

NOTES ON THE FOOD OF SOME WATER BIRDS OF REELFOOT LAKE (UPPER BLUE BASIN AREA)¹

COMPTON CROOK

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The preferred foods of most of the common North American herons are fairly well known to any well-read student of birds. Many studies are available, and the results of these have been summarized in most of the later State bird books and in other good resumes. Bent (1926) has provided one of the most important digests of periodical and monograph studies on this topic.

The average sportsman will immediately aver, if asked, that herons eat "fish." Better informed sportsmen will add frogs, crayfish, and small reptiles to their lists. A few may hazard "insects." But all will agree on fishes as the heronid staple. And this is of course true of a number of species.

From the studies that have been made it is evident that the fish-eating herons will take practically any fish that can be caught and swallowed. This seems also to be true of the crustaceans, amphibians, and insects that they take. Thus their diet at any one time will depend on what is most easily available. With this thought in mind the writer determined to study the food of several of the conspicuous species of water birds on Reelfoot Lake in late summer, inasmuch as they are then more noticeable than at any other time. Further, it is in late summer that the numbers of these birds are greatest. The drying of the swamps about the lake, and the choking of large areas of shallow water in the lake arms with underwater growth provide conditions unlike those that pertain at any other time of year.

The method of procedure was simple. The birds were observed at their normal feeding activities for an aggregate of many hours, the study being carried on daily from July 29 to September 2, 1937, inclusive. Most observations were made from a small rowboat. In the widely scattered feeding flocks of American Egrets, Little Blue Herons, and Ward's Herons it was possible to drift unobtrusively among the birds and to observe them at close vantage. Field glasses, 6x and 4x, were used as aids in observation. Little evidence as to actual identity of food taken could be obtained in this way, so an occasional specimen was shot for stomach analysis. A bird whose feeding had been observed was taken whenever possible. These

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specimens were taken on the Tennessee State permit granted to the Reelfoot Lake Biological Station, and on Biological Survey permit number 2565, which the writer holds.

In this study, data on four birds are presented. These are the species that are most conspicuous on the lake, and about the food of which questions are most often raised. They also are the species that lend to Reelfoot its distinctive and even spectacular avian beauty in late summer.

All save the Little Blue Heron breed commonly at Reelfoot. The Little Blue is a rare breeder. Reelfoot's two nesting colonies of water birds (on Big Ronaldson Slough, and near Hackel's Slough) have several times been described in print (Ganier, 1933; Vaughn, 1933; Woodring, 1934). The numbers of the three species of herons here treated increase markedly on Reelfoot after the breeding season, these numbers probably augmented by northward wandering of birds from more extensive rookeries farther south. The numbers of Double-Crested Cormorants probably show no such increase, although after breeding the birds are so widely scattered over the lake that it is difficult to estimate actual abundance. The writer (Crook, 1935) has attempted to establish the status of each of these birds on the lake in late summer. Whittemore (1937) has compiled records for an entire summer. The reader is referred to these two papers for further discussion of summer bird occurrence at Reelfoot.

In this study of foods, each species is treated separately. All data secured is compiled in Table 1. Figures 1-4 are added to show the contents of a typical stomach of each bird studied.

The writer desires to express his appreciation to the 1937 staff of workers at the Reelfoot Lake Biological Station, all of whom were of assistance in field work, and particularly to Dr. C. L. Baker and Malcolm V. Parker, who aided in identifying some of the fishes taken from stomachs.

AMERICAN EGRET

(*Casmerodius albus egretta* (Gmelin))

This species is easily the most spectacular and the most numerous of the large water birds on Reelfoot during the summer months. The writer (Crook, 1935) estimated 2500 summering birds on the lake in 1934. Whittemore (1937) quoted this estimate without comment for the summer of 1936. In 1937 the number of birds probably exceeded this figure.

The birds fed all over the lake, wherever stumps were available for resting places. Feeding continued throughout the day from dawn until about 6 P. M. Apparently there were two quite active periods during this time, the first ending at from 9 to 10 A. M., the second beginning between 2 and 3 P. M. and continuing until the first flocks

began to leave the feeding grounds for the roosts. Sporadic fishing, however, was in evidence throughout the day.

TABLE 1
Summary of foods eaten by water birds at Reelfoot Lake

NATURE OF FOOD	AMERICAN EGRET (11 BIRDS)	WARD'S HERON (4 BIRDS)	LITTLE BLUE HERON (6 BIRDS)	DOUBLE-CRESTED COR-MORANT (4 BIRDS)
Fish:				
Bluegill Sunfish (<i>Helioperca macrochira</i>).....	21	7	15	2
Large-mouth Bass (<i>Huro salmoides</i>).....	1			
Black Crappie (<i>Pomoxis sporoides</i>).....		1		
Goggle-Eye (<i>Chaenobryttus gulosus</i>).....		1		
Red-eared Sunfish (<i>Eupomotis microlophus</i>).....	1			
Pumpkin Seed Sunfish (<i>Eupomotis gibbosus</i>).....	1		1	
Sunfish (unidentified).....	25	5	5	2
Perch (unidentified).....	1			
Gizzard Shad (<i>Dorosoma cepedianum</i>).....	3	3		1
Buffalo (<i>Ictiobus sp.</i>).....	3	3		
Chub Sucker (<i>Erimyzon succetta oblongus</i>).....	6	5	1	
Silverside Minnow (<i>Menidia audens</i>).....	1			
Golden Shiner (<i>Notemigonus chrysoleucas</i>).....	8		2	
Mosquito Fish (<i>Gambusia petruelis</i>).....	1	1		
Minnow (unidentified).....			2	1
Fish fragments.....	61cc.	55cc.	27cc.	70cc.
Crustacea:				
Common Prawn (<i>Palaemonetes vulgaris</i>).....			1	
Insects:				
Odonata:				
<i>Pachydiplax longipennis</i>	15 ad.	1 ad.	2 ad.	
<i>Mesothemis simplicicollis</i>	3 ad.		3 ad.	
			2 nymphs	
<i>Celithemis eponina</i>	1 ad.			
<i>Epicordulia sp.</i>			2 nymphs	
<i>Enallagma sp.</i>	1 ad.			
Hemiptera:				
<i>Notonecta sp.</i>			2	
<i>Nepa apiculata</i>			1	
Hemiptera (unidentified).....			3	
Lepidoptera:				
Caterpillar (unidentified).....			1	
Arachnids:				
Spiders (unidentified).....	1		4	

Inasmuch as time and the facilities at his disposal did not permit

of an adequate study of the feeding grounds in all parts of the lake, the writer concentrated on the feeding flocks of Upper Blue Basin. The stump fields here are thick and the water shallow. Only the comparatively narrow central portion of the basin lacks the dense masses of hornwort (*Ceratophyllum sp.*) and associated submerged aquatic plants, overlaid with heavy growths of duckweeds and their associates. It was in the regions of thick growth, through which a boat could scarcely be propelled, that the egret feeding grounds were located in this basin. This type of habitat swarms with various sun-

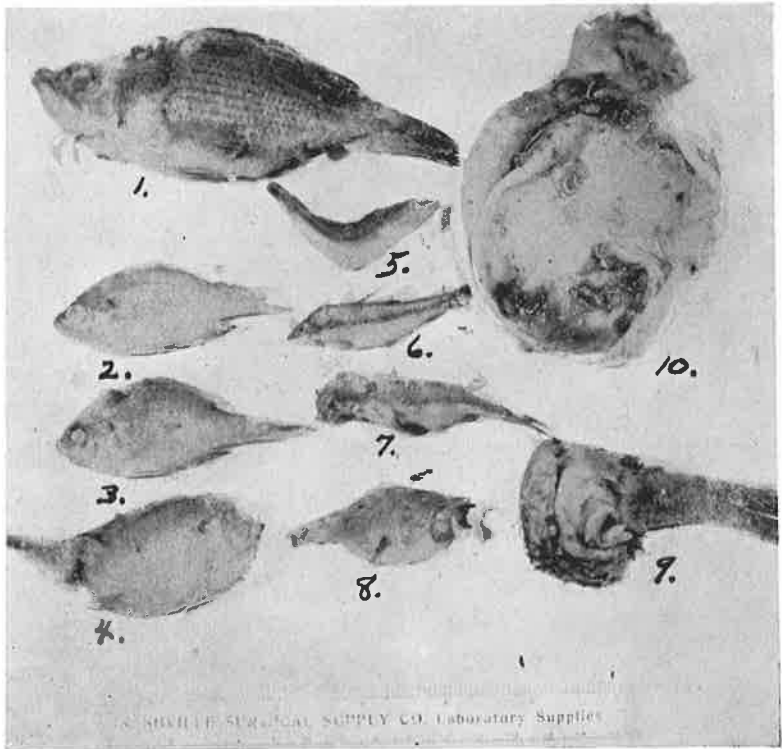


Fig. 1. Contents of a Stomach of an American Egret, 1, *Eupomotis microlophus*; 2-4, *Helioperca macrochira*; 5-7, *Erimyzon succetta oblongus*; 8, *Eupomotis gibbosus*; 9, *Ictiobus sp.*; 10, The stomach.

fishes, with Black Bass (Baker, 1937), and with a number of species of minnows.

Eleven specimens of the American Egret were taken from this region. The stomachs were analyzed carefully by the writer, with some assistance from Dr. C. L. Baker and Malcolm Parker. An almost complete collection of fishes of the basin, well preserved in the Reelfoot Lake Biological Station, was invaluable for comparison with the specimens taken from stomachs, especially when digestion had

destroyed many identifying characters of the latter. Fishes were invariably swallowed head first by the egrets. The anterior end of the fish was thus digested first, and the problem of identification became correspondingly more difficult. Pratt's *Manual of the Vertebrate Animals of the United States* was the reference most used in determining the fishes, and the paper by Baker (1937) was often referred to also.

Table 1 summarizes the stomach contents of the eleven birds studied. Very little further comment seems necessary. Fishes three inches in length or smaller were habitually taken. No specimen measuring as much as six inches was found. Of game fish the Blue-gill Sunfish (*Helioperca macrochira*) was taken most often. This was to be expected, as the fish abounds in these waters. Of the small sunfishes that could not be identified, probably some were Blue-gills. Only one Black Bass (*Huro salmoides*) was found, a three-inch specimen.

The insect portion of the egrets' diet probably was largely incidental, consisting entirely of species of Odonata that were the birds' habitual companions as they sat motionless on the feeding stumps.

Other investigators have found a much more varied diet to be characteristic of this egret (Bent, 1926). All data cited, however, was obtained at various times of the year, and in different habitats. A great deal of what is known specifically about the foods of herons has been obtained by studying the disgorged food of young in the nest, and by watching the adults feed the young. It is not to be supposed that the same foods would be available in the same abundance in late summer. Whittemore (1937) comments on a heronry at Good Hope, Mississippi, where he observed that the young of this egret were fed almost entirely on crayfish. The writer found no signs of any crustacean in the stomachs he examined. The explanation is found in the fact that crayfish were not available in the drying summer swamps. Fellow workers at the Biological Station, studying fishes, and seining every basin, shallow and puddle in the region, probably did not catch twenty-five crayfish during the period of this investigation. Similarly, frogs and other amphibians were not available to the birds, as they are in spring.

LITTLE BLUE HERON

(*Florida caerulea caerulea* (Linnaeus))

Little Blue Herons were studied largely in Upper Blue Basin, where they fed with the flocks of American Egrets. The numbers of these birds were very small during the first several days of the study, but on August 5 they began to move into the egret feeding grounds in hundreds. As usual on Reelfoot in summer, the proportion of white immatures to adults was more than forty to one.

As Table 1 indicates, fish constituted the major food of the Little Blues in the Upper Blue Basin region. These were rarely larger than

fingerlings, as became the small size of the birds. Blue-gill Sunfish were most commonly taken. These, incidentally, were the only game fish found in the stomachs of these birds.

On two occasions portions of the feeding grounds became contaminated in some manner, and the fingerling sunfishes died in thousands. The cause of these "blackwater" regions was not determined. Little Blue Herons flocked over the areas and ate some of the fishes.

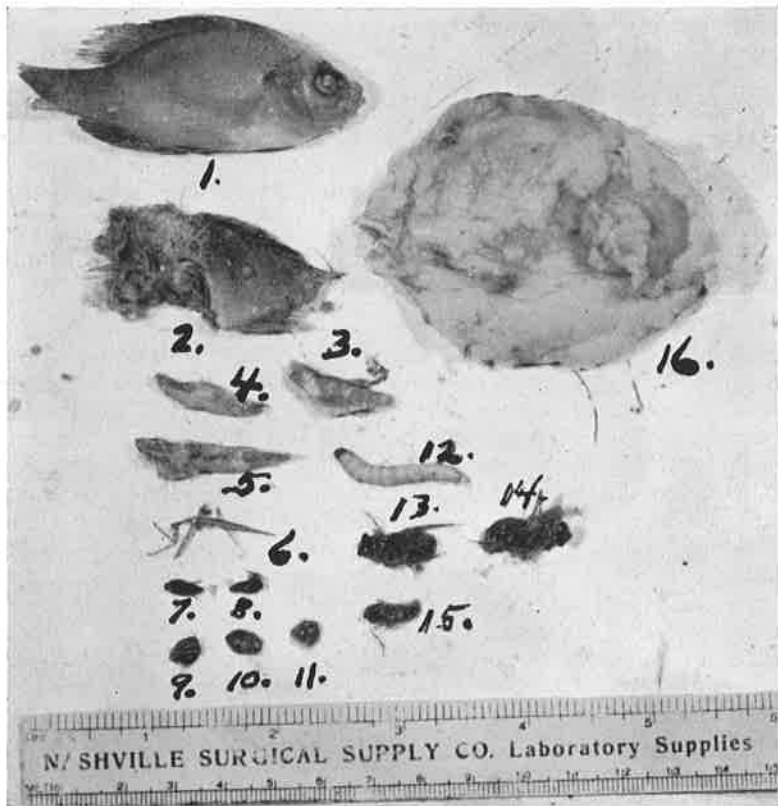


Fig. 2. Stomach Contents of a Little Blue Heron. 1, *Helioperca macrochira*; 3-4, Unidentified sunfish; 5, *Notemigonus crysoleucas*; 6, *Nepa apiculata*; 7-8, *Notonecta* sp.; 9-11, Unidentified Hemiptera; 12, Unidentified caterpillar; 13-14, *Epicordulia* sp. nymphs; 15, *Mesothemis simplicicollis* nymph; 16, The stomach.

Whether they took dead fish, or only those stricken but still alive, could not be seen.

A much wider variety of insects and other small animals was taken by Little Blues than by the others of the herons studied on these feeding grounds. The number taken was not great, but serves to indicate that the birds gave definite attention to these other sources of food.

The writer collected six specimens, all white immatures, well distributed throughout the month of August. One of these was taken from Yankapin Basin; all others were from Upper Blue Basin.

The total contents of these six stomachs included: 26 small fish, of which 15 were of a game species; 27 cc. unidentifiable fish fragments; 11 adult insects; 4 nymphs; 1 caterpillar; 4 spiders; and one fresh water shrimp.

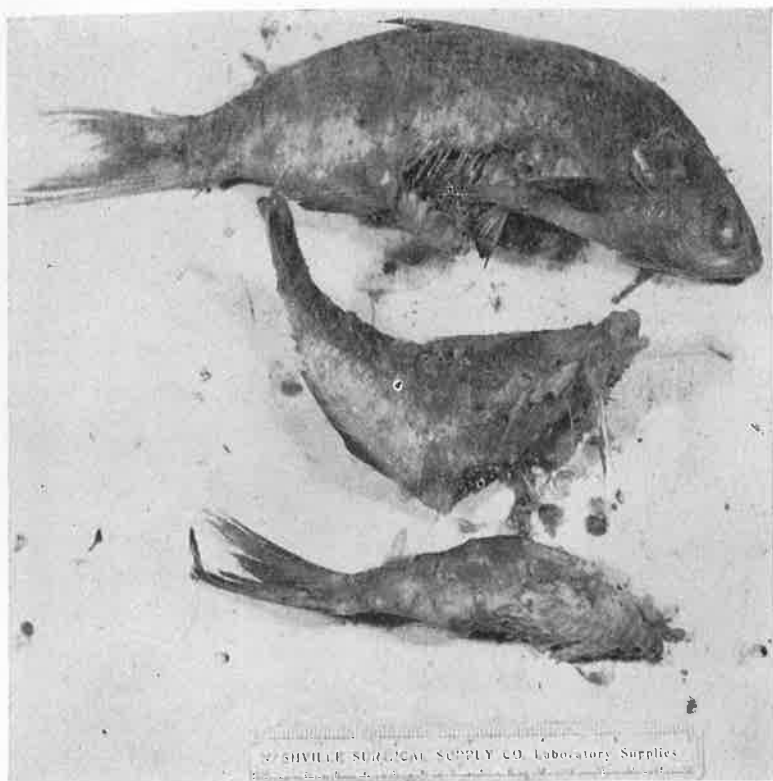


Fig. 3. Three Shikjacks (*Dorosoma cepedianum*) which Comprised the Stomach Contents of a Ward's Heron.

Little Blue Herons occurred more commonly in the surrounding small basins than in the more open feeding grounds. The writer believes that a separate study of these pond-feeding birds would show a quite different diet for them. None the less, crustaceans and amphibians are least available during the summer months, and fish are most available. A preponderantly fish diet still might be expected.

WARD'S HERON

(Ardea herodias wardi (Ridgway))

Ward's Heron is the largest of the lake's fish eaters. The bird is common in all parts of the lake, but does not approach the numbers of the American Egret. It feeds alike in the open stumpfields of

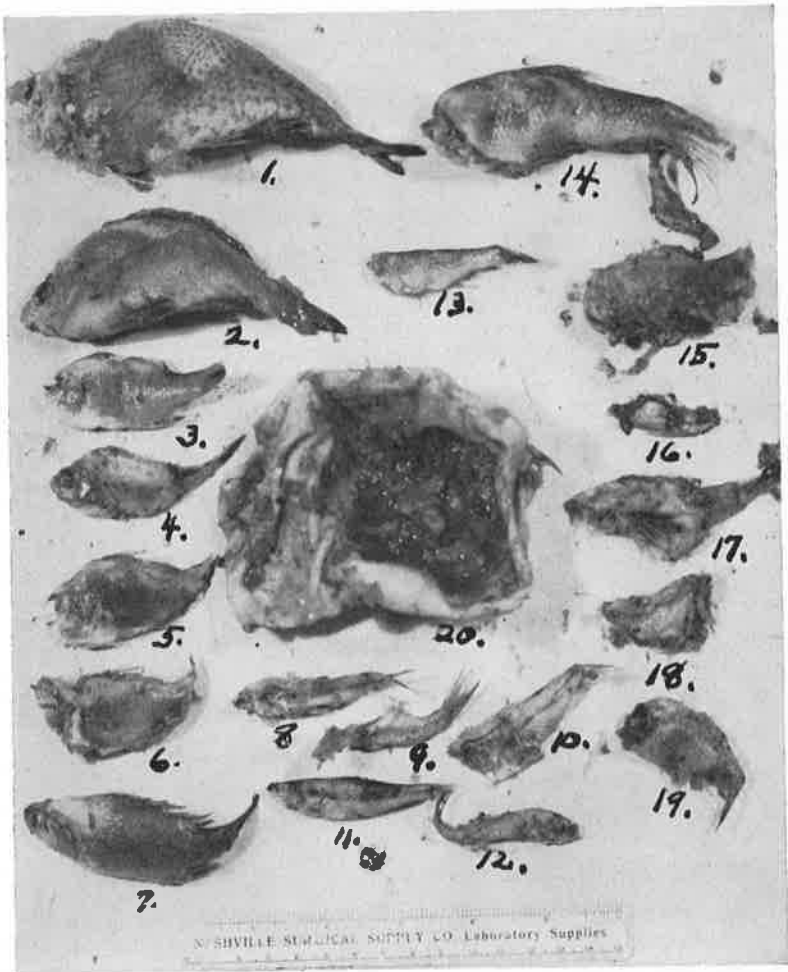


Fig. 4. A Well-stuffed Stomach of Ward's Heron. 1, *Pomoxis sparoides*; 2-6, *Helioperca macrochira*; 7, *Chaenobryttus gulosus*; 8-12, *Erimyzon succetta oblongus*; 13, *Gambusia petruclis*; 14-15, *Ictiobus* sp.; 16-19, Unidentified sunfish; 20, The stomach.

southern Reelfoot and in the vegetation-choked shallows of which most of Upper Blue Basin is typical. Occasional Ward's Herons were

found scattered through every feeding flock of egrets and Little Blue Herons in the ratio of perhaps one to twenty. In addition, every small outlying finger and shallow, as well as each neighboring pond and basin, had its one to several feeding Ward's Herons. Of the birds observed, the writer's impression was that immature birds outnumbered adults in the ratio of about three to two.

Only four Ward's Herons were collected, and these from three distinct habitats. The first, taken August 1 in the open stump fields off Spillway in southern Reelfoot, was an adult male. Its gorged stomach contained three Gizzard Shad (*Dorosoma cepedianum*), the largest of which was 10½ inches long and weighed approximately 2/3 of a pound. This rough fish abounds in the lake, particularly in the open portions.

The second specimen, an immature female, was taken in Yankapin Basin, one of the small ponds in the cypress woods bordering Upper Blue Basin. This stomach was heavily parasitized with round worms, and contained no item of food save one adult dragonfly (*Pachydiplax longipennis*). It did, however, contain a piece of thick, corky bark about two inches long. In the constricted portion of the duodenum was a twig with bark on it, about lead pencil size and 2½ inches long.

The other two specimens, collected from Upper Blue Basin during the morning feeding periods on consecutive days (August 23 and 24) had a varied, all-fish content. This is summarized in Table 1.

From these data it is obvious that Ward's Heron will take any fish it can catch, and that it subsists almost entirely on fish in late summer at Reelfoot. It may be concluded, however, that the numbers of the species would have to be much greater before it became a menace to Reelfoot game fish.

DOUBLE-CRESTED CORMORANT

(*Phalacrocorax auritus auritus* (Lesson))

The cormorant's status as a fish-eater is unquestioned. The writer collected four specimens merely to see which species of fish the birds were finding most accessible in Upper Blue Basin. The stomachs secured were disappointing in this respect, for two were quite negative, and only four species of fish were taken from the other two. Of these, two specimens were small Blue-gills. At least one of the unidentified small sunfish may have been of this species also. The Gizzard Shad (Table 1) was by far the largest fish taken, being eight inches long without the head.

Summer resident cormorants were rare in the entire Upper Blue Basin area. Possibly there were not more than twenty-five birds that fished there consistently. They perched high on the dead snags when not fishing, and were so wary that it was difficult to get within shotgun range. Thus the four birds collected actually represented all the writer

was able to secure from this region. They were more common in every other part of the lake visited by the writer, eighty or more being seen off Green Point in southern Reelfoot on August 11. The birds therefore are not menaces to the game fish of Upper Blue Basin in late summer. It is possible that they may take an objectionable toll in spring and autumn, when they swarm the basin in many hundreds.

They enjoy a very unsavory reputation among the commercial fishermen on the lake, who shoot them whenever it is possible to do so without detection. The writer found a number of floating dead cormorants during the time of this study. All had been shot. It is said that the birds rob the nets of the fishermen. Several fishermen professed to have caught cormorants in trammel nets. The fact that these nets are set thickly over Upper Blue Basin renders the stories believable, but from the sportsman's point of view the nets continue to be a far greater menace to the game fish supply of Reelfoot than the birds possibly could be.

SUMMARY

1. A study of the feeding activities of Ward's Herons, American Egrets, Little Blue Herons, and Double-Crested Cormorants was made on Upper Blue Basin, Reelfoot Lake, from July 29 to September 2, 1937.

2. Much time was spent in observing the normal feeding activities of each species from a small boat.

3. Four Ward's Herons, eleven American Egrets, six Little Blue Herons, and four Double-Crested Cormorants were collected. The stomach contents were analyzed carefully.

4. The percentages of fish in the diets of all species studied, at this time of year, were found to be much greater than that found by other investigators at other seasons and in other habitats, except in the case of the Double-Crested Cormorant.

5. Only one game fish, the Bluegill Sunfish (*Helioperca macrochira*), was found to be taken in significant numbers.

6. The vegetation-choked shallows of Upper Blue Basin were seen to provide an unusually abundant supply of small fishes in late summer. Amphibians and crustaceans were observed to be unusually scarce during the same period, due to drying of the swamps surrounding the lake.

7. It was tentatively concluded that (1) the diet of the herons studied depended on the food that was most easily available; (2) that studies in the different Reelfoot habitats would reveal substantially different diets for the same species; (3) that the time of greatest fish consumption by the Reelfoot herons is probably late summer; and (4) that none of the birds studied were in sufficient numbers to constitute a menace to Reelfoot game fishing even at this season.

8. Further studies of the diets of Reelfoot fish-eating birds in other habitats and at other times of year are needed.

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