

## 7.—LIST OF FISHES COLLECTED AT SEA ISLE CITY, NEW JERSEY, DURING THE SUMMER OF 1892.

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In the summer of 1892 the writer was attached to the Marine Biological Laboratory of the University of Pennsylvania, at Sea Isle City, N. J. During the period from June 25 to September 1 all fish taken at the laboratory passed through his hands, and the notes made thereon are embodied in the present paper.

Sea Isle City is located upon Ludlam Beach, an island about 10 miles south of Great Egg Harbor Bay, where observations upon the fishes were made by Prof. Baird in 1854 and by Dr. Bean during the summer of 1887. In 1871 Prof. Verrill published, in the *American Naturalist*, a short list of the fishes observed in Great Egg Harbor Bay, with notes upon their food.

Most of the species enumerated in the present list were taken in the pound net which the laboratory established in Ludlam Bay, a shallow body of salt water (its salinity being about 5 degrees less than in the ocean on the other side of the island), several square miles in extent, communicating with Corson Inlet at the north and Townsend Inlet at the south end of the island. The depth of water is, in most places, not over 3 feet at low water, and a large area of mud flat is left bare by the tide. The tide rises about 5 feet in the bay, being one hour later than in the ocean, and the temperature of the water is several degrees warmer than in the ocean. The thoroughfares are tortuous channels with low-lying banks and rapid tidal currents.

*Zostera* grows luxuriantly over a large part of the bay, and *Ulva*, *Fucus*, and other algæ abound. The bottom is a vile-smelling mud containing much organic matter. Worms, crustaceans, etc., furnish an abundant food supply in the bay.

The notes which follow relate to marine fishes only, no effort having been made to investigate the fauna of the adjacent mainland. Sixty-one species are enumerated and of these about thirty-five species are represented by young. A systematic investigation would doubtless reveal a number of forms not included in this list but found by Dr. Bean at Great Egg Harbor Bay.

The following species, recorded by neither Prof. Baird nor Dr. Bean, were taken by the writer: *Carcharias littoralis*, *Clupea sapidissima*, *Echeneis naucrates*, *Decapterus punctatus*, *Caranx chrysos*, *Vomer setipinnis*, *Mullus surmuletus auratus*, and *Balistes carolinensis*. Two of these, *Clupea sapidissima* and *Mullus surmuletus auratus*, are of considerable interest.

Three species noted by Prof. Baird, but not by Dr. Bean, are to be recorded from Sea Isle City, namely: *Ophidion marginatum*, *Pogonias cromis*, and *Opisthonema oglinum*. Two specimens of the former were taken during the summer; Prof. Baird's specimen was taken in winter.

Most of the notes from Avalon were made by J. Percy Moore.

1. *Raia eglanteria* Lacépède. *Brier Ray*.

This is the common ray here and is frequently caught by fishing parties in the inlets. Specimens are occasionally found upon the beach and seined in the surf. One was taken in the pound net in Ludlam Bay.

2. *Raia lævis* Mitchill. *Barndoor Skate*.

A small individual of this species was seen at Avalon June 26. No other specimens were found.

3. *Dasyatis centrurus* (Mitchill). *Stingray*.

This species is exceedingly abundant and was taken in the pound net in numbers throughout June, July, and August. After about August 20 all the specimens taken were young of the year, the adults apparently deserting the bay after bringing forth their progeny. Two broods of young, one of four, the other of five, were born in the aquarium August 10 and 15, respectively. In neither case did the mother survive the birth more than a few hours. The parents measured about 2 feet across the "wings;" the young were about 5 to 6 inches. The "uterus" of the mother was clothed internally by a dense mat of vascular villosities, which by some means convey nutritive material to the developing young.

4. *Galeus canis* (Mitchill). *Dogfish*.

This shark is very abundant, usually appearing in packs to the great annoyance of fishermen. It was caught daily, in the pound net, throughout the summer, but greatly increased in abundance during the latter part of August.

5. *Carcharhinus obscurus* (Le Sueur). *Man-eater*.

Several sharks of this species were taken in the pound net during the latter part of July. Seen on Five Fathom Bank August 8. A "large shark 10 feet long," probably this species, was seen in Ludlam Bay August 18.

6. *Carcharias littoralis* (Mitchill). *Sand Shark*.

Three specimens, about 5 feet long, lived for some time in the aquaria. Two of these were caught in Ludlam Bay early in June; the third about July 10. They all showed a very ferocious disposition.

7. *Etrumeus sadina* (Mitchill). *Round Herring*.

This species was found in pools on the beach above the laboratory. Large numbers became stranded along shore during the first week in August, when bluefish were abundant off the coast.

8. *Clupea sapidissima* Wilson. *Common Shad*.

A number of specimens, about 6 inches long, were taken in the pound net during the middle of August. Great Egg Harbor River, 10 miles north of Ludlam Bay, is the nearest stream in which they are known to breed. The captures extended over a period of eight or ten days and but two or three specimens were taken at a time. But little is known of the shad from the time it leaves its native waters at the end of

its first summer until it returns as an adult fish intent upon the propagation of its kind. Dr. Bean writes:

Young shad measuring 5 to 7 inches in length have been seen in the Potomac in company with the adults in spring. Mr. Worth caught many specimens several years ago at Fort Washington. We have occasionally found shad measuring 5 or 6 inches in length in the fall of the year, before the time for their descent to the sea. Whether or not they are the young of the year is unknown to me.

According to Dr. G. Brown Goode, at the time the young fish are leaving the waters in which they were hatched they are said to be from 2 to 3 inches long. If this be true, as my observations upon the herring lead me to believe, the specimens under discussion are from eggs hatched during the spring of the preceding year, perhaps some time in April, and are consequently fifteen or sixteen months old. They have increased but 3 to 4 inches in length during eight or ten months. It would be interesting to determine whether shad of this size *regularly* occur in the almost landlocked waters of the shallow bays along the coast of southern New Jersey. It seems improbable that they so occur in numbers. This question might, perhaps, prove of economic importance.

9. *Clupea pseudoharengus* Wilson. "*Herring*."

Young specimens, 5 inches long, frequently taken in Ludlam Bay during August. Captured in pound net. An active species abundant in ditches communicating with Ludlam Bay. Occasionally infested with *Lerneonema radiata*.

10. *Clupea æstivalis* Mitchill. *Glut Herring*.

Several specimens, 5 to 6 inches long, taken during the middle and latter part of August.

11. *Opisthonema oglinum* (Le Sueur). *Thread Herring*.

Several specimens were taken in pound net.

12. *Brevoortia tyrannus* (Latrobe). *Menhaden*.

The most abundant fish in the bay throughout July and August. Adults caught in great numbers in pound net. Young ones, from 3 to 4 inches long, very plentiful during August. Adults almost without exception infested with *Lerneonema radiata*, some bearing ten or twelve of these conspicuous parasites. None of the young were parasitized.

13. *Stolephorus browni* (Gmelin). *Anchovy*.

Found in the tide pools along the beach. Several specimens, 5 to 6 inches long, were taken in pound net about August 20.

14. *Stolephorus mitchilli* (Cuvier & Valenciennes).

Seen in the pools along the beach with *Menidia notata*. Large numbers driven ashore at Avalon, August 6, by bluefish.

15. *Synodus fœtens* (Linnaeus), *Lizard-fish*; "*Frostfish*."

A specimen about 8 inches long was taken in the pound net August 25. Said by fishermen to be common in the fall during the cool weather, whence its local name. It is said that at that season it takes the bait intended for nobler game, and is thus a source of annoyance to fishermen.

16. *Cyprinodon variegatus* Lacépède.

Very abundant in the ditches and about the shores of Ludlam Bay and the communicating thoroughfares. Found associated with *Fundulus heteroclitus*, *F. majalis*, and *Menidia notata*.

17. *Fundulus majalis* (Walbaum). *Killifish*.

The young are very abundant in the ditches; the adults are more frequently found amongst the *Zostera* of the tide-water flats. The species is sluggish and stupid, and full-grown specimens may often be caught in the hand.

18. *Fundulus heteroclitus* (Linnæus). *Mummichog*.

Very abundant. Found with the preceding.

19. *Anguilla chrysypa* Rafinesque. *Eel*.

Very abundant in ditches, inlets, and bay. Very many caught in pound net. Seined in numbers at Corson Inlet. Taken on hand lines. The writer on July 1, 1886, saw many hundreds of large eels lying dead or dying upon sand flats in the meadows back of Ocean City, N. J. A high tide during the night had flooded the meadows and presumably carried the eels upon the flats. As the tide went out the fish became stranded and were seemingly unable to again reach the sluices, many of them lying helpless upon the very verge of the waterways. This occurrence seems remarkable. Why should a creature gifted with the eel's reputed capacity for terrestrial migration submit to slow desiccation and eventual death with water but a few feet away?

20. *Tylosurus marinus* (Bloch & Schneider). *Gar; Silver Gar*.

Specimens half grown frequently taken in pound net during July. None taken during August. Young, from 3 to 6 inches in length, taken in Ludlam Bay during the latter part of July and abundantly throughout the month of August.

21. *Mugil curema* (Cuvier & Valenciennes).

Abundant in Ludlam Bay. Many specimens, 2 to 3 inches long, were taken in pound net during August. No larger ones were seen. Usually in company of *Menidia notata*.

22. *Mugil cephalus* Linnæus. *Striped Mullet*.

Two specimens, 5 to 6 inches long, were taken in pound net August 10. Several others taken later in August. All about the same size. This and the preceding are hardy fish, living well in confinement.

23. *Menidia notata* (Mitchill). *Silversides*.

Very abundant along the beach and swarming in the bay. Young taken.

24. *Apeltes quadracus* (Mitchill). *Three-spined Stickleback*.

Very abundant on the mud flats in Ludlam Bay. An active species, always flocking about when the muddy bottom is disturbed. Taken throughout July and August.

25. *Siphostoma fuscum* (Storer). *Pipefish*.

Abundant in the eelgrass of Ludlam Bay. Specimens, from 3 to 6 inches long, taken during July and August.

26. *Hippocampus hudsonius* De Kay. *Sea-horse*.

One specimen taken in pound net August 5.

27. *Echeneis naucrates* Linnæus. *Suckfish*.

A specimen about 15 inches long was brought to the laboratory August 8. It was found upon the beach.

28. *Scomber colias* Gmelin. *Chub Mackerel*.

One specimen taken in pound net August 15.

29. *Sarda sarda* (Bloch).

One specimen taken in pound net July 1. Another found upon the beach at Avalon.

**30. *Decapterus punctatus* (Agassiz). *Scad; Round Robin.***

Several young specimens were taken at Avalon August 7 and 8, during a bluefish foray upon the coast.

**31. *Caranx chrysos* (Mitchill).**

Two specimens, about 8 inches long, were taken in pound net early in August.

**32. *Caranx hippos* (Linnæus).**

Young specimens exceedingly abundant in the bay and along the beach during the latter part of July and throughout August. None over 4 or 5 inches long.

**33. *Vomer setipinnis* (Mitchill). *Moonfish.***

Several specimens, 3 inches long, taken in pound net about August 26, with the succeeding species.

**34. *Selene vomer* (Linnæus). *Dollar-fish.***

A specimen 2½ inches long was taken in pound net July 20. Another was seined in the surf July 29. During August the young became very abundant in the bay and entered the pound net in schools. They are quite voracious and when kept in confinement gradually relieve one another of filamentous rays and caudal fins. No adults were taken.

**35. *Trachinotus carolinus* (Linnæus). *Pompano.***

A specimen about three-fourths of an inch long was taken during the first week in July. Several others were afterwards caught, and several small bunches of 10 or 12 each were seen about the wharf in the bay during August. None of these was over an inch long. Like the following species, they swim at or near the surface.

**36. *Seriola zonata* (Mitchill). *Pilot-fish.***

During the first week in July a specimen 5 inches long was taken in the pound net. They are common about the piling of bridges across the inlets. They commonly swim with the dorsal fin just breaking the surface of the water.

**37. *Pomatomus saltatrix* (Linnæus). *Bluefish.***

A young bluefish was taken in the pound net during the last week in July and the first school was reported at about the same time. August 4 a school came close inshore in pursuit of butter-fish and other species which were frequently stranded in numbers in endeavoring to escape their voracious pursuers. Henceforward the species was common and many were taken by fishing parties. During August great numbers of young, from 4 to 8 inches long, appeared in the bay.

**38. *Stromateus triacanthus* Peck. *Butter-fish.***

First appeared August 4, when numbers were found on the beach and captured by bathers in the surf. A few days later they became abundant in the bay, being driven there by the bluefish. They continued to be caught throughout the month.

**39. *Roccus lineatus* (Bloch). *Striped Bass; "Rock."***

A small specimen taken in pound during the first week in July. Two fine specimens were caught in the surf at Avalon by Charles Sutton August 9. Others were reported caught on lines at Townsend Inlet during August.

**40. *Centropriestis striatus* (Linnæus). *Sea Bass; Black Bass.***

Great numbers of this species, from 1 to 2½ inches long, were caught in the *Zostera* ("eel grass") of Ludlam Bay August 20. We dredged specimens of the same size in 3 fathoms, shelly and muddy bottom, in Great Channel and Townsend Inlet. Specimens about 6 inches long are taken on hand lines and frequently enter the pound net. Larger ones, up to 3 pounds in weight, are very abundant on Five Fathom

Bank, biting voraciously on clam bait. They live well in captivity, spending most of their time on the bottom of the aquaria, resting, tripod-like, on the ventral and anal fins.

41. *Stenotomus chrysops* (Linnaeus). *Scup*; *Porgy*.

Six or eight specimens, from 6 to 8 inches long, were taken in Ludlam Bay at various times during July and August. Very abundant on Five Fathom Bank, where many fine ones are taken by hook and line.

42. *Archosargus probatocephalus* (Walbaum). *Sheepshead*.

One taken in seine at Avalon in July. Several caught by fishermen at Townsend Inlet July 30.

43. *Mullus surmuletus auratus* Jordan & Gilbert. *Red mullet*.

A specimen of this much-prized fish was taken in the pound net July 26. Another specimen was captured by the same means August 10. Both were young fish, the first captured being 2½ inches from snout to base of caudal fin; the second was a little longer, about 2¾ inches. The color was red, becoming pale below and in the living fish having a nebulous or cloud-like arrangement, particularly in the head and pectoral region. Below the lateral line the sides were traversed by four narrow longitudinal yellow stripes, the upper two running from head to tail, the inferior two extending from behind the pectoral fin to the level of the middle of anal. Dorsal and caudal fins yellow, crossed by irregular dusky bands; the other fins plain. Eye, 3¾ in head. Head, 3½ in length. Depth, 3¼ in length. Lateral line, 34. Barbels, 1¼ in head, reaching beyond lower angle of opercle.

These specimens are, the writer believes, the only recorded captures of young red mullets on our coast. That they are young of the year seems probable, but apparently nothing is known of the rate of growth and breeding of this fish, even in Europe, where they are commercially important. They are supposed to spawn at sea, but even this is uncertain. The red mullets are bottom fish, and in the aquaria spent most of their time resting upon their anal and ventral fins, like the sea bass, or moving slowly about exploring the bottom with their barbels. This species is recorded from Woods Holl, New York, and Pensacola. Prof. Jordan writes that seven or eight specimens have been taken on our coast, all of which were adults.

44. *Pogonias cromis* (Linnaeus). *Drumfish*.

One specimen, 44 inches long, was caught in pound net June 27. Ten or twelve large parasitic worms were removed from the muscles of the body and tail. The gill filaments were also swarming with lerneans and other parasites. A second rather smaller specimen was taken July 15. These fish appear very stupid, and when caught in the net roll over on one side and permit themselves to be picked up without a struggle.

45. *Bairdiella chrysura* (Lacépède). "*White Perch*."

One specimen caught in pound July 15.

46. *Leiostomus xanthurus* Lacépède. *Spot*; *Porgy*.

Young, 3 to 5 inches long, abundant in the bay and alongshore throughout July and August.

47. *Menticirrhus saxatilis* (Bloch). *Kingfish*; "*Hake*."

Several, about 12 inches long, were taken in pound net during July and August. It was frequently caught by fishing parties in the inlets.

**48. *Cynoscion regalis* (Bloch & Schneider). *Weakfish*.**

A very abundant food-fish. Many were taken in pound net in Ludlam Bay during July and August. The catch was irregular, some days fifty or sixty being taken and then for several days succeeding perhaps none. Many were caught by fishing parties in the inlets, and during August they were successfully fished for in Ludlam Bay. At the same time the young, 2 to 3 inches long, were common.

**49. *Tautoga onitis* (Linnæus). *Tautog*; "Sea-tog."**

A single sea-tog was taken in a seine upon the beach at Avalon August 4. No other noted during the summer.

**50. *Gobiosoma bosci* (Lacépède).**

Many specimens were drawn in a dredge from a shell bottom in Great Channel. Depth, 3 to 4 fathoms. Abundant throughout the summer in Ludlam Bay. All specimens taken were about 1½ inches long.

**51. *Batrachus tau* (Linnæus). *Toadfish*; "Oyster-fish."**

A very common fish in Ludlam Bay and frequently taken in pound net. Takes the hook freely. It delights to lie in the pools on the mud flats at low water, often barely covered by the tide. Its color and general appearance is in such excellent mimicry of its surroundings that it is by no means readily detected as it lies midst decaying *Ulva* and other algæ. Eggs about hatching were found during the first week of July, attached in patches of 50 to 100 to the under side of logs and clumps of turf lying near low-water mark. The young, after hatching, remain for some time fixed upside down by the yolk sac to the attached base of the egg "shell." The male guards the eggs and newly-hatched young, savagely resenting any intrusion. These fish are extremely tenacious of life, and specimens were kept alive without water for sixteen to eighteen hours.

**52. *Ophidion marginatum* De Kay.**

Two specimens taken at Townsend Inlet; one, about 3 inches long, lying dead on sand bar, the other, 8 inches long, buried in sand of beach near low-water mark.

**53. *Pleuronectes maculatus* Mitchill.**

A specimen, 6 inches long, was taken in pound net.

**54. *Paralichthys dentatus* (Linnæus). *Common Flounder*.**

Common. Frequently taken in pound net and with hook and line. Young, 4 to 5 inches long, abundant in Ludlam Bay in August. One weighing over 5 pounds captured with hook and line in the thoroughfare at Avalon August 6. Valued as a "pan" fish.

**55. *Achirus fasciatus* Lacépède. *Sole*.**

A specimen, about 6 inches long, taken in pound net August 1. This fish swims close to the bottom, stirring up the mud and effectually masking its movements.

**56. *Balistes carolinensis* Gmelin. *Trigger-fish*.**

One taken on line at Townsend Inlet August 4.

**57. *Alutera schœpffi* (Walbaum). "Sunfish."**

One taken in pound net. Two others found on beach. Others seen upon several occasions at Townsend Inlet. All adults. A young specimen, 6 inches long, of this or an allied species was found on the beach in August.

**58. *Orbίδus maculatus* (Bloch & Schneider). *Swellfish*.**

One specimen, about 3 inches long, was taken in pound net August 2.

59. *Chilomycterus schœpffi* (Walbaum). *Burrfish*.

Common during July, a number of specimens being taken in pound net during that month. All adults. None seen during August.

60. *Prionotus carolinus* (Linnæus). *Sea Robin; Flying-fish*.

Very common during July and August in Ludlam Bay. Specimens mostly 8 to 10 inches long, none longer. Young, 3 to 4 inches long, taken in August.

61. *Prionotus strigatus* Cuvier & Valenciennes. *Flying-fish*.

Specimens about 4 inches long common in Ludlam Bay during latter part of July and throughout August. No adults taken.