

between cattle and nutria but the main damage caused by nutria to cattle marshes is the opening up of the marsh and making it difficult and in some cases impossible to burn off the old dead vegetation. As fire is the principal management tool in marsh management, this condition can be very bad for the proper management of a marsh regardless of the manager's aim.

Farm Pond Management. Since the introduction of nutria into Louisiana there has been a lot of stocking of nutria into farm ponds and lakes over the state and into east Texas for the purpose of removing undesirable aquatic vegetation and weeds. Improper construction with shallow water areas is usually responsible for the presence of weeds, therefore nutria at best are only a temporary respite from the trouble. Very little has been gained from stocking nutria in ponds and lakes other than the satisfaction of seeing a few cattail and cut grass clumps removed from the pond margin.

FUR PRODUCTION OF NUTRIA

It was not until the 1945-1946 trapping season that nutria became a recognized fur bearer in Louisiana. Since then a minimum of approximately 900,000 nutria have been harvested for their pelts. The prices have run from a high of \$5.00 to a low of \$2.00. This price and the number of animals harvested are from out state severance tax records. A copy of this record is available to those of you that are interested in the fur take in Louisiana. It is believed that the market price for nutria will hold steady at about \$2.75 for top pelts.

It is believed by biologists who work in the marsh that there is an upward of one million nutria in the Louisiana marshes today.

NUTRIA A POTENTIAL FOOD SOURCE

Nutria are being used to some extent in Louisiana for food. This market for nutria flesh is principally to the colored people in and around New Orleans, however, nutria are being eaten throughout the marsh area.

A cooking experiment has just been concluded at Louisiana State University by the Louisiana State University Agriculture Experiment Station, and a paper is to be released in the near future. It is felt that nutria are one of the cleanest animals in the state and the meat has a very good flavor.

THE FLORIDA DUCK IN THE VICINITY OF LAKE OKEECHOBEE, GLADES COUNTY, FLORIDA

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INTRODUCTION

To sportsmen of South Florida an important component of waterfowl hunter's bags is the bird known as the Florida duck (*Anas fulvigula fulvigula* Ridgway). This is a non-migratory species that occurs in peninsular Florida from the latitude of Gainesville (Alachua County) southward, reaching its greatest abundance in the vicinity of Lake Okeechobee. Its value as a game bird is indicated by the fact that in areas where it occurs it comprises about 10 percent of the total waterfowl kill. Such a kill has been estimated by Jennings (personal interview) to be as high as 50-60 percent of its total population, but in spite of such excessive hunting pressure the Florida duck populations are remaining steady or even slightly increasing in numbers (Chamberlain, 1951; Jennings, 1952).

The present study was initiated by the Florida Game and Fresh Water Fish Commission in 1948 as part of Federal Aid Project 19-R. Its objectives were to obtain information on the numbers and distribution of Florida ducks, and to study in detail, the life history and ecology of this species. Beginning with the spring of 1953, H. Jay Hosford, a graduate assistant at the School of

Forestry, University of Florida, was assigned to this project for his thesis subject. Primary emphasis was placed at that time upon a study of the food habits, but also it was hoped that pertinent information could be obtained on the life history of this bird. Unfortunately, Mr. Hosford died of a chronic kidney disorder on February 7, 1955 before he could complete his work or summarize the results of his studies and without the master's degree he was so close to obtaining. The senior author served as chairman of Mr. Hosford's graduate supervisory committee. It was his task to finish analyzing the duck gizzards for the food habits phase of this investigation, and to furnish this report of what had been learned during this study.

Grateful acknowledgment of assistance in this project is given to the following persons: Dr. Alexander C. Martin, Biologist, Patuxent Research Refuge, U. S. Fish and Wildlife Service, Laurel, Maryland, for his prompt and thorough identification of plant seeds; Mr. E. B. Chamberlain, Jr., Federal Aid Coordinator, Florida Game and Fresh Water Fish Commission, Tallahassee, for financial assistance under the Federal Aid to Wildlife Restoration program; Mr. W. L. Jennings, formerly with the Florida Game and Fresh Water Fish Commission in charge of Federal Aid Project 19-R; Dr. Pierce Brodkorb and Dr. Benjamin B. Leavitt, Department of Biology, and Dr. John H. Davis, Department of Botany, University of Florida, all three of whom served on Mr. Hosford's graduate supervisory committee; Dr. A. M. Laessle, Department of Biology, and Mr. Erdman West, Department of Botany, for their assistance in naming unknown seeds and plants, respectively; and Dr. L. A. Hetrick, Department of Entomology, for identifying insect matter.

DESCRIPTION OF THE STUDY AREA

This study took place largely on a 22,400-acre tract owned by Austin Pearce located in Glades County, Florida, approximately 12 miles southwest of Okeechobee City. The topography over most of the area is relatively level, but in a few places, near the border of Lake Okeechobee, there are very slight undulations in the terrain. Elevations range from 22 feet above sea level in the vicinity of Moore Haven, in the southwest corner of the lake, to approximately 34 feet above sea level at Okeechobee City. Cattle raising and truck cropping (largely tomatoes, but some watermelons) are the principal forms of land use.

Surface water is normally abundant and well distributed throughout the study area. Much of it occurs as numerous shallow ponds that vary in size according to the amount of rainfall. Additional open water occurs in drainage ditches that literally criss-cross the study area in an effort to remove excess water so that the land can be farmed. Artesian wells scattered over the area further augment the supply of water in the ditches. There were approximately 91.6 miles of old ditches and 7.5 miles of new ditches in the study area. Inasmuch as these ditches usually contain water, while the ponds may occasionally dry up, they form an integral feature of the Florida duck habitat.

Climatic data for Moore Haven, about 20 miles southwest of the study area, are presented in Figure 1. In general the climate is characterized by cool, comparatively dry winters, and warm, wet summers. The average annual temperature is 73.2° F., and the average annual precipitation is 49.95 inches. Average monthly temperatures range from 64.0° F. in January to 81.4° in August. Temperature extremes during the period of this investigation ranged from a minimum of 36° F. on December 16, 1953 to a maximum of 98° F. on May 28, 1953 (U. S. Department of Commerce, 1954 and 1955).

Hurricanes periodically sweep across or near the study area, but there was only one such storm of any consequence during the period of this investigation. This occurred in October, 1953, and travelled toward the northeast, directly across the area of study. There is no indication that hurricanes are a menace to Florida ducks although they are known to do considerable damage to quail and turkeys and other types of ground-dwelling bird life.

Vegetation of the area was studied in an extensive manner by the use of aerial photographs at a scale of approximately 8 inches = 1 mile. These photographs were examined in the office under a dot-grid sheet having 36 dots per

| Species | Fall 1953 (7) ^x | Winter 1953-54 (26) | Spring 1954 (19) | Summer 1954 (20) | Fall 1954 (6) | Winter 1954-55 (66) |
|---|-------------------------------|------------------------|---------------------|---------------------|------------------|------------------------|
| <u>Axonopus furcatus</u> (Big carpetgrass) | | | | | | |
| <u>Paspalum (ciliatifolium?)</u> (Fringeleaf paspalum) | | | | | | |
| " <u>dissectum</u> (Mudbank paspalum) | | | | | | |
| <u>Panicum (agrostoides?)</u> (Redtop panicum) | | | | | | |
| " <u>bartowense</u> (Bartow panicum) | | | | | | |
| <u>Echinochloa walteri</u> (Coast cocksbur) | | | | | | |
| <u>Setaria geniculata</u> (knotroot bristlegrass) | | | | | | |
| <u>Cyperus (odoratus?)</u> (Flatsedge) | | | | | | |
| <u>Eleocharis cellulosa</u> (Gulfcoast spikesedge) | | | | | | |
| " <u>equisetoides</u> (Jointed spikesedge) | | | | | | |
| <u>Scirpus robustus</u> (Saltmarsh bulrush) | | | | | | |
| <u>Rynchospora (corniculata?)</u> (Horned beakrush) | | | | | | |
| <u>Certhanthus ceriferus</u> (Southern waxmyrtle) | | | | | | |
| <u>Persicaria portoricensis</u> (Puerto Rico smartweed) | | | | | | |
| " <u>punctata</u> (Dotted smartweed) | | | | | | |
| <u>Cabomba caroliniana</u> (Carolina fanwort) | | | | | | |
| <u>Psidium guajava</u> (Guava) | | | | | | |
| <u>Centella repanda</u> | | | | | | |
| <u>Jacquemontia sp.</u> (Vine) | | | | | | |
| <u>Lycopersicon lycopersicon</u> (Tomato) | | | | | | |
| <u>Ambrosia elatior</u> (Ragweed) | | | | | | |

Fig. 3. -- Vegetable foods of the Florida duck comprising 1.0 percent or more of the total gizzard contents in any one season. The width of the line is proportional to the relative importance of each item.

^x Figures in parentheses refer to the number of gizzards included.

10 acres on the ground. A tally was made of all the dots occurring in each vegetative type, and the total number of dots on the study area was thus determined. The number of dots in each type of vegetation was then expressed as a percentage of the total number of dots to arrive at an estimate of the percentage of the total area covered by each type. On this basis the vegetation on the study area is approximately as given in Table I.

TABLE I
VEGETATIVE TYPES OCCURRING ON THE FLORIDA DUCK STUDY AREA EXPRESSED AS PERCENTAGES OF THE TOTAL AREA OCCUPIED BY EACH TYPE

| <i>Vegetative Type</i> | <i>Percent</i> |
|---|----------------|
| 1. Wet prairies, seasonal marshes and grassy sloughs | 64.4 |
| 2. Ponds: | |
| a. Approximately 50 percent <i>Pontederia</i> spp.* and <i>Sagittaria</i> spp. and 50 percent <i>Persicaria</i> spp. | 6.1 |
| b. Mixture of <i>Pontederia</i> spp. and <i>Sagittaria</i> spp. | 4.6 |
| c. Predominantly <i>Scirpus</i> spp. | 1.5 |
| d. Grassy | 0.6 |
| e. Predominantly <i>Persicaria</i> spp. | 0.1 |
| TOTAL PONDS | 12.9 |
| 3. Old fields (principally tomato fields) | 9.8 |
| 4. Southern waxmyrtle (<i>Cerothamnus ceriferus</i>) | 7.9 |
| 5. Tomato fields | 1.7 |
| 6. Cabbage palmetto (<i>Sabal palmetto</i>) | 1.6 |
| 7. Jamaica sawgrass (<i>Mariscus jamaicensis</i>) marsh | 1.3 |
| 8. Other herbaceous perennials | 0.3 |
| 9. Miscellaneous (pondcypress [<i>Taxodium ascendens</i>], spoil banks, etc.) .. | 0.1 |
| TOTAL | 100.0 |

TECHNIQUES OF STUDY

Many of the life history data presented in this report were obtained by making periodic visits to the study area and recording the numbers and behavior of the birds observed. In addition, beginning with October, 1953, an attempt was made to collect at least six specimens monthly. These were used primarily for determining food habits, but weights and measurements, as well as notes regarding coloration, sexual development, and other conditions were also taken from these birds. Additional gizzards for food habits analysis were also obtained by contacting hunters at a fish camp five miles northeast of the study area. It is assumed that the gizzards so obtained represented a valid sample of what the birds were feeding on in the vicinity of the study tract. The number of birds collected and the additional number of gizzards analyzed are listed by months in Table II. It will be noted that during December, 1953 and also during September and October, 1954 no birds or gizzards were obtained for study purposes.

The food habits phase of this investigation was based upon the analysis of a total of 144 gizzard contents that were distributed according to months as shown in Table II. Individual food items were measured volumetrically by the water displacement method, and final results were expressed as percentages of the aggregate volume comprised by each item.

The growth rate of young Florida ducks in confinement was recorded by observing periodically an entire brood of ducklings that was captured on the day the birds hatched, May 3, 1953. Measurements on these ducklings were made until they reached the age of four weeks. They were then transferred to a larger pen at Gist's Bird Farm, McIntosh, Florida, making regular measurements on them impracticable because of the amount of travel involved.

* Scientific names of grasses are drawn from Hitchcock (1935). All other plant scientific names are in accord with Small (1933). Common names are drawn from Standardized Plant Names (1942).

TABLE II
NUMBER OF FLORIDA DUCKS AND ADDITIONAL GIZZARDS OBTAINED FOR
STUDY PURPOSES BY MONTHS

| Month | Birds Collected and Measured | Additional Gizzards | Total Gizzards |
|-----------------|---------------------------------|------------------------|-------------------|
| October, 1953 | 7 | 0 | 7 |
| November, 1953 | 11 | 13 | 24 |
| December, 1953 | 0 | 0 | 0 |
| January, 1954 | 2 | 0 | 2 |
| February, 1954 | 6 | 0 | 6 |
| March, 1954 | 6 | 1 | 7 |
| April, 1954 | 6 | 0 | 6 |
| May, 1954 | 8 | 0 | 8 |
| June, 1954 | 6 | 0 | 6 |
| July, 1954 | 6 | 0 | 6 |
| August, 1954 | 6 | 0 | 6 |
| September, 1954 | 0 | 0 | 0 |
| October, 1954 | 0 | 0 | 0 |
| November, 1954 | 0 | 66 | 66 |
| TOTALS | 64 | 80 | 144 |

In the discussion that follows, the period included in this investigation has been separated into seasons which consist of the following months: Spring—February, March, and April; Summer—May, June, and July; Fall—August, September, and October; and Winter—November, December, and January. Although the seasons in South Florida are rather indistinct by northern standards, there is still sufficient variation from one season to another to have an important influence upon all biological activity.

RESULTS AND DISCUSSION

PHYSICAL CHARACTERISTICS OF THE FLORIDA DUCK

Weight and Size. Florida ducks are moderately large in regard to both weight and size. The average adult male, based upon thirty birds, weighed 1030.3 grams (2 pounds, 4.3 ounces), whereas eleven adult females averaged 968.0 grams (also 2 pounds, 2.1 ounces). Maximum weights for adults of each sex were: Male—1280.1 grams (2 pounds, 13.2 ounces) for a bird collected on October 25, 1953; female—1131.8 grams (2 pounds, 7.9 ounces) for a bird collected March 23, 1954.

Seasonal variations in the weight of Florida ducks are presented in Figure 2. This curve is based upon averages obtained from both adult and young birds. It will be noted that the heaviest birds occurred during fall, 1953, whereas the lightest birds were recorded in the fall of 1954. This apparent discrepancy is caused by the fact that fall, 1953 was represented only by birds killed in October, whereas fall, 1954 included only birds collected in the month of August. According to these data there must be a large increment to the average weight of Florida ducks during the months of August, September, and October.

In regard to size, the average length of the forty-one adult birds was 579 millimeters (22 9/16 inches) and the average wingspread was 849 millimeters (33½ inches).

Color Differences Between the Sexes. The most prominent means of determining sex in Florida ducks on the basis of color is by an examination of the bill color. In males the bill is a solid color, tending to be a brilliant yellow. However, the bill of females is likely to be somewhat darker in color, running toward a dull orange or a dark, dull yellow, and blotched with dark olive colored markings. Bill coloring alone can be used for sex determination in the field. Another means of distinguishing between the sexes on the basis of color is by the appearance of the breasts. On males the breast is generally darker, and has a pronounced mottled or spotted effect, whereas on females the breast tends to be lighter, and the mottling runs in more or less vertical lines. Since there is considerable variation in breast coloration, this character cannot be relied upon entirely for separating the sexes.

LIFE HISTORY OF THE FLORIDA DUCK

Number of Birds Observed. Repeated observations of Florida ducks indicate that the birds are in groups as large as thirteen in number, perhaps even larger, until the latter part of February. Beginning in March and continuing through July, which includes the breeding season, birds occur as singles (usually males), pairs, or quite frequently as triples (two drakes and one hen). Flocks as large as fifty in number and consisting principally of young birds are seen during August. By the beginning of the hunting season in November the birds continue to occur in flocks of from six to twenty in number. Perhaps even larger flocks occur, as Singleton (1953) reports that in Texas during the month of October the quite similar mottled duck (*Anas fulvigula maculosa* Sennett) occurs in flocks numbering up to 3,000 birds.

Mating. The earliest record of mating, on the basis of field observations was between the dates of February 7 and 17, 1954. Mating was known to occur in at least one pair during that period. However, judging from the grouping of the birds observed, the majority of the mating takes place during March.

Courtship. Only one instance of courtship (probably of the postnuptial type) was recorded in this study. This occurred on April 13, 1954. It consisted of the drake quacking persistently and bobbing its head up and down two or three times, sometimes even putting its head entirely under water. This process was repeated a number of times. The drake approached the hen by flapping its wings and bounding forward. When copulation was attempted by the drake the female made an attempt to escape but did not fly away.

Nesting. Since only five nests containing eggs were found during this investigation, it is impossible to draw any definite conclusions about the nesting activities of the Florida duck. However, by using what few data were available, the nesting season was determined to extend from April through June, with the primary nesting season being the month of April and the first week in May. This conclusion is based upon nest data, the observation of two broods of ducklings both less than a week old on May 11, 1954, and the earliest date (July 21, 1954) that a young bird of the year was collected. It is in agreement with Bent (1923), and also is substantiated by the work of Singleton (1953) who regards April as the principal nesting month for the mottled duck. The extension of the nesting season through June is indicated by the collection of hens still in the laying process as late as June 28, 1954.

Nests are circular in outline, measuring about 10½ inches across and from 1½ to 3½ inches deep. They are more or less lined with down, grass, or twigs. A preference for tomato fields as a nest site is indicated by the finding of three of the five nests in such locations. One nest occurred out in the open in an old watermelon field. The location of the fifth nest was not recorded.

Although the location of Florida duck nests are not dependent upon proximity to water, they are usually within easy reach of it. For example, in tomato fields the nests are placed on the hills of the planted rows. Water is usually available either between the rows themselves or in the larger drainage ditches at the ends of the rows.

Eight was both the largest and the most common number of eggs observed per nest, in fact, four out of the five nests contained this number of eggs. The fifth nest contained five eggs. For the sixteen eggs for which data are available, fifteen of them hatched, giving a hatchability of 94 percent. Colored farm laborers were known to have taken a total of thirteen eggs from two of the nests, while a third nest containing eight eggs was completely destroyed by an unknown carnivorous predator.

Brood Growth. One entire brood of seven ducklings was captured the day the birds hatched (May 3, 1953) and confined in a pen to observe their growth rate. The birds were started on a diet consisting of chopped boiled eggs and gradually switched to baby chick mash. Later they were fed a combination of the mash and duckweed. The growth of the young birds is indicated by data presented in Table III.

TABLE III
THE GROWTH OF YOUNG FLORIDA DUCKS INDICATED BY THEIR WEIGHTS AT KNOWN AGES

| Duckling No. | Weight (Grams) at Age | | | |
|--------------|-----------------------|--------|---------|---------|
| | 1 Day | 9 Days | 16 Days | 27 Days |
| 1 | 28.6 | 58.2 | 122.0 | 247.1 |
| 2 | 31.4 | 75.6 | 150.6 | 244.3 |
| 3 | 29.1 | 68.4 | 120.6 | 222.2 |
| 4 | 31.9 | 84.1 | 163.4 | 189.9 |
| 5 | 30.8 | 79.1 | 165.4 | 235.2 |
| 6 | 32.6 | 78.4 | 162.3 | 271.7 |
| 7 | 31.9 | 86.0 | 166.2 | 240.8 |
| AVERAGE | 30.9 | 75.7 | 150.1 | 235.9 |

Post-Nesting Season. Following the nesting season the adult birds evidently go through a normal post-nuptial molt and become flightless for a period of a few days. Although this molting process was never actually witnessed, there is strong circumstantial evidence to point toward it. For example, no adult birds were observed, and none were collected, during the latter part of July and the first half of August. Furthermore, the three surviving birds of the brood mentioned above followed the normal molting sequence for ducks and became flightless during the month of July, 1954. Additional evidence is the fact that mottled ducks in Texas were observed by Singleton (1953) to undergo the post-nuptial molt within the months of June and July.

Age Determination. Young Florida ducks possess the usual characters that are associated with their age, namely, a bursa of Fabricius, an unsheathed penis, and an occluded oviduct (Hochbaum, 1942). The bursa of Fabricius appears first as a pouch that may be as deep as 42 millimeters in young birds during late July and early August. It may persist until as late as mid-February in some birds, appearing by that time as only a small indentation in the wall of the cloaca.

The structure of the penis ceases to be of value as an age determinant when it changes from a small, unsheathed appendage to the large, sheathed organ that characterizes adults. In Florida ducks, on the basis of field observations, this transformation frequently occurs some time between the second week in August and the latter part of October. Hochbaum (*op. cit.*), working in Canada, states that in mallards (*Anas platyrhynchos platyrhynchos* Linnaeus) this transformation may occur as early as late October in young birds only five months old. Applying this age to the known nesting season of Florida ducks, it can be assumed that in some individuals of this species the transition from the immature to the adult penis occurs during the month of September. Consequently, the bursa of Fabricius, and not the condition of the penis, should be used to indicate the age of young drake Florida ducks after this time.

The present investigation yielded no new information regarding the condition of the oviduct as a criterion for age. However, judging from the work of Hochbaum (*op. cit.*) it is logical to assume that the oviduct remains occluded in young females until just before the beginning of the breeding season in February.

FOOD HABITS OF THE FLORIDA DUCK

Within the fifteen-month period included in this investigation the food of the Florida duck, on the basis of the identified items only, and exclusive of the grit content, consisted of 87.2 percent vegetable matter and 12.8 percent animal matter. This proportion varied from almost 100 percent vegetable matter and only a trace of animal material during the fall and winter seasons to 61.3 percent plant material and 38.7 percent animal matter in the summer (Table IV). A list of the kinds and amounts of plant and animal foods found in the gizzard contents of Florida ducks is presented in Table V whereas Figure 3 illustrates graphically variations in the use of plant foods that comprised more than 1 percent of the total gizzard contents during any one season.

Plant Foods. According to data given in Table V Florida ducks utilized a total of 75 separate species of plants which were included in 48 different genera.

Marked variations occur in the consumption of these plant foods from one year to the next as well as from season to season. For example, the food habits of birds representing the fall, 1953 are quite different from those of birds collected during the fall, 1954. Accordingly, during the fall of 1953 the most important foods, listed in the order of relative use, were ragweed (*Ambrosia elatior*), fringed leaf paspalum (*Paspalum [ciliatifolium?]*), knotroot bristlegrass (*Setaria geniculata*), *Jacquemontia* sp., and dotted smartweed (*Persicaria punctata*). In contrast, the principal foods during the fall of 1954 were redtop panicum (*Panicum [agrostoides?]*), dotted smartweed, big carpetgrass (*Axonopus furcatus*), *Centella repanda*, fringed leaf paspalum, and mudbank paspalum (*Paspalum dissectum*).

TABLE IV

PERCENTAGES OF PLANT AND ANIMAL MATTER CONSUMED BY FLORIDA DUCKS ACCORDING TO SEASON ON THE BASIS OF IDENTIFIED MATERIAL ONLY

| Season | Plant Matter | Animal Matter |
|-----------------|--------------|---------------|
| Fall, 1953 | 100.0 | Tr* |
| Winter, 1953-54 | 100.0 | Tr |
| Spring, 1954 | 81.7 | 18.3 |
| Summer, 1954 | 61.3 | 38.7 |
| Fall, 1954 | 100.0 | Tr |
| Winter, 1954-55 | 92.0 | 8.0 |
| TOTALS | 87.2** | 12.8 |

Marked variations also occur in both the kinds of plants and the amounts of the same species utilized during the two winter seasons. For example, jointed spikesedge (*Eleocharis equisetoides*), horned beakrush (*Rynchospora [corniculata?]*) and saltmarsh bulrush (*Scirpus robustus*) were all consumed in relatively large amounts by Florida ducks during the winter of 1954-55. These three species, however, were absent entirely from gizzards of birds collected during the previous winter. Variations in the consumption of the same foods during the two winter seasons are apparent in the data for Gulfcoast spikesedge (*Eleocharis cellulosa*), Carolina fanwort (*Cabomba caroliniana*), Puerto Rico smartweed (*Persicaria portoricensis*), and ragweed.

Spring foods of the Florida duck as indicated in Figure 3 includes dotted smartweed, Puerto Rico smartweed, coast cockspur (*Echinochola walteri*), knotroot bristlegrass, and southern waxmyrtle. Summer foods include Bartow panicum (*Panicum bartouense*) as by far the most important food item, as well as dotted smartweed, Puerto Rico smartweed, mudbank paspalum, *Centella repanda*, and tomato (*Lycopersicon lycopersicon*).

Variations in the food habits of Florida ducks from year to year can be logically explained by differences in the availability of the various foods to the birds. Of particular importance in altering availability are changes in water depths. For example, the previously mentioned differences between the 1953-54 and 1954-55 seasons illustrate the effect of water depths upon the food habits of this bird. Precipitation data for stations located about Lake Okeechobee all indicate that the months of August, September, and October, 1953 were characterized by above normal amounts of rainfall. Part of this excessive precipitation fell during the passage of a tropical storm across the northwest portion of Lake Okeechobee during October of that year. As a result of such large amounts of precipitation much of the land was flooded, enabling ducks to feed over extensive areas of pasture, cultivated lands and periodically inundated areas that were normally not available to them. Florida duck food habits during the fall, 1953 and the winter, 1953-54 reflect such conditions since such species as ragweed, fringed leaf paspalum, and knotroot bristlegrass are all relatively important (Figure 3).

Water levels were entirely different in 1954. During this year deficient amounts of rainfall were recorded through the fall and early winter periods. Surface water during the latter half of 1954 was therefore largely confined to normal ponds, drainage ditches, or to Lake Okeechobee itself. Consequently,

* Tr = less than 0.1 percent.

** Average figures based upon aggregate volumes rather than upon percentages above.

TABLE V
 FOOD HABITS OF THE FLORIDA DUCK BASED ON THE AMOUNT AND FREQUENCY OF OCCURRENCE OF PLANT AND ANIMAL FOODS
 IN 144 GIZZARD CONTENTS COLLECTED FROM OCTOBER, 1953 THROUGH NOVEMBER, 1954

| Species | Fall 1953 (7)* | | Winter 1953-54 (26) | | Spring 1954 (19) | | Summer 1954 (20) | | Fall 1954 (6) | | Winter 1954-55 (66) | |
|--|----------------|-------|---------------------|------|------------------|------|------------------|------|---------------|------|---------------------|------|
| | Amt. | Occ. | Amt. | Occ. | Amt. | Occ. | Amt. | Occ. | Amt. | Occ. | Amt. | Occ. |
| | Plant Material | | | | | | | | | | | |
| <i>Chara</i> sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr** | 1.5† |
| <i>Potamogeton pucher</i> (heartleaf pondweed) | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 5.0 | 0 | 0 | Tr | 1.5 |
| <i>Digitaria</i> sp. (Crabgrass) | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 10.0 | 0 | 0 | 0 | 0 |
| <i>Brachiaria extensa</i> (Signalgrass) | 0 | 0 | 0 | 0 | 0.2 | 5.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Axonopus compressus</i> (Tropical carpetgrass) | Tr | 14.3 | 0 | 0 | 1.4 | 68.4 | 0.2 | 45.0 | 2.2 | 16.7 | Tr | 3.0 |
| <i>Axonopus furcatus</i> (Big carpetgrass) | Tr | 14.3 | 0.3 | 26.9 | Tr | 10.5 | 0.4 | 55.0 | 2.2 | 33.3 | Tr | 1.5 |
| <i>Paspalum (ciliatiform?)</i> (Fringeleaf paspalum) | 12.4 | 100.0 | 2.0 | 57.7 | 0 | 0 | 4.5 | 35.0 | 1.4 | 66.7 | Tr | 6.1 |
| <i>Paspalum dissectum</i> (Mudbank paspalum) | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 15.0 | 0 | 0 | 0 | 0 |
| <i>Paspalum laeve</i> (Field paspalum) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0 | 0 |
| <i>Paspalum urvillei</i> (Vaseygrass) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16.7 | 0 | 0 |
| <i>Paspalum</i> sp. | 0.4 | 14.3 | Tr | 3.8 | Tr | 5.3 | Tr | 10.0 | 0 | 0 | 0 | 0 |
| <i>Panicum (Agrostoides?)</i> (Redtop panicum) | 0 | 0 | 1.6 | 23.1 | Tr | 5.3 | Tr | 10.0 | 17.4 | 66.7 | Tr | 1.5 |
| <i>Panicum bartovense</i> (Bartow panicum) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16.7 | Tr | 1.5 |
| <i>Panicum capillare</i> (Witchgrass) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1.5 |
| <i>Panicum (dichotomiflorum?)</i> (Fall panicum) | 0 | 0 | 0 | 0 | Tr | 5.3 | 0 | 0 | 0 | 0 | Tr | 1.5 |
| <i>Panicum verrucosum</i> (Warty panicum) | 0 | 0 | 0 | 0 | Tr | 5.3 | 0 | 0 | 0 | 16.7 | 0 | 0 |
| <i>Panicum</i> sp. | 0 | 0 | 0 | 0 | Tr | 5.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Echinochloa walteri</i> (Coast cockspear) | 0 | 0 | Tr | 3.8 | 1.4 | 10.5 | Tr | 5.0 | 0 | 0 | 0 | 6.1 |
| <i>Setaria geniculata</i> (Knotroot bristlegrass) | 8.3 | 85.7 | Tr | 7.7 | 2.2 | 10.5 | Tr | 10.0 | Tr | 33.3 | Tr | 4.5 |
| <i>Setaria (magna?)</i> (Giant bristlegrass) | 0 | 0 | Tr | 7.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Leersia oryzoides</i> (Rice cutgrass) | 0 | 0 | 0 | 0 | 0.2 | 5.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Hydrochloa carolinensis</i> (Water grass) | 0 | 0 | Tr | 3.8 | Tr | 21.0 | 0 | 0 | 0 | 0 | 0.8 | 31.8 |
| <i>Cynodon dactylon</i> (Bermudagrass) | 0 | 0 | 0 | 0 | Tr | 5.3 | 0.2 | 20.0 | 0 | 0 | 0 | 0 |
| <i>Cyperus compressus</i> (Flatsedge) | Tr | 14.3 | Tr | 7.7 | Tr | 5.3 | 0 | 0 | Tr | 33.3 | 0 | 0 |
| <i>Cyperus (odoratus?)</i> (Flatsedge) | Tr | 42.8 | 1.4 | 26.9 | Tr | 15.8 | Tr | 10.0 | Tr | 33.3 | 0 | 0 |

| | | | | | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|----|------|--|--|--|--|------|
| <i>Cyperus</i> sp. | | | | | | | | | 0 | | | | | | 0 |
| <i>Eleocharis cellulosa</i> (Gulfcoast spikesedge) | | | | | | | | | 0 | 15.8 | | | | | 81.8 |
| <i>Eleocharis equisetoides</i> (Jointed spikesedge) | | | | | | | | | Tr | 5.3 | | | | | 4.5 |
| <i>Eleocharis interstincta</i> † (Spikesedge) | | | | | | | | | Tr | 10.5 | | | | | 0 |
| <i>Eleocharis (quadrangulata)?</i> (Squaresstem spikesedge) | | | | | | | | | Tr | 0 | | | | | 0 |
| <i>Eleocharis</i> sp. | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Scirpus tuberculatus</i> (Bulrush) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Scirpus (ohneyi)?</i> (Bulrush) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Scirpus robustus</i> (Saltmarsh bulrush) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Scirpus validus</i> (or <i>americanus</i>) (Softstem bulrush) | | | | | | | | | 0 | 5.3 | | | | | 16.7 |
| <i>Rynchospora (corniculata)?</i> (Horned beakrush) | | | | | | | | | 0 | 0 | | | | | 53.0 |
| <i>Rynchospora (microcarpa)?</i> (Littleseed beakrush) | | | | | | | | | 0 | 0 | | | | | 39.4 |
| <i>Rynchospora plumosa</i> (Plumed beakrush) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Rynchospora (plumosa)?</i> (Beakrush) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Marriscus jamaicensis</i> (Jamaica sawgrass) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Scleria (ciliata)?</i> (Fringed razorsedge) | | | | | | | | | 0 | 5.3 | | | | | 0 |
| <i>Scleria reticularis</i> (or <i>setacea</i>) (Netted razorsedge) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Scleria</i> sp. | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Lemna</i> sp. (Duckweed) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Pontederia</i> sp. (Pickerel weed) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Juncus</i> sp. (Rush) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Cerottammus ceriferus</i> (Southern waxmyrtle) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Alnus rugosa</i> (Hazel alder) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Remer</i> sp. (Dock) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Persicaria portoricensis</i> (Puerto Rico smartweed) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Persicaria punctata</i> (Dotted smartweed) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Ambrosia (ambrosioides)?</i> (Wormseed goosefoot) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Brasenia schreberi</i> (Watershield) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Cabomba caroliniana</i> (Carolina fanwort) | | | | | | | | | 0 | 0 | | | | | 0 |
| <i>Argemone mexicana</i> (Mexican prickly poppy) | | | | | | | | | 0 | 0 | | | | | 0 |

* Figures in parentheses indicate number of gizzards included.

** Less than 0.1%.

† All figures are in percent.

‡ Not listed in Small (1933). Listed as *Eleocharis interstincta* (Vahl) R. & S. by Oneill (1940).

TABLE V—Continued
 FOOD HABITS OF THE FLORIDA DUCK BASED ON THE AMOUNT AND FREQUENCY OF OCCURRENCE OF PLANT AND ANIMAL FOODS
 IN 144 GIZZARD CONTENTS COLLECTED FROM OCTOBER, 1953 THROUGH NOVEMBER, 1954

| Species | Fall 1953 (7)* | | Winter 1953-54 (26) | | Spring 1954 (19) | | Summer 1954 (20) | | Fall 1954 (6) | | Winter 1954-55 (66) | |
|---|----------------|-------|---------------------|------|------------------|------|------------------|-------|---------------|------|---------------------|------|
| | Amt. | Occ. | Amt. | Occ. | Amt. | Occ. | Amt. | Occ. | Amt. | Occ. | Amt. | Occ. |
| <i>Chamaecrista</i> sp. (Partridge pea) | 0 | 0 | Tr | 3.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Meibomia</i> sp. (Beggarweed) | Tr | 28.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Sida</i> (<i>spinosa</i> ?) (Indian mallow) | Tr | 42.8 | Tr | 11.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Psidium guajava</i> (Guava) | 0 | 0 | 0.2 | 38.5 | 0.4 | 21.0 | 0.2 | 10.0 | 0 | 0 | 6.4 | 34.8 |
| <i>Proserpinaca</i> sp. (Mermaid weed) | 0 | 0 | 0.6 | 15.4 | Tr | 15.8 | 0.4 | 40.0 | 0 | 0 | 0.3 | 13.6 |
| <i>Myriophyllum</i> (<i>heterophyllum</i> ?) (Water milfoil) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1.5 |
| <i>Hydrocotyle</i> sp. (Pennywort) | 0 | 0 | 0 | 0 | Tr | 5.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Centella repanda</i> | Tr | 42.8 | 12.2 | 80.8 | 1.8 | 73.7 | 1.0 | 100.0 | 3.6 | 83.3 | 0.1 | 16.7 |
| <i>Piptilimum capillaceum</i> (Mockbishopweed) | Tr | 42.8 | 0.4 | 23.1 | Tr | 5.3 | Tr | 10.0 | Tr | 16.7 | Tr | 1.5 |
| <i>Jacquemonia</i> sp. (Vine) | 3.7 | 14.3 | 0.4 | 11.5 | 0 | 0 | 0 | Tr | 0 | 0 | 0 | 0 |
| <i>Cuscuta</i> sp. (Dodder) | 0 | 0 | Tr | 7.7 | Tr | 15.8 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Lycopersicon lycopersicon</i> (Tomato) | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 10.0 | 0 | 0 | Tr | 6.1 |
| <i>Phyla</i> sp. (Frog-fruit) | 0.4 | 100.0 | 0.1 | 57.7 | Tr | 42.1 | Tr | 45.0 | Tr | 83.3 | Tr | 1.5 |
| <i>Tenacrum</i> sp. (Germander) | 0 | 0 | Tr | 15.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Cephalanthus occidentalis</i> (Buttonbush) | 0 | 0 | 0.2 | 19.2 | Tr | 10.5 | 0 | 0 | 0 | 0 | Tr | 7.6 |
| <i>Viburnum</i> sp. (Viburnum) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Ambrosia elatior</i> (Ragweed) | 30.7 | 85.7 | 8.6 | 61.5 | 0.2 | 10.5 | Tr | 5.0 | 0 | 0 | 0.1 | 6.1 |
| <i>Heterotheca subaxillaris</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1.5 |
| <i>Erechtites</i> sp. (Burnweed) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0 |
| <i>Cirsium</i> sp. (Thistle) | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 10.0 | Tr | 16.7 | 0 | 0 |
| Miscellaneous plant | Tr | 42.8 | Tr | 3.8 | Tr | 5.3 | Tr | 5.0 | 0 | 0 | 0 | 28.8 |
| TOTAL PLANT | 56.8 | ... | 34.6 | - | 47.1 | - | 39.6 | - | 55.1 | - | 49.0 | - |

| | | | | | | | | | | | | | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|-----|------|------|---|---|---|---|---|---|---|---|---|---|------|
| <i>Animal Material</i> | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Gastropoda</i> (Snail shells) | Tr | 28.6 | 0 | 0 | 0 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19.7 |
| <i>Pelecypoda</i> (Mussels) | 0 | 0 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Decapoda</i> (Fresh water shrimp) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Odonata</i> (Dragon flies) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 |
| <i>Orthoptera</i> (grasshoppers) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Hemiptera</i> (Bugs): | | | | | | | | | | | | | | | | | | | | | | | 3.0 |
| <i>Belostomatidae</i> (Water bug) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 |
| <i>Naucoroidae</i> (Hot bug) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.0 |
| <i>Nepidae</i> (Water scorpion) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 |
| <i>Coleoptera</i> (Beetles): | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Dytiscidae</i> (Water beetles) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12.1 |
| <i>Elateridae</i> (Click beetles) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Haliphidae</i> (Water beetles) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 |
| <i>Hydraenidae</i> (?) (Water beetles) | Tr | 14.3 | Tr | 0 | 0 | 3.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.0 |
| <i>Hydrophilidae</i> (Water beetles) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.3 | 47.3 | 4.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.5 |
| Miscellaneous insect | Tr | 42.8 | Tr | 0 | 0 | 26.9 | 0 | 0.4 | 21.0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30.3 |
| Insect frass | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7.6 |
| <i>Aranacea</i> (Spiders) | 0 | 0 | 0 | 0 | 0 | 7.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 |
| <i>Pisces</i> (Fish—scales only) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 5.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Miscellaneous animal | 0 | 0 | 0 | 0 | 0 | 7.7 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15.1 |
| TOTAL ANIMAL | Tr | 57.1 | Tr | 38.5 | 10.6 | 84.2 | 25.0 | 90.0 | 83.3 | 3.9 | 72.7 | 47.1 | | | | | | | | | | | |
| MISCELLANEOUS (PLANT AND ANIMAL) | 43.2 | | 65.4 | | 42.3 | | 35.4 | | | | | | | | | | | | | | | | |

the feeding activities of Florida ducks were restricted to such areas. Particularly during the winter of 1954-55, Figure 3 indicates that the birds fed principally upon either emergent marsh plants, such as spikesedges, beakrushes, bulrushes, and smartweeds, or upon strictly aquatic plants such as Carolina fanwort. The importance of guava (*Psidium guajava*) at this time can be logically explained by the occurrence of this species along the banks of drainage ditches.

Animal Foods. It was mentioned previously that spring and summer, 1954, were the periods of heaviest use of animal matter by Florida ducks. During these two periods animal material comprised 18.3 percent and 38.7 percent, respectively, of the total identified material (Table IV), or 10.6 percent and 25.0 percent, respectively, of the total gizzard contents (exclusive of the grit content) (Table V).

The most important forms of animal matter were various kinds of water beetles of the families Hydraenidae (?), Hydrophilidae, Dytiscidae, and Haliplidae (Table V). Snail shells were another important component of the animal matter found in duck gizzards, especially during the winter of 1954-55. It is unknown whether these were taken intentionally for the protein content of the animal bodies or for the calcium and other minerals contained in the shells, or whether they were taken accidentally as grit or mistaken for seeds. Regardless of why snail shells were utilized by Florida ducks, it is logical to assume that they furnish the birds with minerals and other substances that are vital to their continued well-being.

The high utilization of snails during the winter season of 1954-55 also can be correlated with the low water levels that occurred at that time. Under such conditions the birds were restricted to areas where the snails normally occurred, and, because of the shallow water, they were able to feed on the snails if they so desired. High water levels could likewise explain the absence of snails from the duck gizzards collected during the 1953-54 winter season.

Lead Shot. A total of fourteen (9.7 percent) of the 144 gizzard contents contained lead shot. In at least eight of the gizzards (5.5 percent of the total) the shot showed evidences of wear, indicating that it had been mistakenly ingested by the birds as food material. In the remaining six gizzards it was impossible to determine if the shot had been ingested or shot into the gizzard when the bird was killed.

SUMMARY AND CONCLUSIONS

1. This investigation was undertaken primarily to become familiar with the food habits of the Florida duck but also to obtain as much life history data as possible.
2. The study took place on a 22,400-acre tract of more or less level land covered predominantly by wet prairies (seasonally inundated), grassy sloughs, and a variety of mostly shallow ponds.
3. Cool, moderately dry winters and warm, wet summers characterize the climate of the study area.
4. Pairing off in the Florida duck commences as early as February and is completed during March.
5. The nesting season extends from April through June, with the principal activity being in April and the first week of May. Nests commonly contain eight eggs, and are frequently placed in tomato fields.
6. Circumstantial evidence indicates that wild adult Florida ducks undergo the normal molting pattern during the months of July and August.
7. Age in young Florida ducks is reliably indicated by the bursa of Fabricius, in both sexes, and the occlusion of the oviduct in females alone. The structure of the penis becomes valueless as an age determinant when it assumes the characteristics of an adult during the month of September.
8. On the basis of identified material only, Florida ducks consumed an average of 87.2 percent plant material and 12.8 percent animal matter during the fifteen months included in this investigation.

9. Plant foods consumed varied according to their availability on the basis of both season of the year and the extent and depth of water. The amount and distribution of rainfall are important in this latter respect.

10. Animal matter was consumed principally during spring and summer periods.

11. Ingested lead shot occurred in a minimum of 5.5 percent of the gizzards examined.

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A REPORT ON EXPERIMENTAL CONTROL OF GIANT CUTGRASS (*Zizaniopsis miliacea*), 1950-1954

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On Reelfoot Lake, giant cutgrass (*Zizaniopsis miliacea*) is the chief pest plant. It occupies more than 2,000 acres which, from a wildlife management standpoint, could be better utilized by desirable food plant species, particularly waterfowl food plant species. It is the dominant perimental plant in all areas not shaded by such species as baldcypress (*Taxodium distichum*), willow (*Salix* spp.) and buttonbush (*Cephalanthus occidentalis*). In sheltered pockets and shallow marsh localities, its rank growths stretch from shoreline to shoreline. Presumably giant cutgrass thrives in water depths of not more than 30 inches, but on Reelfoot it is not unusual along channel banks to find heavy stands in five feet of water. By late September as the water levels drop, the blades often extend seven feet above the waterline.