus: 133,32,13,6,10 or approximately in the following percentages: 68,16,7,3,5. These results agree closely with those given by Kenoyer (*loc. cit.*) for analyses of frequency distribution in plant communities.

It seems evident that results such as those given, when accompanied by definite statements as to the area concerned and the time concerned, would form satisfactory means of comparison of the relative frequency of birds in one area with those in another or in the same area when so changed that different environmental conditions prevail. It must be kept in mind that factors such as differences in degree of development of sedentary habits in birds, disproportionate representation of types of habitat in the surveyed area, and uneven distribution of time spent in the field combine to make these results deviate from true conditions. However, these factors influence results of this nature that are derived by other methods to an even greater extent.

Funds for use in the field work upon which this paper is based were supplied by the Department of Zoology of the University of Kansas.

LIST OF SPECIES AS FOUND ON THE AREA SURVEYED IN EASTERN KANSAS, ARRANGED IN ORDER OF ABUNDANCE WITH PERCENT OF FREQUENCY FOR EACH

	Percent		Percent
1. Cardinal .....	100.	39. Tree Swallow.....	36.5
2. English Sparrow.....	99.5	40. Green Heron.....	35.5
3. Crow .....	98.5	41. Yellow-breasted Chat.....	34.
4. Chickadee .....	98.5	42. Field Sparrow.....	34.
5. Blue Jay.....	93.5	43. Rose-breasted Grosbeak.....	33.
6. Tufted Titmouse.....	90.	44. Red-tailed Hawk.....	32.
7. Carolina Wren.....	89.	45. Brown Thrasher.....	31.5
8. Downy Woodpecker.....	89.	46. Phoebe .....	31.
9. Mourning Dove.....	84.5	47. Orchard Oriole.....	30.5
10. Goldfinch .....	82.	48. Slate-colored Junco.....	30.
11. Robin .....	68.5	49. Purple Martin.....	30.
12. Red-headed Woodpecker.....	68.5	50. White-eyed Vireo.....	29.5
13. Indigo Bunting.....	65.5	51. Warbling Vireo.....	29.5
14. Red-bellied Woodpecker.....	65.	52. Kentucky Warbler.....	27.5
15. Red-winged Blackbird.....	63.	53. Song Sparrow.....	26.5
16. Yellow-billed Cuckoo.....	62.5	54. Belted Kingfisher.....	25.
17. Chimney Swift.....	59.	55. Mallard .....	23.5
18. Red-eyed Vireo.....	58.5	56. Screech Owl.....	23.
19. Baltimore Oriole.....	52.	57. Maryland Yellow-throat.....	23.
20. Western House Wren.....	49.5	58. Tree Sparrow.....	22.
21. Wood Thrush.....	48.	59. Towhee .....	21.5
22. Wood Pewee.....	47.5	60. Blue-winged Teal.....	21.5
23. Whip-poor-will .....	46.5	61. Least Tern.....	21.
24. Ruby-throated Hummingbird...	45.5	62. Bronzed Grackle.....	19.5
25. Cowbird .....	45.	63. Redstart .....	19.
26. Bell Vireo.....	45.	64. Spotted Sandpiper.....	18.5
27. Kingbird .....	44.5	65. Yellow-legs .....	18.5
28. Bluebird .....	43.5	66. Yellow Warbler.....	18.
29. Blue-gray Gnatcatcher.....	40.5	67. Pectoral Sandpiper.....	18.
30. Hairy Woodpecker.....	39.5	68. Bob-white .....	17.5
31. Great Blue Heron.....	39.5	69. Bank Swallow.....	17.
32. Barn Swallow.....	38.	70. Northern Parula Warbler.....	17.
33. Northern Flicker.....	38.	71. Coot .....	16.5
34. Catbird .....	38.	72. Prothonotary Warbler.....	16.
35. Turkey Vulture.....	38.	73. Killdeer .....	16.
36. Crested Flycatcher.....	37.5	74. Cooper Hawk.....	15.5
37. Rough-winged Swallow.....	37.	75. Black Tern.....	15.
38. Dickcissel .....	36.5	76. Harris Sparrow.....	14.5

	Percent		Percent
77. Ruby-crowned Kinglet.....	13.5	136. Olive-backed Thrush.....	2.5
78. Least Sandpiper.....	13.5	137. Rusty Blackbird.....	2.5
79. Red-shouldered Hawk.....	13.	138. Winter Wren.....	2.5
80. Golden-crowned Kinglet.....	13.	139. Black-bellied Plover.....	2.5
81. Lincoln Sparrow.....	13.	140. Franklin Gull.....	2.5
82. Fox Sparrow.....	12.5	141. Prairie Horned Lark.....	2.
83. Cliff Swallow.....	12.5	142. Grasshopper Sparrow.....	2.
84. Wood Duck.....	12.5	143. Greater Yellow-legs.....	2.
85. Black-and-white Warbler.....	12.	144. Forster Tern.....	2.
86. Marsh Hawk.....	12.	145. Great Horned Owl.....	2.
87. Pintail.....	12.	146. Barred Owl.....	2.
88. Wilson Warbler.....	11.5	147. Blue-winged Warbler.....	2.
89. Brown Creeper.....	11.	148. Olive-sided Flycatcher.....	2.
90. Shoveller.....	11.	149. Bald Eagle.....	2.
91. White-breasted Nuthatch.....	10.	150. Canada Warbler.....	2.
92. Purple Finch.....	9.5	151. Black Duck.....	1.5
93. Nashville Warbler.....	9.5	152. Rough-legged Hawk.....	1.5
94. Summer Tanager.....	9.5	153. Gray-cheeked Thrush.....	1.5
95. White-throated Sparrow.....	8.5	154. Sparrow Hawk.....	1.5
96. Least Flycatcher.....	8.5	155. Virginia Rail.....	1.5
97. Myrtle Warbler.....	8.5	156. Least Bittern.....	1.5
98. Pine Siskin.....	8.5	157. Leconte Sparrow.....	1.5
99. Grinnell Water-thrush.....	8.5	158. Wilson Phalarope.....	1.5
100. Prairie Marsh Wren.....	8.	159. Baldpate.....	1.
101. Mourning Warbler.....	8.	160. Gadwall.....	1.
102. Herring Gull.....	8.	161. Yellow-headed Blackbird.....	1.
103. Solitary Sandpiper.....	8.	162. Little Blue Heron.....	1.
104. Swamp Sparrow.....	8.	163. Chipping Sparrow.....	1.
105. Broad-winged Hawk.....	8.	164. Black-throated Green Warbler.....	1.
106. Black-crowned Night Heron.....	7.5	165. Cerulean Warbler.....	1.
107. Cedar Waxwing.....	7.	166. Worm-eating Warbler.....	1.
108. Nighthawk.....	7.	167. Mockingbird.....	1.
109. Semipalmated Plover.....	7.	168. Double-crested Cormorant.....	1.
110. Scarlet Tanager.....	6.5	169. Hudsonian Godwit.....	1.
111. Lesser Scaup Duck.....	6.5	170. Willet.....	1.
112. Green-winged Teal.....	6.	171. Long-billed Dowitcher.....	1.
113. Acadian Flycatcher.....	5.	172. Philadelphia Vireo.....	1.
114. Migrant Shrike.....	5.	173. Savannah Sparrow.....	1.
115. White Pelican.....	5.	174. Short-billed Marsh Wren.....	.5
116. Pied-billed Grebe.....	5.	175. Swainson Hawk.....	.5
117. Wilson Snipe.....	5.	176. Black-poll Warbler.....	.5
118. Meadowlark.....	4.5	177. Blackburnian Warbler.....	.5
119. Vesper Sparrow.....	4.5	178. Pine Warbler.....	.5
120. Orange-crowned Warbler.....	4.5	179. Ring-necked Duck.....	.5
121. Blue-headed Vireo.....	4.5	180. Red-breasted Merganser.....	.5
122. Alder Flycatcher.....	4.5	181. Redhead.....	.5
123. Semipalmated Sandpiper.....	4.	182. Gambel Sparrow.....	.5
124. Sora.....	4.	183. Long-eared Owl.....	.5
125. Bittern.....	4.	184. Clay-colored Sparrow.....	.5
126. Merganser.....	3.5	185. Louisiana Water-thrush.....	.5
127. Tennessee Warbler.....	3.5	186. Bonaparte Gull.....	.5
128. Ring-billed Gull.....	3.5	187. Osprey.....	.5
129. Canada Goose.....	3.	188. Sharp-shinned Hawk.....	.5
130. Red-breasted Nuthatch.....	3.	189. Buff-breasted Sandpiper.....	.5
131. Ovenbird.....	3.	190. Long-billed Curlew.....	.5
132. Black-billed Cuckoo.....	3.	191. Stilt Sandpiper.....	.5
133. White-rumped Sandpiper.....	3.	192. Saw-whet Owl.....	.5
134. Yellow-throated Vireo.....	3.	193. Yellow-bellied Sapsucker.....	.5
135. Short-eared Owl.....	3.	194. Hermit Thrush.....	.5

Museum of Vertebrate Zoology, Berkeley, California, January 16, 1928.