

## 4.—REPORT ON A COLLECTION OF FISHES FROM THE ALBEMARLE REGION OF NORTH CAROLINA.

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### INTRODUCTORY NOTE.

In the summer of 1888 the U. S. Fish Commission conducted an extensive investigation of the fresh-water streams of the Alleghany region of North Carolina, Virginia, and Tennessee, with reference to the fish occurring in the different river basins of that section. Professor Jordan, under whose direction the field work was accomplished, has published a report on the results of the explorations\*.

The inquiry in North Carolina was very complete and comprehensive for the region specified; but by referring to the report cited it will be seen that a large portion of the State, extending from the coast to the Piedmont region, so called, and embracing many thousand square miles, was not included in that investigation, nor is it apparent that others have examined the fresh waters of this area with reference to the fishes inhabiting them. In this territory, therefore, it was conceived that any ichthyological work would be of interest in itself and also valuable as a supplement to the investigations of the upper courses of the important rivers debouching into the lowlands. Accordingly, in April, 1892, the writer was instructed to make an examination into the fish life of this region, acting under instructions from Mr. Richard Rathbun, who is in charge of the scientific work of the Commission.

Only a brief time could, at this period, be devoted to this work, and it was decided to restrict the inquiry to Albemarle Sound and its tributaries, with a view to make the collections in that hydrographic basin as complete as possible, rather than cover a wider area less thoroughly. The possibility of making collections at this season was something of an experiment; it was not known that the condition of the water would permit the capture of those smaller forms about which we have the least information; but it was thought that certain features of the fauna could be better observed than at other times, and that some light might be thrown on the presence and movements of the local fishes immediately after their emergence from their winter habitat. An opportunity was also afforded to inspect some of the noted shad and alewife fishing stations of this region.

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\* Report of Explorations made during 1888 in the Alleghany Region of Virginia, North Carolina, and Tennessee, and in western Indiana, with an account of the fishes found in each of the river basins of those regions. By David Starr Jordan.—Bulletin U. S. Fish Commission, 1888.

Albemarle Sound is said to be the largest coastal body of fresh water in the world, and it is certainly the largest of the kind in the United States. It is 60 miles long from east to west, and has a maximum width of 15 miles and an average width of 6 or 8 miles; its area is 453 square miles. At its eastern extremity it communicates on the north with Currituck Sound, and on the south it merges into Roanoke and Croatan sounds, through which it enters the ocean by means of openings in the sandy "banks" which skirt the ocean front of the State.

The shores of the sound are low throughout and for the most part marshy; they are very generally fringed by cypress, juniper, and other trees which are characteristic features of the paludal sections of this State. Some of the longest rivers of the State empty into the sound and numerous short streams enter it. On its northern shore, four short rivers, rising in swampy areas in or adjacent to the Dismal Swamp, enter the sound by wide mouths; these are the North, Pasquotank, Little, and Perquimans rivers. At the extreme western end of the sound, the Chowan River terminates on the northern side in a broad estuary, and the Roanoke River, flowing from the west, enters by two narrow mouths. On the southern side, there are two short, sluggish streams known as the Alligator and Scuppernong rivers.

Viewed from the standpoint of commercial fishing, the Albemarle Sound region is one of the most important in the United States, and there is no other fresh-water basin on the Atlantic coast having such extensive fisheries. The especially prominent fish occurring here are the shad, alewives, striped bass, black bass, and white perch. The seine fisheries for shad and alewives are by far the largest in the country. In 1890 the following quantities of the more important economic fishes were taken in the sound and its tributaries, the total output reaching the enormous quantity of 18,663,102 pounds, with a value to the fishermen of \$439,581:

Species.	Pounds.	Value.
Alewives .....	13,723,573	\$140,647
Black bass .....	386,090	19,206
Catfish .....	21,685	651
Eels .....	145,700	9,414
Pike .....	32,010	1,545
Shad .....	3,138,160	217,206
Strawberry bass .....	28,075	1,106
Striped bass .....	474,744	25,320
Sturgeon .....	118,085	3,407
White perch .....	414,745	15,492
All other species .....	180,235	5,527

Collections were made at numerous places in the basins of the Pasquotank and Roanoke rivers, and in Edenton Bay, at the mouth of the Chowan River. In the following pages the localities in which collecting was done are described and the species found in each of the different sections are enumerated. The physical conditions prevailing at the time of the investigation were somewhat unfavorable. The water temperature, elsewhere recorded, was very low and no doubt kept the smaller fishes in the deepest parts of the streams, where they were least accessible. High, muddy water was generally met with, which, together with large quantities of drift wood, greatly interfered with seining and reduced to some extent the number of specimens and species obtained. To these circumstances is to be especially attributed the relative scarcity, as regards both species and individuals, of cyprinoids and other small fish, as shown in the following lists. Nevertheless it is thought that the collection is sufficiently complete to convey a satisfactory idea of the fish life of the region.

The number of specimens preserved was about 800; these, together with others observed but not collected, represent 18 families, 35 genera, and 45 species, as follows:

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| 1. <i>Acipenser sturio oxyrhynchus</i> . | 24. <i>Lucius reticulatus</i> .          |
| 2. <i>Amia calva</i> .                   | 25. <i>Anguilla chryssypa</i> .          |
| 3. <i>Ameiurus albidus</i> .             | 26. <i>Tylosurus marinus</i> .           |
| 4. <i>Ameiurus nebulosus</i> .           | 27. <i>Querimana gyrans</i> .            |
| 5. <i>Elurichthys marinus</i> .          | 28. <i>Menidia beryllina</i> .           |
| 6. <i>Erimyzon sucetta</i> .             | 29. <i>Aphredoderus sayanus</i> .        |
| 7. <i>Moxostoma anisurum</i> .           | 30. <i>Centrarchus macropterus</i> .     |
| 8. <i>Moxostoma crassilabre</i> .        | 31. <i>Pomoxis sparoides</i> .           |
| 9. <i>Hybognathus nuchalis</i> .         | 32. <i>Chænobryttus gulosus</i> .        |
| 10. <i>Notropis hudsonius</i> .          | 33. <i>Enneacanthus obesus</i> .         |
| 11. <i>Notropis niveus</i> .             | 34. <i>Enneacanthus simulans</i> .       |
| 12. <i>Semofilus atromaculatus</i> .     | 35. <i>Lepomis auritus</i> .             |
| 13. <i>Notemigonus chrysoleucus</i> .    | 36. <i>Lepomis pallidus</i> .            |
| 14. <i>Cyprinus carpio</i> .             | 37. <i>Lepomis gibbosus</i> .            |
| 15. <i>Clupea mediocris</i> .            | 38. <i>Micropterus salmoides</i> .       |
| 16. <i>Clupea pseudoharengus</i> .       | 39. <i>Etheostoma nigrum olmstedii</i> . |
| 17. <i>Clupea æstivalis</i> .            | 40. <i>Perca flavescens</i> .            |
| 18. <i>Clupea sapidissima</i> .          | 41. <i>Stizostedion vitreum</i> .        |
| 19. <i>Brevoortia tyrannus</i> .         | 42. <i>Roccus lineatus</i> .             |
| 20. <i>Dorosoma cepedianum</i> .         | 43. <i>Morone americana</i> .            |
| 21. <i>Fundulus diaphanus</i> .          | 44. <i>Paralichthys lethostigma</i> .    |
| 22. <i>Gambusia patruelis</i> .          | 45. <i>Achirus fasciatus</i> .           |
| 23. <i>Lucius americanus</i> .           |  |

Prof. Jordan, in the report cited, speaking of the fishes of the lowlands, makes the following remarks which have application to this collection and may appropriately be quoted:

Additional confirmation has been given to the idea that the lowland swamp fishes of the United States are remains of an earlier and, in part, now extinct fauna. To such a fauna, it is generally admitted, belong the genera *Amia* and *Lepisosteus*. To this list I would add *Umbrina*, *Lucius*, *Chologaster*, *Aphredoderus*, *Jordanella*, *Elassoma*, *Acantharchus*, *Pomoxis*, *Enneacanthus*, *Mesogonistius*, and, doubtless, *Percopsis*. The upland fishes seem to be mostly of recent origin, the species of *Notropis* and *Etheostoma* probably latest of all.

A study of the common names applied to the fishes of this section is not without interest. Some very inappropriate and singular names are in use which do not appear to have been recorded. An amateur ichthyologist making up a list of the fishes of this region based on the local names would be led to some very strange conclusions and would not add to his reputation by mentioning the "California salmon" and "brook trout" as being not uncommon, while he would probably experience considerable difficulty in identifying such fish as the "salt-water pike," "fier," and "horse-fish."

From another point of view the presentation of the popular names is important. With the advent of fishermen from other States or localities, new names will be brought in, and the original designations employed in the region will in time be supplemented or supplanted. It therefore becomes a matter of interest to record the names in present use.

In the annotated lists under each locality, the vernacular synonyms heard during this inquiry have been given. In the following table some of these local names have been brought together for convenience of reference and for comparison, their distribution among the principal fishing towns of the sections visited being shown. The list could doubtless be augmented by additional inquiries, and a few common designations known to be employed in this region, but which were not heard by the writer, have been omitted. The absence of a check mark (×) in the table indicates either that the species was not detected or that no common name was heard for it.

Common names applied to certain fishes in the Albemarle region of North Carolina.

Scientific names.	Local names.	Elizabeth City.	Edenton.	Plymouth.	Weldon.
<i>Amia calva</i> .....	Blackfish.....		x	x	
	Grindle.....	x	x		
<i>Ameiurus albidus</i> .....	Black cat.....	x	x		
	Bullhead.....			x	
	Catfish.....				x
	Creek cat.....			x	
	River cat.....			x	
	Sound cat.....			x	
	White cat.....	x	x		
<i>Ameiurus nebulosus</i> .....	Yellow cat.....	x	x	x	
<i>Elurichthys marinus</i> .....	Silver cat.....		x		
<i>Moxostoma crassilabre</i> .....	Golden-finned mullet.....		x		
	Golden mullet.....	x	x		
	Horsefish.....				x
	Mullet.....				x
	Redfin.....				x
	Redhorse.....	x	x	x	
	Redhorse mullet.....		x		
	Sacking mullet.....		x	x	
	Trout sucker.....		x		
<i>Moxostoma anisurum</i> .....	Sacking mullet.....			x	
<i>Notemigonus chrysoleucus</i> .....	Ronch.....	x	x	x	x
	Shiner.....	x			
	Shiner sunfish.....	x			
<i>Clupea mediocris</i> .....	Hickory shad.....		x	x	
	Jack.....	x	x		
<i>Clupea pseudoharengus</i> .....	Goggle-eye.....	x	x	x	
<i>Clupea æstivalis</i> .....	Blueback.....		x		
	Herring.....	x	x	x	
	May herring.....		x		
	School herring.....		x	x	
<i>Brevoortia tyrannus</i> .....	Bugfish.....		x		
	Fatback.....	x	x		
<i>Dorosoma cepedianum</i> .....	Gizzard shad.....	x	x	x	
	Mud shad.....	x	x		
	Nanny shad.....	x	x		
	Shiner.....		x		
<i>Lucius americanus</i> .....	Pike.....		x	x	
	Red-finned pike.....				x
<i>Lucius reticulatus</i> .....	Black pike.....			x	
	Duck-billed pike.....		x		
	Jack.....			x	
	Pike.....	x	x	x	
	Red-finned pike.....			x	
<i>Tylosurus marinus</i> .....	Doctor-fish.....		x		
	Green gar.....	x	x		
<i>Centrarchus macropterus</i> .....	Flier.....		x	x	
	Mill-pond perch.....			x	
	Sunfish.....			x	
<i>Pomoxis sparoides</i> .....	Speckled perch.....	x	x	x	
<i>Chænobryttus gulosus</i> .....	Chub.....			x	
	Goggle-eye.....		x	x	
	Mud chub.....			x	
<i>Lepomis auritus</i> .....	Leather-ear.....		x		
	Red-belly.....		x		
	Yellow-belly.....		x		
<i>Lepomis pallidus</i> .....	Blue joe.....		x		
	Blue perch.....				x
<i>Lepomis gibbosus</i> .....	Red-belly.....		x	x	
	Robin.....			x	
	Robin perch.....	x			
	Yellow-belly.....		x	x	
<i>Micropterus salmoides</i> .....	Chub.....	x	x	x	x
	Welchman.....	x			
<i>Perca flavescens</i> .....	Englishman.....		x		
	Raccoon perch.....		x	x	
	Redfin.....	x			
<i>Stizostedion vitreum</i> .....	Brook trout.....			x	
	California salmon.....				
	Golden trout.....	x			
	Pickrel.....		x		
	Salmon.....				x
	Salt-water pike.....	x			
	Wall-eyed pike.....	x			
<i>Roccus lineatus</i> .....	Rock.....	x	x	x	x
<i>Morone americana</i> .....	Perch.....	x	x	x	x
	Silver perch.....			x	x

## THE PASQUOTANK RIVER.

This is the largest of the short rivers flowing southeast into the northern side of Albemarle Sound. It has its origin in the Dismal Swamp, and in the upper part of its course is shallow, narrow, and tortuous. Below Elizabeth City, however, it suddenly becomes a wide and deep stream of considerable commercial importance, and at its mouth, 18 miles below the city named, has a width of 8 miles. The water is strongly contaminated with juniper and cypress, which give it a characteristic dark color and peculiar taste. The other short rivers on the northern side of the sound are essentially similar in all physical respects, and it may safely be assumed that their fish faunas are also alike. Collections were made at the following places in the basin of this river:

(a) *Pasquotank River at Elizabeth City.*—The river at this point is about half a mile wide, with low banks, wooded or bush-fringed shores, and occasional bayous or marshy tracts. Temperature of water April 8, 76° F.

(b) *Davis Bay.*—This is a detour in the right bank of the Pasquotank, about 5 miles below Elizabeth City. The shores are for the most part sandy. Seining was done off the mouth of a small creek, on a sand bar formed by the mutual action of creek and river. Temperature of water April 8, 78° F.

(c) *Newbegun Creek.*—This is a short and shallow but broad tributary of the Pasquotank, entering the right side of that river about 8 miles below Elizabeth City. The bottom is mostly of mud. The shores, which are low and marshy, are wooded with cypress, pine, and smaller shrubbery. The water is fresh, and normally of a brownish color, but at the time of visit was somewhat muddy, owing to a recent rain. The creek is fed by small, sluggish streams, which emerge from the cypress swamps, and has little or no current. Temperature of water April 8, 78° F. There is some commercial fishing in this creek, of which advantage was taken in determining the character of the fish fauna; haul seines, gill nets, and eel pots are the apparatus used.

(d) *Road Ditches and Drains.*—Throughout this county the principal roadways are bordered on either side by ditches, which communicate with sloughs and drains running through the adjoining farm lands and ultimately finding their way into the Pasquotank on the east or the Perquimans on the west. The ditches are usually only 1 or 2 feet wide and a few inches deep; but in places they are somewhat wider and deeper. The smaller ditches must dry up at times, but the larger ones probably retain their water continually. In many places there is a growth of filamentous algæ. A species of fresh-water shrimp (*Palæmonetes exilipes*) is abundant in them. Collections were made at a dozen different points. A recent rain had made the water somewhat muddy. Temperature April 8, 77° F.

In the following list of fishes the localities in which the various species were observed are indicated by the use of the letters (*a*, *b*, *c*, and *d*) which precede the names of the stations in the foregoing paragraphs.

## FISHES OF THE PASQUOTANK RIVER.

1. *Acipenser sturio oxyrhynchus* (Mitchill). *Sturgeon*. (a.) Not abundant in the Pasquotank and much less numerous than formerly.
2. *Amia calva* Linnæus. *Grindle*. (a, c.) Common. Examples 2 feet long observed. Of no commercial value, the flesh being "cottony," but is sometimes eaten by negroes.
3. *Ameiurus albidus* (Le Sueur). *Black cat*; *White cat*. (a, b, c.) Very abundant. Most of the fish taken at this time by the commercial fisherman were small, but some were a foot in length and a few were 20 inches long. Some of the largest specimens had full-grown alewives in their gullets when caught. Under the name "white cat," the fishermen recognize the fish having a milky or dusky color, dull red fins with dark edges, and a white iris. They are most common in the lower river, where they seem partial to the shoals, whence, probably, their bleached appearance. Between the black and white forms there is every gradation of color.

The main run of alewives in the Pasquotank River is always followed by a noticeable increase in the abundance of catfish. The fishermen have a saying that when the catfish arrive the herring season is over. The catfish are thought to follow the alewives for the purpose of feeding on their spawn. In April, 1887, during a period of four days, Mr. George Waters, of Elizabeth City, caught 118,000 herring; the run suddenly ceased, and on the fifth day no herring were taken, but an enormous haul of catfish was made.

4. *Ameiurus nebulosus* (Le Sueur). *Yellow cat*. (a, c.) Much less numerous than the preceding. Most common about wharves, feeding on refuse. Above dark green, sides golden yellow obscurely mottled with green, beneath pale yellowish or white. An example from station a has the following features: Length, 12½ inches; head in body, 3½; depth, 4; anal base, 4; pectoral spine in head, 2½; anal rays, 22.
5. *Cyprinus carpio* Linnæus. *Carp*. (a.) First appeared in this river as the result of the breaking of the dam of a carp pond, and is now occasionally taken. The peculiar hard water of the river appears to improve the food value of the fish; three people interviewed spoke in high terms of its edible qualities. Fish 20 inches long have been caught.
6. *Hybognathus nuchalis* Agassiz. (b, c.) Apparently the most abundant cyprinoid in this river; 41 specimens preserved, from 2½ to 4½ inches long. Dorsal, 7 or 8; anal, 8; head, 4 or 4½; depth, 4½ or 4¾; eye, 3 to 3½; scales, 5-37-4 to 5-45-4; scales before dorsal, 14 or 15.
7. *Notropis hudsonius* (Clinton). (b.) Three specimens. In these the variations in the dental formulæ are so marked that it may be proper to describe the fish. Color above pale green, the scales with dark edges. A lateral silvery band, with black punctulations terminating in a distinct roundish black spot at base of caudal. Lateral line complete, nearly straight except at origin. Dorsal rather nearer snout than base of caudal and over ventrals; the latter reaching the vent; caudal deeply forked. Mouth on level with lower edge of orbit, small, somewhat oblique, not reaching half way to eye; lower jaw included. Snout rugose, rounded. Eye large, longer than snout, and equal to interorbital. Teeth hooked, with well-developed grinding surface. Other features of these specimens are brought out in the following table:

Specimens.	Length.	Head.	Depth.	Eye.	Dorsal.	Anal.	Scales.	Scales before dorsal.	Teeth.
	<i>Inches.</i>								
No. 1 .....	2½	4	5	2½	8	8	5-35-3	15	2,4-4,2
No. 2 .....	2½	4½	5½	2½	8	8	5-36-3	15	0,4-4,0
No. 3 .....	2¾	4½	4¾	2¾	8	8	5-35-3	16	0,4-4,0

In his definition of the genus *Hudsonius*, in which the species under consideration was placed, Girard\* gives the variations in the teeth as 2,4-4,2, 2,4-4,1, 0,4-4,2, and 0,4-4,1. In recent works, the formula 2,4-4,2 is not mentioned, and the absence of teeth from the inner row, as in two of these specimens, does not appear to have been previously noticed.

\*Proc. Acad. Nat. Sci. Phila., VIII, 1856, p. 210.

8. *Notemigonus chrysoleucus* (Mitchill). *Shiner*; *Shiner sunfish*; *Roach*. (*a, b, c, d.*) Everywhere abundant. Said to be the principal food of the black bass. The largest specimen obtained was 7½ inches long and was a female in condition to spawn; the ventral fins were uniformly crimson in color, the anal dull orange at base, with a black margin. In other examples the fins are yellowish. Dorsal, 7 or 8; anal, 14 or 15; scales, 10-45-3 to 10-50-3.
9. *Clupea pseudoharengus* Wilson. *Goggle-eye*. (*a, b, c.*) Less numerous at this time than the following species and occurring in smaller schools. Two specimens 2½ and 4½ inches long, respectively, were seined in Newbegun Creek.
10. *Clupea æstivalis* Mitchill. *Herring*. (*a, b, c.*) Adults and young very abundant. Numerous specimens about 1½ inches long were taken in Davis Bay and Newbegun Creek, April 8. These in life were transparent, with the back, dorsal and caudal fins, anal base, and muzzle covered with fine black spots; head, 3½; depth, 4½; eye, 3; dorsal, 16; anal, 19. As the adult fish had just begun to enter the Pasquotank to spawn, the presence of such young individuals, having the appearance of fish about 3 months old, was very unexpected. The explanation of their occurrence seems to be that in all probability a school of spawning fish entered Albemarle Sound late in the fall of 1891 and the young fish remained in the region through the winter.
11. *Clupea sapidissima* Wilson. *Shad*. (*c.*) In 1892, after the shad had entered Albemarle Sound, a protracted period of unfavorable weather, consisting of cold northerly and easterly winds, kept them out of the rivers on the northern side of the sound, and up to April 7 the run had not begun in the Pasquotank, although the fish were daily expected, the waters of the sound being reported as teeming with them. In Newbegun Creek one adult male, a "fore-runner" of the fishermen, was taken April 8. Shad have been known to spawn in the strong juniper and cypress water of the upper course of the river.
12. *Brevoortia tyrannus* (Latrobe). *Fatback*. (*a.*) Small bodies of adult menhaden occasionally ascend the Pasquotank River to Elizabeth City, and schools of young fish are also observed; this is usually during a period of dry weather, when the water of Albemarle Sound becomes brackish. This habit of the fish of ascending fresh-water streams has also been observed in the Potomac River. In 1892, at the shad-hatching station of the U. S. Fish Commission, about 15 miles below Washington, numerous young specimens about 4 inches long were taken early in June and 2 adults were secured in the seine in May. The water here is rarely brackish and at these times was quite fresh.
13. *Dorosoma cepedianum* (Le Sueur). *Nanny shad*; *Mud shad*. (*a, b, c.*) Specimens from 3 to 6 inches long extremely common; adults also numerous. Young examples from the Pasquotank River near Elizabeth City have the dorsal and caudal uniformly dusky and the pectorals, ventrals, and anal with dark edges; specimens from Davis Bay and Newbegun Creek have the lower fins white. The dark spot on the shoulder of immature individuals is lustrous purple in life.
14. *Fundulus diaphanus* (Le Sueur). (*a, b, c.*) Numerous small specimens obtained, the largest 2¾ inches long. Very abundant in Newbegun Creek. Two males 2¾ inches in length from Davis Bay are marked by about 21 dark transverse stripes, alternating with silvery ones; the dorsal is distinctly mottled with dark and white spots; the lower fins in one specimen are bright yellow, in the other white; head, 3½; depth, 4½; eye in head, 3½; dorsal, 14; anal, 11 and 13; scales, 45-18 and 45-20; scales before dorsal, 21 and 22.
15. *Gambusia patruelis* (Baird & Girard). (*b, c, d.*) Exceedingly common. The fish occurring in ditches and drains are very pale and show no trace of a dark bar or spot below the orbit. Specimens from the colored waters of the river and Newbegun Creek are dark greenish-brown and have a distinct purple bar beneath the eye. The proportion of males to females is as 1 to 3. Ova at this time not in an advanced state of development.
16. *Lucius reticulatus* (Le Sueur). *Pike*. (*a, c.*) Common. Often taken by the commercial fishermen, especially in creeks and bayous. Examples from 8 to 18 inches long observed, feeding largely on alewives at this time.
17. *Anguilla chryssypa* Rafinesque. *Eel*. (*a, b, c.*) Taken at almost every haul of the seine. Specimens from 2 inches to 2 feet in length observed.
18. *Tylosurus marinus* (Bloch & Schneider). *Green gar*. (*c.*) Not rare in the lower river. A specimen obtained at Newbegun Creek was 18 inches long, which is the usual size observed. The negro fishermen are fond of this fish and consider its flesh good.

19. *Querimana gyrans* Jordan & Gilbert. (*b, c.*) This diminutive mullet was very abundant in small schools in Davis Bay, where hundreds were taken in company with the other smaller fishes credited to that place. In Newbegun Creek the species was rare, only one specimen being obtained in numerous hauls of the seine.

This species was originally described from Key West, Fla., and has not previously been observed north of Charleston, S. C. It is a marine fish, whose occurrence in the Albemarle region so far from salt water is a matter of considerable interest.\* The specimens at hand agree very closely with the original description by Jordan & Gilbert.† The points of similarity and difference are brought out in the following comparative table:

Locality.	Head.	Depth.	Eye in head.	Eye in snout.	Eye in inter-orbital.	Dorsal.	Anal.	Scales.
Key West, Fla. ....	3½	3¾	3¾	½	1	IV-1, 7	II, 7	28 or 29
Davis Bay, N. C. ....	3½	3¾	3	½	1	IV-1, 8	II, 9	28 to 30

Examples from this region are uniformly larger than the types, being from 1¼ to 1½ inches long, instead of ¾ of an inch; Dr. Jordan and others, however, have since taken specimens as large as ours. The opercles and cheeks are covered with large scales, which are deciduous and often absent in alcoholic specimens.

20. *Menidia beryllina* (Cope). (*b, c.*) Eight specimens about 2 inches long. Head, 4¾; depth, 5½; eye, 3; dorsal, IV-1, 10, V-1, 10, or V-1, 11; anal, I, 16 or I, 17; scales, 40-8.
21. *Pomoxis sparoides* (Lacépède). *Speckled perch.* (*a, c.*) Common.
22. *Lepomis gibbosus* (Linnaeus). *Robin perch.* (*a, c.*) Very abundant.
23. *Micropterus salmoides* (Lacépède). *Chub; Welchman.* (*a.*) Abundant. Often seen jumping out of the water.
24. *Etheostoma nigrum olmstedii* (Storer). (*c.*) Two specimens.
25. *Perca flavescens* (Mitchill). *Redfin.* (*a, c.*) Spawns in February. Less abundant and valuable than the white perch. The paired and anal fins are bright red, whence the local name.
26. *Stizostedion vitreum* (Mitchill). *Wall-eyed pike; Salt-water pike; California salmon.* (*a, c.*) In the Pasquotank River numbers of these fish are taken by the net fishermen; they are 12 to 15 inches long and are said to have been known in the river only a few years. Under the mistaken impression that they are salt-water fish which have wandered here, some of the fishermen call them "salt-water pike," to distinguish them from the fresh-water pike (*Lucius*). The equally inappropriate name of "California Salmon" was also heard in the lower part of the river. The fish are hardly abundant enough to have commercial importance. They have become popular locally, however, and always meet with ready sale.
27. *Roccus lineatus* (Bloch). *Rock.* (*a.*) A common spring migrant in the Pasquotank. Specimens from 6 to 30 inches long observed.
28. *Morone americana* (Gmelin). *Perch.* (*a, b.*) More numerous and more valuable as a food-fish than the yellow perch. Young fish 2 or 3 inches in length very abundant, seined with *Hybognathus nuchalis*, *Menidia beryllina*, *Querimana gyrans*, etc.

\*The range of this species has recently been still further extended by its capture in the Chesapeake Bay. Mr. W. C. Kendall, of the U. S. Fish Commission steamer *Fish Hawk*, states that the fish was abundant in the lower Chesapeake and a number of specimens were taken July 8, 1892. Mr. Kendall observed the fish gyrating, as described by Jordan & Gilbert, a habit not observed by the writer in North Carolina.

†Proc. U. S. Nat. Mus., 7, 1884, p. 26.



## EDENTON BAY.

Edenton Bay is a broad indentation lying east of the mouth of the Chowan River, from which it is separated by a large, swampy projection of land. It is about 2½ miles long and 3 miles wide at its mouth. The town of Edenton is at its head; here two small creeks, arising in wooded swamps, flow into the bay on either side of that place. The bay is an important fishing-ground for shad, alewives, striped bass, etc., and is resorted to by the fishermen of Edenton. The waters of this bay were examined at the following points:

(a) *Edenton*.—Collections were made at the mouth of a small creek entering the bay from the east. On the right bank of the creek there are wharves and fish-houses; the refuse here thrown into the water attracts schools of small fish, such as minnows and silversides; also yellow and white perch, sunfish, etc. The shore of the creek opposite the town is low, partly wooded, and for the most part sandy; the bottom in places near the shore exhibited a sparse growth of *Myriophyllum* in small clusters, in which darters were found in considerable numbers. A fresh-water shrimp (*Palaemonetes exilipes*) was present in abundance, and numerous specimens of a crayfish (*Cambarus blandingii*) were taken. Temperature of water April 11, 56° F.

(b) *Reedy Point*.—This locality is at the western side of the mouth of the bay and is resorted to by the pound-net fishermen, from whom specimens were obtained. At the time of visit, shad, alewives, striped bass, catfish, flounders, perch, suckers, etc., were being taken.

(c) *Skinner Point*.—This is at the eastern side of the mouth of Edenton Bay and is the former site of an important steam-seine fishery. The shore here is high and sandy and is admirably adapted to seine fishing. A heavy wind rendered the water muddy and made collecting difficult, but a large number of specimens were nevertheless secured. Temperature of water April 9, 64° F.

(d) *Cypress Swamp, near Edenton*.—A small swamp southeast of Edenton drains into Edenton Bay by a shallow creek which crosses the road to Skinner Point about 3 miles from Edenton. The water is colored a peculiar reddish-brown by the cypress and juniper trees in the swamp. The creek at this point appeared to contain *Gambusia patruclis* to the exclusion of almost every other species. Temperature of water April 9, 67° F.

All the roadside ditches and drains teem with *Gambusia*, which may be said to be the characteristic fresh-water fish of this section.

In the following list of fishes observed in Edenton Bay, the species occurring at the four stations mentioned are indicated by the letters (*a*, *b*, *c*, *d*) which precede the description of the places.

## FISHES OF EDENTON BAY.

1. *Acipenser sturio oxyrhynchus* (Mitchill). *Sturgeon*. (*b*.) Caught in considerable numbers, but is much less numerous than formerly and the demand is greater than ever before, owing to the market which has been created for the roe.
2. *Amia calva* Linnæus. *Grindle*; *Blackfish*. (*b*.) Common in the sound, where it reaches a length of 2 feet or more. The young fish are said to follow the female, as newly hatched chickens do a hen.
3. *Ameiurus albidus* (Le Sueur). *Black cat*; *White cat*. (*a*, *b*.) Common.

4. *Ameiurus nebulosus* (Le Sueur). *Yellow cat.* (a, b.) Common. Not esteemed as a food-fish and of little commercial value.
5. *Ælurichthys marinus* (Mitchill). *Silver cat.* This fish is casually seen in Edenton Bay, and is recognized by the fishermen as a straggler from salt-water. It is called "silver catfish," as I am informed by Mr. J. L. Leary; of the U. S. Fish Commission, who has taken it while shad-fishing.
6. *Erimyzon sucetta* (Lacépède). (a.) A single specimen, 4½ inches long, was obtained at Edenton. It has an obscure dark bar along the side and about six broad irregular cross-bars of a dark bluish color in life. Body above dusky, with a bronze reflection, below cream color. Dorsal and caudal rays dark; ventral and pectoral fins pale, with dark tips. Head, 4; depth, 3½; eye, 4½; dorsal, 12; anal, 6; ventral, 9; scales, 45-16.
7. *Moxostoma crassilabre* (Cope). *Redhorse; Redhorse mullet; Sucking mullet; Trout sucker; Golden mullet; Golden-finned mullet.* (b.) [*Ptychostomus crassilabris* Cope; *Moxostoma crassilabre*, Jordan & Gilbert, Synopsis; not *Moxostoma crassilabre*, Jordan, Manual, 5th ed., which is *Moxostoma breviceps* (Cope).] Fish which are provisionally identified as this species are common in the sound at this time and are taken with the shad and alewives, with which species they appear to be ascending the rivers. All the common names given were heard at Edenton and vicinity. "Golden mullet" and "golden-finned mullet" are trade names, which are also in use at Elizabeth City and other places on the sound. The smaller individuals with plainer colors are usually known as "sucking mullet" and "trout suckers," the other names being applied to the large marketable fish.
- An example 15 inches long from the pound nets at Reedy Point seems to be identical with a single large fish taken by Jordan in the Little River, a branch of the Neuse, at Goldsboro, N. C. Back elevated, compressed, the greatest depth 3½ in length. Head very small, 5 in length, broad above. Snout blunt, overhanging mouth. Mouth moderate, the lips plicate, the lower lip truncate behind and finely papillose. Eye 4½ in head, 2½ in interorbital, 1½ in snout. Dorsal with the free border rather deeply incised, the longest ray longer than head and base of fin; dorsal rays, 11, 13. Caudal lobes about equal. Scales, 6-45-5. General color pale yellowish-red, dusky above, lighter beneath, with silvery reflections. Lower fins pale orange or red, the dorsal with a black membrane. Each scale above lateral line with a dark spot at base of exposed part, this marking being most pronounced on the back. Cope's description of *M. crassilabre* agrees very closely with the foregoing, the only noticeable variation being in the color of the lower fins, which Cope says are white.
8. *Hybognathus nuchalis* Agassiz. *Choby.* (a.) Six specimens, largest 2½ inches long. Head, 4 to 4½; depth, 4 to 4½; eye, 3 to 3½; scales, 5-39-4 to 5-41-4; scales before dorsal, 13; dorsal, 8; anal, 7.
9. *Notropis hudsonius* (Clinton). *Choby.* (c.) Only one specimen, similar to those from the Pasquotank River and with the teeth 2,4-4,2. Length, 2½ inches; head, 4; depth, 4½; eye, 2½ in head, ½ in snout, ¾ in interorbital; scales, 6-34-3; scales before dorsal, 14; dorsal, 8; anal, 8. Dorsal over ventrals. A black spot at base of caudal. Teeth slightly hooked, with grinding surface.
10. *Notropis niveus* (Cope). (a.) Abundant; 27 specimens, the largest 1½ inches in length. Body above cross-hatched with pale brownish; a dark lateral band. Head, 4; depth, 4½ to 4¾; eye, 3 to 3½; dorsal, 8; anal, 8 or 9; scales, 6-35-3 to 6-38-3; scales before dorsal, 15 or 16; teeth, 1,4-4,1 or 1,4-4,0, slightly hooked, with grinding surface.

Dr. Charles H. Gilbert has kindly examined an example of this series, and, while he would not express a final opinion in the absence of other specimens, thinks it referable to this species. Dr. Jordan records this fish from the upper waters of the Chowan, Roanoke, Pamlico, and other rivers of North Carolina, where it was found to present so many variations that he is "not sure whether it is really distinct from *N. whipplei*." There are in the collection of Prof. B. W. Evermann, from the Tar River at Rocky Mount, N. C., some specimens of this species similar in all respects to those from Edenton.

11. *Notemigonus chrysoleucus* (Mitchill). *Roach*. (b.) Abundant at this time. Caught in seines and pound nets, but of no commercial value.
12. *Clupea mediocris* Mitchill. *Hickory shad*; *Jaok*. (b.) Common.
13. *Clupea pseudoharengus* Wilson. *Goggle-eye*. (b.) Abundant. The fishermen say the goggle-eye is the "forerunner of the herring."
14. *Clupea aestivalis* Mitchill. *School herring*; *Blueback*; *May herring*. (b.) Abundant.
15. *Clupea sapidissima* Wilson. *Shad*. (b.) Now taken in large numbers in the dutch nets. This has long been one of the most important fishing-grounds for shad in the Albemarle region. At Skinner Point, near the mouth of Edenton Bay, at the seine fishery of Mr. H. G. Skinner, 100,000 shad were caught in 1874 in a single seine during a fishing season of 52 days; this is the largest catch ever made on the sound in one seine.
16. *Brevoortia tyrannus* (Latrobe). *Bugfish*; *Fatback*. Occurs during dry weather, when there is a westward extension of the brackish water. Young fish in schools are also observed at such times.
17. *Dorosoma cepedianum* (Le Sueur). (a, b, c.) *Gizzard shad*; *Nanny shad*; *Shiner*. Common.
18. *Fundulus diaphanus* (Le Sueur). (a.) Apparently rare, at least at this season. Only one specimen obtained. This is a female, 1½ inches long; the sides are marked by 12 narrow dark cross-bars, and the back has a few dark mottlings; the scales are all edged with fine dark spots. Head, 3½; depth, 5; eye, 3½ in head, 1 in snout, 1 in interorbital; dorsal, 12; anal, 11, the first rays sheathed by the oviduct; scales, 45-15.
19. *Gambusia patruelis* (Baird & Girard). (a, d.) Abundant. Examples from Edenton are uniformly pale; those from a cypress swamp near that place partake of the dark color of the water.
20. *Lucius americanus* (Gmelin). *Pike*. (d.) One small example from cypress swamp, the only other specimens obtained therein being *Gambusia*. Length, 3 inches; head, 2¾; depth, 5½; eye, 5½ in head, 2 in snout; branchiostegals, 13; dorsal, 13; anal, 11; lateral line, about 105.
21. *Lucius reticulatus* (Le Sueur). *Pike*; *Duck-billed pike*. (b.) Common.
22. *Anguilla chryssypa* (Rafinesque). *Eel*. (a, c.) Small examples common.
23. *Tylosurus marinus* (Bloch & Schneider). *Green gar*; *Doctor-fish*. (b.) Not rare in the sound, where it is caught in pound nets. Mr. J. L. Leary, of the U. S. Fish Commission, who formerly fished in this region for a number of years, says the name "doctor-fish" is sometimes given to this species by the fishermen of Edenton.
24. *Querimana gyrans* Jordan and Gilbert. (a, c.) Apparently more abundant than in the Pasquotank. The collection contains 140 specimens from Edenton and 39 specimens from Skinner Point. The fish seem to go in small compact schools; all the examples from station c were taken at one haul of the seine, while 8 or 10 other trials in the same spot yielded none.
25. *Menidia beryllina* (Cope). (a, c.) Five specimens from Edenton agree in the main with the usual descriptions of this species. The depth is a little less, however, the eye larger, and two of the specimens have the dorsal formula VI-1,10. The principal features are shown in the table:

Number.	Length.	Head.	Depth.	Eye.	Dorsal.	Anal.	Scales.
	<i>Inches.</i>						
1.....	1½	4½	6	2½	VI-I, 10	I, 17	42-9
2.....	1½	4½	6½	2½	V-I, 11	I, 17	40-8
3.....	1½	4½	6½	2½	VI-I, 10	I, 18	40-8
4.....	1½	4½	6½	2½	IV-I, 10	I, 17	40-8
5.....	1½	4½	6½	2½	V-I, 9	I, 17	40-8

The eye is greater than snout and equal to interorbital. Anterior dorsal over vent, and nearer snout than base of caudal. The two dorsals are separated by a distance equal to depth of body or twice length of eye. Anal base black. Silvery band narrow, about as wide as pupil, on the fourth row of scales in the middle of body, slightly involving the third and fifth rows. Back with a narrow stripe of small spots. Lower jaw scarcely projecting. A single specimen from Skinner Point is 2½ inches long, and has head 4½, depth 5½, eye 3, dorsal IV-1,10, anal 1,18.

26. *Pomoxis sparoides* (Lacépède). *Speckled perch*. (a, b.) Frequents same grounds as the "chub." In fall there is some angling for the fish by citizens of Edenton, minnows and grubs being the bait used.
27. *Chænobryttus gulosus* (Cuv. & Val.). *Goggle-eye*. (a.) Common at Edenton.
28. *Enneacanthus simulans* (Cope). (a.) Only three small specimens obtained. These have the following measurements and proportions: Length (inches), 2, 2½, 2¾; head, 2¼, 2½, 2¾; depth 2½, 2¾, 2¾; eye, 3, 3, 3½; dorsal, x, 10, ix, 11, ix, 11; anal, iii, 9, iii, 11, iii, 10; scales, 3-30-9, 3-29-8, 3-29-9.
29. *Lepomis auritus* (Linnæus). *Leather-ear*; *Red-belly*; *Yellow-belly*. Common up the creeks but rare in the open water of the sound.
30. *Lepomis pallidus* (Mitchill). *Blue joe*. Not uncommon in creeks near Edenton, and is a favorite fish for anglers.
31. *Lepomis gibbosus* (Linnæus). *Red-belly*; *Yellow-belly*. (a, b.) Large and small examples abundant. Occurs in sound and in creeks, and is taken in pound nets and seines. Not always distinguished by the fishermen from *L. auritus*; at least the same names are sometimes applied.
32. *Micropterus salmoides* (Lacépède). *Chub*. (a.) Scarce in the sound, and not often taken there by the net fishermen, but quite common in creeks and bayous. Less numerous than in the eastern end of the sound.
33. *Etheostoma nigrum olmstedii* (Storer). (a, c.) Very abundant at Edenton, in quiet, muddy water; 61 specimens. Rare at Skinner Point; 3 specimens. At the former station the fish were often found in shallow water among clumps of *Myriophyllum*. In all the examples examined, the opercles, cheeks, and breast are covered with scales. The features of three examples of each sex are shown in the following table:

Sex.	Length.	Head.	Depth.	Eye.	Dorsal.	Anal.	Scales.
	<i>Inches.</i>						
Male .....	2½	4	5½	3½	X-14	I, 8	5-52-7
Male .....	2¾	4	5½	3½	IX-14	I, 9	5-48-7
Male .....	2¾	4	5½	3½	IX-14	I, 9	5-51-7
Female .....	2½	4	5½	3½	IX-14	I, 8	5-52-7
Female .....	2¾	4	5½	3½	IX-14	I, 9	5-51-7
Female .....	2½	4	5½	3½	IX-13	I, 9	5-50-7

34. *Perca flavescens* (Mitchill). *Englishman*; *Raccoon perch*. (a, b.) Examples 3 to 4 inches long very numerous about wharves. Larger fish occur in the bay, where they are taken in pound nets.
35. *Stizostedion vitreum* (Mitchill). *Pickrel*. (b.) A solitary fish, irregular in abundance and movements, but not especially rare. It is caught in pound nets and seines.
36. *Roccus lineatus* (Bloch). *Rock*. (b.) Very numerous at this time, very large examples, some weighing over 100 pounds, being taken in the dutch nets. They feed chiefly on shad and alewives and are very gluttonous.
37. *Morone americana* (Gmelin). *Perch*. (a, c.) Specimens about 2½ inches long very common, in company with *Querimana gyrans*.
38. *Paralichthys lethostigma* Jordan & Gilbert. *Flounder*. (b.) Not rare in the western end of the sound and often taken in dutch nets and seines fished for shad and alewives. Two specimens preserved are 12 and 9½ inches long, respectively, with head 3¾ and 3½, depth 2¾ and 2½, gill-rakers 2-10 and 2-9.
39. *Achirus fasciatus* Lacépède. *Hog-choker*. Occurs abundantly on sandy bottom in Edenton Bay and is often taken during the shad season.

## THE ROANOKE RIVER.

This is one of the longest rivers of North Carolina; it rises in the Alleghany Mountains in the southwestern part of Virginia and flows in a southeasterly direction a distance of over 300 miles, entering the western extremity of Albemarle Sound by several narrow mouths. The Roanoke in North Carolina is for the most part a swift muddy stream, carrying out into the southern half of Albemarle Sound a volume of thick yellow water which is often seen 40 miles below its mouth, contrasting strongly with the clear dark water of the northern side brought down by the Chowan. It is found that striped bass, white perch, and sturgeon prefer this muddy water and can always be taken there in greater numbers than on the northern side of the sound, where shad and alewives always occur more abundantly. The fishermen have learned by practical experience that the larger quantities of rock, sturgeon, and white perch ascend the Roanoke, while the larger run of shad and alewives is in the Chowan. The seine and other fisheries of the lower Roanoke are of considerable importance, shad, alewives, striped bass, sturgeon, catfish, suckers, perch, and a number of species of sunfishes (*Centrarchidae*) being taken in abundance.

Collections were made at the following places in this river:

(a) *Plymouth and vicinity*.—The Roanoke River in the neighborhood of Plymouth is a narrow muddy stream, the shores being low, wooded with cypress, pine, and other trees, and for the most part swampy. The left bank of the river is of soft mud well overgrown with weeds. Temperature of water April 12, 56° F. Seining was done at numerous points in the following localities:

(1) About a mile below the city on the right bank of the river, on a little sandy beach. Work was here made unsatisfactory by a large quantity of driftwood in the water, a heavy wind, and high muddy water.

(2) On the mud flats opposite the city.

(3) About one mile above the city, on the right bank, at a small sandy beach fringed with bushes.

(4) Two miles above Plymouth at the entrance to Middle River, a branch which the Roanoke gives off about 8 miles from its mouth and which again joins the main river a short distance from its termination.

(b) *Weldon*.—This place is 130 miles from the mouth of the river, which is here a narrow rapid stream passing between precipitous banks of clay, of which color the water partakes. At the time of visit, April 13, the river was much swollen by recent rains and was exceedingly muddy. Seining could not be done in the river owing to the rapid water and the nature of the shores. A short distance below the town, however, a very small brook enters the river from the northwest, which it was possible to explore. This is apparently a spring brook, flowing between steep clay banks which are well wooded in the lower part of its course. It is nowhere more than a few feet wide and a few inches deep, except in small holes and near its mouth. This stream for a distance of half a mile was diligently seined in every hole that by any possibility could contain fish, but with only meager results. The brook abounds in crayfishes (*Cambarus blandingii acuta*), which were molting at this time; some specimens of large size were seined. Temperature of water April 13, 58° F.

In the following list the stations at which collections were made are indicated by the letters (*a* and *b*) used in the foregoing paragraphs.

## FISHES OF THE ROANOKE RIVER.

1. *Acipenser sturio oxyrhynchus* (Mitchill). *Sturgeon*. (a.) A specimen 11½ inches long was seined 2 miles above Plymouth in the Roanoke River April 12. The fishermen at Plymouth report that young sturgeon of this size occur in the river as early as February and are taken in seines hauled for striped bass, but the adult fish do not appear until the latter part of April, after the principal run of shad is over.
2. *Amia calva* Linnaeus. *Blackfish*. (a.) Not uncommon in the lower course of the river near Plymouth, but less numerous than in the sound.
3. *Ameiurus albidus* (Le Sueur). *Sound cat; River cat; Creek cat; Bull-head*. (a, b.) Very common; examples 5 or 6 inches long exceedingly numerous and taken in large quantities in haul seines and weirs near Plymouth. The large, milky-colored examples are known among the fishermen of the lower river as "sound cats" and "bullheads," while the small, dark-colored ones are called "river cats" and "creek cats." At Weldon the fish is also common, and, according to Mr. Worth, of the U. S. Fish Commission, is caught in large numbers by anglers.
4. *Ameiurus nebulosus* (Le Sueur). *Yellow cat*. (a.) Less common than *A. albidus*, the proportional abundance being about as ten to one at this time.
5. *Moxostoma anisurum* (Rafinesque). *Sucking mullet*. (a.) An example about 8 inches long is referred to this species. It agrees very closely with the description of *M. velatum* (Cope), as given in the "Synopsis," which Prof. Jordan refers to the synonymy of *M. anisurum* in the "Manual," although the descriptions of *M. anisurum* in the "Synopsis" and the "Manual" are not applicable to the specimen under consideration. The body is rather stout, compressed, the back elevated, the depth 3½ in length. Head short, small, conic, broad and flat above, 4 in length. Mouth small, the lips plicate, the lower lip  $\Lambda$ -shaped. Muzzle truncate, overhanging mouth. Eye in middle of side of head, 4 in length, ½ in snout, 1½ in interorbital. Depth of cheek one-half length of head anterior to preopercle. Dorsal fin long, with 15 developed and 2 rudimentary rays, the height of first ray equal to length of base and five-sixths length of head, the free edge straight. Caudal lobes subequal. General color silvery, dusky above, whitish below. Dorsal and caudal membranes blackish, other fins plain. Scales 6-42-5.

Although only one specimen was preserved, numerous examples were observed at the seining beaches near Plymouth. From the other sucker obtained in this river this species was easily distinguished by the absence of dark spots at the bases of the scales and by having the dorsal margin straight. No individuals more than 10 inches long were noticed. This fish shares with the small examples of *M. crassilabre* the name "sucking mullet."

6. *Moxostoma crassilabre* (Cope). *Redhorse; Sucking mullet; Horsefish; Redfin; Mullet*. (a, b.) Very abundant in the lower river, where they are taken in numbers in the shad seines, the largest individuals having considerable market value. Examples from 8 to 20 inches long observed. At Plymouth the name "redhorse" is usually restricted to the largest specimens, the small ones being called "sucking mullet." At Weldon the names "mullet," "redfin," and "horsefish" are in use and are doubtless also applied to other suckers which were not detected in this inquiry. Two specimens from the Roanoke River near Plymouth are similar to the fish described from Edenton, but are smaller, being about 9 inches long. Head, 4½; depth, 3½; eye in head, 3½ and 4; dorsal, 12 and 13; scales, 6-42-5 and 6-44-5. General form very similar to the preceding. The square muzzle overhangs the rather large mouth, the lips of which are thick and strongly plicate, the lower truncate behind. Longest dorsal ray equals length of head and is a little longer than base of fin, the free margin rather deeply concave, but not falcate. The upper caudal lobe is somewhat the longer. Color in life, silvery, with pale pinkish or yellowish reflections, dusky above and whitish beneath. Above the lateral line nearly every scale has a dark brown spot at the base of the exposed part, this marking being most distinct on the back. The dorsal and caudal fins have a dark interradiation membrane; the lower fins are pale reddish or orange. In larger individuals the coloration of the fins is more intense. In the uncertainty of the status of many species of *Moxostoma* from the South Atlantic States, the identification as *M. crassilabre* (Cope) of the small specimens at hand from the Roanoke River is not satisfactory and must be considered as only tentative.

7. *Cyprinus carpio* Linnaeus. *Carp.* (*a.*) Not uncommon in the lower river, where it reaches a weight of 7 pounds.
8. *Hybognathus nuchalis* Agassiz. *Roach.* (*a.*) Very common. Eight specimens, from 2½ to 4½ inches long, preserved. The intestinal tract of some of the larger examples is greatly distended with vegetable matter, giving the abdomen a swollen, distorted appearance. A dark spot at the base of caudal occurs in the smaller specimens. There is a narrow, dark vertebral band, extending from nape to caudal. Head, 4¼ to 4½; depth, 4 to 4½; eye, 3 to 3½; scales, 5-39-4 to 5-41-4; scales before dorsal, 13 or 14; dorsal, 11,7; anal, 11,7.
9. *Semotilus atromaculatus* (Mitchill). (*b.*) One specimen, 1½ inches long, showing the dark dorsal spot.
10. *Notemigonus chrysoleucus* (Mitchill). *Roach.* (*a, b.*) Abundant. Taken in large numbers with shad and alewives in the lower river, many of the fish being of large size. The specimens at hand appear to represent the typical species and not the variety *bosci*, whose range embraces this region, the anal having 13 or 14 rays, and the scales being about 10-50-3.
11. *Clupea mediocris* Mitchill. *Hickory shad.* (*a.*) Common.
12. *Clupea pseudoharengus* Wilson. *Goggle-eye.* (*a.*) Abundant.
13. *Clupea æstivalis* Mitchill. *School herring.* (*a.*) Abundant.
14. *Clupea sapidissima* Wilson. *Shad.* (*a, b.*) Large numbers of shad ascend the Roanoke River and are taken with seines and other devices. At Weldon the fish is sometimes caught with a hook by anglers; as this is when the shad is ascending the river to spawn, the observation is contrary to the current opinion that the fish takes no food after entering the rivers.
15. *Dorosoma cepedianum* (Le Sueur). *Gizzard shad.* (*a.*) Very common.
16. *Fundulus diaphanus* (Le Sueur). (*a.*) Exceedingly abundant on mud flats opposite Plymouth. Of the 16 specimens obtained, the largest is 2 inches long. A male example, 1½ inches long, has a small ocellus on the posterior border of the dorsal, consisting of a roundish black blotch surrounded by a pure white area; the base of the fin is white, and the remaining part dusky; head, 3½; depth, 4½; eye, 3; dorsal, 12; anal, 10; scales, 46-13.
17. *Gambusia patruelis* (Baird & Girard). (*a, b.*) Abundant at both stations.
18. *Lucius americanus* (Gmelin). *Pike; Red-finned pike.* (*a, b.*) One specimen from Plymouth, 5½ inches long; head, 3; depth, 5½; eye, 5½ in head, 2 in snout; dorsal, 11; anal, 11. At Weldon the fish was not observed, but was reported by the fishermen; according to Mr. S. G. Worth, of the U. S. Fish Commission, it is abundant in the Roanoke at that place, where it is known as the "red-finned pike."
19. *Lucius reticulatus* (Le Sueur). *Pike; Red-finned pike; Black pike; Jack.* (*a.*) Common. The name "black pike" is given to old, dark-colored examples which apparently frequent deep, shady holes.
20. *Anguilla chryssypa* Rafinesque. (*a, b.*) Common.
21. *Querimana gyrans* Jordan & Gilbert. (*a.*) Apparently very rare, and probably only a straggler from the sound. One specimen was obtained about a mile below Plymouth.
22. *Aphredoderus sayanus* (Gilliams). (*a.*) Apparently rare, and unknown to the fishermen. The single specimen obtained is 2½ inches long, with head, 3; depth, 3½; eye, 4½; dorsal, 11,11; anal, 11,5; lateral line, 51. The outer parts of caudal and dorsal fins are white, the inner parts reddish purple, the color being darkest on the caudal and most intense where it joins the white border; pectorals and anal faintly spotted with purple.
23. *Centrarchus macropterus* (Lacépède). *Flier; Sunfish; Mill-pond perch.* (*a.*) Very common.
24. *Pomoxis sparoides* (Lacépède). *Speckled perch.* (*a.*) Common.
25. *Chænobryttus gulosus* (Cuv. & Val.). *Goggle-eye; Chub; Mud chub.* (*a, b.*) Abundant in the lower river, where it is caught in gill and other nets and sold for food at Plymouth and elsewhere. A single specimen, 2 inches long, was obtained at Weldon; it is marked by faint cross-bars.
26. *Enneacanthus obesus* (Baird). (*b.*) A specimen, 1½ inches long, is referred to this species. It was taken in very muddy water, and was of a pale, olivaceous color, with about 6 indistinct, dark cross-bars. Head, 2½; depth, 2½; eye, 3; dorsal, 11,10; anal, 11,10; scales, 5-31-10. Lateral line absent from posterior third of body.

27. *Lepomis pallidus* (Mitchill). *Blue perch*. (b.) Common at Weldon. Probably occurs at Plymouth, but was not detected there.
28. *Lepomis gibbosus* (Linnaeus). *Robin*; *Yellow-belly*; *Red-belly*. (a, b.) Very common. Regularly exposed for sale in Plymouth, where it is caught in gill nets with *Centrarchus macrop-terus* and *Chaenobryttus gulosus*.
29. *Micropterus salmoides* (Lacépède). *Chub*. (a, b.) Common.
30. *Etheostoma nigrum olmstedii* (Storer). (a.) Fourteen specimens.
31. *Perca flavescens* (Mitchill). *Raccoon perch*. (a.) Abundant.
32. *Stizostedion vitreum* (Mitchill). *Brook trout*; *Salmon*. (a, b.) At a seine fishery near Plymouth an example 2 feet long was seen. While not common in the river, several fish, mostly under a foot in length, are taken at nearly every haul of the large shad seines. At Weldon the fish is rare and was not observed, although it was reported by the fishermen under the name "salmon."
33. *Roccus lineatus* (Bloch). *Rock*. (a, b.) Very abundant during the shad season. Caught chiefly in seines, the most important fishery being about 2 miles above Plymouth. The fish ascend the river as far as the falls near Weldon, where they spawn, according to Mr. Worth.
34. *Morone americana* (Gmelin). *Perch*; *Silver perch*. (a, b.) Abundant, but less numerous than formerly in the lower river.
35. *Paralichthys lethostigma* Jordan & Gilbert. *Flounder*. (a.) The tendency of this species to ascend fresh-water streams has often been observed, but its occurrence so far up the muddy waters of the Roanoke River is a matter of unusual interest. The fish is said to be quite rare in the vicinity of Plymouth, 2 miles above which place, on April 8, a specimen, about 2 feet long, was taken in a seine, and on April 11 another example, 8 inches long, was obtained.