

THE ORIOLE

A Quarterly Journal of Georgia Ornithology; Official Organ of the
Georgia Ornithological Society



VOL. XXVIII

DECEMBER, 1963

No. 4

THE ORIOLE

EDITOR

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BREEDING BIRD CENSUS OF TWO PINE FORESTS WITH SPECIAL REFERENCE TO THE PINE WARBLER

ALLAN ROBERTS

The University of Georgia*

One of the trends in Georgia is to convert much of the land into man-made pine forests. These pine forests are planted for optimum yield per acre by uniform spacing of seedlings consisting nearly always of a single species. Clearing of hardwood undergrowth and removal of dead or dying trees, as commonly practiced in intensive management, further reduces the diversity that would be found in a natural pine forest in Georgia.

The main purpose of this breeding bird census was to compare the occurrence during the breeding season of Pine Warblers (*Dendroica pinus*) and associated species in man-made pine forests and natural pine forests in the Athens, Georgia area. A special effort was made to observe the behavior of Pine Warblers in pine forests with and without hardwood undergrowth.

Three study areas, labeled A, B, and C were selected for study. These areas are illustrated in Figures 1 and 2. Each of these areas was censused as a whole excepting area No. 3, study plot C which was not included in the study even though stands of different ages and species of pine trees were found in each study area. The contrast between tracts with and without hardwood understory are shown in Figure 3. Study areas A and B were used only for the census of Pine Warblers. Study area C was used for a total census of all breeding birds, including the Pine Warbler.

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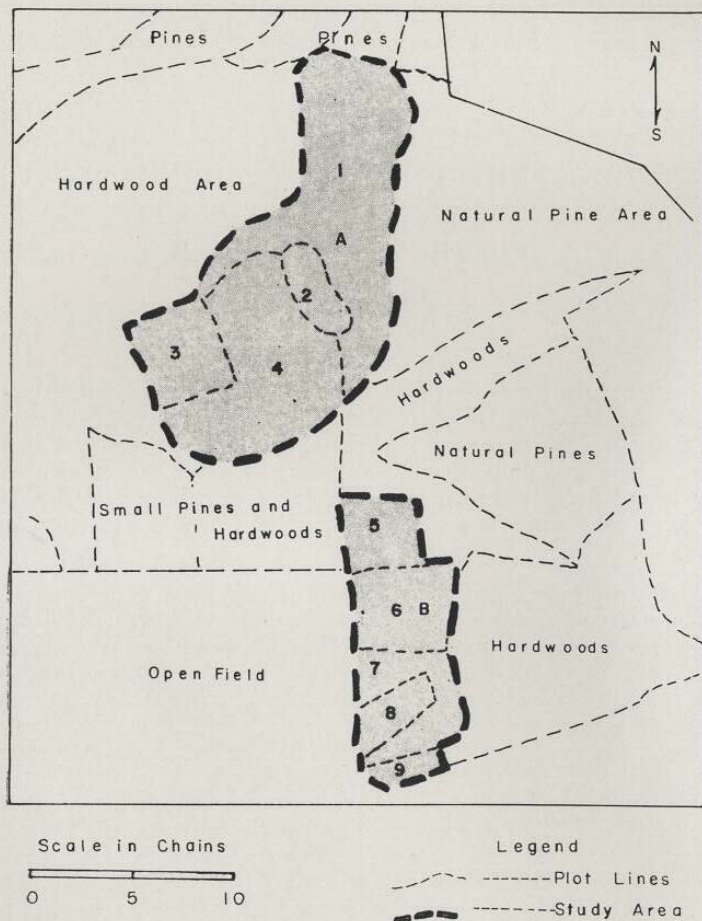


Figure 1. Study area A (top) and Study Area B (bottom) which was used for a total census of only Pine Warblers. 1. Natural Pine Area. 2. Slash Pine, planted in December, 1931, 8' x 8'. 3. Small Pines, 5' to 9'. 4. Natural Pine area which is diseased. Several dead pines are in this plot. 5. A mixture of four Southern species. 6. Loblolly Pine, planted in December 1932, 8' x 8'. 7. Slash Pine, planted December 1932, 6' x 8'. 8. Slash Pine, planted spring, 1941, 6' x 8'. 9. Loblolly Pine, planted February, 1934, 6' x 8'.

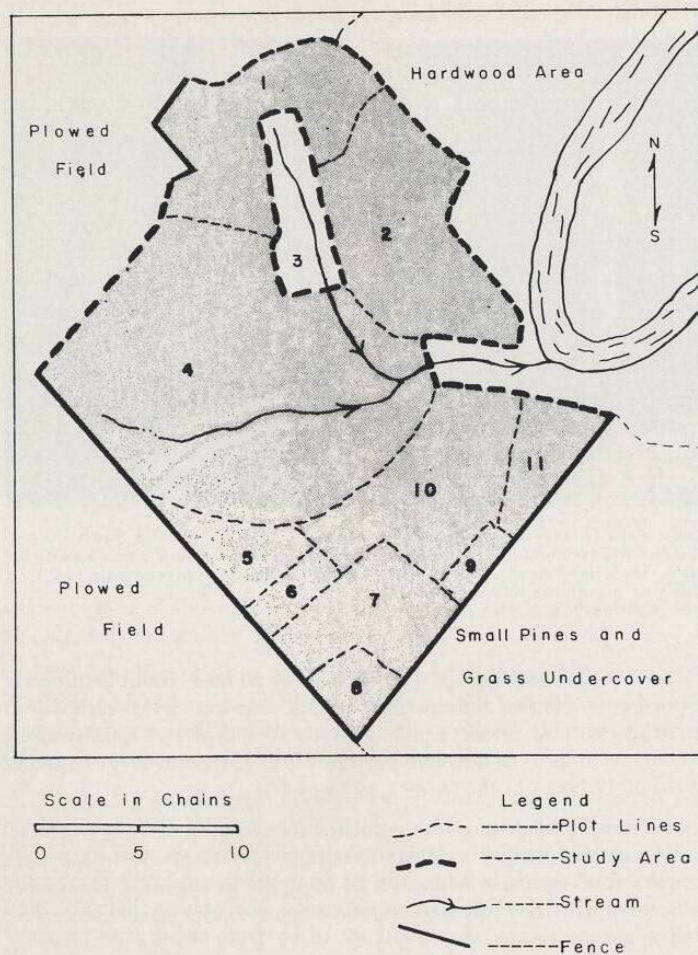
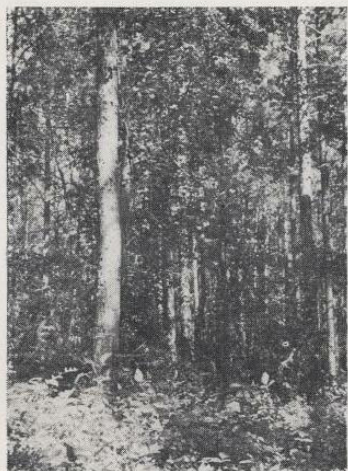


Figure 2. Study Area C which was used for a total census of all spring breeding birds including the Pine Warbler. 1. Pine Cordwood. 2. Slash Pine, planted December, 1937, 6' x 8'. 3. Hardwood area. (This area was *not* included in the study). 4. Slash Pine, planted December, 1936, 6' x 8'. 5. Shortleaf Pine, planted fall, 1934, 6' x 6'. 6. Shortleaf Pine, planted fall, 1933, 8' x 8'. 7. Slash Pine, planted fall, 1934, 6' x 8'. 8. Slash Pine, planted December, 1936, 6' x 6'. 9. Slash Pine, planted December, 1936, 6' x 8'. 10. Slash Pine, planted fall, 1934, 6' x 6'. 11. Slash Pine, planted fall, 1934, 6' x 6'.



Study Area C showing Slash Pine in an area where man has not cleared away the hardwood undergrowth. This was a popular habitat for Towhees, Cardinals and the like.



Study Area C showing Slash Pine in an area where man has cleared out the hardwood undergrowth.

So that the occurrence and movements of all birds could be properly mapped as to location, a precise map of each area was carried each day in the field. For study areas A and B a total of 8 trips and approximately 14 hours were spent in the field. For study area C there were 11 trips and a total of 19 hours in the field.

Breeding bird density was estimated by mapping singing males according to the method used by Kendeigh (1944). Species maps were compiled from the daily field maps. By using the species maps the number of breeding pairs, territory size, and the estimated pairs per 100 acres were determined.

RESULTS

The results of the censuses for Pine Warblers are given in Table 1. Areas A and C each supported two pairs of breeding Pine Warblers. Territory size averaged larger on area C, which was largely planted pine

than on area A, which was largely natural pine forest with hardwood undergrowth. The six acre area B did not support a resident pair; the area was apparently too small and was surrounded mainly by hardwoods and old fields.

The feeding behavior of the Pine Warbler is very diverse even in what seems to be a "uniform" environment! All possible hiding places for insects, both flying and crawling, are investigated by these foraging birds. Pine Warblers generally feed in the middle to upper parts of the pine trees, but they also visit small pines four and five feet high. They seek out small organisms from under the flakes of bark on the main trunk, limbs and even dead areas of the tree.

It is interesting to note that whether deliberate or not on the bird's part, two distinctive behavior patterns were observed to play a part in food gathering. When alighting near the tips of the pine limbs the weight of their bodies generally causes needles to be shaken. This movement causes some of the flying insects to immediately take flight, thus increasing the vulnerability of the insect.

On several occasions it seemed that song played a part in food gathering. When the warbler flies to a new location in the forest it immediately sings a quick phrase of its song. On several occasions moths were observed to fly out from under flat pieces of bark and crevices and be caught by the warbler just after a song.

Individual variation in feeding behavior of the several Pine Warblers was marked. Whereas one bird would continuously use one or both of the above described feeding methods, other individuals would occasionally, or seldom, or never use one or the other of the methods.

According to Burleigh (1958) Pine Warblers are said not to visit hardwood areas, even when at the borders of the pine forests except during the winter months etc. While this is undoubtedly generally true, much individual variation was observed in this study in regard to whether a Pine Warbler would visit a hardwood area. Two of the male Pine Warblers were never observed in the hardwoods while one of the Pine Warblers was observed to visit the hardwood area along a small stream in the area only once. However, in study area C the male Pine Warbler which had a territory estimated to be $5\frac{1}{2}$ acres (Table 1) would on some days spend nearly 30% of the time it was under observation singing and feeding in the adjacent hardwood area.

Table 1. Estimated number of breeding pairs of Pine Warblers in man-made pine forests in three study areas—A, B, and C near Athens, Georgia.

| Study Area | Size in Acres | Number of Pairs | Size of Territories (in acres) | Estimated number of pairs per 100 acres |
|--------------------------|---------------|--------------------------------------------|--------------------------------|-----------------------------------------|
| A (largely natural pine) | 12 | Total: (2) (pair No. 1) (pair No. 2) | 2¼ 5½ | 17 |
| B (largely planted pine) | 6 | None | | |
| C (largely planted pine) | 20 | Total: (2) (pair No. 1) (pair No. 2) | 12¼ 5½ | 10 |

Besides covering a large area during feeding, the Pine Warbler also employs a variety of methods of catching small prey in the pine forest. It will capture insects on the wing, peck at small slabs of bark to expose small creatures which were seen to run under these hiding places, and on one occasion a Pine Warbler was observed to "hover" in order to catch a small crawling creature which ran from the top of a 4" limb to the bottom of the same limb.

This "broad niche" is no doubt due to the lack of interspecific competition from other small passerine birds of the pine forest. In Piedmont Georgia the Pine Warbler is nearly alone in the vegetation canopy of the pine forest. Occasionally a few other small birds will "trespass" in his area, or habitat niche, often enough to cause interspecific competition for food.

The results of the total census, from Study Area C, is given in Table 2.

Table 2. Estimated number of breeding pairs of birds in a man-made pine forest, 20 acres in size, from a total census of Study Area C near Athens, Georgia. (X represent territories too large to determine in this 20 acre plot.)

| Species | Pairs in the study area | Estimated Pairs per 100 acres |
|-----------------|-------------------------|-------------------------------|
| Towhee | 11 | 55 |
| Cardinal | 10 | 50 |
| Tufted Titmouse | 4 | 20 |
| Summer Tanager | 2 | 10 |
| Pine Warbler | 2 | 10 |

| | | |
|--------------------------|---|----|
| Red-eyed Vireo | 2 | 10 |
| Carolina Chickadee | 2 | 10 |
| Carolina Wren | 2 | 10 |
| Hooded Warbler | 2 | 10 |
| Red-bellied Woodpecker | 1 | 5 |
| Brown Thrasher | 1 | 5 |
| Mockingbird | 1 | 5 |
| Great Crested Flycatcher | 1 | 5 |
| Catbird | 1 | 5 |
| Wood Pewee | 1 | 5 |
| Wood Thrush | 1 | 5 |
| Chuck-will's Widow | X | |
| Bobwhite | X | |
| Bluejay | X | |
| Common Crow | X | |

In the study made on natural pine forests of various ages and also in the Athens area Johnston and Odum (1956) found three species, namely, Field Sparrow, Bachman's Sparrow, and Prairie Warbler,—which I also found in the artificial, planted pine forest. Several breeding birds in Study Area C were definitely associated with the hardwood growth along the small streams cutting through the study area. These were the Red-eyed Vireo, Hooded Warbler, and Wood Thrush. It is very doubtful if these birds would have bred in this artificial pine forest if it had not been for the hardwoods along the streams. Of the eleven pairs of Towhees found in study area C all were observed in areas which had not been cleared of hardwood undergrowth. Of the ten pairs of Cardinals nesting in the forest all but three pairs were found in areas where understory was not cleared out by man.

During the study no special effort was made to locate nests. However, eight nests which were being used, were discovered. The species and number of nests found were as follows: Cardinal (3); Crow (2); Blue Jay (2); and Red-bellied Woodpecker (1).

It is interesting to note that the only woodpecker which nested in the entire 20 acres was using as a nesting site the only dead pine tree which had been overlooked during cutting procedures. The more natural pine forests adjacent to study areas A and B had a number of standing dead pine.

In addition to species judged to be holding territories on area C the following species and numbers of visitors were observed during census trips:

| Species | Estimated Number of Visitors |
|------------------------|------------------------------|
| White-throated Sparrow | 23 |
| Goldfinch | 22 |
| Blue Grosbeak | 3 |
| Cowbird | 2 |
| Great Horned Owl | 1 |
| Meadowlark | 1 |
| Downy Woodpecker | 1 |
| Robin | 1 |
| Pileated Woodpecker | 1 |
| Cooper's Hawk | 1 |
| Blue-gray Gnatcatcher | 1 |

No Brown-headed Nuthatches were ever observed in study area C. The absence of these birds in this area may have also been due to the lack of standing dead pines which provide nesting sites for these small birds. The only area in which Brown-headed Nuthatches were observed was in section four of study area A, which had a large number of dead and dying pine trees.

One wonders if the complete removal of diversity in pine forests is necessary or even desirable from the standpoint of long term production of forest products. Without some understory or other cover under the pines and without nesting sites for cavity nesting species birds will be scarce as will also other natural agents that might check an outbreak of insects.

SUMMARY

Breeding censuses were conducted in three tracts of pine forests as follows: A-12 acres mostly natural pine; B-6 acres planted pine; C-20 acres largely planted pine but with some natural undergrowth. Two pairs of pine warblers were resident breeding birds in stands A and also in stand C, but no resident pine warblers were found in stand B. Territory size was larger in tract C than in tract A suggesting that the pine warbler does obtain food from the understory where available.

Since the Pine Warbler is almost alone in the pine canopy niche during the breeding season it is suggested that the extremely varied

feeding behavior observed may be the result of a lack of interspecific competition.

An estimated total of 44 pairs of 16 species (equivalent to 220 pairs/100 acres) were holding territories in tract C with Cardinal and Towhee being the most common species. All species other than the pine warbler were concentrated in the portions of the forest having undergrowth or dead standing trees.

ACKNOWLEDGEMENTS

I wish to thank Dr. Jack May, University of Georgia, for making available for this study records on the school's forestry areas. I also wish to thank Dr. Eugene P. Odum for his helpful suggestions throughout this study.

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NOTES ON THE FOOD OF THE GOLDFINCH

By G. A. DORSEY

Field observations on the feeding of birds may rarely be expected to present an accurate or full account of the total dietary behavior of a species, but data from a number of observers might be pieced together to form a useful adjunct to stomach-content studies. I have in my field notes from 1925 through 1957 the following observations on the American Goldfinch (*Spinus tristis*). The food plants are listed in the order of their apparent popularity:

Elm trees (*Ulmus* sp.)—March 11 through April 23, 22 dates recorded. The ripening seeds are a favorite food in early spring. Flocks of well over 100 birds were sometimes observed, dispersed in a loose group through the tops of the trees, singing and twittering together as they fed. In a few instances Pine Siskins (*Spinus pinus*) and Purple Finches (*Carpodacus purpureus*) were with the Goldfinches.

Sweet Gum (*Liquidambar styraciflua*)—November 3 through January 29, 13 dates recorded. The birds take the seeds from the globular aments in the trees. On one occasion two Purple Finches were feeding with the Goldfinches. They do not seem to come to these seeds in such large numbers as at the elms, about 30 birds at one time being my maximum count.

Dandelion (*Taraxacum officinale*)—March 11 through April 30, 9 dates recorded. Most of these birds, feeding on the ripening seeds, were on urban lawns in small groups.

Alder (*Alnus serrulata*)—November 15 through March 11, 5 dates recorded. One to three birds at a time removing the seeds from the cone-like catkins.

Wild Sunflowers (*Helianthus* sp.)—August 6 through August 19, 4 dates recorded. One to four birds at time at the plants.

Green Algae (*Spirogyra* and possibly others)—Four dates: March 25, August 18, October 3, December 6. I was surprised that the Goldfinch uses this as a food. Careful observation showed that the birds were actually swallowing the hair-like strings of the algae, which they gathered from the edge of a stream or a pond.

They were usually in small groups, the largest of which was 20 by count on March 25, 1954.

Cultivated Garden Sunflower (*Helianthus annuus*)—June 21 to August 15, 3 dates recorded. While I have not kept many notes on the Goldfinch feeding on this plant, yet its large seeds seem to be a favorite food wherever it is planted.

Thistle (*Cirsium* sp.)—Two dates, July 14 and September 18. Two birds were pulling the seeds from the heads each time.

European Chickweed (*Stellaria media*)—March 12, 1926, three Goldfinches with eleven Pine Siskins were feeding on this plant, and on April 5, 1927 several Goldfinches.

Wild Asters and other composites—November 29, 1932, 14 Goldfinches eating the seeds.

Evening Primrose (*Oenothera biennis*)—February 2, 1935, one Goldfinch fed on seeds taken from the capsules on the dried and standing plant.

Short-leaf Pine (*Pinus echinata*)—December 29, 1957, two Goldfinches with two Pine Siskins were removing seeds from the cones on a tree.

The Goldfinch probably follows various kinds of preferred food when it is available, and the bird may be quite abundant in a region at one time, and entirely absent at other times. All of these observations were made at or near Atlanta, Ga., and Rome, Ga. *Darlington School, Rome, Ga., Dec. 10, 1963.*

GENERAL NOTES

ADDITIONAL LARK SPARROW OBSERVATIONS IN CHATHAM COUNTY, GEORGIA.—Previous Lark Sparrow records in Georgia have been listed by Davenport (Oriole, XXVII, 51) and Cypert (Oriole, XXVIII, 53). To these can be added some further local data. A single bird was seen on Cockspur Island on Aug. 5, 1951, then this summer and fall (1963), from one to three individuals were seen on eight occasions from Aug. 11 to Sept. 18, along a short stretch of grassy dirt road on Tybee Island. A single specimen was taken on Aug. 25. It was a male, adult by gonads and skull characters. It was not fat and weighted 30 grams.

This specimen has been compared with Davenport's specimen of *Chondestes g. strigatus*, and the blackish center markings of the back feathers are wider, and the chestnut head markings are darker, meeting the description of *C. g. grammacus* of Ridgeway (U. S. Nat. Mus. Bull 50, part 1, 1901, 176). This confirms the idea that, where a number of Lark Sparrows have been seen in this region, they would likely be representatives of the eastern subspecies.

At least one hundred miles of similar habitat were covered in the meantime without finding any others. IVAN R. TOMKINS, 1231 East 50th St., Savannah, Ga. November 17, 1963.

MALLARDS IN THE ATLANTA AREA.—For two summers—1961 and 1963—evidence has been noted of Mallards (*Anas platyrhynchos*) nesting in the Atlanta area in the backwaters from Bull Sluice Dam on the Chattahoochee River, Fulton County, near Roswell, Georgia.

In 1961, May 14th and again on May 23rd, a pair of Mallards was observed remaining after general migration was over. The female was seen alone on June 25th and 28th. On July 4th she was seen again, acting as if young were present. On July 11th and July 15th a female Mallard and eleven young about two-thirds grown were observed preening, showing the distinctive Mallard speculum. These were seen at close range and also watched for some thirty minutes through 8 x 40 binoculars and through a 30 power scope. W. W. Griffin and Rufus Godwin observed Mallards in this same area the next day, July 16th.

In the summer of 1963, on July 24th, a female Mallard and nine young almost at the adult size were seen in the above location. They were watched in open water through binoculars and scope, preening, feeding and in flight. On July 31st and again on August 7th, Manilla Land and I

saw a female and young in the same area. Two Mallards were seen in flight on September 7th.

In 1962, fishermen reported young Mallards in a location nearer the dam, but none were observed by me during the summer of that year.

These observations seem to indicate that Mallards have nested and raised young in the Atlanta area. MARENE W. SNOW, 2036 N. Johnson Ferry Rd., Marietta, Georgia, September 10, 1963.

FROM THE FIELD

Bobby Crawford of Thomasville had a male Painted Bunting visit his feeder on October 2, 1963. The bird visited the feeder for several days and was still present on October 14 when his letter was written. Most of the visits were in late afternoon. Bobby also observed 77 Cattle Egrets on highway U. S. 19 near Thomasville, Georgia on September 15, 1963.

L. A. Wells of Columbus reports the observation of two Caspian Terns on the Chattahoochee River on August 4, 1963. Mr. Wells indicates that the Grasshopper Sparrow is spending the summer at the Columbus Municipal Airport and reports the sighting of young there.

Mrs. Genevieve Jones of Waverly Hall observed the successful nesting of two Ruby-throated Hummingbirds this past nesting season. Members of the Chattahoochee Valley Natural History Club observed an Acadian Flycatcher on a nest containing three eggs on June 16, 1963. A Red-breasted Nuthatch was observed near Columbus on Nov. 12, 1963 by Jane Knight.

Ivan Tomkins has had a Dickcissel coming into his yard during the latter days of November and early December in Savannah. He had noted all three species of Scoters, the Ruddy Duck, Old-Squaw, Red-breasted Merganser, and others off Tybee Island and mentions that these species seem to be coming in closer to shore than is customary.

NEWS AND COMMENTS

BACK NUMBERS OF THE ORIOLE AND OTHER PUBLICATIONS OBTAINABLE FROM THE BUSINESS MANAGER

Louis C. Fink, 688 N. Parkwood Road, Decatur, Georgia has indicated that all back numbers of The Orioles are available except the following out-of-print issues:

Vol. V No. 3—September 1940

Vol. VI No. 2—June 1941

Vol. XII No. 4—October 1947

These out-of-print numbers will be reprinted as funds become available

Libraries and others who may wish to obtain a complete set of The Oriole should be encouraged to buy a set now while most of the numbers are still available. Anyone who buys a set now will be sent the out-of-print numbers as soon as they are reprinted. The price of the complete set, Vol. 1 to Vol. XXIV, is \$55.00. The majority of the back numbers of The Oriole sell for 50 cents each, however, there are several which sell for \$1.00 and a few for 25 cents each.

The following regional papers are also available: The Birdlife of the Savannah River Delta, Gaviiformes through Charadriiformes by Ivan R. Tomkins, \$1.50.

DON EYLES

Dr. Don Eyles, a native of Atlanta and a graduate of Emory University, died recently in Penang, Malaysia. He was a scientist director with the U. S. Public Health Service's Commission Corps. He had been stationed at Kaula Lumpur for the past three years and was returning to take a post on the faculty at the University of Maryland. Survivors are the widow, the former Mary Stipe of Atlanta; a daughter Mary Anne Eyles; sons, Don Eyles, Jr., and John G. Eyles.

Earle R. Greene pays tribute to Don Eyles in a recent letter to the Editor which is reproduced here.

The news of the passing of Dr. Don Eyles came as a shock to me and of course to many others including the members of The Atlanta Bird Club and The Georgia Ornithological Society, organizations of which he was a member of many years.

Don Eyles and Norman H. Giles, Jr. conceived and brought forth THE ORIOLE as of January 1936 making it the official organ of The Atlanta Bird Club; they being the editors of this valuable contribution. When The Georgia Ornithological Society was organized The Oriole became the official organ of G. O. S., Don and Norman continuing as editors for many months. This small but valuable bulletin has served to keep bird students in Georgia and in many parts of our country informed on ornithological matters. These two men, Eyles and Giles, deserve great credit for their contributions.

In addition I would like to state that we also owe them contributions of interest and value for notes covering much of the state, from the mountains to the Okefenokee Swamp and the coast, as much of this was included in BIRDS of GEORGIA by Greene, Griffin, Odum, Stoddard and Tomkins.

RECENT LITERATURE

WHERE TO FIND BIRDS AND ENJOY NATURAL HISTORY IN FLORIDA—Edited by Margaret H. Hundley, Florida Audubon Society, Maitland, Florida, 24 pp., \$1.00.

This 8½ x 11 inch book is a collection of practical suggestions on bird-finding in Florida. Most of the entries were written by men and women who live in the area they describe; they are grouped according to sections of the State, so that a Georgia visitor can quickly find a good place to look for birds. Detailed road directions are given, interesting species are suggested for each locality; and in some cases, the names and telephone numbers of local bird club members are provided.

The book is illustrated in color on the cover, in black-and-white on the inside pages. The bird photographs are of uneven quality, but will be helpful to visitors trying to identify new birds. As the Preface points out, Florida is the only State where all of the herons listed for the United States may be found. The scrub jay and spotted-breasted oriole are found only in Florida.

The section on south Florida includes references to Grand Bahama Island and the Dry Tortugas. Finally, there is a list of available literature on Florida shells, insects, flowers, trees and so on. The Florida Audubon Society has all of this material available for sale. LOUIS C. FINK.

SEA BIRDS OF PERCE AND THE GASPE PENINSULA—by V. C. Wynne-Edwards, Fourth Edition revised by G. Harper Hall. 34 pages. Drawings and photographs. 50 cents. Montreal, Mercury Press, available from the Black Whale Shop, Perce, P. Q. This is a valuable and readable summary of the sea birds of Perce and Gaspé, including Bonaventure Island. It describes in detail the gannets, gulls, kittiwakes, terns, cormorants, petrels, puffins, murre, auks and guillemots of the area, with drawings of individual birds and photographs of nests and colonies. The little book includes information on habits not found readily elsewhere, and much useful data on finding the birds. LOUIS C. FINK.

THE BIRDS, Life Nature Library, by Roger Tory Peterson and the Editors of Life, 1963, Time Inc., New York, New York, 192 pp., \$4.00.

The editors of LIFE made a very good choice in selecting Mr. Peterson to write the text for this volume, as evidenced by the finished work. It is one of the most attractive bird books to appear in some time.

Almost every page contains a line drawing, colored photograph, or some type of illustration.

The book's eight chapters are titled as follows:

1. From Archaeopteryx to sparrow, 2. What it takes to fly, 3. Birds as food gatherers, 4. How many birds? 5. The riddle of migration, 6. How birds communicate, 7. From egg to adult, 8. Toward a balance with man.

As a introduction to the bird world the layman will find this book touches most of the more interesting aspects of birdlife interestingly and accurately. Milton Hopkins, Jr.

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TITLE—The title should be concise, descriptive, and not more than 10 words in length. Avoid use of scientific names in titles if possible.

FOOTNOTES—Avoid footnotes by incorporating such material in the text.

NOMENCLATURE—Vernacular names are not to be capitalized in text. They are to be accompanied by appropriate scientific names the first time each species is mentioned. Show reference for long lists of scientific names (i.e., A.O.U. Checklist, 5th ed., 1957).

REFERENCES—When there are fewer than 3 references insert them in parentheses where needed in the text by author, journal, volume, pagination, and year of publication. Three or more references are grouped alphabetically by authors last names under "literature cited".

TABLES—Prepare tables in keeping with size of *THE ORIOLE*. A good table should be understandable without reference to the text.

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