

8.—ECONOMIC AND NATURAL-HISTORY NOTES ON FISHES OF THE NORTHERN COAST OF NEW JERSEY.

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GENERAL FEATURES OF THE FISHERIES.

On few parts of the Atlantic coast of the United States are the fisheries of more importance than on the ocean shore of New Jersey. Not only are the commercial fisheries of the region of great value, but pleasure fishing is carried on very extensively; and the antagonism which for many years has existed between the professional fishermen and the sportsmen attracts much public attention and often excites very acrimonious discussion in the public press and the most active rivalry in and before the State legislature. It is not within the province of this paper to discuss the merits of the opposition to various forms of net fishing, or to attempt any settlement of the differences of opinion which prevail as to the propriety of certain branches of the economic fisheries. The few notes that are presented are intended simply to exhibit certain facts relative to the abundance, movements, importance, etc., of some of the most valuable fishes of the coast.

This paper is based on personal observations made on the New Jersey coast by the writer during parts of the years 1886, 1888, 1892, and 1893, while investigating the commercial fisheries in the service of the U. S. Fish Commission, and largely represents a study of the pound-net fisheries of the northern part of the coast. A much greater variety of fish is taken in the pound nets than with any other form of apparatus, larger quantities of products are thus secured than with any other kinds of nets, and the fishery is the most important one prosecuted with nets on this coast.

A small number of pound nets are operated on the outer shore of New Jersey in Monmouth and Ocean counties, to which the fishery is restricted. In Sandy Hook and Delaware bays, however, a large number of nets are set, chiefly for shad and king crabs. From many points of view the nets on the ocean shore are more important, and it is only with them and the results of their use that this paper has to deal. Pound nets have been set in limited numbers on this coast for many years, but of late the number has been greatly augmented, and the fishery is now more important than ever before, both on account of its increased extent and because of the growing attention which all forms of net fishing, especially that for game fish, so called, are receiving at the hands of sportsmen and legislators.

The early history of the pound-net fishery on this coast is interesting. It is recorded * that pound nets were first introduced into this region about 1855, by Mr. George Snediker, of Gravesend, Long Island. The first nets were of small size, and were set in Sandy Hook Bay for protection from storms. It was not until 1873 that pound nets came into general use, and it was about that year that they were first operated on the outer shore.

Twenty-three pound nets, located between Mantoloking on the south and Galilee on the north, were in use in 1892. Twelve nets were operated in 1891, 7 in 1890, and 8 in 1889. The principal increase in the later years has been in the region south of Asbury Park. Most of the nets are set singly or in twos, but at Galilee in 1892 there were two stands containing three nets each. The nets have an average value of about \$2,500, and require the services of 7 to 9 men. The 23 nets operated in 1892 had an aggregate value of \$57,140; the 33 boats used were worth \$5,545; the accessory and shore property required to conduct the fishery was valued at \$20,821; and 167 fishermen found employment.

In 1889 the 8 nets took fish worth \$51,025; the following year 7 nets stocked \$50,141; the value of the catch in 12 nets in 1891 was \$84,927; and in 1892 \$169,949 accrued from the yield of 23 nets. These sums represent the gross value of the fish as received by the fishermen. The quantities and values of each of the prominent fishes taken in 1891 and 1892 are shown in the table. The great abundance and importance of the weakfish are well illustrated, about two-thirds of the proceeds from the pound-net fishery representing this fish. The next important species are Spanish mackerel, flounders, butter-fish, sea bass, bluefish, sheepshead, shad, bonito, and mackerel.

Products of the pound-net fishery of the Northern Coast of New Jersey in 1891 and 1892

Species.	1891.		1892.	
	Pounds.	Value.	Pounds.	Value.
Albacore.....	1, 176	\$40	4, 010	\$136
Blackfish.....	12, 437	261	4, 435	91
Bluefish.....	75, 999	2, 847	99, 313	3, 898
Bonito.....	54, 733	2, 141	68, 318	2, 737
Butter-fish.....	110, 052	2, 721	256, 142	7, 231
Cero.....	847	38	3, 610	172
Cod.....	2, 294	64	4, 659	110
Flounders.....	177, 267	3, 961	513, 247	10, 814
Kingfish.....	2, 247	278	2, 503	306
Mackerel.....	25, 017	2, 304	22, 307	2, 660
Menhaden.....	28, 510	74	37, 665	113
Sea bass.....	29, 188	946	142, 715	5, 947
Scup.....	12, 982	311	36, 900	1, 125
Shad.....	29, 968	1, 822	46, 863	3, 208
Sheepshead.....	17, 240	2, 629	25, 737	3, 774
Spanish mackerel.....	33, 781	4, 525	71, 663	9, 767
Spot.....	1, 080	21	3, 482	39
Sturgeon.....	11, 430.	204	35, 312	729
Weakfish.....	2, 694, 299	59, 326	5, 446, 390	116, 377
Miscellaneous.....	23, 501	414	40, 878	655
Total.....	3, 344, 048	84, 927	6, 866, 149	169, 949

As bearing on the abundance or scarcity of fish, the following averages possess considerable interest. Assuming that there is only a limited supply of fish on this part of the coast each year and that a given number of nets take a certain quantity of fish, it might be supposed that a very marked increase in the number of nets operated

* The Fisheries and Fishery Industries of the United States, section II, p. 389.

would result in a diminution in the average catch per net. In 1880, when there were 11 pound nets set on this shore, the average stock was somewhat greater than in recent years, although the average quantity of fish taken was a little less. Comparing 1889 with 1892, it appears that, although the number of nets in the latter year was about three times the number in the former, the average catch and stock were greater.

Years.	No. of nets.	Average catch per pound net.	Average stock per net.
		<i>Pounds.</i>	
1880	11	248, 980	\$7, 980
1889	8	247, 270	6, 453
1890	7	281, 160	7, 167
1891	12	278, 670	7, 076
1892	23	298, 525	7, 389

The influence of pound nets on the abundance and movements of fishes is a question which can not be answered off hand and which involves a comprehensive knowledge and careful study of the natural conditions determining the migrations and periods of abundance and scarcity of our fishes. Probably the time is not far distant when it will become an obvious necessity in some States to place more stringent regulations on the use of pound and other nets in certain situations, as, for instance, in the mouths of rivers, where the decrease in the catch of shad, sturgeon, salmon, etc., may often be clearly traced to the taking of fish on their way to the spawning-grounds in such numbers that the reproductive process is practically inhibited; but it is a well-recognized fact that pound and other nets which are set in the open waters of the ocean and take chiefly free-swimming marine fishes are the least likely to do serious damage and afford the least ground for apprehension.

Perhaps the most valid and forceful objection that has been made against the pound nets on this coast is that there is a large destruction of immature and small fish that are unmarketable. This criticism is applicable to most of the pound fishing in this country. It is not generally denied by the pound fishermen that many fish too large to go through the meshes of the nets and too small to be marketed are caught and, by the nature of the fishery, necessarily sacrificed. The same objection is justly advanced against much of the seine fishing on our coast. No entirely satisfactory remedy has as yet been suggested for this condition. The enlargement of the mesh in the bowl of the pound nets will not completely overcome present objections and will introduce elements of expense and trouble which the fishermen wish to avoid. The fishermen say that, unless the size of the mesh is made so large that many of the marketable fish will escape, the fish sought to be preserved will be gilled, and thus as effectually destroyed as with a small mesh, while the time and labor required to clear the net of the gilled fish would make the prosecution of the business almost impracticable. The remedy which seems to afford the most relief is to require the pound operators to lift the nets more frequently than is usually done, to liberate all small fish, and bring to the shore only such fish as are marketable. The principal species of which large numbers of small individuals are destroyed on the New Jersey coast is the butter-fish. The fish is naturally a small one, rarely exceeding half a pound in weight and averaging only one-third of a pound. The great relative depth of the body of the fish makes it impossible for even very young

ones, in which this feature is intensified, to go through the meshes of the pocket. The destruction of immature bluefish, weakfish, and other fish by pound nets on this coast is insignificant.

NOTES ON THE FISHES OF THE REGION.

The following remarks on the abundance, movements, etc., of some of the fishes found on the New Jersey coast relate more particularly to the region north of Barnegat Inlet, and, as has been stated, are chiefly based on a study of the pound-net fishery. Only the common names heard in the region are given.

1. *Raia eglanteria* Lacépède. *Possum; Sea Possum; Bob-tailed Skate.*

Large numbers are caught in pound nets. They are valueless, and are a source of annoyance to the fishermen. Other more desirable fish are usually absent or scarce when skates are abundant on the shores. On July 8, 1892, not less than 10,000 pounds were turned out of one net at Bradley Beach. The fish weigh from 1 to 5 pounds.

Some sport fishing is afforded by these fish along parts of the coast, the hook being baited with crab, clam, or fish. At times the fish move close inshore, and numbers are often caught from the piers.

In the trawl-fishing carried on from parts of this coast in winter considerable quantities of skates are caught in company with cod and conger eels. The broad, fleshy "wings" are cut off and sold under the name "saddles," the price received being about 5 cents a pound. Some of these saddles weigh 10 pounds or more. From descriptions furnished by the fishermen it appears that the skate taken in greatest numbers in this fishery is the barn-door skate (*Raia lævis*), which reaches a larger size than any other skate found on our shores.

2. *Dasyatis centrurus* (Mitchill). *Stingray; Stingaree; Pigeon Stingray.*

Common. Examples weighing 150 pounds are taken in the pound nets, but such large specimens are not very common. An example, the body of which was 3 feet wide, was observed July 11 at Bradley Beach. The fishermen always handle this fish with great care, and some of them usually break off the caudal spine with an oar before returning the fish to the water. Stories are told of ugly wounds inflicted by the fish in the feet, legs, and hands of incautious fishermen.

3. *Acipenser sturio oxyrhynchus* (Mitchill). *Sturgeon; Moose.*

Occurs on the coast from April to October, and is taken in pound nets in small quantities during the seven months of the pound-net season. It is most common in May and June. It is shipped to market in a dressed condition, and usually brings from 3 to 5 cents a pound. Small fish, called "moose," are sold whole; the name appears to be a corruption of "mammoose," which is current in Delaware Bay, and is applied to young fish that are too small to dress and are usually sold whole.

4. *Clupea mediocris* Mitchill. *Shadine; Herring.*

Small quantities are taken in the pound nets during the run of shad. They are sold at 5 to 12 cents apiece. The name shadine is in common use in many places.

5. *Clupea pseudoharengus* Wilson. *Herring.*

6. *Clupea æstivalis* Mitchill. *Herring.*

Limited quantities of these two fishes are caught in spring in pound nets. They have little value, however, hardly pay the expenses of shipment, and are usually lib-

erated when caught. In 1892 there was a small run of herring in the pound nets in September, October, and November.

7. *Clupea sapidissima* Wilson. *Shad; Jack.*

The shad occurs regularly, but not abundantly, on the outer shore in spring, and is caught in the pound nets at that season. The largest numbers are taken in April and May, as shown by the following table, giving the catch at a pound-net fishery in Monmouth County. Stragglers, however, occur through the summer, and on October 9, 1891, a ripe roe shad was caught in a pound net in Ocean County.

Months.	1891 (1 net).	1892 (2 nets).
	<i>Number.</i>	<i>Number.</i>
April.....	13	870
May.....	856	78
June.....	49	50
July.....	2	2
August.....	1
Total.....	921	500

Young male shad are called "jacks" at a number of places on the coast.

The fish are mostly shipped to New York, where the bucks bring 8 to 20 cents each and the roes 15 to 50 cents.

8. *Brevoortia tyrannus* (Latrobe). *Bunker; Mossbunker; Mossbanker.*

Very scarce on this shore in 1891 and 1892. Two pound nets in about the middle of the pound-net section had, up to the end of August, 1892, caught only 7 bushels of menhaden. The fish appeared in good-sized bodies in the spring of 1892, but they were driven off by the bluefish and weakfish and only stragglers were caught through the summer. The professional line fishermen are dependent on menhaden for their bait supply, and have to undergo considerable additional expense when the fish are scarce.

9. *Stolephorus mitchilli* (Cuvier & Valenciennes). *Sperlin.*

Exceedingly abundant at times and having an important relation to the occurrence of other fish which feed upon them. When weakfish have been scarce the advent of large schools of "sperlin" is regarded by the fishermen as an auspicious circumstance and they look for the early arrival of the weakfish. Large schools were often observed in and around the pound nets, where they were doubtless attracted by the presence of food. Two other species of anchovy (*S. browni* and *S. eurystole*) occur in abundance on this coast under the same conditions as *S. mitchilli*.

10. *Anguilla chrysypa* Rafinesque. *Eel.*

Some very large examples are often caught by the line fishermen when fishing for bluefish, sea bass, etc.

11. *Conger conger* (Linnaeus). *Conger Eel; Sea Eel.*

Small numbers are taken in the pound nets, chiefly in April and May. They weigh 5 to 7 pounds and have a value of about 2 cents a pound. They are also taken in some quantities in the trawl fisheries for cod, carried on in winter.

12. *Tylosurus marinus* (Bloch & Schneider). *Bilfish; Gar.*

Large schools of fish from 8 to 12 inches long were often observed in the pound nets, which they enter in search of food. When the nets are lifted they go through the meshes and are seldom caught.

13. Exocoetus sp. Flying-fish.

Flying-fish, probably *E. heterurus*, are occasionally taken in the pound nets, mostly in July. The fish weigh from one-fourth to one-half a pound and have no economic value.

14. Scomberomorus regalis (Bloch). Cero; Sier; Siering; Scarer.

Not common; irregular in appearance, and apparently little more than a straggler in the pound nets. About twelve or fifteen fish are usually taken annually in each pound net. They range in weight from a few pounds to upward of 40 pounds, the average being probably 10 pounds. On August 22, 1892, an example weighing 36 pounds was taken at Long Branch, and the same day another weighing 25½ pounds was caught at Bradley Beach. The fish arrives in June, and remains on the coast into October. It is usually most common in August, as is shown by the following record of the number of fish taken in two pound nets in 1892:

Months.	Number of fish caught.
June.....	1
July.....	20
August.....	5
September.....	1
October.....	
Total.....	27

The average price received in 1892 was 50 cents for each fish, or 5 cents a pound. At times, however, and in some places where the fish are sold locally, as at Long Branch, from 12 to 15 cents a pound is the price received.

15. Scomberomorus maculatus (Mitchill). Spanish Mackerel; Spaniard.

Next to the weakfish this is the most important fish taken in the pound nets set on the ocean shore of the State. The fish does not occur regularly, but goes in scattered bodies. Sometimes several weeks may elapse before a given net will catch any; then schools may strike on and fish be taken at each lift for quite a while. One particular net set off Monmouth County in 1887 secured 2,500 pounds of Spanish mackerel on the first and second days of August, but none was taken at any other time during that season.

The fish taken in this State have an average weight of nearly 3 pounds. The monthly variations in the catch in 1891 and 1892 are shown in the following summary:

Months.	1891	1892
	(1 net).	(2 nets).
July.....	Pounds. 336	Pounds. 5
August.....	1,803	3,280
September.....	1,598	4,030
October.....	51	
Total.....	3,788	7,315

In 1887 7 pound nets on this coast took 17,500 pounds of Spanish mackerel, an average of 2,500 pounds to each net. The following year the same nets took about 35,000 pounds, an average of 5,000 pounds each. In 1891 12 nets secured 33,781 pounds, giving an average of 2,815 pounds to a net. The 23 nets employed in 1892 obtained 71,663 pounds, the average catch to a net being 3,115 pounds.

16. *Sarda sarda* (Bloch). *Bonito*; *Bonejack*; *Bone-eater*; *Skipjack*.

While a common fish on the New Jersey coast, the bonito is of irregular occurrence. It usually arrives in May and is found in the inshore waters till the latter part of September, when it leaves with the bluefish and Spanish mackerel. In 1892 a few fish were taken as early as April 28, and good lifts were made in October. The largest quantities are taken in pound nets, but occasionally good catches are made with gill nets, especially in the fall, when the fish are running south and are close inshore. The usual number secured in a pound net is only three or four at a lift, but sometimes schools of 200 or 300 fish "strike on" at a particular place and are caught, while only stragglers will be taken in any other locality on that day. The fish have the habit of splashing the water, like bluefish and Spanish mackerel; at times they were observed very near, and even in, the line of breakers and then created much visible and audible commotion. On August 21, 1892, small schools were noticed close inshore off Ocean Grove and a few examples were caught by trolling from small sailing skiffs. They are also occasionally taken from the piers at Ocean Grove, Long Branch, and other places.

The variations in the abundance of the fish are shown, by months, in the following table, which represents the catch of one pound net in 1891 and two nets in 1892, set off Monmouth County, in the middle of the pound-net section:

Months.	1891.	1892.
	Pounds.	Pounds.
April	8	28
May		
June	3,315	410
July	4,355	4
August	1,497	3,736
September	98	122
October		409
Total	9,273	4,709

The smallest example observed was taken in a pound net at Ocean Grove on July 11, 1892; it was 8 inches long and was the only one taken at that lift of the net. Five pounds is the average weight of the fish caught.

17. *Gymnosarda alletterata* (Rafinesque). *Apple-core*; *Albacore*.

Rather scarce in pound nets in summer. The few caught weigh 6 or 8 pounds. Small quantities are also taken with lines while fishing for bluefish and sea bass. Mr. Barton A. Bean, of the U. S. National Museum, communicates the following note on this fish to the issue of *Forest and Stream* for December 22, 1892:

Mr. W. C. Kendall tells us of the movements of a very large school of tunny or little horse-mackerel off Barnegat. Last summer (about July 27) as the Fish Commission schooner *Grampus* was cruising along slowly, these fish made their appearance and surrounded the vessel. The school was a mile or more in diameter and consisted of fish about 3 feet in length. They schooled close up together, similar to the common mackerel. Ordinarily they would merely flirt their tails out of the water, but at other times they would leap clear out; then again they would swim alongside the schooner quietly, scarcely making a ripple. The boat was sailing very slowly. Lines were gotten out and an effort made to catch some of the tunnies, but without success. A white rag was the only lure offered them.

18. *Scomber scombrus* Linnaeus. *Boston Mackerel.*

Occurs regularly in spring, and is one of the most important species taken in the pound nets at that season. Stragglers occur throughout the summer, and at times good catches have been made in August. Small numbers are sometimes taken in October, as the fish are withdrawing from the coast. In spring they arrive in schools and appear to come from the south, as shown by their capture first in the southernmost pound nets and in the others in regular order. They migrate slowly, both when in large schools and when in small bunches. In good weather they swim at the rate of 6 to 10 miles a day and seem to be leisurely feeding; in stormy weather, however, the runs appear to pass the pound nets more rapidly.

In spring, mackerel and shad are taken at the same time. It often happens that a large run of the two species is coincident. In 1891, in one week, about the 1st of May, 1,500 mackerel were taken in one net in Monmouth County, and during the same time 1,200 shad were caught. Exceptionally large lifts of mackerel are seldom made, for the reason that the schools usually keep well off the shore and the pound nets may be regarded as securing only the stragglers. The largest single catch of mackerel along this shore in recent years was 1,100 fish, caught in the pound net of Mr. Herbert Johnson at Galilee in May, 1891.

The monthly catch of mackerel in one net in 1891 and two nets in 1892, set off the shore of Monmouth County, was as follows :

Months.	1891.	1892.
	<i>Number.</i>	<i>Number.</i>
April	4	190
May	1,874	492
June		12
July		2
August	81	14
Total	1,909	710

A great proportion of the mackerel caught are large, weighing 2½ to 3 pounds. They bring good prices in the New York market, to which place nearly the entire catch is shipped. The average wholesale price was about 26 cents in 1891 and 33 cents in 1892.

The testimony of the fishermen as to the spawning condition of the mackerel is unanimously to the effect that the fish are not ripe when they arrive on this coast in spring. While the fish are nearly all shipped round and the fishermen do not have the best opportunities for determining the actual condition of the reproductive organs, the eggs and milt have never been observed to run from the fish when caught or when thrown into the boats; and the fishermen who have at times dressed considerable numbers of the fish state that the ova have always appeared hard and immature.

Opinion is divided as to the probable effect of the resumption of the southern mackerel fishery on the abundance of fish on the New Jersey coast. Some fishermen who have been in the pound-net fishery for many years think that the suspension of the capture of mackerel in the southern waters resulted in an appreciable increase in the supply in New Jersey. They state that ten years ago and prior thereto very few mackerel were caught, and that in the last three or four years there have been more than ever. Others, however, with equal experience, think that the mackerel are no

more abundant now than formerly. These divergent views represent the two theories which prevail as to the direction from which the mackerel approach the shores: (1) That there is a coastwise migration and that the fish caught in New Jersey are first found off Cape Hatteras; (2) that the fish come in to shore directly from the ocean and that the littoral movement is only local. Unfortunately, no records are available for early years showing the catch of mackerel in the pound or other nets of this coast.

19. *Scomber colias* Gmelin. *Thimble-eye Mackerel*.

This fish has been exceedingly rare on the New Jersey coast for about six years, prior to which time some very good catches were often made in pound nets. As many as 2,000 or 3,000 pounds have been taken at one lift. The fish usually weighed $\frac{3}{4}$ or 1 pound, but examples weighing 2 to 3 pounds were also caught. Very few were taken in 1892. The only example observed by the writer was obtained in a pound net near Ocean Grove on September 10. It was 7 inches long. Mr. L. C. Thompson, of Spring Lake, reported that a number were secured in his net at intervals during the summer, and it is probable that stragglers were also taken in other nets.

20. *Selene vomer* (Linnaeus).

An example of this fish, 2 $\frac{1}{4}$ inches long, was forwarded to the Fish Commission for identification by Mr. O. B. Coit, of Spring Lake, N. J., on August 22, 1892, and was examined by Dr. Tarleton H. Bean. Mr. Coit wrote that the fish was very rare in that locality.

21. *Trachinotus carolinus* (Linnaeus). *Pompano*.

Occurs sparingly on the New Jersey coast and every season is taken in small numbers in some of the pound nets. Mr. L. C. Thompson, of Spring Lake, took about 25 pompanos, weighing from $\frac{1}{2}$ to 1 $\frac{1}{2}$ pounds, in 1892.

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

Occurs irregularly and in small numbers throughout the warmer months. Some 6 to 8 inches long were observed in pound nets in Monmouth County in September. Fish 2 feet in length are sometimes caught. At several places on the New Jersey coast this fish is called "pilot-fish," doubtless because of its resemblance to the species that is properly so called (*Naucrates ductor*).

23. *Seriola dumerili lalandi* (Cuvier & Valenciennes). *Jenny Lind*.

This amber-fish occurs throughout the summer, but is not abundant and is never taken in such numbers in this region as to indicate that it is gregarious. It is called "jenny lind" at several places in the pound-net section. This is the only common name heard for it; its origin could not be ascertained. Numerous examples were observed by the writer in Monmouth County in 1892. Mr. W. H. Gant, of Bradley Beach, has caught specimens that weighed 40 pounds. The usual weight, however, is a pound or a little less, and all the examples seen by the writer were under 2 pounds. In 1891 two fish weighing 10 pounds each were caught in a net near Ocean Grove.

On August 21, 1892, Mr. W. Scott Pierce, of Lake Como, N. J., sent to the U. S. Fish Commission for identification a specimen of this fish which had been taken in a pound net at that place, and stated that it appeared to be new to that part of the coast. A number of these had been caught up to that time.

Mr. Samuel Ludlow, of North Spring Lake, reported a catch of 300 pounds in his pound net in 1892, and it is probable that 5,000 pounds were taken in all the nets in that year.

24. Pomatomus saltatrix (Linnaeus). *Bluefish; Snapper; Snapping Mackerel; Mackerel.*

This is the most important marine species taken in the fisheries of New Jersey. In the line fisheries it is the principal fish, and larger quantities are taken with the hook than in all other ways. In the gill-net fisheries it is also the chief product, and in the seine fisheries it ranks next to the squeteague. While important in the pound nets, it now has much less economic value than a number of other species.

The well-known irregularity in movements and abundance to which the bluefish is subject is often observed on this coast and was well illustrated by the pound-net catch in 1892. During the early part of the season the bluefish was very scarce, and up to August 1 some of the nets had taken less than 100 pounds of the fish. There was a fair catch in August and October, but the total yearly yield in some of the nets was less than half that in the previous year.

The monthly catch in 1891 and 1892 at a pound fishery in Monmouth County was as follows:

Months.	1891 (1 net).	1892 (2 nets).
	<i>Pounds.</i>	<i>Pounds.</i>
May	405	69
June	773	208
July	3,434	2,527
August	3,185	105
September	840	5,906
October	517	
Total	9,154	8,815

25. Leiurus perciformis (Mitchill).

On August 21, 1892, Mr. W. Scott Pierce, a pound-net fisherman of Lake Como, N. J., sent a black rudder-fish to the U. S. Fish Commission for identification; he reported it as new to that coast. The specimen was examined by Dr. Bean.

26. Stromateus triacanthus Peck. *Butter-fish; Dollar-fish.*

One of the most abundant pound-net fish on the coast. It occurs from April to October, and at times constitutes the bulk of the catch in pounds. The fish are usually very small, the average weight being one-third of a pound. The largest weigh only half a pound. On September 7, 1892, the pound nets near Ocean Grove contained enormous quantities of small butter-fish; very few were over 4 inches long.

The fish swim in rather compact schools, and are easily distinguished when in the water by their blackish tails. Butter-fish are said by the fishermen to be a favorite food of the weakfish. The appearance of an abundance of butter-fish is shortly followed by the advent of weakfish.

Following is a statement of the quantities of marketable butter-fish taken in 1891 and 1892 at a pound-net fishery off Monmouth County:

Months.	1891 (1 net).	1892 (2 nets).
	<i>Pounds.</i>	<i>Pounds.</i>
April	622	103
May	957	2,313
June	7,111	11,151
July	1,025	1,206
August	118	292
September	3	4
October	3	851
November		599
Total	9,839	16,519

The fishermen speak of the "genuine butter-fish," which is of a yellow color, is very scarce, and weighs about one-fourth of a pound. It is doubtless a pompano (*Trachinotus*).

27. *Centropristis striatus* (Linnaeus). Sea Bass.

This fish is taken in the pound nets early in the season, May being the month in which the largest lifts are made. As the water becomes warmer the fish begins to move offshore; in June the yield is much reduced, and after that time the fish is rarely taken in nets. It approaches the shores again in the cold months, after the nets are taken up, and remains in the inshore waters until the following spring. The sea bass is one of the best fish caught in pound nets early in the season, and the prices received are usually high, often reaching 8 cents a pound and rarely getting below 3 cents.

Next to the bluefish, the sea bass is the most important fish taken in the line fisheries of this coast. Menhaden is the principal bait used by the commercial fishermen, but in sport fishing clams, crabs, and minnows are also employed.

There is a certain relation between the abundance of bluefish and the scarcity of sea bass on this coast. Both species occur at the same season and are taken on the same grounds with the same apparatus. In 1890 bluefish were abundant and sea bass were scarce, more than three-fourths of the catch consisting of the former species; in 1892 there was a scarcity of bluefish and an abundance of sea bass, and in some localities up to the last of August almost the entire catch was sea bass.

The monthly catch of sea bass in one pound net in 1891 and two nets in 1892, set off Monmouth County, was as follows:

Months.	1891 (1 net).	1892 (2 nets).
	<i>Pounds.</i>	<i>Pounds.</i>
April.....	35	50
May.....	1,443	4,195
June.....	48	288
July.....		29
Total.....	1,526	4,562

28. *Roccus lineatus* (Bloch). Striped bass; Rockfish; Rock.

Rarely taken in the pound nets, but common in the bays and rivers, where it is caught with gill nets and seines.

29. *Lutjanus blackfordi* Goode & Bean. Red Snapper.

This fish is casually taken in the pound nets. In 1892 Mr. L. C. Thompson, of Spring Lake, secured four or five weighing about 1½ pounds each. Mr. Thompson had previously caught this fish in Florida and was familiar with it.

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

A very highly esteemed but not especially abundant species. In the pound nets the largest numbers are taken in June and about the 20th of that month. Very large lifts are rarely made, as the fish do not appear to go in extensive schools. Fifty fish were taken at one lift in June, 1891, at Bradley Beach, which was considered a very large catch, although as many as 150 fish have been occasionally taken. The yield

to a net varies from 100 to 1,000 fish annually, 200 or 300 probably being the average. The monthly catch of one net in 1891 and two nets in 1892 was as follows:

Months.	1891.	1892.
	<i>Pounds.</i>	<i>Pounds.</i>
June.....	823	1,122
July.....	269	773
August.....		364
September.....	6	
October.....		184
Total.....	1,098	2,443

The yield in 1891 in the one net referred to represented 147 fish, with an average weight of $6\frac{1}{2}$ pounds each.

Some years ago the reprehensible practice of killing sheepshead by means of dynamite exploded over sunken wrecks, to which the fish habitually resort, was not uncommon in certain of the bays on the outer shore of New Jersey. The writer saw 33 fish destroyed at one discharge in Great Egg Harbor Bay.

31. *Stenotomus chrysops* (Linnæus). *Porgy*.

Occurs on the shore in considerable numbers between April and July, and is caught in pound nets during that period. The largest quantities are taken in June; in July the fish begin to work off shore, going east, and in the latter part of the summer and in fall only stragglers are taken. The average annual catch to a net is from 1,000 to 2,000 pounds, valued at about 3 cents a pound. The fish weigh from $\frac{1}{2}$ to 2 pounds, the average being about 1 pound.

The following note on the abundance of porgies in 1890 and 1891 has been communicated by Capt. D. T. Church, of Tiverton, R. I.:

During May, 1890, the largest crop of small scup ever seen on our coast appeared from Barnegat to Hyannis. At the time of their appearance it took 25 fish, by actual count, to weigh a pound; when they left the coast their weight was one-fourth of a pound. On their return in the spring they were about the same size as when they left in the fall. This fall [1891] their weight is half a pound. Probably within a year or so there will be present on the coast the greatest body of scup ever known. When the small scup made their appearance in the spring near Seaconnet a large school of cod was with them. We found them gorged with small scup, one cod examined containing 17 fish. After the cod left squeteague took their place, and their destruction [of scup] was enormous, and it was going on from Sandy Hook to Hyannis.

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

This is the most abundant and important fish taken in pound nets on the ocean front of New Jersey; next to the bluefish, it is the most valuable species captured on the coast of that State, and, considering the fisheries of the entire State, it is surpassed in importance only by the shad and bluefish.

According to many fishermen, the weakfish was more abundant in 1891 and 1892 than for ten years previously. Notwithstanding the enormous quantities taken, it is not apparent that the supply is being reduced, and some hauls now made are fully as large as any in the history of the fishery. In Monmouth County, during one day in the second week in August, 1891, fully 100,000 pounds of weakfish were caught in one pound net, and 81,800 pounds were taken out and sold. On July 11, 1892, two other nets in the same county yielded 60,000 pounds at one lift, but adjacent nets took only small quantities.

The ordinary size of the fish taken in the pound nets is 2 or 3 pounds, the individuals composing the schools usually being of uniform size. Sometimes, though rarely, fish weighing 10 pounds are taken.

Small weakfish under 9 inches in length are called "bay weakfish"; they frequent the bays and are taken in the pound nets only in very small quantities. The principal run begins about July 1 and the fish continue to be caught in large numbers till October 1. They go in schools at all times.

The following statement, giving the catch of weakfish at a pound-net fishery in Monmouth County in 1891 and 1892, shows the monthly fluctuations in the abundance of the fish:

Months.	1891 (1 net).	1892 (2 nets).
	<i>Pounds.</i>	<i>Pounds.</i>
April		300
May	3, 886	2, 831
June	31, 040	11, 644
July	35, 680	124, 763
August	114, 423	200, 367
September	34, 829	79, 863
October	933	69, 471
November		23, 677
Total	220, 791	512, 916

33. *Cynoscion nebulosus* (Cuvier & Valenciennes).

Not observed. According to the fishermen it is taken in the pound nets only at rare intervals.

34. *Sciaena ocellata* (Linnaeus). *Red Drum.*

This fish is in most places considered a nuisance by the pound-net fishermen, and only a very small percentage of the catch is sold, the price received being about 50 cents per fish. Large lifts are made at times. At Spring Lake 250 large drum were caught during one day in 1892, all of which were liberated.

35. *Leiostomus xanthurus* Lacépède. *Spot; Goody; Cape May Goody.*

Not a common fish in the pound nets, but abundant in the bays of this coast, where it is taken with seines and gill nets.

36. *Menticirrhus saxatilis* (Bloch & Schneider). *Kingfish; Barb; Hake.*

In the pound-net fishery this is an uncommon and valued food-fish. It is most abundant in May, when more are taken than in all the other months combined. The average weight of those caught in pound nets is 1½ pounds. The price received by the net fishermen ranges from 5 to 30 cents each, the average probably being 15 or 20 cents. The general scarcity of the fish is well illustrated by the accompanying statement, showing the monthly catch at a pound-net fishery in Monmouth County:

Months	1891 (1 net).	1892 (2 nets).
	<i>Number.</i>	<i>Number.</i>
May	164	101
June	5	2
July		
August		2
September		25
October		14
Total	169	144

The name "kingfish" is in common use in the pound-net region; in Barnegat Bay and vicinity "barb" is the current appellation; and "hake" is heard at various points.

37. *Pogonias cromis* (Linnaeus). *Gray Drum*; *Black Drum*.

Less common than the red drum in the pound nets and has about the same commercial value. The adult fish, by some called gray drum, weigh about 20 pounds. The young, which are banded and are known as black drum in some places, are at times sold to summer visitors under the name of sheepshead.

38. *Ctenolabrus adspersus* (Walbaum). *Gall*.

In the pound-net region this fish is found throughout the fishing season, although it is taken only in small numbers. The largest examples weigh $1\frac{1}{2}$ pounds. The name "gall," which was heard for this fish in Ocean and Monmouth counties, is evidently a corruption of burgall, a designation employed in New York and other places.

Small examples were abundant in the dense vegetable growth which adheres to pound-net poles, ropes, anchors, etc. At Bradley Beach an old rope, covered with *Uva lactuca lactuca* and *U. enteromorpha compressa*, when pulled up had hundreds of small cunners on it, which were landed in the boat. Small crabs and shrimp were also found in the same situation. The immature fish differ greatly from the adults in coloration, as may be judged from the following description of specimens taken at Bradley Beach September 9, 1892:

The largest specimens were 2 inches long. The general color in life is dark pinkish, the body being marked by seven or eight more or less distinct dark-brown crossbars. Beneath yellowish, the color being especially bright anteriorly. Eye and operculum lustrous golden. Vent bluish. A black spot at the junction of the spinous and soft dorsal fins. Some examples, probably females, are without crossbars, and are uniformly pinkish. Head in length, $3\frac{1}{4}$; depth in length, $3\frac{1}{4}$.

These small fish are not recognized by the fishermen, although most of them distinguish the full-grown fish from the tautog.

39. *Tautoga onitis* (Linnaeus). *Blackfish*.

This fish is caught in small quantities in the pound nets in April and May. The catch varies from year to year, depending on the time when the nets are first set. Other things being equal, the earlier the pound fishing begins the larger the yield of blackfish. They occur in abundance on the rocky ledges off various parts of this shore, as, for instance, on the Shrewsbury Rocks off Long Branch, and considerable quantities are taken in such situations by professional line fishermen. Examples weighing 10 pounds are sometimes caught, but the fish do not average more than 1 or 2 pounds.

40. *Prionotus strigatus* (Cuvier & Valenciennes). *Pigfish*; *Sand Pigfish*; *Sea Robin*.

Very abundant. Taken in pound nets in enormous quantities throughout the summer. At times practically the entire catch consists of them. A few are utilized for lobster bait, but most of them are turned back into the water.

During the hauling of the pound nets and after being dipped into the boats this fish emits a peculiar grunting sound, which gives rise to the name "pigfish." When out of the water it has a curious habit, when disturbed, of opening its mouth and giving a sudden short jump, at the same time uttering a loud croak.

Some of the fishermen in Monmouth County call this species the "sand pigfish" to distinguish it from *P. palmipes*, which is often known as the "rock pigfish." The name "sea robin" is also in use.

41. *Prionotus palmipes* (Mitchill). *Pigfish; Rock Pigfish; Sea Robin.*

Not so abundant during the summer months as *P. strigatus*, but more numerous in the fall.

Prof. Baird, in his report on the fishes of Great Egg Harbor, N. J., makes the following remarks on this species:

When caught, this fish commences a loud croaking or barking, the sound apparently produced in the abdominal region. This is so loud and constant that in hauling a large seine the presence in the net of a single specimen of this gurnard, however small, could generally be determined by the peculiar sound emitted. For this reason it is sometimes called pigfish by the inhabitants.

42. *Phycis chuss* (Walbaum). *Hake; Ling; Thimble-eyed Ling.***43. *Phycis tenuis* (Mitchill).** *Hake; Ling; Thimble-eyed Ling.*

Both of these fish occur off the New Jersey coast and are taken chiefly in winter on trawls set for cod. At times seven or eight fish are caught daily by one boat. In some places they have little value, bringing only $\frac{1}{2}$ or 1 cent a pound, but in other localities they command the same price as cod. They weigh from 5 to 10 pounds each.

44. *Melanogrammus æglifinus* (Linnaeus). *Haddock.*

Not common. A few are caught in the line fishery for cod carried on from Seabright and other places. The fish arrive on the shores later than the cod. They have about the same market value as cod.

45. *Pollachius virens* (Linnaeus). *Pollack.*

Occurs sparingly in spring, and is caught in small numbers in pound nets in April and May. On July 1, 1892, a fish weighing 5 pounds was taken in a pound net at Bradley Beach. The average weight of the fish taken is 12 or 13 pounds.

46. *Gadus morrhua* Linnaeus. *Cod.*

The cod approaches the shores of the northern part of the New Jersey coast about November 5 to 8, and remains in the region until the first of May. When it first arrives it undergoes the spawning process, in the opinion of the fishermen, although an examination of some of the first arrivals showed that some had already spawned, some had immature eggs, and some were about ripe. They weigh from 5 to 25 pounds, the average being 9 or 10 pounds. Hand lines, trawl lines, pound nets, and gill nets are used in their capture, the largest quantities being taken with lines. Cod are taken in the pound nets when they are first set in April, in company with sea bass, mackerel, flounders, pollack, shad, etc.; a few are also occasionally caught early in May. The yield is always small and uncertain, however, and 100 pounds would probably be a large average catch to a net.

One of the most interesting features of the important fisheries at Seabright is the recent introduction of gill nets in the cod fishery. The nets were first used in 1891 and have not yet become firmly established, although the first experiments were considered satisfactory. The nets are 70 fathoms in length and are set close inshore. In 1891 five nets were operated from two boats; from 500 to 1,800 pounds of fish were taken daily in three of the nets.

47. *Paralichthys dentatus* (Linnaeus). *Flounder; Fluke; Splaice.*

This is the most important flatfish in the fisheries of this State. It is taken in large quantities with pound nets and lines. The common names given are by some fishermen used indifferently, while others make a distinction, based on size, which is not clear. The same names are also applied to other flounders. The most widely used common name in the pound-net region is splaice, an evident corruption of plaice,

which was not heard. The only other species of flounder occurring in the commercial fisheries is the winter flounder (*Pseudopleuronectes americanus*). It is less abundant and important than the summer flounder, and the catch can not be separated from that of the latter. Flounders are taken in the pound nets throughout the fishing season, but the largest quantities are secured in May and June, as shown by the following table:

Months.	1891 (1 net).	1892 (2 nets).
	<i>Pounds.</i>	<i>Pounds.</i>
April.....	229	820
May.....	21,876	8,953
June.....	11,725	3,376
July.....	1,644	1,854
August.....	663	591
September.....	1,694	1,326
October.....	6,143	8
November.....	1,062
Total.....	45,036	16,928

These figures well illustrate the variations in abundance to which marine fish are liable. One net in 1891 took nearly three times the quantity of fish obtained by two nets in the following year.