

ACIPENSER STURIO Linnaeus. *Common Sturgeon.*

THE STURGEON FISHERY OF DELAWARE RIVER AND BAY.

BY JOHN N. COBB,

Agent of the United States Fish Commission.

The great decline in the catch of sturgeon in American waters has attracted the earnest attention of all who are interested in the fisheries. This decline has not been peculiar to the American fisheries, but is noted in nearly all countries in which sturgeon fishing is prosecuted.

The principal sturgeon fisheries of the United States are in Delaware Bay and River, the Great Lakes, South Carolina, and Columbia River. The Delaware fishery, of which the present paper treats, exceeds all others. It is carried on from Pennsylvania, Delaware, and New Jersey, although the interests of Pennsylvania are very slight.

Both the common sturgeon (*Acipenser sturio* Linnæus) and the short-nosed sturgeon (*Acipenser brevirostris* Le Sueur) are found in the Delaware River, but only the former is put to any commercial use there. It attains a large size, a length of 10 feet being not uncommon. *A. brevirostris* rarely exceeds 3 feet in length, and therefore is not gilled in the large-meshed nets used. Some are probably taken at the shore seine fisheries along the river and in the shad gill nets.

HISTORY OF THE FISHERY.

The earliest settlers to this country were especially struck at the immense numbers of sturgeon seen in the Delaware, and their letters to the home folks in England and Germany contain frequent references testifying to their wonderment. Mr. William E. Meehan, in "Fish, Fishing, and Fisheries of Pennsylvania,"* writes as follows:

William Penn made special note of this fish. Peter Kalm speaks of it, and others tell of its capture and great size. Until comparatively a few years ago sturgeons were still plentiful. Men not yet 60 years old say that even after they had passed their majority it was not an uncommon sight to see several sturgeon during a single trip between Camden and Philadelphia, jumping in the river.

Mr. Samuel Williams, a resident of Burlington, N. J., now in his eighty-fourth year, says that when he was a boy on one occasion he went with his father on a shad-fishing trip in the lower Delaware and during it he saw thousands of this huge fish. Once on this trip his father and companions were compelled to take their nets in with great speed in order to save them from utter destruction; as it was, many fathoms were badly torn by this fish. The sturgeon passed their boats in such vast numbers that in a little while the occupants had killed and secured eleven. This was as many as they could take home and, as the run continued, they slew many more on the principle that it was a fish not only of scarcely any value, but was actually a nuisance in the river on account of the damage caused the nets.

* Report of the State [Penna.] Commissioners of Fisheries for the years 1892, 1893, 1894, pp. 257-392. 1895.

Mr. Larzalero states that when he was a young man one night he, with a number of young men and women, went rowing on the Delaware in two boats. While proceeding up the river only a few feet apart a large sturgeon, 6 or 7 feet long, jumped from the water and nearly capsized one of the boats, and the occupants were thoroughly drenched and frightened. The same gentleman also stated that William Stockton, the father of the Rev. Thomas H. Stockton, for a space chaplain of the House of Representatives at Washington, was at one time out boating when a large sturgeon actually jumped into the boat and was secured.

Mr. John Fennimore related the following:

"Many years ago there was a little steamboat which plied the Delaware above Philadelphia called the *Sally*. On each side, near her bows, were two large round windows, which, in the summer time, were often open. One day when the *Sally* was on one of its trips up the river, a large sturgeon in jumping made such a leap that it passed clear through one of these windows and landed in the vessel, where it was killed."

Stories like the foregoing are quite common and many of them are well authenticated, and they serve as nothing else can to illustrate how numerous this species of fish were in the Delaware River, for until recent years the sturgeon seemed to be little esteemed by the people living along this great stream. Nearly all the old fishermen say that in their boyhood days few ate sturgeon except the colored people, though occasionally a family would fry a few steaks and serve them with cream. The roe was considered worthless except as bait with which to catch eels and perch or to feed to the hogs. From 3 to 4 cents a pound were the best prices that could be obtained retail for the meat, and it was not often that more than 25 or 30 cents could be had for a whole fish.

Mr. John Fennimore made a practice of fishing for sturgeon with nets at Dunks Ferry, now Bristol, in the latter part of the twenties and until about 1835. Mr. Vanschiver and Mr. McElroy, two other fishermen of that neighborhood, also carried on the same business. They used a 12-inch mesh and drew their nets over the bar near the Pennsylvania side, a favorite spot for the sturgeon. Sometimes 25 or 30 were taken at a single haul. The fish brought very little money, however, seldom more than 30 cents apiece, and sometimes as low as 12½ cents. Mr. Williams says that a favorite method with many fishermen of catching sturgeon in the month of August, prior to 1835, was with the harpoon, and that the favorite spot for this method was about Dutch Island, near Bordentown.

The exact time when the fishery for sturgeon was taken up to any considerable extent is doubtful. Mr. Benedict Blohm, of Penns Grove, N. J., was undoubtedly one of the earliest to engage in the business with gill nets, and was the first to put up caviar, which he did about the year 1853. For a number of years the business struggled along, owing to the low price received for caviar and the prejudice prevailing against the use of the flesh. After 1870 the business expanded very rapidly. Previous to the use of special gill nets for sturgeon many were taken in the shore seine fisheries, 117 being obtained in one haul of the Fancy Hill Fishery in Gloucester County in the early seventies. Very little use was made of these for a long time; but, as people began to develop a taste for the sturgeon flesh, the fish was sold to peddlers, who dressed them and peddled the meat throughout the surrounding country. Of late years, however, but few are taken in the seines.

The smoking of sturgeon flesh was begun on a small scale in New York City about 1857, and later in Philadelphia. This has caused a fairly steady demand for the flesh at a remunerative price, and has been a large factor in the great development of the industry.

The first person to engage in the business in Pennsylvania waters with gill nets was Mr. Henry Schacht, of Chester, in 1873. He located first on Ridley Creek, whence he removed to Chester Creek. A few years later he purchased Monas Island, opposite Chester. Here, by means of piles, he built a pen in which he could keep the fish alive until the market price was satisfactory.

SEASON, ABUNDANCE OF FISH, ETC.

The fishing season usually begins the early part of April and closes about the middle of June, depending on the run of fish—sometimes closing earlier, and again, if fish are plentiful, continuing until the end of the legal season, June 30. The movements of the fish during the season are thus described by Professor Ryder:*

As the season advances the spawning schools move upward from the salt waters of the Delaware Bay, and in the neighborhood of Fort Delaware and Delaware City, 45 miles south of Philadelphia, where they pass into brackish or nearly fresh water. From this point southward 20 miles, and northward as many more, it is probable that a large part of the spawning now occurs. Those that escape the meshes of the hundreds of sturgeon nets which are every day stretched across their spawning-grounds go farther north to get rid of their burdens of ova.

The upward movements of the school seem to be affected to some extent by a rise of the prevalent temperature of the water and air, thus making the fishery for the time more profitable. Conversely, a decline in the prevailing temperature is often apparently followed by a diminution in the numbers of fish on their way up the river, and a cold, late season retards the appearance of the fish from the salt waters farther south. A very rainy season, which has caused an unusually abundant flow of fresh water down the river, also interferes with their early appearance in the waters above Delaware City. This is supposed to be due to the fact that the water becomes fresh farther south than usual where the schools then remain to discharge their spawn. The fishing season at Delaware City is at its height during the months of May and June, but fish are caught during the summer and autumn and until as late as September and October.

There has been an almost continuous decrease in the number of sturgeon taken by the fishermen for some years back. One of the best methods of showing this is from the average number of fish taken in each gill net per season. The following information from the reports of the U. S. Fish Commission and from the statements of leading fishermen and dealers will doubtless prove instructive: In 1890 the average catch of sturgeon per net was 60; in 1891 it was about 55; in 1892, 43; in 1893, 32; in 1894, 26; in 1895, 32; in 1896, 27; in 1897, 20; in 1898 it was only 14, while in 1899 it dropped as low as 8 fish to the net.

The table following shows the catch of sturgeon for the years 1890, 1891, 1892, and 1897 for all three States and the catch for New Jersey alone in 1898. Pennsylvania and Delaware were not canvassed for 1898. The weights are for round fish, or just as taken from the water, and the value of the caviar is included.

* The sturgeon and sturgeon industries of the eastern coast of the United States; with an account of experiments bearing upon sturgeon culture, by John A. Ryder. Bull. U. S. Fish Comm. for 1888, pp. 231-328.

372 REPORT OF COMMISSIONER OF FISH AND FISHERIES.

Table showing the catch of sturgeon on the Delaware River and Bay for the years 1890, 1891, 1892, 1897, and 1898.

State and county.	1890.		1891.		1892.		1897.		† 1898.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Pennsylvania—										
Bucks	58,650	\$810	52,700	\$640	60,180	\$728	985	\$58		
Delaware							8,960	207		
Total	58,650	810	52,700	640	60,180	728	9,945	260		
Delaware—										
Newcastle	995,000	24,950	1,074,450	27,008	877,680	21,953	312,300	22,713		
Kent	306,000	4,400	230,350	3,380	173,910	2,557	143,100	11,005		
Sussex								1,032		
Total	1,301,000	29,350	1,304,800	30,448	1,051,590	24,510	467,250	34,750		
New Jersey—										
Burlington										
and Mercer										
Camden							* 300	8	* 510	\$24
Salem	3,170,575	78,217	3,067,740	75,800	2,738,455	56,153	* 1,000	25	* 450	12
Cumberland ..	483,350	11,233	428,700	9,562	390,125	7,310	547,915	27,493	381,530	31,605
Cape May						255	100,900	4,481	42,075	2,128
Total	3,662,925	89,450	3,496,440	85,362	3,141,330	63,718	1,951,421	89,430	1,298,315	96,272
Grand total	5,023,175	119,610	4,853,940	116,450	4,253,100	88,956	2,428,616	124,440		

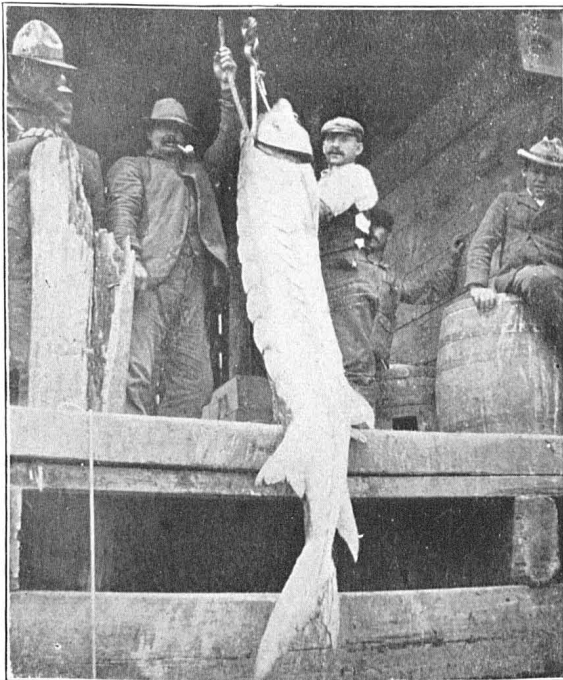
* Taken incidentally in seines. † Pennsylvania and Delaware were not canvassed for 1898.

The best method of improving the condition of this fishery is by artificial propagation. In 1888 Prof. John A. Ryder, after an exhaustive investigation, under the auspices of the United States Fish Commission, conclusively proved that this work was feasible if spawn could be secured in the proper condition; yet little, if anything, has been done in this direction. Mr. L. G. Harron, under the auspices of the Commission, took up the work at Delaware City, Del., in 1899, but unfortunately he was unable to secure any ripe fish, so his efforts came to naught. The difficulty is in getting the ripe spawn and milt at the same time. The soft spawn is the only kind that can be used by the fish-culturist; as this can not be utilized by the fishermen in making caviar, they would readily turn over to the Commission all that they get. Some seasons, however, there seems to be very little of this kind of spawn to be had. The New Jersey fishermen say that ripe spawners are generally caught around Benny's Buoy, about 6 miles below Bay-side, between the 10th and 17th of May. The buck sturgeon are usually about a day or two behind. The Cohansey River empties into the bay near here, and it is probable that the fresh water from the river causes more favorable conditions for the spawning of fish.

The proper protection of the "mammoses" or young sturgeon would benefit the sturgeon fishery. For some years past these have been destroyed by the shad gill-netters and other fishermen on the river and bay merely because they injure the nets by their struggles. These young sturgeon are very common as far up the river as the Trenton Falls, and in 1898, 100 of them were captured in a shore fishery near Newhope, Pa., but it is unusual to find them that far up the river. There is quite a widespread belief among the fishermen that the "mammoses" are not young sturgeon, or, at least, are not the young of the common



CARCASSES OF STURGEON READY FOR SHIPMENT AT BAYSIDE, N. J.



LANDING A STURGEON ON THE WHARF AT BAYSIDE, N. J.

sturgeon, *A. sturio*. This belief probably arises from a considerable difference in appearance which exists between the full-grown *A. sturio* and its young. In some instances the fishermen may have mistaken *A. brevirostris*, the short-nosed sturgeon, for the young of *A. sturio*.

In 1891 the State of New Jersey passed the following law protecting the "mammoses," or young sturgeon:

Be it enacted by the senate and general assembly of the State of New Jersey, That it shall not be lawful for any person or persons to cast, draw, set, anchor, drift, or stake any gilling net, or any other device or appliances of any kind whatsoever, for the purpose of catching fish commonly called or known as mamnose (which are young sturgeon under 3 feet in length) in the waters of the Delaware Bay, river, and their tributaries, within the jurisdiction of the State of New Jersey; and any person or persons fishing with gilling nets, drift nets, shore, seine nets, or any kind of nets, devices, or appliances whatever in the Delaware Bay, river, or their tributaries, within the jurisdiction of the above-named State, who, on lifting, drawing, taking up, removing, or underrunning any of said nets, devices, or appliances, shall find young sturgeon or mamnose under 3 feet in length entangled or caught therein, shall immediately, with care and with the least possible injury to the fish, disentangle and let loose the same and transmit the fish to the water without violence. Any person or persons violating any provisions of this section, or having in their possession young sturgeon or mamnose under 3 feet in length, either for consumption or for sale, or who is known willfully to destroy the same, for so offending shall, on conviction thereof, be punished with a fine of \$10 for each and every fish so caught, sold, or destroyed, and in default of paying such fine, on being convicted thereof, to be imprisoned in the county jail for 30 days.

A few years later the State of Delaware adopted practically the same law, but as Pennsylvania has not yet taken action on this subject the law has so far had very little beneficial effect on the fishery.

FISHING-GROUNDS, FISHERMEN, ETC.

The fishing-grounds on the New Jersey side are located between Cape Shore and Fishing Creek, in Cape May County, and Penns Grove, in Salem County, the principal fishing being near Bayside. The more important fishing-camps are at Cape Shore, the mouths of Fishing Creek and Colhansey River, Bayside, and the mouths of Alloways and Hope creeks. A small fishery is also carried on in the Maurice River.

In Delaware the principal grounds are between Mispillion Creek and Delaware City, and the principal camps are at the mouth of Mispillion Creek, at Bowers Beach, Rays Ditch, at the mouth of Blackbird Creek, Port Penn, and Delaware City.

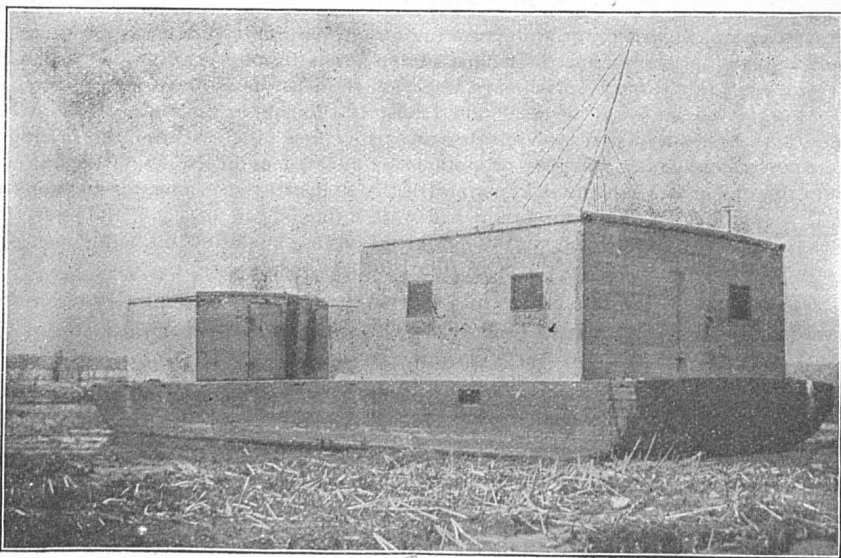
In Pennsylvania the fishery is usually carried on from Marcus Hook and Chester. Owing to the closing of the season on June 30, the fishing by Pennsylvanians in this locality is practically a thing of the past, as the fish do not usually reach there until after that date.

In 1897 978 fishermen, 80 shoresmen, and 45 transporters were engaged in this fishery. Two men usually form the crew on the transporting vessels, although three and four men are sometimes employed. In the fishing boats two men are engaged. The salary of the head man in the fishing boat averages about \$45 per month with his grub, while the other man receives about \$30 per month with grub. The grub bill of a camp usually averages about \$2.50 a week for each man.

VESSELS, BOATS, ETC.

In New Jersey the principal railway shipping-point is Bayside, while in Delaware most of the product is handled at Delaware City. As most of the camps are located some few miles either up or down the bay from these places, it is necessary to ship the caviar and carcasses by vessel. In 1897 the New Jersey fishermen used 25 vessels, with a net tonnage of 540, and valued at \$31,650, as transporting or "market" vessels, or as "lay" vessels. In Delaware 6 vessels, having a net tonnage of 145 and valued at \$5,500, were used, while none were used in Pennsylvania.

If the fishermen have their camp located near a swampy shore, they usually engage a vessel of anywhere from 8 to 50 tons. This is taken

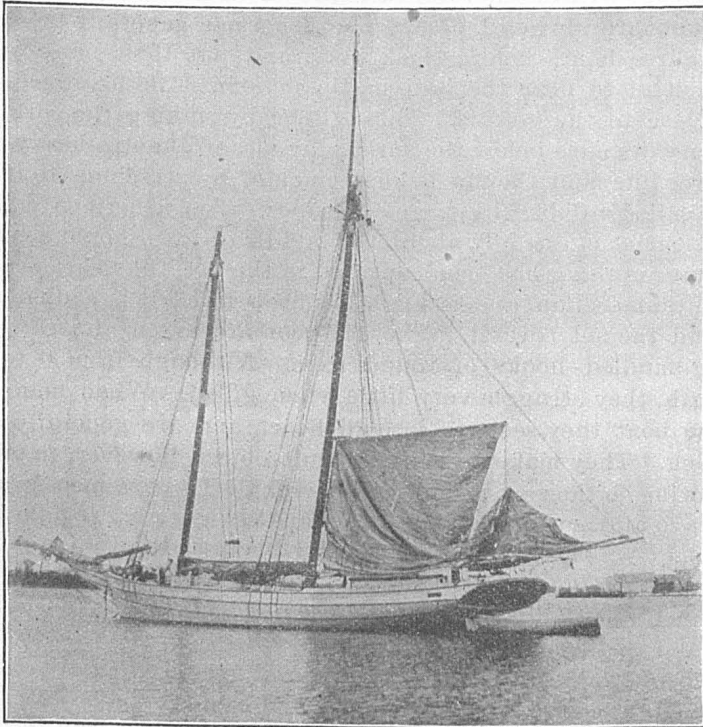


Scow boat used in sturgeon fishing.

to a convenient sheltered spot near where they intend working and is securely anchored. The fishermen then make their headquarters on this vessel for the rest of the season, eating, sleeping, and preparing their catch for market on board. This is called a "lay" boat. The cost of maintaining such a vessel is usually about \$100 per month for rental or charter, with the additional expense, in most cases, of provisions for one man who accompanies the vessel. Others tow to the fishing-grounds immense scows, with a cabin at each end, and use them for camps. One of these cabins is much larger than the other, and is used for sleeping quarters, while the butchering of the sturgeon and the preparing of the caviar is carried on in the smaller cabin. Still others use the ordinary houseboat, or cabin boat, which is nothing but a house built on a small scow.

When the ground is firm and the location convenient, the camps are built on the shore and are usually only rough shacks of unplanned pine boards. Owing to the depredations committed at the isolated camps when the sturgeon fishermen are not engaged in the business, it is becoming more common to use vessels or scows as camps, as they can be removed to a place of safety at the end of each season.

Vessels averaging about 25 net tons each and of both schooner and sloop rig are used in transporting the carcasses and caviar from the camps to the shipping-points and in carrying supplies to the camps. Most of them come from the Chesapeake Bay, they being chartered



Transporting vessel used in sturgeon fishing.

more cheaply than local vessels. The cost is usually about \$100 per month and the provisions for the men in charge of the vessel.

In the season of 1897 a small naphtha launch was used at Bayside in towing the fishing boats in and out in calm weather and unfavorable winds. In 1898 a small steamer of 7 net tons, valued at \$10,000, was used in towing boats and other work at Fishing Creek and Bayside.

The fishing boats used are large open "gilling skiffs," and are locally known as "sturgeon skiffs" in contradistinction to "shad skiffs," which are very similar, but smaller. They are about 25 feet long on the keel, about 8 feet beam, and will carry nearly 5 tons. Their average value is about \$160 each.

APPARATUS AND METHODS OF FISHING.

For the capture of sturgeon gill nets are used exclusively. These usually average about 250 fathoms in length, and are worth, all rigged ready to be put in the water, \$75 each. They are usually about 28 meshes, or 21 feet, in depth and have a stretch mesh of 13 inches. About ten years ago a mesh of 16 inches was used, but owing to the decrease in the number of large sturgeon the mesh has been reduced so that more small fish will be taken. A few sturgeon are also taken incidentally at the seine fisheries along the river, but they form a very insignificant part of the total catch.

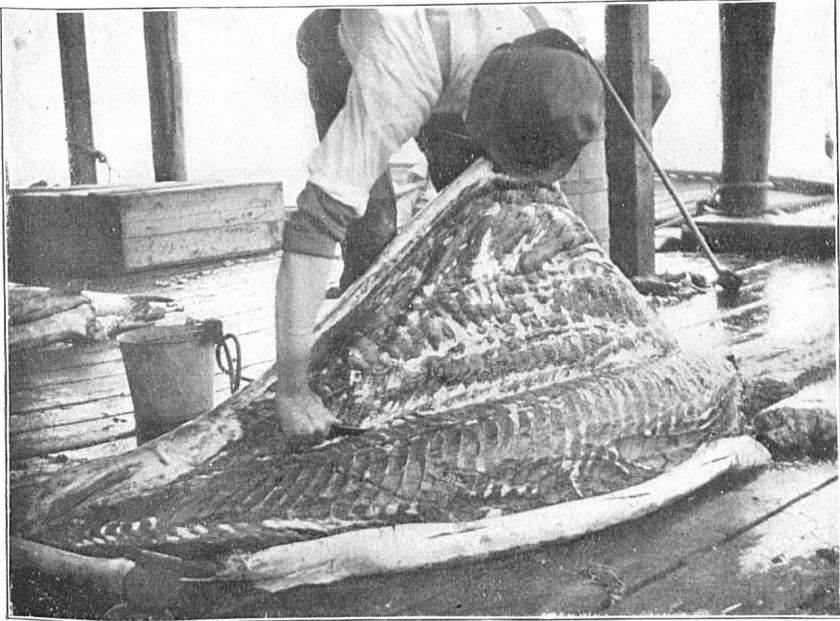
The nets are always drifted. The fishermen generally go out about two or three hours before slack water and put their nets overboard. As the fish feed near the bottom, the nets must be arranged so as to reach close to the bottom. This is done by sinking the cork-line the necessary distance below the surface by means of extra heavy leads on the lower line, and the net is kept track of by attaching to it wooden buoys, called "dabs," by means of ropes. The fishermen drift along behind their net, usually about the middle of it. Should a buoy indicate that anything has been captured in the net, the fishermen at once take in that section, and if a fish has been gilled it is hauled into the boat and the net is reset. The sturgeon are taken aboard by means of long-handled hooks of round iron. Although from 6 to 10 feet in length, they struggle very little when gilled. When being hauled into the boat they seem to lose all heart, and are generally rolled in like a log. They make a rather difficult object, however, to get into a boat, owing to their great bulk and weight. The two men forming the crew have all they can conveniently handle when a big female sturgeon is taken. A fisherman at Bayside has been known to handle a 7-foot female single-handed, but this was a very unusual occurrence.

The net is usually fished but once a day. It is taken in at slack water and the fishermen come back to camp with the ebb tide.

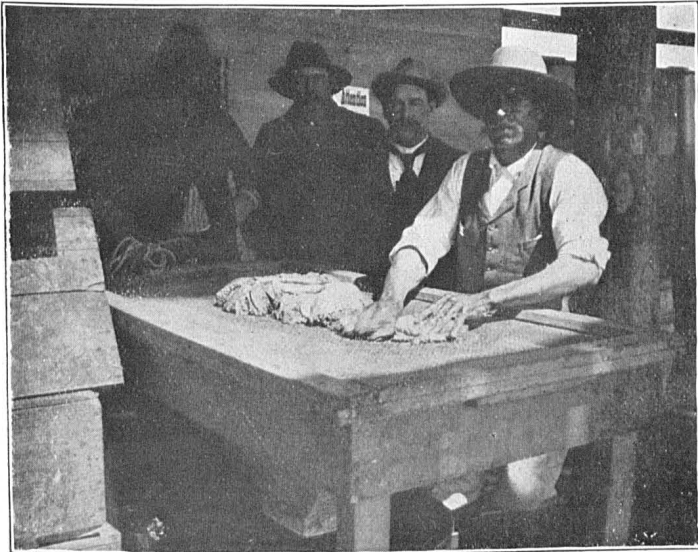
A considerable saving could doubtless be effected if the skiffs were fitted up with small naphtha engines and paddles or screws. On the river the shad-gillers have fitted up some of their skiffs in this way. With such an arrangement the fishermen would be independent of the weather. It is important that sturgeon be landed at the butchering floats or wharves at the earliest moment possible, and when the wind is adverse it is difficult to do this without the exhausting operation of rowing, and even this is impossible if the skiff is very far from the camp.

CLASSIFICATION AND VALUE OF FISH.

The fishermen classify the fish as follows: "Cow" fish, female sturgeon which have hard roe, which is the kind used in preparing caviar; "runners," female fish with soft spawn which is running out of the fish and is generally too soft to be used for caviar; "slunkers," female fish which have already spawned; "bucks," male fish of all kinds. The last three are valuable only for the flesh. Two-thirds of the catch is



SKINNING A STURGEON.



SEPARATING THE EGGS OF THE STURGEON FROM THE MEMBRANE.

of "cow fish," while the remaining one-third is composed of "bucks," "slunkers," and "runners." The "bucks" will not average more than one-tenth of the total catch.

A few of the fishermen, with small capital, or little experience, sell their fish to other fishermen or dealers in the round state, or just as taken from the water, and the buyers prepare the caviar and flesh for market. In 1897 the average prices paid for the round fish were as follows: "Cow" fish, from \$10 to \$12 each; "bucks," "slunkers," and "runners" \$1.50 each. In 1898 "cow" fish sold for \$25 each, while "bucks," "slunkers," and "runners" sold for \$2 each. In 1899 various prices were paid for "cow" fish, as there was a general demand for them, one fisherman receiving as high as \$65 for an extra large one. The number of fishermen who put up their own caviar increases each season, as the possible profit is a great incentive to raise the capital needed.

HANDLING THE FISH.

The fisherman endeavors to land "cow" fishes alive. As soon as they are landed on the wharf, or the butchering float, the tail is severed with an ax, so that the blood may escape and the fish die quickly. After a few minutes the operator makes eight short longitudinal slits in the abdomen, four on each side of an imaginary line drawn down the center of the fish. These are for "hand holds" later in the work of skinning the fish. A long slit is then made down the center of the abdomen, so that when the skin is thrown back the whole abdomen is exposed to view. Should it be a "cow" fish, with the proper kind of roe, the operator cuts the inclosing membrane, takes out the roe, and places it in pails. The head is then cut off with an ax or cleaver. In preparing the carcass for shipment the skin is carefully separated from the body on the sides and then along the back by means of knives, after which the backbone is cut out, leaving the fish boneless. Some sturgeon are shipped, however, without being skinned, these going to the Philadelphia markets. The skinned carcasses are usually shipped to New York, packed in ice, while the undressed fish are merely tagged and shipped without any further preparation.

As taken from the water, the females usually average about 350 pounds each, while the males average about 65 pounds each. When dressed for shipment, the carcasses of the females will weigh about 100 pounds, while the carcasses of the males will average about 35 pounds.

At Bayside a small business is carried on in the preparation of fertilizer and oil from the refuse of the sturgeon. For this purpose a large building is used, containing machinery for cutting up and extracting the oil from the refuse, and the necessary drying floor for drying the resulting scrap. The whole plant is worth about \$10,200, and about 5 men are employed in the work during the fishing season.

The scrap, after the oil has been extracted, is treated with acidulated rock and potash, and makes a very good grade of fertilizer, which is sold to farmers in the vicinity. In 1898 this fertilizer sold for about \$18 a

ton. The oil is put up in barrels holding about 50 gallons each, and in 1898 brought an average of \$10 per barrel. This business was formerly quite extensive, but has greatly decreased owing to the decline in the catch of sturgeon and the heavy competition with other products.

No use is made of the air-bladder, or sound, of the Delaware sturgeon, owing to its coarseness.

PREPARATION OF CAVIAR.

By far the most valuable by-product obtained from the sturgeon is the roe, from which the valuable commercial product called caviar is prepared. For this only the hard roe of the "cow" fish is supposed to be used. The manner of preparation is as follows:

After the eggs have been removed from the fish, they are placed in large chunks upon a stand, the top of which is formed of a small-meshed screen. On the under side is arranged a zinc-lined trough, about 18 inches deep, 2 feet wide, and 4 feet long. The operator gently rubs the mass of eggs back and forth over the screen. The mesh is just large enough to let the eggs drop through, and as they are separated from the membrane by the rubbing, they fall through into the trough and are thence drawn off into tubs by means of a sliding door at the end of the trough. After all the roe has been separated, the tub is removed and a certain proportion of the best Lüneburg (Germany) salt added to the roe, after which the operator carefully stirs and mixes the mass with his hands. The most delicate part of the whole operation is in the manner of mixing. No direct rule can be given for doing this portion of the work, as the condition of the roe regulates the time consumed and the manner of handling. It requires practical experience to become proficient.

After adding the salt the mass of eggs first dries up, but in 10 or 15 minutes the strength of the salt draws from the eggs their watery constituents and a copious brine is formed, which can be poured off when the tub becomes too full. The salted eggs are poured into very fine-meshed sieves, which hold about 10 pounds each. In the caviar house are usually arranged long, sloping boards, with narrow strips nailed on each side. On these the sieves are placed, and are left there from 8 to 20 hours in order to thoroughly drain. The eggs have now become the caviar of commerce, and are transferred to small casks, of either oak or pine, which have been steamed in order to prevent any possible leakage; the casks are covered and allowed to stand until the gas escapes and the eggs settle. The vacant space caused by the settling is then filled, and the cask headed up and put in a cool place until ready for shipment. The casks cost about \$1 each and hold about 135 pounds net. It requires about 11 quarts of salt to prepare a keg of caviar.

Formerly only the hard roe was used in making caviar, but some of the fishermen have become so expert that they can handle roe which is medium soft and still prepare a fair grade of caviar. Others who are not quite so scrupulous as the majority even put up the quite soft roe;

as the eggs, when ripe, have become detached from the membrane, it is not necessary to run it through the sieve. They are put in a pickle to cure them, and, after being allowed to drain, are placed in the middle of a cask, with good caviar at the top and bottom.

The fisherman's work usually ends at this point, as the buyers for the foreign and domestic firms which handle caviar are at the fishing centers during the season ready to buy and pay cash for the product.

An idea of the great increase in the value of caviar can be gathered from the following: In 1885 caviar sold for from \$9 to \$12 a keg; in 1889, 1890, and 1891 the price averaged about \$20; in 1892, 1893, and 1894, about \$40; in 1897 it was \$46.58; in 1898 the price was about \$73 a keg, while in 1899 the price went as high as \$105 a keg.

The greater part of the caviar produced in this country is shipped to Germany, although a considerable domestic trade has been established of late years. The wholesale dealers usually put up the caviar in ¼-pound, ½-pound, 1-pound, and 2-pound cans for the retail trade.

EXTENT OF THE INDUSTRY IN 1897.

The following tables show in detail the extent of the sturgeon industry for the year 1897. About 120 kegs of caviar put up by dealers are not included in the tables, as the fishermen sold the fish in round condition to the dealers. Most of the Salem County fishing is carried on in Cumberland County, but the catch, etc., has been credited to the county in which the fishermen live.

Table showing the number of men employed in the sturgeon fishery of the Delaware River and Bay in 1897.

States and counties.	Fisher-men.	Trans-porters.	Shores-men.	Total.	States and counties.	Fisher-men.	Trans-porters.	Shores-men.	Total.
Pennsylvania: Delaware.....	12			12	New Jersey: Burlington.....		2		2
Delaware: Newcastle ...	202	8	17	227	Salem.....	434	10	50	494
Kent.....	74			74	Cumberland.....	198	25	13	234
Sussex.....	6			6	Cape May.....	54			54
Total.....	282	8	17	307	Total.....	684	37	63	784
					Grand total	978	45	80	1,103

Table showing the shore property and nets employed in the sturgeon fishery of Delaware River and Bay in 1897.

States and counties.	Shore prop-erty.	Drift gill nets.			States and counties.	Shore prop-erty.	Drift gill nets.		
		No.	Length, yards.	Value.			No.	Length, yards.	Value.
Pennsylvania: Delaware.....	\$50	6	5,250	\$580	New Jersey: Salem.....	\$5,620	217	102,080	\$15,820
Delaware: Newcastle ...	3,356	118	64,300	11,485	Cumberland.....	39,405	98	43,870	6,145
Kent.....	595	37	24,600	3,280	Cape May ...	1,760	20	12,100	1,510
Sussex.....	85	3	2,700	800	Total.....	46,785	335	168,050	22,975
Total.....	4,036	158	91,600	15,075	Grand total	50,871	499	264,900	38,630

380 REPORT OF COMMISSIONER OF FISH AND FISHERIES.

Table showing the vessels and boats used in the sturgeon fishery of Delaware River and Bay in 1897.

States and counties.	Lay and transporting vessels.				Sailboats.		Rowboats.		Scows.		House boats.		Naphtha launches.	
	No.	Tons.	Out-ft.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Pennsylvania:					6	\$475								
Delaware:														
Newcastle	3	78	\$165	\$3,100	94	10,700	11	\$200	3	\$2,600				
Kent	2	21	25	900	37	3,600			1	2,000				
Sussex	1	46		1,500	3	375	1	25						
Total	6	145	190	5,500	134	14,675	12	225	4	4,600				
New Jersey:														
Burlington	1	11	50	700										
Salem	11	282	485	15,900	218	40,315			3	1,800	10	\$600		
Cumberland	13	247	788	15,050	93	17,620	5	98	5	1,500	4	325	1	\$700
Cape May					20	2,500								
Total	25	540	1,323	31,650	331	60,935	5	98	8	3,300	14	925	1	700
Grand total	31	685	1,513	37,150	471	76,085	17	323	12	7,900	14	925	1	700

Table showing the quantity of sturgeon caught and caviar prepared on the Delaware River and Bay in 1897.

State and county.	Sturgeon.				Caviar.		
	No.	Round weight.	Dressed weight.	Value.	No. of kegs.	Pounds.	Value.
Pennsylvania:							
Bucks	* 7	985	591	\$53			
Delaware	50	8,060	5,376	207			
Total	63	9,945	5,967	260			
Delaware:							
Newcastle	1,838	312,300	187,380	5,638	341½	46,103	\$17,075
Kent	795	143,100	85,860	2,905	162	21,870	8,100
Sussex	60	11,850	7,110	471	11	1,500	561
Total	2,699	467,250	280,350	9,014	514½	69,479	25,736
New Jersey:							
Burlington	* 2	300	200	8			
Camden	* 3	1,000	668	25			
Salem	5,055	1,301,226	495,806	16,568	909	122,715	40,905
Cumberland	2,145	547,915	243,925	6,240	472½	63,760	21,253
Cape May	396	100,980	31,750	1,587	52	7,020	2,844
Total	7,601	1,951,421	772,349	24,428	1,433½	193,495	65,002
Grand total	10,363	2,428,616	1,058,666	33,702	1,948	262,974	90,738

* Taken incidentally in seines.

During the season of 1898 the New Jersey fishermen caught 5,060 sturgeon, valued at \$19,375, while they prepared 1,067 kegs of caviar, valued at \$76,861. As the fisheries of Delaware and Pennsylvania were not canvassed for the year 1898 it is impossible to show the catch for those States.

It is estimated by a leading dealer that during the season of 1899, only 700 kegs of caviar were put up by all the Delaware Bay and, River fishermen.



CUTTING OUT THE ROE OF A STURGEON.



THE REFUSE OF THE STURGEON.