I.—REPORT OF THE COMMISSIONER.

PRELIMINARIES OF THE INQUIRY.

The importance to the United States of the fisheries on its coasts can scarcely be exaggerated, whether we consider the amount of wholesome food which they yield, the pecuniary value of their products, the number of men and boys for whom they furnish profitable occupation, the stimulus to ship and boat building which they supply, and, not the least of all, their service as a school for seamen, from which the merchant-marine, as well as the Navy of the country, derive their most important recruits.

A few years ago, in view of the enormous abundance of fish originally existing in the sea, the suggestion of a possible failure would have been considered idle; and the fisheries themselves have been managed without reference to the possibility of a future exhaustion. The country has, however, been growing very rapidly; the construction of railroads and the use of ice for packing have furnished facilities for sending fish in good condition all over the country, and the demand for them has increased in proportion. The object of those engaged in the fisheries has been to obtain the largest supply in the shortest possible time, and this has involved more or less of waste, and, in some cases, reckless destruction of the fish.

The discovery, too, that fish can be made to supply a valuable oil by boiling and pressing, and that the residue, as well as the uncooked fish, furnish a valuable manure, to be applied either directly or after special preparation, has constituted an additional source of consumption on a very large scale.

As might have reasonably been inferred, the supply, which formerly greatly exceeded the demand, now, to a certain extent at least and in certain localities, has failed; and the impression has become prevalent that the fish themselves are diminishing, and that in time some kinds, at least, will be almost or quite exterminated. This assertion is made with reference to several species that formerly constituted an important part of the food supply; and the blame has been alternately laid upon one or another of the causes to which this result is ascribed, the fact of the decrease being generally considered as established.

The first official notice taken of this state of affairs, with the view of adopting measures for relief, was on the part of the States of Massachusetts and Rhode Island, both being especially interested in the question, as the greatest depreciation was alleged to have occurred on their southern border. The cause assigned by those who complained most

of the result was the multiplication of "traps" and "pounds," which captured fish of all kinds in great numbers, and, as was supposed, in greater quantity than the natural fecundity of the fish could make good year by year, especially in view of the fact that these catches were made during the spawning season, thereby destroying many of the fertile fish and preventing others from depositing their eggs.

Petitions were presented to the legislatures of both these States in the winter of 1869–'70, asking that a law be passed prohibiting the use of fixed apparatus for capturing fish; and the whole subject came before special committees of the legislatures, and was discussed in all its bearings. The Massachusetts committee, of which Captain Nathaniel Atwood, of Provincetown, was chairman, after considering the evidence adduced, decided that there was no reasonable ground for the complaint, and that any action on the part of the State was inexpedient. (See page 117 of the present report.)

On the other hand, the Rhode Island committee, after giving a much greater amount of personal attention to the matter, came to the conclusion that the prayer of the petitioners was well founded, and they reported in favor of a very stringent law, prohibiting the further use of "traps" or "pounds," excepting within a limited district. (Page 104.) So far from agreeing with the Massachusetts committee on this subject, they gave it as one result of their inquiry that the difference in abundance of food-fishes between the present time and that ten years ago involved an increase in expense of at least $100 per annum to one thousand persons, resident on or near the sea-coast; or, in other words, that one thousand families were taxed to the amount of $100 a year for the purchase of food which previously was readily taken by one or other of its members, at odd moments of time throughout the season. So totally different were the conclusions arrived at by the two committees.*

The report against the prayer of the petitioners, made by the committee of the Massachusetts State senate, settled the question for the time, and no further action was taken. The report of the Rhode Island committee, however, was presented to the legislature, but nothing definite was done. In this State it became a political question rather than an economical one, and shared with the regular issues in determining the result of elections. Rhode Island being strongly republican, the republican ticket was usually elected without any question; but the

* This remarkable contradiction in the results of the two commissions showed the necessity of a special scientific investigation on this subject, to be prosecuted in the way of direct experiment upon the fish themselves, their feeding and breeding grounds. It will be observed that the conclusions depended generally upon the evidence of fishermen alone. The same was the case with the British commission, of which Professor Huxley was a member, and which in the course of its researches visited eighty-six places on the coast of England, and had before them large numbers of persons engaged in the fisheries, some of them using nets and trawls, and others lines. These gentlemen reported that there was no proof adduced to show that the supply of fish in the British seas had decreased, and therefore they opposed any restrictions.

nominee of that party for lieutenant-governor, being looked upon as opposed to the abolition of the trapping of fish, was defeated by the popular vote, although subsequently elected by the legislature. The prevailing sentiment throughout the greater part of the State appeared to be in favor of the prohibition of traps, a measure which was confidently anticipated by all parties, although the propriety of such a course was contested by many persons whose judgment was entitled to consideration. Among these was Mr. Samuel Powel, a member of the State senate, who insisted that the question was too little understood to warrant such action, and that it should first be made the subject of inquiry on the part of scientific men before a proper decision could be reached.

In the accompanying foot-note I present a communication from Dr. Hudson, received as this report is going through the press, in regard to the action on the same subject taken by the State of Connecticut.* This has more particular reference to shad and salmon, but has a part in the general inquiry.

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*STATE OF CONNECTICUT, DEPARTMENT OF FISHERIES,
Hartford, Connecticut, January 2, 1873.

DEAR SIR: You ask for a short history of the efforts made to secure a law prohibiting pounds used for the taking of shad, or prospectively of salmon. In 1866 the Commissioners of fisheries of the New England States met at Boston to discuss measures for restoring salmon and increasing the number of shad in the different rivers of the States. The Connecticut River of our State was the only stream under special discussion, as four of the States, New Hampshire, Vermont, Massachusetts, and Connecticut were all equally interested. An agreement was finally made that the commissioners of Vermont and New Hampshire were to furnish all the salmon-fry necessary to restock the river, Massachusetts was to furnish fishways for all dams on the river in the State, and the Connecticut commissioners were to procure a law abolishing pounds at the mouth of the river. In accordance with this agreement, our commissioners succeeded in having a law passed in 1868, approved July 31, 1868, section 2 of which is as follows: "That from and after the year 1871 it shall be unlawful for any person to erect, construct, or continue in the waters along the northerly shore of Long Island Sound, in this State, any weir or pound for the taking of fish." You will notice that no penalty is provided in case of non-observance of the law. To remedy this defect a law (which I inclose) was passed in 1871, approved July 24, 1871, making a penalty of $400, but giving a majority of the commissioners authority to grant permits. As Massachusetts had built no fishways, and New Hampshire and Vermont did not pretend to live up to their promise in consequence, permits were granted under certain restrictions, and in 1872 the legislature passed a new law by which pounds may be allowed to fish except from sunrise on Saturday until sunrise on Monday, with a few hours' allowance for tides. All restrictions on fykes have been repealed.

Yours, very truly,

WM. M. HUDSON.

Prof. S. F. BAIRD, *Washington, D. C.*

AN ACT in addition to an act for encouraging and regulating fisheries.

Be it enacted by the senate and house of representatives, in general assembly convened:

SECTION. 1. That upon a written request of the fish commissioners, or a majority of them the selectmen of any town in the State shall appoint two or more such persons as shall be approved by such fish commissioners to be fish wardens, whose duty it shall be to assist the fish commissioners in detecting and prosecuting offenses against the fishery laws of the State, and who shall be paid a suitable compensation from the treasurer of

In view of such considerations as were adduced by Mr. Powel, and of the contrariety of opinion on the part of State committees, it was deemed desirable that the whole matter should be investigated by some scientific officer of the general Government presumed to be competent to the inquiry and entirely uninfluenced by local considerations. Indeed, as the alleged diminution of the fisheries was in tidal and navigable waters of the United States, and over which the Federal Government exercises jurisdiction in other matters, it was maintained by many that the State governments had no control, and that any enactments on the subject must be made by Congress; especially as, if left to the States, it would be impossible to secure that harmony and concurrence of action necessary for a successful result.

It will be observed that in all these cases the question turned upon the evidence of men who were interested in one way or another, and whose daily bread might depend largely upon the conclusions arrived at. Many of them had made large investments of money in nets and boats, while others who had no such interests acted upon the natural antipathy that seems to exist between those using the net and those fishing with the line. It was also shown, by some of the testimony, that in many instances persons were biased in their evidence by intimidation, either expressed or understood, on the part of the owners of nets. Ad-

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the town; and in addition thereto shall have one-half the penalty that may be recovered and paid into the treasury for any offense detected by them.

SEC. 2. Chapter 27 of the session laws of 1869, approved June 21, 1869, is hereby appealed.

SEC. 3. After the year 1871, any person who shall set, use, or continue, or shall assist in setting, or using any pound, weir, set-net, or other fixed or permanent contrivance for catching fish in any of the waters within the jurisdiction of the State without the written permission of the majority of the fish commissioners, shall forfeit and pay the sum of $400 to the treasury of the State.

SEC. 4. All the provisions of the third and fourth sections of the act entitled "An act in addition to an act for encouraging and regulating fisheries," passed May session, 1867, and approved July 26, 1867, are hereby extended and shall fully apply to this act; and all parts of acts heretofore passed which are inconsistent with this act are hereby repealed.

SEC. 5. In addition to the penalties provided in section three, any justice of the peace for the county in which such pound, weir, set-net, or other fixed or permanent contrivance has been so set up, used, or continued, or where any persons shall violate any of the laws of this State by fishing at such times as are prohibited by law, is hereby authorized and directed, upon the written request of any fish commissioner or fish warden, to issue his warrant commanding the sheriff, constable, or any other proper person or persons in such warrant named, to cause the same to be seized forthwith, together with all the parts thereof, and all nets, seines, boats, oars, sails, tackle, ropes, and other articles employed therewith, or used in violation of the laws of this State as aforesaid, and to be removed and sold at public auction to the highest bidder, and, after paying out of the proceeds of such sale all the expenses of such seizure, removal, and sale, to deposit what remains in the treasury of the State. The provisions of this act shall not apply to any pounds set for the purpose of catching white fish between the eastern boundary of the town of Clinton and Pond Point, in the town of Milford.

SEC. 6. All acts or parts of acts inconsistent herewith are hereby repealed.

Approved July 24, 1871.

mitting, however, that the use of nets of certain kinds has done a great part, or even the whole, of the mischief complained of, it was a matter worthy of serious inquiry whether so positive a measure as absolute prohibition was expedient or necessary, and whether by limiting the time during which the use of nets is allowed, the interests of both parties may not be reconciled, by giving to the fish the opportunity of spawning undisturbed, and also by regulating the size of the mesh, so as to catch only the oldest and largest fish. All this, however, was only to be ascertained by a careful study of the habits of the fish, so as to determine the nature of their food, the growth of their spawn, and other circumstances bearing upon the solution of the problem in question.

The following bill for this purpose was therefore introduced into the House of Representatives by the Hon. H. L. Dawes, and became a law on the 9th of February, 1871:

[RESOLUTION OF GENERAL NATURE—No. 8.]

JOINT RESOLUTION for the protection and preservation of the food-fishes of the coast of the United States.

Whereas it is asserted that the most valuable food-fishes of the coast and the lakes of the United States are rapidly diminishing in number, to the public injury, and so as materially to affect the interests of trade and commerce: Therefore,

Be it resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the President be, and he hereby is, authorized and required to appoint, by and with the advice and consent of the Senate, from among the civil officers or employés of the Government, one person of proved scientific and practical acquaintance with the fishes of the coast, to be commissioner of fish and fisheries, to serve without additional salary.

SEC. 2. *And be it further resolved,* That it shall be the duty of said commissioner to prosecute investigations and inquiries on the subject, with the view of ascertaining whether any and what diminution in the number of the food-fishes of the coast and the lakes of the United States has taken place; and, if so, to what causes the same is due; and also whether any and what protective, prohibitory, or precautionary measures should be adopted in the premises; and to report upon the same to Congress.

SEC. 3. *And be it further resolved,* That the heads of the Executive Departments be, and they are hereby, directed to cause to be rendered all necessary and practicable aid to the said commissioner in the prosecution of the investigations and inquiries aforesaid.

SEC. 4. *And be it further resolved,* That it shall be lawful for said commissioner to take, or cause to be taken, at all times, in the waters of the sea-coast of the United States, where the tide ebbs and flows, and also in the waters of the lakes, such fish or specimens thereof as may in his judgment, from time to time, be needful or proper for the conduct of his duties as aforesaid, any law, custom, or usage of any State to the contrary notwithstanding.

Approved February 9, 1871.

As passed, the resolution provided for the extension of the inquiry to the lakes, at the instance of some of the western members, who desired that the subject of the diminution in the supply of white-fish and other species in the western waters should be investigated.

To carry out the provisions of the law, an appropriation was made by Congress to meet the necessary expenses of the investigation, and the

position of commissioner (without salary) having been tendered by the President, I accepted it, with the determination of giving to the inquiry as much consideration as the time at my disposal would permit; and, receiving the necessary leave of absence from Professor Henry, the secretary of the Smithsonian Institution, I proceeded to Vineyard Sound early in June, 1871, as it was in that region that the alleged decrease was most clearly manifested, and established my headquarters at Wood's Hole, a village on the coast about eighteen miles from New Bedford, and directly opposite Holmes's Hole, (now Vineyard Haven.) From this center I could readily reach all such points on the adjacent coast, as were most likely to furnish important facts bearing on the question. About the same time Mr. J. W. Milner, of Waukegan, Illinois, a gentleman of scientific training and ability, proceeded to Lake Michigan and spent the entire summer and autumn in prosecuting his labors in reference to the fisheries of the lakes, the results of which will be presented hereafter.

The provision of the law directing the executive officers of the Government to render all the aid in their power to the required investigations was found to be of great value. By the direction of the Secretary of the Treasury, and through the courtesy of Mr. J. A. P. Allen, collector of customs at New Bedford, I was enabled to obtain the use of the small yacht Mazeppa, belonging to the New Bedford custom-house, as well as the services of the captain of the vessel, John B. Smith, esq., then janitor of the custom-house. A substitute in the way of a boat and captain was, however, furnished to the custom-house from the appropriation for the inquiry. The Treasury Department also instructed the collector of customs at Newport to detail the revenue-cutter Moccasin, belonging to that station, and in command of Captain J. G. Baker, for use in my investigation whenever her services were not required in any other direction. The Light-House Board granted the occupation of some vacant buildings and of the wharf connected with their buoy-station at Wood's Hole; and the Secretary of the Navy placed at my command for the summer a small steam-launch, belonging to the navy-yard at Boston, and gave me the use of a large number of condemned powder-tanks, which served an excellent purpose in the preservation of specimens. I am also indebted to Professor Henry for permission to use the extensive collection of apparatus belonging to the Smithsonian Institution in the way of nets, dredges, tanks, &c., and thus saving the considerable outlay which would otherwise have been necessary.

Due use was made, in the course of the summer, of all the facilities in question, and I beg leave here to express my acknowledgments to the Treasury and Navy Departments; as also, among many others, to Captain Macy, of the Newport custom-house; to Captain J. G. Baker and officers of the Moccasin; Mr. J. A. P. Allen, collector of customs, New Bedford; to Captain John B. Smith, of the Mazeppa; to Captain Edwards, of the light-house buoy establishment at Wood's Hole; as also to various other gentlemen whose names appear in the report.

CHARACTER AND PROGRESS OF THE INVESTIGATION.

The plan adopted for the inquiry was determined upon after careful deliberation. The great contrariety of opinion developed in the State investigations as to what should have been the best-known facts in the life-history of the fishes and their associates in the sea, made it necessary to study the natural history of these species as thoroughly as possible, so as to have a more complete knowledge of the facts, and consequently better means of arriving at satisfactory conclusions. Works already published upon American fishes proved to contain comparatively little of value as to the biography of the coast species; and the evidence of fishermen and others, whose judgment ought to be reliable, was found to be entirely contradictory and unserviceable. A systematic plan of inquiry was therefore drawn up, with the assistance of Professor Gill, embracing the points in the history of the fishes information relative to which was desirable, and a series of questions was devised, (see page 1,) answers to which, if satisfactory and complete, would leave little room for future inquiry. These were printed for the purpose of giving them a wide circulation, and include queries in reference to the local names of each kind of fish, its geographical distribution, its abundance at different periods of the year and in different seasons, its size, its migrations and movements, its relationship to its fellows or to other species, its food, and its peculiarities of reproduction; also questions relative to artificial culture, to protection, diseases, parasites, mode of capture, and economical value and application—eighty-eight questions in all, covering the entire ground.

As the history of the fishes themselves would not be complete without a thorough knowledge of their associates in the sea, especially such as prey upon them or in turn constitute their food, it was considered necessary to prosecute searching inquiries on these points, especially as one supposed cause of the diminution of the fishes was the alleged decrease or displacement of the objects upon which they subsist.

Furthermore, it was thought likely that peculiarities in the temperature of the water at different depths, its chemical constitution, the percentage of carbonic-acid gas and of ordinary air, its currents, &c., might all bear an important part in the general sum of influences upon the fisheries; and the inquiry, therefore, ultimately resolved itself into an investigation of the chemical and physical character of the water, and of the natural history of its inhabitants, whether animal or vegetable. It was considered expedient to omit nothing, however trivial or obscure, that might tend to throw light upon the subject of inquiry, especially as without such exhaustive investigation it would be impossible to determine what were the agencies which exercised the predominant influences upon the economy of the fisheries.

As already stated, the preliminary arrangements having been made, and the necessary leave of absence granted by Professor Henry, I left

Washington and established myself at Wood's Hole, where shortly after my arrival I was joined by Mr. S. J. Smith and by Professor A. E. Verrill, of Yale College, who had kindly undertaken to conduct the inquiries into the invertebrate fauna of the waters. With the facilities in the way of steamers and boats already referred to, I repeatedly visited in person the entire coast from Hyannis, Massachusetts, to Newport, Rhode Island, as well as the whole of Buzzard's Bay, Nantucket, Martha's Vineyard, &c., and in addition to making collections and investigations, I secured the testimony of a large number of persons who were interested in the inquiry; among whom were nearly all the leading fishermen, both line-men and trappers, as well as those who had been dealers in fish and engaged in supplying the markets of New York and Boston for many years. Many of these persons eagerly embraced the opportunity to tell their story of alleged wrongs, to urge various methods for their redress, or else to claim the possession of certain inherent rights which it were rank injustice to deprive them of. A verbatim report of this testimony was made by Mr. Henry E. Rockwell, an accomplished phonographer, and has been printed in part, beginning on page 7.

I also made the acquaintance of several gentlemen of literary ability and research, who had previously given much attention to the various questions connected with the fisheries, and who had in a measure become champions of the opposing sides, and obtained from them elaborate arguments on the subject. That of Mr. J. M. K. Southwick, of Newport, in behalf of the traps and pounds, will be found on page 76, and of Mr. George H. Palmer, of New Bedford, and Mr. J. Talbot Pitman, of Providence, as opposed to their continuance and in the interest of the line-fishermen, on pages 88 and 196.

Many important facts were thus elicited by means of the inquiries and testimony referred to, suggesting hints for personal examination to be subsequently prosecuted. Nearly all the fish pounds and traps along the coast, some thirty in number, were visited, and their location and character determined. These have been designated on a map of Massachusetts and Rhode Island, which accompanies the present report.

The large number of pounds in the vicinity of Wood's Hole rendered it an easy matter to obtain material for investigation; and the opportunity was embraced for determining more satisfactorily, from the contents of the stomachs of the different kinds of fish captured, the precise nature of their food. For the facilities in the way of specimens furnished by the proprietors of these pounds, always readily given, I beg to render my acknowledgments; especially to Captain Isaiah Spindel, at Wood's Hole; to Captain Rogers & Brothers, at Quissett; to Captain Peter Davis, at Ram's Head; to Captain Jason Luce & Co., at Menemsha Bight; to Captain Phinney, at Waquoit, and to others.

In addition to the material secured by thus sedulously visiting the pounds and other localities for the objects mentioned, seines and nets of different kinds were set or drawn almost every day, for the pur-

pose of ascertaining facts connected with the spawning of the fish, the rate of growth of the young, the localities preferred by them, &c. Professor Verrill and his parties wese engaged also throughout the summer in making collections along the shores at low tide, as also in the constant use of the dredge and the towing-net.

One important question connected with this investigation, in addition to determining the character of the food available for the fishes, was to ascertain its comparative abundance, a great diminution or failure of such food having been alleged as one cause of the decrease of the fisheries. Care was therefore taken to mark out the position and extent of different beds of mussels, worms, star-fishes, &c., at the sea-bottom, and by straining the water at various depths and at the surface, to ascertain the amount of animal life therein. Temperature observations were also repeatedly taken and recorded, especially from the revenue-cutter Moccasin, under command of Captain Baker.

Having ample facilities at hand for making zoological collections, the opportunity was embraced to secure large series, not only for the national museum at Washington, but also for other establishments; and a sufficient quantity was gathered to supply sets (as soon as they can be fully elaborated) to the various colleges and other public institutions throughout the country. Large numbers of fishes, especially of the more showy kinds, such as sharks, skates, rays, &c., in which the waters abound, were secured for a similar purpose, and a partial distribution to colleges and societies has already been made of the duplicates of this portion of the collections. The occasion was also embraced by several gentlemen to make special collections for establishments with which they were connected. Among them we may mention more particularly Professor Jenks, in behalf of Brown University; Professor Hyatt, for the Boston Society of Natural History; Professors Smith and Verrill, for Yale College; Professor Todd, for Tabor College, Iowa; Doctor Farlow, for the Botanic Garden at Cambridge, &c. Facilities for such enterprises were always gladly furnished.

With a view of exhibiting the character of the fishes of the region explored, and determining their rate of growth, an experienced photographer accompanied the party, who, in the course of the summer, made over two hundred large negatives of the species in their different stages of development, at successive intervals throughout the season. These constitute a series of illustrations of fishes entirely unequaled; forming an admirable basis for a systematic work upon the food-fishes of the United States, should authority be obtained to prepare and publish it.

Among gentlemen interested in science who visited Wood's Hole during the summer for a greater or less period of time, either with special reference to co-operation in the work of the commission, or on account of the interest experienced in such investigations, may be mentioned Professor L. Agassiz, of Cambridge; Professor J. W. P. Jenks, of Brown University; Professors Verrill, Smith, D. C. Eaton, William D. Whitney,

William H. Brewer, and Mr. Thatcher, of Yale College; Professor Hyatt and Dr. Thomas M. Brewer, of Boston; Dr. W. G. Farlow, of Cambridge; Professor Theodore Gill and Dr. Edward Palmer, of Washington; Colonel Theodore Lyman, Massachusetts commissioner of fisheries; Mr. Gwyn Jeffries, of England; Mr. J. Hammond Trumbull, of Hartford; Professor Todd, of Mount Tabor, Iowa; Professor O. C. Thompson, of the Technical Institute, Worcester, and several others.

As already mentioned, my own stay on the coast of Wood's Hole extended until the early part of October; and, on my departure, I commissioned Mr. Vinal N. Edwards, of that place, to continue the investigation as far as possible, by collecting facts in regard to the more important species, and especially as to the time of their leaving the shores. This he performed with great fidelity, besides securing valuable specimens of rare fishes and transmitting them to Washington.

An interesting result of the labors at Wood's Hole, during the summer of 1871, consisted in the great variety of fishes obtained through the pounds and otherwise, many of them of kinds previously unknown on the New England coast. The total number actually secured and photographed amounted to one hundred and six species, of which twenty or more are not included in the great work of Dr. Storer on the fishes of Massachusetts. Nine species are mentioned by various others as found in the waters of Vineyard Sound, but which were not secured; making one hundred and fifteen in all now known to belong to that fauna.

Among the more interesting novelties observed in the way of fishes was a species of tunny, a kind of small horse-mackerel, (the *Orcynus thunnina*,) a species weighing about twenty pounds, and which, although well known in the Mediterranean and in the warmer part of the Atlantic, had never been recorded as taken on the American coast. This fish proved to be quite common, not less than five hundred having been taken in the fish-pounds at Menemsha Bight alone. Two species of the sword-fish family, never noted before in the United States, were also captured. A complete list of the fishes taken, appended to this report, will elucidate more clearly the richness of the locality.

The variety of other marine animals secured was also unexpectedly large. Most of these will be referred to in the appendix, in the form of a paper by Professor Verrill. A list of the algæ, furnished by Dr. W. G. Farlow, of Cambridge, will also be found therein.

After completing my field labors for the season of 1871, I had a conference in Boston with Mr. Theodore Lyman, fish commissioner of Massachusetts, and Mr. Alfred Read, commissioner of Rhode Island, together with Mr. Samuel Powel, of Newport, when the results of the season were discussed, and the draught of a fishery bill presented, which was proposed for adoption by the States of Massachusetts and Rhode Island. The deliberations and discussions of this meeting will be found on page 125.

Simultaneously with the inquiries prosecuted during the summer of 1871, by myself and companions, a careful study was made of the food-fishes found off the coast of North Carolina, by Dr. H. C. Yarrow, acting assistant surgeon United States Army, stationed at Fort Macon. The value of the services of this gentleman in the collection of facts and statistics of the fisheries, and in adding to our knowledge of the natural history of the species, as well as in making collections of specimens, can scarcely be overestimated. The conclusions arrived at by this gentleman and his notes upon the specimens will be found embodied in the report.

During the summer and autumn of 1871, Mr. J. W. Milner, deputy commissioner for the great lakes, made the complete circuit of Lake Michigan, visiting every pound and gill-net station, and collecting a most important body of information and material. This will be made the subject of a special report, as soon as the data collected in 1872 can be properly arranged.

GENERAL RESULTS OF THE INVESTIGATION.

Having thus given an account of the circumstances which led to this inquiry, of the method of research adopted, and of the steps taken to carry out the programme, I now proceed to discuss, in a general way, the results obtained by the investigation, premising, however, that this is but the fruit of two seasons, and requires to be revised by a careful comparison of results for several successive years. Enough, however, has been determined to furnish a general indication in regard to habits of the fishes, and of the methods most likely to accomplish the object of their restoration to their original condition.

As already stated, the objects of the investigation, as authorized by Congress, were, first, to determine the facts as to the alleged decrease of the food-fishes; secondly, if such a decrease be capable of substantiation to ascertain the causes of the same; and, thirdly, to suggest methods for the restoration of the supply. A fourth object incidental to the rest was to work out the problems connected with the physical character of the seas adjacent to the fishing localities, and the natural history of the inhabitants of the water, whether vertebrate or invertebrate, and the associated vegetable life; as also to make copious and exhaustive collections of specimens, for the purpose of enriching the national museum at Washington, and of furnishing duplicates for distribution in series to such suitable collegiate and other cabinets as might be recommended for the purpose.

This research into the general natural history of the waters was considered legitimate, as, without a thorough knowledge of the subject, it would be impossible to determine, with precision, the causes affecting the abundance of animal life in the sea and the methods for regulating it; and the record of these facts, accompanied by proper illustrative figures, it was believed would be a very acceptable contribution to the

cause of popular education, and supply a want which has long been felt in this country.

As the direct operations of the commission required the use of extensive and complicated apparatus, the additional cost of securing specimens enough for the principal cabinets was found to be trifling, and the opportunity for enriching them with material usually so difficult of acquisition it was thought should by no means be lost.

Nearly all enlightened nations have devoted much time to the investigation of precisely such subjects, the German government, in particular, having now in progress, under the direction of the National Fishery Association, an exhaustive examination of all its shores and the adjacent waters, believing that, by a thorough investigation, *a priori* in this direction, the various problems in reference to the culture and protection of fish, oysters, lobsters, crabs, and the like, could be more readily settled.

I. DECREASE OF THE FISH.—Bearing in mind that the present report has more particular reference to the south side of New England, and especially to that portion of it extending from Point Judith on the west to Monomoy Point on the east, including Narragansett Bay, Vineyard Sound, Buzzard's Bay, Martha's Vineyard, and Nantucket, I have no hesitation in stating that the fact of an alarming decrease of the shore-fisheries has been thoroughly established by my own investigations, as well as by evidence of those whose testimony was taken upon the subject.

Comparatively a few years ago this region was perhaps the scene of the most important summer fishery on our coast, the number of southern or deep-sea species resorting to its shoal bays and inlets to deposit their eggs being almost incredible. The testimony of the earliest writers, as well as that given by witnesses examined, and set forth in the appendix to the present report, as to the abundance of the fish, is believed to be by no means exaggerated; and even within the memory of persons now living, the mass of animal life was exceedingly great. The most important of the fish referred to were the scup, the tautog or black-fish, the striped-bass, and the sea-bass, in addition to which there were species of less importance, although equally edible, such as the sheep's-head, the king-fish, the weak-fish, &c.

The appearance of these fish was very regular, and their arrival upon the shore could be calculated upon with almost the same precision as the return of migratory birds; varying only, year by year, with special conditions of temperature and oceanic currents. Other species, more capricious in their appearance, and belonging essentially to the division of outside fishes, were the mackerel, the blue-fish, the Spanish mackerel, the bonito, &c. The alewife, or gaspereaux, and the shad were also included; as likewise the salmon, at an earlier period, although this fish was exterminated at a comparatively early period. (See page 149 *et seq.*)

In view of the facts adduced in reference to the shore-fishes, there can be no hesitation in accepting the statement that there has been an enormous diminution in their number, although this had already occurred to a considerable degree with some species by the beginning of the present century. The evidence of the fishermen, however, and of others familiar with the subject, as published in the present report, goes to prove that the decrease has continued in an alarmingly rapid ratio during the last fifteen or twenty years, or even less; and I can state of my own personal observation that localities in Vineyard Sound where nine years ago an abundance of scup, tautog, sea-bass, &c., especially the former, could be caught, do not now yield one-tenth part of the weight of fish, in the same time and at the same season. As the decrease is most strongly marked in the case of the scup, I refer for the details to the chapter on that fish, (page 228.)

We may also refer to the testimony of the Rhode Island committee, on page 104, in reference to the increase of the cost of living on the coast of that State, in consequence of the diminution of the fisheries. "One very intelligent man thought it made $100 difference in the cost of living to those persons living on the shore and in the small towns on the bay, and, from his own experience, he had no doubt that there are one thousand persons living near the shore to whom it made this difference, amounting to a loss to them of $100,000 each year, that of the high price of fish in Providence market not being taken into account." (Page 105.)

The condition of things referred to is, perhaps, not felt uniformly over the entire coast, but in certain regions the complaint in regard to it is universal; and it will be our object to make inquiry hereafter as to the real causes of the evil.

Many persons are in the habit of considering that the fish supply of the sea is practically inexhaustible; and, therefore, that a scarcity of any particular location is to be referred rather to the movements of the fish, in changing their feeding-grounds capriciously, or else in following the migration, from place to place, of the food upon which they live. This may be true to a certain extent, as we shall hereafter show, but it is difficult to point out any locality where, near the shores in the New England States, at least, under the most favorable view of the case, the fish are quite as plentiful as they were some years ago; and still more so where, by their overlapping the original colonists of the sea-bottom, they tend to render the abundance appreciably greater than usual. And, furthermore, if the scarcity of the fish be due to their going off into the deep waters of the ocean, it is, of course, of very little moment to the fisherman that they are as abundant in the sea as ever, if they do not come upon such grounds as will permit their being taken by his lines or nets.

It is by no means to be inferred from our remarks as to the scarcity of fish that fewer are actually caught now than formerly at any time;

the contrary, perhaps, being the case, since by means of the improved methods of capture, in the way of pounds and nets, an immense supply is taken out at certain seasons of the year so as frequently to glut the markets. The scarcity referred to is better shown by the great difficulty experienced by line-fishermen in securing a proper supply throughout the year on grounds where they were formerly able to catch all they needed for their own use and for sale.*

The evil effects of the state of things here indicated, are felt in many ways. Primarily on the part of many fishermen, resident on the coast, who have been in the habit of making a living by the proceeds of their occupation, not only supplying themselves with food, fresh and salt, for the year, but also making a comfortable living by sales of their surplus. At the present time this resource is cut off to a great degree from this class of people in many places on the Massachusetts coast, where, as on Nantucket, Martha's Vineyard, and elsewhere, the deprivation from the loss of profits by fishing is being most seriously felt. The result, of course, of the inability to make a living in this manner is to drive the line-fishermen to other occupations, and especially to induce them to leave the State for other fields of industry. In consequence the population is reduced, and the community feels this drain of some of its best material in many ways. Furthermore, property depreciates in value, farms and houses are abandoned, the average of taxation is increased, and many other evils, readily suggesting themselves, are developed.

Again, an important stimulus to the building of ships and boats is lost in the decreasing demand for vessels of various grades; and, what is more important to the country at large, the training of skilled seamen with which to supply our national and our merchant marine generally is stopped, or more or less interfered with. It is well known that the line-fisheries, in their different manifestations, have always been looked upon as of the utmost importance in a politico-economical point of view, for which reason bounties were paid by the General Government; and, although these have been lately withheld, it may yet be necessary to restore them in order to regain our lost ground.

II. CAUSES OF THE DECREASE.—As the testimony and considerations already adduced may justly be considered as establishing the fact of the vast decrease in the extent and value of the summer shore-fisheries on the south side of Massachusetts and Rhode Island, the question recurs

*In the article on scup in the body of the report (p. 228) will be found a detailed account of the occurrence of the young fish, to an enormous extent, in the spring of 1871, and the speculations as to their origin. These reappeared in 1872, though in much less numbers, as two-year-old fish, and by autumn weighed from one-third to half a pound, and will doubtless be met with again in 1873 as marketable fish. There is, however, no evidence to show that a renewed supply of young fish, or at least in anything like the same numbers, was present in 1872; which tends to render the problem of their appearence still more difficult of solution.

as to the causes which have led to this result. These, as commonly given, are principally the following:

1. The decrease or disappearance of the food upon which the fish subsist, necessitating their departure to other localities.

2. A change of location, either entirely capricious or induced by the necessity of looking for food elsewhere, as just referred to.

3. Epidemic diseases, or peculiar atmospheric agencies, such as heat, cold, &c.

4. Destruction by other fishes.

5. The agency of man; this being manifested either in the pollution of the water by the discharge into it of the refuse of manufactories, &c., or by excessive overfishing, or the use of improper apparatus.

These we will now proceed to discuss briefly in their order, beginning with, first, *disappearance of the food.*

To this subject special attention was given in the course of the investigations of 1871 and 1872, as the suggestion was quite plausible, and by many was believed to be of great weight. The dredging operations under Professors Verrill and Smith, were admirably calculated to test this question, as the sea-bottom was raked in every direction by the dredges; and the towing and drifting nets revealed the extent and comparative abundance of animal life in the surface-water or throughout its depths.

Fortunately for the proper solution of this question, an extensive series of dredging operations had been conducted by myself in the waters in the vicinity of Wood's Hole, as long ago as 1863, when the diminution in the abundance of the fishes had not made itself so palpable. As a general result, it may be said that, so far from there being any scarcity of invertebrate life in the waters during the summer of 1871, as compared with earlier years, its actual amount was such as to strike with astonishment every one in our party engaged in the inquiry. The dredge was never brought up from scraping the bottom without being filled with worms, star-fishes, sea-urchins, shells, &c. The location of numerous mussel-beds, of acres in extent, was established; the towing-net would become almost filled, in a short time, with embryos of crabs, worms, ascidians, &c., and, on several occasions, in dredging off the coast, to a distance of twenty or thirty miles, the water was found to be so thick with animal life that a bucket of water drawn up would contain hundreds of specimens, the sea indeed appearing like a thick mush of organisms. If any difference were appreciable between the seasons of 1863 and that of 1871, it was in favor of the latter, possibly, indeed, because of the much less number of fishes calculated to reduce the mass. The validity, therefore, of the assumption of a diminution of food may be denied in the most positive terms.

The second alleged cause, *that of change of abode on the part of the fishes*, has also received proper consideration; but the most careful inquiry failed to reveal any locality or localities along the coast where

these fishes were to be found in an increased abundance, such as would result from the overlapping of the normal supply of any part of the coast by that from a different region. The fish were certainly not displaced in an easterly direction; and to the west of Narragansett Bay their numbers, though perhaps not diminished to the same extent as east of it, were decidedly less than formerly.

Thirdly, disease or atmospheric agencies.—The question of epidemic diseases among fishes is sometimes suggested by finding large numbers coming ashore, at times with and at others without any assignable cause. Occasionally this may be referred to volcanic exhalations, which charge the water with sulphuretted hydrogen gas or other noxious substances, and thus produce death. Where no positive cause can be indicated, the occurrence of some form of disease is frequently assigned as the reason. It is stated, for instance, that in the last century the blue-fish about Nantucket, then in great abundance and of enormous size, so large indeed that thirty of them would fill a flour-barrel, were attacked by a disease which destroyed them in large numbers; and that the Indians of the island were nearly exterminated at the same time, either by sharing in a common attack, or by eating the diseased fish. In the course of time the blue-fish again returned to the Nantucket waters, although of much smaller size than formerly represented; but the Indians never recovered their ground, their number being now extremely limited.

The agency of cold is also given as producing occasionally great mortality, especially among the tautog. A very cold spell, occurring at low tide some years ago, is said to have killed the tautog in such numbers that hundreds of tons were thrown ashore at Block Island and along the southern shores of Rhode Island and Massachusetts. This fact appears to be well attested, and, in all probability, may have had a decided influence, and similar facts, though on a much smaller scale, have been adduced in reference to the young scup in the late autumn, but this cannot have material influence on the number of old scup, as may be the case with the striped bass and tautog, both of which are known to be winter residents of these shores. Similar facts have been observed even as far south as the Gulf of Mexico, where the occurrence of a "norther" not unfrequently produces more or less mortality by chilling the water.

The *fourth* cause of decrease, as alleged, namely, *the ravages of predaceous fishes*, I am quite satisfied is one worthy of serious consideration, the principal offender in this respect being the blue-fish. No one who has spent a season on the coast, where this fish abounds, can fail to have been struck with its enormous voracity, and the amount of destructiveness which it causes among other kinds of fish. Wherever it appears in large numbers it is sure to produce a marked effect upon the supply of other fishes, either by driving them away from their accustomed haunts or by destroying them in large quantities in any

given locality. Ample evidence to this effect will be found in the testimony presented in the present report, as well as in the article on the blue-fish, (page 235.) As there stated, it is a pelagic or wandering fish, going in immense schools, and characterized by a voracity and bloodthirstiness which, perhaps, has no parallel in the animal kingdom.

The fish seems to live only to destroy, and is constantly employed in pursuing and chopping up whatever it can master. As some one has said, it is an animated chopping-machine. Sometimes among a school of herring or menhaden thousands of blue-fish will be seen, biting off the tail of one and then another, destroying ten times as many fish as they really need for food, and leaving in their track the surface of the water covered with the blood and fragments of the mangled fish.

The blue-fish range in size, when two years of age and over, from five to twelve pounds. I ascertained by a careful inquiry into the number shipped by the dealers along the shore that about a million and a quarter could be estimated as the number captured along through Vineyard Sound and on the coast from Monomoy Point through Long Island Sound and sent to market in 1871. Any one who has seen these fish will judge that not one in a hundred is taken. If, now, we admit the presence of 100,000,000 blue-fish in these waters referred to, we may form some estimate of the number of fish destroyed by them. To estimate twenty per day as the number destroyed, if not devoured, by each blue-fish, is by no means extravagant, when we bear in mind the result of my own examinations and the testimony of others.

We all know that fish-spawn and fish in different stages of growth constitute the principal source of food to other fishes in the sea, and that the great proportion of fishes devoured are of tender age. The blue-fish, however, will often attack species but little less than itself, and the 100,000,000 referred to probably destroy fishes of two or three ounces and upward; that is to say, those that have passed the ordinary perils of early life, and have a fair chance to reach maturity. Therefore, if 12,000,000,000 are eaten, the number destroyed off the New England coast in a season of one hundred and twenty to one hundred and fifty days can be easily estimated.

No other sea-coast than that of the Atlantic border of the United States can show, as far as our information extends, so destructive a scourge as the blue-fish, occurring in such numbers, of so large a size, and of so massive a frame; able to cope with and mutilate, if not devour, any other fish of less size. Indeed, I am quite inclined to assign to the blue-fish the very first position among the injurious influences that have affected the supply of fishes on the coast. Yet, with all this destruction by the blue-fish, it is probable that there would not have been so great a decrease of fish as at present but for the concurrent action of man, as we shall endeavor to show farther on.

Under the *fifth* head, that of *human agencies*, we may consider first the question of the pollution of the water by poisonous agencies.

These may consist, as already stated, of chemical substances, which exert a directly poisonous influence, or of mechanical objects, such as sawdust, which, it is said, gets into the gills of fishes, and ultimately causes their death, or, falling to the bottom, with edgings, bark, &c., covers up the gravel and destroys the natural spawning-beds, and thus prevents the development of the eggs.

These causes, however, apply essentially to rivers, and their injurious action in such cases has frequently been substantiated, and has invoked, in many instances, legislative interference. They exercise very little influence, however, in regard to the fishes of the sea. The testimony before the Rhode Island legislature would tend to show that, in the immediate vicinity of factories on the Narragansett Bay and its tributaries, many of the smaller varieties of fish were as abundant as ever, and that, even in the vicinity of gas-works, the discharge from which, as containing creosote and other substances, might be expected to produce a very injurious effect, the only result was the imparting of an unpleasant, tar-like taste to oysters and other mollusks that occurred in the neighborhood. It is by no means impossible that some fish might be driven away from the vicinity of the discharge of such an establishment; but that any marked effect could be produced on a large scale is not to be admitted.

Whatever the condition of things may be in Narragansett Bay, we know that none of the agencies alluded to exist, to any considerable extent, along other portions of the New England coast, where the fact of a similar scarcity of fish has been equally established.

We come, therefore, to the question of improper or excessive fishing. The capture of the sea-fishes by man is usually prosecuted either by the hook and line or by means of nets or weirs. Nets for the capture of fish may be divided into those which are movable and those which are fixed. Among the movable we may mention the seine, which incloses the fish in bodies, and either hauls them to the shore or gathers them in the open water, and the gill-net, in which the heads of the swimming fish pass partly through the meshes of the net, by which, in their effort to withdraw, they are held securely. These gill-nets may be either fixed or floating; if the latter, they are called "drifting nets."

The apparatus for capture by fixed nets have various names and modes of operation, as "traps," "pounds," "weirs," "fykes," &c. The trap is an apparatus peculiar to the Narragansett Bay, and consists of an oblong inclosure of netting on three sides and at the bottom, anchored securely by the side of a channel. Into this the fish enter, and the bottom of the net being lifted to the surface at the open end, the fish are penned in and driven into a lateral inclosure, where they are kept until needed. A net of this character requires constant attention, as the fish, after making the circuit of the trap, can readily pass out, unless prevented. On page 10, in Mr. Southwick's testimony, will be found a

figure and diagram illustrating the construction of these two forms of apparatus, as also in the special article on modes of capturing fish.

The pounds and weirs are adapted not only for taking, but many of them for retaining, the fish until it is convenient to remove them, needing no watching to prevent their escape. These are of various construction, depending upon the depth of the water, the tide, the nature of the shore, the kind of fish to be taken, &c. The most common form on the south side of New England consists of a fence of netting, extending from the shore, and nearly perpendicular to it, for a distance of 50 or 100 fathoms or more, as the circumstances may require. The outer end of this straight fence or wall is carried into a heart-shaped fence of netting, the apex of which is connected with a circular "bowl" of net-work, the bottom of which lies upon the ground, at a depth of 20 to 30 feet. The fish, in their movement along the coast, first strike against the fence of netting and are directed outward, following the fence or "leader" along until they reach the end, which, of course, brings them within the "heart." Here they wander around for a time, their only easy avenue for escape being through the apex into the "bowl," and in which when entered they continually circle about without ever finding the outlet. It is a peculiarity of fishes in their movements, especially when in schools, that they do not turn a sharp corner, but move around in curves; and the nets in question are so arranged that the curves they are likely to take never bring them toward an avenue of escape, but rather tend to conduct them farther within.

The "weirs" differ from the "pounds" principally in being constructed, in whole or in part, of brush or of narrow boards, with or without netting; and they are sometimes so arranged that at low tide a sand-bar cuts off the escape of the fish, leaving them in a basin inside, allowing them to be taken at any time before a certain stage of rise of the next tide. The variety of these modes of capture is very great, and I have given in the appendix a description of the forms best known, accompanied by the figures necessary for their illustration, and to these would refer for further information.*

*On the map accompanying this report I have marked the traps and pounds in operation in 1871, on the south side of New England, east of Point Judith, as far as I was able to ascertain their existence. Information concerning those in Rhode Island was furnished by J. M. K. Southwick. Notices of those farther east were, for the most part, supplied by Captain Edwards, supplemented by my own observations. To Captain Prince Crowell I am indebted for a list of the weirs in Cape Cod Bay, represented on a separate map. I also give a separate sketch of Seaconnet Point, showing the peculiarities of arrangement of the traps in that region.

According to Mr. Southwick, there were in Narragansett Bay, in 1871, twenty pound or heart nets, of which the map represents eight on Conanicut Island, and eight on Rhode Island. There were sixteen traps—seven on Rhode Island and nine at Seaconnet Point. Seven of the latter indeed are double, each counting as two, making twenty-three, or a total of forty-three. But few of these were fished after the middle of June.

In Buzzard's Bay and on the Elizabeth Islands the pounds were as follows: One at

The propriety of authorizing the erection of weirs and pounds occupied the attention of the Canadian authorities a number of years ago, and, in consequence of the results of special inquiries, and the general impression on the part of the fishermen and others interested, the use of weirs and traps was forbidden in certain portions of the Dominion, as in the vicinity of Miramichi, and they were placed under close restriction in other localities. The amount of offal usually thrown into the water in the vicinity of the herring-weirs was supposed to have an injurious effect in driving away schools of herring; and a marked decrease in the shad-fishery of the Bay of Fundy and the Gulf of Saint Lawrence was ascribed to the action of the weirs in entrapping the young fish and causing them to perish in immense numbers. In the appendix to the present report I give the testimony of various English writers in regard to the necessity of protecting the fisheries by restricting the time of capture and the nature of the apparatus. Among these Bertram is very outspoken in his views, taking direct grounds against the report of the British commission, consisting of Professor Huxley and his associates.

As I have already remarked, the ordinary brush-weir arrangements, as used on the coast of Great Britain, are not calculated to produce very serious effects, owing to the fact that it is only species coming into comparatively shallow water that are captured in them; and there is abundant opportunity for the fish to escape from their toils, unless attended to immediately. I am, however, inclined to think that with the introduction of the improved American methods of traps and pounds

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Clark's Cove; three on Sconticut Neck; one at West Island, near New Bedford; one at Mattapoisett; one at West Falmouth; two at Quissett Harbor; two on Long Neck, near the guano-works of Wood's Hole; one at Hadley Harbor, two at Ram's Head, one at Robinson Hole, Naushon; five in Menemsha Bight; two at Tisbury, five at Lombard's Cove, two in Holmes's Hole, one west of West Chop, Martha's Vineyard; one at Falmouth; one at Waquoit, and one at Coltuit, on Vineyard Sound; or a total of thirty-five recorded, besides others probably omitted. Of these the greater number were kept down only to about the middle of June. Among those known to have been worked till late in the season were at least two near New Bedford; two at Quissett; one at Wood's Hole; two on Naushon; four on Martha's Vineyard, and one at West Falmouth; twelve or more.

I am informed that the number of pounds and traps in Narragansett Bay, in operation in 1872, was about the same as in 1871, but that there was a considerable increase to the eastward. Then there were four more at Menemsha Bight; one at Lombard's Cove; one at Paintville, Martha's Vineyard; two or more at Kettle Cove, Naushon, and one on the north side of Narhawena, an addition of at least nine to the thirty-five previously enumerated. More would doubtless have been erected if suitable locations could have been found.

According to the chart furnished by Captain Crowell there were fifteen weirs in Cape Cod Bay in 1871, extending from Barnstable to Wellfleet.

It is very probable that I have not learned the situation of all the traps and pounds in Massachusetts waters, as Mr. Bassett, of New Bedford, in his testimony in 1872, stated that there were seven between New Bedford and Mishaum Point, of which I have only enumerated four.

into Great Britain, a very different verdict would be given as the result of thirty years' trial.

While the seines ensnare enormous quantities of certain kinds of fish, under especially favorable circumstances, the pounds and traps take them in still larger numbers, because they act without the direct agency of their owners, who can remain on shore during stormy weather, assured that the very disturbance of the sea will conduce to the greater extent of the catch. Thousands of barrels of fishes are frequently taken at a time, and I am myself cognizant of the capture of no less than 20,000 blue-fish, representing a weight of at least 100,000 pounds, in one weir, in the course of a single night. In the appendix will be found an account of captures effected at various weirs and pounds.

With this general explanation of the character of these potent engines, we may perhaps realize their bearing upon the question of the fisheries. As set in the waters of Rhode Island and Massachusetts, they are usually put down in the early spring and kept at work for six weeks, or even longer; not unfrequently throughout the whole summer, but are taken up before the autumnal storms occur, in order to prevent their destruction. The expense of a net-pound is very considerable, amounting to two and even three thousand dollars, while four men at least are required throughout the season to attend to one. They are usually in operation by the 1st of May, sometimes being set a little earlier and sometimes later, and they take generally more or less in the order specified the following more important kinds of fish:

Alewives, (*Pomolobus pseudo-harengus*, Gill.)
Horned dog-fish, (*Squalus americanus*, Gill.)
Tautog, (*Tautoga onitis*, Gthr.)
Mackerel, (*Scomber vernalis*, Mitch.)
Menhaden, (*Brevoortia menhaden*, Gill.)
Scup, (*Stenotomus argyrops*, Gill.)
Sea-bass, (*Centropristes furvus*, Gill.)
Blue-fish, (*Pomatomus saltatrix*, Gill.)
Squeteague, (*Cynoscion regalis*, Gill.)

By the middle of June the supplies of some of these fish decrease to such an extent that the traps and pounds are generally taken up for the season. Some of the pounds, however, are kept down throughout the summer, especially with the object of securing menhaden, blue-fish, Spanish mackerel, and squeteague, other fish being captured occasionally, but in inconsiderable amount.

It is noteworthy in this connection that, with the exception of dog-fish, mackerel, alewives, and menhaden, the edible fish taken in the first part of the season consist of those species which constitute the great body of the summer-catch with the line, and which are known to find their spawning-ground along the south coast of New England. It is these fish to which the inquiries of the Rhode Island and Massachusetts legislatures have been particularly directed, and which, with the excep-

tion of blue-fish, make up the most important part of the summer fisheries. They are still taken in great numbers by the pounds and traps, although fewer than formerly, and consist in great proportion of adult males and females, ripe with milt and with spawn. We can, therefore, easily understand how a most injurious influence may be exercised upon the fisheries by the capture of so large numbers under the circumstances referred to.

In all discussions and considerations in regard to the sea-fisheries one important principle should be carefully borne in mind, and that is that every fish that spawns on or near the shores has a definite relationship to a particular area of sea-bottom; or, in other words, that, as far we can judge from experiment and observation, every fish returns as nearly as possible to its own birthplace to exercise the function of reproduction, and continues to do so, year by year, during the whole period of its existence. This principle underlies, as is well known, all effort looking toward restoring to our rivers their supply of salmon, shad, and alewives; since it is well known that it is not sufficient to merely remove restrictions that had for years prevented the upward run of these fish, but a colony of young fish must be established in the head-waters of these streams, which, running down to the sea at the proper time, and returning again when fully matured, shall fill the waters to the desired extent.

It is an established fact that salmon, alewives, and shad, both young and old, have been caught on certain spawning-beds, and after being properly marked and allowed to escape, have been found to re-appear in successive years in the same locality. The principle is rather more difficult to establish in regard to the purely marine fishes; but experiments have been made by competent men on our coast and elsewhere, which prove the existence of the same general principle in relation to them. Thus, I was informed by an intelligent fisherman living at Rockport, Massachusetts, that he had himself, on several occasions, marked young and old halibut, and during several seasons they had been retaken on about the same grounds.

A second law, equally positive, with a great variety of fish, is that they pass from their spawning-grounds to the sea by the shortest route that will take them out into the deeper waters, where they spend the winter; and that coming and going to and from a given locality, they follow a determinate and definite line of migration.

Having in mind these two propositions, we shall then better appreciate what takes place when fish are disturbed or caught up during the breeding-season. Should nets be set along their line of travel before they have spawned, so that when they strike the coast they are immediately arrested, first at one point and then at another, running a continued gauntlet of dangers in their course to their final destination; and should an appreciable proportion of them be caught before the eggs have been laid and fertilized, it is very easy to see why the stock should rapidly diminish. It is not a sufficient argument in reply to this to

point to the enormous number of eggs laid by a single fish in each season, amounting in some instances to perhaps from five thousand to hundreds of thousands, or even millions, since this immense fecundity is an absolute necessity to preserve the balance of life under the water. The eggs and the young fish furnish the appointed food to an immense variety of animals, many species of fish as well as crustaceans and other animals depending entirely upon them for their support. Among the particular enemies of the eggs and the young fry may be enumerated the small minnows or cyprinodonts, the atherinas, silver-sides or friars, the cunners or chogset, the young of many larger fish, the different kinds of minute crustaceans, including also the lobsters, &c. These are not interfered with to any material extent by any form of net, as they are too small to furnish profitable employment in their capture, and they pass readily through the meshes of any nets that would be set for other purposes. Although, therefore, the amount of spawn and of young fish may be materially less than a previous average, the predacious animals just referred to will probably still destroy as many as ever, since they have every opportunity for picking up their prey at all times; and whatever the scarcity at first, they are likely to get all they require. For this reason, we cannot count upon the increase of the fish that escape the perils of their journey to furnish a sufficient supply, since if half the young brood is lost by means of the capture of the parents through human agencies, before and during the spawning season, a very large percentage of the remainder is prevented from attaining maturity by other enemies.

As most fish require from three to five years of growth before they are capable of reproduction, and in many cases remain in the open sea until this period is reached, it will follow that for several years after the establishment of an exhausting fishery the supply may appear to be but little interfered with, since there are several successive crops of fish to come on at the annual intervals, and not until the entire round has been completed do these injurious agencies begin to present the evidence of their severity. It is easy, therefore, to understand why, after five or ten years' fishing, the supply of fish in a given bay, or along a certain stretch of the coast, will be reduced to a very considerable degree, and although it may be perfectly true that the sea is practically inexhaustible of its fish, yet if the fish of a particular region are cleaned out, there is no hope that others will come in from surrounding localities to take their places, since those already related to a given undisturbed area continue in that relationship, and have no inducement to change their ground. It should therefore be understood that the exhaustion of a local fishery is not like dipping water out of a bucket, where the vacancy is immediately filled from the surrounding body; but it is more like taking lard out of a keg, where there is a space left that does not become occupied by anything else.

These considerations also furnish a sufficient answer to the objection

against the necessity for any protection of the fisheries from disturbance during the spawning-season; namely, for instance, that should Massachusetts pass laws for their protection, it would be of no avail so long as Rhode Island and Connecticut failed to do the same. The practical result of protection on the one hand and of license on the other, probably would be, that after a few years' interval fish would be as abundant as ever on the Massachusetts coast, and would be almost exhausted on those of the adjacent States, and an important market would be furnished to the Massachusetts fishermen outside of the limits of their own State.

Another fallacy, which vitiates much otherwise sound argument on the question of protection, is in confounding regular shore-fish, that come in from the deep seas to the coast to spawn, with the outside fish that come and go with more or less irregularity, and usually feed and swim near the surface. In the one category we may enumerate the porgies or scup, tautog or black-fish, and the sea-bass; while the other includes such fish as the sea herring, blue-fish, mackerel, Spanish mackerel, and some others. The occurrence of the latter group is, to a large extent, determined by the presence of the former. Should the first mentioned be decreased materially in number, it becomes necessary for their pursuers to seek other waters for their proper supply of food. The case of the cod, that feeds largely upon ground-fish, as well as upon the more surface-loving herring, is another instance in which the scarcity or abundance of one fish is influenced by that of others.

It was formerly supposed that certain fish, as the herring, the shad, and the alewives, with others of like habits, prosecuted an extensive migration along the shores of the ocean, covering, sometimes, thousands of miles in the sweep of their travels; and much eloquent writing has been expended by such authors as Pennant and others in defining the starting-point and terminus, as well as the intermediate stages of the voyage. The shad, too, which, as is well known, occupies all the rivers of the Atlantic coast from Florida to the Gulf of Saint Lawrence, was thought to begin its course in the West Indies, and in an immense body, which, going northward, sent a detachment to occupy each fresh-water stream as it was reached, the last remnant of the band finally passing up the Saint Lawrence, and there closing the course. We now, however, have much reason to think that in the case of the herring, the shad, the alewife, and the salmon, the journey is simply from the mouths of the rivers by the nearest deep gully or trough to the outer sea, and that the appearance of the fish in the mouths of the rivers along the coast, at successive intervals, from early spring in the South to near midsummer in the North, is simply due to their taking up their line of march, at successive epochs, from the open sea to the river they had left during a previous season, induced by the stimulus of a definite temperature, which, of course, would be successively attained at later and later dates, as the distance northward increased.

The principle may safely be considered as established that line-fish-

ing, no matter how extensively prosecuted, will never materially affect the supply of the fish in the sea. As a general rule, fish, when engaged in the function of reproduction, will not take the hook, whatever be their abundance; but, as soon as the critical season has passed, they feed very voraciously, and then can be readily caught by skilled fishermen. It therefore would be no evil should every fully grown fish of three to five years old and upward be lifted from the sea after the close of the spawning season, in the course of a season, since the following year we may look for a new generation coming into exercise the function of reproduction; and ample provision will thus exist for a renewed supply from year to year. As already explained, the case is entirely different when these fish are caught before they spawn, all the evils that we have depicted following in the train of such thoughtless destruction, precisely equivalent to killing of all the mature hens in a farm-yard before they have laid their eggs, and then expecting to have the stock continued indefinitely. As well might the farmer expect to keep up his supply of wheat, year by year, while he consumed all his grain, reserving none for seed, and without the possibility of obtaining it from any other source.

Objections have been made to the use of what is called the trawl-line, trot-line, bultow, &c., in capturing fish of the cod family. This consists of a strong cord of 18 or 24 thread, sometimes of several hundred fathoms in length, to which are attached at intervals of about six feet short lines of nearly three feet in length, having hooks at the end. These, to the number of four or five hundred or more upon a single line, are baited and sunk to the bottom by anchors, and at regular distance, the ends of the main line being buoyed so as to show their locality. At intervals throughout the day these lines are examined, being taken up and carried across a boat, the fish captured removed and the empty hooks rebaited, and the whole again replaced. Immense numbers of fish are taken by this method, especially on the coast of England and on the banks of Newfoundland, as likewise along various parts of the New England coast.

Although this practice has excited the animadversions of some on account of its supposed destructive nature, it seems hardly possible that it can be really injurious, since it does not take the spawning fish, and merely represents the result of an increased number of hand-lines.

Our remarks have been hitherto directed toward the practice of the destruction of the parent fish before the function of spawning has been properly accomplished. It is equally reprehensible to interfere in any way with or destroy the spawn after they have been laid, or the young fry after they are hatched. This result is said to follow the use of the trawl-net, which, dragged carefully and sedulously, day by day, over that portion of the sea-bottom which constitutes the great nursery of fish, bruises the eggs and harrows up the sea-weed or grass to which the eggs have been attached, or among which the young fish are play-

ing, and gathers it inside of the net, involving the destruction of all life that may be inclosed. This evil has not manifested itself in America, owing to the almost entire absence of trawl-net fishing, as it has in Europe, where it is considered as doing much more mischief than all other modes of fishing put together. Should this engine of destruction come into general use on our coast and add its agency to those already referred to in connection with the pounds and weirs, the diminution of the supply may continue to go on in a vastly greater ratio than ever.

We have now considered at considerable length the influences separately exerted by the blue-fish and by human agencies upon the number of food-fishes on our coast; and we next proceed, as a *sixth* division of the subject, to discuss the result of their combined action, especially in view of the great destruction of the spawning fish.

While, perhaps, in view of the wonderful fecundity of fishes, the blue-fish alone, or the traps alone, might not produce any serious consequences upon the general supply, their combination in any locality cannot fail to have a very decided effect; as what the one spares the other destroys in large part; and in the enormous consumption in addition of the eggs and young fish by the minor inhabitants of the water, we can easily imagine how speedily an approximation toward extermination may be effected.

My explorations, as already referred to, have shown the existence in the waters, in addition to the larger kinds and their young, of immense numbers of small species of fish, such as the friar or atherina, the various species of cyprinodonts, &c., occurring in great numbers, and feeding almost exclusively upon the spawn and young of fish. These, it has been shown, are not affected by any modes of fishing, and in fact, if anything, are more abundant than ever, in consequence of the diminution of larger fish by which they are devoured in turn. Some are resident in particular places along the shore, while others move along the coast in large bodies. Being always on the grounds and congregating upon the spawning-beds, they are engaged in a continual work of destruction, and when the ordinary ratios have not been disturbed they simply tend to prevent an overproduction of the different species of fish; but if other causes of diminution co-operate when they have devoured their share, and the different crustaceans, star-fishes, &c., have been kept supplied, the percentage of eggs left for development and of young fish for attaining maturity becomes less year by year until practical extermination may follow.

As far as the blue-fish is concerned, however, if it were even possible to drive it off by any human agency, the fishermen of the south coast of New England would strenuously object, since, after its appearance on the coast, in May or June, it is the most important food-fish to be taken; and, as will be observed by the testimony presented, it was as much the diminution of the blue-fish as of any other species that excited the apprehension and alarm of the fishermen. It is, however, in all probability, the increasing scarcity of the shore-fishes that has in-

volved the reduction in addition of the blue-fish, since these require food in large amount and of easy access, and they would naturally leave for more favorable localities.

During the season of 1871, while blue-fish and Spanish mackerel were comparatively rare in Vineyard Sound and the adjacent waters, they abounded to an enormous extent in localities farther to the west, the coast of Long Island Sound and the coast of New Jersey being supplied with them to an unprecedented degree. It is not a little suggestive that while traps are scarcely known in the waters referred to, there has been no complaint in regard to the scarcity of the shore-fishes, nor but little of that of such species as the menhaden, blue-fish, &c.

MEASURES SUGGESTED FOR RELIEF.

In view of all these circumstances, therefore, the conclusion appears warranted that if measures can be taken to prevent the present great destruction of spawning-fish, the supply will again increase before long, and with the increasing abundance of the shore-fishes, the blue-fish will also increase in number. At the same time, I am not prepared to advocate the abolition of traps and pounds, as without them it would probably be extremely difficult to furnish fish in sufficient quantity to meet the present and increasing demand of the country. Nor is it probably desirable to suppress them during the whole of the spawning-season, as it is in consequence of the profits made during that time that the fishermen are enabled to meet their expenses, and very few would put down and maintain their traps for the summer-fishing alone. The traps and pounds also perform an important service in the capture of bait, especially of herring, alewives, and menhaden, for the spring mackerel-fisheries, without which it is alleged that this latter industry could not be successfully prosecuted. In this connection, however, it should be stated that the practice of carrying seines or gill-nets, and of catching herring and menhaden for themselves on the mackerel grounds, is rapidly increasing with the mackerel fishermen, who, consequently, do not depend to the same degree as formerly upon the pounds.

There is, however, no reason why there should not be occasional intermission during the six weeks when most of these fish deposit their eggs, of sufficient length of time to allow a certain percentage to pass through to their breeding-ground; and, after consultation with various persons interested, I have come to the conclusion that if the capture of fish in traps and pounds be absolutely prohibited, under suitable penalties, from 6 o'clock on Friday night until 6 o'clock on Monday morning, even during a season of six weeks only, (thus requiring a close time of three nights and two days, to enable the fish pass and perform their natural function of reproduction,) the interest of all parties would be subserved. Indeed, it would seem to be decidedly to the advantage of the owners of the pounds to enter heartily into such an arrangement, as it is well known that in the height of the season the supply of fish

thrown into the market is so great as very materially to reduce the price paid the fishermen. This, however, does not affect the consumer in the least, as the fish are all sold to middle-men, who keep up the retail price. Large numbers of fish, however, at this season become spoiled, and are either thrown overboard or converted into manure.

By intermitting the catch as suggested, there is a greater certainty that the entire supply will be put to its legitimate use as food; and it is probable that, while less money may be made by the middle-men referred to, the owners of the pounds and traps would receive quite as large an amount of money for less labor and for three-fourths the same weight of fish. This arrangement would also furnish an opportunity for persons connected with the fisheries to repair their apparatus, or attend to other duties. I have, indeed, been assured by many persons engaged in this business that they are fully aware that it would be for their interest, in every way, to have the close time specified, and that they will gladly welcome a law to that effect, if it be made universal in its application.

In view of all these considerations, I have draughted a bill, which has been presented to the consideration of the commissioners of several States, and to several eminent lawyers, well versed in the local laws of their respective States, and corrected to their satisfaction. A copy of this bill, as finally modified, is given on page 132. I sincerely trust that this, or a somewhat similar bill, may become a law in the States of Rhode Island, Massachusetts, Connecticut, and New York, as I am satisfied it would be for their benefit. Although there may be no serious question as to the right of the General Government to make enactments in regard to the common waters of the United States, it is possible that any attempt on its part, at the present time, to pass this law would meet with considerable opposition; and it would be extremely difficult for the United States to enforce any special requirement or penalty connected with a close season.

The plan of licensing the pounds, so as to give the State more efficient control, is considered one of great importance, and will, I believe, be acceptable to the owners of these establishments, as it would give them a security against interference from other parties that they do not at present possess.

The penalty attached to fishing without a license, and the ability of a State the more readily to punish an offender by depriving him of his permission to fish, will render parties careful how they offend; and by giving to the informer, in consequence of whose complaint the license is withdrawn, the first choice of taking the station forfeited, an intense vigilance will be induced on the part of those who may desire to secure a favorite location, and thus supersede the necessity of an expensive surveillance on the part of the State.

In the event, however, of the refusal of the States mentioned to establish the very limited close time suggested, I would recommend the

passage by the United States of a law absolutely prohibiting, until further notice, the erection of fixed apparatus for taking fish, after a period of one or two years, on the south side of New England and on the shores of Long Island, which constitute the spawning-grounds of the shore-fishes referred to. Although this would be a serious blow to the pound and trap interest, yet the grace allowed would permit the owners to use up their material in the way of nets, and render the enforcement of the law less onerous. The restoration of the fish to their original abundance would be thus accomplished in a much less time than by any merely palliative measures; and there is no reason to anticipate that there would be, in the mean time, any material decrease in the supply, or any rise in the price of fish to the consumer. There would still be open to the fishermen the use of seines, gill-nets, &c., which would capture fish in large quantity without overstocking the market; and the inducement to the use of the hook and line would furnish employment to large numbers of persons now needing it, while the markets would be more regularly and equally supplied. The wholesale cost of fish would probably be somewhat increased, but the competition being distributed among a large number of persons would prevent an excessive charge by the retail dealers; and the only difference would be that a few men would not make large fortunes in a short time, as they are now in the way of doing.

The erection of fixed apparatus requires a considerable amount of time, generally several days, and, once set, its presence along the coast could readily be determined by an occasional patrol by vessels of the Revenue Department, any violation of the law to be met by confiscation of all apparatus, including nets, piles, boats, &c. It would therefore be comparatively easy to prevent, at little or no expense to the Government, the infringement of the law of absolute prohibition, while it would be impossible to exercise a sufficient oversight as to the violation of the regulation in regard to close time, this requiring a multiplication of officers to be had only from among the regular authorities of the States themselves.

As already explained, the suggestions and reasonings here are restricted exclusively to the capture of fish by means of fixed apparatus in the waters on the south side of New England. Whether it is expedient to enact regulations in reference to taking menhaden and other fish in the waters of Long Island Sound, and elsewhere, by means of nets, or of herring, &c., on the eastern coast of New England, I hope to make the subject of a subsequent inquiry and report.

A potent objection to the abolition of pounds is the service they render during the spring in procuring bait (alewives, herring, mahaden, &c.) for mackerel-fishing. I am assured, however, that this can be done to a sufficient extent by seines or gill-nets, especially since the discovery that the true herring can be taken in the coast of Maine and in the Bay of Fundy in the spring, apparently to an unlimited extent. If,

however, the States will pass the regulation requiring a close time of two days and three nights, and for six weeks only, from the 20th of April to the 15th of June, as proposed in the bill, severer measures will, I trust, be unnecessary, and we shall probably find a gradually increasing supply of valuable food.

RESULT OF INQUIRIES IN 1872.

In consequence of an unavoidable delay in the publication of the present report, I have been enabled to include in it the results of inquiries respecting the fisheries on the south coast of New England during the season of 1872, having revisited many of the localities of the investigations of 1871, and sending an assistant to others.

I found what I had expected, that with the exception of the scup, fishes of all kinds in Vineyard Sound and Buzzard's Bay were as much scarcer in 1872, compared with 1871, as they had been in that year compared with the preceding one. (See pages 183–194 *et seq.*) The testimony everywhere, with scarcely an exception, both from line-men and trappers, was that the whole business of fishing was pretty nearly at an end, and that it would scarcely pay parties to attempt to continue the work on a large scale in 1873.

The pounds of Messrs. Jason Luce & Co., at Menemsha, took a larger number of fish, as shown by their statement of catch kindly furnished to me, (p. 173,) but only by increased exertion, and this during a very short period. The other pounds, according to testimony taken by Mr. Edwards, scarcely met their expenses in any single case.

At Nantucket most of the fishermen estimated the decrease at from one-half to three fourths, compared with last year.

Very few blue-fish were taken on the north side of the island with the line, the supply being furnished by means of gill-nets alone. According to some the supply was rather greater on the south side; but the difference between the two seasons was the greater, as the period for fishing was longer this year than the last, and was less obstructed by stormy weather.

Several of the fishermen at Nantucket (all, however, personally interested in gill-nets) contested the statements of others as to the decrease of fish, while many, both pound and line fishermen, stoutly maintained the fact.

At Edgartown and Hyannis the testimony was absolutely unanimous as to the fact of a woful diminution and the doubtful future of the entire fishery interest. At various places on Martha's Vineyard, as already remarked, the evidence was in the same direction from both net and line men.

Captain Hinckley, of Wood's Hole, testified that fish were never so scarce at his pound as this season, with the exception of menhaden, alewives, and dog-fish. These he found it difficult to dispose of on account of their numbers, and was obliged to turn many out of his nets unsold.

He considered the number of blue-fish scarcely one-fourth as great as usual, and these were of small size. Squeteague, also, were much scarcer.

At Newport the testimony was conflicting. Some persons, principally, however, fish dealers and trappers, maintained that fish were as plenty as last season, or even more so; this being based, however, upon the number of small scup and an unusual run of Spanish mackerel. Such assertions were, on the other hand, strongly denied by numerous line-men; and some of these testified that fish were never so scarce; and others admitted that they were no more plenty than last year, with the exception of the catch in the traps, which was quite equal to the usual average.

There was, however, no exception to the impression that blue-fish were much scarcer this year than last; this substantiating the opinion that they have been gradually diminishing for many years past. (See the article on blue-fish.)

Tautog and sea-bass were also scarcer. The scup were perhaps less numerous than last season, but made more show, as the small fish so plentiful in 1871 had attained a larger size, and were in a certain degree marketable. These, according to the testimony of some, were as plenty as ever they had been before; but this was certainly not the case in Vineyard Sound and Buzzard's Bay.

It is also noteworthy that whatever may have been the causes which produced so large a crop of young fish in 1871, they were not persistent, since comparatively few were taken in 1872 of the same dimensions as last year.

Upon the whole, the decrease in the fish appeared to be more marked in Vineyard Sound and Buzzard's Bay than about Newport; and this fact may be of much significance, when we remember that the pounds have multiplied much more rapidly in this locality than about Newport, where, indeed, as I am informed, the number was about the same in 1872 as in 1871. In 1871 the number was thirty-five. There were four new ones at Menemsha Bight, one at Lombard's Cove, and one at Paintville, on the north side of Martha's Vineyard; two or more in Kettle Cove, and one on the north side of Nashawena; making at least nine in all, in addition to the number there in previous seasons. The general result, as already stated, was that scarcely one made sufficient profit to pay for the outlay and labor.

The New York markets, as might be expected, were fully supplied with fish during the season of 1872, no appreciable difference being realized by the wholesale dealers. If anything, however, striped bass and blue-fish were scarcer, while the small scup, from the waters south of Massachusetts and Rhode Island, were shipped in large numbers, although scarcely of a size to render them marketable, their average weight being little more than from a quarter to half a pound.

In view, therefore, of all these facts I have no hesitation in saying that all the arguments presented in the earlier part of this report, in

favor of regulating the fisheries on the south side of New England by law, are enforced by the experience of the season of 1872, and that it is too evident that, unless some protective measures be adopted, the fisheries in these waters will be practically destroyed in a very short time.

This result will, of course, bring its own relief in time, since the cessation of trapping will permit the fish to recover their ground; but several years will be required for this, and doubtless as soon as there is any show of increase the traps will be again brought into use.

For several days during the present season Spanish mackerel were extremely abundant, so much so, in fact, that for a time they were sold in Newport at fifteen cents per pound. At Wood's hole pound five hundred and ninety-three were taken in one day, (August 23,) being a larger number than the entire catch of 1871. The total catch at this pound amounted to nine hundred and sixty-four.

Tautog, as already stated, were scarcer, and fewer striped bass were captured. A few salmon were taken at Seaconnet and at Menemsha. A marked increase in the abundance of shad and alewives was noticed, the shad especially being so plentiful about Newport that, according to Governor Stevens, they could not be sold in New York. When captured they appeared to be moving eastward. Alewives, too, were in unusually large numbers, this being the natural result of the operations of the fish-commissioners of New York, Connecticut, Rhode Island, and Massachusetts in protecting the alewives and opening the rivers for their entrance, while the abundance of shad was doubtless due to the enormous number hatched out under the direction of the Connecticut and New York commissioners and allowed to escape into the water. This certainly is a speedy realization of all the anticipations for the increase of shad, since fish, usually selling at a dollar a pair, became so abundant as not to be worth taking to market. This abundance, while rather unsatisfactory to the fishermen and dealers, is of great moment to the consumer.

Of mackerel none were taken off the south coast of New England, as in 1871. Messrs. Jason Luce & Co. secured a larger number of squeteague than in any previous year, and the testimony in regard to them elsewhere varied considerably, some maintaining that they were more abundant, others that they were scarcer.

GENERAL SUMMARY OF RESULTS.

The general conclusions at which I have arrived as the result of my investigations of the waters on the south side of New England during 1871 and 1872 may be briefly summed up as follows:

I. The alleged decrease in the number of food-fishes in these waters within the past few years has been fully substantiated.

II. The shore-fishes have been decreasing during the past twenty years, gradually at first, but much more abruptly from about the year 1865, the reduction by the year 1871 being so great as entirely to prevent any

successful summer-fishing with the hook and line, and leaving to the traps and pounds the burden of supplying the markets. This statement applies also, but perhaps to a certain extent, to the blue-fish. The decrease in their numbers first manifested itself about ten years ago, and is going on quite rapidly until now.

III. This period of decrease represents the time during which the traps and pounds have been well established, their operations increasing year by year, and their catch, especially in the early spring, being always very great.

IV. In 1871 and 1872 the decrease in the number of fish has been so great as to reduce very largely the profit formerly derived by the traps.

V. The appearance, in 1871, of an unusually large number of young fish spawned in 1870 is a phenomenon only to be explained by the probable escape of a larger number of breeding-fish than usual during the previous season, an abrupt decrease in the ravages of blue-fish and other species, or else by a spontaneous movement northward of newly-hatched fish that ordinarily would have remained on a more southern coast. While these fish will probably, for several years, constitute a marked feature in the fisheries, there is no evidence of the existence of a second crop of young fish corresponding to the one in question.

VI. The decrease of the fish may be considered as due to the combined action of the fish-pounds or weirs and the blue-fish, the former destroying a very large percentage of the spawning fish before they have deposited their eggs, and the latter devouring immense numbers of young fish after they have passed the ordinary perils of immaturity.

VII. There are no measures at our command for destroying the blue-fish, nor would it be desirable to do this, in view of their value as an article of food. The alternative is to regulate the action of the pounds so as to prevent the destruction of fish during the spawning-season.

VIII. The quickest remedy would be the absolute abolition of the traps and pounds. This, however, would be a harsh measure, and their proper regulation will probably answer the purpose of restoring the supply, although a greater number of years will be required. Such regulation may consist either in prohibiting the use of traps or pounds during the entire season of the spawning of the fish, or for a certain number of days in each week during that season.

IX. As the principal profit of the pounds is derived from the catch of fish during the spawning season, it will probably be sufficient to try the experiment of prohibition of the use of nets from Friday night until Monday morning of each week of the spawning-season, and after that no restriction need be imposed.

X. It is desirable that the regulation for a close time during each week be passed by the several States; and if this cannot be effected, then the General Government should enact absolute prohibition, or at least during the spawning-season, as it possesses no officers who could

exercise the supervision required to enforce the partial closure, or before whom complaints could be entered and the penalty exacted.

XI. Any marked increase in the number of the shore-fishes, resulting from their protection during the spawning-season, will probably tend to restore the blue-fish to their original numbers.

XII. As there is reason to believe that scup, and to a less degree other shore-fishes, as well as blue-fish, have several times disappeared at intervals to a greater or less extent, within the historic period of New England, we cannot be certain that the use of traps and pounds within the last ten years has actually produced the scarcity complained of. The fact, however, that these engines do destroy the spawning fish in so great numbers renders it very probable that they exercise a decided influence. No vested interest or right will suffer by the experiment of regulating the period of their use, as we have attempted to show that a better price will be obtained from a smaller number of fish, by preventing the glutting of the market, and the consequent waste of so perishable an article as fresh fish.

XIII. A feeling of bitterness entertained by the line-fishermen and the general public against traps and pounds, and those who own and profit by them, will in a measure be allayed if the experiment of regulation and restriction be tried, at least for a few years.

CONCLUSION.

In preparing the present report, my object has been to consider the subject of the New England shore-fisheries in a strictly dispassionate manner, not taking side with any of the different parties on the question as a special advocate, and attempting to draw such general conclusions only as the facts seemed to warrant. With the view, however, of enabling any one interested to review the ground for himself, I have given in detail the testimony (principally phonographic) collected during the inquiry in which I have been engaged, and added the special arguments of representative men on the opposing sides, prepared and furnished at my request, or else reprinted from official sources. To these I refer for the more local details and considerations of the subject, and especially in regard to the movements of scup in the Rhode Island waters.

As the entire questions at issue are most nearly related to the scup and the blue fish, I have given on pages 228 and 235 respectively as complete an account of their habits and peculiarities as the material at my command will allow.

For a detailed account of the principal methods in use for capturing fish in the United States by lines, nets, or otherwise, I refer to the article in the appendix. The subject is by no means exhausted, and I hope to refer to it again, and to include some important forms of such apparatus used in other countries and especially applicable to our own, to-

gether with some account of improved methods of curing fish for the market as yet unknown in the United States.

In addition to a list of the fishes found at Wood's Hole, amounting to the large number of 116 species, I give a complete list of all the fishes known to occur on the eastern coast of North America, as prepared and furnished by Professor Theodore Gill. I am collecting materials for full descriptions and biographies of these species, to be published hereafter, with appropriate figures, should such a work be called for.

The account of the natural history of the south shore of New England is rendered much more complete by the memoir of Professors Verrill and Smith on the marine invertebrates, with its excellent illustrations, all executed in relief by the method of Jewett & Co., of Buffalo. The list of the algæ, by Dr. Farlow, will also furnish an important indication in reference to the distribution of this group of plants.

An accompanying map of the south shore of Massachusetts and Rhode Island is intended to show more particularly the distribution of animal life—the fish-food—along the coast by indication of the results of soundings, dredgings, and temperature observations, made by Professor Verrill and myself during the season of 1871. On this same map is recorded likewise the position of all the traps and pounds in use in 1871, as far as I could ascertain their situation. There is also a separate diagram of the traps at Seaconnet, where are taken, as is said, nearly nine-tenths of all the fish caught by fixed apparatus in Rhode Island. I have also given a diagram of the weirs on Cape Cod Bay, as furnished by Captain Crowell.

SPENCER F. BAIRD,
Commissioner.

SMITHSONIAN INSTITUTION, *December* 2, 1872.

II.—GENERAL PLAN OF INQUIRIES PROSECUTED.

For the purpose of securing greater precision in the inquiries prosecuted in reference to the natural history of the fishes and the influences exerted upon their multiplication, a general plan was drawn up, with the assistance of Professor Gill, which was followed, as far as practicable, in the investigations. For greater facility the same features were thrown into the form of questions, answers to which were entered by their corresponding numbers, as shown in the testimony. This systematic arrangement of the subject and the corresponding questions are as follows, it being understood that some particular kind of fish is usually under discussion:

MEMORANDA OF INQUIRY RELATIVE TO THE FOOD-FISHES OF THE UNITED STATES.

A. Name of the fish in question in different localities.
B. Geographical distribution.
    At present time.
        Change of location with season of year.
    In former times.
        Supposed cause of any permanent change.
C. Abundance.
    At present time; in different seasons and localities.
    In former times; in different seasons and localities.
    Supposed cause of variation in abundance.
    Probable change in the future.
D. Size.
    Maximum length, girth, and weight.
    Average length, girth, and weight.
    Rate of growth.
    Length and weight at age of one, two, three, &c., years.
    Difference of sexes in this respect.
E. Migrations and movements.
    Arrival and departure.
    Period of stay.
    Certainty of arrival.
    Route of movement coming and going.
    Number and times of runs or schools in one season, and differences, if any, in the runs.
    Difference in time of arrival of the sexes and ages.
    Feeding of fish after arrival.
    Summer abode.
    Winter abode.
    If anadromous; when they enter the fresh water and when they leave it.
    If anadromous; what the movements up and down fresh waters of adults or of young.
    Rate of progression of schools in fresh or salt water.

Relation of movements to tides.
Depth of water preferred by schools or single fish.
Temperature and general condition of water preferred.
Favorite localities in any region; whether bottom be sandy, rocky, muddy, grassy, &c.

F. Relationships.
To its own species; whether gregarious, solitary, grouped by age or sex at any season, predaceous, &c.
To other animals; whether preyed upon by them, feeding upon them, &c.
Special enemies, friends, or companions.

G. Food.
Nature.
Mode of taking it.
Time of taking it.
Quantity consumed.

H. Reproduction.
Interference with spawning by lines, nets, &c.
Age of male and of female, respectively, when capable of reproduction.
Change in physical condition, (color, shape, fatness, &c.)
Date of spawning and its duration, as relating to the individual as well as to the species.
Preferred localities for spawning, as to place, temperature, &c.
Special habits during spawning season.
Special habits before or after spawning.
Ratio of mortality in old fish from spawning.
Number of successive years of capacity for spawning.
Nesting-places.
Are nesting-places prepared? If so, whether of grass, stones, sand, &c., or cleared areas, and whether made by one sex only, or both.
If ridges or furrows are formed, how made?
The eggs.
Mode of fecundation.
Where laid.
Where and how attached, if at all.
Whether covered up, and how, or whether exposed in water.
Number laid by one fish at one time, and the number during lifetime.
Size and color.
Special enemies.
Guarding of eggs by either sex.
The embryo and young fish.
Time necessary for development.
Ratio of fish hatched to number of eggs laid.
Proportion of young fish attaining maturity.
Movement after birth; whether remaining on spawning-ground, and how long, or whether changing from fresh to salt, or salt to fresh water, &c., and when.
General appearance and successive changes.
Rate of growth.
Special food.
Enemies and diseases of eggs and young.
Relation of parent fish of either sex to young; whether protective, predatory, &c.

I. Diseases.
K. Parasites.
L. Artificial fish-culture.
M. Protection by law.
N. Capture.
    Methods.
        By lines.
        By nets.
            Floating or movable, (seines, gill-nets, &c.)
            Fixed, (traps, pounds, weirs, dams, &c.)
        Other methods of capture.
        Bait.
        Influence of modes of capture on abundance.
    Season of capture.
        By lines.
        By nets.
        Otherwise.
    Time of tide when taken.
    Statistics of capture.
        By lines.
        By nets.
        Otherwise.
    Value of fish taken.
    Disposition of fish taken.
O. Economical value and uses.
    For food, (fresh, salted, smoked, dried, &c.)
    For oil.
    For manure.
    For other purposes.
    Price, in its variations with place, season, and year.
    Export and trade, in their variations with place, season, and year.
P. Remarks relative to foreign or domestic allies.

QUESTIONS RELATIVE TO THE FOOD-FISHES OF THE UNITED STATES.

A. NAME.

1. What is the name by which this fish is known in your neighborhood? If possible, make an outline sketch for better identification.

B. DISTRIBUTION.

2. Is it found throughout the year, or only during a certain time; and for what time?
3. If resident, is it more abundant at certain times of the year; and at what times?

C. ABUNDANCE.

4. How abundant is it, compared with other fish?
5. Has the abundance of the fish diminished or increased within the last ten years, or is it about the same?

6. If diminished or increased, what is the supposed cause?
7. What is the amount or extent of the change in abundance?

D. Size.

8. What is the greatest size to which it attains, (both length and weight,) and what the average?
9. State the rate of growth per annum, if known; and the size at one, two, three, or more years.
10. Do the sexes differ in respect to shape, size, rate of growth, &c.?

E. Migrations and Movements.

11. By what route do these fish come into the shore; and what the subsequent movements?
12. By what route do they leave the coast?
13. Where do they spend the winter season?
14. When are the fish first seen or known to come near the shore, and when does the main body arrive; are the first the largest; are there more schools or runs than one coming in, and at what intervals?
15. When do the fish leave shore, and is this done by degrees or in a body?
16. Is the appearance of the fish on the coast regular and certain, or do they ever fail for one or more seasons at a time, and then return in greater or less abundance; if so, to what cause is this assigned?
17. How do the runs differ from each other in number and size?
18. Which sex comes in first; and how far advanced is the spawn in the female on first arriving?
19. Will either sex, or both, take the hook on first arriving; and if so, is there any period of the stay of the fish when they refuse it?
20. If they refuse the hook at first, how soon do they begin to take it after arriving?
21. Do the schools of fish swim high or low; and is their arrival known otherwise than by their capture; that is, do they make a ripple on the water; do they attract birds, &c.?
22. What is the relation of their movements to the ebb and flow of the tide?
23. Does spawn ever run out of these fish taken with a hook?
24. Answer same question in regard to fish taken in nets or pounds; is the spawn ever seen in any quantity floating about inside of nets?
25. Are these fish anadromous; that is, do they run up from the sea into fresh water for any, and for what, purpose?
26. If anadromous, when are they first seen off the coast; when do they enter the mouths of the rivers, and what is the rate of progression up stream?
27. If anadromous, what the length of their stay in fresh water, and when do they return to the sea, or do they become exhausted by breeding and die?
28. Do the different sexes or ages vary in this respect?
29. Do these fish come on to the breeding-grounds before they are mature; or do you find the one or two year old fish with the oldest?
30. What are the favorite localities of these fish; say whether in still water or currents, shallow or deep water, on the sand, in grass, about rocks, &c.?
31. What depth of water is preferred by these fish?
32. What the favorite temperature and general character of water?

F. Relationships.

33. Do these fish go in schools after they have done spawning, or throughout the year, or are they scattered and solitary?
34. Have they any special friends or enemies?
35. To what extent do they prey on other fish; and on what species?
36. To what extent do they suffer from the attacks of other fish, or other animals?

G. Food.

37. What is the nature of their food?
38. Are there any special peculiarities in the manner of feeding of these fish?
39. What amount of food do they consume?

H. Reproduction.

40. Is there any marked change in the shape or color of either sex during the breeding-season, or any peculiar development of, or on, any portion of the body, as the mouth, fins, scales, &c.?
41. Are there any special or unusual habits during the spawning-season?
42. Is spawning interfered with by lines or nets, or otherwise?
43. At what age does the male begin to breed, and at what age the female?
44. For how many years can these fish spawn?
45. Does the act of spawning exert an injurious effect?
46. Where do these fish spawn, and when?
47. Can you give any account of the process, whether males and females go in pairs, or one female and two males; whether the sexes are mixed indiscriminately, &c.?
48. Is the water ever whitened or colored by the milt of the male?
49. What temperature of water is most favorable for hatching?
50. At what depth of water are the eggs laid, if on or near the bottom?
51. What is the size and color of the spawn?
52. What is the estimated number for each fish; and how ascertained?
53. Answer the question for one season, and for the lifetime.
54. Do the eggs, when spawned, sink to the bottom, and become attached to stones, grass, &c.; or do they float in the water until hatched?
55. Do the fish heap up or construct any kind of nest, whether of sand, gravel, grass, or otherwise; and if so, is the mouth, the snout, or the tail used for the purpose, or what; and if so, how is the material transported; or do they make any excavation in the sand or gravel?
56. Do they watch over their nest, if made either singly or in pairs?
57. When are the eggs hatched, and in what period of time after being laid?
58. What percentage of eggs laid is usually hatched?
59. What percentage of young attains to maturity?
60. What is the rate of growth?
61. Do the parents, either or both, watch over the young after they are hatched?
62. Do they carry them in the mouth or otherwise?
63. What enemies interfere with or destroy the spawn or the young fish; do the parent fish devour them?

64. Are the young of this fish found in abundance, and in what localities?
65. On what do they appear to feed?

I. Artificial Culture.

66. Have any steps been taken to increase the abundance of this fish by artificial breeding?

K. Protection.

67. Are these fish protected by law or otherwise?

L. Diseases.

68. Has any epidemic or other disease ever been noticed among them, such as to cause their sickness or death in greater or less number?
69. When have these epidemics taken place, and to what causes have they been assigned?

M. Parasites.

70. Are crabs, worms, lampreys, or other living animals found attached to the outside or on the gills of these fish?

N. Capture.

71. How is this fish caught; if with a hook, what are the different kinds of bait used, and which are preferred?
72. If in nets, in what kind?
73. At what season and for what period is it taken in nets, and when with the line?
74. What would be the average daily catch of one person with the hook, and what the total for the season?
75. Answer the same question for one seine or pound of specified length.
76. Is the time of catching with nets or pounds different from that with lines?
77. Is it caught more on one time of tide than on another?

O. Economical value and application.

78. What disposition is made of the fish caught, whether used on the spot or sent elsewhere; and if the latter, where?
79. What is its excellence as food, fresh or salted?
80. How long does it retain its excellence as a fresh fish?
81. To what extent is it eaten?
82. Is it salted down, and to what extent?
83. Is it used, and to what extent, as manure, for oil, or for other purposes, and what?
84. What were the highest and lowest prices of the fish, per pound, during the past season, wholesale and retail, and what the average; and how do these compare with former prices?
85. Are these fish exported; and, if so, to what extent?
86. Where is the principal market for these fish?
87. Name and address of observer.
88. Date of statement.

III.—TESTIMONY IN REGARD TO THE PRESENT CONDITION OF THE FISHERIES, TAKEN IN 1871.

NEWPORT, RHODE ISLAND,
August 1, 1871.

The following reports were all made by a phonographic reporter, Mr. H. E. Rockwell, of Washington, and are intended to present the words of the witnesses, without alteration:

HENRY O. TIFFT:

There are very few fish indeed now, to what there used to be. They are growing scarcer every year; they are much scarcer this year than last, I think. I hear people who fish say that they cannot do anything to what they could once. One of them told me he had been out and fished a week, and did not catch a black-fish. The traps catch them up in the spring of the year. The tautog are a species that go up the Providence River to spawn; it is salt water all the way up. We used to catch scup and tautog, as many as we wanted, away up Providence River; but they don't catch scup now. I don't think they could go anywhere in Narragansett Bay and catch scup with a hook and line. I don't think they catch them much in the pounds.

Mr. MACY. If you were to take a vote of the people, I think it would be ten to one against the use of pounds. All the people say to me that the pounds are the cause of the diminution of the fish.

Mr. TIFFT. Most of the traps are in the river; none outside. They are in the East and West Bays, and all the way up on both shores nearly half-way up to Providence. There is a trap-seine at Point Judith now; there is a pound everywhere that they can drive stakes. There are three times as many pounds this year as last; it is a money-making business, and all want to go into it. They say the legislature has no power to stop them, and will keep on fishing if they are prosecuted. The fish strike at Point Judith before they do in West Bay. It seems as if they were coming from the south. Traps were put down first at Saughkonet. In the spring of the year you will see little spring-bass in the market, about six inches long, taken in these nets. The majority of them are small when they first come.

Mr. MACY. Sixteen or eighteen years ago there were five vessels went out from here, fishing for mackerel, but they sunk money in it and dropped the business.

Mr. TIFFT. There are some pounds on the south end of Providence Island, on both sides of the Canonicut, and through the east and west passages, up as far as Tiverton. Scup are out of the question. All kinds of fish are killed out, and the breeding broken up. I think, what the pound men call small scup, that they say they catch so plenty this year, are skip-jacks.* They look almost precisely alike when small. The skip-jack is a small species; never grows large; the only difference from the scup is, that the skip-jack has finer scales than the scup. The skip-jack grow about four or five inches long. They are caught about the wharves here; but no scup has a chance to spawn in our waters.

* This is a mistake; the fish in question are small scup.—S. F. B.

Mr. MACY. The squeteague are four times as plenty now as I have ever seen them before, and keep increasing. In 1830 we caught the first blue-fish in Nantucket; but in 1831 my uncle caught a barrel which he salted. They became plenty afterward, and continued so up to the year of the plague that killed off all the Indians but two children. They all disappeared that year.

Mr. J. J. CURRY, dealer in fish:

The Spanish mackerel are caught in this vicinity. They are more scarce this year than usual. The blue-fish run about as last year, but larger. I have kept a fish-market here six years. I do not think the blue-fish scarcer than they were six years ago. There was a time, six years ago, when in August, for three days, we could not get any. I do not know that there are any more traps used now than there were six years ago. We get all our fish for market here in this neighborhood, except halibut, round mackerel, and salmon; these come from Boston. Six years ago the price of Spanish mackerel was forty cents a pound; now they are worth a dollar a pound. Salmon are selling for fifty cents a pound. I buy my fish from the pound-men, paying about fifty-five cents a pound for Spanish mackerel. Last year we had four times as many Spanish mackerel as formerly. They were first caught here four years ago. We get eight cents a pound for blue-fish; never sell them for less than that. Flat-fish we can hardly give away in this market. We get eight cents a pound for weak-fish, (squeteague.) We do not sell many round mackerel; we cannot get more than ten or twelve cents a pound for them fresh, and, when salted, they sell for eighteen cents Scup bring five cents apiece on an average; not more than six or eight cents a pound. We get no scup scarcely.

SAMUEL ALBRO, dealer in fish:

We get forty cents a pound for sheep's-head; they are taken in the West Bay. We get five cents a pound for flat-fish, (flounders;) take anything we can get for them; they are not much used here. We get half a dollar a pound for salmon. There is one kind of flat-fish, that we call pucker-mouth, that is better than the other kind. For lobsters we get five cents a pound. I think blue-fish are more plenty than last year. Tautog are scarce. George Crabb* makes five dollars a day catching tautog with a hook and line the year round. He will average a hundred pounds a day. In the spring our market would not be as well supplied with fish if it were not for the pounds, because they can catch them in pounds before they will bite the hook. Down at Gooseberry Island they took in one pound as many as 10,000 barrels of small scup, so small that they did not want them; the net was so full that they could not haul it, and had to catch hold of the bottom of it and tip them out. They were spawned south. They never saw such a lot of young scup here before. It was from the 14th to the 18th of May that they caught so many young scup. The big ones came along about from the 1st to the 10th of May.

FRANCIS BRINLEY, esq., chairman of the Commission on fisheries of Rhode Island:

We had many meetings of the Commission in different parts of the State to make inquiries, and found the people generally ready to answer them, though some hesitated. As a general thing, the pound or trap men here would not attend the meetings, although invited through the notices in the newspapers. Mr. Stevens did not appear before the Com-

* See George Crabb's testimony, p. 30, to the contrary.

mission, nor did he respond to the interrogatories sent him. There has been a new development of this question since our last report was made. It is likely that the subject will come up next winter; it is largely a political question here. There was a bill prepared last spring in the senate, about which there is a good deal of feeling, as it varies from the bill which I prepared, in applying to the whole State of Rhode Island. Originally I took the ground that we would try the experiment of running the line in a particular manner. That was opposed because it was unequal, and it was said, "This is a partial line." Now they say to the pound-men, "You have had time to get out of this business and pull up your traps; and having been forewarned, we will now run the line the whole length of the waters of the State." It is possible there may be some resistance on account of want of jurisdiction, as gentlemen of the profession are generally willing to embark in such matters. In Connecticut they have passed a law prohibiting the catching of shad in pounds after this year.

Mr. LYMAN. In Connecticut they set their pounds to the west of Connecticut River; they do not catch enough east of it to make the business pay.

Mr. MACY. I know that a few years ago you could go out back of the fort and catch as many scup as you wanted; but I would like to see any one catch a scup there now. They said the people in Connecticut and Massachusetts are catching in nets, and why should we be cut off here? We catch shad very rarely here. Excepting very early in the season we get them from the East. About fifty-five or fifty-six years ago they caught shad plenty around Nantucket.

Mr. LYMAN. That was a sporadic run, about which there was something very curious.

Mr. BRINLEY. In the Providence Press, within two or three days, there has been a very strong article, in which the writer speaks of the great number of young scup which have been caught, even within the waters near the city, except where the water was charged with impurities, these young fish having got the advantage of the net fishermen by coming in two weeks earlier this year than usual.

Professor BAIRD. Does he mean to imply that these same young scup come in year by year?

Mr. BRINLEY. No; that they escaped the nets this year, in consequence of coming in two weeks earlier than usual. Young scup have been killed in Providence Bay by the impurity of the water.

General C. C. VAN ZANDT. I was chairman of a committee of the legislature on the subject of the shell-fish, and I found that the impurities had a great influence. We found oysters with a perceptible odor of coal-tar, that were taken five or six miles down the bay. This was some years since.

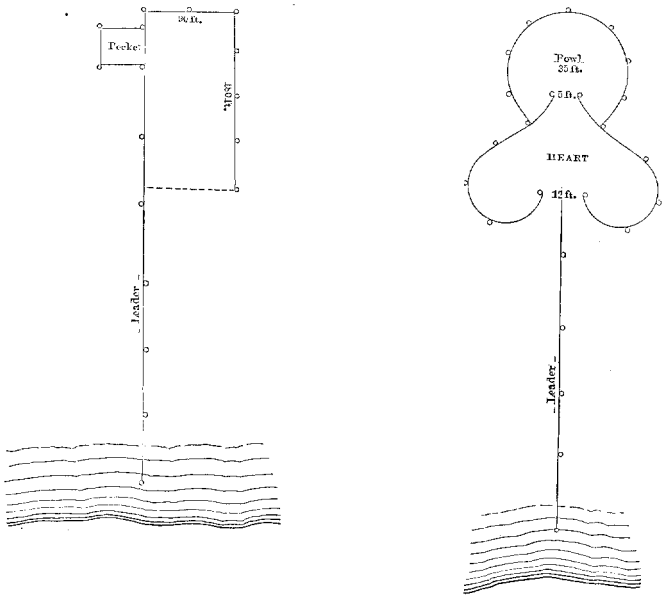
Mr. SAMUEL POWEL. The people who are interested in this question do not understand it at all as a whole. I think many facts are needed before we can act correctly in regard to it. To attempt to stop the trapping would not be useful in the end, as the traps gather great quantities of fish in a short time—more than the lines could do in a long time. The matter here is now fought off till next January. I am wedded to no theory; but there is a curious fact that the fish come this year, bringing their little ones with them.

NEWPORT, RHODE ISLAND, *August* 2, 1871.

J. M. K. SOUTHWICK:

I am not now a practical fisherman, although I have fished many years with traps and nets of different kinds. The question is one which excites considerable feeling. We have two styles of nets; what is called the trap, and the heart-seine or pound.

[These were illustrated by drawings in this manner:]



There is no bottom to the trap-net, and it must be watched all the time. Fish, when not excited, will remain in it some time, especially scup; but menhaden are apt to get out unless they are closely watched.

The first trap is set at Franklin Hollow, to catch the fish as they run south, on the eastern shore of the West Passage. It has a leader of something like a hundred fathoms. Traps have been tried on the west shore, but no fish are caught there in the spring.

There is a heart-seine in Mackerel Cove, which has a leader of about seventy-five fathoms. There are two set near Fort Adams. I set one five years at Pine-Tree Beach, having a leader of forty-five fathoms. The leader is generally set perpendicular to the shore. There is a heart-seine at Coddington's Cove. The rest are usually traps. I catch fish usually by the 10th of May. This year the fish came earlier, and probably could have been caught by the 1st of May. The fish were ten days later at Coddington's Cove than at Pine-Tree Cove. When the fish first come in the spring, we catch a few at first, and then a hundred or two, and then pretty soon several hundred barrels. The first run is generally larger than the later. The first run of scup that comes in, is generally of large scup, all large, weighing from two to three pounds. Then, perhaps a week afterward, the smaller scup, two-thirds the size of the others come in; and two weeks later they come that weigh from half to three-quarters of a pound. The last run are smaller, and many not worth saving, and many pass through the meshes of the net.

There is a phenomenon that has happened this year not commonly observed by fishermen before. The Saughkonet and all the other fishermen—I come in contact with all—report to me that they saw the small scup in vast quantities about the time they were taking up their nets; they described them as being from half an inch long up to three inches. That was about the 1st of June. Still later they were reported to be further up the bays; and in July Mr. Arnold, of West Greenwich, told me that the river up there seemed to be full of them.

From the middle to the last of May the heart-seines are put down at different points along higher up the bays; some of them may have been put in about the 1st of May, but they do not begin fishing much until a little later. I have a heart-seine now at Dutch Island Harbor, in the West Bay.

Flat-fish are caught about here in the winter.

Captain Calhoun stated to me that he saw the first scup caught here, which was placed on exhibition at the United States Hotel. There is a tradition that they first occurred here about 1793, and the sheep's-head disappeared here about that time. There have been more sheep's-head caught here this season than I have ever known. I have seen a dozen in the market at once.

Scup have been much more abundant this year than at any time during the last five or six years; still, not so plenty as at some former periods.

The blue-fish have not shown themselves very plenty yet this year; they have been rather scarce. There have not been so many as last year, up to the present time.

I think the squeteague have been as plenty as ever before; they have been very plenty indeed.

About the time that the blue-fish come, the scup disappear.

There is no doubt but that the great majority of the fish are destroyed while in their spawn or small fry.

In May the spawn of the scup is found in different degrees of development; while some are quite ready to spawn, others have it developed but little. Some have no spawn in them. I saw six cleaned in the month of May, of which only one had spawn; there might have been the same number taken, and every one had spawn in it.

We catch in our traps and pounds the scup in largest quantity; next come the sea-bass; then, squeteague; then, blue-fish; and then the flat-fish, called the brail, the pucker-mouth, and the flounder; then, tautog.

The great bulk of the fish caught in the pounds goes to New York.

I have known scup sold as low as fifty cents a barrel, five or six years ago. They sometimes sell fish for just what they can get, because they cannot be kept long enough to get them to market. Sea-bass bring about the same price as scup generally—about five cents a pound. Squeteague bring four cents; blue-fish, five cents; flat-fish, from two to three cents—many have been sold for two cents each. Very few fish are salted here, except the herring.

Menhaden are second to scup in number of pounds caught; they are used for oil and bait. One gang caught 1,500 barrels of menhaden last week. There are three or four oil-works on this island. This season is reported to be the best for many years for menhaden. For bait they are sold for a dollar a barrel, and sometimes a dollar and a half. When sold for manure, they bring about thirty cents a barrel. The purse-nets supply the oil-works generally with menhaden.

JOHN D. SWAN:

I have been fishing about forty-eight years, with hook and line; have never used traps or seines of any kind—nothing more than a gill-net for herring for bait. I have fished about Brenton's Reef, mostly for black-fish, (tautog.) I think tautog is about as plenty this year as last; but not so plenty as five years ago. Eighteen or twenty years ago, in two hours I could get as many as I wanted. Then we got four or five cents a pound at retail; now we get eight cents. If we get fifty pounds a day now, and work hard, we do a pretty good business. I sell to families; dealers give only about five cents a pound.

I have not seen a scup this season in the water. We used to catch them when fishing for tautog. I have not seen the run of young scup that there is so much said about; I have not seen young scup this year in greater quantity than usual.

We did not formerly catch scup with the hook until ten days after they were seen. They used to run so thick that they would crowd one another up out of water. There was one place where they run over a point where the water was nine feet deep, and they were so thick as to be crowded out of water. I went there this spring in the month of May, and did not see a scup there.

Mr. SOUTHWICK. It was reported that scup have been seen there.

Mr. SWAN. Scup have been dwindling off ever since the traps appeared, and I attribute the diminution to the traps.

Mr. SOUTHWICK. I think it is due to some increase of enemies. I think all fish, if left alone, would multiply at certain periods and become very numerous, until their particular enemies increased and destroyed their spawn. We know that all spawn has enemies. I do not think there has been so much decrease as is asserted; I think it has been principally in the bays and not in the waters generally. They are scarce in the bay from over-fishing by the great number of fishermen around the shores. In fishing for bass, they will play with the bass they hook until he drives all the other fish away. I think that has an effect on the bass. The scup, I think, are affected by the impurities of the water in coming up the bay. The appearance of the blue-fish and the impurities of the waters from the manufactories keep out the scup.

Mr. SWAN. I have not caught a blue-fish this year except when fishing for bass; they are not plenty enough to be worth fishing for.

Mr. SOUTHWICK. My observation shows that the blue-fish have been less than last year. They struck in very scattering.

Question. When were scup first seen this season?

Mr. SOUTHWICK. Somewhere about the third of May, at Pine-Tree Cove. Frequently we do not see them, though they are in the water. They swim slowly and almost always with the tide. I think they drift backward and forward with the tide; unless frightened, they never go against the tide.

Mr. OBED KING. There is not three days difference between Watch Hill and Gay Head. This season they caught scup at Gay Head first.

Mr. SOUTHWICK. I used to think it was safe not to put in my net at Pine-Tree Cove till I heard of the fish being caught down near the light-boat, off the mouth of the harbor. That was so well established as being safe to act upon, that I should not hesitate now to act upon it. For three years, I think, the 10th, 11th, and 12th of May were first days on which scup were caught. This year they seined them about the 3d of May. Sea-bass were more plenty at Saughkonet this year than last.

Mr. SWAN. I have not found them so plenty.

Mr. SOUTHWICK. I fished at Pine-Tree Cove five years, and for the

first four years I did not exceed four or five hundred pounds a month. This year I got at some single hauls more than during the whole former season. Last year I got as many as twelve or fifteen hundred-weight. I do not know the cause of the diminution of the scup, but I think they may have diminished from the same cause that many other fish have that were never caught in our traps, such as the bull's-eye; the old fishermen say they used to catch them in large quantities.

Mr. SWAN. They used to be here every season. They disappeared twenty-five years ago. There is not one to ten striped bass that there used to be. They catch the small ones by hundreds, in the traps, early in the season.

Mr. SOUTHWICK. We take up the traps after May, and do not put them down again at all. The heart-seines are kept down through the season, because the heart-seines do not need watching, and you can go and get the fish out at any time, the fish remaining in them. The traps are best when the fish come in large bodies. We catch menhaden in the traps sometimes, but we have to work very quick. The heart-seines are supposed to catch all the time.

Mr. KING. Nine out of ten of the fish have spawn in them in the spring; they are slow and lie around, and will not run out of a square trap. Gill-nets are used around here too; they catch blue-fish in them outside, but they are much more scarce than formerly. They say scup are blind when they first come, but it is not so; they move slow because they are full of spawn. Large bass are caught here in the winter, in deep water, with clam-bait, but they are slow in biting. In one winter they were thrown up in great numbers on Block Island, frozen to death. The pucker-mouth is caught in winter in shallow water; the other flat fish go into deeper water.

Mr. SWAN. I caught a Spanish mackerel about twenty years ago. We should not get many now were it not for the traps.

Mr. SOUTHWICK. They are caught only in the heart-seines, because the square traps are taken up before they come in.

Mr. SWAN. I can remember when the blue-fish first came in; they did not catch them when I was a boy. It must have been forty years ago when, at one time that I had been fishing for tautog, I trolled for blue-fish, and got several that day. Twenty years ago we could catch scup in any quantity, but since the traps came in they dwindled off.

Mr. SOUTHWICK. Nobody disputes the fact that scup have of late years been less plenty than formerly. They showed themselves quite plenty last year. Near Bristol Ferry they caught them in plenty.

Mr. KING. There were not so many barrels shipped to New York this year as last.

Mr. SOUTHWICK. That is no criterion. The great bulk of the fish are sent directly to New York from the traps in vessels.

Mr. KING. There have not been half so many vessels on the river as last season. I have not caught three scup in three years.

Mr. SOUTHWICK. The pounds about Point Judith have taken more than in any year for three years; that is the general information. There is one trap, near the Spouting Rock at Watch Hill, which has been more successful in getting scup this year than for a number of years.

WILLIAM DENNIS, Esq.:

Question. Have you paid any attention to the political economy of this fishing question?

Answer. I am a Newporter, and am here every year for about two

months, and I fish all the while with a line. I have fished regularly since 1828, and know something about it. Compared with the fishing twenty years ago, under the same conditions, the number of tautog caught now would not be more than one-eighth as many. There are no scup now; I have not caught one this year. I have been fishing two weeks, and fishing where scup ought to be very abundant; I have not caught one or seen one. I consider them nearer gone than the Indians. Twenty years ago I used to go outside for my fishing mostly, and my car would hold from one hundred to one hundred and fifty pounds. In the ordinary condition of weather I would fill it and be home by nine o'clock in the morning; and when I left off fishing, having caught as many as I wanted, I could have caught as many more if I wished. I think that now, fishing the same time, under the same circumstances, on the same ground, if I saved all that I could, and exhausted my ability, and got twenty-five pounds of all kinds of fish, I should do well. I fished for nothing except tautog. I first began to appreciate a difference within ten or twelve years—a very sensible difference. I never saw any difference until traps were set. I know that, after the traps had been in successful operation a short time, there was a clear diminution of the fish, the same that there always is in countries where birds are trapped. You cannot shoot up the game—neither woodcock nor pinnated grouse; and you cannot exterminate the fish with the hook and line. Consequently there was no diminution until the traps were set here. Of course the fish are diminishing all the while. I don't believe that to-morrow morning you can take a box of crabs, and go out and catch a hundred pounds a day for a week. We don't know what they take in traps. They say they never get any, although other people have seen them carried off by the cartload. They take everything from a shark down to a large chogset. The very moment you sink your trap to the bottom, you are sure to take shark as any other fish. Those who fish for striped bass tell me they are very scarce. I have been here two weeks, and have caught a few fine tautog, but I have caught them all in the river; and of course that is no way to determine whether there are any fish, because if there were one or two hundred fish here at this time, they would be sea-fish that came into the river. I remember very well when the blue-fish came here.

Mr. SWAN. The blue-fish were small when they first came here, not weighing over a pound and a half. The biggest I ever caught weighed fourteen pounds. I think I have seen one weighing eighteen pounds.

Mr. DENNIS. I have my own theory about squeteague. I was fishing, six or seven years ago, off Point Judith, when I hooked the first squeteague I ever caught here. I then took twelve large fish, weighing seven or eight pounds. I take it they require a peculiar kind of bait, which is becoming more abundant than it has been. There is only one fish here that maintains its numerical integrity; that is the chogset.

Mr. SOUTHWICK. Nothing but menhaden are used for manure. In the five years that I fished I never sold any to be put on land, except about two barrels of waste fish. I have sold, perhaps, in that time, seventy-five barrels of menhaden.

Mr. SWAN. We find the tautog two or three miles from land in winter, and the chogset stow away in deep water. Lobsters are pretty scarce now. Last year I averaged forty a day in my pots; this year not more than twenty-five or thirty. They sometimes burrow themselves up in the sand.

Captain SHERMAN fully indorsed the statement of Mr. Dennis. He had been fishing with him a great deal. There has been a general de-

preciation of the fish since the traps have been set. The bays are so blocked up with nets that the fish cannot come in. It will not admit of an argument. I can think of nothing else than the traps as the cause of the diminution.

Mr. SOUTHWICK. If traps are the sole cause of the diminution of the scup, what could have been the cause of the diminution of the bull's-eye, sea-bass, blue-fish, and squeteague, all of which have disappeared almost wholly in this century, and again returned, with the exception of the bull's eye? I am told the sea-bass disappeared about thirty years ago, and then came on again.

Mr. SWAN. I never knew them to disappear. About fifteen years ago, one 4th of July, I trolled for blue-fish while going out to my lobster-pots, and I got a striped bass that weighed thirty pounds. After I had hauled my pots, I caught two more, one weighing nineteen and the other twenty-one pounds. On the 8th of July I went again, and, after hauling my pots, I cut up a little lobster and fixed my bait, and when I threw my line it got snarled, and in trying to twitch out the snarl, I caught a fish; and that day I got eight that weighed in the aggregate two hundred and seventy-six pounds after they were cleaned. I do not think the steamboats have any influence in diminishing the fish. A steamer coming within fifty yards of a fishing-place would not drive away the fish. In former times, a common impression among the fishermen was that if the heads and gills of the fish used for bait were thrown into the water, it would scare away the fish, but I always throw them overboard.

I have no idea how old scup are when they spawn. I think scup as large as a man's hand will have spawn in them. We generally save the spawn of the large scup to eat. Scup move with the tide; other fish we do not see so much, as they keep near the bottom; the scup are seen when they go over shallow places.

I don't think I ever saw scup in blue-fish; I have found little mackerel and shiners something like a herring, and menhaden. Blue-fish throw out all that is in their stomach when caught.

Before traps were put in we could see the tautog in the water about the rock, and under the edges of the stones in a warm day. Some say you cannot catch tautog in a thunder-storm. That is "all in your eye." I caught more fish in one thunder-squall than I had caught all day in another place. When tautog are plenty, the best bait for them is the crab; but I always fish with lobsters. They eat the muscles off the rocks. I have seen some of the rocks covered with muscles at one time, and then the star-fish would come and eat them all off.

I think there are more hand-line fishermen than there were fifty years ago. The business has rather increased during the last twenty years.

Bonito were never plenty about here. I never caught more than one in a day and not a great many in all.

I have never seen any fish that appeared sickly except the cod-fish; that is sometimes what we call loagy. I think those have the consumption. Menhaden are very bad bait for lobsters. If there is any in their paunch when boiled, the oil comes right through the meat. Any strong fish affect lobsters in the same way. The bull's-eye fish was poisonous if kept long. It was a kind of chub-mackerel.

Twenty-five years ago, I think, I caught 165 blue-fish in one day and three bass, trolling. That is the most I ever caught in one day.

NEWPORT, RHODE ISLAND,
August 2, 1871—*Afternoon.*

LIEUTENANT GOVERNOR PARDON W. STEVENS:

I have only one pound; I do not trap at all. We thought we could do better in buying fish. The trap is a Rhode Island institution entirely; they are set only about three weeks. Previous to last year they commenced trapping about the 20th of April, but this year not till the 1st of May. The trap is like an oblong box, with one end knocked out. But in a heart-seine we can hold the fish we catch. A brother of my partner got a bass in his pound that weighed fifty-two pounds. The leader of the trap must be long enough to get to a sufficient depth of water. Over on the Saughkonet side the leaders are two hundred fathoms. The leaders run from east to west, with the mouth of the trap to the north; and where they set several traps, the leader of one runs a little by that of another. The fishers there measure off the water and draw for it. There is a sort of agreement among the trappers that the leaders shall be two hundred fathoms. There is one place where they allow them longer. On the southeast corner of the State they allow them to go out five hundred fathoms, so as to get square with the one at Saughkonet Point.

We set the mouth of the trap up stream because, as the tide runs north, the trap must be right across the tide; the open part to the northwest, and the leader on the south side. The mouth is in some instances leaded and goes to the bottom. I never worked a trap at Saughkonet; what I know about the fishing there I learn when I go there to buy fish. I never worked a trap except down in this bay.

I think the fish are bound eastward. I always took the ground that if the fish were bound to the river the traps would not hinder them. I think the heart-seine is much more injurious than the trap, if either. There are many days when a man cannot attend to his trap. It requires almost as much attention to fish with a trap as in the hauling of a seine. Half a gang attend half a day and the other half the rest. It usually requires six men to haul up the gate to a trap. I attend one with one man.

I had a heart-seine at Sachuest Point, thinking that if the fish went up the river there I would try and get some. The leader runs from the shore sixty-five or seventy fathoms. We attended that diligently, and all the scup we got was two. We got perhaps half a dozen tautog, a few dozen codfish, and a few barrels of herring. We set to catch Spanish mackerel or anything that would run in in the summer. I was satisfied that no fish went above, but they went across. I know the fishermen do not go more than two and a half miles north of Saughkonet Point; but we were two miles above them.

As a general rule, we have to set our traps on the east side of the channel for the first run of scup. I do not know so much about the second run, because small scup stay here all summer. When you take up a school of these, they are almost a calico-color; the first run are almost white. I never saw any with regular bars on them. Some that are called the third run of scup are caught up at the head of the bay. I cannot tell whether the large scup have ever been caught up at the head of the bay, because I never fished there. My idea is that the fish come in east of Block Island and strike first at Watch Hill and Point Judith. I don't know how far into the Sound they go; but they catch them first at Watch Hill. I think the big scup do not go up the West River. I have seen them running across Brenton's Reef on their way

eastward. Some say they are blind at first, but I never saw any that were so; I never saw any that did not move pretty fair. They move faster in warm weather than when it is cooler. Recently they have got the first scup at Watch Hill; but there used to be a trap west of Beaver Tail light, which picked them up first. Now they have rigged it as a pound.

There would not be more than a day's difference between the times of catching at Fort Adams and Saughkonet. They caught scup in Vineyard Sound this year two days before we did. On the 20th of April we caught thirteen barrels. We caught some on the 18th of April; that was sixteen days earlier than last year. Some of the run got by and went down to the Vineyard Sound.

Scup are more scarce than they used to be.

There were two cold seasons a few years ago, and a great many tautog were frozen, and it was a number of seasons before we could get many to supply the market here. I have heard that they are more plenty this year. When they froze, they were thrown up on the Nantucket shore, and they were cut out of the ice and sent to New York. That was in 1856–'57.

That could not have affected the scup, because they do not stay around here. The chogset were affected in our harbor.

Question. What do you suppose has affected the abundance of the bass?

Answer. They are much scarcer than they were formerly. I do not know what has cleaned them out. I suppose that catching some in the spring of the year may affect them somewhat.

No fish are used for manure except menhaden. I was ready to give two dollars a barrel for scup, and they were not worth that for manure. That was the lowest price this year. The highest price was five dollars at the traps. We get in New York just what the commission merchants are a mind to pay us. Sometimes we do pretty well, and sometimes not. The scup are packed in bulk in ice, and sent to New York or Philadelphia. A common sloop-smack from New London carries about 100 barrels.

Question. Supposing that it is decided to try any experiments with traps, in the way of legislation, is there any compromise that can be made between no traps at all or all that people choose to put down; would it be expedient to attempt any limitation of the length of the leader, the size of mesh, and time of keeping them down?

Answer. I judge that a limitation of time would be best.

Question. What would be best, so many weeks or so many days in a month?

Answer. I should say, so many days. They run about a month, and then the fishing in traps is all over—from the 20th of April to the 20th of May.

Question. Suppose it should be said that no fish should be taken from noon on Saturday to noon on Monday; would that be acceptable?

Answer. It ought to be; and it ought to be made acceptable. Now, although half the men go home Saturday noon, the rest will make up a gang and fish Sunday, and find a fellow with a smack, to whom they will sell their catch, and then divide what they get, and thus make the share of each greater than that of the rest of the gang.

Question. How could you treat a trap or pound so that they could not catch any fish?

Answer. Have it hauled up. We haul our pound up with a long line, leaving the bottom up about two fathoms.

Question. What would you suggest as the proper way of securing general obedience to such a law?

Answer. Hold the captains of the gangs responsible; either confiscate their property or make a heavy penalty.

I have had a long controversy with Tallman about menhaden spawning twice a year. Every fisherman says menhaden come along full of spawn in the spring, and go back in fall full of spawn.

Question. Do you find small scup to any extent in the blue-fish that are taken in any way excepting in traps?

Answer. It is very seldom we catch them in any other way except with the gill-net. I have found blue-fish with young scup in them; when taken in gill-nets, we almost always find scup in them. Blue-fish caught with a drail often vomit up the food in them. Sometimes three-fourths of the food would be young scup. I have shaken them out of them within a week. Squeteague and blue-fish do that; they will eat anything that runs free. To-day I picked up one, and just took and pressed on the belly of the fish, and he was full of them. The pound is full of these small fish, and they get the little fish in the pound. I have seen the little striped smelt in them, packed in them, and looking like a row of pencils. Sometimes they will come ashore with a lot of scup in them; and then again they will have nothing but hake and sea-robins. They will bite these off close up to the fin; and then they will come ashore with mackerel. I have seen them with small flat-fish in them. I don't know as I ever found a crab in a blue-fish. I have always taken particular pains to know what the blue-fish feed on. Until this became so extensive a watering-place, I have shipped four thousand pounds of black-fish to New York in a year. I have shipped a thousand to fifteen hundred sugar-boxes—bought them and sold them. But then the competition became so great that I could not afford to buy them. What were wanted here were sold readily, and the balance were sent off. The retail dealers here buy fish wherever they can get them. Two buy to send to New York, in connection with what they sell here.

We caught from one thousand to fifteen hundred pounds last week. We found them accidentally out in Saughkonet River. They come up from the bottom every night. We catch blue-fish in gill-nets more than in the pounds. They destroy the nets very badly.

I do not know as blue-fish are more plenty than last year; there have been days when they cannot catch any. We are catching now full as many as we did last year. We get the fish at night; we catch the fish below the middle of the net then; but when the fish are playing on the top, we get them near the top of the net. We have our nets with a mesh two and one-half inches to four and one-half; they are from fifty to ninety fathoms long. They are made by Mr. Stowe, of Boston.

My partner's brother went down the other day and caught twenty-eight bass. If there comes a heavy sea, on the fall of the sea they can get large bass, plenty of them. My partner's brother went down and caught eight or nine hundred-weight, and Mr. Perry Cole and Mr. Durkee get a great many.

Question. Are eels scarcer than they used to be?

Answer. I think so. Whether the gas-works have affected them or not I do not know. Six or seven years ago I was a member of the legislature, and I went out one morning and found a man on the steps opening a basket of oysters, and I could smell the coal-tar in them very plainly. Fourteen or fifteen years ago I kept a fish-market on Long Wharf, and you could see the tarry substance rise on the water and spread out while going through the bridge. We have had a thousand

pounds of fish killed by it in one night. Scup will not go up Providence River; it is nothing but a mud-hole. It is only in the pounds that we get the little scup. When fish were running here, we caught a great many young scup from two to five inches long. I never knew anything like it before; none of us ever saw it before. If it had occurred it would have been observed. Menhaden have been more plenty this year than for many years before. I heard a regular fisherman say he never knew such July fishing as there has been this year in the West River. Menhaden are caught in the pounds in the spring of the year. Forty to fifty barrels of menhaden would be a large yield. But the purse-nets take as many as they can hold, and sometimes they lose their nets; they cannot gather up the fish soon enough, and they would die and sink; and they would have to cut open the seine.

We get mackerel here in this harbor; they are poor in the spring, and have spawn in them. In August they have no spawn in them. We do not catch any fish much when they are full of spawn, neither black-fish nor scup, nor the first run of mackerel. Here are ninety to one hundred sail of mackerel-catchers lying off here, and they take the fattest mackerel I have ever seen. Last year was the first time they have ever done it. Mackerel promise to be plenty this year. There is no sale for the spring-catch; they are poor mackerel.

Question. If we had three times as many scup as we now have, could we buy them for any less money?

Answer. If the fish were not exported from Rhode Island, they would not be worth a cent a pound.

Question. Why has the wholesale price been less this year than before?

Answer. It is because of the increase of pounds in Vineyard Sound, and they all send fish to New York. Squeteague run from three to ten pounds. Large ones began to come here five or six years ago. They are much larger now than they used to be. They were here once before, and went off more than forty years ago, and they have not been plenty since until within a few years.

When the blue-fish first came back, the people would not eat them; there was no sale for them; people said they would make a sore on those that eat them. The prejudice against them was so great that you could not sell one in market.

In 1854 I used to catch the bull's-eye. They were here for a considerable time after that, and had been off and on before that. They were not a regular fish.

There is only one pound at Saughkonet River. I have the only one there. There was one set up in Coddington's Cove by a man by the name of Clarke. He got a great many Spanish mackerel, and that set us after them. The right to fish is as perfect as any right we have here in Rhode Island. The right to the fisheries and the right to the shore are all the same. All the people have a right to go on the shore, being only liable for any damage. There is a path clear round from the bathing-houses to the boat-house here. The right is universally recognized in Rhode Island.

NEWPORT, RHODE ISLAND,
August 3, 1871.

NATHANIEL SMITH:

I am seventy-three years old. I have fished forty-six years. There were scarcely any fish when I left the business, three years ago, on

account of my health. Fish used to be very plenty, so that any one could get as many as he wanted; they were plenty until the trapping was commenced. That was about 1828 or 1830. But I fished before they had any trapping or purse-seines. One man could catch scup enough forty years ago to load a boat in a short time. I have seen the water all full of them under my boat. Every one could catch as many sea-bass or tautog as he wanted. The blue-fish came around in 1834, I think. I caught the first blue-fish, which was about a foot long. Every year they became more and more plenty; but still they did not make any difference with the other fish. It never made any odds with the tautog nor bass-fishing, because I have caught the bass right among them. I had a bass once with a scup in his throat, choked with it. I don't think blue-fish trouble scup at all. I never saw scup spawning; but think they spawn up the river, close in shore. I never fished for scup much, but they were plenty, and there was no difficulty in catching them until they began trapping them up. It was just so with tautog. I got up the first petition against trapping tautog, and got seventy to one hundred signers, and Sam Brown got one hundred. It was handed to our legislature, and laid on the table, and I suppose thrown under the table or turned out doors. The tautog began to grow scarce twenty years ago. They set traps up over Saughkonet shore at the time I got up the petition. I think, if traps could be stopped, we should have fish plenty in the course of three or four years. The spawn is taken up with the fish going in to spawn in the spring of the year; there is no seed left in the water for fish to grow from. Thousands and thousands of hundredweight of tautog have been sent to New York, besides hundreds of boxes of scup. I have seen them take thousands of pounds of tautog off Gooseberry Island in a morning and send them to New York. But now they cannot get them around the shores.

The blue-fish were in these waters before, and very large. My father used to catch them about the year 1800, not far from that. I think, from what was said when I caught the first one, they must have been out of the water sixteen or eighteen years. About 1800 they were very plenty. They first made a net of rattan to trap them, and then they all went away in a body, and till the little ones came back they did not return again. I used to catch the little ones and bring them to market; but nobody would buy them, and so I threw them away. The first man who brought blue-fish to our market was Mr. John Springer, and he first brought them when they came back the last time.

Scup were always here; were here when my father was a boy.

When I first began to catch blue-fish, they did not weigh more than a pound or two apiece; but when they were here before, my father said they weighed sixteen and eighteen pounds.

They first began to set traps on the eastern shore about 1827; they used to set them just the same as now; they would drive the fish into the pockets at the ends.

There are no school-bass here in the fall of the year. In old times, thirty or forty years ago, the bass were around in schools in September, and would run until cold weather. I have caught them as late as the 10th of December. I would get from one to two hundred a day. I used mackerel or menhaden for bait. I used dead bait, but of late years I fished with lobster bait. That would not answer only when there was a heavy sea and the water was thick; I used to catch a boat-load in a day in that way. I got sixteen one morning, four of which weighed 206 pounds, and the rest would weigh from thirty to forty

pounds apiece. Four or five years ago I could not catch any. The sea-bass are very scarce now.

Mackerel used to be caught here all the year round, but they are scarce now.

The skip-jack is something like the bonito: the bonito has a darker and broader stripe than the skip-jack. The bonito is striped like an albicore.

I don't know but one kind of sword-fish here. I know the bill-fish; they are a long fish, with a bill something like that of a sword-fish. I have seen a bill-fish three feet long. They are not at all like the sword-fish. They have little fins like the mackerel. They followed some ship in here; they were here in the fall of the year and latter part of the summer, only one year. That was forty years ago; I have seen none since. The docks were all full of them then, about eight or ten inches long and very black. They would bite anything you might put down, even a bit of pork.

The bull's-eye fish were here from 1812 to 1830, perhaps; they were very plenty. The women would haul them in with seines—barrels of them; once in a while two or three are caught in the fall of the year; they were nearly a foot long, very thick and fat. One year they poisoned every one who eat them; people thought they had been feeding on some copper-bank; they were much fatter than common mackerel. I salted a barrel, and carried them out to Havana. They were never sent from here to a market abroad. They were so fat they would rust too quick, like the Boston Bay mackerel. Split them and they would fall apart, they were so fat.

Menhaden are decreasing too. In 1819 I saw a school of menhaden out at sea, when I was going to Portland, that was two miles wide and forty miles long. I sailed through them. We were out of sight of land. They appeared to be all heading southwest. There were no fish near them. I have seen a school on this coast three miles long. I think they spawn in April or May.

They catch a few shad in the traps here now; they never used to do that. They get plenty of herring in the spring. Herring are bigger than alewives; they come along together and spawn together; they spawn in April and May; they are used only for bait. People never pretend to smoke them. There are many different kinds of herring.

NEWPORT, *August* 3, 1871.

W. E. WHALLEY, of Narragansett Pier:

I am using a trap-seine. We work on the tide, and we don't care on which side of the seine it is. We catch all kinds of fish that wear scales, and some that don't—big fish and eels. We catch sturgeon, from seven pounds up to three or four hundred. I do not know how many heart-seines are being worked this season. The heart-seines take the fish both ways; the trap, only one way. They are of various sizes, according to the locality, the leaders being from seventy-five to two hundred fathoms. The trap-seine is calculated to take fish working down an eddy; the heart-seine, where the tide works both ways. They are at Horse Neck, and all along where the tide sets both ways. Taking fish in traps depends on the eddies; the better the eddy the better the chance for fishing. When the tide sets up into the bayous, there is an eddy when it runs back, and the fish run in. We fish every half-hour,

and get from a few barrels to five hundred, and when the tide is over we wait; we fish only when the tide is running in; we do not expect to get as many on the ebb-tide as on the flood, except in some places. At Gooseberry Island we fish on the ebb-tide. At Sachuest Point we have fished two seasons, and I have fished at Point Judith on the flood-tide. There is a westward tendency there at the ebb-tide. On the strong ebb, these fish coming across the Sound strike through there. At Gooseberry Island I wanted a flood-tide, and that brings an eddy inside, making a bay for a mile or a mile and a half.

On Saughkonet River there is not much tide, only when it blows fresh to the north or south. There are two bridges there, and we always thought we did best at them on flood-tide. We never set any nets on the west side. When I went there in 1857, there were eleven traps; next year, fifteen; and the next, seventeen. The traps were first started in 1846, by Ben. Tallman. He invented the trap.

Question. What do you think about the general question of traps; do they affect the quantity of fish or not?

Answer. Yes, sir; I think, if they were stopped, the fish would be much more plenty.

I will give my reasons why I have answered "yes." I do not mean to say that traps should not be used on our coast. I do not mean to say they should be abolished, but I do mean to say that, in the way they are handled, and used, and allowed to be set anywhere, without regard to water, place, &c., they are an injury to the fisheries, and are what is killing off and curtailing the luxuries that the Creator has furnished, and intended should be enjoyed. My ideas are derived from nine years' experience in trapping and seining, and I have heard the other fishermen say the same thing. I am a fisherman, and expect to fish as long as I do anything.

In the first place, our bays are large in proportion to the size of our State, and the school-fish have not a place where they can go and stop wagging their tails long enough to lay their spawn, while the oysters are protected. Here is a trap and there is a purse-net, so that from the time they come in until they go out somebody is after them.

And, what is worse than all, our own State's people cannot get them at all. They will bring them in and sell them to carry away for a quarter of a cent a pound, in the month of May; and now to-day you cannot buy them for ten cents a pound. Why? Because they have been taken here for twenty years, before the spawning-time, and sent out of existence for nothing. If you kill a bird before it lays its eggs, where is your increase? And so, if you kill your sheep, where is your stock? Can we raise anything if we don't try to keep our breeding-stock good? Is it expected that we can have fish if we will put them on the land for manure at a quarter of a cent a pound? And now you cannot buy them for ten cents a pound. Confute it if you can.

When I could go out here and catch from three to five hundred-weight of black-fish in a day, I have been told not to deliver them, and when I brought them in, to cover them up with scup, and then carry them away and throw them in the river after dark, and not sell them in Newport. Why? So that the inhabitants would not know where they came from. I have done it. They are selling fish from off Point Judith, and sending them to New York.

But they have thrown striped bass into the dung-heap, because they could not get ten cents a pound; deacons of churches did that. Now you cannot get them at all. I used to get enough Saturday afternoon to last my family a week; go now, and you don't get a nibble. Give us

some protection, and, by-and-by, we may have a place that the fish can go to and lay their spawn, and where the young fish can grow.

Black-fish (tautog) we cannot get. Yesterday we had five men fishing, and 27 pounds, 22 pounds, and 19 pounds each was the best they could do. If it was not for lobsters, our fishermen could not get enough for their breakfasts.

We take striped bass in nets, at the mouth of Saughkonet River, and at the back beaches. The fish run eastward in the spring, the same as the geese go north. But black-fish and bass can be caught here all the year. I fish inside of the point in winter, and outside in summer. We get bass through the ice, in winter; sometimes a barrel of them. They go into the mud in eighty feet of water. The bass and tautog are a native fish; the blue-fish is a traveler, here to-day and gone to morrow. I don't care anything about them.

Shad are a fish that will run up the rivers annually if not hindered. I have caught shad at Gooseberry Island, seven hundred a day, with a trap-seine. That is no rig for catching shad; but if you go to work and prepare for it, you can catch shad plenty.

In regard to tautog, bass, and scup, we cannot make a living fishing for them, as we used to do. Many a man has been driven out of the business. I could show you a dozen good boats rotting down, all gone to destruction; and the fishermen have taken to something else, which they had no love for. It drives people away from the State. We had about three hundred fishermen here twelve years ago, who got their living directly from fishing. That was their legitimate business, with the drag-seine and hook; not with the purse-seine or trap. They did not know anything about a trap till I set it. Two have been set there since.

The men have left here and gone down off the Banks; gone to New London to go on board fishing-smacks; gone to the eastward and to the southward. It is depopulating our shores of the men of that class. There are now only about fifty men fishing where we had three hundred; and some of the old men remain, but all the young men have gone, the fishing has been so killed out within the last five years. Instead of fishing, those who remain have, many of them, gone to taking boarders. Unfortunately I got broke down, and did not earn my salt; but I have followed the fishing business and have kept boarders. People come here from abroad in the summer, for what? Because Rhode Island has been noted for hook-fishing. Dr. Babcock comes with his rod and reel for striped bass. This year he has caught one; that is all. Last year he caught two. Many others have tried it, with no better luck. They come here for fish; they don't care anything about our stale meats, for which I pay thirty cents a pound, that are brought from Cattaraugus County, New York. That is the change we have made; we send fish out at a cent and a quarter a pound, and they send us beef at thirty cents a pound. Five hundred thousand dollars have been paid out to build up Narragansett Pier, for the purpose of a fishing-place. It is a good, quiet neck, where they can go fishing, having a beach equal to any; and you may see a man with his whole family, each of them having a rod trying to catch some fish. They catch anything they can, and carry it home to have it cooked; and because they cannot get what they used to, they give us the name of having depreciated the fish.

The tautog and striped bass have diminished most; that is, we feel their loss most.

Question. Supposing you were in the legislature, and wished to draw up such a blll as would be fair and just to all parties, what would you do so as to control the traps as to number, size, place, and time?

Answer. My proposition to the legislature was, to allow only a certain number of nets from Point Judith to Saughkonet River, so as to allow the fish to come in.

Question. Suppose the pounds were down from the 1st of June through the summer, and only then, what would be the effect?

Answer. I should say they should not be set before the 15th of June. From the 15th of May up to the middle of June I have caught tautog and scup that were full of spawn, and were ready to shoot spawn at the touch, and when they were taken into the boat they would throw their spawn; you could almost see the fish in the egg. The fish are later in a cold, backward season.

Question. What would be the effect of this plan: To require the fishermen to take up the pounds two days in seven, say from 12 o'clock Saturday till Monday, and have a proper penalty for violation of the law?

Answer. It would have the effect of making a great catch Tuesday morning. As a general thing, they would get almost all the fish. I used to do the same thing. The fish would lie back of the leader, not having a free passage.

Question. Suppose you pull up the leader?

Answer. Then the course would be clear.

Question. Suppose you were to require that the nets be so arranged that there could be no impediment for two or three days, would not enough fish get by the nets so as to secure an abundant stock of the fish, year by year?

Answer. That would help; of course it would. Why do the fish come in to the shores? So that every man can get them. How was it with our fathers? I remember when my father used to say he was going off to the beaches for scup. Every family in the spring of the year used to go and pick up scup enough for their use. They smoked them. Do you see them now? Why not? Because our stock-fish are taken away at the season of the year before they have spawned. And now the human child has got to suffer for it. Traps are down here all summer, and they catch eels, flounders, and Spanish mackerel, and everything that swims, more or less.

Question. Squeteague?

Answer. We have always caught squeteague here with the hook. They are not a new fish to me. I have always known them from childhood. I know you cannot go off Point Judith and catch a scup to-day. I will give a dollar a pound for every scup. Ten years ago you could catch any quantity, and there was fifteen miles of coast you might fish on. The scup used to come from Point Judith to Brenton's Reef in about two tides. I used to have my boat ready to run back and forward, and in about two tides or twenty-four hours after catching them at Point Judith I got them at the Reef. It is about twelve miles. If the wind was northeast, they would come slower. They come in on the tide and go back on the ebb, and sway with the tide, going a little farther forward every time. When they first come in, they are kind of numb; some call them blind. I think there is a kind of slime on the eye in winter, and they want a sandy bottom to get off the slime. From Point Judith to Saughkonet is about four tides—two days.

Question. Did they come much earlier than usual at Point Judith this year?

Answer. About the same. They expected them in February, and got the seines ready. They had them in the water in March. I always judge by the dandelions; when I see the first dandelion, scup come in;

I watch the buds, and when the buds are swelled full, then our traps go in. When the dandelion goes out of bloom and goes to seed, the scup are gone; that is true one year with another, though they vary with the season. I am guided by the blossoms of other kinds of plants for other fish. When high blackberries are in bloom, we catch striped bass that weigh from twelve to twenty pounds; when the blue violets are in blossom—they come early—you can catch the small scoot-bass. That has always been my rule, that has been handed down by my forefathers.

Question. When scup were plenty, and they first had traps, did they keep them down all summer?

Answer. One season I kept them down till the 12th of June; that was the latest I ever kept a trap down. In the latter part of the time I got from fifteen to twenty barrels a day; but in the early part of the season I got a thousand or fifteen hundred barrels a day. That was ten years ago.

Question. You think if a trap were kept down all summer, some scup and other fish would be taken all the time?

Answer. Yes. The fish are changing ground for food; to-day I may go to such a place and catch scup, and to-morrow I do not get them there; they have worked up the food there. It is just the same as in the case of herds in a pasture. We find out by one another where the fish are; we are all along, and we signal each other when we find good fishing. That is the way we used to fish; but now they are so scarce, we don't tell when we find a good place. It makes the people selfish as the pigs. That is the tendency.

Question. How long have you known Spanish mackerel?

Answer. About eleven years. I don't know that I ever saw one but once before I was fishing at Gooseberry Island. I think they might have been here before, and they would have been taken if they had been fished for in the same way, in the summer season. The hotter the weather, the more Spanish mackerel we get. Last year we had the hottest season for some time and the most Spanish mackerel. They are a southern fish. I have caught them with a drail on a hook. They are not a native of our waters. I never knew any caught thirty or forty years ago. They are not as plenty yet this year as they were last. I caught fifty last year in my gill-net. We get all our fish over at the pier in gill-nets—tautog, shad, menhaden, sea-bass, squeteague, and Spanish mackerel. We use the menhaden as bait for sea-bass. We get cod-fish, pollock, and hake in the traps. I never knew any torpedo-fish here.

We cannot get any scup now. I have not seen one since the trapping season was over. I have five men now fishing for me, but none of them get any scup. I think the blue-fish are about as abundant as last year. They come in schools at different times. Scup first come in from the 15th to the 25th of April, and will not bite when they first come in; they are not caught with the hook until the last of May or first of June. Fish do not generally bite when spawning, so that any amount of line-fishing will not destroy the fish. I have seen many a handsome fish that I wanted, but could not tempt to bite; they would turn aside and leave the most tempting bait. At other times the most inferior bait will be taken greedily. The hook and line will not make any inroads on the fish so that there will not always be a supply.

I never knew a blue-fish to feed on scup. In all my catch of blue-fish for three years I have not been able to find one. I find squid, lances, herring, menhaden, and the tail of the robin, bitten off just back of the

fin. I have found eels in them, but never, within three years, have I found a scup in a blue-fish. I have examined every one. I caught three blue-fish yesterday, and they threw out a great many squid. I think the feed for the young fish is as plenty as ever—as it was twenty years ago, with the exception of the menhaden and herring. Crabs never were more plenty, and the lobsters are more plenty than I ever knew them. I think squid are as plenty as I ever knew them. People complain that menhaden have left the bay. Along about the first of September they will come back, perhaps; I know that is about the way they generally do.

The lance is found all along the coast; I never found it buried in the sand.

I only know one kind of sword-fish and one kind of bill-fish. I have seen the saw-fish when I was a boy—about thirty-six years ago. They followed some sulphur-bottom whale in.

EDWARD E. TAYLOR:

I have caught but a few fish; I want something done to try to save the fish for my children.

Question. How are we to help your children to get fish?

Answer. You will have to abolish traps. I used a trap-seine this spring, but I am now running gill-nets. We have only three, one hundred and sixty or one hundred and seventy fathoms in all. We have caught about a dozen Spanish mackerel this year. We sell our blue-fish at five cents a pound to the dealers here; to families we sell some at eight cents a pound. I do not find scup in blue-fish.

I have seen scup, and blue-fish, and sea-bass all come to my bait in the deep, clear water, at the same time, down back-side of Gay Head. I would drop my line down, and I could see them when they came to the bait in about twenty feet of water. I used menhaden, cut up, for bait.

We got a great many small scup in the traps in the latter part of May, about two to two and a half inches long, right at the south side of the island. I caught an albicore last year that weighed 550 pounds. It was sent to Providence for steaks. It was sold for ten dollars. Last year we caught a fish called cero that weighed 7½ pounds; it was sold for five cents a pound, not knowing the worth of it.

I owned a trap before the war, and sold out very cheap, to go to the war; and when I came back, after three years, I found the fish had decreased very much. I was the first witness on the stand before the committee of the legislature against the traps. As long as the law allows any one to fish with seines, I shall do it; and as soon as they make a law to stop it, I shall stop.

I do not know what protection is best; I think there should be a law to prevent fishing at certain seasons, or with nets of a certain size of mesh. A great many small scup are caught in the traps and destroyed, because the people are too lazy to let them go.

I can recollect when you could catch bass all day long; now I have to turn out every day, at from one to two o'clock in the morning, and to get my lines in as quick as it is light, for after the sun is two or three hours high they will not bite, unless it is thick water and a heavy sea. I have fished with another gentleman three years, and I do not think we have caught a bass in the afternoon. He is an amateur sportsman, and he likes to go now better than when the fish were plenty, because it is more of a science to catch one when there are but a few. I have

had a bass run out sixty-four fathoms of line; one run out the length of three lines. He weighed 48 pounds.

Mr. GARDNER BREWER:

I have been a resident at the end of the avenue eleven years, and I think the tautog and blue-fish are falling off very much. I do not think fifty have been caught off my grounds this year. My friend and neighbor, Mr. Mixter, who came here about eighteen years ago, sold his place in disgust, because he could not get fish. That was his great pleasure, and he went off almost in a rage. He used to scold a great deal about the destruction of fish in the spring. It is really a great misfortune to Newport. I used to see a dozen boats fishing off my place at a time, but now they have abandoned it. I have not seen a boat there this year.

Testimony of E. E. TAYLOR resumed:

When I was a boy, I could catch four or five hundred scup here early in the morning, and, after coming ashore and peddling them out, two for a cent—and sometimes not get my pay at that price—would then go off in the afternoon and catch as many more. I recollect that when the factories stopped, in 1857, I think, the people were thrown out of work, but they could go and get fish in any quantity to live on, scup and blue-fish. The poor people could go off and get as many as they wanted without any trouble. Soon after the twine went into the water. The first piece of twine I set was a mesh-net, with a two and a half inch bar—too big. It would fill chuck full of scup. Then I and my brother-in-law, George Crabb, went to fishing together, and got a net twelve feet deep and thirteen fathoms long, and we could get as many scup as we could haul; but I suppose now you could not get half a dozen there. Then I bought a $40 net; and then, with others, we bought a large trap.

We have done very little in catching blue-fish. We caught more last year in two weeks than all I have caught this year. It looks to me like a miracle how any fish get by the traps. The coast is strung all along full of twine; and how the fish can go eastward and get back again I do not know. About the only thing that can account for it is the occasional heavy seas. When the water is thick it keeps so off the shore two miles, and the fish follow along the edge of the thick water; that is the only way that they escape.

Question. Do you think that if all sorts of nets were abolished, fish would be more plenty in three years?

Answer. Yes, sir. I think that where there is one now there would be a hundred in three years.

Question. Suppose we say, "You may fish with as many gill-nets and draw-seines as you please, but not with traps," how would that be?

Answer. It would not make a great deal of difference.

Question. Suppose we say "You shall not fix your nets except in the tide-way?"

Answer. That would not effect any thing. We moored our gill-nets at each end with anchors; they do not swing with the tide. We set them in as still water as we can. The mackerel run with the wind, and we set so that they shall strike square.

I do not see that the blue-fish run any lower this year than last. We catch them about the middle of the net. We have seventy-six meshes deep, and catch them about midway. We have a 4½-inch mesh; we catch some all the way down. As a general thing, we catch them that

weigh from 2½ pounds up to 7 and 8 pounds. An eight-pound blue-fish is rare. We caught this morning eighteen fish; yesterday morning we caught fifty. That is big. For three mornings we took nothing but two little dog-fish and some butter-fish.

We send our fish to New York sometimes. We open our blue-fish. I do not find scup in any of them. The dog-fish that we have around here feed on crabs; sharks feed on menhaden. The heaviest shark we have around here is the thresher; they feed on menhaden. I saw a thresher-shark kill with his tail, which was nearly eight feet long, half a bushel of menhaden at one blow, and then he picked them up off from the water. They come up tail first, and give about two slams, and it is "good-by, John," to about half a bushel of menhaden. The body of the thresher-shark is about a foot longer than the tail.

When the blue-fish first came here and were caught, people used to think they were poison. My father, who was eighty-two years old when he died, said they used to catch blue-fish that weighed sixty pounds. That was a long time ago. I can recollect when they first began to catch them here; it was about thirty-two years ago; I was about ten years old. My father said sheep's-head used to be caught here in great abundance some forty-five or fifty years ago. I used to have to fish all day to get as much money as I now do for the few fish I catch. The scarcer the fish the higher the price. I have peddled striped bass about the streets at four cents a pound; now they sell at the market at from seventeen to twenty cents a pound.

NEWPORT, *August* 3, 1871—*Evening.*

At the office of Captain Macy, custom-house, this evening, there were present several fishermen, some interested in traps, and others who fish only with lines.

Mr. SMITH, an old fisherman, said scup and tautog were growing more and more scarce. This, he thought, was owing to the use of seines. He had not caught a scup in four years with a hook. Ten years ago he could make good wages catching scup. The first of June was the time he first started for fishing. When they first come in, scup will not bite for about three weeks. They are full of spawn then, and are going up the river. He never saw a scup spawn. Had not caught a blue-fish this year; it would not pay a man to fish for them with a hook. I used to catch three hundred pounds in a day. Blue-fish came in here first about forty years ago. They began to grow scarce about fifteen years ago.

Mr. WILLIAM RECORD. I set gill-nets myself; I set the first seven years ago. It was not unusual to catch from five to eight hundred pounds in a day. I am now setting from two hundred and fifty to three hundred and fifty fathoms, instead of fifty fathoms, that I had at first. Once I caught twelve or thirteen hundred weight, but generally I don't think we caught over five hundred weight. I have five nets now; but I don't catch as many fish as I did when I had one net, seven years ago. We fish on the beach inside of the point, near what we call the Beach House. We set the nets so as to break the tide, and therefore we calculate to set inside of the points of the small bays. I don't think there is one fish in a hundred that there was twenty years ago. Then it took half a dozen men to keep the net clear; now we generally haul them once a day, and they are not overloaded.

I catch once in a while a Spanish mackerel. They came along some, a fortnight ago, so that there would be four, three, or two in the net at a time; then, for several days I did not catch any. Hot, calm weather is the time to catch them. I have never seen them schooling around like blue-fish.

[One person present said one hundred and sixty Spanish mackerel were caught at one haul up at Coddington's Cove.]

The gill-net does not catch one-fourth as many as a heart-seine. In the gill-net it is very seldom that we catch a blue-fish weighing less than three pounds. A small Spanish mackerel goes through our net. The greater part of the fish are caught about a fathom below the surface, in a gill-net. We catch most when we have southerly winds; not many with northeast and north winds.

The first run of scup was more plenty this year than last; but nothing compared with nine or ten years ago. Governor Stevens and Mr. Whalley took up their net, and they turned out seven hundred barrels of scup, because they could not sell them. Afterward they sold them at Point Judith, for eighteen cents a barrel. They sold some for twelve cents a barrel, and I have no doubt they got more that year in that one trap than have been caught in all the traps in Rhode Island this year.

They made some good hauls in 1863, but they have been growing more and more scarce ever since. Governor Stevens took all of 10,000 barrels of scup that season. A thousand barrels were lost. They were saving them to get $1 25 a barrel, and they had to sell them for 60 cents a barrel. When they were taken out, 250 barrels were put on board a Fall River schooner. I used to see large schools of scup off outside, when I was fishing, but I have not seen any lately. They are growing scarce, from some cause; we are either working them up, or else we are growing so wicked that they will not come to see us.

Twenty years ago it was no trouble to go down and catch from half a dozen to twenty small-sized bass in an afternoon; but now, when anybody catches three or four bass, it is told of as something strange.

Fish are plenty in New York, because where there was one seine years ago, there are twenty now.

In the spring of the year, the average size of scup is a pound and a half.

[One person said he was present one morning this year when Mr. Holt's heart-seine was drawn, and there were as many as twenty barrels of little scup turned out.]

The small scup follow after the big ones, and there is a class that is called mixed scup, coming along about a week after the first run of large scup. Small scup are caught all summer, with heart-seines—last year's scup.

They used to set the seines about the middle of April, but now they do not until the last of April or the first of May; this year they came along rather earlier than usual. The nets are generally kept down about a month. All the nets were put down this year about the same time, and they all began to catch scup as soon as they were down. They got five dollars a barrel for the first scup; then down to three. They are not used for manure now. They have been going down in number steadily since 1862; they were put on the land in 1862.

Menhaden come along after the first run of scup; they do not purse menhaden till after they get through with the scup. They used to put down the traps about the 20th of April, and took them up about the

20th of May, when they went into the menhaden fishing; but now they keep the traps down through May.

When I was a boy I used to see men who followed tautog fishing go off in the early morning, and come back with as many as they could sell by 7 or 8 o'clock in the forenoon; now you cannot get any to sell by going all day.

The striped bass that winter on our coast have dwindled off to nothing.

GEORGE DWINNELL:

In 1835 they put their seines together near Point Judith, and they caught fish by thousands; they have never been so plenty here since.

In one trap there were 20,000 small bass caught in one season; they were sold at 25 cents a dozen. We used to catch them weighing from two to four pounds; now we don't get any of that size. At one time I caught bass for a week that weighed from twenty to sixty pounds; then there was a seine put in, and they started off.

Mr. MACY:

I have seen 2,000 pounds caught here in a day. George Mason sold what he caught in one day for $22.

Mr. SMITH:

Seven years ago the 28th day of June, I sold fifty-six dollars' worth, that I caught before 6 o'clock in the morning; I got eight cents a pound for them.

GEORGE CRABB:

I do not average more than two dollars a day, fishing. The greatest catch in one day this year was 206 pounds; I have not caught over 200 pounds a day but twice this year—once 201 and once 206. They were extraordinary days, and I fished from 3 to 4 o'clock in the morning till 6 o'clock in the afternoon. If I had fished as long a few years ago, I should have got more than my boat would carry. I have loaded my boat with sea-bass, but I cannot get any now; I think my average catch has been about sixty pounds a day, during this season. The season is best about four months. I used to catch blue-fish; this year I have not caught any.

Mr. SMITH:

I have caught twenty-four blue-fish with a hook and line; they are not worth fishing for.

Mr. C. H. BURDICK:

Four years ago last May I went off fishing, and caught 63 blue-fish in one school; that night my brother-in-law, who had a seine in Coddington's Cove, caught over five thousand pounds. The school went right up the river, and they caught them.

Mr. MACY:

When I first came here, there would be thirty or forty sail of smacks here for fish. There has been a great falling off until this year, when there are scarcely any. About all the fish caught here have been shipped from the steamboat wharf.

Mr. RECORD:

Mr. Swan's father told me that at the beginning of the present century scup were a new fish.

Extract from correspondence with parties near Newport.

"NEWPORT, R. I., *August* 4, 1871.

"About the 10th of October, in the year 1869, Captain Joseph Sherman and William B. Gough in three hours' fishing caught 250 pounds of tautog and 40 pounds of cod and sea-bass. Another boat occupied the same ground the same day, and caught 250 pounds tautog—two men fishing.

"WM. B. GOUGH."

"NEWPORT, *August*, 1871.

"DEAR SIR: Thinking you might wish to verify, or inquire more into the matter while here, I send you the statement of Captain Garritt, of Westerly, Rhode Island. He has known bass caught in June that weighed from half to one pound, that were first put into a pond, and, when taken out in October following, weighed six pounds. A boy living with him caught, at the mouth of a small brook, two miles above the fishing-ground on Pawcatuck River, a female tautog weighing about 5 pounds. It was very full of far-developed spawn. He thinks the spawn would weigh a pound. The water where taken was not over one foot deep. He also states that the light-house keeper, (not the present,) Mr. Pendleton, lost a bob fishing for bass at Watch Hill, that was taken next day with the fish in Long Island Sound. It was identified and returned to him.

"Yours, with respect,

"J. M. K. SOUTHWICK.

"Professor BAIRD."

"TIVERTON, *August* 11, 1871.

"DEAR SIR: I have been informed that you are collecting information about fish for the purpose of guiding Congress, if they see fit, to take up the question. If so, I should like to submit some facts to you about their increase, decrease, &c., that have come under my observation.

"This question is important, for it affects a large number of people, and there are large sums of money invested, and hasty legislation upon one-sided facts might ruin men, and all trouble might be averted provided the proper facts were presented.

"My opinion is that man is not an enemy of a salt-water fish. I mean by that statement that all machinery yet devised by man for taking fish does not perceptibly affect the supply, although there are many facts about fish, looked at superficially, that would tend to lead a man to a different conclusion. For instance, scup have disappeared from Narragansett Bay. Some say seines have been the cause, or traps. But squeteague have taken their place, and where, ten years ago, there were millions of scup, now there are almost none, but millions of squeteague. How does that square? If the traps destroy one, why not the other, for they both come the same course and both are caught in traps. But the most significant fact in relation to the squeteague question is, they don't come few at a time and gradually increase from year to year, but suddenly appear. Hundreds of acres could be seen any clear day between

Point Judith and Providence; and the same unexplained cause can be shown by facts of every fish that inhabit our waters. For ten years there have not been blue crabs about here. This year the water was alive with them about as large as a three cent piece, and probably in a year or two they will be as thick as they used to be when you could catch easy three bushels at a tide. Ten years ago there were twenty square miles of blue muscles off Hyannis. In a few years they disappeared.

"Tell me where I can see you, and I will come and talk with you. I should like for you to come to Round Pond, Maine, and I would see that you were shown this fish question as you ought to see it, by going among the fishermen and observing its practical workings. I would furnish you every facility, and I think you would like it. I shall be in New Bedford within a fortnight, and if you are to be in that vicinity, let me know, and I will find you if my business will let me.

"Write me, and send your letter to Round Pond, Maine.

"Yours,

"DAVID T. CHURCH.

"Professor BAIRD."

NAUSHON ISLAND, VINEYARD SOUND,
August 23, 1871.

Testimony of PETER DAVIS, of Noank, who has two pounds in Buzzard's Bay, on the northwest side of Naushon:

I have been here all the spring; got in about the first of May or last of April. A few scup were here then. They caught them westward of us before we put down. I think most of the scup had gone by on the 1st of May; they were the first fish we caught.

My idea about fish striking the shore is, that they strike in square from deep water when they find the water of a certain temperature. They run close to the shore, and, if the shore rises gradually, they will come in very close to it, into very shoal water. We have caught plenty of small scup, and they are plenty now. They are five or six inches long. We first caught these small ones about the last of June; none of them earlier than that. We get very few big scup now. I have made up my mind this year that scup grow pretty fast. I think a year-old scup weighs about three-quarters of a pound. We get some that don't weigh over half a pound that I think were spawned this spring.

I have fished at Montauk five or six years. We have caught a few stingarees here, but do not catch many now; it is late in the season for them, I think. We used to get them up at Montauk until the last of July and into August. I do not recollect but three kinds of stingarees caught here. We are not paying expenses now. We got some mackerel early, and we get a few squeteague. Blue-fish have been more plenty this year than last. They are a very uncertain fish, anyway. They are somewhere, of course, but they don't show themselves all the time. I don't think there is any greater variety of sharks and rays at Montauk than here. We used to get a silver-fish there that weighed forty pounds. The scales were two and one-half inches, and looked as if they had been plated. The fish was shaped a good deal like the salmon. They had a curious-shaped mouth, that seemed to have a joint in it, where the lower jaw slid into the upper one.* Squeteague eat scup either in or out of the pounds; they are as voracious as blue-fish. We get for

* Probably *Megalops thrissoides.*

blue-fish about five cents a pound; but we make the most on squeteague. We have taken 10,000 pounds of squeteague this year; we took 6,000 pounds at one haul in the middle of June. That was nearly the first run. The biggest squeteague we have caught, I think, would weigh ten pounds. A north wind or northeasterly wind is the best for fish here.

REUBEN DYER, at Mr. Forbes's farm, west end of Naushon:

We caught two or three scup a day; not so many this year as last. There are more little scup around the wharves near New Bedford than there are here. Squeteague are not more than half as plenty about here this year as last. We catch them up at Quick's Hole. When fishing for tautog, once in a while we would catch one. We use menhaden as bait for squeteague. Most are caught after dark. We used to catch a good many blue-fish at the bottom. All fish are scarcer this year than last. There have not been any blue-fish around this year, except very small ones. I have seen, formerly, this hole (Robinson's Hole) all alive with blue-fish.

Scup began to get scarce about here seven or eight years ago. The decrease was not sudden, but gradual. I cannot say it was the traps, exactly. I think the blue-fish destroy a great many fish; they eat up the little fish.

The men who have pounds here caught a few mackerel the first part of the season. They do not catch many Spanish mackerel; but a few bonito. I do not think shore-seines destroy the fish much; but some kinds of fish are destroyed by traps.

SYLVANUS WESTGATE, at Robinson's Hole:

I am out on a seining-cruise. I have a net of about sixty fathoms. I am not doing much now; catch some blue-fish and bass. I generally haul at night. I think I should not catch anything in the day-time. I have not caught a hundred scup in five years with the seine. I have not caught any bass this year that weighed over twenty pounds. I don't think they are half as plenty as last year; there is no kind of fish as plenty, unless it is menhaden.

Mr. DYER. I have caught three sea-bass this year. A few years ago I could go out and catch fifty or sixty.

Mr. WESTGATE. I think the traps destroy the fish; I don't think the seines do much hurt. We have seined ever since we were born; but a trap is a stationary thing, and if a fish is going by he must go in.

Mr. DYER. They catch more than they can sell in the traps. The pockets are sometimes crowded, and a great many die. This spring they could not get smacks to take the fish to New York fast enough.

Mr. WESTGATE. They need not try to stop trapping; they will run themselves out pretty soon.

Mr. DYER. The fish taken at the pound here are not worth $25 a day. Last year a man hired the privilege of the pound at Menemsha Bight, and he sold $1,200 worth in a week. Squeteague are not half as plenty this year as last. The scup, sea-bass, and tautog, when they come in in the spring, are full of spawn, ready to shoot. They have ripe spawn in them when they come into the pounds. I had some and dressed them, and found spawn in them so ripe you could not take out the spawn whole.

Mr. WESTGATE. I think blue-fish and squeteague kill about as many fish as pounds. A blue-fish will kill twice his weight in a day. A blue-

fish will go wherever scup can go, and they feed at the top more. They feed at the bottom at night.

Mr. DYER. I can tell you just my opinion about traps. If they did not catch the mother fish in the spring, when they come along the shores to spawn, I don't think they would destroy the fish a great deal. They should not be allowed to put them down so early. I think they should not be allowed to put them down before the 1st of June. By that time the bottom fish have got through spawning.

Squeteague come about the 10th of June; they come from the westward; they catch them at Long Island before we do here.

Question. What would you say of the plan of allowing them to fish at any season, but requiring them to draw up the net two or three days in a week?

Answer. That would be a good idea.

Mr. WESTGATE. I do not think Spanish mackerel have been around here many years; they were something new to me, and I had been fishing twenty years.

Mr. DYER. I never saw a Spanish mackerel till this year.

Mr. WESTGATE. I never saw a bonito till two or three years ago; I have not caught many this year. I think new fish are coming on to the shores, and if it were not for the pounds we would have them plenty.

PASQUE ISLAND, VINEYARD SOUND,
Club-House, Pasque, August 23, 1871.

PHILIP C. HARMON, treasurer of the club, thought it a gross outrage to have fish-pounds on the shore near. This pound was kept, he said, by New London men. There was a much larger capital employed in pound-fishing than he had supposed—between five and six millions of dollars. Fifty bass destroyed in the spring prevents a vast amount of increase.

PETER BALEN, a member of the club, said he understood that the trappers threw away, at one time, a large number of dead blackfish, (tautog.) There are not as many tautog as there used to be by nearly one in twenty. There is a great diminution of the groundfish. The bass are more scarce. I think the traps interfere with them very much. We had a law passed to prohibit drawing a seine on this island; but they draw a net every night, and if I were to go and try to stop them, they would insult me. I am persuaded the trappers do not make any money for themselves, and they perfectly clear the whole coast of fish. I think the great evil of the traps is, that they catch the fish in spring before they have spawned. I do not think the blue-fish diminish the other kinds of fish that I spoke of. They generally follow the menhaden.

Mr. HARMON. The blue-fish have very materially diminished along here within three years, to such an extent that when fishing off our stands we do not take more than two or three in a day. Out here I have caught as many as sixty in a day by drailing for them. Now we cannot catch any. The blue-fish and bass accompany each other, I think. The blue-fish chop up the menhaden, and the bass pick up the pieces. I don't think there is one blue-fish where there were fifty a few years ago.

Mr. BALEN. Two of us caught twenty-eight bass once, weighing from five to twenty pounds apiece.

THOMAS E. TRIPLER, a member of the club, said he had been here eight days, and had caught twenty-four bass, weighing from four to twenty-nine pounds. I think they are more plenty than they were last year.

MENEMSHA BIGHT, MARTHA'S VINEYARD,
EAST OF GAY HEAD, VINEYARD SOUND,
September 22, 1871.

JASON LUCE & CO., (the company consists of Jason Luce and Brother, Mr. Tilton, and two other men :)

Blue-fish are quite plenty near Noman's Land as late as November. We find little fish in the stomachs of blue-fish ; we have taken out small scup. I took forty-two scup about two inches long out of the stomach of one blue-fish, a year ago this summer, out at the eastward of Edgartown. The blue-fish weighed about three and a half pounds. Besides the forty-two that I counted, there were some so far gone that they could not be counted.

Menhaden average from 225 to 240 in a barrel. We caught this year 2,000 barrels, or about 470,000 menhaden. We caught over 100,000 mackerel ; not so many as last year. We began fishing about the 12th of April, and caught alewives first. We caught about 100,000 dog-fish this year. All fish were earlier than usual this year. Mackerel generally come from the 5th to the 10th of May, though we get some scattering ones earlier. Menhaden come next. Tautog come early, with the herring. We catch shad the last days of April. When we see blue-fish, we conclude the spring fishing is at an end. We generally catch them about the middle of June, going west. We see acres of them schooling off here. They are over in the Bay ten days earlier than here. Some come into the Sound through Quick's Hole. Menhaden are taken in the Bay before we see any here. We catch scup here just about the time they do at Saughkonet. I think a part of them come in by way of Saughkonet, and a part by Gay Head. Scup are around Noman's Land, and are caught there with the hook. We have noticed a good many young scup this year ; *never* saw them so before. This is the third season we have fished in the summer and fall, but this is a new thing to see so many young scup. I was up in Connecticut last week, and they told me the young scup were numerous there. The scup we take in the pound are spawning fish. We take them weighing from one and a half to two pounds. Many will not weigh over half a pound. We catch more of that size than of the large size. I have dressed scup that were not very large which had the red-roe in them, which we call ripe. I think we find spawn about as often in the medium-sized fish as any.

We have every opportunity of knowing what fish eat, and about their spawn, because we handle a great many. We can squeeze young ones out of a dog-fish any month in the year. Last year we caught a drum. We caught two salmon this year. We catch what they call sea-trout—not more than three or four in a season. We catch the salmon in May. We catch a few blue-fish, squeteague, and skip-jack, or bonito. We have caught 150 albicore at a time.* We have caught as many as 500 this year. They bring six cents a pound. We catch lump-fish in the season of all sizes, up to twenty inches long. They are as apt to get the first scup at Lombard's Cove as we are here.

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* *Orcynus thynnus.*

I suppose we catch more fish in our two pounds than are caught in all the other pounds in the Sound put together. We think this is because we are so near the ocean. When both pounds are in operation, we catch more fish in the eastern one. Later in the season we see schools of fish coming from the west.

We can judge something of the way fish are going by those that are gilled in the leaders. We have caught the conger-eel in the spring. They are a spotted fish, and have considerably large holes in the side of the mouth. We catch many of them every year. We catch the true cat-fish also every year.

Question. What would you rent your pound for by the month and man it—five hundred dollars?

Answer. If you would say five thousand dollars a month, we might talk about it.

Before we came here with our traps, the herring had begun to diminish up in Squib-Nocket Pond. But last year they could catch as many as they wanted—from five to ten thousand at a time.

Last year and the year before they caught more than they had in any year for thirty years. Scup began to diminish long before we put down pounds here. Summer trapping would not pay without the spring trapping. I have dressed tautog in the month of August chock-full of spawn.

Question. Would it suit you to propose to close the pounds for a certain time in each week; say from Saturday noon until Monday noon; and make the law imperative on all the pounds, so that no fish should be taken during that time by anybody; and with such penalties that it will be absolutely certain that the law will be enforced?

Answer. That would suit us better than to be stopped entirely. We would like that, of course, if we could not do any better.

Question. What would be the best way to prevent fish from going in the pounds?

Answer. Close the door; and if they went into the heart, they would pass right under.

We make a good deal of money on mackerel; and it is no worse for us to catch mackerel than for the mackerel-catchers. The money that we make on tautog and scup is a mere trifle. We make money on the fish that nobody pretends to catch with the hook. We have been in the pound business about ten years, and I do not see any diminution of fish of any kind. Mackerel last year were plenty with us.

There should be a pretty heavy penalty, in order to carry the thing through; and it ought to be so.

Question. What should be the nature of the penalty?

Answer. I should say put it pretty heavy, for we should obey the law.

Question. How much?

Answer. [All present agreed that $1,000 was not too much.]

Question. Would you advise a fine and confiscation of the equipment?

Answer. Yes, sir; that is a good idea.

Question. What would you think of requiring a license, in order to put down a pound?

Answer. I should like that very well.

Question. How far apart should the pounds be of two different parties?

Answer. About a mile.

Question. Would you say that, when a license to place a pound in

any given locality was granted, that there should be no change of location without a new license?

Answer. There should be no change to any great extent. It is not a common thing to change a pound from one point to another.

I think we should fare better to have the United States control the business than to have the State do it. We want all to be served alike in the fishing business, as well as other things. If we cannot fish, we don't want our neighbors to fish. If we could have our rights secured to us by a license, it would be better for us.

[All agreed that if it was a uniform thing to have the time of fishing restricted, it might be quite as well.]

Boston is the market for mackerel. We catch a great deal of bait to supply the cod and mackerel fishermen. We don't catch the kind of fish that the people are contending for after the 1st of June.

We never hauled our trap on Sunday, and are not disposed to do it; if the fish come in then, well and good. We have caught but few striped bass; perhaps sixty or seventy.

One of our leaders is 216 fathoms and the other 225.

About one hundred and fifty barrels of scup in a day is as many as we have caught this year.

Last year, on the 28th of September, mackerel were more plenty in this bight than we ever saw them. Our traps were not down then; we have never fished so late as that. But we propose to keep our traps down this year till the end of the season.* The fall mackerel are small. In the spring they are larger, and we get all the way from two to eighteen cents apiece for them.

The bill-fish, as distinct from the sword-fish, is found near here. The sword is smaller; the fin does not hook over like that of the sword-fish, but goes straight up; but not so high as the fin of the sword-fish. The sword is not so flat. There is a good deal of difference in the eating. You can see any quantity of them sometimes; but they are shy.

EDGARTOWN, MARTHA'S VINEYARD,
September 27, 1871.

This evening there were present at an examination of the subject of fisheries the following-named persons, who are employed in fishing, but who have formerly been commanders of ships, and several of them captains of whale-ships: Captain Francis Pease, Captain Charles Marchant, Captain Alexander P. Fisher, Captain Gustavus A. Baylies, Captain Joshua H. Snow, Captain Theodore Wimpenny, Captain Rufus F. Pease, Captain Thomas C. Worth, Captain Thomas Dexter, Captain John P. Fisher, Captain George Coffin, Captain Josiah C. Pease, Captain Leonard Courtney, Captain George A. Smith, Captain Richard Holley, Captain Grafton N. Collins, Charles F. Dunham, esq., Dennis Courtney, Henry B. Huxford, William Simpson, Holmes W. Smith, John Vinson, Thomas Dunham.

The persons who principally spoke for the others were Captain Francis Pease, Captain Rufus F. Pease, Captain Josiah C. Pease, and Captain George Coffin.

* They were kept down into October, but no mackerel were taken.—S. F. B.

Captain FRANCIS PEASE. Fish are getting a great deal scarcer than they used to be. A few years ago you could sit on the end of the wharf and catch fish enough before breakfast for a family. Any boy or old gentleman could do it. Now they are gone. The scarcity commenced when they began to put down the pounds. There used to be scup and tautog all through the harbor here very plenty, but now we can scarcely get any that are eatable; we have to go out of the Sound. Every year we have to go farther out.

I do most of my fishing outside. I have not noticed the harbor as much as the other fishermen, and do not know about there being young scup here, though there always are some. I was on the wharf fishing for cunners and I got two or three little scup.

There are no traps on the island this side of Holmes's Hole. Up at Menemsha they caught up so many fish that they could not dispose of them. We do not get blue-fish as plenty as we used to. There are a good many caught with seines. The boatmen think they have not done as well this year as before. Most of the fish caught here are shipped to New Bedford and New York. There are some thirty-five boats that are sending off fish. Vessels come in and take them—four or five of them. The majority of the boatmen sell to the vessels. The latest that I have known blue-fish to be caught was the last of October; but those are what we call the fat ones, weighing from ten to fifteen pounds apiece. We don't catch many of them, and those we want ourselves. Most of them are caught over at the island of Muskeget. I think the blue-fish spawn at the south. They are a warm-weather fish; the least cold will send them off into deep water.

Captain JOSIAH C. PEASE. We calculate that the blue-fish spawn here about the last of July and first of August. I have seen them when I think they were spawning on the sands. I have caught them a short time before full of spawn, and then for a time afterward they would be thin and weak. They do not get much fat about them till the last of August or first of September. They spawn on white, sandy bottom, right out to the eastward of this island, toward Muskeget. I have seen them there in considerable numbers formerly. All kinds of fish are scarcer now than they used to be. A few years ago we could get any quantity of them.

Question. What has made them scarce; has there been any disease among them?

Answer. Yes, sir. The disease is twine, I think. Fishing never killed out the fish.

When I was a boy we could catch as many scup right off the wharves as we wanted. I do not think there are as many fish caught with the hook and line as there used to be. We would catch them if we could get a chance.

It is only about twelve years since fish have been shipped in large quantities. Before that the market was nearer home, and no fish caught with the hook and line were shipped. Bass were so plenty in those days that we could not get more than three or four cents a pound for them; now they are worth ten or twelve cents. I recollect seeing one man, when I was a boy, haul up three thousand, that he allowed to lie and rot. Our boats could then get one hundred in a day quite frequently; large bass, too.

Question. But bass are not caught in the pounds, are they?

Answer. They are a cunning fish, and know enough not to go into the pounds after they have been in one once.

I do not know where the striped bass spawn. I have never seen any very young; none two or three inches long.

I never saw a young squeteague.

I have seen plenty of young rock-bass not more than two inches long.

The striped bass go up into the ponds and among the eel-grass, I suppose.

Question. Don't you think the blue-fish have something to do with making other fish scarce?

Answer. No. There have always been blue-fish. For thirty years they have been plenty.

Captain RUFUS F. PEASE. Blue-fish came in here before 1830. I recollect of hearing the old folks talk about blue-fish. I caught them before I went to sea, in 1824.

Captain GEO. COFFIN. I caught enough to load a boat in 1825. They were so plenty, I caught them just as fast as I could haul them in.

Captain FRANCIS PEASE. I have heard my father speak of the large blue-fish, weighing forty pounds. I think that must have been before the beginning of this century. They were all gone long before my day. The first that I recollect were small fish. The large blue-fish are not as active as the smaller ones. I think the blue-fish that are around in the summer, weighing five or six pounds, are the same as we catch now, which are large and fat.

Captain RUFUS F. PEASE. Blue-fish are growing plenty now away down toward Nova Scotia, and are growing less year by year here. The mischief of the pounds is, they keep the price down, and they cannot sell their own fish. I think they injure every man; I can see in the last ten years a great change.

Question. Why are fish so dear at retail?

Answer. That is all owing to the market-men, who have a compact among themselves that they will not sell below a certain price.

Captain FRANCIS PEASE. It makes no difference with us whether fish are high or low; they will not give us but about a cent a pound, while at the same time they keep their agreement not to sell for less than eight cents.

There were as many as twenty-five boats from the bluffs around here this year, driving off the fish from the shoals. They are not fishing-boats; but they come with a crowd of sail on, and they frighten the fish.

If fish were not caught any faster than they are taken with a hook and line, they would be plenty.

Captain JOSIAH C. PEASE. The pounds take all the breeding-fish that come into the shores. I saw in New Bedford, the first of May, large scup, full of spawn, and rock-bass. They were taken in the pounds, and could not have been caught with lines; it was too early.

Captain R. F. PEASE. They had so many tautog taken at Wood's Hole at one time that the net sunk and the fish died, and they had to turn them on the shore. They were chuck-full of spawn; large breeders in there, looking for a place to deposit their spawn.

Captain JOSIAH C. PEASE. Some of the farmers will have a pound, and go to it in the morning, and take out the fish and ship them, and then go to work on their farms. They do not follow fishing for a living.

Captain R. F. PEASE. The law ought to be uniform. One reason why the pounds were not stopped by the legislature of Massachusetts was, that the Provincetown people made a statement that they could not fit out their vessels with bait, unless they had pounds to catch it for them.

Question. Could they?

Answer. How did they do it before? They had the same facilities then as now. They used to send to Nova Scotia for bait; now they use only herring and menhaden for bait. Menhaden are getting scarce. This harbor used to be full when I was a boy; but it is a rare thing to find any here now, because they are caught up. They don't catch them at Saughkonet Rocks, as they used to. If they keep on catching them up as they have done, we shall have to send to California to get a mess of fish. We have had bonito here this year, and there have been more squeteague about this year than before.

Captain FRANCIS PEASE. When I was a boy, we used to catch squeteague very plenty. You cannot go off here now and get fresh fish enough for dinner and get back in time to cook it. You will soon have to go to New Bedford to get fresh fish. I used to go out at this time of the year and catch half a barrel, in a short time, of big pond-scup eight inches long.

Captain R. F. PEASE. Round Muskeget we used to do well catching the large blue-fish and bass, but now we cannot get any fish there. I am down dead against any fishing except with hook and line. A man who is rich can sweep the shore with nets, but a poor man, with his boat, cannot get any fish. The big fish eat up the little ones!

Captain J. C. PEASE. I think five hundred pounds is the highest amount I have ever caught this year in a day. Four years ago I caught 1,472 pounds in a day. I used to go three or four years ago and get 250, 275, and 280 fish in a day, but now it is hard work to get a hundred. They have been decreasing gradually every year for four or five years. Last year there was a great fall from the year before. I know there is nobody who goes over more ground for blue-fish than I do. I caught the first blue-fish this year the 29th day of May. Sometimes I get them as early as the 25th of May. We generally catch a few of the first when we are fishing for codfish at the bottom. We catch codfish till the last of May. We do not see them at all on the top of the water when they first come. We begin to see their whirls on the water about the middle of June. If the weather is warm, they will be here till the middle of October. I have caught them as late as the first of November. I have caught blue-fish that weighed thirteen or fourteen pounds. Blue-fish now are our main stay. If I could have my choice of the fish to be plenty, I would choose sea-bass. Scup are too small, unless they are very plenty; indeed, you could not make any wages catching them. I would like to have a law prohibiting the use of pounds and seines for ten years. Is not that fair? They have had a chance for ten years, and a few are monopolizing the whole fishing.

Question. What fish would be materially affected by seining besides bass?

Answer. As quick as frost comes, the bass go out into the rips, and we can catch them with hook and line. They follow the small fish out of the shallow water. The cold weather drives the little fish out, and the bass follow them. We never catch in the summer, in July and August. Last year, one day, I saw an immense number of blue-fish down beyond Cape Pogue. It was quite calm, and I could not catch one. There was a seine set there that afternoon, and hauled ashore about three hundred. That night a gill-net was set, and next day you could not see a fish. They were all frightened away. That was some time in June, I think.

Question. Would not they have gone off any way?

Answer. No, sir; you would see them month in and month out, if not disturbed.

Question. What do blue-fish eat?

Answer. They will eat everything that is living. We have a great many launces that they eat. They take young scup and squid. They eat a good many eels, too, and anything they can get hold of. [The general opinion was that blue-fish do not often eat eels.] The blue-fish eats off the tail of the eel.

Captain R. F. PEASE. You may go to work and dress 1,500 blue-fish, and I'll bet you won't find an eel in any of them. There is a time when, I think, they are spawning, when they will not bite at all, and they have not anything in them; but we generally find them pretty full. Eight or nine years ago, any laboring man could go down to the wharf and get as many scup as he wanted for breakfast, and then go to his day's work. They were good-sized scup; but now, if we get any, they are not fit to eat. Fourteen years ago, I could make more money catching blue-fish at a cent and a quarter a pound than I can now for three cents. I could sell them at three-fourths of a cent or a cent a pound, and make good wages at that. The vessels that come here now in the first part of the season offer two cents a pound.

NANTUCKET, *July* 18, 1871.

Testimony taken at Nantucket, July 18, 1871, being made up of statements by several persons engaged in fishing either with lines or nets of different kinds, Captain C. B. Gardner, Sylvanus Andrews, John G. Orpin, and Captain Winslow being the principal fishers with lines, and Mr. Snow, Gershom Phinney, William C. Marden, and Mr. Chapin using nets, the last two using hooks and lines also:

The testimony of those using hooks and lines only was substantially as follows:

Boat-fishing is nothing now. Blue-fish are not more than half as plenty as five years ago. They were not as plenty five years ago as they were ten years ago. They grew less after the use of seines and gill-nets began. That broke up the schools of fish that used to go around the island two or three times a day. Forty years ago the blue-fish were very small, about ten inches long. They were not here before that. Year by year they became larger, and in about three years obtained their full size. Up to this time blue-fish are scarcer on both sides of the island than they were last year, though early in the season they were more plenty.

The average catch up to this time has been less this year than last; but more have been taken, because there have been more nets. Fifty nets, probably, have been added this year, generally on the north side. These are visited every morning. They are from thirty to forty fathoms long. They will gill a blue-fish that weighs two pounds. Up to within a few years you could go with a boat anywhere in this harbor and get as many blue-fish as you wanted. Now they are driven out by the nets. They used to have spawn in them, but they don't now.

Mr. SNOW, who uses seines or gill-nets, said:

The 29th of May we caught the first blue-fish. We don't catch them as early with the hook as in seines. They came here late this season. About a hundred a day is a good catch this season. They weigh about six or seven pounds. In September we catch them weighing twelve to

fifteen pounds, getting twelve out of a hundred of that size. That is when they are passing back. We have caught some in the nets this spring that weighed ten pounds. We can catch blue-fish steadily throughout the summer; generally get some every day while they are here. When we get two tides a day we get more fish. They come in on the flood, and we take them when they are going out. We invariably catch them on the ebb. [It was here explained that the nets are set parallel to the shore.] The bait comes in-shore nights, and, I presume, they follow it in. They feed on herring and such like. They will eat all the scup they can get.

[The line-fishermen denied this statement, generally agreeing that they never find any pieces of scup in the blue-fish.]

Mr. SNOW. I have seen hundreds and thousands of little scup in them. They will pick up a crab, and when they cannot get anything else they will eat sand-squibs. I have found shell-fish in them, that they pick up from the bottom. On the line-fishing grounds the blue-fish do not eat scup, because they have spurs on them.

[It was generally agreed that they will eat small scup, and that they would drive away the scup, that run for protection into the eel-grass.]

Mr. ANDREWS. I think a large one would not run away.

Mr. SNOW. I have seen the largest scup in them, and even blue-fish in blue-fish. I don't think they waste any fish they catch.

Mr. WINSLOW. Nine-tenths of the blue-fish have no scup in them; but most of them have menhaden in them. There are no blue-fish here in the winter. They come about the 1st of June. I think there are fewer in the harbor this year than heretofore.

Mr. SNOW. We have probably two this year to one last year.

Mr. WINSLOW. We do not catch so many with the hook.

Mr. SNOW. We get some every day, but not so plenty as for a time back.

Question. How do you explain that there are three times as many in the seines and less caught with hooks?

Mr. WINSLOW. Those caught in the seines are small.

Mr. SNOW. We get as great a proportion of large ones as we did last year. I think blue-fish are more plenty in nets than last year.

Mr. ANDREWS. That is my explanation, too—because the nets have destroyed the hook-fishing.

Mr. WINSLOW. We used to get from two to three hundred blue-fish in a day through the season.

Question. Have the select-men given permission to put down traps?

Mr. MACY. They have not refused any.

Mr. SNOW. The pounds did not do well last year, because they were not rigged right. I never fished with a pound, and don't know anything about them. Fishing with pounds is much more expensive than with set or gill nets. It would cost $6,000 to put down a pound at Great Point. I do not think there are more than twice as many gill or drift nets this year as last. There are about fifty gill-nets out belonging to the people of Nantucket, and some fifteen or twenty to others, all on the north side of the island. They are twenty-five to fifty fathoms long, and from thirty to fifty meshes wide. The size of the mesh is from four and one-fourth to four and one-half inches, No. 15 or No. 16 thread. We get the largest blue-fish in the fall. The biggest one I ever heard of weighed twenty-five pounds. I have seen two fish that weighed forty pounds, one weighing eighteen and the other twenty-two.

GERSHOM FINNEY. I think blue-fish are more plenty this year than

they were last; they are very numerous this year. I think the large fish are more plenty, as well as the small.

Mr. ANDREWS. We don't catch any on the north side with hooks.

Mr. MACY. I went out with a party and got forty, a week ago. I know that the fishermen generally say they get fewer on the north side.

Mr. SNOW. I think more fish would have been caught with the hook and line if the price had been such as to suit the people.

Mr. WINSLOW. I have been up six or seven times, and have averaged, I think, two each time. I think we should have averaged more than that two years ago; perhaps not last year.

Mr. PHINNEY. I don't know where the blue-fish spawn; we see their young ones here. I have seen them alongside the wharf, about four inches long, a little later than the middle of July. They would catch the little launces and drive them about. The first school that comes is generally the largest.

Mr. SNOW. I caught the first blue-fish about the 22d of May.

Mr. PHINNEY said the 1st of June.

Mr. WILLIAM C. MARDEN and Mr. CHAPIN fish at Great Point. They fish some with nets and some with hooks. Blue-fish are more plenty than last year, at Great Point, by one-third. We were there last year, from April till about the middle of October, and we never got so many on the lines during the whole season as we have up to this time this year, fishing with the same apparatus.

Mr. ANDREWS. On the south side we have not caught so many, up to the present time, as last year.

Mr. PHINNEY. I think they came rather earlier this year than last.

Mr. MARDEN. We got them at Great Point about the 11th of June, first.

Mr. SNOW. We are southwest of Great Point. They always come earlier to the west, on the front side of the island, than eastward. As a rule there are larger fish outside. Sometimes they come in schools, sorted by sizes, and sometimes all mixed up.

[All the gentlemen agreed that they could not tell anything definite about the spawning of blue-fish. Some would spawn when they first came. Mr. Snow had caught them with spawn in them, the last of July. Mr. Andrews had seen them with spawn in them as late as the last of August.]

Mr. SNOW thought scup more plenty this year than last, at Long Hill.

Mr. ANDREWS said the whole place where they were caught was not larger than the room in which they were then sitting; and that was the only place where they can be caught, about a few rocks.

Mr. MACY. They are very particular about their ranges. When one gets the range of them exactly they can be caught in plenty there. We caught 150 there, the other day, one of which would weigh probably two pounds. But most of them would weigh not more than half or three-quarters of a pound. Last year it was almost impossible to get scup. We paid five and six cents right along to get even small scup.

Mr. SNOW. Last year, in September, we had a heavy gale, and after that, for three days, we had scup. I don't know where they came from. Generally they were on the in-shore side of the net. I think they are more plenty this year than last. Crow-fish, (black-bass,) generally so called about here, are more plenty, as well as tautog.

Mr. SNOW had seen no young scup three or four inches long. He had seen, that day and the day before, some about an inch long.

Captain BURGESS, an old fisherman, in response to a question about the use of nets, said: If it was expected that he should say gill-nets

made fish more plenty, such an answer could not be drawn from him very easily. Of the summer fish, the blue-fish and scup are the principal to be relied upon. Very few tautog are caught here. Blue-fish are scarcer, as a uniform thing, on the north side of the island than they have been. I fish on the north side of the island, from Great Point to Muskeget.

Mr. PHINNEY. I have seen more fish this year than in any two years before.

Mr. CHAPIN. There have been more than twice as many fish in the bay this year as there were last.

Mr. PHINNEY. I think they swim very low this year.

Mr. SNOW. I catch them lower than usual. I think they are after the bottom bait.

Mr. PHINNEY. We find them with eels in them, and every thing that lives at the bottom.

Mr. ANDREWS. I fish both ways. Twenty years ago we could catch enough at the top.

Mr. SNOW. Twenty years ago there were no nets belonging to Nantucket people, but they came here from Cape Cod and fished.

Question. Might we say that, upon the whole, the blue-fish are more plenty this year than last; but that, in consequence of their swimming lower than usual, they cannot be caught with hooks?

Mr. PHINNEY responded affirmatively, others not answering.

Mr. BURGESS. I should like to see some one go from Tuckernuck to the Point and get ten fish a day; whereas ten years ago you might get a hundred. I don't know the cause of the decrease; I think it is the nets. I have seen acres and acres along Great Point, but they would not bite.

Mr. ANDREWS. I think that is about the time they are spawning. I have seen them when they would not take the hook anyhow, perhaps for an hour, and then they would bite.

Mr. PHINNEY. We find plenty of spawn in the blue-fish this year; but not so many as we did at first; about the 10th of June we found it most plenty. We find now more males, generally, than females.

Mr. BURGESS. The roe of the female is yellow; that of the male is white. I do not know where blue-fish spawn; I never saw any of the eggs floating on the water. I think the females deposit their spawn, and then the male deposits his on top of it. I am very much opposed to nets of all kinds; I think they are a general loss and disadvantage.

Mr. SNOW. I don't know what the fish are going to bring this year. Last year they sold for about $8 and $10 a barrel. I do not send any fresh fish, but salt them. We send the salted blue-fish to New York and Baltimore. A barrel holds 200 pounds, which would make them worth about four to five cents a pound.

Mr. BURGESS. I think the scup, on the whole, are more plenty this year than last, but they are small; we do not get large ones, as we used to. The small ones are just as full of spawn. We find scup, not more than two or three inches long, with spawn in them. It appears to be perfect. Blue-fish a foot long will spawn. I got some to-day that I think were a foot long, and they had spawn in them. I think it is wrong to this whole community to have pounds.

Mr. SNOW. I think the blue-fish have used up the bait, and are going away to seek it. There used to be herring and menhaden plenty, but they are gone now. We do not find as many menhaden and herring in the blue-fish as we did in June.

Mr. ANDREWS. There has been more bait passing this island this year than for a long time.

Mr. BURGESS. The menhaden come in the spring, and then again in June, and pass by and go into deeper water, where it is cooler, and come back in the fall.

Mr. PHINNEY. There have been more mackerel here this year than last. There has been only one net for them. This was a special net, smaller than the blue-fish net. There have been more schools in the bay this year than last—large mackerel, that would be called large "threes." They were spawning when they went through. We never catch any small mackerel in nets. Cod-fish are around here in the spring and fall. They are gone now. They spawn here in the fall. We find spawn in them in October and November—very full; never, or very seldom, in the spring.

Mr. HOLMES had fished for cod on the Banks, and had found spawn in them in July there; sometimes got a bucketful, in latitude 45°. They do not appear to have any spawn in June, and we catch only a few female fish that have spawn in them. The Bank cod are a different kind from the shore cod. No shore cod are found with spawn in them except in the fall. I have seen a cod that weighed one hundred pounds—more than five feet long.

Mr. BURGESS. We once caught, on the Georges, 1,100 fish in one day, and they made 110 quintals of dried fish.

Mr. ANDREW thought cod as plenty as they had been. The shore fish bring about twice as much as those from the Banks. Take them right through, and they will not weigh four pounds each. We have a very large school here in the winter that will not average more than a pound and a half apiece.

Pollock are very plenty here, but they do not bring much. They come from the last of April to the first of June. They have no spawn in them then. I do not know when they spawn.

Haddock spawn from the last of October to December.

Halibut are not caught much about here.

Squids are plenty; they are not used.

Dog-fish are caught; many use them. They are not around here much at this time of the year.

Mr. BURGESS. The blue-fish were later than usual this year; I think two weeks later.

Mr. SNOW. We caught the first blue-fish the 30th day of May.

JULY 19.

SAMUEL H. WINSLOW, in 1870, June 17, went up about Tuckernuck and caught 130 blue-fish; on the 18th of June eight nets were set there; on the 22d he went there fishing again, and got only one fish. The nets, in his opinion, had driven them away, (to the devil, he said.) He thought the nets were driving the fish from the island.

GEORGE WINSLOW. Ten or fifteen years ago we could catch as many scup as we wanted anywhere around in our harbor. They were around the wharves; they are a salt-water fish altogether. Now we can catch scarcely any; it would not pay to go after them. It was so with bass. Ten or fifteen years ago we could go out here and load a boat with bass in a short time, weighing fifteen or twenty pounds. They commenced seining; and now it is very rare to catch bass. Bass and scup are pretty much used up; and the blue-fish are going out at about the same rate; they are driving them away as fast as they can. I have caught 140 bar-

rels in a season of blue-fish at Great Point. Then they commenced netting in the bay with seine and weir and every way in which they capture fish with nets. The second year after they commenced they had a net at Great Point, and I could not get anything to pay at all. Mr. Snow was with me then, and he has had to leave it and sell his fish-house. I presume a man could not get ten barrels of blue-fish in a season now. The nets alter the course of the fish. I think the nets use them up in a measure, and they drive them away. The blue-fish are not as plenty on the rips anywhere outside; they don't begin to be. I think about fourteen years ago they were the most plenty; then they commenced netting, and they have fallen off. I have stood on the south shore and loaded a cart in a short time, catching them over the surf; but now you could not catch half a dozen in the same time.

The scup and striped-bass are used up almost entirely. They went at the scup on a larger scale. Four or five years ago they commenced seining scup, to take them to the New York market. Our fish come from the south; and the scup and other fish, as the temperature of the water becomes right, come in and go eastward. They seine them in almost any depth up to eight or ten fathoms. They seined scup in the early spring, as they were passing. I have known as many as six hundred barrels seined at one haul, by a man named Lamphear, up near Tuckernuck Island, and he took them to New York. They were taken on the muscle-beds, at any time in the season for them. I think the scup spawn with us, because in July you begin to see small scup—we did years ago, but don't now. Years ago old gentlemen used to go and sit on the wharf, and in a short time catch a basketful; but one may sit there now from morning till night and not get one. The blue-fish are not only scarce but small. This same Mr. Snow has fished with me with a hook for years, and he was drawn away because he could not catch enough.

Most of our blue-fish are passing fish, and in a month they will be down east of Cape Ann. Year by year they go away eastward further and further. There are no pounds on Nantucket; they do better with gill-nets, and depend entirely on them.

Blue-fish are very destructive to drag-nets. The reason fish are so cheap is partly because they run in a great many from the provinces, and blue-fish generally follow the mackerel in price, and there are still many last year's mackerel on hand. Where we used to catch five or six hundred barrels of blue-fish in a season, off Great Point, we cannot now catch a barrel. As soon as the harbor is strung with nets the blue-fish leave. All fish have their homes, and a class of fish will make Great Point Rip their home if not driven away. The fish strike our shores to the westward, the herring coming first, then the mackerel, the blue-fish, and scup, and all coast along down eastward.

Question. What remedy ought to be applied to make the fish more plenty?

Mr. WINSLOW. Take the seines out directly; I do not want a net in the waters in any shape or form. If you want to save the fish, you must take the nets out. Any man who has observed, will say that the fish have depreciated very much in the last fifteen years.

The principal food of blue-fish generally is menhaden and squid. They can get menhaden or mackerel all the season through. Sometimes they will leave our shores for a few days and go off south of the island, and when they come back they will be full of mackerel. I never saw any cod-fish in them. They will eat flat-fish from the bottom. The menhaden are very scarce now, and I think we shall lose them, too, very soon, because they are using them up for oil. In this month, and

from the 20th of June, the ocean used to appear to be literally covered with menhaden. Now there are not a quarter as many as there used to be. People think they are plenty because, by using a purse-net one or two hundred fathoms long, they can purse several hundred barrels at a haul. Menhaden spawn in all the little bays as they pass along the coast. They go into some rivers sometimes. I think they spawn early in the season. I have seen schools of young menhaden in the fall, but I do not recollect seeing any lately.

I think the scup spawn in some still places in our harbor. When we first catch them the spawn is very fine, and about the latter part of June they begin to lose the spawn. Scup feed on clams and muscles.

Mr. GEORGE F. DUNHAM. I have stopped at anchor over night in two fathoms water, and in the morning have found scup-spawn sticking to my rope. Herring spawn in the grass. I never found a scup in a blue-fish nor an eel. Menhaden and squid are their principal food.

Mr. WINSLOW. Sea-clams were not here until about three years ago. I first observed them by seeing the ducks over them. Four years ago, perhaps, there was a bed three miles long of little ones, about a quarter of an inch long, and the ducks found them and fed on them. The second year, also, the ducks came, but the clams were pretty large for them to swallow, and the third year they did not come.

Mr. DUNHAM. It is not the scup they catch that makes them so scarce; it is the spawn they kill. I have caught spawning scup and have sold the spawn—quarts and quarts. Scup bite here when they first come; blue-fish will not.

Captain GARDNER. Have been on the south shore of the island eight years; have never caught any scup there. I catch codfish, haddock, pollock, halibut, and plaice, which looks like a halibut a good deal. The plaice-fish weigh sometimes twenty pounds. They are as good a fish as the halibut. Flat-fish are much more scarce than they used to be a few years ago.

I catch a good many dog-fish. They are on our shoals. I went off the 6th of June and caught them on the 10th. In six weeks I have caught about thirteen hundred. They grow there four feet long; will average three feet. I have caught but few blue-fish, and those when fishing for cod-fish on the bottom. I do not think the blue-fish stop there at all. In the fall of the year I have no doubt there are many mackerel about there, for you see fowl and fin-backs, porpoises and gannets, and I think they are after mackerel.

Mr. DUNHAM. In the deep holes out here in the pond, I used to go with my boat and throw a stone overboard to give the scup a start, and then I would throw my dog over, and so I would follow, and drive them up to the shore and clear out of the water. They would spring out on the bank, and I have caught five hundred at a time in that way.

Mr. MACY. Within ten years I have seen boys go to the wharf and get scup, as many as they wanted, but for the last five years we get them only at Long Hill.

HYANNIS, MASSACHUSETTS, *June* 29, 1871.

Captain ALMORAN HALLET:

I have been fishing off the coast here for twenty years. The number of fish has decreased very much, and I think the decrease is due to the pounds. It is not for the want of proper food, for there are a great many shell-fish and muscles here, and the fish that we catch are full of

them. There is as much food for the fishes here now as there was twenty years ago. We never used to catch the sea-clams as much as we do now; they are taken with rakes for the market; they are taken in water from six to twelve feet deep.

Blue-fish are much more scarce here than they have been. I do not know where they spawn.

Scup are not a fourth as plenty as last year. I think they spawn somewhere in the Vineyard Sound; they used to spawn in this bay; twenty years ago you could see schools of the young in the fall, all about in the bay; they have not been seen so for four or five years. We begin to catch scup usually about the 10th of May. They could not be caught with traps any earlier than they are caught with hooks. When we catch them they are full of spawn. I caught two this spring that weighed 7½ pounds; I never caught any larger.

The matter of fishing is one of great importance to the people here; many get their living by it. In these places, Barnstable and Osterville, there are one hundred boats employed in the business of fishing, which would represent more than a hundred families. If the fishing is broken up, the people will have to go to sea or to work on the land. Most of them are old men, and, like myself, have no trade. I do not know what else I could do. The biggest part of the men who have been in the fishing business have no trade, and must fish or go to sea. It would affect the sail and boat making business, too, if the fishing were to fail; they cannot get half price for their boats.

The business is falling off, year after year, worse and worse, for six or eight years. I have been off here and in the course of a single forenoon caught 800 scup that would weigh five or six hundred pounds; but now I have not caught fifty pounds in this whole spring, and I have been out every day since the 1st of May. I have not averaged a pound of scup a day, fishing right on the same ground where I used to take so many. Smacks that used to come in and get five or six hundred pounds in a day, do not come at all now. I lay it to the pounds.

The diminution began about ten years ago, and there has been a falling off every year; so that I have not got more than a quarter as many this year as last; and it is the same with others.

There are no pounds right about here. The fish come here a fortnight earlier than at Nantucket. Scup and bass follow the shore. They used to catch scup near Saughkonet so plenty that they sold them for ninepence a barrel. They are never caught east of Sandy Point.

We always regarded this as the great breeding-ground for scup; they always had spawn in them when they came, but in October they had no spawn in them.

They used to come from New London, and eighteen boats would load a smack in a day.

We got two cents a pound for scup this year, and two now for blue-fish. Last year we got two to the 1st of July, and then three. Ice was generally scarce last year, and, as we had ice, we got better prices than some others.

When they were as plenty as at one time we could not give them away.

If the pounds stop the fish from coming along we shall not have any to catch.

There is no need of pounds to get bait for mackerel and cod-fishermen, because we can get all the bait that is wanted with purse-nets, the same as has been done before.

Menhaden are scarce here now. They spawn here in these waters.

I have seen plenty of little ones here in September and October. We do not get any mackerel here with the hook.

We used to get a great many striped bass in the bay here in the month of May. They do not stay here in the winter, and are only caught in May and June, and then again in September.

It is not true that the more pounds there are the more fish; the more pounds the less fish. There is not a boat fisherman in Hyannis but knows that pounds are the cause of the fish being so scarce here. I think they catch our scup about Saughkonet, in Rhode Island. They get them sooner at Saughkonet than at Vineyard Sound, and about a week earlier at Waquoit than here.

This year the scup came here first, on the 22d day of April, which was about two weeks earlier than usual.

We send most of the fish caught here away to market. The blue-fish are sent to New York. Many people around here have not had a scup this year.

A few Spanish mackerel are caught here in the fall in nets; they are never caught with the hook. None were caught until within five or six years.

There are no skip-jacks here. I have not seen any stingarees here

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HYANNIS, MASSACHUSETTS, *June* 29, 1871.

ALEXANDER CROWELL:

The fishing business has gone down so that it is not more than one-fourth of what it was four years ago. The pounds take the whole schools. They are killing all the spawn and will thus kill the breed. I am quite sure it is the pounds; it is plain enough. The fish all come here from the west through Vineyard Sound. Six or seven years ago, the New London smacks would come here and eighteen men would load a vessel every day, carrying about five thousand pounds—about one thousand five hundred fish. They have now given up the business, they get so few.

The scup used to stay till the last of July and then go away, and come again in September; but the big ones did not come again till the next spring.

The blue-fish came here about thirty-five years ago. We catch sea-bass here, but very few compared with what we used to do. The pogies have gone also. We get very few Spanish mackerel. The menhaden are also more scarce. The blue-fish feed on menhaden.

The scup spawned in the Sound here.

HYANNIS, MASSACHUSETTS, *June* 29, 1871.

JOSEPH G. LORING:

The number of fish has decreased here very much within the last ten years, since I first began to deal in them. The fish taken here are principally caught with the hook; never taken in pounds. We think that the pounds keep the fish from the shores; we do not get fish in-shore as we used to. Pretty soon after the pounds were first put down we began to notice a decrease in the fish, and whether the pounds break up the schools or what the trouble is, we do not know; but we know the fish are much more scarce than they used to be.

Scup we used to get in the Bay, generally full of spawn in the spring, and in old times we could get them till October; but now it would be about impossible for a man to get half a dozen, where ten years ago he could get two or three hundred. They have become less and less every year. This year, as compared with last, I do not think there is more than half a crop. For the last six years they have grown less and less.

We think the pounds cause the trouble. We think these grounds are the place for the fish to spawn. This seems to be the home of the scup, on this sound here. They are never caught in Barnstable Harbor; but the pounds off that harbor get bass and blue-fish. The general impression about here is that the pounds injure the fishing; and if the question of having pounds or not was put to vote in this county, seven-eighths of the people would vote against them.

Shad used to be taken in the pounds, but for some years I have not seen a box of shad on the shore.

There are not more than one-third as many persons employed in connection with the fisheries on the shore as there were five years ago. Those who have lost their business of fishing have gone away. There are three places in the village of Hyannis where the fishermen bring in their fish to be sent to New York to market; and they now bring in at each place about a ton a day. At each place about sixteen boats are employed. We give two cents a pound this year, but vary some according to the market. We used to give three and four cents a pound.

HYANNIS, *September* 18, 1871.

CHARLES H. WALLEY:

I have always lived here, and have followed fishing the last three years, with a boat. Blue-fish have not been caught more than half as plenty this year as last.

The highest price paid by dealers here for blue-fish was two cents a pound, unless for a few days they may have paid three cents.

Very few blue-fish are caught now; only one or two in a day.

Of bottom-fish (scup, tautog, and bass) they get from twenty-five to seventy-five pounds a day, in good weather.

Very few rock-bass are caught here.

Scup have not been near as plenty this year as last. June is the best time for scup, but this season there were very few.

TIMOTHY CROCKER, (a dealer in fish:)

Blue-fish have not fallen off in number as much as other fish. I think the pounds have had a tendency to make fish scarce; also traps and seines. I do not think blue-fish will trouble scup or rock-bass very much. We used to find menhaden and squid in the blue-fish in the spring.

Scup and sea-bass have fallen off very much within the last five years. I have not seen any more show of little scup this year than last.

Four years ago Mr. Loring and I loaded a vessel with sea-bass in one day, and had fifty barrels apiece to head-up and send to New York, besides. They were all taken with the hook.

I have had about twelve regular boats fishing for me this summer. I think they averaged about one hundred pounds a day during the season. One day I had 9,600 pounds brought in. I had more fish in 1869 on

account of being in company with another man who was doing something in the business. My average this year was about fifteen boats. One or two of them had two men in them.

Account of Mr. Timothy Crocker's business for the following years:

	Boxes.	Barrels.
For 1867	180	410
For 1868	174	382
For 1869	260	394
For 1870	170	215
For 1871	190	172
Total	974	1,573

Each box contained 300 pounds, and each barrel 150 pounds.

974 boxes	292,200 pounds.
1,573 barrels	235,950 pounds.
Total	538,150 pounds.
Supposing each fish weighs 5 pounds	5)538,150 pounds.
	107,630 fish.

J. G. LORING, (a dealer in fish:)

I had as many as sixteen or eighteen men employed this year; on an average about fourteen men; and the same for the last four or five years.

Scup and bass have been falling off every year for many years. Scup were never known on the east side of Cape Cod. With twenty-five boats we loaded a vessel one Saturday with big sea-bass. We got one and three-quarter cents a pound for them. The next year we got dispatches not to ship sea-bass and scup; they would not pay the freight.

Scup are not caught on the south side of the Vineyard. This is their natural cruising-ground. I do not think the scup go back in schools in the fall, but go just as it happens.

Spanish mackerel are rather falling off here this year. Three years ago they were most plenty. The first I ever saw was five years ago; but they were much more plenty the next year.

Squeteague are increasing here. They are caught where blue-fish are caught, drailing, and while fishing for blue-fish.

Account of J. G. Loring's shipments of fish for the following years:

	Barrels.
For 1866	552
For 1867	612
For 1869	694
For 1870	799
For 1871	567
Total	3,224

In 1866 twelve men were employed in fishing, and in subsequent years an average of fifteen men. The barrels contained 150 pounds of fish each.

[Reducing the above to pounds, there are found to be 483,600; and on the supposition that each fish weighs 5 pounds, there are 96,720 fish.]

Captain HETSEL HANDY:

You may call on anybody on Cape Cod, and you will find he was brought up to go to sea. There was nothing else for us. Steam has now taken the lead; and we must either take our families and go away, or else something must be done to enable us to live here. With a weir two or three men can catch more fish than all the other fishers on the coast. They ship off a hundred tons a day to New York, and they must be used up or spoil; whereas if they were caught with a hook and taken care of they would be good, healthy food for men to eat.

I don't know of any other way than to stop the pounds wholly. The pound-men will not be satisfied with taking up their nets two days in a week. The decrease of fish this year is 50 per cent. Fishermen who have been in my employ two years say they used to fetch in five hundred pounds of fish in a day and get a cent a pound for them. Now they go out and try from 2 o'clock in the morning, and come in at night with one or two fish; and some come with no fish at all. Twenty boats will not bring in more than two barrels. It seems to me the men have not made seventy-five cents a day; and they get up at 1 or 2 o'clock in the morning and are off at the "Bishop's," or some other fishing-ground outside, when day breaks.

We have paid two cents a pound for blue-fish, and have lost a quarter of a cent a pound.

I ship to Baker & Co., J. W. Miller & Co., and Crocker & Haley. I sell some, too. They don't lose anything. I sent two boxes of blue-fish at the same time; for one I got $12, and for the other a dollar, or less.

I have heard men solemnly swear they would destroy the pounds and everything connected with them that they could lay their hands on before they would submit to have the maintenance of their families thus taken away.

I think Government does not do what it should to protect the fishermen in their trials to get a living.

I have handed a man a quarter of a dollar, and even less, for his day's work in fishing; and they would say their arms felt as though they would drop off. It is a hard case anyway. What are they going to do next winter? If they are well they may keep out of the poor-house.

There are a good many mackerel-fishermen who go from here.

There are two weirs in Harwick; four this side of Monomoy.

Blue-fish like squid very much; they drive eels clear up the creeks. The first blue-fish caught are caught at the bottom, while fishing for scup. I never saw any scup in blue-fish. I have found a whole menhaden in the stomach of a blue-fish.

Gill-nets never ought to be set in these waters. The fish die in them and drop around, and that frightens away all that kind of fish. Two or three men about here have had weirs for thirty years; and they say that if they cut up a shark and strew the pieces around they are not troubled with sharks any more.

If the work is given up to the pound-men, I do not know what will become of the fishermen. It seems as if they cannot exist together—the rich or the poor man must have it.

I think 100,000 blue-fish have been taken about Hyannis this year.

I have not seen a large scup in two years. I shipped some of the handsomest blue-fish I ever saw to New York. I gave a man $20 for a thousand pounds, and I sent them in boxes, for which I got $6 33 a box, containing three hundred pounds!

The blue-fish are not so plenty as they were last year.

I have had a single man catch 618 pounds in a day, for which I paid $12 36.

I have been told by men that saw it that this year there were twenty carts loaded with fish at Saughkonet to be carried off for manure. The fish had gone there to spawn, and after spawning, if not caught, they would go eastward. All the fish caught there are those that go there to spawn. They cannot be caught there after they have spawned.

I paid to Eleazer Baker for six days' fishing last year $59. He caught scup, tautog, and a few bass. I don't think he has made half the money this year that he did last.

Seines scare blue-fish all away.

HENRY LUMBERT, (Centreville, near Hyannis:)

I was once interested in a trap, but use a net altogether now. We used to catch menhaden mostly. I have shipped this year about 110 boxes and 120 barrels from four boats. They were pretty much all blue-fish.

I have not sent ten barrels of scup. We got about fifty Spanish mackerel in all. We caught one the 23d of July this year, and last year the 15th of July. We took the last we caught about the last of August. Most of the Spanish mackerel were sent to the Parker House, Boston. We got from twenty cents to a dollar a pound.

No fish are as plenty as they were a few years ago. I suppose the traps and pounds, and their being caught up, makes them scarce. Eleven years ago we could catch any quantity; but we were not much better off than now, for we could not sell them. We got from $15 to $20 a box of 300 pounds; this year they will not average over $6 a box. Blue-fish are so destructive I have told the fishermen that Government ought to pay a bounty of a cent a head for every blue-fish. We drive blue-fish pretty hard here.

Spanish mackerel were first caught here five years ago. I caught the first, and sold what I caught in two nets for fifty cents a pound.

I think the schools of fish are broken up at Saughkonet. We have caught less fish this year than ever.

We used to sell to smacks eleven years ago, and got a cent a pound; we never shipped any then. But we salted fish then. I salted fish for several years. Blue-fish are not salted much now here.

The prices were better this year than they were two years ago, but not so good as last year; that was because ice was scarce last year. There are too many fish caught and sent to New York.

WOOD'S HOLE, MASSACHUSETTS, *July* 6, 1871.

Captain EDWARDS:

SCUP.*

I have lived in this place thirty-five years, and have followed fishing more or less since I was a boy.

* The numbers are those corresponding to the queries on page 3 of the present report.

2. Not found here except from May till October, varying a little as to the time of coming and going, according to the season.

3. They used to be more plenty in June than any other time, and that is about the time when scup first take the hook.

4. No more abundant.

5. Diminished, so that there is scarcely one scup where there were a hundred ten years ago.

6. Have been caught beyond the increase, in nets.

8. Three pounds; the average, including spring and summer fish, about three-fourths of a pound. The large scup come first, and the little ones follow them.

10. The female is the largest; but probably there is no difference except on account of the spawn.

11. They come from the southwest, following the shore from Watch Hill or Point Judith, into Buzzard's Bay, generally swimming two or three fathoms under water.

14. A few scattering fish are caught about the 10th of May; this year a few were caught in April, the season being earlier than usual.

15. They leave in October, and by degrees; once in a while one is caught as late as the first of November

16. They come regularly, with a decrease in numbers from year to year.

17. The larger fish come first generally.

18. Both together; they spawn within five to eight weeks after they first appear.

19. Neither will take the hook; they appear blind at first.

21. Swim low; never seen by the ripple on the water.

22. They come in-shore on the flood-tide, and off with the ebb. In former times I have waded in and driven hundreds ashore and killed them with nothing but a stick.

23. I have never known it to happen.

25. No.

29. The different sizes come together.

30. Gravelly bottom; rather in currents.

31. Found at all depths, to ten fathoms.

33. No; not after spawning.

34. No.

35. They feed on shell-fish.

36. Not at all, except that the spawn may be eaten.

37. Crabs, and other small shell-fish.

38. No.

39. Not a great amount; not voracious.

40. Not in breeding-time; but usually in the latter part of the season there is a difference in color in both sexes, according to the color of the feeding-ground. On light, sandy bottom they are invariably light-colored; and on rocky bottom, dark.

41. None.

42. By catching the fish while going to their spawning-ground.

46. They always spawn in grass, and prefer some current caused by the natural ebb and flow of the tide.

50. Near the bottom.

51. Yellowish.

63. The parent fish does not devour them; but eels and other fish eat the spawn.

64. Very few now seen anywhere.

68. No.

70. No.
71. With the hook; mostly by nets and pounds. Clam and squid are the best bait for the hook.
73. Taken in nets most in the month of June; with the hook through the summer.
74. A man may now catch four, or he may catch a dozen in a day; but at any rate, so few that no estimate can be made.
76. They are caught two or three weeks earlier in nets than with the hook.
77. The flood-tide is best for fishing.
78. Sent to New York and Philadelphia.
79. Good; best when newly caught.
81. Very extensively.
82. Probably none are now salted, since so scarce.
83. Not used for manure now. It was formerly; but is now too scarce.

BLUE-FISH.

They come about the 1st of June and remain till the middle of October; most abundant in June.
4. There are more pounds of blue-fish caught now than of any other kind.
5. Diminished.
6. I think they have extended their cruising-ground to the east, as they do not find the bait that they used to.
7. Diminished more than half; probably three-fourths, so that there is not more than one-fourth as many.
8. Sixteen pounds; the average of the first run, which is the largest, seven pounds; the later runs will not average over two and a half pounds.
10. I think not.
11. They seem to come more directly from the sea, and from the eastward. They are caught at Watch Hill before they are found here. Thousands of them go outside of Nantucket, following the mackerel and menhaden.
12. No particular route.
14. They follow along one after another, the largest coming first, generally following near the shore, and come in from all directions. Most plenty about the middle of June.
15. At different times, never breaking up the schools.
16. Rather regular; but constantly decreasing in numbers.
17. The largest come first and leave last.
18. They have no spawn when here.
19. They always will take the hook if they have the right kind of bait—any kind of fish—a good piece of fresh herring or menhaden is good enough for them.
21. Swim both high and low; they show themselves at the surface, and attac[illegible] birds.
23. No.
24. No.
30. In currents; generally on sandy bottom where the water is not deep, on what are called "rips."
31. From two to five fathoms.
32. Not very warm.
33. They keep together in this vicinity.

34. The horse-mackerel* and the porpoise; nothing else troubles them.
35. Voraciously on most kinds of small fish, squid, herring, menhaden, smelt, &c.
36. Very slightly.
68. No.
70. No.
71. In nets, pounds, and with hooks; the best bait being menhaden, herring, or squid.
72. Pounds and gill-nets.
73. Taken in nets from the 1st of June till the middle of October, and during the same time with the hook.
74. Not a regular business here.
76. No.
77. Most on the flood-tide.
78. Sent to New Haven, New York, and Boston, and used here more or less.
79. Good when fresh; and when salted equal to No. 1 mackerel.
80. Only a short time.
82. Salted to a considerable extent.
83. No.

TAUTOG.

2. From first of May to the middle of November. Most abundant in May and October. In the summer season they are in the grass, and do not bite well.
4. Rather more abundant than other fish.
5. Decreased some; not so much as other fish. They are not exposed so much to nets, as they do not make any long journeys.
7. Nearly one-fourth.
8. One remarkably large, twenty-two pounds; generally the largest, twelve pounds; and the average, not over two pounds.
9. I once tried an experiment with one that weighed half a pound, putting him into a lobster-car, where he had plenty of room and plenty of food, there being three hundred pounds of living lobsters with him. He was kept in the car from the 1st of May to the end of October, six months, when he had destroyed all the lobsters, and weighed three-quarters of a pound! Thirty-two years ago I put some thousands of small tautog in the pond, some of which staid there five years, but none were caught weighing over two and a half pounds, and they had one year's growth, at least, when put in the pond.
10. They do; the female is shorter and thicker than the male, and generally the largest.
11. They come directly in from the sea.
13. They go out to the mouth of the sound, far enough to prevent being chilled and frozen to death, in water from fourteen to twenty fathoms in depth.
14. They do not come or go in schools, and are first seen among the rocks. The first fish are the largest.
16. They appear regularly, never failing unless killed by the frost.
18. They spawn in June.
19. They will not bite when they first come in.
20. Within ten days they will take the hook.
21. They swim low, on the bottom nearly.

* This is the Tunny, (*Orcynus secundidorsalis.*)

22. They work in-shore on the flood, coming among rocks after crabs.
23. Yes.
29. They are found all together.
30. They prefer a current, from one to four fathoms in depth, among rocks; found sometimes much deeper.
33. They do not travel in schools.
37. Shell-fish entirely, muscles, crabs, lobsters, &c.
41. They usually go among the grass for spawning.
42. No.
46. In June, in bays and harbors, among grass.
50. Near the bottom.
63. Eels probably destroy the spawn as much as anything.
64. Usually in the grass, near where they are spawned.
68. Very cold winters kill them sometimes, so that they are found on the shore outside frozen, on Noman's Land and Gay Head. This has happened twice in ten years. Thousands have been destroyed in this way. They will freeze under water, the inside being a bunch of ice.
71. Caught with nets in the spring, and then with the hook. The hermit crab is preferred by them; crabs and lobsters are next best.
76. They are taken in nets from the 1st of May through the summer; with hooks from the middle of May. They are most plentiful in May.
74. Fifty pounds a day, with the hook.
77. Caught more on the flood-tide.
78. New York is the principal market.
79. Good, fresh; not usually salted. Retains its excellence as a fresh fish as long as any fish, after being caught.
81. All that can be caught.
84. Highest price by the quantity in New York, this year, twelve cents a pound. That is as much as they ever brought, and was for a lot taken early.

SQUETEAGUE.

Come about the middle of June, and remain till about October. Generally caught in July.
5. There have been more for the last four years than before, but not so many this year as last. They are not very abundant. Have increased within the last ten years.
7. There were none ten years ago.
8. Six pounds; average three pounds.
11. They come from the sea, and straggle along the coast looking after food. They are not considered a running fish. I am confident they do not spawn here.
14. They make their first appearance in June. There is no difference in the size of those that come first from that of those that come last.
15. They leave by degrees, in small bodies.
16. Not regular.
17. The same.
18. No spawn seen in them.
19. They are an uncertain fish about biting, anyway. They are caught in nets and traps before any are caught with the hook.
20. Have not known any to be caught with hook within three weeks of their arriving.
21. Swim anywhere, at bottom or top, just where the bait is. They attract birds, the same as the blue-fish when they come under a school of small fish.
22. They will venture into shallow water on the flood-tide.

23. No.
30. On the sand and about rocks, both; generally where there is some current, and where the small fish gather.
31. From one fathom to six. Often found in the grass where the water is low.
34. None that I know of.
36. None.
37. Small squid and all kinds of small fish.
71. With hooks, drag-nets, and pounds. For bait white shiners are used; sometimes a piece of menhaden.
76. Taken in nets first.
79. Moderately good.
81. Quite extensively.
83. No.
84. Average price is low; one and one-half cents a pound here a week ago.
86. New York.

MENHADEN.

Come in May, and remain till the middle of October; generally most early in the season.
5. Decreased very much; very few now, comparatively.
6. They are caught in nets.
7. Scarcely one now to ten thousand formerly.
8. Less than a pound.
11. Come from the west; pass by now. They formerly remained in the harbor all summer.
12. They go off to sea by way of the mouth of the sound and bay.
15. They leave in small bodies; they run together all the time.
16. Regular decrease for ten years; no increase at any portion of that time.
17. No difference.
18. Not one in twenty has any spawn. I do not think they spawn at any particular season; the first caught is as likely to have spawn as any. Those that stay in the summer run up where the water is brackish and remain; and in New Bedford River there are thousands of young ones in the fall; the same is true at Mattapoisett, Wareham, and Monument River.
21. Generally swim high; make a ripple, but do not attract birds.
29. Half-grown ones are found with the old ones. I do not think they come here when only one year old.
31. Four fathoms.
33. They keep together in schools.
34. Almost all fish prey upon them.
35. None; they eat bait or any small substance floating in the water. They get very fat; but I never found any small fish in their stomachs.
36. Very greatly.
37. Cannot give it a name.
39. I think not much.
42. The breeding-fish are caught in nets.
46. Nobody has found out; it is supposed they spawn at all seasons.
63. All kinds of fish eat the young; have even more enemies than when full-grown.
64. No, not now.
67. No.
68. No.

71. In sweep and purse nets and in pounds; not with lines.

78. Used for manure, oil, and mackerel-bait.

84. Highest price, $1 50 a barrel for mackerel-bait; fifty cents at the guano works. About the same as former prices.

86. Here, for fish-bait, and to the guano-works. About two thousand barrels were sold to fishermen, for $1 50 a barrel, for bait. Scarcely a quarter of those caught about Buzzard's Bay go to the fishermen, but go for oil and guano.

HERRING.

There have been as many herring the past year as for many years; more abundant just about here than for two or three years before. They come about the first of March and stay till June. The young ones strike in about the 15th to the 20th of May, and in a pleasant afternoon there will be from one to three acres very lively with half-grown herring, and those not much larger than the finger; among these a few old ones that seemed to be their guides. The little ones never go up the rivers. They are caught with nets when running up creeks. Good, fresh; most of them are salted. They were formerly sold early in the spring to the George's fishermen for bait. This year they brought about forty cents a hundred; generally average seventy-five cents a hundred. Most are carried to New Bedford to market. I seined up the herring for bait, at the pond near my house, for three years in succession, and in that time used them all up, so that none come there now.

WOOD'S HOLE, *June* 19, 1871.

Captain THOMAS HINCKLEY, JR:

On the 19th of April of the present year we laid our net and got 25 tautog. The pounds were put down about the middle of April. The herring or alewives did come into Buzzard's Bay as soon as into the Vineyard Sound. I think they come direct from the sea, and do not run along the coast. They are caught in February off the coast outside of the Vineyard. The Georges fishermen get their bait of English herring down east, before the alewives come here. The English herring come here about the 1st of May, but are not plenty then. Last year we caught considerable many in the bay, but this year not any. There are many in the bay, and on the 1st of December there are many of the English herring there.

The pounds are down and in operation in Buzzard's Bay, about the 20th of April. Alewives are the first fish we catch. The menhaden this year were out of season—earlier than common. They struck in Buzzard's Bay, and we caught a few the 20th day of April. It was something remarkable, never known before. I think some had spawn in them then; about the 1st of May they had. They should not strike good until about the 10th of May.

SCUP.

2. No; only during the summer months. They make their appearance about the 15th of May, and remain until about the middle of October. In about a week after they come in they are most abundant. They leave gradually, much more slowly than they come in.

4. They are the most abundant of any fish caught with the hook.

5. It is decidedly scarcer than it used to be, and it is becoming more and more scarce. You catch fewer in the pounds and fewer with the hook. I do not mean to say you catch less scup this year than last year. The diminution cannot be noticed so much from one year to another, but during a period of five years. This year is remarkable for the nets having taken an immense number of small scup, about half grown, except the little ones, of which we make no account. It is unusual to have so many half-grown ones come in. There are little ones, that is, very much smaller ones than we have got here for many years. These run with the big fish, and are taken with them. The big fish seem to pilot them in.

8. The largest scup I ever saw was about a foot long—would weigh four pounds, I think; though I never measured or weighed them exactly. The big scup come first every year. We find nothing but large ones, the first that we get; the next school, four or five days later, would be smaller, half grown, weighing from half to three-quarters of a pound.

9. I think it takes scup three years to grow. I think the small ones we get this year were spawned last year, and that the little ones were two years old. I think I can distinguish about three sizes every year. I never saw any spawn in the middle-sized ones. The last year's scup will, most of them, go through a two-inch mesh; the middle size will not. Scup will only grow to about such a size, when they stop growing.

11. They tell me that they catch scup at Montauk Point before they get them in Gardner's Bay. They get them at Watch Hill before they do at Saughkonnet; first at Montauk, then at Watch Hill. I cannot tell how long a time between Montauk and Saughkonnet. They used to run up into Narragansett Bay before they reached Saughkonnet, around by Rhode Island Bay; and even sea-bass went the same way.

After striking the main land they follow closely around the shore, in about eighteen feet of water, so deep that you cannot see them in a school. If the pounds are set in less than eighteen feet of water we do not catch the scup. They are caught about one day sooner at North Falmouth than at Wood's Hole. They are generally found in Vineyard Sound sooner than in Buzzard's Bay. This year they caught them at Menemsha Bight three or four days before we did in the bay, and two or three days earlier than at Saughkonnet. I do not think there is any difference in the time of getting them on the two sides of Vineyard Sound. I think those that come into Buzzard's Bay come out again into Vineyard Sound; otherwise the bay would be full. I do not know that there was any more protection in Buzzard's Bay this year than the year before.

5. I do not think the little scup are as plenty as they were ten years ago; but there were more this year than last year.

46. I think that the scup that come into the sound go to Hyannis to breed.

7. In Waquoit Harbor they used to get any quantity of scup; they were large and fat, because they lived on clams. Since the pound was set there they have not caught any scup with the hook in the harbor. The pound is on the west side of the harbor.

12. I think they return the same way that they came, most of them; others go right out to sea.

15. I do not think there is the same regularity in leaving that there is in coming in; they do not school as much in going out. In the fall of the year, when scup leave the ponds, they will school up and go together. All sizes go out together.

13. I do not know where they spend the winter; they are never seen here then.

14. In the spring there are several schools. Take the biggest part of the time the large scup come first and have three or four days' running, then the middle sized ones, and then the smallest ones. Between the periods there is a time when we catch only a few. The large ones are caught only four or five days, and little ones about the same length of time.

2. The scup generally strike about the 25th of May, and we get them up to the 20th of June. There is no use in fishing after that. About the 15th of June we get the most scup; this year it was about the 1st of June, the season being two weeks earlier.

I think not more than one-third of the scup that come into the bay in the spring would stay there if there were no pounds. I think we do not catch but a few of the scup that would keep in Buzzard's Bay. I think we catch somebody else's scup, and but a few of our own. It is only when fish are running that we can catch them in pounds. Where they belong, they will not run into pounds. In Clark's Cove there are two or three pounds, and there is any quantity of menhaden there; but they cannot catch any at all in the pounds. Those menhaden belong there; they come there to spawn.

18. The sexes generally come in together. The female dog-fish comes in first. When the scup first come in the spawn is not grown; about the 15th of June it is pretty full.

20. When they first come in they will not bite the hook. Neither will any kind of fish; none of those caught in the pounds will bite the hook. Even if as plenty as they used to be, scup would not bite the hook until about the 20th of June; and I think they would bite about the same time all along the coast.

21. The gulls do not follow them at all. I think they swim within from two and a half to four feet of the bottom; not nearer the bottom than a foot, nor higher than about four feet from it.

22. I do not think the tide makes much difference about their coming in.

19. I do not think you can catch many scup with the hook when spawning. Sea-bass and cod-fish sometimes bite when spawning.

23. Many fish are caught in the pounds when spawning, the mackerel most plentiful; tautog and scup also. The spawn is often seen on the nets.

25. They do not run into fresh water, only into shoal water.

29. We find small and large scup coming in together.

30. On a sandy bottom, not necessarily rocks, excepting in the fall of the year, when they will come on the rocks somewhat. It does not make much difference as to the water being still or running.

31. They are caught in water about fifteen feet and over.

32. You get them in the sound just as well as in the bay.

33. I think they school a little in going out, but not so much as when coming in.

34. I do not think the blue-fish trouble scup any to speak of; nor sharks either, as they are so spiny they will not take them when they can get other fish.

37. They feed mostly on sea-clams. I have seen them root down into the sand in summer for clams. Sometimes they feed on other shell-fish and small muscles.

38. Along the shore where it is sandy you can see where they have made a little hole digging for clams.

40. I do not think there is any difference in color when breeding. On a rocky bottom they are darker and more barred than elsewhere.

37. They usually go to a place with rocky bottom to get some kind of crabs or something of the sort.

47. I do not think the small scup are the males accompanying the big females, because in the large scup you find spawn, but in the middle-sized ones you do not have any show of that sort. The breeding females are a little larger than the breeding males—simply swelled out more.

45. I do not know what becomes of the spawn when laid, but I think it sticks to the bottom; because if it floated at the top I should have seen it when scup were plenty. All the spawn that we find in the pounds is in the bottom of the bowl—none on the sides.

47. I think they spawn in the school.

63. I do not know of any; I do not know what the small fish feed on.

68. I never knew any sort of disease in scup.

71. Salt menhaden is said to be about the best bait, and salt clams. We generally use soft clams for scup.

72. In a seine, mostly in the fall. Sometimes in a floating net.

74. When most plenty, the average catch with a hook and line would be eight or nine hundred a day. They would bite about as fast as you could put the bait in, and you pulled them in two at a time.

77. Scup, and all fish in the sound, bite best on the slack of the tide, and not when it is running in full strength. In the bay it does not make so much difference.

86. New York and Philadelphia.

79. It is good salted; people used to salt them for winter.

80. They are best when first caught; but they eat them in New York when they have been caught a fortnight.

83. Never sold in any quantity to the guano-works; when used for manure they are put directly on the land. Never used for oil.

84. Highest price at wholesale this year was six cents a pound; the lowest, two cents. The price was less this year than last; not because more were sent to market, but because there were so many pounds down.

I think the fish-pounds are a curse to the country, but I don't believe in Rhode Island catching our fish. In 1860 there was but one fish-pound, that at Waquoit, and before that we used to catch scup at Saughkonnet, but after they had it down three or four years we did not begin to catch one-half the fish we did before. They used to come from Naushon to buy scup to put on the land, and then we tried to get a living by catching them, but as soon as they got pounds at Saughkonnet our fish were gone. There are not now one-hundredth part as many sea-bass as there used to be.

MENHADEN.

1. Known as pogee, here.

2. Some are found all summer; it probably breeds here.

3. They first appear at the westward. They strike Montauk Point, and follow along the coast exactly like the scup, but go rather more into the bays. They go in more shallow water; I have seen them in 12 feet. A school looks reddish. I have seen a school a mile wide and a mile and a half long. They frequently swim near the surface, and make a little disturbance that can be seen. The first school swims rather deep, but as they become more plenty they can be seen. They generally come in about the 10th of May; this year we got the first the 21st of April—about three weeks earlier than the average. We got about a

hundred barrels at once. But they strike off again for about a fortnight before they come regularly.

4. It is the most common fish on the coast, but is nowhere near so plenty as formerly.

5. They have diminished.

6. To pounds and purse-netting; and I think they run in deeper water this year.

7. There were not one-tenth as many caught this year as were caught last year, although there were a good many more pounds.

8. They run two different sizes; the largest, I think, are scarcely a foot long.

9. It takes them three years to grow.

10. You cannot tell the sexes apart, except by the spawn. They both spawn.

11. They come in like the scup, but hug the shore closer.

12. They go more to the westward than scup, and very nearly the same way they came.

13. I do not think that any stop here in the winter; they breed in salt-water.

16. They keep coming in thicker and faster till they get to the height, and then they go off again.

15. I think they go off in schools.

18. Both sexes come in together; they spawn about the 20th of May.

23. It does, when they are full.

19. They never bite the hook.

37. I think they live mostly on sand-fleas.

46. They spawn in shoal-water, in the latter part of May. We find young menhaden here in the fall.

21. Nearer the surface than any kind of fish I know.

34. All fish eat them. They make the best bait, because they are so oily.

36. I do not think the blue-fish could affect their abundance when they were so plenty as they were many years ago; but where we catch thousands and thousands of barrels it must make a difference.

37. When caught in the pounds they are traveling, and then we seldom find much food in fish. The fish we catch in pounds are not feeding, but are bound for their breeding-grounds.

40. No difference.

41. I think they spawn like alewives; the eggs not so large as those of herring.

71. Never with the hook; only with nets. They are taken with purse-nets throughout the season.

15. They disappear from the middle to the last of October.

75. The largest haul we ever made was 1,200 barrels; but I have known others to catch from 1,600 to 2,000 barrels.

86. Most of ours was sold to the mackerel and George's fishermen. If pounds were abolished, I do not know what the cod and mackerel fishermen would do for bait. It would not pay for all the pounds to be kept down for the purpose of catching cod and mackerel bait; if a few only were down it would pay. If the pounds were taken up by the 10th of May, the scup would not be affected here. The scup are not any appreciable profit of a pound every year, but on the whole they are. The demand for fish for bait lasts till about the 10th of June; after that they are sold to the oil-works, and the scrap goes into the guano.

84. We get about a cent apiece for them when they first come. Of the George's men we get half a cent apiece, and about seventy-five cents

a barrel of the mackerel fishermen. When sold for oil they bring about thirty cents a barrel. That is less than the former prices. Last year the price was fifty cents a barrel, and other prices in proportion. All kinds of fish brought a low price this year, because there were so many pounds running against each other. Last year we got $2 50 a barrel alongside the fish-pound; now we get only $2. We sell menhaden for oil to the guano-works here. They grind up about six hundred barrels a day.

MACKEREL.

2. We got some stragglers earlier; but about the 9th of May we calculated that the main body struck; that is, that they came in for good. They appeared about the same time in the sound and in the bay.

11. We caught them in the bay before they were caught at Wood's Hole. They always strike on the east side. All the fish we caught this spring had been up the bay and were coming out.

2. The mackerel run about ten days.

4. They were unusually plenty this year; I think from a half to a third more this year than before.

6. I do not know why they were more abundant this year.

11. In the fall they appear to go more out in the sea channel. They go east in the spring and westward in the fall. Last fall they were very plenty in the mouth of Vineyard Sound; were caught by the mackerel fishermen about the middle of October—large mackerel.

8. Those caught this spring were so large that a flour-barrel would hold only 140, without any ice, and laid on the head would go half round. They were not fat, but very poor. Sometimes we get smaller ones.

17. There was only one general run.

13. I do not know.

18. Both come in together. There is a scale over the eye, so that it looks very dim in the spring, and they will not bite.

73. It is only caught in nets in the spring; they will not then bite the hook.

23. Certainly, any quantity.

21. Near the surface.

37. Nothing but small fish.

34. The blue-fish eat them; all kinds of fish will eat them.

46. When we first catch them there is spawn in them, so ripe that it will run out, about the 10th of May. They could not have got far from these waters before spawning.

64. I have seen young mackerel here in the fall; they are found in the ponds, about five inches long. These, I think, were spawned in the spring.

52. I have no idea how many.

72. At sea they are caught in purse-nets.

71. They are caught with the hook outside by the 1st of May.

78. Highest price, ten cents a pound, and the lowest, three, by the quantity. It was less than last year.

86. New York and Boston.

TAUTOG.

2. When the winter is moderate I have seen them around all winter. In a hard winter many come ashore dead. They are more plenty in the summer.

71. A tautog will not bite when it is closed up.
4. Rather more plenty than scup.
5. Much less plenty than formerly.
8. Nine or ten pounds. The largest are caught in the spring, in the fish-pounds.
9. About three years in growing.
10. The female is more plump, and a shorter fish than the male.
11. We catch them at the head of the bay (west) before they are caught here; the best place is along the coast in Buzzard's Bay.
46. Among scattering rocks, or an eel-grass bottom. I have seen them come in where there was not more than four feet of water, and seen them spawn there. Sometimes two or three big fish are seen together. They come to spawn about the beginning of June, and stay about a fortnight.
52. The eggs are plenty, as large as those of the herring.
14. They come in in schools, the first mostly large fish.
2. They came this year on the 19th of April, and continued to come more plentifully till the 25th of April. This was about two weeks earlier than usual.
19. They will not bite when they first come in.
20. Sometimes they will bite just before they spawn; and then, again, right after. They almost always have one biting spell, just before spawning, from the middle to the last of May.
46. I do not think they drop their spawn until the 1st of June.
23. Sometimes the spawn runs out about the 1st of May, in the pound. That depends upon the number, whether they are crowded or not.
42. All the fish we take in pounds we take before they spawn; none of them afterwards.
21. Close to the bottom.
30. About rocks and eel-grass, whether spawning or harboring.
34. None that I know of.
37. Crabs, muscles, and barnacles; and I have caught them with little lobsters in them. The hermit-crab is the best bait for them, and sand-crabs.
86. New York, particularly.
82. No; it is not good.
83. Not used for manure.
84. The first caught brought $75 for four barrels, in New York. A barrel averages 180 pounds, without ice. The lowest price was one and a half cents a pound here.

SQUETEAGUE.

2. They are most plenty in August.
5. They are more plenty every year, while the blue-fish is getting scarce.
2. We found them first this year about the 1st of June.
6. They increase because the blue-fish diminish.
8. The largest about nine pounds.
9. They attain their growth in three years.
11. They come from the West.
17. There are different sizes, but not so great as in scup.
20. They are not caught here with the hook. In the bay they are caught, and will bite menhaden for bait.
37. I think they feed on the same as the striped-bass; that is, small fish.

BLUE-FISH.

2. Come in spring and leave in the fall. Come about the 20th of May.
21. Not so near the top as the menhaden. We only know they are here by first catching them in the pounds.
76. Caught in pounds before they bite the hook.
8. The larger ones caught first; weigh from five to eight pounds.
11. They go eastward. Come in from the sea, like mackerel. Most of the migrating fish come in like scup, some running nearer the shore than others.
23. Never saw one with a spawn in it.
64. There are many young ones about here.
5. They are decreasing; the decrease began within four or five years.
6. I think those taken in the pounds make much difference.
75. The largest haul I ever knew in a pound was about seven hundred.
20. They begin to take the hook about the 10th of June.
11. They scatter in summer, and school again when they run out.
37. Any fish that are swimming; they want something to chase. Never knew them to eat crabs or shell-fish. Never saw worms in their stomachs.
42. Know nothing about their spawning.
68. Never knew of any disease among them.
82. Yes; many are salted in the fall, as it is then fat.
83. Never used for manure.
84. Highest, eight cents a pound; and lowest, four. That is as much as the price last year. They were scarce this year.

SPANISH MACKEREL.

2. We began to catch them two years ago, about the 25th of July. Caught till the middle of September.
4. More plenty last year than the year before.
37. About the same as that of striped-bass.
8. Average about three pounds; never saw any of the very large ones, so called.

SEA-BASS.

2. First taken about the 1st of May. It is found here in the summer and in the winter.
5. Much scarcer than formerly.
8. Have caught them that weighed twelve pounds.
11. Much like scup; but do not school as much as scup.
75. Have caught three or four hundred in a pound at a time.
83. They used to put them on the land about Seconnet.
46. I think on the eel-grass bottom.
37. They catch some fish and eat crabs. Mackerels' intestines are the best bait; and the stomach of the menhaden is largely used as bait.
82. Never.
84. Highest price, six cents a pound, and the lowest, four. Have known the price as high as fifteen and eighteen cents.

STRIPED-BASS.

11. They go eastward, like scup and sea-bass.
2. First caught about the first of May.

46. Think they spawn out south, in the fall.
5. They are much diminished—almost exterminated.
71. We catch them with hooks in the spring; but they will not weigh half a pound apiece, and are all of the same size.
30. These little ones go into the ponds every year.
8. The largest weigh from three to seven pounds, and then the old sea-bass, as they are called, weigh from ten to eighty or ninety pounds.
17. There are three runs of striped-bass; the smallest coming the 1st of May, the second size about the 20th to the 25th, and the biggest about the 1st of July.
72. They will not go into pounds; or if they do they get out; except the small ones.
5. They are less plenty than formerly.
71. They begin to bite about the 10th of June.
30. The little ones go into fresh water; the larger ones never do.
2. I have known them here all winter. The little bass stay in the ponds until it is very hot, and then come out, and go in again when it is cooler. The large ones are caught in deep water.
37. Mostly they feed on brit—little fish. They will eat crabs, and a large one will eat herring or menhaden.
11. They go eastward in spring and westward in the fall.
84. The highest price this year was not over half a cent a pound. We caught none of the large ones.

COD-FISH.

72. With the hook; none in pounds, to speak of.
2. Last of March and first of April off Noman's Land. Come into the sound about the 10th of April; they stay till about the first of May.
11. I think those that come into the sound go west.

HERRING.

2. Caught in pounds about the 1st of April.
11. Bound eastward. When they run low they are traveling.
75. The largest haul last year was 13,000.
5. More plenty this year and last than for some years before.
6. I do not think it is from the planting on the coast. Perhaps it is because the blue-fish are gone. They were appreciably more abundant this year than last; and also last year than the year before.

WOOD'S HOLE, *September* 5, 1871.

Captain ISAIAH SPINDEL:

Captain Spindel is the manager of a fish-pound at the eastern extremity of Buzzard's Bay. They took scup first this year on the 27th of April. The pound was put down on the 12th, and the first fish were taken on the 14th. Herring and alewives were the first fish taken. Some English herring were caught with the rest, but not very plenty. They are easily distinguished from the alewives. I call them "blue-backs." They are the same as they catch down east in nets, and also in Cape Cod Bay. We got the English herring all the time we did alewives. I should say both were caught as late as the middle of May. We caught them most plenty about the last of April. Never caught over three thousand at a time. We sold them for bait; all the alewives

caught in spring go for bait. We could sell ten times as many, if we could get them, for bait. We sold a few at New Bedford. A few are salted by people here. They do not eat many fresh.

Menhaden come next. The first one we caught last year was on the 23d of April; and the first mackerel at the same time.

The mackerel and menhaden caught then were stragglers. Likely enough the next day we got two or three, and so on. About the 10th to the 15th of May was the best time for catching menhaden last year; this year they came on the 21st of April, when we caught a thousand. We caught a few stragglers before. I think we caught one or two about the middle of April. We brought them ashore and tried them for their fatness. The first that come are nearly as fat as they are in the fall of the year.

The English herring have spawn in them when we first catch them. The alewives and menhaden have some. I never saw much spawn in menhaden any time; not so much as in alewives.

I have seen blue-fish and squeteague throw the food out of their stomachs when caught. I think the blue-fish fill their stomachs and then empty them just for the fun of the thing, so as to catch more fish I have seen them go into a school of menhaden and catch some and throw them up again, and then go in again. I could not swear they threw the stuff up, but I am quite positive it is so. I have seen the fish all chewed up thrown out in the water. They often bite fish, and swallow a part and leave the rest.

We do not catch tautog with the first run; not till about the 5th to the 15th of May. We catch only now and then one in April.

Sea-bass (black-bass) come a little after the tautog, along about the 20th of May to the 10th of June. We do not catch any stragglers in April.

We got the first lot of scup on the 27th of April, when we got four barrels, I think. We got them most plenty about the 8th of May. We did not catch a great many this year. At one haul I think we got two boat-loads, say thirty-five barrels in all. These were very large—three-pounders, some of them. They had spawn in them, not very ripe. I have seen spawn in middling-sized scup—the two-year old scup. When most plenty, we got $2 50 and $3 a barrel for scup. We sold to Powel, of Philadelphia. Those we sold at New Bedford we got three cents a pound for.

The lowest price we have ever sold blue-fish for was two and a half cents a pound—about the first of July. I sent some to New York, and got $4 98 for two barrels. They would weigh 180 pounds to the barrel. That was about the 25th of July.

We have caught less fish this year than last, and got poorer prices for them. We have cleared expenses, though. If I had known the result this year I should have undertaken the business, even if I had other business. We did three times as well last year, though. I do not know why we did not do better this year; whether it was in consequence of the greater number of pounds in this vicinity, or because the fish were caught more at the westward.

Question. What were some of the peculiarities in respect to fish this year?

Answer. Scup came earlier; menhaden and herring about the same time as usual. We have not caught any more squeteague this year than we did last. Mr. Luce, at the Vineyard, said he caught as many as last year, but did not get so much for them. We caught as many common mackerel as last year; but they were more scarce than any other fish.

Squeteague we took first about the 20th of July, excepting now and then a scattering one; not more than half a dozen in all before that time. They had spawn in them—good, nice spawn. I took particular notice of the difference between the spawn of herring and squeteague. The herring-spawn was larger; that of the squeteague a dark red, and smaller than that of herring. But all I noticed had spawn in them. We never catch any small squeteague, though the first we caught, I think, was not over a foot long.

Cod-fish we catch once in a while; the large, overgrown, logy ones. We caught one pretty good-looking cod-fish.

We never catch haddock.

Pollock we have caught a few.

Cod-fish are caught off on the Middle Ground in the spring; once in a great while they catch a haddock, but not often.

Hake they catch occasionally.

We never catch any salmon or salmon-trout.

Striped-bass we caught last year, sixty or seventy, weighing from eight to twelve pounds. It is pretty difficult to catch them in a pound. They go in, but seem to go out again very quick at the mouth.

Question. Do any of these go back in the fall as they come in in spring?

Answer. Yes; menhaden and mackerel. I do not know how late scup stay; we have caught them in October, in a moderate fall. Tautog stay in the bay all winter, in the deep water.

Captain SMITH, who was in company with Captain Spindel, said he had lived here and on the island twenty years. Blue-fish were most abundant in this vicinity from twelve to fifteen years ago; much more plenty than now.

Captain SPINDEL: When the guano-works were started, seven years ago, I went purse-seining for the company, and there were plenty of blue-fish up in the bay then. The next year I was looking for schools of mendaden and went aloft, and saw nothing but blue-fish as far as I could see—for miles around—breaking water in schools. There were no menhaden there. There was a blue-fish for every square yard; they were all over the water, and it was as calm as could be. I stood on the deck and looked at them and then went aloft, and they were as far as I could see. I have never seen anything like it since. I have known blue-fish in Massachusetts Bay as far back as fifteen or sixteen years ago. I went to California about twenty years ago, and I think they were there before I went away. The blue-fish drive out other fish when they come into a bay—all kinds of fish that are not larger than themselves.

Mackerel have come in more plenty, and blue-fish not so plenty. I think the blue-fish do more harm to the fishing than the pounds do, ten times. I don't think pounds make fish any more scarce. Where a pound catches one fish, other fish eat up thousands.

Question. Suppose the blue-fish eat up nine-tenths of all the scup, and the traps caught the other tenth when going to the spawning-ground, would not that make a difference?

Answer. It might make a difference; but it would make a difference if they were caught with a hook. Take it this year; there have been a great many pounds—lots of them—to the westward; and they say they never had so many fish as this year. I wish fish would diminish so that we could get a decent price for them. There are five times as many fish eaten as there used to be. Any one would think that 5,000 vessels, catching mackerel with spawn in them, would diminish the number;

some years they are scarce, and then again you can get any quantity of them.

I have seen very small mackerel in Provincetown Harbor, not more than two inches long, in July.

Question. What is the number of mackerel taken in pounds, compared with those taken with the hook?

Answer. Not one-tenth. This year and last there have been more purse-seines for mackerel than ever before. When fish are moving, bound somewhere, we catch them in the pounds, when they come near the shore. They follow along in here, and away they go again.

Question. Do you suppose bound for the eastern end of the sound, to come into the bay?

Answer. Yes, sir.

When mackerel have spawned and are in schools they will refuse the hook, sometimes for a week at a time. I think they have no spawn in them in July. When they are out here they are full of ripe spawn. They will take the hook in the spring, even when they have spawn in them. They run out as far as fifty miles from the shore.

I never caught a scup out at sea.

I do not think pound-fishing is a quarter as bad as blue-fish for destroying fish. A blue-fish will destroy a thousand fish in a day. When they get into a school of menhaden you can see a stream of blood as far as you can see. They go into them, and they will destroy the whole school before they let them go. I think menhaden are more scarce than they used to be. They put up the guano-factory here on account of menhaden being so plenty then. Twenty-five or thirty years ago there were no blue-fish, and menhaden were plenty. Only once in a while were there any blue-fish then. Finally the blue-fish got so plenty they drove all the menhaden out of the bay. There are plenty of menhaden up in the head of the harbors; some blue-fish will go up and drive them up as far as they can; but blue-fish don't like to go up into fresh water.

Squeteague will swallow menhaden whole.

We did not catch any little scup last year in the pounds. Once in a while we caught one of large size; but now we get a good many small ones every morning. We let them go, all we can.

Sharks and rays are more plenty in the early spring; they seem to go with the early fish.

Stingarees don't come until July.

HEAD OF BUZZARD'S BAY,
September 25, 1871.

POTTER BRIGHTMAN, (lives at Westport, but was fishing near the head of the bay:)

I can tell you it is slim fishing; the fishing is growing worse every day. There is nothing doing at Westport. Here I can fish every day about, but there you cannot. I am catching tautog altogether; I have not caught a scup since I have been here. There are some boats that go off and catch a few little ones, very few. I have been off here fishing for tautog, and, while catching that car full of them, could catch two bushels of scup. I do not see any difference in the little scup this year. They are caught up; that is what makes them so scarce. The traps and pounds here catch them; they catch more in one night than all the smack-men can catch in a season. Before they commenced trap-

ping I could come up here and catch enough to get ready to go home again in ten days. The fish grow scarcer every year.

Question. How are you going to remedy it?

Answer. I would stop the trapping; that would remedy it. I would vote to stop trapping pretty quick.

Six or seven smacks used to come up here, and every one get a load; now nobody has got a load for a long time. There would be as many again fishing with hook and line if it were not for the traps.

There are no traps about Westport; they had one, but the head man was accidentally shot, and it was stopped; and since then there have not been any traps set there.

Soon after they began to trap at Wood's Hole fish began to grow scarce. In one night they caught 200 barrels of tautog; and not only that, but they take them as spawning fish.

Fish will not bite when full of spawn. I have seen two bushels in a heap all throwing out their spawn. Then you cannot get a fish to touch your hook. I have seen as many as twenty-five large fish doing that. They look as though they were all in a snarl, coming right up under your boat. Sometimes you will see a pair together. I have seen them shoot their spawn. They will not bite then, and you cannot do anything with them.

They spawn anywhere, where they happen to be. I have never seen scup spawning.

Tautog spawn the last of May or first of June.

Blue-fish have been pretty plenty the latter part of the season; the first part they were scarce; most of the time less than last year, and very small.

I never saw them spawning; and I don't know as I have taken them with spawn in them; I don't know a great deal about that kind of fish; I follow tautoging.

I have caught 2,400 tautog in a day, with the help of one man. But I have not made a living by fishing this summer. I have done the slimmest that I have ever done since I have run a smack. I went out with another man, and fished all the forenoon, and both of us got about twenty-five pounds.

The largest tautog I ever caught weighed fourteen pounds. Rock-bass are very scarce; I have not caught but one since I have been here. I used to catch a great many here. In fishing for tautog, while I got a hundred weight of them I would catch fifty to seventy-five pounds of bass. I believe I did not catch one this spring.

I do not know where squeteague spawn. They are more plenty than they used to be for a good many years. Forty years ago they were more plenty.

I remember when there were no blue-fish around.

If the traps were stopped the fish would come back again in half a dozen years.

There are very few hook-fishermen now. Most of them have given it up because they cannot make a living.

Question. When they caught fish in old times where did they market them?

Answer. In New York. I think it is twenty years since they have sent fish to New York.

They first begun to set traps at Watch Hill, and then at Saughkonet.

I came up with a man about a week ago, and we have caught about seven hundred pounds. We have fished ever day—two of us.

COHASSET NARROWS, *September* 25, 1871.

A. J. HATHAWAY:

I have been here twenty years, and I never saw the young scup so plenty as they have been this year. Striped-bass are five times as plenty this year as they were last.

There are more tautog here, and about the same number of squeteague as last year.

There are a good many young blue-fish up this harbor; but no large ones.

I think blue-fish and bass spawn up in this river.

Small mackerel come up here, arriving about the first of October, and staying three or four weeks. Last fall we caught a good many.

PATRICK BUTLER. There have been plenty of small-sized scup about here this year. For two or three years back there have been very few here. Twelve or fifteen years ago they were very plenty; but for two or three years back a man could not get enough to have a mess to eat, with a hook and line.

ROBERT P. HOLMES. There have been a good many young scup about here this year. There was a great quantity of young menhaden. I have not seen so many young scup for a long time. The breeding scup in the spring here were not more than 8 inches long. We have not caught any big scup at all.

I never saw a young squeteague.

I think blue-fish spawn up in this bay, because we see a great many little fish. I found a young blue-fish Sunday morning, not over an inch long. For the last two years we are not catching many blue-fish.

S. S. RIDER, (head of Buttermilk Bay.) There seem to be a great many scup here this year; some three and some six inches long. We don't see any scup that will weigh a pound here now, and we don't get but a few any way. My father, twenty years ago, used to catch three boat-loads at a tide. Now you might as well look for a salmon as for a large scup.

IV.—SPECIAL ARGUMENTS IN REGARD TO REGULATING THE SEA-FISHERIES BY LAW.

ARGUMENT OF SAMUEL POWEL, ESQ., DELIVERED IN THE RHODE ISLAND LEGISLATURE.

This question of the protection of the fisheries of Rhode Island is one demanding the most careful examination.

The most important aspect is the supply and cost of valuable food supplied by fisheries.

How shall the amount be rendered most ample and how shall the cost be reduced to the lowest price?

An able committee, with great labor, patience, and care, have devoted much time to the subject. They have taken a vast deal of testimony, and, at pages 22 and 23 of their formal report, they give us this deliberate opinion upon the subject, in these words: "The opinions—depend." And again, on page 23, they say: "As was anticipated—irreconcilable."

At pages 29 and 30 the committee admit the testimony of Mr. Tallman, to the effect that forty-five years ago the menhaden-men pulled up their nets to allow scup to pass, *lest they should cut their nets;* that ten years afterward (*i. e.*, 1835) "We sold them at ten cents a barrel, for manure."

Now, bearing in mind that the present constitution dates in 1842, this authoritatively fixes and establishes the custom of netting scup as existing seven years, say, prior to the constitution. This is a *very important point in one aspect of the case.* It is the testimony adduced by the committee, and not by me. At page 30 they further state: "Ten years after [*i. e.*, 1845] we begun—knowledge." Now, our committee met many witnesses face to face; they had witnesses representing both interests, and their secretary himself had the previous winter represented, as a sort of counsel, the appellant interest. And with all this, the best means of reaching an opinion, they have told us, (pages 21 and 22:) "The subject," &c.

Now, besides taking personal and written testimony, our committee have earnestly examined the most important documents and reports, both upon our own and upon the fisheries of foreign countries; and with perfect frankness and sincerity they show us what I must display to you in regard to the wandering fishes of the mighty ocean, to which families the scup belong. The United Kingdom (English) report (cited at our report, page 15) asserts that, notwithstanding the most careful inquiries, there was no instance where it was statisfactorily proven that various nets and weirs, "used in bays or estuaries," have "been permanently injurious to the supply of fish," while, on the other hand, it is proved that, in certain bays and estuaries, such fishing has gone on for years without permanent injury to their fisheries.

A Frenchman disputes this in some degree; still it is the deliberate opinion of the British official report. Then our committee cite a counter-report of the commissioners of inland fisheries of Massachusetts,

who criticise the above report of the British commissioners, chiefly because, to arrive at their conclusions, they (the Englishmen) adopted the very same and about the only course acted upon by our own committee. It is true the Englishmen asked 62,000 questions, while our committee did not do so extensive a wrong, for they asked, I believe, only about 5,000. The only way in which our committee departed from the English procedure was that three of them spent a day in a steamer visiting our traps. However, they have not thought this visit even worthy of mention. So we may suppose it yielded no important results in their eyes.

I understand our commissioners to quote, at page 21, from these inland Massachusetts commissioners, the following words: "On our—— of menhaden." "At times—— but absence."

Here allow me to remark that while our committee claim the evidence that horse-mackerel (blue-fish) do not devour large scup, it was fully proved they do devour all the young scup.—(See minority report of winter of 1870.)

Now, I might read the last two paragraphs on page 21, still quoting the last-cited authority, the inland commissioners of Massachusetts, who merely admit that it is claimed—not proved—that no amount or kind of fishing can diminish the "schooling or wandering fish of the high-sea," citing the kinds, and that it is likewise claimed—not proved—that the local bottom fishes, which are peculiar to certain limited areas near the shore, may be greatly reduced, or even practically annihilated, in certain places by improper fishing. Among these they cite the tautog, some others, and also the bass and the scup.

Now, the scup are known to be schooling, wandering fish of the high seas, and come from the Gulf Stream and from the Florida Cape. This is their undenied history, except here, *where the whole question as to scup is begged and distorted* by the Massachusetts report. This point thus makes against them.

All the evidence of our commissioners shows when and how the various runs of scup strike our coast, and that they are not local, but come in from the high seas. I ought to read our report at pp. 12, 13, and 14, to show the judgment of another Massachusetts committee. They sum up by saying, (p. 13,) "In view—legislation." And upon the next page they cite the report of the most able scientific English commission thus: "Yet that commission—be repealed."

I may dismiss the Massachusetts report by citing from p. 14, that they, among other causes accounting for the diminution of the scup, tautog, &c., in Buzzard's Bay, ascribe it, in part, to a scarcity of food, owing to the deleterious substances thrown into the water from manufactories, which affect the clams and other species of mollusca, and also to the advent of blue-fish, who drive away nearly all other species of fish.

Captain Atwood, and I believe others, give the date of the first appearance of the scup in the waters of Buzzard's Bay at 1793, which, let me remark, was just seven years *after* the terribly severe winter of 1780, and that our scup diminished after 1856–'57.

Now as to the variableness of many species of sea fishes, Dr. Storer, in his History of the Fishes of Massachusetts, which includes the waters of our bay, gives the following facts, written in 1853: "In August, 1846—quite small." Page 45, Storer says: "Dr. Yale—blue-fish came," and more to the same effect, on same page. On 23d of June, 1847, a squeteague, &c.; page 53, Storer says: "Captain Atwood has seen," &c. Page 73 speaks of the great abundance of sword-fish at Martha's Vineyard, which eat shoals of mackerel and menhaden, &c.

[Quotations are made from Storer at pp. 277, 422, 334, 339, 365, 226, 231, 82, 83, 265, and 269.]

So much for Storer. Star-fish and oysters are notoriously bad friends. An old fisherman of Newport, and I believe he is far from being alone in his views, often said the steamboats seriously injured the fishing. Now, without claiming undue weight for all these restraining or repressive causes, they should have due and that a very great weight when we form our opinions. Every one of these facts has a direct bearing upon the intricate question before us.

There is a sound principle of philosophy to be applied to questions of science, and most especially in the department of natural history. It is, not to mistake a succession of phenomena or a coincidence for cause and effect.

Now, in the reptilian family, low down in the scale of creation, where we find the fishes, the variety of circumstances which attend their existence is very great, and very curious; so that the most learned men have been unable to indulge with any safety in dealing with analogies. The circumstances which mark the habits of each species vary with one another in a most extraordinary way. Thus the United States commission, in running the Texas boundary line, found fresh-water fishes which produced their young alive. Other fishes are curious, and especially, I believe, the salmon family, which appears in both fresh and salt water; and this is the family which most especially has been proved to return to its native waters. It has no relation whatever to the migratory fishes of the sea, which range the coast from the Mexican Gulf to the waters of Massachusetts Bay—few of them pass that cold point, Cape Cod.

The food of fishes has a vast deal to do with their presence. We know very little about their food. Can any one tell me what is the food of the rich and valuable shad, and that of most of its relatives in the herring family? The food of nearly all fishes, as far as we know, is of an animal nature, and in its turn requires food; and any failure of this secondary supply of the *food of the food* will entail the absence of the fishes which consume the first kind of provender.

Fishes are liable to disease, to parasites. All the perch in the ponds about South Kingston have little black specks in their scales. [Other parasites were referred to.] [Certain enemies named.] I do not wander further into this intricate field. It is enough *to show how many grounds there are for the conflict of testimony so decidedly announced. It has convinced me that there is no sufficient ground, and especially taken in the whole broad spirit of our report, to pass a measure so fraught with the direst ruin to many of our citizens.* * * * *

STATISTICS.

J. M. K. Southwick, from Albro's market, November 2, 1870. (All hook and line.) George Crabb, (alone,) 439 pounds tautog, one day. Mr. Brown, (with man and boy, 3,) 718 pounds tautog, one day. Benjamin Nason and father, (2,) 600 pounds tautog and cod, one day. Samuel Young and Lawrence, (2,) 800 pounds tautog, two days, (not from the books.)

Cary's market, same date, November 2, 1870. Hook and line only. John Heable, (1,) 193 pounds tautog, one day. Mr. Osman and man, (2,) 126 pounds tautog, 97 of cod, one day. Champlin & Huddy, (2,) 260 pounds tautog, 330 of cod, one day. Wm. Champlin and Young, (2,) 388 fish of various sorts, one day.

ARGUMENT OF J. M. K. SOUTHWICK.

NEWPORT, RHODE ISLAND, *October*, 1871.

DEAR SIR: It is with diffidence that I, in compliance with your request, attempt to prepare for you this paper on the fish question; for, as my resources of information have been limited, I cannot claim thoroughness, either in reading or personal observation. Therefore I fear I shall, like too many others who have written upon this subject, give too much of theory without practice; and to escape the study of cause and effect, *jump* at the first plausible theory for the solution of an important question.

That my conclusions are mainly right I can only hope; but I feel assured that your very thorough investigation will establish what is right, and expose and reject what is wrong. If it aids you in settling any point of fact, or helps you to arrive at a philosophical truth, I shall feel repaid.

As much of it was written during a local controversy in this State, it will contain much that may not be of general interest; but, as you said "Don't stop," I give you all as I have written it, hoping that you may be enabled to glean something from it.

THE DIMINUTION OF FISH APPARENT, NOT REAL.

In former times, before the facilities of transportation in ice became the means of supplying the great markets and the interior country with the products of the waters, fish was an article of food only to the few living along the coast, and a small amount sufficed for the demand. Any extra catch, at this time, overstocked the market and caused a glut that gave the appearance of the great abundance that has been attributed to those times.

LOW PRICES.

In consequence of the limited market the prices were very low, and the fisherman never realized pay adequate for his toil, notwithstanding he saved to himself (or to the consumer) the large profits that now go to the marketmen, by daily taking his catch in a barrow to some prominent corner or to the houses of consumers for disposal.

HARD TIMES.

In that day, by dint of lobstering, piloting, and acting as city watchman winter nights, the fisherman who was very industrious and very prudent, managed to make both ends meet; but where one *was* so very fortunate it was only by working early and late, and using the utmost economy.

AVERAGE CATCH.

The fish most caught were cod, haddock, tautog, bass, and mackerel. They would usually get from one hundred to one hundred and fifty pounds, but sometimes failed to catch so much, and then they would complain that "fish were not so plenty as they used to be."

We are told that, sixty years ago, the above complaint was chronic among fishermen, but not of so virulent a type as at the present day, as there were *then* no trappers to charge with being the cause; but *now* there is a competition with them in the waters and markets, where those who will not use improved methods are outdone.

Yet we believe that, where the fisherman really applies himself to his business, he does as well as at any former time, though we would by no means convey the impression that hook and line ever *was* or ever *will be* a profitable way to catch fish.

WHY LESS ARE CAUGHT IN SOME LOCALITIES.

1. Because they are made wild by steamboats, vessels, and an infinite number of small craft, and by being fished for by everybody, and in every way.
2. The fish whose numbers have most diminished in those localities are of the less belligerent kind, while their enemies among fish have increased and driven from their favorite grounds.
3. The failure, or partial failure, of crops of sea-vegetation and small animal life that, according to natural laws, will vary from one year to another, and the great amount of filth that must accumulate on some at least of the feeding and spawning-grounds, may cause a permanent failure in such localities.
4. The impurity of the water that so affects the oyster as to destroy its value for food, as in Taunton River and at other points.
5. The destruction of muscles by the occasional storms that drive the shells up on our shores in windrows two or three feet thick.

OTHER CAUSES OF DIMINUTION.

1. Their destruction at sea from natural enemies there.
2. Convulsions of nature.
3. Distempers.
4. Being chilled by the excessive cold of some of our winters, as in 1856–'57, when tautog were driven ashore in large quantities.
5. The enormous destruction of the spawn and young by natural enemies, that may increase or diminish unobserved and unknown. These enemies may be of their own kind when food is scarce.

From all these causes, may we not find the answer to the question, "What has become of our food-fishes?"

It may be objected that most of these causes are natural ones, that may have operated at other times as well as at present. We answer, they *have* so operated; and perhaps the fluctuations of fish were more remarkable for the half century previous than for the one just passed, and to what, we ask, can it be attributed? Certainly not to fishing.

WHAT FISH HAVE DIMINISHED, WHAT INCREASED, AND WHAT NEITHER WITHIN FIFTY YEARS.

We have stated that there was an apparent, when there was not a real or general diminution. We believe this to be true of bass, and also of tautog. While the indications are that scup have really diminished, the bull's eye have entirely disappeared.

The horse-mackerel, squeteague, butter-fish, and Spanish-mackerel have increased very much, and are fish that were scarcely caught at one time, but are now numerous, in spite of the means used to catch them.

But before we proceed to examine in detail the different fish peculiar to our waters, we will say that their numbers fluctuate in such irregular manner—a season of scarcity often followed by a season of unusual plenty—and their entire disappearance from certain localities for a series of years, to re-appear again, are phenomena that upset our best theories, and make past figures of little account for the future estimate of numbers, as, for instance, in the course of five, ten, or thirty years, there may be an apparent gradual diminution from one year to another, preceeded by a year of abundance. We here submit some facts that lead to the conclusion that bass and tautog are about as plenty as ever.

1. Fifty years ago a shore-seine was used in bassing two weeks; but the men engaged did not get enough to pay for their food while so engaged. A failure to catch, in that time, was not rare.

2. At this writing, July 28, 1871, a boat is in the harbor with 9,000 pounds of bass, the result of one haul with a shore-seine, for which they will probably realize $900. One day this month, one man, Mr. H. G., caught with hook and line 1,000 pounds of bass in two hours!

3. Ten years ago, fishermen caught from 100 to 150 pounds of tautog in a day's fishing.

4. There were sold on the 3d day of November, 1870, at two of our markets, as the day's catch of fifteen men, 2,800 pounds of tautog, besides cod-fish caught by the same, amounting to 600 pounds, being an average of over 226 pounds to each man.

The fishes of our waters may be classified—1. As local and bottom fish, being those that remain in the bay the year round. Of such are the cod-fish, haddock, tautog, flat-fish, and eel. 2. The migratory fish, that visit our waters and remain with us but a part of the year, such as the bass, horse-mackerel, squeteague, sea-bass, scup, herring, Spanish-mackerel, butter-fish, and mackerel.

THE COD-FISH.

The cod-fish are very generally distributed, during the cold weather, in the lower waters of the bay, and, on the approach of warm weather, work off into deeper water outside the bay, and are then less generally caught, but may be taken at all seasons the year round. They are taken by hook and line, troll-line, not otherwise to any extent. They live on shell and other small fish.

I hear of tautog being taken from them that would weigh a pound. I am told by many fishermen that they are as plenty—some think more so—as ever; while some of our local fishermen think they are not so plenty as thirty years ago.

The haddock, the colleague of the cod, are caught with them.

BASS.

This fish has been generally abundant in our waters, but during the last, as in the present century, there have been seasons of scarcity. They first appear in our waters early in May, going eastward. They are caught in traps in May, to some extent, but are of small size, say from one to four pounds in weight. They are caught in July with hook and line and shore-seines, but are of larger growth, say from ten to forty pounds weight. They frequent the bay much less than formerly, but are caught quite plenty at more remote, or less disturbed places, as at the Vineyard Islands, where they appear as abundant as ever they were.

We are told that now, August 21, they are schooling up, and will very soon be, if they are not already, going west, taking the same route by which they came, but, perhaps, a little farther from shore. They are very shy when alarmed, and are made wild by fishing, steamboats, and small craft that swarm in our waters; and from that cause, are kept from the bay. They go very fast when migrating. A very great increase in their numbers might cause an increase in these waters, on old fishing-grounds, but from causes above named I cannot think that their increase can again cause them to come into the bay as formerly.

The most successful fishing for them that I know of is done at the Vineyard Islands, by small craft, fitted with ice, shore-seines, and experienced men. These rarely fail to make a good catch.

We know of the following catches this season by two boats, most of them the result of one haul with the shore-seine; 500 pounds; 3,500 pounds; 3,000 pounds; 9,000 pounds; 3,000 pounds; 2,000 pounds; also with hook and line in our waters, 1,000 pounds in two hours' fishing.

I know of a locality near Tappahannock on the Rappahannock River, where there is very good fishing for them; have caught them there in *January* with troll-lines, but they are most abundant in February. In February, 1867, I saw 6,000 pounds that had been caught there at one haul. There was one fish among them that weighed 80 pounds, the largest I ever saw. The smallest of this lot would probably weigh 10 pounds.

THE TAUTOG.

This fish winters near the mouth of the bay, comes into the bay in the spring—in March or April—remains until November or December, and then returns to deeper waters.

They are caught in May in traps, still later in heart-seines, but more generally by hook and line. They feed on rocky bottoms where seining is impracticable; are caught, sometimes as late as Christmas, in the bay in some deep holes where *some* may winter, but most of them go outside and feed on the ledges until very late, and remain there nearly all the winter.

In February, 1857, after a very cold spell, there were large numbers of tautog driven ashore at Black Island and many other places, chilled, doubtless, by the excessive cold, and from this event many fishermen date a *diminution*.

HORSE-MACKEREL (SNAPPERS, BLUE-FISH) AND SQUETEAGUE, OR WEAK-FISH.

These fish have similar habits, come and go about the same time, and are very destructive to smaller fish. They disappeared from our waters about the first of this century, and returned again thirty-five or forty years ago, and are now generally very plenty; but the present season they have been less so in the bay, though as plenty as usual outside, and I hear they are abundant on the coast of New Jersey.

Although *scup* came some twenty days earlier this season than for a number of years, *these* fish were about as much *later* than usual. They are not much caught now, but what are caught, are generally full of the *small* scup that are so numerous in our waters this year.

The horse-mackerel and squeteague are, perhaps, the bulk of the fish that are caught in heart-seines and gill-nets. When numerous they are very destructive to most kinds of smaller fish, driving them off

when they do not destroy them, and following up schools of them to prey upon them.

SCUP OR PORGY.

That these fish first appeared in these waters the latter part of the last century, seems confirmed by all our traditions of them. The first caught being exhibited as a new and unrecognized wonder of the deep, leads us to infer that if ever before they had been here it was too long before that to be remembered by the men of that day. At least they have left us no tradition of their presence here before that time.

It appears that they came here in small numbers, but, favored by certain conditions, they multiplied until they became the most numerous of all our edible fish. If we study the conditions under which they then increased, we may arrive at a correct solution of the question of the cause of the present increase. Here we fail to obtain information that is wholly satisfactory; but it is certain that about the time scup first appeared, horse-mackerel (blue-fish) and squeteague disappeared; and during their absence scup increased to their greatest number; but at the increase of the former they again decreased. Therefore we conclude that the increase of the one is in proportion to the decrease of the other, and also contingent upon the same.

The present season gives us a new phenomenon, corroborative of this inference, the appearance of small-fry of scup in myriads directly after the great run of scup; first, outside, three or four weeks later at the lower waters in the bay; and the late appearance and small number of horse-mackerel. These latter seem to have chosen another field for their operations, and allowed these small scup to escape the destruction that has so commonly been their fate.

In former years scup migrated to our coast about the middle of April, and then appeared to be plentiful all over the bay. For ten years to the present time they have not favored us with their presence until nearly a month later, and then they came in less numbers, and were scattering in the bay. What connection there is in their late coming and apparent consequent small numbers does not appear; but fishermen have a theory that the time and number depend much on the weather, warm southerly winds being most favorable. How far the adverse weather may have operated to keep them back in their migrations to our coast, until the horse-mackerel and squeteague have marshaled their hosts and cut them off, we know not.

TRAPS VS. SCUP.

It is said that traps destroy this fish while seeking an entrance to the bay to deposit their spawn; and this is insisted upon, notwithstanding the traps catch only one way, *i. e.*, when the fish are going out. But if this is true, and the trappers by some legerdemain turn their heads down stream and capture them, what can be said about the spawn, when, as at the present season, precocious little fellows, two or three months old, come paddling their own canoe directly after their fathers and mothers, and fill our waters with their young life? It certainly seems to settle the question conclusively that we do not depend upon the product of our own waters for supplies. And is it not a little singular that objections should be made to the capture of fish while in spawn, when the legislative authorities, in one of the most enlightened States of the Union, passed a law to prevent their being sold at any other time than when in spawn, as being then, and only then, fit for food?

Scup, as an article of food, were little prized until, by the aid of traps, ice, and steamboats, fish were utilized as such over a large area of country; and the immense demand thus created required a vast amount to satisfy it, and has operated to build up this branch of industry to its present magnitude.

OVER-FISHING.

That every fish caught makes one less in the water is true, but if that one, if left, would destroy ten others, then the catching of that one saves the other ten. This may not apply to scup as to more destructive kinds, as horse-mackerel, squeteague, sharks, dog-fish, porpoises, &c.; but in some measure it may apply to scup, for aught we know.

It is known that herring destroy their own spawn, and we believe that all others would in a case of scarcity of food.

The small horse-mackerel are often the little bait upon which many fish feed, and we very much doubt whether their own fathers and mothers would stop to discriminate between their own and the young of another.

That it is possible to so diminish their numbers by fishing that those remaining cannot repair the loss, independent of the vicissitudes of ordinary fish-life, we cannot believe. They are scattered over so much ground that all the devices of man can never reduce their number, without some great auxiliary aid from nature more destructive than anything man can devise, although it may be, when natural conditions are such that they must diminish, from year to year, as some species have, to the point of extermination—then it may be that fishing may hasten; but, as has been said by others, "Under favorable conditions, no amount or kind of fishing can ever make any material diminution of the fish of the sea: 1, because of the small proportion of the whole number that can be caught by any means possible, scattered as they are over so great an area; 2, because of their vast reproductive powers, requiring but a small number to keep the stock good; 3, because the same means that are used to catch food-fishes are equally destructive to other fish, their enemies, the destruction of one of which saves numbers that would otherwise be destroyed.

IMPURITIES.

That the great amount of impurities that are emptied into the waters of this bay from the sewerage of cities, the *débris* of manufactories, and the accumulation of filth from various sources; the ashes of steamers and other substances thrown into the water, while it may not be unfavorable to some kinds, it seems impossible that it should not affect others that inhabit the pure waters of the ocean for a large part of the year.

We know it is said that the impurity either rises on the top or settles to the bottom, and that between these two extremes the water is pure. In some degree we think this true, and to the measure of its truth we ascribe the presence of what we have of the sea-fish in the upper waters of the bay.

Fish, coming to our coasts in schools, swim near the surface. May they not be diverted another way where they come in contact with impurities; or would they find a clear streak of pure water, and follow it to the source of impurity to investigate causes?

Instances are not wanting where the total disappearance of certain fish has been traced to this cause, as the desertion of the river Thames by the salmon; yet the white-bait continue to thrive there in spite of

all the filth. So may the cat-fish and the eels thrive in the mud of our rivers, but the bass and tautog never can.

But the impure water is not the only nor the greatest evil of filth emptied into the bay. The great deposits that settle from it and cover the bottom, where the tide is insufficient to carry it off, by its accumulation must destroy much of the small animal and vegetable life that would otherwise furnish food and shelter to the fish. The effect of the impurity in the water is very observable in the oysters of Taunton River, which have become so impregnated with copper, since the introduction of the works near the river, as to destroy their value for food. Similar results have been noticed from gas refuse.

FREEDOM OF FISHING.

At the Creation, "God said, Let the waters bring forth abundantly the moving creatures that have life, and every living creature that moveth, which the waters brought forth abundantly; and God saw that it was good."

After the creation of mankind, male and female, the first great boon conferred upon them by their Maker was dominion over the fish of the sea. So it appears that man's dominion over the fish of the sea does not date with the charter of Charles II and his Rhode Island Colony, but is contemporaneous with the creation of the world; since which time man has continued to exercise it without limit or restriction, as inclination or interest dictated.

That he first exercised it by the use of that most suggestive and simple appliance, the hook and line, of which we have a very early account, is evident; but the increased population causing an increased demand, soon suggested to the progressive spirit of man a better way, and 2,500 years ago the Sacred Historian says: "As fishes of the sea that have no ruler over them, they take up all of them with the angle, they catch in their net and gather them in their drag, because by them their portion is fat and meat plenteous." Thus defining God's first boon as an unrestricted use of the fisheries, that were without a ruler, and showing an appreciation of the means used and the great good resulting from their use; and then exclaimed the good prophet, "Shall they therefore empty their net that brings fatness and plenty?" Not only was an advance made in fishing, but they also made sluiceways and ponds for fish.

In Christ's time nets were much used, and a sort of net that was cast from the ship's side, and thence taken back into the ship like the purse-nets of our day. The shore-seines then used must have been large ones, for it was not considered that 200 cubits (300 feet) was far from land. "They were not far from land, but, as it were, 200 cubits, dragging their net with fishes." "Simon Peter went up and drew the net to land full of great fishes, an hundred and fifty and three." It was thus that they exercised dominion over the fish of the sea, and *sometimes* made great catches, but often "toiled all night and caught nothing." A fluctuating fortune, common to fishermen of all ages.

Those fishermen of Gallilee were countenanced and encouraged by Christ, and were of the first from whom he chose his Apostles. We hear nothing of hook and line at this time, but can hardly hope to make our hook-and-line friends believe it was because that method had become obsolete; but certainly we do not find them mentioned by the Sacred Historian after other methods were mentioned.

It then appears that in other ages improvements were made in fish-

ing as in other industries, and that they then had the means of catching them in quantity, and that hook and line were not the prime means for catching fish.

Coming down to the early days of our colonial existence, we find that the Indians used weirs and nets in fishing, and fish was to them an important staple food; and it became so to the early settlers also, they using weirs, shore-seines, and gill-nets to catch them.

So important was this interest at the time the charter was granted by Charles II, that a special provision was made in it, securing this right, (*e. g.*:) "That it should not in any manner hinder any of our loving subjects whatsoever from using and exercising the trade of fishing upon the coasts of New England, in America. But that they and every or any of them shall have full power and liberty to continue and use the trade of fishing upon the said coasts in any of the seas thereunto belonging, or in arms of the seas, or salt-waters, rivers, and creeks, where they have been accustomed to fish, and to build and set upon the waste lands belonging to said colony and plantations, such wharfs, stages, and work-houses as shall be necessary for the salting, drying, and keeping their fish to be taken upon the coast."

Living under this charter our grandfathers and fathers continued to exercise this inherent natural right with as much freedom as they used the air to breathe and move in, choosing their implements and using them without limit or restriction. And under a constitution that continues to us the same guarantees, we have so increased this productive industry as to make it second to none in a large section of the State.

("The people shall continue to enjoy and freely exercise all the rights of fishery, and the privilege of the shore, to which they have been heretofore entitled under the charter and usages of this State."—Article 1, section 17.)

We do not doubt that our heart-seine is an improvement on the weirs of former times, and that our purse-nets are in advance of those used by the Apostles is likely; perhaps, too, the fish-hook of to-day has a different bend, a sharpness of point, or a larger barb than those in use when man first exercised "dominion over the fish of the sea, that had no ruler over them," but were free to all. And *freedom* did not mean restriction, as it has been defined by the committee on fisheries, where they, alluding to the clause in our constitution containing the charter-rights, say that, "constitutional scruples may make it necessary to restrict fishermen in Rhode Island."

This, then, the most ancient of man's rights, conferred upon him at his creation by his Maker, continued to be exercised and enjoyed by him without interruption for nearly 6,000 years, confirmed to him by the laws of the State, approved and justified by the best informed of this and other countries, who have most thoroughly investigated its merits, is in these latter days brought to trial for its continued existence, and the liberty-loving little State of Rhode Island is asked to lead the van in the crusade against it.

OPPOSITION.

About fifteen years ago many of the most enterprising of the fishermen, better to facilitate and render more successful their business, adopted the method of catching fish known as "trapping," which, as a natural consequence of their better success, provoked the opposition of such of the fishermen as lacked the necessary enterprise or energy to adopt the measures, without which they could not compete in the mar-

kets and waters. Re-enforced by occasional and sporting fishermen, they succeeded in creating a prejudice against this method of fishing, such as has been arraigned against every labor-saving machine adopted by other industries with the same result, until parties of wealthy young men, seeking relief from *ennui* or the cares of business, and thoroughly furnished with the most approved tackle, turn fishermen for a time; but, disappointed in consequence of not catching fish, are easily persuaded that it is because traps have destroyed them; then, without taking the trouble to investigate the matter, an effort is made to unite every element of aggrieved (or imagined to be aggrieved) interest against the net-fishermen, with a determination to exterminate their, the only admitted profitable method of fishing.

By dint of great efforts and one-sided statements by canvassers, they enrolled the names of a long list of petitioners.

That very many well-meaning persons signed the petition, we doubt not; and that some advocated it from a sense of public good, we believe; for the fish question, when first brought to issue before the people of this State, so long as the facts remained obscure, did have some show of fairness to those content to know simply that traps had increased and the price of fish increased, while the catch of fish with hook and line, in some localities, had decreased. While this constituted the whole bulk of the information made available to the mass of the people, and was enforced and made to appear plausible by the eloquent rhetoric of scholastic lore—that the first was the cause, the latter the effect—it is not surprising that many were influenced by it.

But while they are discussing the means of restoring the fish to our waters, the fish themselves re-appear and upset all prognostications of their extinction by human means, and establish the fact that they, like insects, in the lapse of years, fluctuate in numbers, though left to themselves. First, one species, favored by certain conditions, multiply and increase to a number limited only by the amount of food produced, and the ordinary vicissitudes of fish life, until some deadly distemper, a convulsion of nature, the destruction of their normal food, an increase of natural enemies, or the invasion of their grounds by new enemies which take their place and multiply until some of the above-named, or other causes, produce the same effect upon their numbers, and they in turn give place to the former or other species.

Such changes are constantly going on under the inexorable laws of nature, that produce a like effect upon vegetation, sometimes by visible, sometimes by invisible causes; and man can no more change the result by legislation than he can limit the drops of rain that shall fall upon the earth.

To account for all the causes that produce the effect is much beyond the grasps of finite minds; its roots are deeper than they can penetrate. It is comprehended, in all the relations of cause and effect, only by the Allwise Ruler of the universe.

We can only theorize and speculate about the hidden, unsolved mysteries of nature, that show man's weakness, and point the limit of his attainments.

The following communications may serve to illustrate what I have said:

Captain TIMOTHY GAVITT, of Westerly:

Has known bass caught in June that weighed from one-half to one pound, that were put in a pond, and, when taken out in October, weighed six pounds.

A boy living with him caught, by wading in, a tautog weighing five pounds, at the mouth of a little brook two miles above the fishing-ground at Pawcatuck River. It was a female fish, very full and very far developed spawn; he thinks the spawn would weigh one pound. He also states that the light-house keeper at Watch Hill, Mr. Pendleton, (not the present keeper,) lost a bob fishing for bass that was taken next day with the fish on Long Island. It was identified and returned to him. Bass return west in August and September, by the same route they came, but wider off shore.

Statement of JOB TEW, aged seventy-six:

Ten years ago saw the heads of scup in the water and along shore, and considered it as an indication of the presence of horse-mackerel, as there were no other fish in water at the time that would do it, it being too early in the season for sharks.

In 1810 bass were scarce.

Fishermen used to complain sixty years ago that fish were not as plenty as they used to be. Have known bass to be very plenty in a particular location, and never appear there again in numbers, without apparent cause for the change.

Think fish generally as plenty as ever. Always did vary one year with another.

BENJAMIN DUNWELL'S statement:

Has fished thirty years with hook and line. Two hundred and fifty pounds tautog used to be considered extremely good fishing. Often did not catch enough to eat during the month of August. My day's catch is about the same now as it used to be, both in tautog and codfish.

The seasons vary, but average about the same; do not observe any reduction of fish; go further when fishing for tautog; think that owing to the destruction of them, by being chilled in 1857, since which they have not been so plenty in the bay.

Scup used to be plenty in the bay, but horse-mackerel have driven them off. There are a great many more half-way fishermen now than formerly, and they do not follow it up so well.

EDWIN BROWN'S statement:

Early in May, 1866, saw at Gardner's Bay very small fry of scup and sea-bass, just large enough to distinguish their species.

Fished at Seconnet in 1857; sea-bass were very plenty then. Since that time they have very much decreased, but have again become very numerous, and the last season were as plenty as at any time since I first fished at Seconnet. Caught more tautog the present than any previous year.

PELEG HUDDY'S statement:

Has been a hook-and-line fisherman thirty-five years. Sea-bass were very scattering, when first fished; were told that they were very plenty before that time. About ten years ago they became very plenty, since which they are not so abundant.

Mackerel were more plenty in August, 1870, than ever knew them to be before. Fish generally are quite as plenty as ever, except at certain localities in the bay. While some kinds have decreased, others have increased. Don't believe nets or traps materially affect their number.

Statement of NATHAN KING:

Is now, and always has been, a hook-and-line fisherman; thinks fish, generally, as plenty as ever, but are driven off shore by the steamers; thinks they are the chief cause of scarcity in the bay; has watched them darting from a boat, and thinks that steamers must have great effect in driving or scaring them from the waters.

About twelve years ago, knew of a boat that went to Point Judith for tautog; fished some, without success, at the usual fishing-grounds, then hauled up killick, and worked along slowly—watching all the time for fish; came to a clear spot on the bottom and saw them; carefully dropped anchor, and in a very short time had a good fare of very nice, large tautog. Repeated the same several days, with good success.

When the sun is very hot, tautog leave the clear spots for shelter in the weeds and rocks. Mr. King thinks the fish are very much harassed all along the shore by fishermen; but when they are found in a quiet spot, can be caught quite as well as ever they could. He remembers hearing the complaint, "that fish were not so plenty as they used to be," when he first went fishing; but fishermen forget the poor fares, and remember well the good ones. The nearest places are so much more fished, is a reason for catching less at those places, if there were nothing else to disturb the fish.

Lobsters are quite as plenty as ever; that is to say, that the same number of pots catch as many pounds as thirty years ago.

NEWPORT, *September*, 1871.

HENRY MERRITT'S statement:

Have been engaged in hook-and-line fishing twenty years—principally for tautog; used to catch from thirty to three hundred pounds. The latter was an extra good catch. We considered one hundred and fifty pounds a good day's fishing. The seasons varied somewhat, but cannot tell just which seasons they were most plenty; but think they were more scarce the season after so many were chilled in the winter and driven ashore. They were very scarce two years ago, but very plenty last year; never saw them more so than then.

Caught three hundred pounds tautog several days running, and sometimes two hundred pounds cod-fish on the same day. Fished from Beaver Tail to Point Judith. Thinks the average catch equals former years at same places. Have caught tautog as late as Christmas on the ledges. Have seen scup very plenty on the ledges almost every year, but more last year. Should say there were three times the number fishing now that there were twenty years ago.

Scup are very plenty in the bay at present; have been since June.

P. SOUTHWICK'S statement:

Is seventy-six years of age. When about twenty years old, went several times to the Vineyard Islands, with a seine, to fish for bass; sometimes staid two weeks, but never with success; did not realize enough to pay expenses, and often not enough to pay for food consumed while so engaged.

The fishermen used to say fish were less plenty than formerly, as long ago as I can recollect.

Mr. T. STEVENS, one of our oldest hook-and-line fishermen, says that he, with two others, went to Martha's Vineyard to fish for tautog about thirty-five years ago; would get from one thousand to three thousand pounds in a week's fishing. Went east because they could do better than at home.

NEWPORT, *August* 12, 1871.

WILLIAM SISSON, of Westerly, commenced fishing fourteen years ago; fished all the time since, except from 1861 to 1865, from June to October. Used shore-seine; fished from Long Island to Cape Cod with it. Find bass first appear on western part of fishing-grounds; later, further east. The first that come are smaller. Have not failed to catch good fares any year that I have been fishing, but never caught more than at the present season. The spawn is well developed in most of the bass now; saw last week small bass, smallest four inches long, at Waquoit.

Horse-mackerel are not so plenty the present season, but have been very much more plenty the last few years than when I first fished; think three to one.

Bass feed on the bottom, on small fish, worms, and roots; swim near the surface, sometimes very fast, so that it would take a smart sail-boat to keep up; catch them best on the flood-tide.

Both bass and horse-mackerel attack birds. Have seen small quantity of spawn of bass in seine. They go together to spawning-grounds in the rivers. Have seen scup cut by horse-mackerel, and have taken from them the tail-end of scup that I think would weigh half a pound. I think them very destructive to all kinds of smaller fish, more so than anything I know of.

Fish are just as plenty as ever, but more wild, and keep more off shore, owing to traps and other fishing for them. Bass will take hook any time.

STATEMENT TAKEN FROM MY BOOKS OF THE FISHERY AT PINE TREE.

In 1866, up to May 11, caught $2 25 worth of fish. On the 11th caught 168 barrels of scup, at $2 per barrel.

In 1867, up to May 14, caught $10 worth of scup. On the 14th caught 76 barrels, at $2 a barrel.

In 1868 fished from May 1 to 23. Total sales of all kinds of fish, $86 72.

In 1869, May 6, catch, 2 scup; 10th, catch, 1 barrel; 13th, caught 32 barrels, at $3 a barrel.

In 1870, May 2, catch, 11 scup; 8th, 6 barrels; on the 15th, 60 barrels, at $2 per barrel.

This fishery had been fished about seven years before I fished it in 1866; and I am told that large bodies of scup were taken as early as

April 20; that 200 barrels have been taken at Seconnet as early as the 15th of April.

J. M. K. SOUTHWICK.

The fish question might be summed up thus:

Fish have diminished in certain localities. It is charged that the diminution is in consequence of trapping. Is the charge sustained? If so, then we may stop here. But if only met by the query, what else can be the cause? we might ask by what maxim of law are trappers adjudged guilty without proof, and compelled to seek relief by fixing the guilt? But answer: If no other cause could be given, then it may not be traps; for who can explain the working of the mysterious laws of change written all over the universe? Yet numerous and sufficient causes have been assigned to account for all the real or apparent diminution, besides the fact shown the present season, that an increase of fish is possible without a reduction of traps; that scup, like the herring of England, may increase in spite of the enormous and increasing fishing.

It is proposed to stop trapping three years as an experiment—a sort of sedative to popular clamor. And then what? The business would be destroyed for all time, for none would venture capital in material once rendered valueless, and liable to be again, at the caprice of experimenting legislatures.

As well charge the ice-merchants with short crops of ice, because of large ones gathered in former years, and suspending their business on their failure to demonstrate that it was from other causes.

To stop trapping two days and three nights in the week. Although the scup-traps are down about twenty-five days, the great bulk of the fish are taken within ten days. Now, if allowed to fish but five days of the ten, as may then happen, there would be no chance left the fishermen at this, the most important trap-fishing in Rhode Island.

The effect would not be so detrimental to the heart-seines, although discouraging to those not now very successful. I believe any restriction of the scup-traps, beyond that from Saturday night to Monday morning, would amount to prohibition.

THE FOOD-FISHES OF THE NEW ENGLAND COAST.

BY GEORGE H. PALMER, OF NEW BEDFORD, MASSACHUSETTS.

Within a period of about twenty years, four of the best food-fishes of the New England coast, of different *genera*, different habits, and feeding to a certain extent on different food, have been observed to become, year after year, less in numbers and smaller in size.

These four fishes are—

The striped bass, *Labrax lineatus*, (*Roccus lineatus*, Gill;) sea-bass, *Centropristis nigricans*, (*C. atrarius*, Gill;) tautog or black-fish, *Tautoga Americana*, (*T. onitis*, Gill;) scup, *Pagrus argyrops*, (*Stenotomus argyrops*, Gill.)

For several years this fact attracted but little attention, and called for no special investigation.

At length, however, the subject began to excite the alarm of the fishermen who depended upon fishing for their entire or partial support, and grew to be a subject of very general complaint.

Of these fishes there is no evidence that they have not always been

abundant, until within the time mentioned, except the scup, about which there is a tradition that it first became known in Buzzard's Bay, in 1793, since which time it has always frequented the waters south of Cape Cod.

Up to about 1851, no means of taking these fishes were commonly in use, except the hand-line, with a baited hook.

All but one were caught at the bottom, upon their feeding-grounds, with a still bait.

The exception, the striped bass, was fished for, for the most part, among the rocks near the shore, by throwing and hauling an eel or other bait, or sometimes in the tide-ways, and at the bottom, with shrimp or dead or living fish, and in the surf with a bait floating upon or under the surface of the water.

They were all caught in large numbers throughout the entire season, except the tautog, which appeared in the spring and again in the autumn.

The catching of these fishes gave employment to thousands of fishermen, and furnished a cheap and wholesome article of food to all the inhabitants upon the sea-shore.

The supply was always fully equal to the demand. When, however, railroads began to provide easier and quicker means of transportation, when ice came to be used to prevent or retard decomposition, and when the fishes came into more general use as one of the ingredients of fertilizing compounds, wholesale methods of catching them, more or less ingenious, were devised to supply the demand thus artificially created. Then traps, pounds, and weirs were brought into use, and have increased in numbers and efficiency from year to year, and, as they did, the hook-and-line fishermen caught fewer and fewer of fish, during a shorter portion of the season, and these smaller and smaller in size, until within two or three years hardly any of the fishes of the varieties named could be caught by the common practice of hook-and-line fishing.

As a consequence, men who had followed it heretofore for a livelihood gave it up and became trappers themselves, and those who had occasionally pursued it to supply themselves and their families with food, or for recreation and amusement, have been obliged to abandon it altogether, or be content to spend weary and toilsome hours to capture the few stragglers that have escaped the toils of the more crafty and ingenious fishermen.

So well convinced did the people become that the multiplication of traps and pounds and the growing scarcity of fish stood to each other in the relation of cause and effect, that in 1870, simultaneously in Massachusetts and Rhode Island, legislative investigation was demanded, and, to a certain extent, obtained, with a view to such action as should check the evil and prevent the much-feared destruction of these valuable and important fishes.

In what I shall have further to say on the subject, I shall confine my remarks as to those investigations to the "Report of the committee on fisheries, to the legislature of Massachusetts," the "Majority and minority reports of the committee on fisheries in Rhode Island, January session, 1870," to the "Report of the joint special committee of the general assembly of Rhode Island, appointed to examine into the fisheries of Narragansett Bay," to the speech of Mr. Atwood, of the Cape district, chairman of the Massachusetts committee, in support of his report, and to a general review of the facts elicited by those investigations, and to the reasoning upon them.

I shall refer to those several matters, to the evidence brought before both these committees, to opinions stated and conclusions drawn, in such order and connection as shall best serve my purpose, and without more particular reference thereto.

From very similar testimony, the committees in Massachusetts and Rhode Island came to directly opposite conclusions.

The Massachusetts committee reported "leave to withdraw." The Rhode Island committee recommended the passage of "An act to prohibit trap and heart-seining of fish in the waters of Narragansett Bay."

In the Fifth Annual Report of the Commissioners on Inland Fisheries, (Boston, 1871,) those gentlemen, in concluding their remarks "on the possible exhaustion of sea-fisheries," say, "The petition for abolishing weirs, &c., ought to have brought out much valuable testimony, but it proved quite otherwise." This was true, and the criticism that followed it just.

Early in that investigation, and in order to bring out all the valuable testimony possible, the managers for the petitioners represented to the committee the difficulty of procuring the attendance of witnesses; that most of those who were interested to protect the fisheries were poor or of limited means, and that those who were rich, not being pecuniarily interested, had contributed but little to carry on the investigation; that the question was one of great public concern, and asked the committee to obtain from the legislature authority to send for persons and papers, which they, although expressing a determination to give the subject a full and impartial hearing, refused to do. The managers therefore were limited to such witnesses as would willingly attend and the means in their hands enabled them to produce.

On the side of the remonstrants it was not so. These two investigations became so general and looked for such stringent legislation, that the opposition was aroused, and all those who were engaged in the profitable business of trapping and seining fish contributed liberally to defeat, and did defeat, any action on the subject.

One witness in Rhode Island, William Spooner, testified that they went so far as to threaten all those fishermen who should go before the committee to testify anything against trapping.

It is more than probable, however, that limited and unsatisfactory as those examinations proved, they together furnished more evidence than had hitherto been procured, and brought out as many facts as are likely to be obtained by anything short of congressional action on the subject.

It is a matter of surprise, therefore, that so much information was gained, and not that so little that was valuable was in evidence, and although the "very interesting contemporaneous investigation in Rhode Island" went more carefully, thoroughly, and understandingly into the matter, yet we find, on comparing the testimony, that what was proved in the one case was, for the most part, confirmed in the other.

The English commission, the Massachusetts commissioners, and Mr. Atwood may all agree "that fishermen, as a class, are exceedingly unobservant of anything about fish which is not absolutely forced upon them by their daily avocations;" "that these witnesses do not know one-half of what they ought to know;" nevertheless this is all the testimony we can have upon a question of vital consequence until the Government devises some better means of ascertaining the truth. Meantime the evil, if it is an evil, goes on, to the prejudice of the fishermen and to the possible destruction of the fisheries.

Perchance this is one of those cases where the stopping the practices complained of is the only means of accurately knowing what the ultimate effect of their continuance will be.

Should the trapping and pounding of these fishes be suspended for a time, and the fish should thereafter steadily increase in numbers, the question would be settled.

The matter is of consequence enough. Would it not be worth while to try the experiment?

In this view of the case, all we have to show is, that these novel, and what we claim are improper, methods of catching fish, are a probable cause of the scarcity complained of, having first shown that the scarcity exists. The burden of proof is then logically shifted, and it is for the trappers to show that their methods do not consume these fishes faster than their natural increase.

They have then one further point to make—that by their wholesale modes of fishing they do not interfere with the rights of others, for nothing is clearer settled in the law than that all men have the right to catch fish in the bays, inlets, and arms of the sea, and that no man has the right to catch fish to the injury of others in their rights. Then we inquire—

Firstly, have the fishes under consideration become scarce?

Secondly, are the methods of catching them, by pounds, weirs, and traps, a probable cause of such scarcity?

In answer to the first, we claim that they have.

Both in Massachusetts and Rhode Island it was at first stoutly denied that there was any scarcity of the fishes named, yet it was testified to, by most of the witnesses in both States, and Mr. Atwood finds himself at last compelled to admit it, and then goes on to try to account for it.

The interrogatories put by the joint special committee of the general assembly of Rhode Island were in writing, and were eighty-two in number. They were answered in so far as they severally knew, by thirty-nine witnesses, under oath.

Twenty-eight of these interrogatories bear directly upon the question of scarcity, and thirty-seven of the witnesses swore that they had grown perceptibly scarcer year after year, except during two years, when the traps had been broken up by storms.

The testimony of the Massachusetts witnesses is not in print that I am aware of, but from my notes I find that every hook-and-line fisherman among them, except one, agreed with the Rhode Island witnesses upon this point.

Add to this the testimony of every amateur fisherman with whom I have conversed, many of whom are men of superior knowledge, accustomed to observe everything with regard to the fish they catch, some of whom have made their opinions public in works of standard merit, and we have evidence sufficient to establish the fact of the increasing scarcity of these fishes, beyond a reasonable doubt.

Again, and more conclusive than the testimony of all these witnesses, the scarcity of these fishes has become notorious. All along the shore, from Point Judith to Monomoy, it has been and is now a general cause of complaint. Everywhere you go, in any seaport town, the fishermen will tell you what they used to do, and all the inhabitants are lamenting the time when they could go out and catch a "mess of fish at any time." But now it is not so.

If there remained any doubt as to whether it was proved that these fishes have become scarce, the Massachusetts committee, in their report

say that "it appeared in the evidence that the scup, tautog, sea-bass, and striped bass, in Buzzard's Bay, have diminished during the last few years, comparatively few having been caught in that locality;" and the joint special committee of Rhode Island, in their report, after a careful review of the whole subject, and in view of its "profound intricacy," say that "the oral and written testimony laid before the committee establishes the fact that, whereas scup were formerly abundant in the waters of Narragansett Bay, and constituted a cheap and nutritious article of food to the inhabitants, readily found and easily caught, they have gradually left these waters, until they are quite abandoned by this species of fish, and partially so by other species."

Then, from the testimony of all the witnesses in Massachusetts, except the trappers, and one Bearse, from Hyannis, who was not surpassed by any one on the stand in the exhibition of ignorance and prejudice, that these fishes had diminished in Vineyard Sound, and we have three very considerable and important fishing waters, in which these fish had formerly been abundant, where now they have become scarce.

The fact of the scarcity having been so entirely proved, the report of the "minority of the committee on fishes" in Rhode Island finds it necessary to say, "and if these fish do not come into the bay as plenty as formerly, we can only suppose that there are some conditions necessarily wanting;" and the committee in Massachusetts accounts for it in these four ways:

1. That they have merely disappeared.
2. By reason of the scarcity of food.
3. From impurities in the water.
4. The blue-fish have destroyed or driven them.

Let us review the evidence going to sustain these several positions in their order.

1. That they have merely disappeared.

The Massachusetts committee, in their report, say that it does not necessarily follow that when fish leave a locality they have been driven away by over-fishing; nor has any such thing been claimed. What is claimed is, that in these waters, and with reference to these particular fishes, they have been destroyed or taken in such large quantities just before or at the time of spawning that any increase is impossible. The significant fact is, that they have disappeared from these several waters at the same time, and have steadily, not suddenly, decreased.

If they have not been exhausted, but have only left the locality, is it not a little remarkable that these four different species of fish should not only have agreed to leave these several localities at one time, but that they should not have appeared in great numbers anywhere else?

Mr. Atwood says that "all agreed that the scup, tautog, sea-bass, and striped bass had, within a few years, diminished in Buzzard's Bay, but failed to show that over-fishing was the cause of the diminution." They were not bound to show any such thing. Having proved that the fish had become scarce, and that they had done so since the setting of the pounds and traps, it was the duty of the committee not to take sides with the trappers, but, acting under their oaths, on behalf of the people of the commonwealth, to force the trappers to show, as logically they were bound to do, that their novel and wholesale methods were not the cause of it.

There was not a particle of evidence before either of these committees going to show that these fishes had disappeared—that is, changed their ground—nor any evidence that they were of the kind of fishes that appear here in one place at one time, and then in another place at another

time. On the contrary, all the evidence there was proved that they returned annually to the same grounds to spawn.

All there is upon this point comes from Mr. Atwood himself, after the evidence is closed, when he, "laying aside the evidence," becomes a witness before the senate of Massachusetts, and gives a very interesting account of what he had "noticed during a long life of practical experience in the fisheries."

This covers a period of fifty-one years, and is very important in this investigation, because it is the testimony of Hon. N. E. Atwood, of whom the Rhode Island commission says, he is a "practical fisherman of Provincetown, and a distinguished ichthyologist;" because, say the commissioners on inland fisheries in Massachusetts, it is the opinion "of a man who probably knows more of the habits of our cold temperate sea-fishes than any one in the country."

We have no longer ignorant and prejudiced fishermen on the stand, who "possess only a local knowledge of the fish with which they come in contact; who do not make the habits of fish a special study; who do not know one-half of what they ought to know;" but the great ichthyologist and the intelligent fisherman of fifty years' practical experience.

Let us see what "changes he has noticed" going to show that *these* fishes—the fishes under consideration; not other fishes, but the scup, tautog, sea-bass, and striped bass—have, or may have, merely left the localities they once frequented.

He first alludes to the scup, of which he is "informed that in examining the old shell-heaps that have been deposited by the aborigines, many years ago, the bones of this species have been found, showing that they were here before this country was settled by the Europeans."

If they were here then, it is quite as probable that they have remained here ever since, as that the "tradition" is true that they appeared in Buzzard's Bay in 1793.

The witnesses who stated that they had such tradition were the same witnesses of whose testimony on other points Mr. Atwood thought so little; and the tradition itself may, for aught we know, have had reference to some other species; but what is a great deal more probable is, that they then first began to be considerably fished for.

At all events, this is very feeble evidence to support a theory that this species of fish has appeared and then disappeared, driven away by none other than the "Indians, with their rude implements of fishing."

Since 1793 Mr. Atwood gives us no information that every year, for a period of more than seventy years, they have not, until recently, been abundant. And there was no evidence before the Rhode Island committee that they had not existed in the waters of Narragansett Bay since the settlement of the country, which, if they had not, would certainly have appeared, since the people of that State have always been interested in the subject of the fisheries, from the "earliest authentic history of the colony." As early as 1719 the general assembly passed an enabling act empowering each town council "to take care for the preservation of the fishery within their respective jurisdiction, and to remove all obstructions made in any rivers that may prejudice the inhabitants by stopping of fish from going up the stream."

The only other fish of the species under consideration of which Mr. Atwood gives us any information, is the striped bass, of which he says, that they have diminished in the vicinity of Cape Cod, as the blue-fish have destroyed the bait upon which they feed. This is only admitting the fact of the scarcity of these fish, and begging the question as to the cause of it.

This is all the information we have from Mr. Atwood upon the subject. What he says more has reference to fish of other *genera* and different habits, without the least connection to show that what has been true of them is also true of the species now being considered.

In order that nothing having any bearing upon this subject should be left out of the reckoning, let us see what Mr. Atwood says of the other fishes included in his list of "changes," and inquire what are the natural inferences to be drawn.

After his remarks upon the scup, he states that the chub mackerel, *Scomber dekayi*, disappeared long before a weir-trap or pound was used in our Massachusetts waters. The common mackerel, too, "come to us some years in great abundance; in other years they are comparatively scarce." In 1840, shad appeared, and, not long after 1842, "they then disappeared."

Precisely the same line of reasoning is to be followed here that was taken by Rimbaud in his Review of the Report of the English Commissioners. Mr. Atwood has fallen into the error of "compounding under the common name 'fish' of all the vertebrate class taken by fishermen." Rimbaud shows that a classification is necessary, a "classification founded not on anatomical characters, but on habits and localities."

Rimbaud makes four divisions. For the purposes of this discussion only two are necessary:

1. Wandering fishes, the most of which are surface-fishes.
2. Bottom fishes.

The difference chiefly to be borne in mind is this: That whereas the wandering fishes appear on our coasts only when migrating, and then in vast but uncertain troops, the "latter are especially domestic, and dwell and multiply on particular localities along the coast."

According to such classification, the chub mackerel, the common mackerel, and the shad, belong to the first division, of which there is no doubt they appear and disappear for no assignable cause. They come, they are gone, is all that can be said about them.

Not only do they change their ground one season after another, but in a single week or day in a locality where they have abounded not one can be found.

Not so with the bottom fishes. They return to the same places year after year, deposit their spawn, seek their feeding-grounds, and remain during their seasons. The fishermen all understand this, and have their bearings so that when once they have found a locality where they are feeding, they may and they do return to the same place again, as confident of finding the fish at any subsequent time as they are that they shall find the rocks near which they had been anchored. Did anybody ever hear of a fisherman's fixing his bearings for a school of mackerel; or, if any ever did, did he do it more than once?

With regard to what Mr. Atwood says of the haddock, there seems to be better ground for his analogy, but yet we are not sufficiently informed of their habits, nor so advised of the real facts in the case as to determine how far it may logically be used in support of his views of the subject. The fact, as he states it, is, that fishing with the trawl-line has been in use since 1850, and that this species of fish has been increasing year after year notwithstanding, until "they have increased in vast numbers; so much so that they are too plenty for the fishermen or dealers:" 621,953 pounds of cod and haddock were sold in Boston in a single day. Mr. Atwood does not infer that the trawl-lines are the cause of the increase, but says: "The present mode of fishing catches vast quantities of a species of flat-fish, (*Platessa dentata*,) which no doubt fed

upon the spawn of haddock when the hand-line only was in use. Whether the flat-fish did feed upon the spawn of haddock we do not know as a matter of fact; but if they did, we shall see with what probable effect when we come to consider Mr. Atwood's remarks on the fecundity of fishes.

Reasoning from analogy is, after all, only showing a probability, and cannot be regarded as a very safe method from one class of fishes to another.

Mr. Atwood admits, with respect to the halibut, that they seem to be decreasing on all the fishing-grounds, and leaves the senators, who of course are not expected to know much about it, to decide whether or not over-fishing is the cause of it. Whether the senators ever have decided I do not know, but the fair inference would be, in the absence of any explanation of the matter, that the fishery of them, prosecuted as extensively as Mr. Atwood says it is, had something to do with it.

Mr. Atwood says: "It appeared in evidence before the committee that the fish known as the squeteague is increasing in the vicinity of Buzzard's Bay, and along the south shore of Cape Cod. Some sixty years since it was vastly abundant in the southern part of Massachusetts Bay, and though absent for so many years, it seems to be returning to its former haunts."

From such knowledge as we have of its habits, it seems to be one of the wandering fishes, and likely, therefore, to appear or disappear at any time.

One other fish concludes the list referred to by Mr. Atwood, a species of flat-fish, the *Platessa oblonga*.

What he says of the blue-fish will be passed here, as it comes more properly under another head of my subject.

This species, (the flat-fish,) he says, was exceedingly abundant along our shores before the blue-fish came. "It is a bottom fish, and does not come so directly in contact with the blue-fish as top-water swimmers; still, it has almost wholly disappeared, owing to the blue-fish having destroyed its favorite bait, which is the common squid."

Here, again, the scarcity of the fish is admitted, and here, again, the question of the cause is begged. Mr. Atwood, it is true, states it as a fact that the squid is its favorite bait, and that the blue-fish has destroyed the squid. Could he think of nothing else which destroyed its "favorite bait," after all the testimony before the committee showing the vast quantity of squid taken in the pounds and traps?

This, then, is all there is going to prove that the decrease of the species of fishes now under consideration is absence and not scarcity. We may now consider the evidence as all in, for if there had been any more, Mr. Atwood, with his declared purpose of "trying to show the danger of exterminating the race of fish, if there is any," would have stated it. From it, what are we fairly to conclude?

First. That a certain class of fishes, called wandering fish, appear in and disappear from certain localities without our being able always to assign the cause; that their decrease is, or may be, *absence*, not *scarcity*.

Second. That a certain other class of fishes, called bottom fish, including the scup, tautog, sea-bass, and striped bass, are domestic in their character, coming annually into the same waters to breed and dwell, migratory, and not wandering, in their habits, concerning which, if they decrease, it must be *scarcity*, not *absence*.

2. The decrease of these species of fish is accounted for by reason of the scarcity of food.

In both Massachusetts and Rhode Island the attempt to prove that the food of these fishes had become scarce, was a complete failure.

The fifty-seventh interrogatory of the joint special committee of Rhode Island had special reference to this point.

Twenty-two of the witnesses answered directly that there was no scarcity of food, and of the rest, I think there was not one, not even Mr. Tallman, who testified that it was not as abundant as it had been years before. Mr. Johnson goes so far as to say, "I never knew as much food for fish as at present." Mr. Matthewson says, "Mussels are fully as abundant now as I ever knew them to be; new beds have formed right in front of my place." Mr. Place says, "No scarcity of food; plentier now than ever." Mr. Rice says, "For mussels, &c., are plentier than ever." So the committee in Rhode Island, in their report, well say that, "in the opinion of your committee, the preponderance of evidence is that there is an abundant supply."

In Massachusetts there was less testimony on this point, and what there was went only far enough to show that the food may have changed ground, and that if there was scarcity of one kind, there was plenty of another.

It was from the very slightest testimony, therefore, that the Massachusetts committee concluded that the cause of the diminution of fish in Buzzard's Bay "may be a scarcity of the bait on which they are accustomed to feed, as large beds of mussels on which some of these species feed have been killed by star-fishes, (five-finger, so called by the fishermen.)" Mr. Atwood does not assign this as a cause, except that the blue-fish devours the food of other fishes; he does not anywhere say, nor commit himself to the opinion, that the food of these fishes has become scarce.

During the past year new beds of mussels are being formed, as we should infer would be the case, from the growing scarcity of the fish which consume it.

It will be observed, too, that the traps catch large quantities of the food of these fishes, so that if it has become scarce, they are one of the causes of it.

We are forced to the conclusion, from all the testimony concerning the food for these fishes, except of those kinds taken by the traps themselves, that it never was so abundant, while the fishes were never so few to consume it.

3. Impurities in the water.

If the testimony to sustain the scarcity of food, as a cause of the scarcity of the fish, established the fact that there was no scarcity, but abundance, so the testimony upon this point showed nothing so much as the weakness of the cause of the trappers, and the shifts they were put to to defend their wretched work.

The destructive effects of deleterious substances thrown into the water was attempted to be proved in Rhode Island and in Massachusetts, and in both cases without success.

One trapper in Rhode Island resorted to the novel and ingenious theory that scup were more sensitive to such influences than any other fish, and one witness in Massachusetts had known a small bed of clams near New Bedford to be tainted, and this, from one petroleum factory, was the cause of the scarcity of fish in the tide-waters from Palmer's Island to Noman's Land, a distance of more than thirty miles.

The same interrogatory (57th) and the 78th to 81st, put by the Rhode Island committee, covered this point. Nineteen witnesses testified that of their own knowledge no impurities existed in the waters with which they were acquainted, or that if there were any, they had failed to ob-

serve any injurious effects upon the fishes swimming in it. Allen says, "Waters are not impure on fishing-grounds that I am used to; would know if it was." Bassett says, "Barrington River was always famous scup-ground; Kickamuit River the same. I cannot find a person who knows of any impurities in those waters that were not there fifty years ago;" and, again, "I think the water south of Stone bridge as pure as the ocean." No witness, in all the thirty-nine, save Mr. Benjamin K. Tallman, the inventor of the traps, and Mr. Munro, of Portsmouth, also a trapper, who, in July, 1868, once in a while could see a fish (menhaden) on Pawtucket River come up on the top of the water, gape, and turn on its side and die. He supposed the cause of this was impurity of the water. Had been there for several years before 1868, and was there in 1869, but never saw any other instance of fish dying in this way on that river.

So the committee reported that, "in certain localities, doubtless the waters are impure; but the pollution does not extend so far by any means as some persons in all honesty contend."

One witness from East Greenwich, a fisherman, says, "The water is as pure as ever. My fish will keep as long near where the print-works water comes into the cove as anywhere, and clams, quahogs, &c., are as plenty as they have been for forty years."

The known reputation of Providence River oysters in the market for excellence of quality and flavor is another significant fact in the way of those who would account for the scarcity of fish from the injurious effect of poisonous substances thrown into the water from large cities.

And in Massachusetts no impurities could get into Buzzard's Bay or Vineyard Sound, except from New Bedford, and nothing deleterious goes into the Acushnet River, except from one petroleum factory and a copper-works, which did not thirty years ago. The Prussian-blue works has sent its refuse into that river for more than thirty-five years, and yet more was said about that than of any other of the causes.

It is a little remarkable that we hear of no destruction of the fishes from impurities in the waters of the Hudson or East Rivers, nor in the waters of Long Island, nor in the Schuylkill or Delaware.

Only when traps are set in the bays and arms of the great sea are the fishes diminished by the impurity of the waters.

Even Mr. Atwood could not be made to consent to this, and closes all the avenues to such an argument when he says, "But in the great sea man cannot pollute its waters by anything he can do."

Besides, if the pollution of the waters was, and is, a sufficient cause for the scarcity of fish, we should naturally expect to find the fish to become most scarce in the waters most affected, while the fact is that they have diminished just as rapidly in localities where there are not known to be any impurities which did not exist fifty years ago, and from that time ever since.

Lastly, the blue-fish as a cause of the scarcity. "But," says the Massachusetts committee, "the great cause that has driven many species of fish from our waters is the blue-fish;" and in support of this Mr. Atwood, in his speech, says: "But the great change that has taken place in our fisheries has been caused by the return of the blue-fish."

In his very interesting account of this fish, we are told that they frequented our waters in 1763 and 1764, in which latter year, coincident with a great pestilence which visited the island of Nantucket, the blue-fish disappeared, and Mr. Atwood has no knowledge of a specimen having been seen here for more than seventy years. "About 1832 they reappeared along the south shores of Cape Cod, but did not appear on the

north side of the cape until 1847, when they drove away from our bay nearly all other species."

The bones of the scup found show that that fish was here when the country was first settled. So far as we know, they have always existed in the waters of Rhode Island; and we have also the tradition that they appeared in Buzzard's Bay in 1793, and no evidence that they have not frequented these waters ever since. They must then have been here when the blue-fish arrived in 1832. In 1847 they (the blue-fish) so affected the fishery, that that year was the last of the catch of mackerel, in which Mr. Atwood was then engaged in fishing with nets. Why then did not scup and tautog begin to grow scarce if the blue-fish is the cause? How happens it that the blue-fish which, in one year, drove all the mackerel out of Cape Cod Bay, did not trouble the scup and tautog on the south side of the cape for nearly twenty years? From 1832, when the blue-fish came, until 1848, when these fishes began to be very considerably diminished, the blue-fish, which had appeared in such abundance as to depopulate the waters of nearly all other fish, and depopulated Mr. Atwood's village and home, made no perceptible difference to the tautog and scup. Nor was any difference apparent until after the traps began to be set, which was in 1844.

The truth is, the blue-fish do not drive nor destroy the bottom fish to any considerable extent, and would not at all, but that the traps catch up their food and force them to attack every species that swims. The fishes which Mr. Atwood was catching were mackerel, surface fish. These the blue-fish would pursue, and these they could both destroy and drive.

I have no doubt the blue fish has done much to drive other species of wandering fishes from one place to another. Undoubtedly they consume and destroy large numbers of other fish; they may indeed occasionally attack scup and tautog, and possibly consume the food which is eaten by the fishes of which we are now speaking, but there is no evidence that they do so to any considerable extent. Let us look at the testimony and see when this savage, this scapegrace for the trappers, this *Temnodon saltator*, does his work, and upon what.

It is not probable that he troubled the scup much in Mr. Atwood's bay, since he says that only a few straggling specimens venture into the colder waters north of Cape Cod; and we do not find that he disturbed them on the south side of the cape and in Narragansett Bay until they had lived peaceably together in the same waters for nearly a quarter of a century.

The forty-eighth printed interrogatory of the Rhode Island commissioners is as follows: "Please state, for the benefit of the committee, how a hook-and-line fisherman is employed during the season, what fish he takes at the beginning of the season, with time of commencing, and in order mention the different fish as they are caught, with the usual date of arrival and disappearance."

See also questions 4, and 68 to 71.

In answer to these questions, the witnesses agreed that flat-fish appeared the earliest, then the scup, then tautog, and after them the menhaden, which were soon followed by the blue-fish. It also appeared that scup and tautog were not taken with hook and line until after they had spawned, so that they must have spawned before the blue-fish arrived; consequently the blue-fish do not drive nor destroy these fish until after spawning. Unfortunately, therefore, if the blue-fish drive these fish to any considerable extent, which we have already shown they do not, or did not prior to 1844, they come altogether too late in the

season to depopulate the waters south of Cape Cod, or lay waste any homes there; for when they come the scup and tautog have spawned, and they have gone to their feeding-grounds in deeper waters. Mr. Atwood himself conclusively shows the complete improbability of their being destroyed after that in what he says of the fecundity of fishes.

I repeat what he says on this subject: How vast is the number of eggs produced by a single fish; hundreds of thousands, which, if any considerable percentage should come to maturity, the waters would be filled to overflowing.

How vast, then, I submit, is that destruction which prevents the spawning of fish!

In order of time it also appeared from the testimony in both States that the traps, pounds, and weirs are set before the arrival of either of the fishes under consideration, and to catch them as they arrived, when they are coming with the shoaler and better ærated waters to spawn.

If, therefore, it was a matter of surprise to the senator that men professing to be acquainted with fish should come before the committee and say they did not know blue-fish ate any other fish but menhaden, it is more a matter of surprise that Mr. Atwood, the man who did know all about it, did not tell the senators when these food-fishes appear, in what order they come, when they spawn, and whether they did not go immediately into shoal water for that purpose. He could have told, too, when the blue-fish appear, and what fish they are pursuing when they come, and whether the traps were not set before the arrival of any of these fishes, and to catch them when they came near the shore to deposit their spawn. And, in my judgment, he would not have failed to do this if he had not seen the obvious effect of it upon the cause of the trappers, whom he was placed in his position to protect.

Whatever may be said about it by Mr. Atwood, scup, nor tautog, nor sea-bass, nor yet the food of any of the food-fishes of the New England coast are the natural or chief food of the blue-fish. Menhaden and herring are the fish which they mostly pursue, and upon these they chiefly feed. This all the witnesses testified to, and this everybody on the sea-coast knows, and, what is a significant fact about it, these fishes on the whole do not greatly diminish.

Again, as to this blue-fish, horse-mackerel snapper, or by whatever other name he may be called, Long Island Sound is full of them, and yet we do not learn that he has depopulated those waters of scup, tautog, sea-bass, or striped bass, nor laid waste any considerable towns or villages there. So we conclude that, bad as the blue-fish is, too much blame is laid upon his shoulders; and I am not sure that he does not furnish food enough, and that which is good enough, to pay for all he eats.

It is more than doubtful whether, in the arrangements of Divine Providence, any species of fish can be destroyed by any other agency than man, and not by him, unless he prevents their increase. He who gave the law to increase and multiply abundantly on the face of the earth, knew how to make its operation certain, and gave dominion to man alone to control it. It cannot be shown that any species of fish has been exterminated by any other cause than by preventing their increase. Salmon and trout feed upon their own spawn and upon their own young, and yet how did they abound, until prevented from spawning by improper modes and times of fishing?

Secondly. Are the modes of catching fish by pounds, weirs, traps, &c., a probable cause of the scarcity of any or all the fishes now under consideration?

It is evident that something has occurred during the past seventeen years to cause the food-fishes of the waters of Massachusetts and Rhode Island to become scarce. It has not been satisfactorily accounted for in either of the four ways above considered. During those years, but one other cause can be found which has existed in both States at the same time which did not exist before, and that cause is the unrestrained catching of these fishes by traps, pounds, weirs, heart-seines, and the like.

It is certainly very remarkable that these four fishes should all agree to become scarce in both States upon the setting up of the traps and to grow scarcer and scarcer, year after year, as the traps increased, if either of the above causes assigned for such scarcity was the true cause.

Was not a temporary absence of these fishes likely to occur before Mr. Tallman invented a pound? Was never food for these fishes scarce till trapping commenced? Were not the substances sent into the waters from Providence, Fall River, and New Bedford, deleterious till then? Has the nature of the blue-fish changed since the traps were set? Could he live in the same waters peaceably with all these fishes and not *before* become voracious and destructive? If not, even then ought the traps to be abolished, if by reason of them, however indirectly, the fish absent themselves, or their food becomes scarce, or the waters become poisonous, or the blue-fish becomes savage.

Such extraordinary effects, threatening the entire destruction of the fisheries, depopulating our waters, depriving us of food, ought not to be continued if the removal of the traps and pounds will prevent it. One point further, going to show that the traps and pounds are a probable cause of the scarcity complained of: the thirty-third interrogatory of the Rhode Island commission is, "Do you know of your own knowledge, or did you hear whether the traps at Seconnet Point were broken up during the year 1862, and also in 1867 or 1868, for how long a time were they displaced, and by what wind, and about what date, and what was the fishing for scup those seasons compared with the previous and suceeding year?

Twelve of the witnesses gave full or partial answers, and proved that the traps were broken up in 1862 and again in 1867, and that the catch of scup, by the hand-line fishermen, during those years, was greater than during the preceding or following years. I grant that these facts are not conclusive upon the point, but they are significant, and have sufficient bearing to entitle them to consideration in the case, and go to strengthen the testimony of most of the witnesses when asked to give their opinion as to the true cause of the scarcity about which they had testified.

It is not necessary to review particularly the evidence given as to the cause of the scarcity of these fishes. It is enough that in both Rhode Island and Massachusetts almost the unanimous voice of the witnesses was, that it is the traps and nothing but the traps.

Whether the opinions of these men are of little or much worth, they are, as I have before said, the best evidence we can have until the Government collects the statistics, and all the facts are ascertained. We are glad that some steps in the right direction have been taken, and that a man so well qualified for the work as Professor Baird has undertaken the investigation. That there are many and great difficulties attending the subject there can be no doubt, but they are never likely to be less, and the longer the matter is delayed the greater proportions they will assume.

In Mr. Atwood's remarks to the senate, he says, "If this legislature

should pass an act to prohibit these modes of fishing that have been called novel and improper, what would be the practical workings?"

This, then, was the great point in the case—not what injury had been done and was still being done to the private rights of individuals, nor what the hazard to the fisheries, but what harm would the prohibition of the traps do to the monopolists—what was to be the effect on the Gloucester fishery, on the Wm. L. Bradley Manufacturing Company at Weymouth, on the Pacific Guano Company at Wood's Hole, on the Cape Cod Railroad Company, who had asserted, and who were defending what they called their right to all the fishes they could, by any means, catch.

Even supposing, for the sake of the argument, that these wholesale methods of taking fish do not, on the whole, injure the fisheries, by what right does any man, or set of men, take all the fishes of the sea which they can catch as his or theirs? Have the public no rights? Has not every individual some rights which these monopolists are bound to respect?

I wonder that the great injustice which is done to public and private rights by trapping did not move the legislatures of both Massachusetts and Rhode Island to prompt and immediate action to prevent it. No other so great public right could be trampled upon, no other private right would be so despised.

I wonder that the people have so long consented to be robbed, and for no better reason than that large moneys are invested in the business.

Are the fishermen to be driven from their fishing-grounds, are the people to be deprived of food, that a few men may be made rich out of the public treasury of the sea? And has he or they only the right to catch fish who can afford the extensive and costly apparatus of the trappers?

One would suppose it could hardly be necessary at this late day to discuss this question.

The right of every man to catch fish in the bays and arms of the sea has long since been settled. The denial of the right of any man to catch fish to the injury of the right of any other man has been maintained from the earliest history of the country.

I marvel at the presumption of those who, in derogation of every other man's right, stand boldly before the law-makers of the land, and ask to be protected in their unlawful business, or not hindered in pursuing it. Is it not a matter of surprise that these men should go before these legislative committees and parade the extent of their plunder as a justification of the robbery itself? See the hundreds of thousands of barrels of fish which they testified annually to have taken in their traps for market at home and abroad, for fertilizing phosphates, for bait for the mackerel and cod fisheries, the profits of which they pocketed, and to which they had no legal or moral right if their modes of fishing deprived the poorer fishermen of what was legally and morally theirs.

There can be little doubt remaining that these novel methods of fishing stop the fish from going into their accustomed waters to spawn; that they prevent their going, as was their wont, into the bays and rivers, and that they thus prevent those who live upon the banks of these waters from taking the fish as they formerly did, or compel them to longer voyages and to more expensive apparatus. What Mr. Atwood speaks of, therefore, as the practical working of any act to protect these fisheries or these fishermen, is, in fact, the practical wrong and in-

justice of the business, which he should have been the first and most active to punish.

But the people of the Atlantic shores, as a people, have some interest in the continuance of the fisheries themselves, and know and can know of no private or corporate interest so great as to be long permitted at the risk of their exhaustion. Enough has been proved to show that the traps and pounds are one great cause, if not the only cause of the scarcity of the food-fishes of the coast, and the people demand and have the right to demand that they be abolished altogether, or so regulated that the fish may pass along the shore to their accustomed places to spawn.

The trappers have had their way and filled their pockets during the past seventeen years, and the fishes have become scarce. Let the poorer hand-line fishermen have their way for a few years, and you will see that the fishes are as abundant as formerly. The proverb that "there are as good fish in the sea as have been caught," was only good until trapping began, and the theory that any scarcity of fish during one season will be made up by increased numbers from the great sea the next, is only a poor conjecture.

We admit that there is a great fishing interest involved in the trapping of fish, as the fishing business is now carried on, but we do not admit that sufficient bait for the mackerel and cod fishermen cannot be obtained in some other way not prejudicial to the other fisheries. A proper regulation of the traps with respect to the time of their being set and taken up would permit their use for catching menhaden, but were they prohibited altogether, there is no good reason to suppose that the Gloucester fishermen would suffer for want of bait. Let it be known when and where the bait was wanted, and thousands of our fishermen, with nothing now to do, with their shore-nets would supply it in the greatest abundance, at no higher cost, in better condition, and just where and when it was wanted.

Perhaps not so many fish would be cast upon the land or ground up into phosphates, but more would be for sale for food and as much for bait.

Nor will a law protecting the fisheries necessarily throw men out of employment, but, on the contrary, will make business for a much larger number. That great class of hardy fishermen so feelingly spoken of by the senator of the Cape district, will not only become more numerous, but be better rewarded by a proper regulation of the fisheries. How many hook-and-line fishermen equally as worthy as those who have lain down to rest in a Newfoundland fog, have been thrown out of employment by the greed of the trappers in their unconscionable, everlasting hunt after that "last dollar," and lain down to rest in as gloomy a solitude, in the fog of New England!

It is only necessary to prohibit the traps for awhile, and regulate the time and extent of such fishing hereafter, and it will result for the permanent good of the trappers themselves, for the good of these hardy fishermen on the whole, and for the benefit of the thousands who could once find a living on our shores, now so depopulated of the fishes the catching of which gave them employment and heretofore furnished them with food.

I am satisfied that further commissions and investigating committees will do no good. What availed the sixty-two thousand questions of the royal commission, or the eighty-two questions of the Rhode Island committee, or all the oral testimony of the Rhode Island and Massachusetts investigations? The trappers are always able to throw more

influence into the scale than the fishermen. "Leave to withdraw" is the stereotyped report of the Massachusetts "committees on the fisheries," and bills to protect are everywhere quietly voted down.

Mr. Atwood closes his remarks by alluding to the antiquity of nets, and recites the simple and beautiful narrative of the calling of Peter and Andrew, James and John, the fishermen of the sea of Galilee, to make them fishers of men.

It does, indeed, show that nets were in use at that remote period, but it does not show the justness or lawfulness of the practice, and commits not the Master to its approval. For he said unto them, "Follow me." "And they straightway left their nets and followed him."

Once, indeed, in the ship, which was Simon's, he performed the miracle of the great draught of fishes, but while he compensated the disciples in that they had toiled all night and taken nothing, he destroyed their nets.

There is another class of persons interested in the continuance of the fisheries, to which I have but slightly alluded. What little was said by them or in their behalf before the committee in Massachusetts was sneeringly received, and they themselves contemptuously referred to. I mean the amateur fishermen. These men also have some rights of which the trapping of fish is a violation. Though they are anglers rather than fishermen, and pursue their finny game for recreation and not money, they are entitled to no little consideration. As a class they are rapidly increasing in numbers and in influence. Driven during the heated months of the summer season from our more crowded and unhealthy cities, rod in hand, they flock to the mountain-streams and the sea-side. Generally men of means, of leisure, of cultivated tastes, they form themselves into clubs or associations, build comely houses, and beautify their grounds. Lands long since worn out and become comparatively useless, and well nigh abandoned, they increase in value; they add to the revenue of the towns and State they visit; men of intelligence and culture for the most part, they study the habits of the fish they catch, and add not a little to the stock of our knowledge of a subject of which the people know so little.

In the investigation of this interesting subject, while we hope to find out more about the habits of the fishes upon our sea-coast, and what are the proper modes and times of catching them, we shall not altogether have wasted our time if we find out that there are some things valuable which do not pay, and some things worth considering which do not result in dividends.

Whether a case has been made out showing that the traps and pounds are solely responsible for the growing scarcity of fish, the methods of otherwise accounting for it, resorted to by the trappers and their defenders, are proved to be insufficient and unsatisfactory. Enough has been shown to demonstrate that, by these means, the "exhaustion of the sea-fisheries" as to these particular species of food-fishes is possible.

This is enough to entitle the subject to serious consideration, and to warrant the Government in early legislation to prevent it.

It will be better that the trappers should submit to some inconvenience—be put to some loss, indeed, rather than that action should be too long delayed.

It is easier now to interpose to save, than it will be by and by to replenish, our depopulated waters.

GEO. H. PALMER.

NEW BEDFORD, *January* 1, 1872.

V.—REPORTS OF STATE COMMISSIONS IN REGARD TO REGULATING THE SEA-FISHERIES BY LAW.

REPORT OF COMMITTEE OF RHODE ISLAND LEGISLATURE, MADE AT NEWPORT JUNE 15, 1870.

The committee,* at the first of its several meetings, (which have taken place at Providence, Tiverton, Seconnet, Newport, and Narragansett Pier,) chose Francis Brinley, of Newport, chairman. They found it necessary to obtain the services of a secretary who should aid them in recording the testimony of witnesses examined by them, and J. Talbot Pitman, esq., of Providence, consented to act in that capacity. The duties have been performed by him with accuracy and to the great satisfaction of the committee.

The process of oral examination was so exceedingly slow and tedious that the committee were soon convinced of the impracticability of continuing it if their labors were to terminate in season to report at the May session, and a series of eighty-two interrogatories was prepared, with printed instructions, (copies of which are annexed,) and widely distributed. The chairman has received prompt, sworn answers from many persons. As was anticipated, the statements are somewhat contradictory, and in some particulars utterly irreconcilable. These numerous documents have been carefully examined and considered by the committee with an anxious desire to get at the truth. It should always be borne in mind that the fisheries have, from the time of the charter of Charles II down to this present time, been considered deserving of recognition and special regard. The right of fishing belonged to each individual, and he could not and ought not to use it so as to infringe upon or destroy the right of another. Now, it is the alleged violation of this individual right, and of a common but sound principle of law as well as of morals, by the introduction of trap-fishing, that the people on the inland waters of the State complain.

The oral and written testimony laid before the committee, establishes the fact that whereas scup were formerly abundant in the waters of Narragansett Bay, and constituted a cheap and nutritious article of food to the inhabitants, readily found and easily caught, they have gradually left these waters, until they are quite abandoned by this species of fish, and partially so by other species.

To what cause shall this change be ascribed? The opinion is very generally expressed by witnesses, that it is owing to the interception of fish by the various traps and nets which are scattered in their way, so that some of the deponents entertain a belief that they will soon be utterly exterminated.

In this connection let us advert to the deposition of Mr. C. H. Bassett,

* The first part of the report is omitted as consisting of general considerations on the subject in the way of statistics, &c.

of Barrington, a very intelligent man. In answer to interrogatory 38, he says, "I have caught scup both side of Stone Bridge. These fish spawn in this bay; the fish caught in Kickamuit River had never been out of that river; they were spawned there, and if not disturbed would have returned there the next spring, as sure as the bird comes back to its old haunt." In answer to question 58, he adds, "My opinion is, these fish follow along the coast and would fill all the bays and rivers, where no obstruction was placed; as a drove of cattle going along the road will come into your fields if the bars are down, so these fish in their migration would fill our bay were it not for the traps." A portion of his answer to question 80 is, "For a fortnight past I have fished nearly every morning for two or three hours on Barrington Bridge, and have conversed with a great many carpenters, shoemakers, and other workmen who come to the bridge to catch a few tautog, if possible, for a dinner before going to their day's work; they say formerly they were able (when scup and fish were plenty) to come down here and catch all the fish they wanted before they went to their day's work. They all tell one story. Before traps were allowed, there were plenty of fish; could catch enough in half an hour. One very intelligent man thought it made one hundred dollars difference in the cost of living to those persons living on the shore and in the small towns on the bay, and, from my own experience, I have no doubt there are a thousand persons living near the shore to to whom it would make this difference, amounting to a loss to them amounting to one hundred thousand dollars each year, the loss in the high price of fish in Providence market not being taken into account."

It was in evidence that such vast amounts of scup were sent to New York, Philadelphia, &c., that the increased catch did not reduce the price for home consumption. Mr. Bassett, in his answer to the 50th question, states that "in former years Providence market was almost wholly supplied with fish from the bay. The bay and river was a vast reservoir from which we took out fresh fish from day to day, as we wished. I remember seeing a fisherman salting down a car-load of blue-fish, because all he could get offered was one and a half cents per pound. A fish he was then glad to sell for twenty cents would to-day sell for $1 25. Under the hook-and-line system, we had scup from five to six months in the year at a very low price; now we get scuppaug for about fourteen days, and stale at that; when the fish were allowed to come in the bay, we had them near the city, and they came to our market 'live and kicking.' Under the present destructive system of trapping, not only is all our summer supply sent off, but the fish not being allowed to spawn, the natural increase is cut off." According to the testimony of Daniel L. Church, of Portsmouth, "up to noon of this 16th day of May, 1870, between nine and ten thousand barrels of scup, and about three hundred barrels of other fish, including fifty barrels of striped mackerel, have been caught between Brenton's Reef and here, (Seconnet,) and about two-thirds of this whole catch have been caught at Seconnet Point."

The scarcity of fish in the bay has by some witnesses been attributed to the impurity of the water arising from deleterious water poured into the bay from Taunton, Fall, and Providence Rivers, and other sources, where the residue of chemicals, &c., is permitted to mingle with the pure waters of the ocean. On this point, as on others, the evidence is very inconclusive and contradictory. In certain localities doubtless the waters are impure; but the pollution does not extend so far by any means as some persons in all honesty contend.

Mr. Bassett, in his answer to interrogatory 57, says, "As to the im-

purity of the water, Barrington River was always famous scup-ground; Kickamuit River the same. I cannot find a person who knows of any impurities in those waters that were not there fifty years ago; but no scup are now caught there to-day, and with the tide ebbing and flowing twice every day, the impurities falling into the bay are hardly more noticeable than a drop of ink into a hogshead of water."

Scarcity of food has been assigned as a reason why fish are not so numerous in the bay and rivers as heretofore. Again opinions differ, some persons believing there is no want of food, and others affirming its scarcity. In the opinion of your committee, the preponderance of evidence is that there is an abundant supply.

Mr. Bassett, in reply to question 57, says, "My opinion as to scarcity of food is, that there is the same amount as formerly; some have said muscles are scarce; on this point I can say, in the spring of 1868 I lived at the head of Bullock's Cove, and two or three mornings of the week went on to the muscle-bed off Nayatt or Bullock's Points, carrying a pair of rakes, and always pulled up all the muscles we wanted; they were so plentiful on Bullock's Point that a man in my employ, at a very low tide, shoveled into a sea-weed scow as many as two horses could draw, and put them into the manure heap."

In answer to the 80th interrogatory, Mr. Bassett says, "This trapping has destroyed a business which formerly was followed by many of our citizens. I do not know a man in the city of Providence who now follows fishing for a living, and for this reason: I think fish are so scarce in the bay they could not make a living. Boat-building was formerly carried on here by six or seven different concerns. I know of but two now, who build a few boats. All the business formerly connected with down the river boating-parties has been broken up, and our citizens go down to Maine or other places for fishing."

This witness presents the view which, in general, is that of the hook-and-line fishermen. In juxtaposition, the committee propose to place the evidence of Benjamin Tallman, of Portsmouth, well known as a fisherman of very great experience, and who may be considered as the inventor of trap-fishing. His examination by the committee was thorough and protracted. His oral reply to the 5th printed interrogatory was as follows: "The proportion of tautog to scup is very small. I don't suppose that the average of each trap would amount to four hundred pounds the whole season. In 1867, in nine days, I got $18,000; I have six traps; had three traps on one line; employed twenty-seven men on these three traps and twenty-seven on the other three; couldn't tell how many barrels; sold them at about $2 per barrel; should think about 10,000 barrels; got one morning $3,000 before breakfast. In 1868 did nothing. I had nine gangs, and expected to have got $30,000, but did not get over $6,000. The reason was it was owing to the northeast winds; cold storm all the time; kept the fish off the shore in deeper waters. In 1869 had six traps and six gangs; took about $6,000. Horse-mackerel came along about the 25th of May; the price averaged $2 per barrel; some sold for $1 and some for $3."

As to the number of traps, he stated, "There are nine setting-places, eight for double gangs and one for single gang, at Seconnet Point; there are three set further south than usual this year. There are seventeen gangs, of about ten men each, including the cook. At the Flints, on Sachuest Point, there are six gangs, having fifty-six men, between Sachuest Point and Easton's Point. Three at Gooseberry Island; one belongs at Newport, one at Tiverton, and one at Portsmouth. East of Brenton's Reef, single gang. Two traps at the Wash-Bowl, west of

Brenton's Reef; one owned at Newport and one at Portsmouth. There used to be *one* at Castle Hill—whether now there or not I cannot tell—small one. On west side of Conanicut, north of Beavertail, there is a trap owned by Gladding, as I understand; took three hundred pounds of menhaden yesterday there. Sometimes a trap is set this side and north of Point Judith, in pleasant weather; but not much is done with it."

That an approximate estimate may be made as to the cost of these traps and necessary apparatus, the committee refer to the following statements of Mr. Tallman. In answer to the 8th printed interrogatory he stated that "it takes about four hundred and fifty pounds of twine to make a trap, for the trap part alone; that's the average for an average-sized trap. The leader about two hundred fathoms long; that's the average of the leader at Seconnet Point; weight about six hundred pounds. We have a purse-seine used a year and then made into a leader. Twine costs now about $1 per pound; some is over that; most of the twine costs $1 15 down to 85 cents; worth about half-price when used as a leader. As a general thing, we use new twine for the trap and pound. Cables cost about $6 apiece; use ten for a trap; ten anchors to a trap, costing $15 each, and worth that. Cables would last two years good. Think the best way is to have a new cable; cable after being used one year would be worth $2. Three little boats (14 feet long) to each gang, and worth $65 apiece, new; they will last about six years; depends upon where you use them, somewhat. Two large boats (30 feet keel) to carry fish to vessel, to a gang. Boats worth $1,400 each will last ten years; could be used for other purposes. There are two boats (19 feet keel) to a gang, which are used to carry out the anchor-warps, set the traps, &c., cost about $165 each; these boats are also used for menhaden-fishing. New twine put into traps and taken good care of, would be good for another year."

To the 11th and 12th printed interrogatories, he answers that "there is a law among the trappers at Seconnet Point that no leader shall be more than two hundred fathoms; the leaders come out in a line ten fathoms beyond the one above it. At the Flints, the leader is five hundred fathoms from the beach, but the one on the Point is seventy-five fathoms. On the five hundred fathom leader three traps are set; on the one at the Point only one trap is set. The trap is about twenty-eight fathoms wide, so that a trap set in seven fathoms of water would be about fourteen fathoms across; the length is about thirty-four fathoms."

In regard to the diminished number of fish, Mr. Tallman testifies, in reply to printed interrogatories 23 and 24, that "sea-bass are not so plenty as fifteen years ago; then they were worth three cents per pound, and the same now. Tautog same price as fifteen years ago, three cents per pound. With the exception of scup, prices are the same. Scup are three times the price they were then. The first thing we did forty-five years ago, if we saw scup, we used to pull up the nets when fishing for menhaden and let them go, for fear they would cut the seine to pieces. Ten years after, we sold them at ten cents per barrel, for manure. Ten years after, we began to send fish to New York, packed in ice, and they were then sold for twenty-five cents per barrel. Not more than two vessel engaged in the business. Most of them used for manure were sold at about sixteen cents per barrel. About twenty years ago you could buy as many as you wanted for sixteen cents. About twelve years ago the price would average for shipping fish, fifty cents per barrel. Not more than one-fifth was used for food. Those sold for manure brought about twenty cents per barrel. No scup have been sold and used for manure for about eight years, to my knowledge. The price

then would average about one dollar per barrel, I should think. The price has been constantly and gradually increasing ever since; the average price last year was about two dollars a barrel; they have brought $4 50 per barrel. The price has been increased in consequence of increased demand and scarcity of fish, together with the facility of carrying them to market. I have seen seventy vessels taking in fish and waiting their turn, twelve loading at one time, at Seconnet Point." To the 25th interrogatory, he says, "I should think that about three thousand barrels of scup were carried to Providence. I should say not over one-fifth of the takings were used in the State for food, for the last three years." "Scup," he says, in answer to interrogatory 31, "were caught above Stone Bridge in 1825 and afterward. In the year 1823, or thereabouts, they were caught at Church's Cove. That is about the first seining that was done about Seconnet Point. From 1825 to 1845 any quantity of scup were caught; after that they did not so many come up the river as formerly."

Mr. Tallman is of opinion that if these methods of taking fish were disused, the market would not be better or fish more plenty, because the fish the trappers take would not have stopped in the bay; all the impurities of the waters at Fall River, Providence, &c., deleteriously affect the fish.

These two deponents may be said to fairly represent the opinions and convictions of the hook-and-line men on the one hand and of the trappists on the other. It will not escape observation that they agree on two important points: *first*, that there has been a gradual diminution of the number of fish entering the bay or river; *secondly*, that fish are not as cheap as formerly. They differ as to the cause of the decrease, but it must be admitted as a fact that contemporaneous with the introduction of traps was a decrease of fish. In this connection we may use the language of Professor Greene in his speech before the general assembly last winter: "Is it not an accepted principle of philosophical investigation that where two facts follow each other in this close order of sequence, they bear to each other the relation of cause and effect? Does the severest logic demand any other test than that the cause should be adequate, the effect evident? Is it not to reasoning like this that we are indebted for all that we know of the laws of animal and vegetable life? What is theory but the generalization of phenomena, and what do we require of these phenomena but that they should bear the most rigorous investigation? That investigation, in questions like this, is experiment. If the theory be just, the experiments will confirm it. If the theory be false, the experiments will reveal the falsehoods. And here," he continued, "I might rest my argument, for all that we ask is, that this question, so important to every citizen of Rhode Island, should be brought to the test of experiment."

This report had reached this point, when the chairman received a copy of the Yarmouth Register of May 27, in which there is a speech made by Mr. Atwood, of the Massachusetts senate, on the 19th of April last, in relation to the petitions for the prohibition of net and seine fishing on the coast of that State. Mr. Atwood was opposed to any prohibitory legislation, because he had not any apprehension that the fisheries could be exhausted; that fish were migratory, or rather not permanently local; they sometimes have a locality, and, after the lapse of years, reappear; that therefore the disappearance of fish of any kind is not proof of their exhaustion, but merely of absence. Mr. Atwood states, "The scup that has been so abundant for many years south of Cape Cod extends to Florida, and is caught in great numbers along the coast. It finds a ready sale in New York, and other markets, but in

Boston market it is not known as a marketable species, and is seldom seen there. Only a few straggling specimens venture into the colder waters north of Cape Cod. Witnesses stated before the committee that they had a tradition informing them that scup first appeared in Buzzard's Bay in 1793." If it be true that scup will avoid the colder water north of Cape Cod, the force of the argument that if they are not taken at Seconnet Point they will keep on eastward, and then be taken by the fishermen of Massachusetts, is essentially impaired.

It must not be overlooked that Mr. Atwood in his speech has in mind the fisheries of the coast of Massachusetts, and not of Rhode Island; besides, he was relieved from constitutional scruple, inasmuch as there is no constitutional provision in Massachusetts as in this State in reference to the right of fishing, the intent and design of which he could not disregard. It may be, therefore, that he is warranted in his belief that in Massachusetts there is no necessity for the passage of any general legislative act for the protection and regulation of the sea fish and fisheries; but it does not follow that there is no necessity for such action in Rhode Island. Finally, he makes this admission: "If fish have diminished in any of the small arms of the sea, I should have no objection to the passage of a local act, provided it did not interfere with the rights of others."

Now, as the testimony is ample and conclusive that scup and other bottom fish have diminished in the rivers and bay and arms of the sea of Rhode Island since the introduction of trap-fishing, it appears to the committee that some legislative restraint, as to the use of new instrumentalities for fishing, which impair or destroy individual rights, should be provided and enforced. The grave and complex question, how to adjust that restraint, has been most anxiously and carefully considered by the committee.

The boats, anchors, traps, and other apparatus required for the prosecution of trap-fishing are of heavy cost; some or all of these articles and materials could be used for various useful purposes, if trapping was prohibited. But this great interest should not be stricken down at once. Care must be taken, however, that in seeking for the reasonable preservation of that interest, the claims of another and large portion of the people should not be disregarded. Mechanics and other respectable persons who, by a cast of the hook and line, could, without interfering with their regular duties and employments, add a dish to their frugal tables, have not now the same chance as heretofore. It was in evidence that in certain localities boat-building was quite abandoned; that parties did not visit Narragansett Pier, Stone Bridge, and other watering places, or soon left them, because the attraction of good fishing was wanting; and that this was attended by the depreciation of real and other property.

After a careful and anxious investigation of the subject, the committee have come to the unanimous conclusion to recommend that the use of all traps and heart-seines, and other contrivances for catching fish, not including pike-nets, shore or purse seines, be prohibited in all the waters of Rhode Island northerly of a line drawn from the southerly point of the rocks at Brenton's Reef, to the southerly point of Point Judith, and north of the Stone Bridge at Howland's Ferry.

FRANCIS BRINLEY,
JOSEPH OSBORN,
JOSEPH W. SWEET,
HENRY T. GRANT,
JABEZ W. MOWRY,
Committee.

NEWPORT, *June* 15, 1870.

The committee recommend the passage of the following act:

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS.

January session, A. D. 1871.

AN ACT to prohibit trap and heart-seining of fish in the waters of Narragansett Bay.

It is enacted by the general assembly as follows:

SECTION 1. No trap, heart-seine, or other contrivance of any kind or description, other than pike-nets, purse-seines, shore-seines, scoop or hand-nets, and hook and line for catching fish, shall be set or drawn in any of the waters within the jurisdiction of the State, northerly of a line drawn from the southerly point of the rocks at Brenton's Reef, to the southernmost point of Point Judith, and north of the Stone Bridge at Howland's Ferry.

SEC. 2. That each and every person who shall be or shall have been engaged in setting or drawing any trap or other contrivance prohibited by the first section, shall be deemed guilty of a misdemeanor, and shall pay a fine of not less than fifty or more than three hundred dollars for the first offense, and for the second and every subsequent offense he shall be fined a sum of not less than five hundred nor more than one thousand dollars, and shall be imprisoned for not less than one month nor more than one year.

SEC. 3. That all and every the nets or other contrivances, apparatus, boats, and vessels of persons willfully and knowingly engaged or employed in violating the provisions of said first section, or in carrying off the fish so caught, shall be forfeited upon being condemned, as hereinafter provided, to and for the uses hereinafter provided.

SEC. 4. Complaint shall be made, or an information filed under oath or affirmation, by the mayor or city marshal of any city, the president of the town council, or any town sergeant, the sheriff and his deputies, and the city or town constables, whenever either of said officers has knowledge of the violation of the first section of this act within his jurisdiction, if no other complaint or information shall have been made or information filed against the same property for the same violation of said first section; and may make such complaint or file such information when the alleged violation has been committed in any place therein forbidden, and any such complaint or information shall set forth that the complainant or informant has reason to believe, or does believe, that the traps or other contrivances, apparatus, boats, and vessels, which shall be described as nearly as may be in such complaint or information, are being used, or have been used, engaged, or employed in violating the provisions of said first section, before any court of competent jurisdiction, and such proceedings shall be had therein as by law is prescribed for protection of personal property under the penal statutes.

SEC. 5. That any of the officers named in the fourth section may, without a warrant, seize and detain any traps and other property mentioned in the second section, found in use or engaged in violating the provisions, or which he has good reason to believe, and does believe, has been so used or employed, and shall convey the same to some proper place of security, and there to keep the same until said traps and other property mentioned in section second can be proceeded against as provided in the next preceding section; and upon said seizure the said complaint or information shall be made or filed within sixty hours after said property has been seized and secured as aforesaid; and when said information shall be filed in the office of the clerk of the court of common pleas within and for the county within which the said violation is alleged to

*This bill failed to become a law.—S. F. B.

be made, as provided in chapter 225, section 15, of the Revised Statutes, said clerk shall issue a warrant under his hand and the seal of said court, returnable at the term of said court to be held next after the expiration of twenty-one days from the time of filing said information, as provided in section sixteen of the last-mentioned chapter, and said clerk shall immediately issue notice of said information, as is provided in section seventeen of said chapter.

SEC. 6. Upon entry of judgment of forfeiture against said property so complained of or seized, the court, before whom the complaint or information shall be tried, shall enter up judgment that the same are forfeited to the State, which judgment shall be the judgment from which any appeal must be taken.

SEC. 7. Upon final judgment of forfeiture against such property, either in the original or appellate court, or upon forfeiture of claimant's recognizance to prosecute his appeal according to law, the court shall forthwith issue to the officer having such forfeited property in custody, or to some other proper officer, an order in writing directing him to sell the same at public auction, and pay the proceeds thereof into said court, and every such officer shall execute said orders and shall return the same with his doings thereon indorsed to said court within such time as said court shall direct.

SEC. 8. Whenever in such proceedings for forfeiture it shall appear to the court that there has been any irregularity in the service of any process issuing upon the complaint or information, or any omission to publish the notices required, or any defect or omission in the complaint or information or other proceedings, the court may permit the same to be amended, and direct such further service of process or publication of notice, as will, in the judgment of such court, be most effectual.

SEC. 9. No officer complaining or informing as aforesaid shall be required at the time of making such complaint to enter into recognizance, or in any way to become liable for the costs that may accrue thereon, or for any damages on account of such seizure, unless it be proved to the court that the complaint was made maliciously, and without good cause.

SEC. 10. All fines recovered, and proceeds of forfeiture made under this act, shall inure one-half to the State, to be applied for the purpose of protecting the fish in our waters, and the other half to the complainant.

SEC. 11. Any person convicted of any offense under the second section of this act may appeal from the sentence of the court to the appellate court then or next sitting: *Provided*, Such appeal be prayed for at the time of passing sentence.

SEC. 12. Upon such prayer of appeal, the appellant shall be required to give recognizance in the sum of hundred dollars, with good and sufficient sureties, in every case so appealed, with condition that he will file his reasons of appeal, together with a copy of the case, in the court appealed to, on or before the expiration of ten days after the date of said prayer, if sitting, if not, in the office of the clerk thereof, that he will appear before said court, and there prosecute his appeal with effect, and abide and perform the order or sentence of said court in said case, and that he will not, during the pendency of said appeal, violate the provisions of said second section, which said recognizance such court shall forthwith certify to said appellate court.

SEC. 13. Any person interfering with, obstructing, or resisting any officer in the performance of the duties herein prescribed, upon conviction, shall be punished as provided in the eighth section of chapter 211 of the Revised Statutes.

SEC. 14. This act shall take effect from and after its passage.

ON THE POSSIBLE EXHAUSTION OF SEA-FISHERIES.

BY THEODORE LYMAN, MASSACHUSETTS COMMISSIONER OF INLAND FISHERIES.

[From the sixth report of the commissioner, 1872.]

Turn now the inquiry from river fishes to those that inhabit salt water only; and take a representative. The scup belongs to Rimbaud's division of "white fishes," (*poisson blanc*,) that is to say, those which retreat in cold weather to the off-shore depths, and return with the warm weather to the shallow water close to the coast. Of this group no representative has been more abundant on the south shore of Cape Cod than the scup. Early in May they used to make their entry into all the bays and fiords in great multitudes. Their route is not so well made out as it should be, but, according to the best observations, they make their advance through the gap, about fifty miles wide, between Montauk Point on the west and Gay Head on the east. Where they come *from* is a more difficult question; for the species is plenty as far south as Georgia,* and nobody can say how far south the Vineyard Sound scup retire during the winter. It has been guessed that they go to the edge of the Gulf Stream; and this is as good as any other good guess. The same remarks apply to our shad, which come round Montauk Point, and thence, according to the fisherman's belief,† oblique westward to enter Connecticut River. It is the received opinion that the scup, as they near the shore, "fan out" to the northward and eastward, filling Narragansett and Buzzard's Bays and Vineyard Sound. J. N. Luce, a very intelligent observer, testified, at the legislative hearing of 1870, that scup appeared first at the *west* end of the Vineyard, and coasted its northern shore, passing into the tidal ponds in succession, beginning with Menemsha Bight, (see plate 1,) and continuing eastward. The big fish, some weighing two pounds, were in-shore, and the smaller ones out in deeper water. They appeared first at Gay Head between April 25 and May 10, and then were full of spawn, but, by the end of June, all the females were shotten; and in August, the tidal ponds were crowded with the young. The first frost was a signal for old and young to leave these ponds; the latter in such vast numbers that whole windrows of them were sometimes thrown back on shore by the surf. Of these big scup in the salt ponds, he had seen none since 1865, and he noted a diminution, beginning at the *east* end of the island, as soon as pounds were set in the neighborhood, whence he argued that in their passage eastward they got completely cut off before reaching the extremity.

The scup arrive near Newport from the 10th to the 12th of May; at this season they push their way slowly, sometimes making no more than four miles in a day. They then are said to be "numb," and are thought to be blind. The origin of these absurd notions is the fact that they are full of spawn, and are feeling their way cautiously, like most fishes in like circumstances; moreover, the temperature of the water variously affects their movements. When a cold northeaster blows, they hold more in deep water, to the great loss of the trappers. Their mode of entering Narragansett Bay was a subject of dispute. Some of the Saugkonnet trappers, whose interest it was to show that they took the scup *coming out* of the bay, maintained that the fish entered by the west pas-

* Holbrook, p. 175, pl. xxv, Fig. 1.
† Report for 1867, pp. 8, 12, 49.

sage, past Point Judith, passed round the north end or across the south end, and coming down the east passage, fell into the traps,* whose mouths were always set to the *north*. The hook-and-line men, however, averred that the scup pushed up both passages at once, and in the middle also, and those that were taken at Saugkonnet were hugging the shore and got set into the traps by the tide. Both views may be correct; but the second one doubtless is, because the singular inroad of young scup, which took place this year, and which will presently be spoken of, struck first at Saugkonnet and *afterward* at Beavertail. It is usually thought that no scup came in through Muskeget Channel, but this, like the rest of the theory, is not well proved. The first specimen was taken at Waquoit, this season, as early as April 25, and the greatest numbers taken were on May 10 and 13. The season was peculiarly early, and the first "run" near Newport was on May 3, which would be a week's difference between these points, not enough, perhaps, for the slow scup to move so far. The dates for appearance for past years, (table,) suggest that the fish of that part of the coast must strike in through Muskeget Channel.

Within a few seasons, a great change has come over the numbers and movements of the scup. In bays and salt ponds they have become nearly extinct; while in the great channels and near the mouths of the bays they still are found in considerable though diminished quantities. Witnesses disagree as to the exact time when scup began to fall off; indeed, it is not probable that they diminished uniformly and in all places at once. Some aver that a falling off was to be noticed only four or five years after the first traps were set, which would make the year 1850. But most of the testimony goes to show that it was between 1856 and 1866. Certainly in 1860 scup were still plenty at Point Gammon and in Lewis's Bay, near Hyannis. Four causes are alleged for this diminution: 1. Impurities in the water. 2. Want of food. 3. Traps. 4. Blue-fish. As to the first, although gravely put forward by certain witnesses, it is too absurd to be for a moment entertained. The idea of poisoning all the waters of Buzzard's and Narragansett Bays by a few mills and print-works near Providence, Greenwich, and Fall River, is ludicrous in itself; and it is moreover well known that live fish are found in plenty in close proximity to these very manufactories, and that live clams lie directly in the track of the drainage of petroleum works.† As to want of food, it was stated that the five-fingers (*Asterias*) had destroyed certain great muscle-beds, which were feeding grounds. But the dredgings of Professor Baird, during the present season, have shown, not only that there are vast muscle-beds still existing, but that the tautog were no more plenty there than elsewhere; and, moreover, the sea-water was everywhere full of the salpæ, fish-eggs, minute crustacea, jelly-fishes, and small worms which are usually found in such localities. The real perplexities of the question are to be found when the effects of traps and of blue-fish come to be considered. The traps can diminish scup in the way they have been diminished, only under certain conditions, to wit: (*a*,) all the scup must stand in between Montauk Point and Gay Head; because any that advanced through Muskeget Channel would nowhere find enough traps to interfere much

* A trap is a simplified weir. The bowl is merely an oblong, rectangular pen, of large size, and the fish would immediately escape, did not the fishermen, as soon as a school had entered, pull up the net bottom and shut them in. A trap, therefore, requires constantly to be watched. This modification of the *Madrague* is said to be the invention of Benjamin Tallman.

† See also Report of Massachusetts Commissioners for 1865, pp. 18 and 53.

with them between Waquoit and Monomoy Point, and therefore they would have continued abundant within these limits, while they would have grown scarce in Vineyard Sound and in the two great bays; (*b*,) all, or nearly all, the fish must, as they come in, crowd toward the shore at certain points, and must pass within 1,200 feet of it, because that is the usual length of the trap-leader; (*c*,) all, or nearly all, these scup must be captured before they have spawned, otherwise the race would be abundantly continued, despite the capture of the parents. Each of these conditions is fulfilled, according to the opponents of traps.

The scup, they say, *do* all stand in as indicated above; they are full of spawn; and they encounter a different pressure and a varying temperature, which render them slow and lethargic; and, in this condition, they are swept by tides and eddies against certain points of the shore, or of themselves seek the sunshine in protected nooks and bays, where they are captured by hundreds and thousands of barrels. If, on the contrary, they were let alone, they would soon cast their spawn and then would spread far and wide, as a bottom fish, greedily taking the hook. Under the present system, vast quantities of gravid fish are thrown on the market in May, but in the summer and early autumn it is hard to get any. The trappers admit the chief facts, though not the inference. They agree that the scup come in altogether between the Vineyard and Montauk Point; that they are "numb" and full of spawn at that time, and that during warm spells they stand close in, often seeking quiet coves; while, in cold, easterly weather, they keep off in deeper water. They admit, further, that the quantity taken is very great,* but maintain it is but a small proportion of the whole. They are lame in two ways; in the first place, they could give no reasons, that were tenable, for a diminution they fully admitted. In the second, they were usually very shy about giving any testimony at all before the Rhode Island committee. Nevertheless, it does not follow that they have the wrong of it. The question must be answered by a collection and a comparison of *facts*. It is clear that the scup approaches the shore in a way differing from that of the alewife, a hardy, active fish, which does not spawn till later, and then in fresh ponds. It *may* therefore be that scup will fall *en masse* into a trap, which alewives would under certain circumstances avoid, as has been nearly proved in the case of the Waquoit weir.

The blue-fish theory is an old one, but new in its application to scup. Mackerel and menhaden are, as is well known, driven away by them, but it has always been maintained that scup were too spiny to be a favorite food, and practically were let alone in favor of fatter and less bony prey. The witnesses in the Massachusetts and the Rhode Island investigation were unanimous in their assertion that a scup in the stomach of a blue-fish was a very rare thing; Professor Baird, however, has found many scup in their maw. It is true that these were usually from scup-traps, and the blue-fish may have attacked them simply because they were the only prey at hand. On the whole, it will be perhaps pretty near the truth to say that, although the blue-fish blindly destroys almost everything that comes in his way, his *main* food is the soft fishes and mollusks, such as menhaden, mackerel, alewives, and squid. Scup were abundant when the whites first visted the country, certainly from 1621 to 1642. At some time after this, not yet ascertained, they *disap-*

* In 1867, six traps at Saugkonnet Point took 10,000 barrels of scup. Next year, however, by reason of bad weather, they got only about a third as many for the whole season.—(B. Tallman.) In 1870, about 6,000 barrels of scup were taken by the Saugkonnet Point traps before May 16.—(D. Church.)

pearcd wholly, and, toward the end of the last century, were not known in our waters. About 1794 they reappeared, and became abundant. In 1864 they decreased very much, and are at present comparatively scarce. If now the blue-fish are the cause of scarcity, there ought to be some correspondence in their dates of appearance and of disappearance. They were plenty near Nantucket from 1659 to 1764, when they *suddenly* and totally disappeared, to reappear in 1830. Now it would seem that scup did not reappear till thirty years *after* the blue-fish went away, to wit, in 1794, and when the blue-fish came back in 1630, they found scup abundant, and lived side by side with them for thirty years, before the latter began decidedly to decrease. It is hardly in accordance with what is seen in nature, to suppose that a cause so active would take so long to act, or that, when it ceased to act, so long a time would be needed to restore the original state of things. And now, in the midst of this theorizing and seeking for evidence, rises a phenomenon which puzzles both parties to the dispute. About the 1st of June of this year (1871) those trappers at Saugkonnet Point, who had kept their netting down until that time, were astounded to find their traps clogged with myriads of "dollar-scup," little fish about the size of a Spanish dollar. They were tipped out of the bowls by hundreds of barrelsful. This swarm struck first at Saugkonnet, then at Beaver Tail; and thence apparently it slowly worked up the bay, so that in July these little scup were schooling round the wharves of Greenwich and Providence. In August they were still among the shallows, and were plentiful in the more eastern waters, at the extreme head of Buzzard's Bay, and in the neighborhood of Hyannis.

The weir-owner at Wood's Hole had had his nets established for seven seasons, but had never before witnessed this spectacle; and the same sort of evidence was given by other weir men. Benjamin Tallman, in his testimony, already cited, speaks of a large quantity of such little scup taken by a seine in 1864; and of another considerable batch brought up from deep water in a purse-seine, about 1855. It is to be observed that this invasion is nothing but an abundant "late run" of yearling fish, coming in its due season. The army of scup advancing to its spawning-grounds in May is preceded by a few skirmishers, and is in two or three divisions, of which the first is usually the most numerous, and contains the oldest fish; at an interval of perhaps two weeks there follows the second, and then the third, which is usually fewer in numbers and of smaller individuals. Sometimes, and in some places, the great and the smaller scup come mixed together, and the "runs" are not well defined. As with most schooling fishes, the young scup doubtless come last; and the phenomenon of this year's run had two peculiarities; first, it is more abundant by many hundred-fold than anything that has been seen since a dozen or fifteen years ago, when all the shallows, in midsummer, were full of these little yearlings; second, instead of following the deep channels at the mouth of the bay, the swarm struck directly to the coast on entering, and fell into the traps and weirs which chiefly are there set. This last is, to be sure, an hypothesis, but will be useful as a guide to future investigation. Mr. Luce, in his testimony, stated that the big scup coasted the shore of the Vineyard, while the smaller ones moved *outside*, in deeper water. In other words, the spawning fish sought their grounds, while those that spawned later, or that were too young to spawn at all, kept in the offing. The yearlings (assuming that they do not carry spawn) would come in and spread over the warm shallows simply to seek food; and this, also, the old fish do *after* they have cast their spawn; only they spread out in deeper water, where

they remain till the first frosts warn them to depart from the coast. Should such a view of their movements prove the correct one, the invasion of "dollar-scup" would simply be a normal movement of yearlings, which, owing to unusual warmth of water, or for some other reason, struck the first points of land on entering Narragansett Bay, instead of holding to the main central channels. The question would be narrowed down to accounting for their *vast numbers*, so sudden and so unwonted. The anti-trap men jumped to the conclusion that these little fishes were the progeny of *this* year's (1871) hatch; and accounted for the abundance by the very early appearance of the breeding-fish, which stood in by the last of April, whereas they usually do not appear till the 10th or the 12th of May. Consequently the trappers had not generally their lint on, and the first run, in good measure, escaped capture. But the "dollar-scup" were *last* year's (1870) hatch and not this year's, which, on the 1st of June, would not be larger than a squash-seed. The theory would properly account for an abundance of *this* year's hatch; and, as a fact, the little scup, two or three months old, might be seen in great numbers during August, feeding close to the shore. If, next year, (1872,) there should be a great run of two-year-olds, (hatch of 1870,) and if this run should spread over all the bays, and should be taken by hook and line during the entire season, as of yore, then it might fairly be laid down that the traps were *not* the cause, or not the chief cause, in the diminution of scup. In like manner it might then be said, though with less force, that the blue-fish were not a chief cause of the scarcity of scup; because, although blue-fish have notably diminished these last three or five years, and therefore scup might properly increase, yet the decrease in blue-fish has neither been so great nor so sudden as to warrant a *sudden* increase in scup, such as this would be. And, if neither traps nor blue-fish can be convicted, it will only remain to say that the diminution has been one of those changes in the numbers or the location of fishes, for which science can at present give no reason.

That there has been a change of location as well as a diminution is quite apparent; for whereas thousands of barrels are taken at Saugkonnet Point, along the south part of Aquidneck and at Beaver Tail, in the upper part of the bay they are nearly extinct. A change, too, there has been in their stay, for whereas the tautog grounds all over the bay were once so infested during the summer by scup that a hook could scarcely be got to the bottom, now they are on the shores during a part of May, and thereafter are seen no more. All this the anti-trap men explain very simply, by asserting that the big scup are practically annihilated each season by the traps, and that the supply is kept up only by the spawn which is shot in deep water before they strike the coast.

The same line of observation and reasoning that has been applied to scup, will, with little change, apply to tautog, rock-bass, striped bass, and other "white fishes" and "bottom fishes" whose decrease has been complained of. *Observations*, conducted through several seasons, by men of learning and impartiality, are the only means to real knowledge in this perplexed question. If the governments of the States of Rhode Island and Massachusetts have any forecast, they will see to it that such observations be made.

In this slight sketch, based, as it needs must be, on scanty and imperfect information, I have avoided dogmatic statements and rounded conclusions. I have tried to show the problem in all its crudeness, and to point out, both directly and by implication, the great gaps which must be filled before it can take on a scientific form.

FISHERIES ON THE COAST OF MASSACHUSETTS.

REMARKS OF MR. ATWOOD, OF THE CAPE DISTRICT, IN RELATION TO THE PETITION TO PROHIBIT NET AND SEINE FISHERIES.

SENATE CHAMBER, *April* 19, 1870.

The report (leave to withdraw) on the petition of T. D. Eliot and others, came up for acceptance by special assignment.

Mr. Hawes, of Bristol, arose and said that, as a large number of the petitions asking for a prohibitory fishery act came from his district, he was not ready to vote until he could have some further explanation.

Mr. Atwood, of the Cape district, chairman of the committee on the fisheries, arose and spoke at length, substantially as follows:

Mr. PRESIDENT: As so many petitions have been presented to this legislature and referred to your committee on the fisheries, asking for an act to prohibit certain modes of fishing now in use in the waters of this commonwealth, I feel it to be a duty incumbent upon me, as a representative of a district extensively engaged in this branch of industry, to occupy some time in giving somewhat in detail the reasons why your committee have unanimously reported leave to withdraw.

Early in this session, on the 12th of January, there was presented and referred to the committee on the fisheries, the petition of Charles W. Lovett, jr., and sixty-four others, claiming to be citizens and tax-payers of this commonwealth, asking for an act to prevent the taking of certain *salt-water* fish in weirs and pounds, and also that the taking of fish known as Spanish mackerel, and striped or sea-bass, in any seine or net, may be prohibited; but that the same may be taken between the first day of June and the first day of December, by hook and line only. On the following day the petition on T. D. Eliot and 1,225 others was presented and referred, and subsequently a large number of petitions in aid of the same, claiming that the practice of *pound-fishing*, *trap-fishing*, *drag-seining*, *purse-seining*, and *gill-netting*, is seriously and fatally prejudicial to the production and increase of fish. They pray that the legislature will, by suitable enactments, protect said fish and those of the community interested in their continuance and production, from these novel and improper modes of fishing. Also there has been presented and referred a large number of remonstrances against the passage of any general prohibitory act. For their number I refer senators to the printed report of the committee.

Though the two first petitions were not in aid of each other, still they were aiming to accomplish the same object, and they seemed to be inseparably connected; so much so that your committee deemed it expedient to hear the parties who would represent both at the same time. Accordingly all the parties were notified, and the hearing was commenced on the 15th of February. No less than 18 sessions of the committee were given to these hearings, during which time many witnesses testified, and very little was learned from the evidence that proved to the committee that fish were being exhausted. All agreed that the scup, tautog, sea-bass, and striped bass had within a few years diminished in Buzzard's Bay; but failed to show that over-fishing was the cause of the diminution. Like the many fishermen that I know, the witnesses were not well acquainted with the habits of fish. They study them no further than they contribute to their pecuniary interest. At most they possess only a local knowledge of the fish with which they come in contact. They prosecute the fisheries for their support, and do not make

the habits of fish a special study. Sir, if any other matter upon which there were more than 11,000 names on the petitions and remonstrances should come before the legislature, what would the committee expect? They would expect that experts and men acquainted with all the practical workings would come before them. An ordinary committee on the fisheries might expect men to come before them on a subject of so much importance as our *sea-fisheries*, that possessed a knowledge of the geographical distribution, migrations, habits, food, time of depositing their spawn, growth and development of their young, as far as it could be known, and, besides, all the changes that have taken place during a long series of years. That if certain species had diminished in Buzzard's Bay, from whatever cause, is there danger of the race being exterminated? The fishes that inhabit our waters, and in their migrations visit our coast, differ widely from those that were upon our fishing-grounds when I first engaged in the fisheries.

Mr. President, allow me to lay aside the evidence before the committee, while I briefly allude to the changes that I have noticed during a long life of practical experience in the fisheries.

I can go back to no earlier date than 1816, when I entered the fishing boat and followed fishing as a business for a period of *fifty-one* years, during which time there have been many changes. I shall speak of only a few species. The scup that has been so abundant for many years south of Cape Cod, extends to Florida, and is caught in great numbers along the coast. It finds a ready sale in New York and other markets, but in Boston market it is not known as a marketable species, and is seldom seen there. Only a few straggling specimens venture into the colder waters north of Cape Cod. Witnesses stated before the committee that they had a tradition informing them that scup first appeared in Buzzard's Bay in 1793. If so, I ask was it then that they first came into existence, or did they come from some other locality? I have been informed that in examining the old shell-heaps that have been deposited by the aborigines of this country many years ago, the bones of this species have been found, showing that they were here before this country was settled by Europeans. If they were here at that time, is it to be supposed that they were driven away by the Indians with their rude implements of fishing?

When I first engaged in the fisheries, and for many years after, there was a species of mackerel that annually visited our waters, known by the name of Spanish mackerel, that were abundant. It was not the species now called by that name. It was about two-thirds the size of a common mackerel, known to science by the name of *Scomber Dekayi*. (Excuse me for using classic names, I do it for the reason that there are so many local names for the same species, I fear that I may not be understood by any who may be acquainted with ichthyological science.) This species, although plentiful for many years, has long since disappeared, and I have not seen a single specimen for the last twenty years. They disappeared long before a weir, trap, or pound was used in our Massachusetts waters. The cause of their leaving us is unknown. We can assign no reason. There have also been great changes in our common mackerel. While in some years they come to us in great abundance, in other years they are comparatively scarce. In 1831, 385,559 barrels were packed and inspected in this State, after which there was a falling off in the catch, so much so that from 1839 to 1844 the number of barrels caught did not exceed 75,000 in any one year, for five years in succession. In 1841 the quantity caught was only 50,992 barrels. They have since increased. During the last ten years the catch has been, with the excep-

tion of two years, upward of 200,000 barrels annually. Last season it was 234,000 barrels. It will be seen that the catch of fish from year to year differs as widely as the product of our land.

About 1840 there appeared on our coast, south of Cape Cod, large quantities of shad, which appeared to be the same species with those that visit the Connecticut and Merrimack Rivers annually, (*Alosa prestabilis.*) Fishermen from Massachusetts, Connecticut, and Rhode Island engaged in this fishery, and found it profitable. In 1842 an act was passed by the legislature to prohibit fishermen from other States from fishing for shad within a line drawn from Monomoy Point to Point Gammon. I myself engaged in this fishery, but we found there was no need of the passage of such an act. The shad appeared in small numbers, so that not enough were caught to pay expenses. They were also caught in large quantities in the waters north of Cape Cod. They then disappeared, so that only a few straggling specimens have since been caught in these localities. Where were they before they appeared in our waters? What was the cause of their coming? Where are they now? All that can be said in answer, I can say in three words—they are gone.

Sir, I ask to be allowed to allude briefly to two species of fishes that are not caught by any mode of fishing that we are asked to prohibit. I do so for the reason that no less than four times petitions have been sent to the legislature asking for an act to prohibit fishing with trawl-lines (so called) in Massachusetts Bay. The report from the committee has always been "leave to withdraw." In 1858, when the report came up in the house of representatives, it was discussed at length, and it was there stated that if this mode of fishing was not prevented by legislative enactment, soon haddock would be as scarce as salmon. The report of the committee was accepted, and this mode of fishing has been in use since that time, and this species has been increasing from year to year, until they have increased in vast numbers, so much so that they are too plenty for the fisherman or dealer, and during the spawning season, which is the spring, they are sold at a low price—from two dollars down to fifty cents per 100 pounds. But it may be said the consumer pays a high price. I cannot help that; it is not that that I am discussing. I am trying to show the danger of exterminating the race of fish, if there is any, and do not intend to leave my subject, lest I may be called to order. When I first engaged in the fisheries, haddock was scarce on our coast, and in winter sold much higher than cod. They did not increase for many years after. They, however, became plentiful when the trawl-line was first used—about 1850—and every year they seem to be increasing. On the 4th of last March, when a large number of fishing-boats were out, the catch was larger than I ever knew before. The next day, 5th, there was brought to this city and sold at Commercial wharf, of cod and haddock, 621,953 pounds, as taken from the books of dealers that bought that day—a larger quantity than ever was sold of all kinds of fresh fish in a single day since Boston has been a city. What has been the cause of so great an increase? If I was asked how their numbers could be diminished, I have two ways now suggested to my mind: one is to introduce the beam-trawl, which has not been used in our waters, which is a large net-bag with a long beam across its open mouth, which is kept up some two feet from the bottom by an iron frame-work at each end of the beam, and as it is dragged along by the fishing-boat the fish pass into the net and are caught in the pockets at the sides as they attempt to pass out. This net being dragged over the bottom, would destroy the young fish as it passed over them, and might tend to diminish their numbers.

One other way would be to hire the fisherman to leave them, and to stand back and fold his arms and see nature perform her wonderful work without the interference of man. The present mode of fishing catches vast quantities of a species of flat-fish, (*Platessa dentata*,) which no doubt fed upon the spawn of haddock when the hand-line only was in use.

One other species, our common halibut, which is caught in the same way, have greatly diminished. When I first engaged in this fishery, Boston was supplied wholly with halibut caught between Cape Cod and Nantucket Shoals. The demand was limited—only a few could be sold. There were no railroads. Boston only wanted enough to supply the city and the surrounding towns. As facilities for transportation increased, and ice began to be used to keep them, they were sent further away. The supply would not meet the demand. The fishery was prosecuted by vessels from Gloucester, on George's Bank, and also on Brown's Bank, the western coast of Nova Scotia, and upon the Banks of Newfoundland, and voyages have been made to Greenland, and halibut have been caught in quantities as far north as the latitude of 68, on the western coast of Greenland. They seem to be decreasing on all the fishing-grounds. But I must pass them by, and leave senators to decide whether or not over-fishing has been the cause of the increase of the one and the diminution of the other of these two species.

It appeared in evidence before the committee that the fish known as the squeteague is increasing in the vicinity of Buzzard's Bay, and along the shore south of Cape Cod. Some sixty years since it was vastly abundant in the southern part of Massachusetts Bay, and although absent for so many years it seems to be returning to its former haunts.

But the great change that has taken place in our fisheries has been caused by the return of the blue-fish. This species was abundant on our coast many years ago. We are informed that in a journal of the first settlement of the island of Nantucket, written by Zacheus Macy, 1792, and contained in the Massachusetts Historical Collections, he says a great pestilence attacked the Indians of that island in 1763 and 1765, and that of the whole number, 358, 222 died. In that year, he says, the blue-fish disappeared, and I have no knowledge of a specimen being seen here for more than 70 years. We are informed that they are found in other localities. They are said to occur on the western coast of Africa, around the island of Madagascar, and also at Australia; if so, they are found over a wider geographical range than any other species with which I am acquainted, inhabiting the waters in both the torrid and temperate zones. After an absence of so many years, they returned, as appeared in evidence before the committee, about 1832, along the shores south of Cape Cod. They did not come north of the cape so as to affect our fisheries, until 1847, when they appeared in vast abundance, and drove away from our bay nearly all other species. I was at that time engaged in fishing for mackerel with nets. This was the last of our catch; and every year since, when our fishermen are engaged in this fishery, they appear. I have known them to appear as early as the second day of June, but usually they do not come until a few days later—from the 5th to the 15th. When they first appeared in our bay, I was living at Long Point, (Provincetown,) in a little village containing some 270 population, engaged in the net-fishery. The blue-fish affected our fishery so much that the people were obliged to leave the place. Family after family moved away, until every one left, leaving that locality, which is now a desolate, barren, and sandy waste.

These fish not only depopulated our bay of nearly all other species, but

they depopulated my village and my home. It was a matter of surprise to your committee that men professing to be acquainted with fish should come before them and say they did not know that blue-fish eat any other fish but menhaden; and as they are not an edible species, no matter how many they destroyed; and also say they did not know that they drove other species away. Call them, sir, by whatever name we please; whether blue-fish, of Massachusetts Bay; snapper, of New Bedford; horse-mackerel, on the shores of Rhode Island; or tailor, in Delaware and Chesapeake Bays, they are the same *Temnodon saltator* still, and deal out destruction and death to other species in all the localities they visit.

One other, a species of flat-fish, which is called dab or plaice at home, but when we bring it to Boston and offer it for sale we call it turbot. It is the *Platessa oblonga.* This species was exceedingly abundant along our shores before the blue-fish came. It is a bottom fish, and does not come so directly in contact with the blue-fish as top-water swimmers; still, it has almost wholly disappeared, owing to the blue-fish having destroyed its favorite bait, which is the common squid. It seems to be nearly exterminated in the waters north of Cape Cod, only a few being seen.

The striped bass have diminished in the vicinity of Cape Cod, as the blue-fish have destroyed the bait upon which they fed.

The so-called Spanish mackerel, (*Cybium maculatum,*) Cuvier says, is an inhabitant of the Carribean Sea, extending southward to the coast of Brazil. Dr. Holbrook mentions it, in his Fishes of South Carolina, as being found in the waters along that coast. It has wandered southward until it has reached the southern coast of Massachusetts, and even specimens have been taken north of Cape Cod. It sells in our market at a higher price than other species. It is, no doubt, an excellent fish, but it is probably not so much better than our common mackerel as the prices seem to indicate. It has been selling in Quincy market for a few summers past at from fifty cents to one dollar per pound. It has been increasing in our waters for a few years, and the prospect is it will continue to increase, until it will be a fishery of considerable importance. There is no danger of destroying them by catching them by any way we can, when it is only the few wanderers that come to us from the localities where they inhabit. I think they need no legislative protection to increase their numbers.

Such are a few of the many changes that have taken place since I first engaged in the fisheries. Time will not allow me to go into detail of the some one hundred and fifty species found along our New England coast. They may be said to form one great chain, each species being a separate link, having its own peculiar history and habitudes.

I pass now briefly to notice their fecundity. We look with wonder and astonishment at the provisions in the animal economy. How vast is the number of eggs produced by a single fish; hundreds of thousands, which, if any considerable percentage should come to maturity, the waters would be filled to overflowing.

Take a few thousand specimens, and allow ten per cent. to come to maturity; multiply them together for ten years, and how great would be the number! And what is that when compared with the countless myriads that swarm our coast annually? Their numbers, how vast! Human ingenuity has invented no means by which they can be enumerated; their numbers are only known to Him who created them, who feeds them with a bountiful hand, and watches over them with more than parental care.

Sir, if we study them with reference to their longevity, we see marks on them indicating age: the loss of fins; scars, where they have at some time received wounds that have permanently healed; marks of physical debility, which appear to be the result of advanced age. I regret to say that no Linnæus nor Cuvier, nor all the researches of science have ever been able to give us any indication by which we may know the age that fishes live with any degree of certainty. They pass off and on the coast as the seasons change during their natural lives, however long that may be.

In view of all the foregoing facts, where is the danger of exhausting our fishes? I fail to see the danger of exterminating them.

The British commission that was appointed in 1863 to investigate the fisheries of Great Britain and Ireland visited nearly all the principal fishing-places in the United Kingdom, and made a thorough investigation; asked and received answers to nearly sixty-two thousand questions. They came to the unanimous conclusion that there was no danger of exhausting the fisheries, either in the open sea or in any of the arms or estuaries along the coast, with all that man could do, and finally made their report to the British Parliament in 1866.

There were persons that did not wholly agree with the British commissioners. One of the most prominent is J. B. A. Rimbaud, who has published a work on the fishes of the southern coast of France. Himself a fisherman, he says that the migratory species, that go off to sea in schools and return each season, cannot be diminished by over-fishing, but local fishes can be exterminated by constantly fishing for them, and such has been the case in the locality where he had been accustomed to fish.

Of the two I allow Rimbaud to be the best qualified to judge, as he has acquired his knowledge by practical experience in the fisheries, and the British commissioners had gained their information from others. Sir, I hope I may not be charged with undervaluing scientific research; no man has a higher appreciation of the labors of scientific men than myself. Their kindness to me in aiding me in my investigations of fishes has laid me under the greatest obligations. I owe to them a debt that I can never repay.

Sir, I call attention of senators at this board to the locality where Rimbaud has gained his information—the southern coast of France. France on the Mediterranean is not like our own coast. There the land is high, and deep water near the shores. The area of fishing-grounds is comparatively limited. Our own coast is low, and shoal-water extends off a great distance from the shore. Besides that, the great chain of banks, commencing with Nantucket Shoals and running eastward a thousand miles, and terminating with the great Bank of Newfoundland, gives us an immense area of fishing-grounds.

On the coast of France there is not so great change of temperature in the water from summer to winter as on our own coast. The Gulf Stream comes out through the straits of Florida, running up the coast to Cape Hatteras, from whence it turns eastward. As it passes it leaves our New England out in the cold; its course is onward until it reaches the shores of Western Europe, making the water comparatively uniform through the season. I ask, are not the fish on the coast of France more permanently *local* than those on our own coast, where there are great changes of temperature from summer to winter? Tell me, sir, how many are there of our fishes that are not more or less migratory. Senators will see that our fishes and fisheries are not like those of Europe.

Mr. President, lest I may be misunderstood, I desire to define my

position. I firmly believe there is no necessity for the passage of any general legislative act for the protection and regulation of our sea fish and fisheries. If fish have diminished in any of the small arms of the sea, I should have no objection to the passage of a local act, provided it did not interfere with the rights of others; but I must confess that I am slow to believe that when fish have left a locality that any act on our statute-books will bring them back. If we wish to increase and stock our inland waters, it cannot be accomplished without protection. The building of dams across the streams, throwing of deleterious substances into the waters, have diminished the fish; but in the great sea man cannot pollute its waters by anything he can do. If this legislature should pass an act to prohibit those modes of fishing that have been called by the petitioners novel and improper, what would be the practical working? It would not only affect those directly engaged in them, but it would have also an indirect bearing. The large fleet of vessels belonging to Gloucester are a part of the season dependent on these fisheries for bait to be used in their bank-fisheries. The question was asked at the time of the hearing before the committee how the Cape Ann bank fishermen procured their bait before these modes of fishing came into use, but was not answered. When vessels from Gloucester first engaged in the halibut fishery on George's Bank they met there immense shoals of sea-herring, (*Clupea elongata.*) They could be taken in nets on the top of the water. After a few years they became less abundant, and were not seen schooling, but could be caught by sinking the nets several fathoms below the surface. Long since they have left that locality, and none have been caught there for several years.

Our mackerel fishermen require a large quantity of bait, to be used in the prosecution of this fishery, which is principally menhaden, caught in weirs or seines. Some 7,000 barrels of this fish was used by Provincetown vessels engaged in the mackerel fishery last season. Their whole catch of mackerel was about 25,000 barrels.

There is a large amount of capital invested in our fisheries, giving employment to a great number of men, who follow a life of hardship and exposure. They are a useful class of men, as they are producers. By their labors they bring to our tables a large amount of wholesome and nutritious food, which is a blessing to our people.

Sir, allow me one brief moment, while I allude to the life of a fisherman. He may enter the fishing-boat at nine years of age. Deprived of the advantages of school education, he follows his business from day to day. He may engage in some dangerous voyage. Follow him to the banks of Newfoundland, where he is not only exposed to gales and storms—he may in some seasons be surrounded by enormous icebergs, whose gigantic height and massive bulk adds to the danger. He is filled with fear lest his little bark may come in contact and sink beneath his feet. Beside this, the merchant-ship, on its passage to or from Europe, may, in some thick, dark, and stormy night, at one stroke put an end to his earthly voyage. What hardier occupation—what bolder daring can man display, than to lie down to rest shrouded in the gloomy solitude of a Newfoundland fog. As he leaves the cold, wet, and lonesome deck, at the end of his midnight watch, worn down by hardships and exposures, he lies down upon his bed, and while his cradle is rocked by the mountain billows, he courts that sleep that may know no waking. Day after day he looks forward with pleasing anticipation to the time when his voyage will end; when he will return; when he can rest from his toils, safe in the bosom of his home. Year after year, as his physical energies begin to relax, he dreads it more and more. He is still com-

pelled to work for his support and those that may be dependent upon him. Few fishermen get rich, while a great many of us remain poor. He may abandon his business, and stop on shore. With a few nets, or some other implements of fishery, he may be able to procure means to supply his wants.

The great question is, What is the danger of exhausting our fisheries if these modes of fishing are continued?

Nets have been used from time immemorial. We have an authentic history, that has come down to us, that tells us that more than 1,800 years ago, Jesus, walking by the sea of Gallilee, saw two brethren—Simon, called Peter, and Andrew, his brother—casting a net into the sea, for they were fishers, and he said unto them, Follow me, and I will make you fishers of men; and straightway they left their nets and they followed him. And going out from thence he saw other two brethren, James, the son of Zebedee, and John, his brother, in a ship, with Zebedee, their father, mending their nets; and he called them, and they immediately left the ship and their father, and followed him. This not only shows that nets were in use at that remote period, but that they also needed mending, plainly indicating that they were somewhat like our nets.

From the foregoing considerations that I have so briefly stated, your committee came unanimously to the conclusion that it was their duty to report that the petitioners have leave to withdraw.

VI.—REPORT OF CONFERENCE OF UNITED STATES COMMISSIONER WITH COMMISSIONERS OF RHODE ISLAND AND MASSACHUSETTS.

REPORT OF CONFERENCE HELD AT BOSTON, OCTOBER 5, 1871, WITH FISHERY COMMISSIONERS OF MASSACHUSETTS AND RHODE ISLAND.

There were present at the conference: Mr. Reed, of Providence, commissioner of Rhode Island; Mr. Lyman, of Boston, commissioner of Massachusetts; Mr. Powel, of Newport, a member of the Rhode Island legislature, and Mr. Baird, United States commissioner. Such portions of the discussion as have no special bearing on the subject in question have been omitted.

Mr. SAMUEL POWEL. I think the trappers of Rhode Island would agree to the close time; and Governor Stevens, I think, would consent to it.

Professor BAIRD. I think the traps have a positive influence; but I still think that the blue-fish are a great cause of the trouble. A decrease of the blue-fish would give the other fish an opportunity to increase; but the young blue-fish are as much more plenty than usual this year as the young scup; so that I think it is expedient to try the experiment of a close time. If the blue-fish were to run out again, I think it would not be so imperative to adopt any restrictive measures. We cannot regulate the blue-fish, but we can control the traps.

Mr. REED. I think scup feed more or less on the small crustaceas, perhaps slugs, and a species of leech. I think they would feed on the small muscle. I have seen little scup, when the water was clear, bumping their noses against the rocks, as though they were picking something off. Some say that the salmon do not feed while not in the salt water, but I think they do. I have seen them strike the dragon-fly with their tails when it was skimming over the water.

The blue-fish will attack almost anything as long as he can eat, even a piece of rag he will bite. I think the "slick" on the water so often seen is, in many cases, produced by the oily matter proceeding from fish that have been attacked by the blue-fish, they first swallowing as much as they can, and then vomiting it up, so as to eat again.

As to the scup, I think the blue-fish attack them throughout the season, especially the small scup. I think the blue-fish feed near the surface.

Professor BAIRD. I think, as a general rule, that the blue-fish swims at the surface in the day-time and at the bottom at night. We find rock-crabs, eels, and sand-launces in their stomachs. We have found scup in the stomachs of the blue-fish from the 15th of June to the 1st of October.

Mr. REED. Two years ago we had an unusual run of blue-fish late in the fall. In half an hour I caught thirty-five, averaging about a pound each. We used a hook smaller than usual for blue-fish. We have plenty of food for scup in our bay.

Professor BAIRD. That element need not be taken into account at all.

Mr. REED. We have had scup away up to the mouth of the Narragansett River. It is a very filthy river, too, because there are so many manufacturing establishments, and among others that of hair-cloth, the clippings of which are thrown into the water. There are large manufacturing towns all the way up, and every kind of refuse is thrown into the water. All the manufactories make their own gas, and they saw wood, and so it is with all the branches of the river. But scup have been caught right at the mouth of the Forestdale River, where they have thrown in tar.

Professor BAIRD. The sea pollution cannot enter into the question, except merely locally. The only thing that is injurious in this refuse is the carbolic acid and tar, and this is so small in amount as to have little influence. In fresh water it is a different thing, but in the salt water I do not think it need be considered.

Mr. REED. The print-works empty everything into a narrow passage twelve feet wide, that is about one-sixteenth of a mile from where the tide comes in. I have seen little fish, two inches long, feeding right at the mouth of the river. And I have dug clams there so dyed that they looked red in consequence of the madder thrown down there. Prior to the building of the print-works, I have been told, there were no oysters up there, but the year after it was started there was an unusual number of oysters set in that little bay.

Professor BAIRD. I have come lately to the conclusion that the prime cause of the variation in the supply of food-fishes on this coast is to be found in the blue-fish; but then I am also satisfied that the trapping and pounding, coming at the heels of the mischief done by the blue-fish, have intensified the evil; and that, if we mean to restore the fish, we must regulate one or the other. I think that if the fish have a chance to reach their spawning-ground they will multiply fast enough for both hooks and lines and traps. We must exterminate the blue-fish or regulate the trapping, or the evil will increase. I can see very positively the relationship of the shore-fishing to the establishment of the trap.

Mr. REED. I was told by a gentleman of Providence that he was present the very day the traps were set this spring, at a certain place, and he said they were filled within fifteen minutes with scup and other fish. He said the season was a fortnight ahead of them. The effect has been that young scup have been caught this year away up the Seekonk River, so plenty that you could scarcely throw in the hook without catching one.

They have not been so plenty as this for a long time. They are spawned in shallow water, in the inlets and bays. I do not believe any scup would deposit spawn outside as far as off Point Judith. I doubt whether fish an inch long would be found accompanying the schools of big fish.

Mr. POWEL. I saw some this spring ranging from two to four or five inches in length, and I took some up to Professor Blake; I think it was the 25th of April. They were caught in a trap below Newport.

Professor BAIRD. I think the scup might have spawned off the Carolinas in March, and some of these might come along up with the older scup. But my impression is, that the largest part of what are now called "dollar scup," are this year's brood.

In the middle of August it took five of the last year's scup to weigh a pound, and now four will weigh a pound. They will come back next year weighing about a pound each.

While there are a great many scup of this year's growth, there are also many last year's scup. Therefore I ascribe a part of this change at least to the diminution of the blue-fish. For five years blue-fish have been growing more scarce; last year about three-fourths of the usual take, and this year the catch has been much less than last.

Of squeteague there are a dozen this year where there was one five years ago. In 1863, I collected fishes at Wood's Hole, and I did not see a squeteague, and when I spoke with the fishermen there about it, they did not know the fish. Four years ago a few were caught there, and last year a great many. This year, at Menemsha Bight, one caught five thousand at a single haul.

Mr. REED. I understand that the increase of the squeteague has been in proportion to the decrease of blue-fish.

Professor BAIRD. I think the blue-fish are continuing to decrease, thus leaving a better chance for other fish.

But it is not so much a matter of importance whether the blue-fish eat the scup or other fish. We know that the waters swarm with little fish that prey largely upon the spawn of other fish, and very young fish. They are just as plenty now as they ever were, and no trapping can affect their supply. They are bound to have a heavy toll out of something. When scup have been most abundant, they have furnished to these little fish the larger portion of their sustenance; and when they cannot get young scup they will take anything, and perhaps they take 75 per cent. of all the spawn of everything that is laid in the waters.

There is a certain balance of fish, there being plenty to feed all these scavengers, and to feed mankind also. Now, if you bring in the blue-fish, they disturb this balance; they take scup, sea-bass, &c., that should be permitted to spawn. Consequently the absolute amount of spawn is decreased, and the little fish will still secure their part from that which remains. If there is but a little spawn in the water, it makes little difference to them; they will have their share out of what is left.

Then, having disturbed the balance to that extent, we come in with our traps and reduce the number of spawning fish and of spawn still further; and where the blue-fish destroy many, we destroy even more; and then the little fish must take the spawn of anything they can get. If you take in the traps fish that would otherwise furnish spawn to the little fish, then these little fish will take the spawn of other fish. Therefore, I think the traps should be regulated, but need not be prohibited.

I think that a "close time," especially during the spawning season, will give the relief that we require. I understand that, as a general rule, the spawning fish run almost always at night. All the trappers tell me that they catch the breeding fish at night. But in the summer season they catch the Spanish mackerel and other pelagic fish in the day-time. My suggestion to the trappers was, that they should close the traps from six o'clock Saturday night till Tuesday morning. I want three nights and two days.

Mr. REED. I suggested from sunset Saturday till Tuesday morning—three nights and two days.

Mr. POWELL. I think that from Friday night till Monday morning will satisfy them better, as Sunday intervening would prevent the disposal of the fish caught Saturday. That is what I wanted to do last winter.

[Mr. REED agreed to that time as being better.]

Professor BAIRD. If the trappers will not assent to that, I would favor a law prohibiting the whole business.

Mr. POWELL. Rhode Island has waked up to the necessity for regulating her fishing. The fish are gone to such an extent that, at a clambake of some New Hampshire people in Rhode Island, they brought their fish along with them.

Professor BAIRD. Massachusetts people say, "What is the use of trying to catch fish with the hook and line while the trappers at Saughkonet are allowed to take our fish?"

Mr. POWEL. I would like to ask Mr. Reed whether it was usual or unusual for the large and small fish to come in together. The fishermen say it was unusual.

Mr. REED. I cannot tell in regard to scup. I know the scup have decreased very much for the last five years, since I came there.

Mr. POWEL. This year we have had the young scup coming in almost in their former abundance.

Mr. REED. There is no bay so peculiarly situated as Providence Bay. It has three outlets, and the fishing-grounds are numerous. You can put a trap down in certain places where the tide flows backward and forward, in such a way that your trap would be as effectual in stopping and catching the fish as a dam run right straight across the tide. The fish cannot get up except when the traps are lifted. They have come constantly to these places, trying to get up, but it has been impossible.

Professor BAIRD. Then you think that, apart from the capture of the fish, the presence of the nets has kept them out?

Mr. REED. Yes, sir.

Mr. POWEL. Your argument would be that the two weeks' supply has been the cause of the greater abundance of young scup?

Mr. REED. Partly so. Squeteague have been very scarce, and I do not believe there were five thousand pounds of blue-fish caught in the whole bay. Squeteague were not as plenty as they were last year. In fact, almost all the fish in our bay have totally disappeared.

I suppose the scup had a free run of two weeks, and when they struck that water free from traps they spread themselves, and could choose any kind of temperature or any kind of bottom, whether sandy, or rocky, or mud. Thus we have an unusual variety in the bay. At Prudence Island there are very bold rocks, and it is a great place for catching scup and tautog.

Professor BAIRD. If the intermission from catching for two weeks was sufficient to create so great a supply, it shows what we may expect if we keep up that intermission through the season. If we have the intermission of three nights and two days in a week, throughout the season, instead of the incidental two weeks, we may hope to restore an ample supply to all our waters.

Mr. POWEL. There are three well-described kinds of scup on our coast; and very probably each has a different habitat. There is something different in them, because they come one after the other. They are described as three different growths, when we know they come from somewhere about the Florida capes, to begin with.

Professor BAIRD. Do they?

Mr. POWEL. They come from somewhere down south, and they turn in, as they come along, into the different estuaries. Where do they go; and why don't they all go into the first place?

Some gentlemen tell us that fish always return to the waters in which they were spawned. How do they know it? They know it in regard to

some fish, salmon, trout, &c. Then comes Mr. Agassiz, who tells us they are not pelagic fish; that they are born in fresh water, and we have no right to know that they ever absent themselves far from the fresh waters. But it is not so with the wandering fishes of the sea. Now, I have no theory on this subject, but I wish to call your attention to it.

Professor BAIRD. We have the fact that last year's scup are much more plenty than the experience of the past few years would lead us to suppose; and this year's scup are equally plenty. Now, what caused this state of things?

Mr. LYMAN. The scraps that I have picked up indicate that scup were here abundantly on the first arrival of the settlers in 1620. They were abundant, still, down to 1642, as mentioned by Roger Williams. Then there is a little gap. In 1642 they were abundant in all our borders. In 1659 the blue-fish were abundant about Nantucket, and Macy is very precise in this. There are seventeen years when the scup were abundant, as well as the blue-fish, in the same waters, and remained abundant until 1764. Then the blue-fish go away, disappear entirely, as far as regards Nantucket. Macy says they totally disappeared, and none whatever were caught in the seines. Now, we know that in 1790 the scup was unknown in Nantucket, because we have oral testimony collected by Professor Baird; and then, about 1794, the scup reappeared. There were thirty years, in round numbers, that the blue-fish disappeared, and then again became very abundant, and have continued so since, until about the year 1864, when everybody agrees that they fell off very much.

Now, the blue-fish, coming in 1830, have continued to the present time, though with decreasing abundance for a few years past. The blue-fish having diminished in 1764, it took thirty years for the scup to get back, and then they continued side by side without any diminution until recently, from 1830. At any rate, for twenty-five years the scup and blue-fish lived side by side in vast abundance.

What we know of nature does not indicate that the predatory fish that is going to clean out another kind of fish is going to take twenty-five years to do it; that is to say, when it does it, it is not to be done with a jump. I would illustrate it by saying that I find in testimony from different witnesses, independent of each other, that in 1841 and in 1856 there was an exceedingly cold snap coming on suddenly in the autumn, the consequence of which was that immense quantities of the bottom fish, tautog, rock, bass, &c., were killed throughout the waters of the southern shore, and drifted ashore; and the next year these species in many localities were almost extinct. But in three or four years the fish had returned to their normal abundance. There is an instance of a cause annihilating the local fish, and in three or four years there is a return. It is an illustration that in nature the supply does not take very long to recover itself.

Professor BAIRD. It is "nip and tuck" between the blue-fish and the scup. For instance, take the abundance of scup that existed twenty years ago, and no man would have said it was possible, by any agency, to make them scarce, because they thronged everywhere in Vineyard Sound and Buzzard's and Narragansett Bays. Suppose one scup produces a hundred thousand young—that was more than all the blue-fish could manage. They did all they could, but the scup were too many for them. But the blue-fish kept preying upon them, and we can imagine that year by year they finally cut down the supply to such a point

that, after all the little prowlers had got their share, then the blue-fish cut them "down by the run."

Mr. POWEL. And the very epidemic which has sometimes influenced the larger classes of families may also affect their pabulum too, and the consequence would be that the scup would have to tighten their sword-belts. I want you to bear in mind the magnificent run of scup that has burst upon us, on account of the opportunity to run into the waters freely for two weeks.

Mr. LYMAN. I think that it is non-proven that blue-fish feed on scup generally. Although scup have been taken out of blue-fish captured in pounds, still the universal testimony of the fishermen before the legislative committee was, that scup were never—some said rarely—found in blue fish. Therefore, I do not believe that the blue-fish follows the scup as its normal food. I do not think it is proven at all, and I don't think any mathematical theories, multiplying so many blue-fish, eating so many scup in a season, have anything in them.

But I do really think that there is evidence to show—to make us suspect very strongly—that the blue-fish and pounds have had something to do with it; and with the really insufficient evidence we have, my private opinion is, that two-thirds of the diminution should be charged to the pounds, and one-third to the blue-fish.

Professor BAIRD. It is very easy for the fishermen to say that they did not find scup in the blue-fish; because there were no scup at all to be caught.

Then, how do you know there were any blue-fish at Nantucket while the scup were absent there?

Mr. LYMAN. Macy tells you the month and the year, and says they were taken from June to September in great abundance; and he says that thirty would have filled a barrel.

Professor BAIRD. They may have been some other fish.

Mr. LYMAN. Neither are we certain that what Roger Williams calls bream was a scup, though I presume it was so. It may have been something else than the blue-fish.

Professor BAIRD. We all agree, I think, that fish are scarce, and that something should be done as an experiment for their restoration. I have made a draught, with a memorandum, in regard to this question of regulation, which I will read. It seemed to me that, as a preliminary to all legislation, the whole question of pounding and trapping should be under State control; that the State commissioners should be required to give licenses, and that it should be illegal to carry on the fishing in pounds without such a license.

[The draught of the law was then read, and afterward discussed.]

Mr. LYMAN agreed that the putting of the subject in the hands of the commissioners was a good thing. It will work well, if we can say to the trapping people, we protect as well as check you.

Mr. REED. I believe that we shall not repeat what we did last year. Failing in that undertaking the people have more liberal views. The trappers are very willing to concede, and the others also. I think that if the question were taken of traps or no traps, the traps would be killed; that is simply my opinion.

Mr. LYMAN. I think some such act, thrown into a strictly legal form, will be a good thing. The main features, I think, we may consider as agreed upon, and that the differences, if any, shall only be in putting it into form.

Professor BAIRD. Would Captain Atwood consent to the "close time?"

Mr. LYMAN. Yes, sir; he thinks you cannot lessen the sea-fish, but he

has no objection to the protection of fish that breed in the bays, nor to the "close time," if reasonable. But he does not think it proper nor feasible to cut off the bait from the cod-fishermen.

Professor BAIRD. Shall it be carried throughout the season, or only during the spawning season of the shore fish?

Mr. LYMAN. That is very important. I think it would lessen the opposition to the passage of the law if we give the traps a chance to catch herring and menhaden. These are needed for the Gloucester fishermen. I would rather put a limit on the beginning of the season than the end. Catching the herring early I do not think injures the fishing much.

Professor BAIRD. Supposing they did not catch quite as many fish for the first year, would they not catch enough more in future years to compensate them? And supposing this applies only to the south side of the cape, could not they supplement the loss from the "close time" by other means of catching? Ten years ago there was only a single trap for ten miles around Wood's Hole, and yet they managed to get all the bait they wanted.

Mr. LYMAN. The George's fishing has been growing up under the system of getting bait from weirs more particularly. Let us leave it so that the time shall be cut off at the beginning, and not the end of the season.

Professor BAIRD. But let the law run through the season?

Mr. LYMAN. I think so.

Professor BAIRD. There is this consideration to the advantage of this regulation, that there is much less probability that fish will be lost or wasted. The Messrs. Luce, of Menemsha, said that if fish were sent off only five days in the week, they would be better cared for, and they would get a better price for them, while there would be no difference to the consumer. I am quite sure the supply will be more equally distributed, less fish wasted, and as much money made by all parties.

Mr. POWEL. It will diminish opposition, to have the "close time" cease by the end of the scup-fishing, because Spanish mackerel and squeteague are not caught with hooks, and they come after the scup. I think I can get through such a law.

Mr. LYMAN. I think we had better cut it at both ends.

Mr. POWEL. I know the people of Rhode Island will accept it.

Mr. LYMAN. From the 10th of May to the 15th of June will give sufficient time for the scup.

VII.—DRAUGHT OF LAW PROPOSED FOR THE CONSIDERATION OF AND ENACTMENT BY THE LEGISLATURES OF MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.*

A BILL TO REGULATE THE USE OF STATIONARY APPARATUS IN THF CAPTURE OF FISH.

SEC. 1. The commissioners on inland fisheries are hereby empowered to license individuals and corporations to erect, establish, and use, in the waters of this commonwealth, whether navigable or unnavigable, fixed nets, traps, pounds, pots, fykes, weirs, or other stationary apparatus, for the purpose of capturing fish, upon application for such license, duly made as hereinafter conditioned and provided.

SEC. 2. All persons seeking such licenses shall make written application to said commissioners, specifying the locality in which they desire to use stationary apparatus as aforesaid, the exact character of the said apparatus which the applicant proposes to use, including, if of netting, the proposed sizes of mesh, as also the proposed length of the leader, or fence, together with all other details and particulars necessary for an exact understanding of said apparatus; and upon examination of such applications, and after public hearing, if they deem necessary, the said commissioners shall grant the license desired, provided the application be made on or before the first day of March in each year, subject to the conditions hereinafter mentioned, it being understood that parties last in lawful possession of any fishing-station shall have preference in its assignment, unless barred by a violation of this act.

SEC. 3. The license shall be in writing, signed by a majority of said commissioners, and shall state clearly and minutely the locality within which the same shall have effect, and no license shall have effect in any locality other than that mentioned and described therein, and, if for netting, the minimum size of the mesh of the different parts of the net, and the length of the leader, and shall prescribe such other limitations and directions as said commissioners shall deem proper; and no license shall take effect until the same shall be left for record with the clerk of the town or city within which the same is to have effect, nor until the recording fee of said clerk, being the same as that established by law for recording mortgages of personal property of equal length, shall be fully paid.

SEC. 4. The said licenses may embrace any period not exceeding one year; but, whenever given, they shall expire on the first day of January next following their date, and the clerk of each city or town in

* The draught, as originally prepared, was first discussed at the conference with the commissioners of Massachusetts and Rhode Island, and then submitted to several eminent legal gentlemen for consideration; among others, to Mr. Henry Williams and Mr. Geo. H. Palmer, of Boston, from whom important criticisms and suggestions were received and incorporated.

which said licenses have been recorded shall, on the first day of April in each year, make return to said commissioners of the said licenses then in force and the localities to which the same relate.

SEC. 5. Every person who shall have received a license in the manner herein provided shall, before the first day of January following the date of said license, make accurate return to said commissioners of the numbers and the kinds of fish captured by him during each day of the season by virtue of said license, and shall furnish accurate information of all other facts relating to said license which said commissioners may require, and no license shall be renewed until said report shall have been made to the satisfaction of said commissioners.

SEC. 6. No person enjoying such license shall take, or allow to be taken, any fish by means of stationary apparatus from the twentieth day of April until the fifteenth day of June in each year in the interval of time between the hours of six o'clock on Friday evening and six o'clock on the following Monday morning; and every person enjoying such license shall lift up at least twenty yards of the outer or seaward end of the leader or fence of his apparatus, or otherwise open it, so as to secure a free passage for the fish from the surface of the water to the very bottom, and shall at the same time place a gateway of netting over the "heart" or entrance into the inclosure, and, in general, take whatever precautions may be necessary to prevent the entrance of fishes into the same during the period of time aforesaid; and, generally, shall comply with any and all regulations made by the commissioners for the purpose of securing the accomplishment of the object of this section, namely, to allow and secure an unobstructed passage of the fish through or by the apparatus in question during the time specified.

SEC. 7. No license granted under the provisions of this act shall be construed as authorizing the grantee of the same to enter upon the land of individuals without their permission, nor to interfere in any way with private property.

SEC. 8. Whoever sets or uses, or causes to be set or used, in the waters of this commonwealth, whether the same are navigable or unnavigable, any weir, pot, pound, yard, trap, or other stationary apparatus whatsoever, for the purpose of capturing fish, except by virtue of a license duly issued, and for that particular locality, under the provisions of this act, shall forfeit and pay for each day during any part of which said apparatus is so set or used a sum not less than two hundred dollars nor more than five hundred dollars, and shall forfeit all apparatus so used, including nets, stakes, boats, &c., which shall be sold, and the proceeds of such sale placed in the treasury of the commonwealth.

SEC. 9. Whoever, having received a license under the provisions of this act, shall neglect or refuse to comply with the provisions of the same, or of his license, shall forfeit and pay for each offense a sum not less than two hundred dollars nor more than five hundred dollars, except that, in case of his violation of section six of this act, he shall forfeit and pay for each day during any part of which his offense is committed the sum of five hundred dollars, and shall forfeit all apparatus used in violation of said section, which shall be sold, and the proceeds of such sale be placed in the treasury of the commonwealth.

SEC. 10. All actions and prosecutions under this act shall be commenced within six months after the offense is committed, and one-half of the fine or penalty recovered in any action or prosecution aforesaid shall be paid to the person who shall first bring an action of tort therefor, in his own name, or shall make complaint in any criminal case, and the

remaining half in either case shall be paid into the treasury of the commonwealth.

SEC. 11. Whenever a person who has received a license hereunder shall be convicted of any offense under this act, or of violation of his license, he shall be forever disqualified from receiving another license within this commonwealth, and the license then held by him shall become void; and the said commissioners, on re-issuing a license in place of the same, shall prefer the party furnishing the evidence or making complaint against the party so offending, unless they shall see good reason to the contrary.

SEC. 12. No apparatus for capturing fish shall be set in such manner or in such place as to obstruct navigation with boats or vessels; but no one shall be permitted wantonly to destroy fishing apparatus lawfully set and managed, and for which the required license has been given, under penalty of not less than fifty nor more than five hundred dollars, to be recovered as aforesaid.

SEC. 13. It shall be at the discretion of the commissioners to revise or annul a license to establish fixed apparatus for capturing fish, when, in their opinion, and that of the governor of the State, the establishment or continuance of such apparatus may interfere with the passage of salmon, shad, herring, or alewives into fresh water for the purpose of spawning.

SEC. 14. This act shall take effect from and after its passage.

VIII.—MISCELLANEOUS CORRESPONDENCE AND COMMUNICATIONS ON THE SUBJECT OF THE SEA-FISHERIES.

NANTUCKET ISLE, GRAND MANAN,
November 21, 1870.

SIR: I received your letter, and I notice what you say about the fish, &c. In regard to the herring, so long as the mother herring is left to lay her eggs, there will be a good supply of young herring. Thus, sir, it is good for Government to stop netting. Last fall, and this fall also, was the best fishing ever known at Grand Manan. I think the wiers, if tended properly, will not destroy the herring; but if the female herring are taken, then all are gone. Codfish are led by herring, as they are choice food for cod. Last summer cod were scarce in the bay, plenty on the banks. In the summer, in drought, and when the water is warm, the herring stay in the deep waters; when fall rains come, and the water and weather cool, the herring come into shoal water, and the codfish follow them. Last winter was the best cod and herring fishing ever known at Grand Manan, and was good this fall when the weather was suitable for fishing; but there have been more gales this fall than I ever knew, so that there was great difficulty in fishing. Government has done nothing about the weir fishing, but forbids netting for three months (July 15 to October 15) at the south head of Grand Manan. The abundance of cod is affected in this way. If the herring are destroyed in one place the cod go to another in search for them. For this reason the seed-herring should be left. There was a report during the last summer that cod were plenty, and every vessel that went on the bank from Grand Manan and Eastport was loaded with fish. The cod prefer living or fresh-killed herring for food. Last Thursday I caught a cod five and one-half feet long that chose to bite at a herring-bait when full of sea-crabs, thirteen in number, and other small things. Cod live on crabs, scallops, and the jellies on the bottom, and a small fish in the form of a shrimp, but four or five times as large. Large cod eat small flounders, small pollock and hake, small salmon, sea-perch, cunners, and a great many things found at the bottom of the water, but always prefer the herring. Some come in schools and eat the herring-spawn. Cod lay their eggs in November and December, as near as we can tell, and we catch them sometimes when their spawn is so ripe as to run from the fish when dying. Some cod caught in the winter have small spawns in them. Some think they spawn in March or April. The small cod, which never grows to a large size, spawn in the fall months, the same as the large cod. The herring at south head of Grand Manan spawn in August, September, and October. Over at Campbell's they catch large herring in winter with spawn in them, which would be hatched in spring. Down at the East Bay they are found in the same condition. I never heard of a blue-fish being caught at Grand Manan. I think the set-lines an injury to

the halibut, the females being caught in them, which cannot be caught by hand-lines. People complain of the injury to halibut and cod from the set-lines.

Yours, truly,

SIMEON F. CHENEY.

NASHUA, NEW HAMPSHIRE,
February 24, 1871.

DEAR SIR: Allow me your attention for a few moments. I was a fisherman for several years on the cod-fishing line. You are well aware that different kinds of cod use different food. There is the poogie cod, the herring-cod, and the clam-cod. The best, and what has always been relied on, is the poogie-cod, which is fast going out of existence, and the fisheries will eventually be ruined if there is nothing done to prevent it by the Government. They have tried to legislate it in Maine, but, you know, "money makes the mare go," and these oil mill owners have more than fishermen; therefore the effort will fail unless the friends of fishermen take hold of it. It is unnecessary for me to explain how many thousand barrels of this food of the poogie-fish is consumed in a year to make oil of; it is sufficient to know that it is destroying all the food, and with very little recompense. The Government ought to pass an act prohibiting the seining of poogies on the coast, especially on Government waters, to make oil or manure of.

I have the honor to be, your obedient servant,

WINSLOW P. EAYRS.

The fish here referred to as the Pogie is the Menhaden, or Moss Bunker, (*Brevoortia menhaden.*)

NASHUA, *December* 28, 1871.

DEAR SIR: Every other year, when the pohagen or poogies (menhaden) come into the mouths of the rivers, we find thousands of them thrown on shore, dead. There is a great deal of speculation in regard to them, and as to the cause of their death. I think, however, I can solve the mystery. I notice that all the print-works, dye-houses, and factories discharge into the water tons of dyes, poison culch, in fact, everything which ought to be buried, such as copperas and other chemicals. You know what they are, and that they fill the water with poison. Even the card-factory here in this city throws tons every year into the Merrimac. Fish being so easily destroyed, I believe that is the reason, and that the practice ought to be stopped. I believe that is the reason that salmon, shad, &c., do not come up the river as they used to. Is not my idea reasonable? Not only the fish are affected in this way, but the city of Lowell are drinking the water. We may soon know that the people are dying, while the cause is not understood.

The idea that dye-stuffs settle, and the water runs clear, is all bosh, in my estimation. Am I not right? I think this too important to fish and people not to be looked into. But I know of no one who has even

mentioned it, or, as far as I know, even thought of it. Does that not come under the fish question?

Very truly,

WINSLOW P. EAYRS.

UTICA, *February* 21, 1871.

DEAR SIR: When I was a lad I lived twenty miles from Bellows Falls, and shad were brought to my home and sold for 10 cents each. They could not surmount the falls; but salmon went north, to Canada, and were worth 3 cents per pound. In my grandfather's time salmon were taken in plenty three miles from our place, at the head of the Contokook River. There is not a doubt but the obstructions of the Connecticut River can be removed; but the smaller streams carry less water by the clearing of the land, and, I fear, cannot be *re-populated*. But the noble brook-trout can be produced at a very cheap rate where butchers are plenty.

Yours, truly,

E. JEWETT.

COPY OF MEMORIAL OF CITIZENS OF HYANNIS ADDRESSED TO CONGRESS, PRAYING THAT LAWS BE PASSED PROHIBITING THE USE OF FIXED APPARATUS FOR CAPTURING FISH.

We, the undersigned citizens of Cape Cod, humbly entreat your honorable body to become interested in making laws to regulate the fishing business, so as to secure to the fishermen a compensation for the toil and danger accompanying the business. Pounds, weirs, and traps have about used it up. Many of the fishermen have been driven into fishing for a living. It is not uncommon to find two or three men on board a small fishing-vessel. Ten years ago they were in command of as good ships as floated. Steam has robbed us of our first occupation. Pounds, weirs, and traps have served us as bad as steam. We contend that the rich man's dollar, while he is asleep, should not be allowed to catch all the fish, while our lines, which are well baited and tended, find no fish to bite at them. We contend we can put as many and better fish into the markets where fish are sold than are sold in those markets. If any of you doubt it, let him visit the places where fish are induced to go and deposit their eggs. You will find fish taken in such quantities that, after taking care of all they can, the balance are thrown into the farmers' wagons that stand waiting to take them away to dress the land; catching as many fish at one time as it would take to supply all the markets for months; destroying hundreds of what would become fish where one fish is taken.

Shall the rich man's dollar be allowed to drive us from our home and all that is sacred to us in memory? Must we look on, and see the rich man's dollar rob our children of bread and clothing? It will be hard work. We have contended with old ocean from our youth, but the rich man's dollar we cannot manage in a lawful way. Why should we not

have good laws that would encourage rather than discourage the poor man while toiling to earn bread for his family? God grant that your wisdom may be guided in the right direction.

Very respectfully,

HATSEL HANDY,
Hyannis, Massachusetts.

JOSEPH G. LORING.	JAMES ELLIS.
DANIEL HUMES.	CHARLES DENISON.
DUSTIN TAYLOR.	HENRY E. BAXTER.
OSBURN HALLETT.	NELSON BAXTER.
LEVI L. BUCK.	JERVIS W. EDDY.
WM. C. WHELDEN.	PRENTISS LINNELL, JR.
GEO. H. SMITH.	JOSHUA HOPKINS.
ARUNAH WHELDEN, 2d.	REUBEN BAKER.
BENAGER WHELDEN.	TIMOTHY CROCKER.
ALEXANDER CROWELL.	HIRAM HAMBLIN.
ELEAZER BAKER.	TIMOTHY HAMBLIN.
BENJAMIN BAXTER.	SIMEON HAMBLIN.
ELLERY E. BARTER.	WILLIAM HAMBLIN.
EBENEZER CROWELL.	WALTON HOLMES.

HYANNIS, *Massachusetts*, 1871.

IX.—EUROPEAN AUTHORITIES ON THE SUBJECT OF REGULATING THE FISHERIES BY LAW.

ON THE FISHERIES OF THE GULF OF NAPLES.

BY ACHILLE COSTA.*

CONSIDERATIONS ON THE SYSTEMS OF FISHING.

Among the inhabitants of the sea the spinous-rayed fishes (to which almost all the best kinds of eatable fishes belong) are without doubt immensely prolific, more so than animals of any other class, and this fact is in harmony with a general law observed throughout nature, namely, that fruitfulness is in direct ratio to the means of destruction that animals meet with in nature, which destruction fishes find in the sea and within the sphere of their own class; the carnivorous devouring not the vegetable-feeders alone, but also those of their own kind which are smaller than themselves. If to these natural causes of destruction we add the artificial modes invented by man for his own use, we can readily appreciate the nature of the drain to which the families of fishes are subjected, and the necessity of an enormous fertility to maintain the supply at a given average.

Indeed, in spite of such fecundity, it has been observed in numerous localities that marine productions are on the decrease. In regard to the Gulf of Naples, no exact statistics are on record by which to determine the precise amount of this decrease; but, taking into consideration the local conditions of the sea, it is easy to prove that the product of fishing is very inferior to what it should be. This fact is accounted for by the avidity of fishermen, who, valuing present utility only, make no account of the injury done to the future, and who, thus ignoring their own interest, instead of being the jealous preservers of the source from which they derive their constant industry, are its destroyers, and invent new means of destruction instead of preservation. As this is a subject which regards the public welfare, owing to the loss arising therefrom to consumers, the attention of the governments of different nations has been called to it, in order that every precaution may be taken to protect this highly-important branch of industry by every means dictated by science and experience. A royal council, to which we have the honor of belonging, is already engaged in investigating all that relates to the subject in question in our country, and a law on fishing throughout Italy is in course of preparation. We do not deem it necessary here to expound in advance all the special views which we consider a subject of discussion for the council

* Atti del reale istituto d'incorraggiamento alle scienze naturali economiche e tecnologiche di Napoli. 2do serie. Tomo VII. 1870. P. 89.

itself; nevertheless we deem advisable not to overlook any of the general considerations which are the result of direct and experimental observations made on the systems of fishing in the Gulf of Naples. If, on one side, we view these considerations as only partial regulations relating to local facts, on the other side we find them placed among the general facts which furnish the elements of the law itself.

In order to judge of the fitness of the systems of fishing, we must consider them under three aspects: the means to be employed, the proper seasons, and the proper places; three things that are so united that one cannot be separated from the others, and means which in themselves might be harmless if employed in proper seasons and places, become very injurious to marine productions when used out of season and place.

The general rules which a wise regulation for fishing must prescribe, are:

1st. Fishes should not be molested during the time of spawning.

2d. The eggs should be left to rest where they were deposited, so as not to be disturbed during their development.

3d. The young must not be destroyed till they have reached a certain size.

4th. Fishes must not be destroyed in mass, by means of poisoning.

From these incontestable principles it follows, as an evident deduction, that a regulation for fishing must prescribe:

1. That fishing must not be carried on in times and places when and where fishes meet for the deposition of eggs or spawn.

2. Dragging-nets must not be used in seasons and places in which eggs are in process of hatching, or embryos undergoing development.

3. Nets with too close meshes must not be used, because they gather the very small fishes, and thus prevent them from developing sufficiently to become useful to consumers.

4. No substance must be used which, when thrown in the sea, produces such changes in the water as to cause the death of all the fishes therein.

The third and fourth of the above rules find their application equally in every country, but the first two require for their application an exact knowledge of the instincts of fishes in regard to their spawning, and of the nature of the bottom of the sea.

The general rule, that fishing must be carried on in such a manner as not to affect the continued production, contains certainly, in itself, all that can be required. It often happens, however, that general rules are easier in theory than in practice.

As regards the apparatus of fishing, the greatest care has been deemed necessary, from remote times, in the use of trawl-nets, which, raking over the bottom of the sea so as to gather up the mud in seasons in which the eggs are deposited, destroy everything, thus causing much damage to the reproduction of the species. Hence the permanent prohibition of the use of such nets from April till October, which is found in the fishing regulation in the old Neapolitan provinces. The fact of the damage which is caused to marine productions by the use of trawl-nets in the seasons above mentioned is so evident to us that it seems useless to attempt to argue the question, especially as we would only be repeating what has already been demonstrated so learnedly by others. We think, however, that in examining such arguments we must not confine ourselves to the trawl-net, but must take into consideration the whole category of meshed nets. We must undoubtedly make a distinction between those which drag heavily the bottom of the sea, thereby

gathering up all they meet with, including mud itself, as the trawl drags it, and the other nets which rest lightly on the bottom of the sea, like the seines in their modifications, &c. If, however, the former are the most injurious, the latter are none the less hurtful in certain seasons, for, while the former destroy the eggs and the embryos, the latter gather up the young when scarcely able to swim. In fact, the seines and hand-trawls, and similar nets, are precisely the kind that take enormous quantities of young of various kinds of fishes, which are brought to market by the ton, under the name of *fravaglie*, and which are the young of anchovies, mullets, gurnards, &c. While this immense quantity of fishes brings but a very scant profit, it subtracts from the sea the elements which, in the following seasons, would prove a source of sustenance to the people and profit to fishermen. It is owing to this principal reason, as we have stated before, that, while the Gulf of Naples furnishes the most favorable conditions to the prosperity and increase of its inhabitants, the fact is, that the fishes sent to market are not sufficient for the wants of the people, so that, in spite of the considerable quantities derived from the gulf, if we except a few rare cases of a small variety, the prices are such that the masses cannot afford to procure them. Another effect of this excessive fishing is, that in the Gulf of Naples (with few exceptions) the species never attain any considerable size; hence, for example, flounders and many other kind never attain half the size of those in the Adriatic. It is necessary, therefore, to forbid the use of nets which injure the inhabitants of the sea, of whatever kind.

ON THE POSSIBILITY OF EXHAUSTING THE SEA-FISHERIES.*

BY JAMES G BERTRAM.

The idea of a slowly but surely diminishing supply of fish is no doubt alarming, for the public have hitherto believed so devoutly in the frequently-quoted proverb of "more fish in the sea than ever came out of it," that it has never, except by a discerning few, been thought possible to overfish; and, consequently, while endeavoring to supply the constantly-increasing demand, it has never sufficiently been brought home to the public mind that it is possible to reduce the breeding-stock of our best kinds of sea-fish to such an extent as may render it difficult to re-populate those exhausted ocean colonies which in years gone by yielded, as we have been often told, such miraculous draughts. It is worthy of being noticed that most of our public writers who venture to treat the subject of the fisheries, proceed at once to argue that the supply of fish is unlimited, and that the sea is a gigantic fish-preserve, into which man requires but to dip his net to obtain at all times an enormous amount of wholesome and nutritious food.

This style of writing on the fisheries comes largely into use whenever there is a project of a joint-stock fishing company placed before the public. When that is the case, obscure little villages are pointed to as the future seats of enormous prosperity, just because they happen to be thought of by some enterprising speculator as the nucleus of a

* Extracted from "The Harvest of the Sea, a contribution to the natural and economic history of the British food-fishes. London. John Murray, 1865."

fishing town; and we are straightway told that Buckhorn, or Kirksalt, or some equally obscure place, could be made to rival those towns in Holland, whose wealth and prosperity originated in even smaller beginnings. We are likewise informed, on the occasions of giving publicity to such speculations, that "the sea is a liquid mine of boundless wealth, and that thousands of pounds might be earned by simply stretching forth our hands and pulling out the fish that have scarcely room to live in the teeming waters of Great Britain," &c. I would be glad to believe in these general statements regarding our food-fisheries, were I not convinced, from personal inquiry, that they are a mere coinage of the brain.

There are, doubtless, plenty of fish still in the sea, but the trouble of capturing them increases daily, and the instruments of capture have to be yearly augmented, indicating but too clearly to all who have studied the subject, that we are beginning to overfish. We already know, in the case of the salmon, that the greed of man, when thoroughly excited, can extirpate, for mere immediate gain, any animal, however prolific it may be. Some of the British game-birds have so narrowly escaped destruction that their existence, in anything like quantity, when set against the armies of sportsmen who seek their annihilation, is wonderful.

As has been mentioned in a previous chapter of this volume, the supply of haddocks and other *Gadidæ* was once so plentiful around the British coasts that a short line, with perhaps a score of hooks, frequently replenished with bait, would be quite sufficient to capture a few thousand fish. The number of hooks was gradually extended, till now they are counted by the thousand, the fishermen having to multiply the means of capture as the fish become less plentiful. About forty years ago the percentage of fish to each line was very considerable. Eight hundred hooks would take about 750 fish; but now, with a line studded with 4,000 hooks, the fishermen sometimes do not take 100 fish.

It was recently stated by a correspondent of the John O'Groat Journal, a newspaper published in the fishing-town of Wick, that a fish-curer there contracted some years ago with the boats for haddocks at 3*s.* 6*d.* per hundred, and that, at that low price, the fishing yielded the men from £20 to £40 each season, but that now, although he has offered the fishermen 12*s.* a hundred, he cannot procure anything like an adequate supply. As the British sea-fisheries afford remunerative employment to a large body of the population, and offer a favorable investment, it is surely time that we should know authoritatively whether or not there be truth in the falling-off in our supplies of herring and other white fish. At one of the Glasgow fish-merchants' annual soirees, held a year or two ago, it was distinctly stated that all kinds of fish were less abundant now than in former years, and that in proportion to the means of capture, the result was less. Mr. Methuen reiterated such opinions again and again. "I reckon our fisheries," said this enterprising fish-merchant on one occasion, "if fostered and properly fished, a national source of wealth of more importance and value than the gold-mines of Australia, because the gold-mines are exhaustible; but the living, propagating, self-cultivating gift of God is inexhaustible, if rightly fished by man, to whom they are given for food. It is evident anything God gives is ripe and fit for food. 'Have dominion,' not destruction, was the command. Any farmer cutting his ripe clover grass would not only be reckoned mad, but would, in fact, be so, were he to tear up the roots along with the clover, under the idea that he was thus obtaining more food for his cattle, and then wondering why he had no

second crop to cut. His cattle would starve, himself and family be beggared, and turned out of their farm as improvident and destructive, who not only beggared themselves, but, to the extent of their power, impoverished the people by destroying the resources of their country. The farmer who thus destroys the hopes of a rising crop by injudicious farming, is not only his own enemy, but the enemy of his country as well."

Such evidence could be multiplied to any extent if it were necessary, but I feel that quite enough has been said to prove the point. It is a point I have no doubt upon whatever, and persons who have studied the question are alarmed, and say it is no use blinking the matter any longer—that the demand for fish as an article of food is not only beginning to exceed the supply, but that the supply obtained, combined with waste of spawn and other causes, is beginning to exceed the breeding-power of the fish. In the olden times, when people only caught to supply individual wants, fish were plentiful, in the sense that no scarcity was ever experienced, and the shoals of sea-fish, it was thought at one time, would never diminish; but since the traffic became a commercial speculation, the question has assumed a totally different aspect, and a sufficient quantity cannot now be obtained. Who ever hears now of monster turbot being taken by the trawlers? Where are the miraculous hauls of mackerel that used to gladden the eyes of the fishermen? Where are now the wagon-loads of herring to use as manure, as in the golden age of the fisheries? I do not require to pause for the reply—echo would only mock my question by repeating it. Exhausted shoals and inferior fish tell us too plainly that there *is* reason for alarm, and that we have, in all probability, broken at last upon our capital stock.

What, then, if this be so, will be the future of the British fisheries? I have already, and more than once, in preceding pages, hinted my doubts of the existence of the enormous fish-supplies of former days; in my opinion, the supposed plentifulness of all kinds of fish must in a large degree have been a myth, or at least but relative, founded, in all probability, on the fluctuating demand and the irregular supply. Were there not an active but unseen demolition of the fish-shoals, and were these shoals as gigantic as people imagine them to be, the sea would speedily become like stirabout, so that in time ships would not be able to sail from port to port. Imagine a few billions of herrings, each pair multiplying at the rate of thirty thousand per annum! picture the codfish, with its million ratio of increase; and then add, by way of enhancing the bargain, a million or two of the flat-fish family throwing in their annual quota to the total, and figures would be arrived at far too vast for human comprehension. In fact, without some compensating balance, the waters on the globe would not contain a couple of years' increase! If fish have that tendency to multiply which is said, how comes it that in former years, when there was not a tithe of the present demand, when the population was but scant, and the means of inland carriage to the larger seats of population rude and uncertain, the ocean did not overflow and leave its inhabitants on its shores? Were we better acquainted with the natural history of fish, it would be easy to regulate the fisheries. The everlasting demand for sea-produce has caused the sea-fishing, like the salmon-fishing, to be prosecuted at improper seasons, and fish have been, indeed, are daily, to a large extent, sold in a state that renders them quite improper for human food. Another cause of the constantly-lessening supplies may be also mentioned. Up till a recent period, it was thought

all fish were migratory, and the reason usually assigned for unsuccessful fishing was that the fish had removed to some other place. Thus the fact of a particular colony having been fished up was in some degree hidden, chiefly from ignorance of the habits of the animal. This migratory instinct, so far as our principal sea-fish are concerned, is purely mythical. The rediscovery of the Rockall-cod-bank must tend to dissipate these old-fashioned suppositions of our naturalists. All fish are local, from the salmon to the sprat, and each kind has its own abiding-place. The salmon keeps unfailingly to its own stream; the oyster to its own bank; the lobster to its particular rock; and the herring to its own bay. Fishermen are beginning now to understand this, and can tell the locality to which a particular fish belongs, from the marks upon it. A Tay salmon differs from a Tweed one, and Norway lobsters can be readily distinguished from those brought from The Orkneys. Then, again, the fine haddocks caught in the bay of Dublin differ much from those taken in the Frith of Forth, while Lochfyne herrings and Caithness herrings have each distinct peculiarities.

Our great farm, the sea, is free to all—too free; there is no seed or manure to provide, and no rent to pay. Every adventurer who can procure a boat may go out and spoliate the shoals; he has no care for the growth or preservation of animals which he has been taught to think inexhaustible. In one sense it is of no consequence to a fisherman that he catches codlings instead of cod; whatever size his fish may be, they yield him what he fishes for—money. What if all the herrings he captures be crowded with spawn? What if they be virgin fish, that have never added a quota to the general stock? That is all as nothing to the fisherman as long as they bring him money. It is the same in all fisheries. Our free, unregulated fisheries are, in my humble opinion, a thorough mistake. If a fisherman, say with a capital of £500 in boats, nets, &c., had invested the same amount of money in a breeding-farm, how would he act? Would he not earn his living and increase his capital by allowing his animals to breed? and he would certainly never cut down oats or wheat in a green state.

EXTRACT FROM THE LONDON FIELD, 1871.

The Americans, like ourselves, have begun to find that fisheries will die out if the fish are hindered from spawning, and are taken at all times and of all sizes. Incited thereto, perhaps, by our example, and by the movement which has taken place in Canada in respect to the fisheries, the Americans have begun to look rather sharply into the condition of their own rivers. We have received various reports from the United States of the proceedings which have been and are being taken in reference to their fisheries. Last year an inquiry was held respecting those of Massachusetts, at the instance of certain petitioners; but the inquiry failed, as it was stated by the committee that there was no sufficient cause shown for enacting any special measures. When a failure of this kind happens with us, we generally know on whose shoulders to put it; the opposition has been too strong, and the perpetrators of the mischief, whatever it may be, have made sufficient interest to keep things *in statu quo*. We do not say that this is the case over in Massachusetts. Fortunately, however, the example set by that State has not been followed, for Connecticut has come to a different conclusion, and

has ordered that fixed engines shall be done away with on the southern coast of the State after the 1st of January, 1871; while now we have a report from Rhode Island, forwarded to us by Mr. Spencer F. Baird, in which it seems the committee have arrived at a similar opinion. The report will not bear much dissecting, as it consists chiefly of a series of questions answered by a number of different persons. From their evidence it seems to be clearly proved that the methods of fishing by means of traps, pounds, gill-nets, &c., are too severe for the fish, and that few of them can now reach their spawning places, while every year the total falls off; that whereas formerly scup, tautog, and other fish were very abundant, they are now (particularly scup) growing very scarce; and therefore the committee recommend the State to pass a very stringent act, prohibiting the setting of such traps and contrivances, under penalty of a fine of not less than $50 nor more than $300 for the first offense, and not less than $500 nor more than $1,000, with imprisonment for not less than a month nor more than a year, for every other. These are something like penalties, and prove that when our cousins mean to prohibit a thing they are in earnest.

EXTRACTS FROM THE REPORT OF THE COMMISSIONERS APPOINTED TO INQUIRE INTO THE SEA-FISHERIES OF THE UNITED KINGDOM; PRESENTED TO BOTH HOUSES OF PARLIAMENT BY COMMAND OF HER MAJESTY. LONDON, 1861.*

To the Queen's Most Excellent Majesty:

We, the undersigned commissioners, appointed by Your Majesty to inquire into the condition of the sea-fisheries of the United Kingdom of Great Britain and Ireland, and especially instructed by the terms of Your Majesty's commission to ascertain, firstly, whether the supply of fish is increasing, stationary, or diminishing; secondly, whether any modes of fishing which are practiced are wasteful or otherwise injurious to the

*This commission, composed of James Caird, Professor T. H. Huxley, and George Shaw Lefevre, was appointed in 1863 by the Queen, to inquire into the following points:

1st. Whether the supply of fish from the sea-fisheries is increasing, stationary, or diminishing.

2d. Whether any of the methods of catching fish in use in such fisheries involve a wasteful destruction of fish or spawn; and, if so, whether it is probable that any legislative restriction upon such method of fishing would result in an increase of the supply of fish.

3d. Whether any existing legislative restrictions operate injuriously upon any of such fisheries.

The conclusions to which the commissioners arrived have been vigorously assailed by many writers, both in this country and in Europe; chief among the latter is a French author, Rimbaud, whose protest is referred to in the report of the Massachusetts commissioners of fisheries for 1869, p. 60, and by Mr. G. H. Palmer, (p. 94,) of the present report. It is upon the conclusion of Professor Huxley and his associates that Captain Atwood mainly relies for his argument in favor of free fishing, without any restrictions. As has been shown by the first-mentioned writers, and in my own report, a distinction is to be drawn between the shore and the outside or deep-sea fisheries, and while the arguments of the British commissioners apply essentially to the latter, the questions in connection with the fisheries of the south side of New England are related almost exclusively to the former.

S. F. B.

supply of fish; and, thirdly, whether the said fisheries are injuriously affected by any legislative restrictions, humbly submit the following report of our proceedings to Your Majesty:

We first proceed to state the results of our inquiries into the matters to which Your Majesty's commission especially directs our attention. And, first, whether the supply of fish from the sea-fisheries is increasing, stationary, or diminishing.

Though there has been much conflicting evidence on this point, we have had no difficulty in coming to the conclusion that, on the coasts of Great Britain, the supply of fish is increasing, and that it admits of progressive increase.

It fluctuates according to the locality and the season of the year. In the autumn of 1863 the northeast coast of England yielded a meagre inshore fishing, while, in the following year, we found on the east coast of Scotland the haddock fishing had been one of the best ever known. And at the time that the inshore fishing was unproductive in 1863, that carried on by the decked vessels farther to sea was yielding an abundant supply.

The evidence where strongest in favor of a gradual decline in the yield of fish was nearly always accompanied by statements showing a progressive increase in the number of men and boats engaged in the fishing. And not only have these numbers uniformly increased, but there has also been an increase in the length of each fishing-line and the number of hooks upon it, in the length and depth of the nets, and in the size and sea-going qualities of the boats. The machinery for fishing has been increased in efficiency, while, in proportion to that efficiency, the cost of working it is actually diminished. There is likewise abundant proof of the continued productiveness of the nearest and most frequented fishing-grounds. The principal London salesmen concurred in their testimony to that effect. Not only are the fishing-vessels constantly being increased in number, but the take of each vessel is increasing, and, from the speedier means of transport, the quality of the fish is improving. On the western part of the Dogger bank it is not uncommon for a single trawl vessel to take, in a three hours' trawl, from two to three tons' weight of fish; and a smack-owner mentioned a recent case in which five of his vessels caught 17 tons of fish in one night. Similar testimony is borne to the prolific character of the fishing-banks of Scarborough, Flamborough Head, Grimsby, and the coast of Norfolk. In the English Channel, the famous fishing-ground of Rye Bay, which has for a long period of years been constantly trawled over by both English and French fishermen, was stated to have yielded more fish in 1863 than in any previous year. In some of the bays on the south coast signs of over-fishing have been alleged to exist, but in the deep sea the well-known trawling-grounds are constantly fished over with daily returning success.

The second question submitted to us is, whether any of the methods of catching fish in use in the sea-fisheries involves a wasteful destruction of fish and spawn; and, if so, whether it is probable that any legislative restriction upon such methods of fishing would result in an increase of the supply of fish?

Of the many methods of taking sea-fish described in the appendix, (No. 1,) very few have escaped complaint from one source or another; and our minutes of evidence would have been far less voluminous had we not considered it our duty to encourage the complainants to state their views fully, and to sift out, by careful and varied questioning, the amount of truth contained in their multitudinous allegations.

As these complaints have usually been brought against one class of fishermen by others, who, rightly or wrongly, conceived themselves to be unjustly injured in their most important interests; and as they have been rebutted by persons whose means of living, largely or wholly, depend upon their power to continue the alleged wrongful practices, it will not be a matter of astonishment that the evidence, so far as it records merely personal convictions, and assertions that can be neither proved or disproved, is of the most conflicting character.

In making this remark, we have no wish to reflect in the slightest degree upon the veracity of either side. On the contrary, we desire particularly to acknowledge the frankness with which the fishermen generally gave their evidence, and the intelligent manner in which they stated their views. But fishermen, as a class, are exceedingly unobservant of anything about fish which is not absolutely forced upon them by their daily avocations; and they are, consequently, not only prone to adopt every belief, however ill-founded, which seems to tell in their own favor, but they are disposed to depreciate the present in comparison with the past. Nor, in certain localities, do they lack the additional temptation to make the worst of the present, offered by the hope that strong statements may lead the state to interfere in their favor, with dangerous competitors.

Leaving out of consideration the comparatively few cases in which private rights of sea-fishery exist, it may be laid down as a broad principle that, apart from the restrictions prescribed by international law, or by special treaties, the produce of the sea is the property of the people in common, and that methods of fishing are fitting subjects for legislation only so far as such legislation can be shown to be necessary to secure the greatest possible advantage to the whole nation from the sea-fisheries, either by suppressing wasteful and uselessly destructive modes of fishing, or by removing legislative obstacles in the way of improved modes of fishing, or by preserving peace and order among fishermen.

Keeping these principles in view, all the tenable complaints against methods of fishing which have been brought before us may be classified under two heads:

I. Complaints that a given mode of fishing is wasteful, and tends to diminish the supply of fish permanently.

II. Complaints that a given mode of fishing interferes with the lawful occupations of fishermen of another class, or of other persons.

In discussing the first series of complaints, three distinct issues will have to be considered:

a. Does the alleged waste take place, and to what extent?

b. Can the waste which occurs be shown to have affected the supply of fish?

c. If waste have occurred to a sufficient extent to affect the supply of fish, how far is it desirable to interfere by direct legislation, and how far is it better to trust to natural checks?

And as regards the second series, we shall find it necessary to inquire—

a. Does the alleged interference occur, and to what extent?

b. If the interference occurs, does the public interest require the intervention of the state?

I. Complaints that a given mode of fishing is wasteful, and tends to diminish the supply of fish permanently.

The chief methods of fishery against which complaints of this kind have been brought are—

1. Beam-trawling in the open sea.

2. All kinds of sweep-net fishing, (beam-trawling, shrimping, seinings

circle-net fishing,) and fishing with small meshed nets and weirs in bays and estuaries.

Trawling is alleged to be a wasteful and destructive mode of fishing—

1. Because the whole, or the majority of the fish brought up in the trawl, are dead, and so much damaged as to be unwholesome or otherwise unfit for human food.

2. Because the beam and net, dragging along the sea-bottom, tear up or destroy the spawn of fish.

3. Because the net brings up a vast quantity of the fry of fish, or of fish so small as to be unsalable, which is all thrown back dead into the water.

4. Because, in consequence of the latter effects of trawling, all the grounds over which the trawlers work are becoming rapidly exhausted; so that not only are line-fishermen unable to obtain any fish there, but the trawlers themselves are obliged to seek other localities, and are in fact rapidly becoming ruined.

1. The assertion that trawled fish is always, or commonly, brought up not only dead, but so much damaged as to be unwholesome and unfit for human food, has been made and strongly persisted in by several witnesses; but we feel bound to express our conviction that the statement is incorrect, and, indeed, absurd.

2. The statement that the beam and the net of the trawl dragging along the ground tear up and destroy the spawn of fish, has not been justified by the evidence adduced. Many of the unhesitating assertions which have been made before us on this head, in fact, are only intelligible upon the supposition that the witnesses were ignorant of the real mode of working the trawl-net, and of the true nature of many of the substances brought up by it.

In conclusion, we are clearly of opinion—

1. That fishing by the use of the beam-trawl is the source of by far the greatest and most progressive supply of fish, other than herring, to the principal markets of this country; that certain descriptions of fish, such as soles and plaice, could not be largely supplied by any other mode of fishing; that it engages the largest capital, employs the most numerous body of hardy fishermen, is the least under the control of the weather, and obtains the greatest returns of fish for the labor and capital employed.

2. That there is no reason to believe that trawling in the open sea destroys the spawn of fish.

3. That trawling in the open sea involves the capture of a certain very variable proportion of small fish, which is wasted or not, according to circumstances.

4. That there is no evidence to show that trawling has permanently diminished the supply of fish from any trawling-ground, but that there is proof to the contrary.

5. That trawling in the open sea has not interfered with the supply of fish from line-fishermen; unless it be by catching, in a more expeditious and regular manner, fish which the line-fishermen might have taken.

6. That trawling in the open sea is not shown to be a wastefully-destructive mode of fishing, but the contrary.

7. That any legislative restriction upon trawling in the open sea would result in a very great decrease in the supply of fish.

X.—NOTICES IN REGARD TO THE ABUNDANCE OF FISH ON THE NEW ENGLAND COAST IN FORMER TIMES.

"*An account of two voyages to New England. A description of the country, natives, and creatures. By John Josselyn Gent.*, 1675.

[Reprinted in Collections of the Massachusetts Historical Society, 3d series, III., 1833.]

"The Sea that *Piscina mirabilis* affords us the greatest number, of which I shall begin first with the Whale, a regal fish, as all fish of extraordinary size are accounted; of these there are (as I have said in another place) seven kinds—the Ambergreese *Whale* the chiefest. *Anno Dom.* 1668, the 17 of *July*, there was one of them thrown up on the shore between *Winter-harbour* and *Cape-porpus*, about eight mile from the place where I lived, that was five and fifty foot long. They are Creatures of a vast magnitude and strength."—(P. 271.)

"The *Sea-hare* is as big as a *Grampus* or *Herrin-hog*, and as white as a sheet. There hath been of them in *Black-Point* Harbour, and some way up the river, but we could never take any of them; several have shot sluggs at them, but lost their labor."

"The sturgeon is a Regal fish, too; I have seen of them that have been sixteen-foot in length; of their sounds they make isinglass, which, melted in the mouth, is excellent to seal letters."

"The *Sea-horse* or *Morse* is a kind of monster-fish, numerous about the Isle of *Sables; i. e.*, the Sandy Isle. An amphibious creature, killed for their Teeth and Oyl; never brings more than two at a birth; as also doth the Seal and Manate or Cow-fish, which is supposed to be the Sea-monster."

"The small *Sword-fish* is very good meat; the *Sea-bat* or *Sea-owl* is a kind of flying fish."—(P. 272.)

"The *Mackerel*, of which there is choicefull plenty all summer long; in the spring they are ordinarily 18 inches long; afterwards there is none taken but what are smaller."

"The Herrin, which are numerous, they take of them all summer long. In *Anno Dom.* 1670. They were driven back into *Black-Point* Harbour by other great fish that prey upon them so near the shore that they threw themselves (it being high water) upon dry land in such infinite numbers that we might have gone up half-way the leg amongst them for near a quarter of a mile. We used to qualifie a pickled *Herrin* by boiling of him in milk."

"The *Alewife* is like a *Herrin*, but has a bigger bellie; therefore called an *Alewife;* they come in the end of April into fresh Rivers and Ponds; there hath been taken in two hours' time by two men without any Weyre at all, saving a few stones to stop the passage of the River, above ten thousand."—(P. 273.)

"The Basse is a salt-water fish too, but most an end taken in Rivers where they spawn; there hath been 3,000 *Basse* taken at a set; one writes that the fat in the bone of a *Basse's* head is his braines, which is a lye."

"The *Salmon* likewise is a Sea-fish, but as the *Basse*, comes into Rivers to spawn. The *Salmon* the first year is a *Salmon-smolt;* The second a *Mort;* The third a *Spraid;* The fourth a *Soar;* The fifth a *Sorrel;* The sixth a *forket-tail;* and the seventh year a *Salmon*. There are another sort of *Salmon* frequent in those parts, called White *Salmons*."

"*Capeling* is a small fish like smelt."—(P. 274.)

"The *Frost-fish* is little bigger than a *Gudgeon*, and are taken in fresh brooks; when the waters are frozen they make a hole in the Ice, about half a yard or yard wide, to which the fish repair in great numbers, where, with small nets bound to a hoop about the bigness of a firkin-hoop, with a staff fastened to it, they take them out of the hole. I have not done with the fish yet, being willing to let you know all of them that are to be seen and catched in the Sea & fresh waters of *New England;* and because I will not tire your patience overmuch, having no occasion to enlarge my discourse, I shall only name them and so conclude."

"Aleport,
Albiocre,
Barracha,
Barracoutha,
Blew-fish,
Bull-head,
Bur-fish,
Cat-fish,
Cony-fish,
Cusk,
Clam,
Rock-Cod,
Sea-Cod,
Divers kinds of Crabs,
Sea-cucumber,
Cunner,
Sea-Darts or Javelins,
Flail-fish,
Flounder or Flowke,
Flying-fish,
several kinds,
Sea-Flea,
Grandpisse,
Hake,
Haddock,
Horse-foot,
Hallibut,
Hen-fish,
Lampre,
Limpin,
Lumpe,
Maid,
Monk-fish,
Sea Mullet,
Nun-fish,
Perch,
Polluck,
Periwincle,
Pike,
Pilot-fish,
Plaice,
Porpisse,
Prawne,
Purple-fish,
Porgee,
Remora,
Sea-Ravens,
Sail-fish,
Scallop,
Scate,
Stingray,
Sculpin,
Shadd,
Spurlin,
Sheath-fish,
Smelt,
Shrimps,
Sprates,
Star-fish,
Sword-fish,
Thornback,
Turbet,
The Vlatife or Saw-fish,
Sea-Vrchin,
Sea-Vnicorn."
—(Pp. 276, 277.)

New England's rarities discovered in Birds, Beasts, Fishes, Serpents, and Plants of that country, etc. By John Josselyn, Gent. 1672.

[Reprinted in Archæologia Americana, vol. IV., 1860.]

"The wobble, an ill-shaped bird; having no long feathers in their pinions, which is the reason they cannot fly; not much unlike the pengwin. They are in the spring very fat, or rather oyly; but pull'd and garbidg'd, and laid to the fire to roast, they yield not one drop."*—(P. 146.)

"The Sturgeon; of whose sounds is made isinglass,—a kind of glew much used in physick. This fish is here in great plenty, and in some rivers so numerous that it is hazardous for canoes and the like small vessels to pass to and again; as in Pechipscut River to the eastward."—(P. 164.)

"The scarlet muscle. At Paschataway, (a plantation about fifty

* This refers to the Great Auk, *Alca impennis*, now extinct.—S. F. B.

leagues by sea eastward from Boston,) in a small cove called Baker's Cove, there is found this kind of muscle, which hath a purple vein; which, being prickt with a needle, yieldeth a perfect purple or scarlet juice; dying linnen so that no washing will wear it out, but keeps its lustre many years. We mark our handkerchiefs and shirts with it."—(P. 167.)

Blew Fish or Hound-fish, two kinds. Speekled hound-fish, and blew hound-fish, called horse-fish.—(P. 158.)

Blew-fish or horse. I did never see any of them in England. They are big usually as the salmon, and better meat by far. It is common in New England, and esteemed the best sort of fish, next to rock-cod.—(P. 229.)

Advertisements for the inexperienced Planters of New England, or anywhere. Or, the Pathway to experience to erect a Plantation. By Captaine Iohn Smith. London, 1631.

[Reprinted in Collections of the Massachusetts Historical Society, III., 3d series, 1833.]

At the sole charge of foure Merchants of London and my selfe, 1614, within eight weekes sayling I arrived at *Monahigan* an Ile in *America* in 43. degrees 39. minutes of Northerly latitude. Had the fishing for Whale proved as we expected, I had stayed in the country; but we found the plots wee had, so false, and the seasons for fishing and trade by the unskilfulnesse of our Pylot so much mistaken, I was contented, having taken by hookes and lines with fifteene or eighteene men at most, more than 60,000 cod in lesse than a moneth.—(P. 19.)

The seven and thirty passengers miscarrying twice upon the coast of *England*, came so ill-provided, they onely relyed upon the poore company they found, that had lived two yeares by their naked industry, and what the country naturally afforded; it is true, at first there hath beene taken a thousand Bayses at a draught, and more than twelve hogsheads of Herrings in a night; of other fish when and what they would, when they had meanes; but wanting most necessaries for fishing and fowling, it is a wonder how they could subsist, fortifie themselves, resist their enemies, and plant their plants.—(Chap. 7, p. 19.)

One ship this summer with twenty cattell, and forty or fifty passengers, arrived all well, and the ship at home againe in nine weekes: another for all this exclamation of want, is returned with 10000. corfish, and fourescore kegs of Sturgion, which they did take and save when the season was neare past, and in the very heat of summer, yet as good as can be.—(Chap. 13, p. 42.)

A Description of New England: or, the Observations & Discoueries of Captain John Smith (Admirall of that Country) in the North of America, in the year of our Lord 1614; *with the successe of sixe Ships, that went the next yeare* 1615; *& the accidents befell him among the French men of warre: with the proofe of the present benefit this Countrey affoords: whither this present yeare,* 1616, *eight voluntary Ships are gone to make further tryall. At London: Printed by Humfrey Lownes, for Robert*

Clerke; & are to be sould at his house called the Lodge, in Chancery lane, ouer against Lincolnes Inne.—1616."

[Reprinted in Force's Historical Tracts, vol. ii. Contents, p. 3, Tract 1.]

"The seasons for fishing approoued. In March, April, May, & halfe June, here is Cod in abundance; in May, June, July, & August, Mullet & Sturgion; whose roes doe make Cauiare & Puttargo. Herring, if any desire them, I haue taken many out of the bellies of Cods, some in nets; but the Saluages compare their store in the sea, to the haires of their heads: & surely there are an incredible abundance upon this Coast. In the end of August, September, October & Nouember, you haue Cod againe to make Cor fish, or Poore John: & each hundred is as good as two or three hundred in the *New-found Land.* So that halfe the labor in hooking, splitting, & turning, is saued: & you may haue your fish at what Market you will, before they can have any in *New-found Land;* where their fishing is chiefly but in June & July: whereas it is heere in March, April, May, September, October, & Nouember, as is said. So that by reason of this plantation, the Merchants may haue fraught both out & home: which yeelds an advantage worth consideration."

"The Mullets heere are in that abundance, you may take them with nets, sometimes by hundreds, where at *Cape blank* they hooke them; yet those but one foot & a halfe in length; these two, three, or foure, as oft I have measured: much Salmon some haue found vp the Riuers, as they haue passed: & heer the ayre is so temperate, as all these at any time may well be preserued." (*Vol. II, p.* 10, *Tract* 1.)

"Of Beuers, Otters, Martins, Blacke Foxes, & Furres of price, may yearely be had 6 or 7,000: & if the trade of the *French* were preuented, many more: 25,000 this yeare were brought from those Northern parts into France; of which trade we may haue as good part as the *French*, if we take good courses." (*Vol. II, p.* 12, *Tract* 1.)

WOODS.—"The cheefe headlands are onely *Cape Tragabigzanda* & *Cape Cod.*"

"Oke, is the chiefe wood; of which there is great difference in regard of the soyle where it groweth: firre, pyne, walnut, chesnut, birch, ash, elme, cypresse, ceder, mulberrie, plumtree, hazell, saxefrage, & many other sorts."

BIRDS.—"Eagles, Gripes, diuerse sorts of Haukes, Cranes, Geese, Brants, Cormorants, Ducks, Sheldrakes, Teale, Meawes, Guls, Turkies, Diue-doppers, & many other sorts, whose names I knowe not."

FISHES.—"Whales, Grampus, Porkpisces, Turbut, Sturgion, Cod, Hake, Haddock, Cole, Cusk, or small Ling, Shark, Mackerrell, Herring, Mullet, Base, Pinacks, Cunners, Pearch, Eels, Crabs, Lobsters, Muskles, Wilkes, Oysters, & diuerse others, &c." (*Vol. II, p.* 16, *Tract* 1.)

BEASTS.—"Moos, a beast bigger than a Stagge; Deere, red, & Fallow; Beuers, Wolues, Foxes, both blacke & other; Aroughconds, Wild-cats, Beares, Otters, Martins, Fitches, Musquassus, & diuerse sorts of vermine, whose names I know not. All these & diuerse other good things do heere, for want of vse, still increase, & decrease with little diminution, whereby they growe to that abundance. You shall scarce finde any Baye, Shallow Shore, or Coue of sand, where you may not take many Clampes, or Lobsters, or both at your pleasure, & in many places lode your boat if you please; Nor Iles where you finde not fruits, birds, crabs, & muskles, or all of them, for taking, at lowe water. And in the harbors we frequented a little boye might take of

Cunners, & Pinacks, & such delicate fish, at the Ship's sterne, more than sixe or tenne can eate in a daie; but with a casting-net, thousands when wee pleased: & scarce any place, but Cods, Cuske, Holybut, Mackerell, Scate, or such like, a man may take with a hooke or line what he will. And, in diuerse sandy Baies, a man may draw with a net great store of Mullets, Bases, & diuerse other sorts of such excellent fish, as many as his Net can drawe on shore: no Riuer where there is not plentie of Sturgion, or Salmon, or both; all which are to be had in abundance obseruing but their seasons." (*Vol. II, p.* 17, *Tract* 1.)

"And is it not pretty sport, to pull vp two pence, six pence, and twelue pence, as fast as you can hale & veare a line? He is a very bad fisher, cannot kill in one day with his hooke & line, one, two, or three hundred Cods: which dressed & dryed, if they be sould there for ten shillings the hundred, though in *England* they will giue more than twentie; may not both the seruant, the master, & marchant, be well content with this gaine? If a man worke but three days in seauen, he may get more then hee can spend, vnlesse he will be excessiue." (*Vol. II, p.* 21, *Tract* 1.)

"*New England's Trials. Declaring the successe of* 80 *ships employed thither within these eight yeares; and the benefit of that Country by Sea and Land. With the present estate of that happie Plantation, begun but by* 60 *weake men in the yeare* 1620. *And how to build a Fleete of good Shippes to make a little Nauie Royall. Written by Captain John Smith, sometimes Gouernour of Virginia, & Admirall of New England. The Second Edition. London: Printed by William Iones.*—1622."

[Force's Historical Tracts, vol. II, Tract 2.]

"With two ships sent out at the charge of Captain Marmaduke Roydon, Captain George Langam, M. John Buley, & W. Skelton, I went frō the Downes the third of March, & arriued in New England the last of April, where I was to haue stayed but with ten men to keep possession of those large territories. Had the whales proued, as curious information had assured me & my adventurers, (but those things failed.) So having but fortie-five men & boyes, we built seven boates, 37 did fish; myself with eight others ranging the coast, I took a plot of what I could see, got acquaintance of the inhabitants; 1,100 Beuer skins, 100 Martins & as many Otters. 40,000 of drie fish we sent for Spaine with the salt fish, traine oile & Furres. I returned for England the 18 of July, & arriued safe with my company the latter end of August." (*Vol. II, p.* 9, *Tract* 2.)

"The country very pleasant & temperate, yeelding of it self great store of fruites, as vines of diuers sorts in great abundance; there is likewise walnuts, chesnuts, small nuts & plums, with much varietie of flowers, rootes, & herbs, no lesse pleasant then wholsome & profitable: no place hath more goose-berries & straw-berries, nor better, Timber of all sorts you haue in England, doth couer the Land, that affoords beasts of diuers sorts, & great flocks of Turkies, Quailes, Pigeons & Partriges: many great lakes abounding with fish, fowle, Beuers & Otters. The sea affoords vs as great plenty of all excellent sorts of sea-fish as the riuers & Iles doth varietie of wilde fowle of most vsefull sorts." (*Vol. II, p.* 14, *Tract* 2.)

"What is already writ of the healthfulnesse of the aire, the richnesse of the soile, the goodnes of the woods, the abundance of fruits, fish, & fowle in their season, they stil affirm that haue bin there now neare 2

yeares, & at one draught they haue taken 1,000 basses, & in one night twelve hogsheads of herring." (*Vol. II, page* 16, *Tract* 2.)

"*Gov. Thomas Dudley's Letter to the Countess of Lincoln, March*, 1631. *With explanatory Notes, by Dr. John Farmer, Corresponding Secretary of the New-Hampshire Historical Society. Washington: Published by Peter Force.*—1838."

[Reprinted Force's, Historical Tracts II., Tract 4.—1838.]

"Vpon the 8 of March, from after it was faire day light untill about 8 of the clock in the forenoone, there flew over all the tounes in our plantacons so many flocks of doues, each flock conteyning many thousands, & some soe many that they obscured the lighte, that it passeth credit, if but the truth should bee written. (*Vol. II, page* 17, *Tract* 4.)

"*New English Canaan; or, New Canaan, containing an abstract of New England.—Composed in three Bookes. The first setting forth the Originall of the Natives, their Manners & Customs. Together with their tractable Nature & Love towards the English. II. The Natural Indowments of the Countrie, & what Staple Commodities it yeeldeth. III. What People are planted there, their Prosperity, what remarkable Accidents have happened since the first planting of it: together with their Tenants & practise of their Church. Written by Thomas Morton, of Clifford's Inn, Gent. Upon ten Yeers Knowledge & Experiment of the Country. Printed by Charles Green.*—1632."

[Reprinted in Force's Historical Tracts, Vol. II, Tract 5.]

"And first of the Swanne, because she is the biggest of the fowles of that Country. There are of them in Merrimack River, & in other parts of the country, greate Store at the seasons of the yeare."

"There are Gesse of three sorts, vize, brant Geese, which are pide, & white Geese which are bigger, & gray Geese, which are as bigg & bigger then the tame Geese of England, with black legges, black bills, heads & necks black."—*Vol. II, p.* 46, *Tract* 5.)

"Ducks, there are of three kindes, pide Ducks, gray Ducks, & black Ducks in greate abundance."

"Teales, there are of two sorts greene winged, & blew winged."

"Widggens there are, & abundance of other water foule."

"Simpes, there are like our Simpes in all respects, with very little difference."

"Sanderlings are dainty birds, more full bodied than a Snipe."

"Cranes, there are greate Store." (*P.* 47, *Tract* 5.)

"Turkies there are, which divers times in great flocks have sallied by our doores. Of these there hath bin killed, that have weighed forty-eight pound a peece. I had a salvage who hath taken out his boy in a morning, & they have brought home their loades about noone. I have asked them what number they found in the woods, who have answered Neent Metawna, which is a thousand that day; the plenty of them is such in these parts. They are easily killed at rooste, because the one being killed, the other sit fast neverthelesse, & this is no bad commodity."

"There are a kinde of fowles which are commonly called Pheisants,

but whether they be pheysants or no, I will not take upon mee, to determine. They are in form like our pheisant-henne of England. Both the male & the female are alike; but they are rough footed: & have stareing fethers about the head & neck, the body is as bigg as the pheysant-henne of England; & are excellent white flesh, & delicate white meate, yet we seldome bestowe a shoote at them."

"Partridges, there are much, like our Partridges of England, they are of the same plumes, but bigger in body. They have not the signe of the horse shoe-shoe on the brest as the Partridges of England; nor are they coloured about the heads as those are; they sit on the trees. For I have seen 40. in one tree at a time; yet at night they fall on the ground, & sit until morning so together; & are dainty flesh."

"There quailes also, but bigger then the quailes in England. They take trees also: for I have numbered 60. upon a tree at a time. The cocks doe call at the time of the yeare, but with a different note from the Cock quailes of England." (*P.* 48, *Tract* 5.)

"There are Owles of divers kindes: but I did neve heare any of them whop as ours doe."

"There are Crowes, kights & rooks that doe differ in some respects from those of England. The Crowes (which I have much admired, what should be the cause) both smell & taste of Muske in Summer, but not in Winter." (*P.* 49, *Tract* 5.)

"There is a curious bird to see to, called a hunning bird, no bigger than a great Beetle; that out of question lives upon the Bee, which he eateth & catcheth amongst Flowers: For it is his Custome to frequent those places, Flowers he cannot feed upon by reason of his sharp bill, which is like the poynt of a Spanish needle, but Shorte. His fethers have a glosse like silke, & as hee stirres, they show to be of a chaingable coloure; & has bin, & is admired for shape, coloure, & size." (*P.* 50, *Tract* 5.)

"There are in this Country, three kindes of Deares of which there are greate plenty, & those are very usefull. First, therefore I will speake of the Elke, which the Salvages call a Mose: it is a very large Deare, with a very faire head, & a broade palme, like the palme of a fallow Deares horne, but much bigger, & is 6. footewide betweene the tipps, which grow curbing downwards: Hee is of the bignesse of a great horse. There is a second sort of Deare (lesse then the redd Deare of England, but much bigger then the English fallow Deare) swift of foote, but of a more darke coloure; with some griseld heares. When his coate is full growne in the summer season, his hornes grow curving, with a croked beame, resembling our redd Deare, not with a palme like the fallow Deare." (*P.* 51, *Tract* 5.)

"There is likewise a third sorte of deare, lesse then the other, (which are a kind of rayne deare,) to the southward of all the English plantations, they are excellent good flesh. And these also bring three fownes at a time, & in this particular the Deare of those parts, excell all the knowne Deare of the whole world."

"The next in mine opinion fit to be spoken of is the Beaver; which is a Beast ordained, for land & water both, & hath fore feet like a cunny, her hinder feete like a goese, mouthed like a cunny, but short eared like a Serat, fishe in summer, & wood in winter, which hee conveyes to his howse built on the water, wherein hee sitts with his tayle hanging in the water, which else would over heate & rot off."—(P. 52, *Tract* 5.)

"The Otter of those parts, in Winter season, hath a furre as black so jett, & is a furre of very highe price; a good black skinne is worth 3. or 4. Angels of gold. The Flesh is eaten by the Salvages: but how

good it is I cannot shew, because it is not eaten by our Nation. Yet is this a beast, that ought to be placed in the number amongst the Commodities of the Country."

"The Luseran or Luseret, is a beast like a Catt: but so bigg as a great hound: with a tayle shorter then a Catt. His clawes are like a Catt's. Hee will make a pray of the Deare. His Flesh is dainty meat, like a lambe; his hide is choise furre, & accompted a good commodity."

"The Martin is a beast about the bignes of a Foxe. His furre is chestnutt coloure, & of those there are greate Store in the Northerne parts of the Country, & is a good commodity." (*P.* 53, *Tract* 5.)

"The Racowne is a beast as bigg, full out, as a Foxe, with a Bush-tayle. His Flesh excellent foode: his oyle precious for the Syattica, his furre course, butt the Skinnes serve the Salvages for coats, & is with those people of more esteeme, then a coat of beaver, because of the tayles that (hanging round in their order) doe adorne the garment, & is therefore so much esteemed of them. His fore-feete are like the feete of an ape; & by the print thereof, in the time of snow, he is followed to his hole, which is commonly in a hollow tree, from whence hee is fiered out, & so taken."

"The Foxes are of two coloures; the one redd, the other gray, these feede on fish; & are good furre, the doe not stinke, as the Foxes of England, but their condition for their pray, is as the Foxes of England."

"The Wolfes are of divers coloures: some sandy coloured; some griselled, & some black, their foode is fish which they catch when they pass up the rivers, into the ponds to spawne at the Spring time. The Deare are also their pray, & at Summer, where they have whelpes, the bitch will fetch a puppy dogg from our dores, to feed their whelpes with." (*P.* 54, *Tract* 5.)

"The Beare is a tyrant at a Lobster, & at low water will downe to the Rocks, & groape after them with great diligence. His hide is used by the Salvages, for garments, & is more commodious then discommodious, as may passe (with some allowance) with the rest."

"The Muskewashe, is a beast that frequenteth the ponds. What he eats I cannot finde."

"This Country, in the North parts thereof, hath many Porcupines, but I do not finde the beast any way usefull or hurtfull."

"There are in those Northerne parts many Hedgehoggs, of the like nature, to our English Hedghoggs."

"Here are greate store of Conyes in those parts, of divers coloures; some white, some black, & some gray. Those towards the Southern parts are very small, but those to the North are as big as the English Cony; their eares are very short. For meate the small rabbit is as good as any that I have eaten of elsewhere."

"There are Squirils of three sorts, very different in shape & condition; & is gray, & hee is as bigg as the lesser Cony, & keepeth the woods feeding upon nutts."

"Another is red, and he haunts our houses, & will rob us of our Corne, but the Catt many times, payes him the price of his presumption." (*P.* 55, *Tract* 5.)

"The third is a little flying squirill, with bat-like wings, which hee spreads when hee jumps from tree to tree, and does no harm."

SNAKES.—"The general Salvage name of them is Ascowke. There is one creeping beast, or longe creeple (as the name is in Devonshire,) that hath a rattle at his tayle, that doth discover his age. I have had my dogge venomed with troubling one of these; & so swelled, that I thought it would have bin his death; but with one saucer of salet oyle

powred downe his throat, he has recovered, & the swelling asswaged by the next day. The like experiment hath bin made upon a boy that hath by chance troad upon one of these, and the boy never the worse. Therefore it is simplicity in any one that shall tell a bugbeare tale of horrible or terrible Serpents that are in that land.

"Mise there are good store, & my Lady Woodbees black gray malkin may have pastime enough there: but for rats, the Country by Nature is troubled with none." *(P. 56, Tract. 5.)*

" Of the Fishes, & what commodity they proove.

"Among Fishes First I will begin with the Codd, because it is the most commodious of all fish, as may appeare, by the use which is made of them in foraigne parts."

"The Codd fishing is much used in America, (whereof New England is part) in so much as 300. Sayle of shipps, from divers ports, have used to be imployed yearely in that trade."

"I have seene in one Harboure, next Richmond Island 15. Sayle of shipps at one time, that have taken in them, dryed Codds for Spaine, & the Straights (& it has bin found that the Saylers have made 15. 18. 20. 22. p. Share for a common man."

"The Coast aboundeth with such multitudes of Codd, that the inhabitants of New England doe dunge their grounds with Codd; & it is a commodity better than the golden mines of the Spanish Indies; for without dried Codd the Spaniard, Portugal & Italian, would not be able to vittell of a shipp for the sea; & I am sure at the Canaries it is the principall commodity; which place lyeth neere New England very convenient, for the vending of this commodity, one hundred of these being at the price of 300. of New found land Codds, great store of traine oyle is mayd of the livers of the Codd, & is a commodity that without question will enrich the inhabitants of New England quickly; & is therefore a principall commodity."

"The Basse is an excellent Fish, both fresh & Salte one hundred whereof salted (at market) have yielded 5. p. They are so large, the head of one will give a good eater a dinner, & for daintinesse of diet, they excell the Marybones of Beefe. There are such multitudes, that I I have seene stopped into the river close adjoining to my howse with a sand at one tide, so many as will loade a ship of 100 tonnes."

"Other places have greater quantities in so much, as wagers have bin layed, that one should not throw a stone in the water, but that hee should hit a fish."

"I myselfe, at the turning of the tyde, have seene such multitudes passe out of a pounde, that it seemed to me, that one might goe over their backs drishod."

"These follow the bayte up the rivers, & sometimes are followed for bayte & chased into the bayes, & shallow waters, by the grand pise[1]: & these may have also a prime place in the Catalogue of Commodities."

"The Makarels are the baite for the Basse, & these have been chased into the shallow waters, where so many thousands have shott themselves a shore with the surfe of the Sea, that whole hogges-heads have been taken up on the Sands; & for length they excell any of other

[1] Grampus, (S. F. B.)

parts: they have bin measured 18. & 19. inches in length & seaven breadth: & are taken with a drayle, (as boats use to pass to & froe at Sea on businesse) in very greate quantities all along the Coaste."

"The Fish is good, salted; for store against the winter, as well as fresh, & to be accounted a good commodity."

"The Sturgeon in England is *regalis piscis*, every man in New England may catch what he will, there are multitudes of them, & they are much fatter than those that are brought into England from other parts, in so much as by reason of their fatnesse, they do not look white, but yellow, which made a cook presume they were not so good as them of Roushea: silly fellow that could not understand that it is the nature of fish salted, or pickelled, the fatter the yellower being best to preserve."

"Of Salmons there is a great abundance: & these may be allowed for a commodity, and placed in the catallogue."

"Of Herrings, there is great store, fat, and faire; & (to my minde) as good as any I have seene, & these may be preserved, and made a good commodity at the Canaries."

"Of Eeles there is abundance, both in the Saltwaters & in the fresh: & the fresh water Eele there (if I may take the judgment of a London Fishmonger) is the best that hee hath found in his life time. I have with jieele potts found my howse hold, (being nine persons, besides doggs) with them: taking them every tide, (for 4. moneths space) & preserving of them for winter store; & these may prove a good commodity."

"Of Smelts there is such abundance, that the Salvages doe take them up the rivers with baskets, like sives."

"There is a Fish (by some called shadds, by some allizes[1]) that at the spring of the yeare, passe up the rivers to spaune in the ponds; & are taken in such multitudes in every river, that hath a pond at the end, that the inhabitants doung their grounds with them. You may see in one township a hundred acres together, set with these Fish, every acre taking 1,000 of them: & an acre thus dressed will produce & yeald so much corne as 3. acres without Fish: & (least any Virginea man would inferre hereupon, that the ground of New England is barren, because they use no fish in setting their corne, I desire them to be remembered, the cause is plain in Virginea) they have it not to sett. But this practice is onely for the Indian Maize (which must be set by hands) not for English graine: & this is, therefore, a commodity there.

"There is a large sized fish called Hallibut, or Turbut: some are taken so bigg that two men have much a doe to hall them into the boate; but there is such plenty, that the fisher men onely eate the heads & finnes, and thow away the bodies: such in Paris would yeeld 5. or 6. crownes a peece: and this is no discommodity."

"There are excellent Plaice & easily taken. They (at flowing water) do almost come ashore, so that one may stepp but halfe a foote deepe, & pick them up on the sands: & this may pass with some allowance."

"Hake is a dainty white fish, & excellent vittell fresh; and may passe with other commodities, because there are multitudes."

"There are greate store of Pilchers: at Michelmas, in many places, I have seene the Cormerants in length 3. miles feeding upon the Sent."

"Lobsters are there infinite in store in all parts of the land, & very excellent. The most use that I made of them, in 5. yeares after I came there was but to baite my Hooke for to catch Basse, I had bin so cloyed with them the first day I went a shore."

[1] Alewives, (S. F. B.)

"This being knowne, they shall passe for a commodity to the inhabitants; for the Salvages will meete 500, or 1,000, at a place where Lobsters come in with the tyde, to eate, & save dried for Store, abiding in that place, feasting & sporting a moneth or 6. weekes together."

"There are greate store of oysters in the entrance of all Rivers; they are not round as those of England, but excellent fat, and all good. I have seene an Oyster bank a mile at length."

"Mustles there are infinite store, I have often gon to Wassaguscus; where were excellent Mustles to eate (for variety) the fish is so fat & large."

"Clames is a shellfish, which I have seene sold in Westminster for 12. pe. the skore. These our swine feede upon; & of them there is no want, every shore is full, it makes the swine proove exceedingly, they will not faile at low water te be with them. The Salvages are much taken with the delight of this fishe; & are not cloyed (notwithstanding the plenty) for our swine we find it a good commodity."

"Raser fishes there are. Freeles there are, Cockles, and Scallopes, & divers other sorts of shellfishe, very good foode."

"There are, in the rivers and ponds, very excellent Trouts, Carpes, Breames, Pikes, Roches, Perches, Tenches, Eeles, and other fishes such as Engiand doth afford, & as good, for variety; yea many of them much better; & the natives of the inland parts doe buy hookes of us to catch them with, & I have knowne the time, that a Trout's hooke hath yielded a beaver skinne, which hath bin a good commodity to those that have bartered them away."

"*New England's Plantation, or a short & true description of the Commodities & Discommodities of that Countrey. Written by a reverend Divine [Mr. Higgeson] now there resident. London. Printed by T. C. & R. C. for Michael Sparke, dwelling at the signe of the Blue Bible in Greene Arbor in the little Old Bailey,* 1630."

[Force's Historical Tracts. Vol. I, Tract XII: also, collections of Massachusetts Historical Society for the year 1792. Vol. 1. Boston: 1806.]

"For Beasts there are some Beares, & they say some Lyons also; for they have been seen at Cape *Anne*. Also here are severall sorts of Deere, some whereof bring three or foure young ones at once, which is not ordinarie in *England*. Also Wolues, Foxes, Beauers, Otters, Martins, great wild Cats, and a great Beast called a Molke as bigge as an Oxe. I have seen the skins of all these Beasts since I came to this Plantation excepting Lyons. Also here are great Store of Squerrels, some greater, & some smaller & lesser: there are some of the lesser sort, they tell me, that by a certain Skin will fly from Tree to Tree though they stand far distant." (P. 8.)

"*New England* hath Water enough both salt & fresh,-the greatest Sea in the World, the *Atlanticke* Sea runs all along the Coast thereof. There are aboundance of Islands along the Shore, some full of Wood & Mast to feed Swine; & others cleere of Wood, & fruitful to beare Corne. Also we haue store of excellent harbours for Ships, as at Cape *Anne*, & at *Masathulets* Bay, & at *Salem*, & at many other places: & they are the better because for Strangers there is a verie difficult & dangerous passage into them, but unto such as are well acquainted with them, they are easie & safe enough. The aboundance of Sea-Fish are almost

beyond beleeuing, & sure I should scarce haue beleeued it except I had seene it with mine owne Eyes. I saw great Store of Whales & Crampusse, & such aboundance of Makerils that it would astonish one to behold, likewise Cod-Fish aboundance on the Coast, & in their season are plentifully taken. There is a Fish called a Basse, a most sweet & wholesome Fish as euer I did eat, it is altogether as good as our fresh Sammon, & the season of their comming was begun when we came first to *New-England* in June, & so continued about three months space. Of this Fish our Fishers take many hundreds together, which I haue seene lying on the shore to my admiration; yea, *their Nets ordinarily take more than they are able to hall to Land*, & for want of Boats & Men they are constrained to let a many goe after they haue taken them, & yet sometimes they fill two Boats at a time with them. And besides Basse we take plentie of Scate & Thornbacke, & aboundance of Lobsters, that the least Boy in the Plantation may both catch & eat what he will of them. For my owne part I was soone cloyed with them, they were so great, & fat, & lussious. I haue seene some my selfe that haue weighed 16 pound, but others haue had diuers time so great Lobsters as haue weighed 25 pound, as they assured me. Also here is aboundance of Herring, Turbut, Sturgion, Cuskes, Hadocks, Mullets, Eeles, Crabs, Muskles & Oysters."—(P. 9.)

"Here are likewise aboundance of Turkies often killed in the Woods, farre greater than our English Turkies, & exceeding fat, sweet, & fleshy, for here they haue aboundance of feeding all the yeere long, as Strawberries, in Summer all places are full of them, & all manner of Berries & Fruits. In the Winter time I haue seene Flockes of Pidgeons, & haue eaten of them; they doe flye from Tree to Tree as other Birds doe, which our Pidgeons will not doe in *England:* they are of all colours as ours are, but their wings & tayles are farr longer, & therefore it is likely they fly swifter to escape the terrible Hawkes in this Countrey. In Winter time this Countrey doth abound with wild Geese, wild Ducks, & other Sea Fowle, that a great part of Winter the Planters haue eaten nothing but roastmeat of divers Fowles which they have killed."

Chronicles of the Pilgrim Fathers of the colony of Plymouth. 1692–'25. *By A. Young*, 8 *vo.*, *Boston*, 1841.

"In five or six hours [in Cape Cod Bay] we pestered our ship so with cod fish that we threw numbers of them overboard again." *Journal of John Brereton*, *May*, 1602.

[He was then with Gosnold, on the voyage in which Cape Cod was discovered. Page 101.]

"We saw daily [in Cape Cod Harbor, Nov.–Dec., 1620] great whales, of the best kind for oil & bone, come close aboard our ship, and in fair weather swim & play about us." P. 146.)

"Before the brook [Town Brook, Plymouth, Mass.] was so much impeded by dams, vast quantities of alewives passed up through it annually to Billington Sea. In a single season 800 barrels have been taken." P. 172, *note* 3.)

"Having but one boat left, we divide the men into several companies, six or seven in each; who take their turns to go out with a net and fish, and return not till they get some, though they be five or six days out; knowing there is nothing at home, & to return empty would be a great discouragement. When they stay long or get but little, the rest go a digging shell fish." [Plymouth, Mass., summer of 1623.] Bradford in Prince, p. 216. P. 348, *note* 1.)

History of Scituate, Massachusetts, from the first settlement to 1831. *By Samuel Deane,* 8 *vo. Boston,* 1831.

"In 1680, Cornet Robert Stetson, of Scituate, and Nathaniel Thomas, of Marshfield, hired the cape fishery for bass and mackerel. In 1684, the court enacted a law "prohibiting the seining of mackerel in any part of the colony;" and the same year leased the cape fishery for bass and mackerel to Mr. William Clark for seven years, at £30 per annum. Subsequently to 1700, it is certain that the mackerel were very abundant in the Massachusetts Bay. It was not uncommon for a vessel to take a thousand barrels in the season. The packing, as it is called, was chiefly done at Boston and Plymouth until late years. The vessels of Scituate now pack at one harbor. George Morton, who came from Plymouth in 1730, was the first cooper of whom we have heard, at Scituate harbour. Our vessels now find them less abundant, and farther from their former haunts. They used to set into the bay early in May, and again in autumn: but now they are found at Block Island channel in May—at George's Bank and Nantucket shoals in the summer, and at Mount Desert and along the shores of Maine in the autumn. Those first taken are lean, and favour the commonly received opinion, that they lie in the muddy bottom in the winter but towards the winter they are found well fed, fat, and delicious. The full-grown mackerel vary in weight from one to two and three pounds. The fattest, taken in the autumn, are not generally of the largest size."

New-Englands Plantation. Or, a short and trve description of the commodities and discommodities of that countrey. Written by a reuerend Divine [Francis Higginson] now there resident. London, 1630.

[Foree's Historical Tracts, I, 1836, No. 12.]

The abundance of Sea-Fish are almost beyond beleeuing, and sure I should scarce have beleeued it except I had seene it with mine owne Eyes. I saw great store of Whales and Crampusse, and such aboundance of Makerils that it would astonish one to behold, likewise Cod-Fish aboundance on the coast, and in their season are plentifully taken. There is a Fish called a Basse, a most sweet and wholesome Fish as ever I did eat, it is altogether as good as our fresh Sammon, and the season of their comming was begun when we came first to New-England, in June, and so continued about three months apace. Of these Fish our Fishers take many hundred together, which I have seene lying on the shore to my admiration, yea, their nets ordinarily take more then they are able to hale to Land, and for want of Boats and men they are constrained to let a many goe after they have taken them, and yet sometimes they fill two Boats at a time with them, (p. 9.)

Nevv Englands Prospect. A true, lively, and experimentall description of that part of America, commonly called Nevv England: discovering the state of that countrie both as it stands to our new-come English Planters and to the old native inhabitants. By William Wood. London, 1634.

[Publications of the Prince Society. Boston, 1865.]

The Sammon is as good as it is in England, and in great plenty (p. 38).

Of these fishes [the Basse] some be three and some foure feet long, some bigger, some lesser; at some tides a man may catch a dozen or twenty of these in three houres, the way to catch them is with hooke and line. The Fisherman taking a great Cod-line, to which he fasteneth a piece of Lobster, and throwes it into the Sea, the fish biting at it he pulls her to him, and knocks her on the head with a sticke. These are at one time (when Alewives passe up the Rivers) to be catched in Rivers, in Lobster time at the Rockes, in Macrill time in the Bayes, at Michelmas in the Seas. When they use to tide it in and out to the Rivers and Creekes, the *English* at the top of an high water do crosse the Creekes with long seanes or Basse Netts, which stop in the fish; and the water ebbing from them they are left on the dry ground, sometimes two or three thousand at a set, which are salted up against winter, etc. The Herrings be much like them that be caught on the *English* coast. Alewives be a kind of fish which is much like a Herring, which in the latter end of Aprill come up to the fresh Rivers to spaune, in such multitudes as is almost incredible, pressing up in such shallow waters as will scarce permit them to swimme, having likewise such longing desire after the fresh water ponds, that no beating with poles, or forcive agitations by other devices, will cause them to returne to the sea, till they have cast their spawne. The Shaddes be bigger than the *English* Shaddes, and fatter. The Macrells be of two sorts, in the beginning of the yeare are great ones, which be upon the coast; some are 18 inches long. In Summer as in May, June, July, and August,come in a smaller kind of them, (p. 38.)

Codfish in these seas are larger than in new found land, six or seaven making a quintall, whereas there they have fifteene to the same weight. The chiefe fish for trade is Cod. ---

A little below this fall of waters, the inhabitants of Water-towne [near Boston] have built a Wayre to catch Fish, wherein they take great store of *Shads* and *Alewives*. In two Tydes they have gotten one hundred thousand of those Fishes, [p. 44.] * * * I have seen ten thousand [Alewives] taken in two houres by two men, without any weire at all, saving a few stones to stop their passage up the river, [p. 46.] * * * The Basse continuing from the middle of Aprill to *Michaelmas*, which stayes not above half that time in the Bay; besides here is a great deal of Rock-cod and Macrill, insomuch that shoales of Basse have driven up shoales of Macrill from one end of the Sandie Beach [Swampscott] to the other, which the inhabitants have gathered up on wheelbarrowes, [p. 47.] * * * In this river [*Merrimacke*] is Sturgeon, Sammon, and Basse, [p. 49.]

A Topographical Description of Truro, in the County of Barnstable. 1794.

[Collections of the Massachusetts Historical Society for the year 1794. Vol. III. Boston, 1810.]

"A traveller from the interiour part of the country, where the soil is fertile, upon observing the barrenness of Truro, would wonder what could induce any person to remain in such a place. But his wonder would cease, when he was informed, that the subsistence of the inhabitants is derived chiefly from the sea. The shores & marshes afford large & small clams, quahaugs, razor shells, periwinkles, muscles, and cockles. The bay and ocean abound with excellent fish and with crabs and lobsters. The sturgeon, eel, haddock, cod, frost-fish, pollock, cusk, flounder, halibut, bass, mackerel, herring, and alewife, are most of them caught in great plenty, and constitute a principal part of the food of the inhabitants. Besides these fish for the table, there is a great vari-

ety of other fish: among which are the whale, killer or thrasher, humpback, finback, skrag, grampus, black fish, porpoise, (grey, bass, and streaked,) snuffer, shark, (black, man-eating, and short-nosed,) skate, dog-fish, sun-fish, goose-fish, cat-fish, and sculpion; to which may be added the horseshoe and squid. The cramp-fish has sometimes been seen on the beach. This fish, which resembles a sting ray in size and form, possesses the properties of the torpedo, being capable of giving a smart electrical shock. The fishermen suppose, but whether with reason or not the writer will not undertake to determine, that the oil extracted from the liver of this fish is a cure for the rheumatism."

A short Journal of the first settlement of the island of Nantucket, with some of the most remarkable things that had happened since, to the present time. By Zaccheus Macy.

[Collections of the Massachusetts Historical Society for the year 1794, vol. III. Boston, 1810.]

The natives of Nantucket were a kind people, and very friendly to each other. There were no poor persons among them. For when any of them grew old & helpless, and went to a neighbor's house, they were made welcome to stay as long as they pleased. If the English entered their houses whilst they were eating, they would offer them such as they had, which sometimes would be very good. At their feasts they had several sorts of good food, and very good strong beer. By drinking rum their numbers were so much reduced that in the year 1763, there were but three hundred & fifty-eight left on the island. In that year an uncommon mortal distemper attacked them. It began the 16th of the eighth month, 1763, and lasted till the 16th of the second month, 1764. During that period two hundred and twenty-two died. Thirty-four were sick and recovered. Thirty-six who lived among them, escaped the disorder. Eight lived at the west end of the island, and did not go among them: none of them caught the disease. Eighteen were at sea. With the English lived forty, of whom none died.

The Indians are now reduced to four males and sixteen females. Before this period, and from the first coming of the English to Nantucket,[1] a large fat fish, called the blue fish, thirty of which would fill a barrel, was caught in great plenty all round the island, from the 1st of the sixth month till the middle of the ninth month. But it is remarkable, that in the year 1764, the very year in which the sickness ended, they all disappeared, and that none have ever been taken since. This has been a great loss to us.

Extracts from a Petition from New Shoreham (Block Island) for assistance to make a harbor there in 1773.

Having stated many reasons why the island was suffering for want of a good harbor, they say further: "That they also suffer greatly by the loss of the cod-fishery, which formerly, while the channel was kept open between the sea & a large salt pond on the west side of the island,

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[1] *Note by Theodore Lyman:*

In 1659. Therefore, the Blue Fsh	were	present	at Nantucket,	1659–1764—	105	years
" " "	"	absent	"	1764–1830—	66	"
" " "	"	present again,	"	1830–1871—	41	"

was so considerable that they used to catch fish enough for their own consumption, and to supply *Newport* & divers other places with fresh fish; but that, the channel being now filled, the small fish or bait which used to go into the pond, have left the island, & the cod-fish with them; so that at present the inhabitants cannot get near enough for their own eating, and that these inconveniences have such an effect upon the real estates on the island that land will not sell or rent for more than half the sum which land of the like quality will sell or rent for in other parts of the colony.

A Key into the language of America, or an help to the Language of the Natives in New England, London, by Roger Williams; 1643.

[Reprinted in the collections of the Rhode Island Historical Society, vol. 1, 1827.]

OF FISH AND FISHING.

Namaûs, suck.	Fish, Fishes.
Panganaût, tamwock.	Cod, Which is the first that comes a little before the Spring.
Qunnamâng-suck.	Lampries, The first that comes in the Spring into the fresh Rivers.
Aumsûog, and Munnawhatteaûg.	A Fish somewhat like a herring. [The alewife and menhaden.]
Missûckeke-kequock.	Basse.

The Indians (and the English too) make a daintie dish of the Uppaquontup, or head of this fish; and well they may, the braines and fat of it being very much, and sweet as marrow.

Kaûposh-shaûog.	Sturgeon.

Obs: Divers part of the Countrey abound with this Fish; yet the Natives, for the goodnesse and greatnesse of it, much prize it, and will neither furnish the English with so many, nor so cheape, that any great trade is likely to be made of it, untill the English themselves are fit to follow the fishing.

The Natives venture one or two in a Canow, and with an harping Iron, or such like Instrument, sticke this fish, and so hale it into their Canow; sometimes they take them by their nets, which they make strong of Hemp.

Ashòp, their nets. Which they will set thwart some little River or Cove, wherein they kill Basse (at the fall of the water) with their arrows, or sharp sticks, especially if headed with Iron, gotten from the English, &c.

Aucûp.	A little Cove or Creeke.
Aneppâwese.	A very little one.
Wawwhunnekesûog.	Mackrell.
Mishquammaûquock.	Red fish, Salmon.
Osacóntuck.	A fat, sweet fish, something like a Haddock. [Not identified.]
Mishcûp-paûog. Sequanamâuquock.	Breame. [Scup.]

Obs: Of this Fish there is abundance, which the Natives drie in the Sunne and smoake: and some *English* begin to salt, both wayes they keepe all the yeere; and it is hoped it may be as well accepted as Cod at a Market, and better, if once knowne.

Taut-aûog.	Sheeps-heads. [The tautog.]
Neeshaûog.	Eeles.
Tatackommmâûog.	Porpuses.
Pôtop-paûog.	Whales.

Which, in some places, are often cast up; I have seene some of them, but not above sixtie foot long; The Natives cut them out in severell parcells, and give and sende farre and neere for an acceptable present or dish.

Ashaunt-teaug.	Lobsters.
Opponenaûhock.	Oysters.
Sickissuog.	Clams. [Soft clam. *Mya arenaria.*]

OBS: This is a sweet kind of shellfish, which all Indians generally over the Country, Winter and Summer, delight in; and at low water the women dig for them. This fish, and the naturall liquors of it, they boile, and it makes their broth and their nassaúmp (which is a kind of thickened broth) and their bread seasonable and savoury, instead of Salt: and for that the English Swine dig and root these Clams wheresoever they come, and watch the low water (as the Indian women do) therefore of all the English Cattell, the Swine (as also because of their filthy disposition) are most hateful to all Natives, and they call them filthy cutthroats, &c.

Sequnnock. Poquaûhock.	A Horse-fish. [Hard clam; quohog. *Venus mercenaria.*]

OBS: This the English call Hens, a little thick shell fish, which the Indians wade deepe and dive for, and after they have eaten the meat there (in those which are good) they breake out of the shell, about half an inch of a blacke part of it, of which they make their Luckaûhock, or black money, which is to them precious.

Meteaûhock.	The Periwinckle. [Probably *Pyrula,* (Hammond.)]

Of which they make their *Wómpam*, or white money, of halfe the value of their *Suckáwhock* or black money, of which more in the Chapter of their Coyne.

Moamitteaûg.	A little sort of fish, halfe as big as Sprats, plentifull in Winter. [Murmchogs or cyprinodonts.]
Paponaumsûog.	A winter fish. [Tom cod.]

Which comes up in the brookes and rivulets; some call them Frost fish, from their comming up from the Sea into fresh brookes, in times of frost and snow.

Qunôsuog.	A fresh fish. [The pickerel.]

which the Indians break the ice in fresh ponds, when they take also many other sorts: for, to my knowledge, the Country yeelds many sorts of other fish, which I mention not.

On some early notices of New England fishes. By J. Hammond Trumbull.

HARTFORD, CONNECTICUT, *December* 30, 1871.

MY DEAR SIR: * * * * *

As to Williams's *tautauog*, the fact that the Indian name comes down to us associated always with the "blackfish" or tautog, and nowhere with the *Sargus ovis*, convinces me that the former was the "Sheeps-

head" of Williams and of Josselyn, (in New England Rarities, p. 69, of Tuckerman's edition,) and the latter, if known at all to the Narragansett Indians in Williams's time, was not common enough to bring its Indian name to his notice. In a manuscript vocabulary obtained by President Stiles in 1762, "from a Pequot Indian at Groton, Connecticut," I find "*Tautauge*, Blackfish," which removes all doubt as to the appropriation of the name. In the same vocabulary, or list of names rather, are these: "*Umpsauges*, Alewives," [=*aumsuog*, R. W.,] "*Cachauxet*, Cunners," [our "Chogset,"] "*Aquaunduut*, Blue Fish."

This last I have not found elsewhere. Its occurrence here shows that the *Temnodon saltator* was no stranger in Fisher's Island Sound in 1762.

While at Edgartown last summer, I heard old fishermen call flounders and plaice "buts," distinguishing the species by a prefix. I did not before know that this old English and Dutch name had survived, in popular use, to our time. Palsgrave translates the French "plye" [plie] by "*Butte* fysshe," and Steendam, the Dutch poet, names the "*Bot*, en Sneck"—plaice and pike—among the fishes of New Netherlands in 1661. The Halibut is the "holy-but," (German, heilige-butt,) and we have the same ground-word in "Thorn-butt," and "Turbot," though the lexicographers stick to the old etymology from Latin, *turbo*, a top; and in the English "Burt" or "Birt."

I forget whether or not I made a note for you on the alleged derivation of "alewife," from "*aloof*." Dr. J. V. C. Smith, in his Natural History of the Fishes of Massachusetts, 1833, was perhaps the first to record the suggestion that "*alewife* is derived from the Indian word *aloof*, signifying a *bony fish*." Dr. Bartlett's Dictionary of Americanisms, Webster's, and, I believe, Worcester's, Dictionaries accept this etymology, and Professor Schele De Vere, in his recently published volume of "Americanisms," is misled into recognizing in "alewife" a "most ludicrous corruption of the Narragansett term *aloof*," though he appears to have been struck by the objection that neither *l* nor *f* can have a place in a Narragansett word, and he suggests that the original name may have been *ainoop*.

The Narragansett and Massachusetts name of the alewife and herring (common to several species) was *Aumsu-og*, (plur.,) as noted by Roger Williams and, with slight dialectic variation, by President Stiles, as you have seen. The only authority for "aloof" is a letter of (the se,cond John Winthrop, printed in the Philosophical Transactions for 1678, (No.) 142,) in which he mentions the use of "the fishes called *alooſes*" for manuring corn-fields. If we could refer to Winthrop's manuscript, I am confident we should find that a copyist or printer had substituted "aloofes" for "*alooſes*," *i. e.*, *aloses* or *alizes*. The modern English "allis" was in old French and old English "alouze" or "aloose,' nearer than the modern form of the name to Latin *alausa*. Morton's New England Canaan, (1637) mentions the use of the "fish by some called *shadds*, by some *allizes*," as fertilizers.

Forty years before Winthrop's letter was written from Connecticut, Wood, in New England's Prospect, (London, 1634,) catalogues "big-bellied Alewives," with "consorting Herrings and the bony Shad," among the fishes of Massachusetts; and Josselyn (New England Rarities, p. 23) names the "Alize *Alewife, because great-bellied*," with the synonymes "Olafle, Oldwife, Allow." In his "Voyages" (1674) he describes this fish as "like a Herring, but has a bigger bellie, *therefore called* an Alewife."

Couch, I see, gives "*Alewife*" and "*Maid*" as popular names of the

larger and smaller English shads—the allis and twait, (iv, 117.) Perhaps I have wasted too many words and too much paper on this name, but I am tired of the re-appearance every now and then of Dr. Smith's spurious Indian "*aloof*."

"En decembre, vu, pour parler plus juste, pendant les deux dernieres lunes, un poisson appellé *Ponamo* vient frayer *sur* les glaces, et on en prend autant qu'on veut; je crois que c'est une espèce de *Chien de Mer*."—(*Tom. I, p.* 127.)

"Vers la fin de mars, les poissons commencent à frayer, et entrent dans les rivieres en si grande quantité, qu'on ne peut le croire, quand on ne l'a point vû. Le premier qui paroît est l'*Eplan*, lequel est trois fois plus grand en ce pays-là, qu'en Europe. A la fin d'Avril le *Hareng* donne," *etc.*—(*Ibid.*)

Charlevoix, *Histoire générale de la Nouv. France, (Paris,* 1744,*)* borrows this account of the fishes of Acadie from Father Biard's Relation de la Nouv. France, 1611–13. Biard writes:

"En decembre (admirable providence de Dieu) vient un poisson appellé d'eux *Ponamo*, qui fraye *sous* la glace, (p. 10.) Sur la my-mars, le poisson commence à frayer et à monter de la mer en haut contre certains ruisseaux, souvent en si grande abondance, que tout en fourmille. . . . . Entre ces poissons, l'*Esplan* est le premier. Cet esplan est deux ou trois fois plus grand que l'est le nostre de rivière." (P. 10.)

You will observe that Charlevoix, by mistranscription, makes the *Ponamo* spawn "*sur* les glaces" instead of "*sous* la glace," and confounds it with some species of "*chien de mer*," and, oddly enough, Dr. J. G. Shea, in his new translation of Charlevoix, mistranslates "*chien de mer*" by "*seal*," an error to be noted in his errata.

The *Ponamo* is the Tom-cod or Frost-fish (M. *tomcodus*, Mitch.,) of which the modern Micmac name is *Boonamoo*. It is not confounded by Biard or Charlevoix with the *other* "frost-fish," the Smelt, (Eperlan.)

The name *Ponamo* means "winter fish," or, more exactly, "fish taken in the winter."

Biard's relation will be found in the reprinted "Relations des Jésuites," (Quebec, 1858,) vol. 1, to be found in the Congressional Library.

The notices of fishes of New England in Wood's "New England's Prospect," (London, 1634, and reprinted, Boston, 1865, by the "Prince Society,") you have probably noticed; and, of course, Josselyn's list of New England fish, in his "Account of Two Voyages to New England," (London, 1675,) as well as in his "New England Rarities," (1672.) In the former work (pp. 112, 113) he describes the "Frost-fish," "a little bigger than a Gudgeon," &c.; but in his list (p. 89) includes the "Smelt" by name.

Captain John Smith, in "The Description of New England," 1616, (reprinted, Boston, 1865,) gives a short list of the fishes of New England, (p. 48,) which includes "Cole, Cusk, or small Ling, Mullet, *Pinacks*, [very plenty,] *Cunners*," &c.

"Pinak" is, I suppose, the old English "Pinck" or "Pink," meaning any "small" or "delicate" fish, and still in use as a name for the minnow. (Dutch *pinck, pinky?* the little finger.) "Cunner," in the seventeenth century, belonged to the Golden Wrasse, (*Crenilabrus Donovani*, Cuv. and Val., *Labrus cornubius*, Don.,) rather than to the *other* "Gilt Head," the *Sparus aurata*, of Linn.—*Chrysophrys aurata*, Cuv. and Yarrell. The former was common, the latter rare, on the southern coast of England; and I have no doubt that Smith and Josselyn both transferred the name of "conner" (see Yarrell, ii, 498) from the *Wrasse*, not from the *Gilthead* proper. But it is very likely that the Dutch name of

the American fish Bergall (Holl. *Vergulđ* and *Bergylt*) came from another species, though the Dutch name of the European *Gilt-head* was *Zeebraassen*.

Jacob Steendam's poem in "Praise of New Netherland," (*'t Louf van Niew-Nederland*,) 1661, printed, with an English translation by Hon. Henry C. Murphy, for the Bradford Club, of New York, (Anthology of New Netherland: Brad. Club Series, No. 4,) 1865, pp. 52, 55, contains a considerable list of the fish of New York, and is useful for its Dutch names, among which are the "Elft," "Twalf," and "Dertien"—shad, striped bass, and drum-fish, as Murphy translates; "Knor-haan," "Swart-vis," "Schelvis," "Weekvis," and "Masbank," (our mossbanker or Menhaden.)[1]

In the "History of Hadley," Massachusetts, by Sylvester Judd,

[1] By the kindness of Mr. L. E. Chittenden I am enabled to give both the original poem of Steendam, and the translation of most of the stanzas, by Mr. Murphy:

"Die groote Zee bespoeld uw Voorste-strand;
Die (als een dijk) zich voor u Velden Kant:
Door-aderd, met veel killen: die het Land,
En 't Bosch verfrischen.

"Die van 't gebergt, en heuvels neder-vliên
En 't Molen-werk, bequame plaatsen biên
Op d'oevers van u stromen. Waard te sien:
Gepropt met Visschen.

"En Prik, en Aal, en Sonne-vis, en Baars:
Die (blank en geel u Taaf'len als wat raars)
Vercieren kan: ook Elft, en Twalft met schaars,
Maar overvloedig.

"Steenbrassem, Steur, en Dartien, en Knor-haan,
En Zee-baars, die geen Vorst sal laten slaan:
En Kabellau: en Salm die (wel gebraan)
Is vet, en voedig.

"Swart-vis, en Roch, en Haring, en Makreel,
Schelvis, Masbank, en Voren die (se veel)
Tot walgens toe, de Netten'vuld: en heel
Min ward ge-eeten.

"So gaat het hier: dat 's Werelts overvloed,
(Waar meê de Mensch word koninglijk gevoed
Door gulle gunst des milden gevers) doet
Hem vaak vergeeten.

"Weekvis, en Schol, en Carper, Bot, en Snoek,
Ja gy en hebt geen poel; geen water-hoek,
Of't krielter vol von Visschen: die (te soek)
Licht zinj te vinden.

"En Kreeft, en Krab, en Mossels: Oesters, die
Een beter is als Europa drie
In veelheyt heel on-kenbaar voorhem, wie
't Mocht onderwinden.

"De Schild-pad, en de Zee-hond, en den Hay,
De Walvis, en Torijin speeld in u Bay:
En toond Gods Macht, en wonderheden. Fray
Om an te merken.

"De seldsaamheên in 't Banelose diep:
De diepte, van de Wijsheyt, die het schiep:
Die noyten slaapt, noch nimmermeer en sliep:
Maar werkt, in 't werken.

* * * * *

'The lamprey, eel, and sunfish, and the white
And yellow perch, which grace your covers dight,
And shad, and stripéd bass, not scarce, but quite
Innumerable.

(Northampton, 1863,) is a good article on "The Shad and Salmon Fishery" in New England, (pp. 313–318,) containing notices of "great hauls" in the Connecticut, and facts respecting early fisheries collected from the records and other manuscript authorities.

You will observe that Josselyn (New England's Rarities, 1672, p. 96) mentions the "*Blew Fish*, or *Horse*," as "*common* in New England, and esteemed the best sort of Fish next to Rock Cod;" "as big usually as the Salmon, and better meat by far." Elsewhere (p. 24) he catalogues "two kinds" of "Blew Fish or *Hound* Fish," the "Speckled Hound Fish," [is this the Weak fish, *Otolithus?*] and the "Blew Hound Fish, called Horse Fish." I am inclined to think that Roger Williams's "*Osacóntuck*, a fat, sweet fish, something like a haddock," may be the *Otolithus*, though in a note to the name, Key, p. 105, I suggested "pollack, whiting, or cusk."

Very truly, yours,

J. HAMMOND TRUMBULL.

Professor SPENCER F. BAIRD,
Washington, D. C.

Documents relative to the colonial history of New York, procured in Holland, England, and France, by J. M. Brodhead. Quarto, vol. iii, p. 182, 183. *Albany*, 1853–1858.

[Mr. Maverick to Colonel Nicolls.]

NEW YORK, *July* 5, 1669.

* * * * * * *

Now give mee leave to acquaint you a little how things goe heere at Yorke. Tryalls have been made severall times this spring for cod fish, w^th^ very good success; a small ketch sent out by y^e^ Governour hath found severall good fishing bancks; amongst y^e^ rest one not above 2 or

---

"The bream and sturgeon, drum-fish, and gurnard,[1]
The sea-bass,[2] which a prince would not discard,
The cod and salmon, cooked with due regard,
Most palatable.

"The black and rock fish, herring, mackerel,
The haddock, mossbanker, and roach, which fill
The nets to loathing; and so many, all
Cannot be eaten.

"And thus it happens here, that in the flood,
Which, rolling from the Fountain of all Good,
O'erwhelms weak, mortal man with royal food,
He is forgotten.

"You've weak-fish, carp and turbot, pike and plaice;
There's not a pool or tiny water-trace
Where swam not myriads of the finny race,
Easily taken.

"Crabs, lobsters, mussels, oysters, too, there be,
So large, that one does overbalance three
Of those of Europe; and in quantity,
No one can reckon.

"The tortoise, seal, and shark; and, in your bay,
The mighty whale and porpoise, sporting, they
The power, and wondrous works of God display,
For our beholding."

[1] "Gurnard." Murphy thinks this was certainly the "porgy." As the latter was not known in Europe, Steedam used the name of the European species which most resembled it, (*Trigla hirundo.*) It however more probably refers to the sea-robin, (*Prionotus.*)

[2] The name *Zee-baars* is now applied in Holland to the representative of our striped bass.

2 leagues from Sandy Hook, on which, in a few houres, 4 men took 11 or 12 hundred excellent good codd the last time they were out, and most of y^e^ vessells that goe to and from Virginia take good quantityes. That vessell is to goe from Newfound Land to gett fishermen, lines, hookes, and other necessaryes for fishing: I doubt not but this coast will afford fish in abundance.

On y^e^ east end of Long Island there were 12 or 13 whales taken before y^e^ end of March, and what since wee heare not; here are dayly some seen in the very harbour, sometimes within Nutt Island. Out of the Pinnace, the other week, they struck two, but lost both, the iron broke in one, the other broke the warpe. The Governour hath encouraged some to follow this designe. Two shallops made for itt, but as yett wee doe not heare of any they have gotten.

* * * * * * *

A Perfect Description of Virginia: being, a full & true Relation of the present State of the Plantation, their Health, Peace & Plenty: the number of people, with their abundance of Cattell, Fowl, Fish, &c. With several sorts of rich & good Commodities, which may there be had, either Naturally, or by Art & Labor, &c. London. Printed for Richard Wodenoth, at the Star under Peter's Church, in Cornhill, 1649.

[Force's Historical Tracts, II, tract 8.]

Now these are the several sorts & kinds of Beasts, Birds, Fish, in Virginia.

Beasts great & small, as followeth: above 20 severall kinds.

1. Lyons,
2. Beares,
3. Leopards,
4. Elkes.

But all these foure sorts are up in the higher parts of the Countrey, on the hills & mountains, few to be seene in the lower parts, where the English are; the Elkes are as great as Oxen, their horns six foot wide, & have two Calves at a time; the skins make good Buffe, & the flesh as good as Beefe.

5. Deere.
6. Foxes.
7. Wilde Cats.
8. Racconnes, as good meat as Lambe.
9. Passonnes. This beast hath a bagge under her belly, into which she takes yer young ones, if at any time affrighted, & carries them away.
10. Two sorts of squirrels: One called a flying one, for that she spreads like a Batt, a certaine loose skin she hath, & so flyes a good way.
13. A Muske Rat, so called for his great sweetnesse & shape.
14. Hares.
15. Beavers.
16. Otters.
17. Doggs, But barke not, after the shape of a Wolfe, and Foxes smell not; Wolves but little, neither not fierce.
18. Wolves.
19. Martins, Poule Cats, Weesels, Minks: but these Vermine hurt not Hens, Chickins, or Eggs, at any time.
20. A little beast like a Conny, the Foxes kill many of them.

Birds are these, viz., above 25 severall kinds:

1. Eagles.
2. Hawkes, of six or severall kinds.
3. Parteridges, many.
4. Wilde Turkies, some weighing sixtie pound weight.
5. Red Birds, that sing rarely.
6. Nightingales.
7. Blue Birds, smaller than a Wren.
8. Black Birds.
9. Thrushes.
10. Heath Cocks.
11. Swannes.
12. Cranes.
13. Hernes.
14. Geese.
15. Brants.
16. Ducks.
17. Widgeons.
18. Dottrells.
19. Oxeyes.
20. Parrots.
21. Pidgeons.
22. Owles.

Many more that have no English Names; for one called the Mock-bird, that counterfeits all other severall Birds cryes and tunes.

Fish are in these, in their kind, above Thirty sorts.

1. Codde.
2. Basse.
3. Drummes, six foot long.
4. Sheepshead, this Fish makes broath so like Mutton-broath that the difference is hardly known.
5. Conger.
6. Eeles.
7. Trouts.
8. Mullets.
9. Plaice.
10. Grampus.
11. Porpus.
12. Scates.
13. Sturgeons, of 10 foot long.
14. Stingraes.
15. Brets.
16. White Salmon.
17. Soles.
18. Herring.
19. Conny-fish.
20. Rocke-fish.
21. Lampres.
22. Cray-fish.
23. Shads.
24. Perch.
25. Crabbs.
26. Shrimps.
27. Crecy-fish.
28. Oysters.
29. Cockles.
30. Mussels.
31. St. George Fish.
32. Toad-Fish.

Trees, above 20 kinds, and many no English names.

1. Okes, red & white Wood.
2. Ashe.
3. Wallnut, two kinds.
4. Elmes.
5. Ceader.
6. Cypres, three fathomes about.
7. Mulbery Trees, great & good.
8. Chesnut Trees.
9. Plum Trees of many kinds.
10. The Puchamine Tree.
11. The Laurell.
12. Cherries.
13. Crabes.
14. Vines.
15. Sassafras.

Fruits they have, Strawberies, Gooseberies, Raspices, Maracokos, Puchamines, Muskmillions, Pumpions; And for Fruits brought thither & planted, Aples, Peares, Quinces, Apricoks, Peaches; & many more kindes excellent good, &c. Pp. 15–18.

Newes from the Bermudas.

"BERMUDA, *July*, 1609."

"In half an houre he tooke so many fishes with hookes as did suffice the whole company [150 men] one day."

"Fish is there so abundant, that if a man steppe into the water, they will come round about him; so that men were faine to get out for fear of byting. These fishes are very fat & sweete, & of that proportion & bignesse that three of them will conveniently lade two men: those we called rock-fish."

"Besides there are such abundance of mullets, that with a seane might be taken at one drought, one thousand at the least, & infinite store of pilchards, with divers kinds of great fishes, the names of them unknowne to me: of tray fishes very great ones, & so great store, as that there hath been taken in one night with making lights, even sufficient to feed the whole company (150 men) a day."

"We were no sooner come within a league of the land," &c. (Page 18.) (July, 1612.)

"Hogges, Turkles, Fish, & Fowle do abound as the dust of the earth." (Page 20.)

"Angell-fish—very strange & beutiful to behold." (Page 21.)

Whale, Sword fish & Threasher.—"The sword fish swimmes under the whale, & pricketh him upward: The Threasher keepeth above him, & with a mighty great thing like unto a flaile, hee so bangeth the whale, that hee will roare as though it thundered, & doth give him such blowes, with his weapon, that you would thinke it to be a crake of great shot." (Page 22.)

"The whales come in Februarie & tarry till June."

The Remembrancer, London. Part 2, 1776, page 79.

"Madrid, April 22, [1776.] Several of our frigates have been sent from Acapulca to make discoveries and propagate the gospel among the Indians to the North of California; in which expedition, in the month of July, 1774, the Spaniards navigated as high upon the coast as the latitude 58 deg. 20 min., (six degrees above Cape Blanco.) They discovered several good ports and navigable rivers upon the West coast of this great continent. In one of the largest ports they have established a garrison, and called the port Presidio de San Carlos, and have left a mission at every port where inhabitants were to be found. The account mentions the Indians to be a docile sort of people, agreeable in the countenance, honest in their traffic, and neat in their dress, but at the same time idolaters of the greatest degree, never before having any intercourse with Europeans. M. Bucarelli, viceroy of New Spain, has received his Catholic Majesty's thanks for the discoveries, as they were made under his directions, and the several navy officers upon that service have been preferred. It is imagined that those new discoveries will be very advantageous, as the coast abounds with plenty of whales, as also a fish equal to the Newfoundland cod, known in Spain by the name of bacallao.[1]—*Madrid Gazette, published by authority.*"

[1] First (?) mention of occurrence of cod-fish on the Pacific coast of North America.

XI.—STATISTICS OF FISH AND FISHERIES ON THE SOUTH SHORE OF NEW ENGLAND.

TABLE 1.—*Account of fish taken by Jason Luce & Co., at Menemsha Bight, Martha's Vineyard*

Kind.	1869—April 4 to June 7.	1870—April 14 to June 8.	1871—April 14 to June 9.	1872.
	No.	*No.*	*No.*	*No.*
Herring	52,500	*61,200	22,100	143,600
Tautog	275	500	1,242	1,000
Dog-fish	79,000	53,000	64,162	127,500
Striped-bass	125	150	250	400
Scup.....barrels..	380	70	684	1,011
Shad	300	550	125	.....
Mackerel	15,900	†150,000	60,800	2,050
Sea-robin.....barrels..	2,500	2,500	2,500	.....
Menhaden.....barrels..	1,590	1,375	3,200	3,800
Sea-bass	300	6,400	500	1,500
Salmon	‡2	.....	.....	3
Squeteague or weak fish	.....	14,000	23,000	45,700
Blue-fish	.....	4,000	7,000	1,000
Flounders.....tons..	.....	.....	.....	10
Spanish mackerel	.....	.....	.....	470
Cero	.....	.....	.....	12

* One-third English. † 1,000 barrels. ‡ 1 April 27; 1 May 19.

Sea-bass are usually taken last of May. More taken in 1870 than for five years previous.

Seventy barrels of scup (1870) is the smallest catch in any year since we have been in the business.

More shad taken in 1870 than in all previous years taken together. Usually taken from April 25 to May 10.

Striped bass average 3 pounds. We call them sand-bass.

Usual number of sea-robins, 2,500 to 2,000 barrels. They are turned over the side of the pound as being worthless.

First blue-fish in 1871 caught May 26.

Menhaden are taken from April 21 to May 25; two in advance in 1871.

Scup taken from April 25 to May 18; in 1871, ten to fifteen days earlier than usual.

Striped bass in 1871, taken from April 18 to May 5; mackerel from April 18 to May 27; rock-bass from April 14 to May 10.

Blue-fish are first seen schooling in our bay by the middle of June. Very few are taken here, for the reason that they appear to be at home, and not traveling. Fish cannot be trapped unless they are on a course. I have seen acres of them all around our trap in the bay; but when the trap is hauled we get only fifty or a hundred.

Mackerel first taken in 1872, May 11; first scup taken May 10; squeteague, July 4; cero, September 15; salmon, May 29; sea-bass, May 28.

TABLE II.—*General return of the Waquoit weir for* 1871.

Day.	Weather.	Temperature. Air.	Temperature. Water.	Scup.	Mackerel.	Blue-fish.	Tautog.	Plaice, flat-fish, turbot.	Alewives.	Shad.	Menhaden.	Dog-fish.	Skate.	Squid.
March 24	.....	.....	.....	.....	.....	.....	.....	.....	1,840	.....	.....	.....	.....	.....
April 3	.....	.....	.....	.....	.....	.....	.....	.....	357	.....	.....	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	.....	6,400	.....	.....	.....	.....	.....
10	.....	.....	.....	.....	.....	.....	.....	.....	5,850	1	.....	.....	.....	.....
11	.....	.....	.....	.....	.....	.....	.....	.....	2,340	.....	.....	.....	.....	.....
14	.....	.....	.....	.....	.....	.....	.....	.....	13,250	.....	.....	.....	.....	.....
17	.....	.....	.....	.....	.....	.....	.....	.....	7,000	23	.....	.....	.....	.....
18	Fine	54	50	.....	1	.....	6	314	4,056	11	.....	.....	80	.....
19	Cloud	51	50	.....	.....	.....	9	215	4,100	5	.....	.....	60	.....
20	Breeze. Rain	51	49	.....	.....	.....	22	500	2,600	16	.....	.....	260	.....
21	Clear. Fog	59	52	.....	.....	.....	5	230	2,300	2	6,000	.....	110	6
22	Cloudy	69	51	.....	1	.....	9	568	.....	1	.....	.....	20	.....
23	Cloud. Breeze	56	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	Clear. Breeze	55	51	.....	.....	.....	1	.....	.....	.....	13,300	.....	.....	.....
25	Clear. Cloud	59	51	1	1	.....	6	125	30	.....	.....	30	197	6
26	Clear	63	52	.....	1	.....	.....	1	.....	.....	.....	.....	3	.....
27	Cloud. Breeze	50	52	.....	2	.....	11	26	30	.....	.....	212	133	.....
28	Breeze. Rain	50	51	.....	.....	.....	7	30	.....	.....	.....	204	20	.....
29	Cloud	54	51	3	.....	.....	27	64	.....	.....	.....	476	80	.....
30	Cloud. Clear	57	53	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
May 1	Cloud. Clear	56	52	6	.....	.....	5	103	.....	.....	17,420	381	200	400
2	Clear	58	54	.....	.....	.....	3	35	.....	.....	.....	201	179	2,500
3	Cloud	64	54	.....	.....	.....	.....	75	.....	1	.....	716	220	6,000
4	Wind. Rain	44	52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	Thick. Rain	56	52	.....	.....	.....	.....	49	.....	.....	35,920	162	170	200
6	Cloud. Breeze	48	52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	Cloud. Breeze	54	52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	Cloud. Gale	56	52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	Cloud. Breeze	55	52	2	.....	.....	.....	42	.....	.....	10,020	988	525	.....
10	Cloud. Rain	59	52	27	.....	.....	.....	2	.....	3	16,800	307	158	400
11	Clear. Cloud	58	53	.....	.....	.....	.....	.....	.....	.....	14,945	.....	.....	.....
12	Clear. Cloud. Breeze	60	54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	Cloud. Breeze	56	53	59	4	.....	.....	5	.....	6	14,200	1,026	154	600
14	Cloud. Breeze	56	53	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	Cloud. Clear. Breeze	59	54	.....	8	.....	3	15	.....	17	7,300	.....	39	2,000
16	Clear	66	54	.....	5	.....	12	4	.....	.....	900	.....	22	3,000
17	Cloud	66	55	.....	.....	.....	.....	20	.....	.....	.....	.....	.....	.....
18	Clear. Breeze	55	56	.....	58	.....	6	4	.....	24	1,280	.....	33	6,000
19	Clear	63	58	.....	23	.....	3	15	.....	5	1,040	.....	20	4,000
20	Clear	72	58	.....	32	.....	.....	11	.....	4	7,600	6	10	5,000
21	Clear. Breeze	68	60	.....	.....	.....	.....	16	.....	.....	.....	.....	.....	.....
22	Cloud. Fog	73	61	.....	85	.....	.....	.....	.....	4	6,000	50	40	1,500
23	Smoky	75	62	.....	6	.....	.....	16	.....	.....	26,000	25	16	2,000
24	Smoky. Breeze	69	57	.....	.....	9	.....	7	.....	.....	2,205	3	7	.....
25	Clear. Smoky. Breeze	65	57	2	.....	.....	3	7	.....	.....	780	1	9	2,000
26	Cloud. Rain	65	58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	Cloud. Breeze	62	60	.....	.....	11	2	7	.....	.....	.....	2	34	.....
28	Clear. Breeze	65	62	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	Clear. Breeze	67	62	1	.....	63	.....	.....	.....	.....	.....	.....	31	.....
30	Thick. Breeze	72	62	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	Cloud. Showers	78	62	.....	.....	2	1	.....	.....	1	40,300	.....	22	.....
June 1	Cloud	65	62	.....	.....	11	1	.....	.....	.....	13,260	.....	3	.....
2	Fog. Breeze	66	63	1	.....	83	.....	.....	.....	.....	.....	.....	5	.....
3	Fog. Breeze	73	63	.....	.....	66	.....	1	.....	.....	.....	.....	3	.....
4	Cloud. Thunder	82	63	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	Clear. Breeze	68	63	.....	.....	76	2	.....	.....	.....	.....	.....	6	.....
6	Cloud	73	66	.....	.....	10	1	.....	.....	.....	.....	.....	5	.....
7	Cloud. Rain. Breeze	76	66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	Fog. Rain Breeze	68	66	.....	.....	1	.....	20	.....	.....	.....	.....	.....	.....
9	Hazy. Clear	80	66	.....	.....	27	.....	.....	.....	.....	.....	.....	30	.....
10	Clear. Breeze	75	67	48	.....	25	2	1	.....	.....	7,540	.....	20	.....
11	Rain. Breeze	81	67	.....	.....	.....	.....	40	.....	.....	.....	.....	20	.....
12	Fog. Breeze	64	67	.....	.....	.....	.....	10	.....	.....	.....	.....	.....	.....
13	Clear. Cloud. Breeze	70	65	1	.....	127	.....	.....	.....	.....	.....	.....	27	.....
14	Cloud. Breeze	70	66	.....	.....	68	1	.....	.....	.....	27,300	.....	2	.....
15	Cloud. Rain	60	64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	Cloud	73	65	.....	.....	81	.....	.....	.....	.....	93	.....	3	.....
17	Clear. Cloud	75	64	.....	.....	31	.....	.....	.....	.....	19	.....	.....	.....
	Total	.....	.....	151	227	691	148	2,578	50,153	124	270,222	4,790	2,923	35,612

NOTE.—The statistics of the Waquoit weir (Tables II to V) are taken from the report of the Massachusetts commissioners of inland fisheries for 1871. This weir was leased by the commissioners for the purpose of securing exact statistics on the subject of pound-fishing.

TABLE III.—*Return of dog-fish and blue-fish at Waquoit Weir for seven years.*

	DOG-FISH.							BLUE-FISH.						
	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1865.	1866.	1867.	1868.	1869.	1870.	1871.
April 9	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
21	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
22	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	.....	.....	.....	.....	.....	.....	30	.....	.....	.....	.....	.....	.....	.....
26	42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	15	.....	.....	.....	.....	.....	212	.....	.....	.....	.....	.....	.....	.....
28	50	.....	.....	.....	.....	.....	204	.....	.....	.....	.....	.....	.....	.....
29	.....	.....	.....	.....	.....	.....	476	.....	.....	.....	.....	.....	.....	.....
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
May 1	208	.....	.....	.....	.....	.....	381	.....	.....	.....	.....	.....	.....	.....
2	50	.....	.....	.....	.....	.....	201	.....	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	716	.....	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	.....	.....	.....	.....	.....	.....	162	.....	.....	.....	.....	.....	.....	.....
6	.....	.....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	.....	.....	.....	.....	.....	.....	988	.....	.....	.....	.....	.....	.....	.....
10	.....	.....	.....	.....	.....	.....	307	.....	.....	.....	.....	.....	.....	.....
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	.....	.....	.....	.....	.....	.....	1,026	.....	.....	.....	.....	.....	.....	.....
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....
15	.....	.....	.....	.....	1,000	.....	.....	100	.....	.....	.....	.....	.....	.....
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14	.....
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	.....	.....	700	.....	500	.....	.....	.....	.....	.....	.....	.....	25	.....
19	.....	.....	.....	.....	1,000	500	.....	.....	.....	.....	.....	.....	.....	.....
20	.....	.....	800	.....	500	.....	6	200	.....	15	.....	.....	.....	.....
21	.....	800	2,000	.....	.....	.....	.....	.....	.....	.....	.....	100	.....	.....
22	.....	.....	.....	.....	.....	.....	50	.....	.....	.....	.....	.....	.....	.....
23	.....	200	200	.....	.....	.....	25	203	1	.....	230	.....	.....	.....
24	.....	200	100	.....	.....	.....	3	270	.....	400	.....	.....	.....	9
25	.....	.....	.....	.....	.....	.....	1	67	.....	300	200	160	.....	.....
26	.....	.....	.....	.....	.....	.....	2	62	.....	.....	200	.....	.....	.....
27	.....	.....	.....	.....	.....	.....	.....	164	.....	.....	150	295	.....	11
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	246	160	135	.....	.....
29	.....	.....	.....	.....	.....	.....	.....	94	.....	164	.....	150	.....	63
30	.....	.....	.....	.....	.....	.....	.....	146	6	.....	.....	.....	.....	.....
31	.....	.....	.....	.....	.....	.....	.....	220	.....	.....	.....	.....	.....	2
Total	1,871	1,203	3,901	.....	3,001	502	4,700	1,526	7	1,127	940	840	39	85

TABLE IV.—*Consolidated returns of alewives, shad, menhaden, bass, blue-fish, and dog-fish, at Waquoit Weir, for seven years.*

Date.	1865.	1866.	1867.	1868.	1869.	1870.	1871.
ALEWIVES.							
March 17 to April 20	323,610	63,749	46,914	7,837	30,604	52,717	47,793
April 20 to May 29	85,050	7,500	11,900	27,680	3,900	22,755	2,360
Total	408,660	71,249	58,814	35,517	34,504	75,472	50,153
SHAD.							
April 8 to 20	26	33	63	13	7	62	56
April 20 to May 15	645	269	340	1,642	439	523	30
May 15 to 31	.....	.....	.....	400	.....	.....	38
Total	671	302	403	2,055	446	585	124
MENHADEN.							
April 21 to May 15	175,300	213,730	82,680	45,706	66,680	152,590	136,005
May 16 to June 2	35,800	104,780	121,060	79,020	79,030	255,340	99,256
Total	211,100	318,510	203,740	124,726	145,710	407,930	235,270
BASS.							
April 14 to 20	35	.....	.....	.....	.....	.....	69
April 21 to May 15	81	7	111	65	25	51	10
May 15	10	.....	18	.....	.....	.....	7
Total	126	7	129	65	25	51	68
BLUE-FISH.							
May 14 to 31	1,526	7	1,127	940	840	39	85
DOG-FISH.							
April 9 to May 6	373	3	101	.....	1	2	2,382
May 7 to 31	1,500	1,200	3,800	.....	3,000	500	2,408
Total	1,873	1,203	3,901	.....	3,001	502	4,790

TABLE V.—*Days of first appearance of alewives, scup, blue-fish, and menhaden, at Waquoit Weir, for thirteen years.*

Year.	Alewives.	Scup.	Blue-fish.	Menhaden.
1859	April 7	May 5	May 16	May 6
1860	April 3	May 2	May 15	May 4
1861	April 1	April 27	May 17	May 1
1862	March 30	May 10	May 13	May 6
1863	March 29	May 8	May 15	May 2
1864	March 28	May 6	May 17	May 5
1865	March 29	May 1	May 16	May 1
1866	April 2	May 8	May 15	May 7
1867	March 28	May 4	May 14	May 3
1868	March 30	May 10	May 19	May 15
1869	March 31	May 7	May 17	May 10
1870	March 28	May 2	May 16	May 8
1871	March 24	April 25	May 24	April 21

[a] Dates when first plenty. The weir takes alewives when first set; probably some come a little earlier.

TABLE VI.—*Account of blue-fish caught with a line by Josiah C. Pease about Edgartown, Massachusetts,* 1865–1871.

Month.	First fish caught.	Last fish caught.	Number of days in month.	Sum total of days.	Number of fish.	Sum total of fish in season.	Average per day in month.	Average per day in season.
1865.								
May	24th		6		58		9	
June			20		626		31	
July			15		796		53	
August			15		1,790		53	
September		24th	10		349		35	
October								
				66		2,619		40
1866.								
May								
June								
July	18th		11		913		83	
August			18		1,792		99	
September		24th	7		323		46	
October								
				36		3,028		84
1867.								
May	27th		5		176		35	
June			17		1,518		89	
July			21		1,695		80	
August		30th	11		333		30	
September								
October								
				55		3,722		67
1868.								
May	25th		5		392		78	
June			13		757		58	
July			18		1,148		63	
August			22		2,029		92	
September			17		464		27	
October		23d	13		208		16	
				88		4,998		57
1869.								
May								
June	1st		15		1,314		87	
July			22		1,913		86	
August			22		1,352		61	
September			16		304		19	
October		23d	8		15		2	
				83		4,898		59
1870.								
May	30th		1		61		61	
June			14		557		39	
July			16		713		44	
August			21		942		45	
September			15		274		18	
October		18th	6		273		45	
				73		2,820		39
1871.								
May	29th		2		55		27	
June			23		962		42	
July			20		1,370		68	
August			19		1,570		83	
September		28th	15		500		33	
October								
				79		4,457		56

SUMMARY.

1865	May 24	Sept. 24		66		2,619		
1866	July 18	Sept. 28		36		3,028		
1867	May 27	Aug. 30		55		3,722		
1868	May 25	Oct. 23		88		4,998		
1869	June 1	Oct. 23		83		4,898		
1870	May 30	Oct. 18		73		2,820		
1871	May 29	Sept. 28		79		4,457		
				480		26,542		55

TABLE VII.—*Account of fish landed at Baxter's Wharf, Hyannis, Massachusetts.*

*1870.	Flat-fish.		Scup.		Blue-fish.		Bass.	
	Pounds.	Price.	Pounds.	Price.	Pounds.	Price.	Pounds.	Price.
April	10,463	$142 81						
May	2,113	26 15	†13,866	$226 92			9,246	$151 28
June			25,209	619 98			16,808	413 13
July					‡28,151	$563 04		
August					31,147	797 13		
September					14,618	405 15		
October	§31,851	797 10						
November	14,217	427 10						
Total	58,644	1,393 16	39,075	846 90	74,016	1,765 32	26,054	564 41
¶1871.								
April	9,412	94 12						
May	1,841	18 41	4,953	83 73			3,306	55 86
June			35,063	572 85			11,687	190 95
July					36,251	625 02		
August					12,503	259 06		
September					10,513	251 17		
Total	11,253	112,53	40,016	656 58	59,267	1,126 25	14,993	246 81

* Highest number of boats employed, 13.
† First scup caught May 21.
‡ About all catching blue-fish.
§ All catching flat-fish October 10.
¶ Highest number of boats employed, 25.

AGGREGATES.

	Pounds.	Price.
1870	197,786	$4,569 79
1871	125,529	2,142 17
Excess in 1870 over 1871	72,260	2,427 62

TABLE VIII.—*Account of Austin Taylor, Hyannis, Massachusetts.*

*1870.	Pounds.	Price.	1871.	Pounds.	Price.
April	2,285	$24 10	April	829	$8 29
May	1,777	35 54	May	569	9 12
June	2,957	59 18	June	1,203	24 06
July	2,203	55 07	July	1,518½	30 37
August	2,087	62 61	August	996½	19 83
September	208	24 27	September	847	21 10
October	1,481	57 47			
November	613	18 37			
Total	13,611	336 61	Total	5,961	112 77

* Kinds not given.

AGGREGATES.

	Pounds.	Price.
1870	13,611	$336 61
1871	5,961	112 77
Excess of 1870 over 1871	7,650	223 84

TABLE IX.—*Account of Timothy Crocker, Hyannis, Massachusetts.*

	Pounds.
Shipment of fish by railroad to New York, in 1867	115,500
Shipment of fish by railroad to New York, in 1868	109,500
Shipment of fish by railroad to New York, in 1869	137,100
Shipment of fish by railroad to New York, in 1870	83,250
Shipment of fish by railroad to New York, in 1871	82,800

Men and boats employed: 12—15 each season.

TABLE X.—*Account of J. G. Loring, Hyannis, Massachusetts.*

	Number of pounds.	Average per M.
Shipment of fish by railroad to New York, in 1867	82,800	$69 00
Shipment of fish by railroad to New York, in 1868	91,800	76 50
Shipment of fish by railroad to New York, in 1869	104,100	86 70
Shipment of fish by railroad to New York, in 1870	119,850	77 20
Shipment of fish by railroad to New York, in 1871	85,050	56 70

About twelve men and boats were employed in 1867–1869; and fifteen in 1870, 1871.

TABLE XI.—*Shipment of fish by railroad from Hyannis, monthly, to New York, furnished from the books of the company, by Luther Chase.*

Months.	1866.		1867.		1868.		1869.	
	Barrels.	*Boxes.*	*Barrels.*	*Boxes.*	*Barrels*	*Boxes.*	*Barrels.*	*Boxes.*
January	21	15	8	6	1	1	65	13
February	47	8	5	1	2	2	28	12
March	23	14	3	4	1	2	50	23
April	5	8	30	4	49	5	31	13
May	435	114	135	67	165	66	267	29
June	432	265	251	71	753	183	636	221
July	16	32	139	141	260	166	429	230
August	8	.....	39	5	41	53	176	59
September	24	1	106	14	77	29	26	15
October	36	8	148	2	74	4	116	1
November	15	2	41	3	79	7	42	10
December	18	11	30	15	25	8	57	10
Total	1,080	478	935	333	1,527	526	1,923	636
Total in pounds*	305,400		240,000		386,700		479,100	

Months.	1870.		1871.		Total.	
	Barrels.	*Boxes.*	*Barrels.*	*Boxes.*	*Barrels.*	*Boxes.*
January	5	10	11	14	.....	.....
February	3	10	12	12	.....	.....
March	15	17	44	22	.....	.....
April	186	13	236	34	.....	.....
May	295	23	292	17	.....	.....
June	1,154	366	551	391	.....	.....
July	233	214	170	269	.....	.....
August	119	193	119	71	.....	.....
September	94	17	94	†17	.....	.....
October	963	4	263	4	.....	.....
November	111	10	111	10	.....	.....
December	26	13	26	13	.....	.....
Total	2,504	890	1,939	874	9,908	3,717
Total in pounds*	642,600		552,900		2,606,700	

* According to the usual estimate at Hyannis, the box of fish weighs 300 pounds; the barrel 150.
† The record for 1871 only extends through August; we therefore take the figures of 1870 for the same months.

The above table includes the shipments by Messrs. Taylor, Crocker, Loring, Handy, and others, and consist in greater part of fish taken with the line. The figures for June, July, August, September, and October, relate almost exclusively to blue-fish.

TABLE XII.—*Statement of fish caught in the pound at Wood's Hole, Massachusetts, in* 1872, *by Wood's Hole Weir Company.*

1872.	Herring.	Dog-fish.	Scup.	Mackerel.	Menhaden.	1872.	Spanish mackerel.	Ceros.
April 25	1,000	1	1	.....	.....	July 31	2	.....
27	2,000	22	.....	.....	.....	August 2	1	.....
30	3,500	21	.....	.....	.....	5	4	.....
May 3	1,000	4	.....	.....	.....	8	2	.....
4	500	35	.....	.....	.....	10	1	.....
7	.....	107	.....	1	.....	13	7	.....
8	.....	2,249	.....	35	.....	19	4	.....
9	.....	3,650	.....	4	.....	20	3	.....
10	.....	1,800	Few ..	15	.....	21	2	.....
11	.....	2,845	..do ...	127	.....	22	4	.....
12	.....	6,074	.....	131	.....	23	596	5
13	.....	3,411	.....	3	.....	24	69	4
14	.....	516	.....	1,800	.....	25	76	14
15	.....	225	Few ..	146	.....	28	11	1
16	.....	130	..do ...	162	.....	29	13	Few.
17	.....	.....	*10	1,700	*80	30	3	3
18	.....	.....	38	185	60	Sept. 2	37	6
19	.....	.....	Few ..	150	150	4	9	Few.
20	.....	.....	..do ...	80	200	6	30	.....
23	Very f	ew fish c	aught to	June 4.	.....	9	29	.....
25	.....	.....	.....	.....	2,000	11	11	.....
June 5	Heavy	gale fro	m north	east.	.....	13	1	.....
9	.....	.....	*150	.....	.....	16	13	.....
10	.....	.....	†75	.....	.....	19	8	.....
11	.....	.....	40	.....	.....	21‡	28	2
12	.....	.....	80	.....	.....	29‡		
18	Took lin	toff; ple	nty sma	ll scup;	few wea	k-fish.		

* Barrels. † Barrels; mostly small. ‡ Eight boxes with blue-fish.

TABLE XIII.—*Catch of fish at pound of Thomas Hinckley, West Falmouth, 1872.*

	Alewives.	Tautog.	Horned dog fish.	Sturgeon.	Shad.	Mackerel.	Scup.	Menhaden.	Sea-bass.	Smooth dog fish.	Blue-fish.	Flounders.
April 26, 1872	3,000	1	1									
April 27, 1872	2,000	1	3									
April 29, 1872	200	1	9									
April 30, 1872	1,000		3									
May 1, 1872		3	14									
May 2, 1872	500	4	18									
May 3, 1872			2	1								
May 4, 1872	500	3			6							
May 5, 1872		2	5			1						
May 6, 1872	200	200	27			3	3					
May 7, 1872			5,000			3						
May 8, 1872			2,500			1	1					
May 9, 1872		5	2,000			8						
May 10, 1872			5,000			12	2	1				
May 11, 1872		400	1,500		½ bbl.	168						
May 12, 1872		600	100		½ bbl.	240						
May 13, 1872		600				500	5	2				
May 14, 1872	3 bbls.	600				66		3	3			
May 15, 1872			12									
May 16, 1872								75 bbls.				
May 17, 1872								250 bbls.				
May 18, 1872								450 bbls.				
May 19, 1872								600 bbls.				
May 20, 1872	Pound full of menhaden.											
May 29, 1872	More than could be sold											
May 30, 1872										100		
May 31, 1872								150 bbls.	2	800	3	
June 1, 1872								350 bbls.		800	10	
June 3, 1872								300 bbls.			1	3 bbls.
June 4, 1872									½ bbl.		15	
June 7, 1872								100 bbls.	5	50	45	
June 8, 1872								200 bbls.				
June 12, 1872								800 bbls.				

TABLE XIV.—*Date of first appearance of fish at the pounds and weirs on the south side of New England.*

	Dog-fish.	Mackerel.	Menhaden.	Alewives.	Tautog.	Blue-fish.
Newport, R. I.						
New Bedford, Mass.		1871, Apr. 25			1871, Apr. 10	
Wood's Hole, Mass.		1871, end April	1871, Apr. 23	1871, Apr. 14	1871, Apr. 19	1871, May 20
West Falmouth, Mass.	1872, Apr. 22	1872, May 9	1872, May 18	1872, Apr. 25	1872, May 9	
Menemsha Bight, Mass.*	1872, Apr. 26	1872, May 5	1872, May 10 1871, Apr. 21	1872, Apr. 26 1871, Apr. 12	1872, Apr. 26	1872, May 31 1871, May 26
Waquoit, Mass.	1871, Apr. 26	1872, May 11 1871, Apr. 18	1871, Apr. 21	1871, Mar. 24	1871, Apr. 18	1871, May 24
Nantucket, Mass.						1871, May 29
Hyannis, Mass.						

	Scup.	Shad.	Herring.	Squeteague.	Sea-bass.
Newport, R. I.	1871, Apr. 18				
New Bedford, Mass.	1872, May 15 1871, Apr. 24	1871, Apr. 15	1871, Mar. 25		
Wood's Hole, Mass.	1871, Apr. 27			1871, June 1	1871, May 20
West Falmouth, Mass.	1872, May 10				1872, May 13
Menemsha Bight, Mass.*	1872, May 6 1871, Apr. 25	1872, May 4 1871, Apr. 25			1872, May 14 1871, end May
Waquoit, Mass.	1872, May 10 1871, Apr. 25	1871, Apr. 10		1872, July 4 1871, May 9	1872, May 28 1871, May 24
Nantucket, Mass.					
Hyannis, Mass.	1871, Apr. 22				

* Situated on north side of Gay Head, end of Martha's Vineyard.

XII.—SUPPLEMENTARY TESTIMONY AND INFORMATION RELATIVE TO THE CONDITION OF THE FISHERIES OF THE SOUTH SIDE OF NEW ENGLAND, TAKEN IN 1872.

A delay in the printing of the present report renders it possible to bring the inquiry into the fisheries of the south side of New England through the season of 1872, for which purpose I revisited Wood's Hole and Newport, in October, and sent Mr. Vinal N. Edwards, my able assistant at Wood's Hole, to Hyannis, Nantucket, and Martha's Vineyard, with a similar object. The following memoranda, obtained by myself and Mr. Edwards, will be found to contain some important statements:

NOTES TAKEN BY THE COMMISSIONER.

NEWPORT, RHODE ISLAND, *October* 10, 1872.

Mr. T. LEE, fish-dealer, said that fish were more plenty in Newport this year than last. Scup, weighing from one-fourth of a pound to a pound, were very plenty.

Bass have not been quite as plenty as last year, but they were quite plenty last year.

Spanish mackerel have been more plenty, and squeteague very plenty. Spanish mackerel have been as low as 15 cents a pound; they were never less than 50 or 75 cents a pound before; they were almost as common as blue-fish at one time.

Bonito have been abundant this year.

Several ceros have been caught here. I bought one for 5 cents a pound and sold it for 8; and the man who bought it of me sold the fish for $12.

Mr. CURRY, a fish-dealer, said fish generally had been tolerably plenty this year. Blue-fish are plenty, but we do not get many sea-bass this fall. Squeteague, bonito, and Spanish mackerel have been more plenty than usual.

Scup are plenty, some of fair size, weighing about half a pound. There were very few of the small-sized scup this year corresponding to those here last year.

Sheepshead have been about as plenty as usual.

No regular mackerel have been caught off the coast.

Several salmon were caught in Saughkonet River, and shad were plenty over at Second Beach, and several were taken in other places.

SAMUEL ALBRO, a fish-dealer, considered fish as plenty as they were last year. He gave the catch of one fisherman, George Crabb, from which the following amounts are taken, as caught with hook and line:

July 11	100 pounds tautog.
Another day	154 pounds tautog.

Another day .. .. 198 pounds tautog.
Another day ..... 175 pounds tautog.
Another day ..... 128 pounds tautog.
Another day ..... 162 pounds tautog

From the account of fishing by WILLIAM RECORD, it appears that he took in a pound, on different days, 80, 120, 211, 272, and 310 pounds. August 1, 121 pounds; 5, 35 pounds blue-fish; 7th, 54; 8th, 33; 9th, 133; 13th, 9; 14th, 48; 15th, 138; 16th, 19; 19th, 185; 26th, 21; 27th, 31; 28th, 519, 29th, 48. September 2, 28; 3d, 54; 6th, 27; 9th, 116; 11th, 17; 12th, 37; 14th, 135; 22d, 14. October 1, 51.

Blue-fish are bought of the fishermen for 5 cents a pound. George Crabb averaged 100 pounds a day. In the month of June, last year, he caught 1,109 pounds of tautog.

Mr. J. M. K. SOUTHWICK, a dealer in fishing-tackle, nets, &c., said that small scup had been observed almost every fall about Saughkonet River. A gentleman of Tiverton remembered that many years ago there was precisely such a run of small scup as last year. The hook-and-line fishing is now connected with lobstering, and the lobsters are the most important part to that class of fishermen.

EDWARD M. GLADDING, pilot and fisherman, said line-fishing had not been much attended to this year. He had tried all summer, and could not catch many. It is much poorer fishing than it was last summer; as much worse as you can think. You cannot catch a mess in all day. Tautog'ing has been good for nothing this summer. He had not caught any blue-fish this summer. He had fished more or less for fifty years. No man ever saw the fish so scarce as they are now. He had not caught more than four scup this summer. Two-thirds of the fishermen with set-seines have not made anything; but thousands of fish have been carried to New York and thrown overboard. The heart-seines are death on fish; they catch anything and everything. The West Bay trap never caught more than this season; fish were plenty in the spring, and then they caught them. One trap caught 1,500 pounds in one day. The first fish of the season are tautog. Fifty years ago sea-bass were plenty about the Vineyard, and he used to fish there; but no sea-bass are caught there now. We used to get some nights over one hundred big bass, and sell them at New Bedford.

SAMUEL SOUTHWICK was a trapper three years ago, at Coddington Cove, and had seined more or less for forty years. Used to catch scup, menhaden, alewives, and pretty much all kinds of fish. Large scup are now scarce, but other fish are about as plenty as they have been. Last spring more tautog were taken at one haul than he ever took at two in the same place. Twenty years ago the market for fish was better than now. We did not formerly catch Spanish mackerel. He once caught two near Brinton's Reef, which he sold for a dollar apiece, but did not know what they were.

Bulls-eye mackerel were very plenty here fifteen years ago and more. They were considered better than ordinary mackerel. They were fat and small. When found now they are with the small mackerel.

Squeteague first appeared about twenty years ago; and they grew more and more plenty. About thirty-five years ago the people did not know what blue-fish were. One night he got 200 and put them on the wharf, and nobody would carry them off.

Mr. WILLIAM CHAMPLIN had a number of tinker-mackerel, which he had just caught. He thought they belonged to a different race from the round mackerel. He thought the fishing this summer as good as it was last summer. Lobstering has been better; there are as many lobsters now as there were fifteen years ago. They weigh only about two pounds each.

The tinker-mackerel are worth about fifteen cents a dozen.

P. B. HUDDY said the stripes on the bulls-eye mackerel are more green than on the common mackerel. There have been about the same number of fish caught with the hook and line this summer as last.

Codfish come in at Christmas time and stay till May. Never saw menhaden here in the winter. Mr. Tallman once caught 1,600 barrels on the 3d of December.

English herring come in here in the fall and stay all winter; never noticed any spawn in them. Scup have not been so plenty for four years as they have been this summer.

MARTIN GLADDING has a heart-seine in West Bay. Had found squeteague and scup more plenty this year than for ten years past. The scup are large enough to market, and send to New York every day. They correspond to the so-called second run of scup. Never knew the big scup to stop here in the spring. He thinks the second run of scup spawn. Never saw any spawn run from them.

Blue-fish have not been as plenty as common this season.

Tautog are caught, weighing from one to ten pounds; but the small ones have spawn running from them. They will bite as well when spawning as at any time. They spawn in July.

Got a great many shad this season, and alewives. The shad were caught in May.

Catches squeteague now altogether, and will take them all this month. He gets from four to eight hundred pounds a day. They are much more plenty than last year. He caught so many he could not sell them, and let them go.

The scup that used to be caught years ago were about the size of those taken this year. There was this year a large run of scup so small that they would go right through the meshes; were about an inch and a half long; and there were those of different sizes, up to a pound, all mixed together. There were not so many small ones this year as last; but hundreds of barrels were turned right out of the seine at a time.

Fall before last tautog were very plenty.

Governor STEVENS.—Fish of all kinds, generally speaking, have been more plenty this year than usual. Blue-fish have not been so plenty as sometimes; about the same as last year. Spanish mackerel more plenty. Never saw anything like the number of shad on the coast. They were moving east. They were caught all through this region, and so plenty they could not be sold in New York.

The Spanish mackerel did not last a great while. The scup that were caught were large enough to market. The large ones came a little in advance. The small ones are here now. Occasionally some of the large ones were mixed in with the small. They were more than twice as large as the run of small scup that came last year. I saw this year two days' catch of the largest scup I ever saw; some of them would weigh four pounds. That was about the first of the run. The fish they used to talk about as being so plenty were just like the run

of scup we are getting now. The fish they used to catch weighed three-quarters of a pound to one pound.

We get full-sized English herring here; they are taken in gill-nets. I never saw any spawn about them. They used to catch them here in the winter. They are not plenty.

I got boneto plenty this year; sometimes got one hundred at a time. They brought about six cents a pound in New York. They are not worth as much in New York as blue-fish. I got a good many cero.

WOOD'S HOLE, MASSACHUSETTS, *October* 9, 1872.

Captain THOMAS HINCKLEY, who has a pound at West Falmouth, and whose testimony, taken in 1871, is printed on page 59, stated that all fish had become unusually scarce in 1872, with the exception of alewives, menhaden, and dog-fish, (*Acanthias americanus.*) Alewives and menhaden were in such abundance that it was impossible to dispose of them; especially as the fishing smacks which formerly came in for bait for mackerel are now in the habit of securing their own supply by means of nets that they carry with them. Blue-fish are scarcely one-fourth as numerous as last year, and are of very small size, this scarcity perhaps having some relation to the abundance of herring. Squeteague, too, are considerably more scarce; so much so that both they and blue-fish for a fortnight brought 10 cents a pound at wholesale, an unusually high price.

The small scup, so abundant in the summer of 1871, made their appearance as one year older, and were caught readily on the proper grounds. These averaged 5½ ounces each, or nearly double the weight of last year. There were, however, few or no scup corresponding in size to the small ones of the year before. Unintermitted fishing by the children from the wharves, in the summer of 1872, failed to make any captures. [From this it would appear that the astonishing supply of young scup in 1871 was rather sporadic in its character, and that, from whatever cause it proceeded, the same conditions did not prevail this season. Where these fish actually came from, it is extremely difficult to say; whether an unusually large number of the breeding-scup succeeded in evading their enemies in 1870, or whether fish bred in more southern waters appeared on the coast in 1871, and moved in a body northward, covering the ground where they did not originally belong.

In reference to the young scup of 1871, some light may possibly be thrown upon the subject by the statement of Thomas James, the proprietor of two heart-seines in Narragansett Bay, that late in the fall of 1870 he was astonished at finding in his nets immense numbers of young scup, evidently spawned during that summer. These would represent, of course, the three-ounce scup found in the summer of 1871, and the six-ounce scup of 1872.

The scup of 1872 correspond to what are usually called the "second run" of scup, and were caught in sufficient quantity to market, being sent to New York in large numbers. Should nothing interfere with them, these fish will probably make their appearance in 1873 as spawning fish. Whether they will be permitted to deposit their eggs in peace, and thus keep up the supply, will depend probably upon the question whether the close time recommended is adopted.

While there did not appear to be any new pounds or traps erected in Narragansett Bay during 1872, many additions were made to the num-

ber in Buzzard's Bay and Vineyard Sound. Thus, four new ones were established in Menemsha Bight, one in Lombard's Cove, and one at Paintville, on the north side of Martha's Vineyard, two or more in Kettle Cove, on the north side of Naushon, and one about the middle of the north side of Nashawena, making nine in addition to the number which were there before. The result has been that, with the increasing scarcity of fish in these waters, scarcely one of them has made a sufficient profit to pay for the outlay and labor, and it is therefore probable that, with or without regulation, a smaller number will be hereafter established. Captain Hinckley thinks that the future of pound-fishing is closely connected with its regulation, and, as a representative of that class, is quite willing to accept any law that promises to secure a continuance of the business. He advises, as the best method of preventing the capture of fish, that the opening to the bowl of the pound be completely closed, and that the entire netting of one side of the heart be taken from the stakes. In his opinion, neither the removal nor the replacing of the net will require more than fifteen minutes to half an hour in each operation.—S. F. B.]

NEW YORK, *October* 15, 1872.

Messrs. MIDDLETON, CARMAN & CO., fish-dealers, state that the supply of fish in the New York market has been full up to that of last year.

Striped-bass have not been quite so plenty. Squeteague of medium size have been quite plenty, and at one time large ones, from Vineyard Sound, were plenty.

Blue-fish are obtained principally for the New York market, off Rockaway and the New Jersey shore, and as far south as Norfolk.

The price of blue-fish and squeteague has been about the same—from four to eight dollars per hundred pounds, at retail.

There were a good many scup off the Jersey shore. There have not been so many brought from Narragansett Bay as in former years. A great many very small scup have been brought from that direction, so small that three or four would weigh only a pound.

Sea-bass have not been quite as plenty as formerly, though many small ones have been taken off New Jersey.

Prices have averaged a little less for fish this year than last.

Spanish mackerel have been quite plenty at one time, for a few days, and then they were off again. There are no pounds in this vicinity.

Mr. E. G. BLACKFORD, a fish-dealer, said pound-fish were not as plenty as last year.

ROGERS & EDWARDS, wholesale dealers, said there had been more than the usual quantity of some kinds of fish, a good supply of large-sized squeteague. The larger ones came from Buzzard's Bay and Vineyard Sound. Blue-fish have not been as plenty as last year. They are mostly caught in this vicinity, and some from Block Island and Sandy Hook.

There have been a great many small scup brought in, more than could be sold. Large ones have not been as plenty as before. The small ones come from Narragansett Bay, principally. Something should be done to prevent the taking of the small scup; it would be an advantage to the trade. There have been few large scup this season. Bonito have come in from Block Island, Newport, and down the Sound.

REPORT OF VINAL N. EDWARDS.

NANTUCKET.

Professor S. F. Baird :

DEAR SIR: I went to Nantucket Tuesday. When I arrived there the net-men got together and agreed to tell the same story, that the fish were more plenty than last year. I heard this from net-men who did not agree with them. The report of the net-men was the same as that of Gershom Phinney and C. E. Snow. But all the others, hook and line fishermen and seine-net men say that fish are growing less every year, and think that nets are using the fish up. A large number of fishermen say that the blue-fish came into harbor to spawn every year, until this year, when there were so many nets that no fish got into the harbor. They begin to catch blue-fish by the middle of May.

I have seen a large number of the younger fishermen of Nantucket, all of whom tell the same story that fish are growing less every year.

Two of the net-men whom you examined last year were absent, and have been gone fishing all summer. Gershom Phinney and C. E. Snow say they had the same number of nets as last year, but other fishermen say they had double the number this year that they had last. The testimony given, is as follows:

GERSHOM PHINNEY, C. E. SNOW.—Think blue-fish have been plenty. They, together, caught in their nets in 1871, 5,500 blue-fish. In 1872, 7,518 blue-fish. They ran two weeks longer this year than in 1871.*

Captain C. B. GARDNER and Captain BATES fished together throughout the season. They report:

In 1870, caught 4,000 blue-fish.

In 1871, caught 3,350 blue-fish.

In 1872, caught 3,495 blue-fish.

They fished more than two weeks longer this year than for a number of years before. They fished on the south side; could get none on the north side.

WATSON BURGESS, a line-fisherman, says there were not half as many blue-fish on the north side this year as the last; that there were twice as many nets on the north side, but did not get as many fish as last year. A line-fisherman could not get one-fourth as many blue-fish this year as the last, in the same time. He went off a number of times and did not get a bite; did not get a large scup; little ones were plenty. Cod and alewives were more plenty.

* Professor N. S. Shaler, during a recent visit to Nantucket, was informed by C. E. Snow that with the same means and labor as many blue-fish could be caught in 1872 as last year; thinks if there had been no more fishermen than last year, should have caught three times as many. The fish are larger on the whole than last year. There are three different sizes observable. The largest size includes about one-fourth the whole number of fish, and averages in weight about nine pounds. The next size weigh about five pounds, and includes about half the fish. The smallest size weighs about three pounds, and takes the remaining fourth. Some have been caught weighing from twelve to twenty pounds. Since the 7th of September blue-fish have been more abundant than ever before. Scup were plentier than at any time during the last ten years; they were smaller but in good condition. There had been a decided gain in the number of cod-fish; they are larger than last year. Weak-fish were about twice as numerous as last year. Spanish mackerel has not gained in numbers. Alewives were more abundant.

JOHN ORPINS, a line-fisherman, has been fishing for thirty years and never knew fish so scarce as at present. Every year they grow less and less.

Captain WINSLOW, a line-fisherman, has not caught half as many fish this year as last. The nets were so thick that the blue-fish did not get by. None got into the harbor to spawn. Formerly large numbers have spawned in the harbor. He had been off a number of times, and found none; never knew such a thing before. There have been no large scup this year, but plenty of small ones.

Captain G. DUNHAM, E. DUNHAM, and C. DUNHAM, line-fishermen say: We did not catch any large scup this season; there were plenty of little ones at Long Hill. We could get but very few blue-fish on the north side, and had to go to the south shore for them. They were not as plenty as in past years on the south shore. We had to go to Great Point for blue-fish; could catch 25,000 to 35,000 fish in a season formerly; but last year could not catch any fish. Since the fish-pounds have been set, we can get scarcely any fish.

DAVID ANDREWS, a line-fisherman, thinks there have not been more than half as many blue-fish on the north side as last year; they have been becoming scarcer every year for four or five years. There were not so many on the south side as last year; and though the weather was better and the season longer, he did not get as many fish. He did not catch a large scup this summer; little ones were plenty at Long Hill, but few in the harbor. He went fishing several times for blue-fish on the north side, but did not get a bite; never did it before in his life.

David Andrews is regarded in Nantucket as an entirely truthful man.

SYLVANUS ANDREWS, a line-fisherman, had been off fishing several times on the north side of the island, and did not get a bite; never knew such an occurrence before. The nets took all on the north side, so that he could not catch any. The nets did not get as many as last year, the fish having been growing scarcer for eight or ten years. He did not catch a large scup this season, but got a large number of small ones.

J. G. ORPINS, line-fisherman, went blue-fishing part of the season on the south side; the fish were not so plenty as last year. On the north side the nets stopped all hook-fishing.

WILLIAM WOOD, line-fisherman, had been fishing many years; never saw so few fish as this year; on the north side there was no line-fishing; the nets took all or kept them off. Fish were not so plenty on the north side as last year.

CHARLES GARDNER, a line-fisherman, said blue-fish were so scarce on the north side of the island he did not fish for them; caught a large number of small scup. For the last few years blue-fish and scup grow less and less.

MOSES BEATMAN, a net-fisherman, said that in 1871 he caught some large scup; but this year caught but four large scup; plenty of little ones at Long Hill. No blue-fish in the harbor, as in former times; very few on the north side; none to be caught with the hook and line; the nets did not do as well as last year.

Very few of the fishermen keep any account of their catch. At the custom-house an account was kept of the number of pounds of blue-fish caught at the island. The report is as follows:

1871, from April 1 to June 30, 75,000 pounds.

1871, from June 30 to September 30, 149,000 pounds.
1872, from April 1 to June 30, 55,000 pounds.
1872, from June 30 to September 30, 139,250 pounds.

WOOD'S HOLE, *November* 9, 1872.

EDGARTOWN, MASSACHUSETTS.

I have just returned from Edgartown, and have seen the fishermen. Captain Francis Pease is dead; died last September. I saw the rest of the men, besides other fishermen. The record of Captain JOSIAH PEASE is as follows:

		Number of blue-fish.
1871,	June	1,021
	July	1,471
	August	1,600
	September	1,101
	October, to 17	1,014
	Total	6,207
	Sea-bass during the year	312

		Number of blue-fish.
1872,	June	1,616
	July	1,005
	August	937
	September	976
	October, to 13	174
	Total	4,708
	Sea-bass during the year	17

Captain Pease says he fished nearly double the time this year that he did in 1871; had very good fish-weather this season; better than usual. He had been accustomed to go into the harbor and catch blue-fish; but there were none there this year, and he had to go outside for them.

Little scup were plenty early in the season, but none in the latter part. No large scup and no tautog were caught by him. Captain Pease keeps an account of his catch every season.

Captain RUFUS PEASE did not keep an account, but knew that not more than two-thirds as many fish had been caught as last year, by all the fishermen in Edgartown. All kinds of fish have been very scarce. He thinks that if the decrease continues for three or four years, there will be none to be caught with hook and line.

Captain GEORGE COFFIN thought fish had fallen off one-fourth since last year, and nearly one-half since the year before. The blue-fish had always come into the harbor to spawn, but this year the nets took them, and none got in to spawn. Five years ago he could go down the harbor, and in three or four hours could catch three hundred blue-fish. This year he could not catch any. Other fish have decreased in the same manner.

Dr. Fisher, Seth Marchant, and W. Huckford, of Edgartown, all confirmed the statements of others as to the condition of the fishing.

At Holmes's Hole (Vineyard Haven) they caught twenty-three English herring on the 12th of November, but they had no spawn in them. The fishermen say that those that come later have spawn in them.

There have been no whiting yet, but plenty of frost-fish, with spawn in them.

No menhaden or tinker-mackerel were caught later than the 15th of October, and there were no menhaden caught with spawn in them in the neighborhood of Wood's Hole.

WOOD'S HOLE, *Massachusetts, November* 10.

HYANNIS, MASSACHUSETTS.

I have been to Hyannis and got the report of the fishermen, though not much of an account has been kept by them this year. Hatzel Handy has only kept an account of the number of barrels—160 pounds to the barrel. I saw a large number of men, but they say they keep no account; though they say they have not caught more than two-thirds, and some say one-half, as many as last year.

ALEXANDER CROWELL, a line-fisherman, in 1871 caught 8,000 pounds of scup, sea-bass, and blue-fish; in 1872 he caught 5,000 pounds only of the same kinds of fish. He says there were but few large scup, and about half as many sea-bass as last year; that there were but few blue-fish caught with the hook; the nets took nearly all that were taken.

ALMORAN HALLETT, line-fisherman, had no account for 1871; in 1872 he caught, according to his best judgment, 6,000 pounds. Has never known fish to be as scarce as this year.

HATZEL HANDY, a shipper or dealer, received, as shown by his books, the following fish in 1872:

	Barrels.
May, mackerel and scup	124
June, sea-bass, scup, and blue-fish	238
July, blue-fish	106
August, blue-fish	65
September, blue-fish	56
October, blue-fish	54
Total	643

He says he kept a strict account of the number of barrels. He had a larger number of nets this year, and that if it were not for the net-fishing he could not have done anything this year, the hook and line men have done so poorly. In May and part of June the fish were caught in nets and pounds. Blue-fish were caught until the 15th of October. Very many of the scup taken were small.

TIMOTHY CROCKER, a dealer, received in 1871, scup and sea-bass, 250 barrels; blue-fish, 400 barrels; in 1872, scup and sea-bass, 200 barrels; blue-fish, 300 barrels.

He had more net-men fishing this year than last. The hook-men did about one-half or two thirds as well as last year. The scup were generally small.

JOSEPH LORING, a dealer, received, this year, sea-bass and scup, 208 barrels; and of blue-fish, 305 barrels.

He had more nets than last year, and the same number of hook-men, (25.) The hook-men did about two-thirds as well as last year. Very many of the fish taken were small scup. No tautog. Blue-fish were taken till October 14. Says the whole number of his twenty-five men will state that they got about two-thirds as many fish as last year.

While coming up in the cars this morning from Hyannis, I met Arnold Luce, of Jeremiah Luce's fish-pound at Lambert's Cove. He says his father did not do more than half as well as last year. He said he had himself been connected with the fish-pound three years, but sunk money this year. He said that he caught two of those large bill-fish and two saw-tail sharks, (by his description;) that the tail was longer than that of the switch-tail shark.

WOOD'S HOLE, *November* 12, 1872.

MARTHA'S VINEYARD.

I have been to Menemsha and to Lambert's Cove, and saw all the fishermen that are at home. Some are not willing to give an account of what they catch, but say they did not get as much as last year. The Paint-Mill fish-pound men were all away, but the owners say they did not do half as well as last year. There was no run of scup, sea-bass, or tautog. Of blue-fish, they caught about one-fourth as many as last year.

B. TILTON, of the Menemsha Luce pound, said that they did not catch one-half as many scup and sea-bass and tautog as last year; of blue-fish, about half as many. Squid were more plenty; bait very plenty.

HIRAM POOL and LEMUEL REED, of Menemsha, net-men, of Prince Stewart's pound, said that they did a little better on scup this year than last. Their leader was twice as long as last year.

Of tautog and sea-bass they did not take one-fourth as many as last year, nor of blue-fish in the same length of time. They kept their pound down a good deal longer this year. Striped-bass were quite plenty in October. The 1st day of November, the day they took up the pound, they caught blue-fish, striped-bass, squeteague, cod-fish, and shad.

E. FLANDERS, of Menemsha, a net-fisherman, said he never saw fish so scarce since he had lived there as this year. He always could catch plenty of scup, sea-bass, and tautog there with hook and line; but could not catch any this year. Five years ago there were plenty of scup at Menemsha Pond, but none this year. He tended a fish-pound this season, and never knew fish so scarce. There were no blue-fish to be caught with the hook, and very few in the pounds. Squid quite plenty; very few mackerel this year. WILBUR FLANDERS, of the same fish-pound, confirmed the statement made by E. Flanders.

LAMBERT'S COVE.

SETH LUCE and JEREMIAH LUCE, net-men, said they did not keep any account of fish, but knew they did not catch more than one-half as

many blue-fish as last year; of scup, sea-bass, and tautog not more than one-fourth as many. Menhaden and squid were about the same. Did not get more than one-tenth as many mackerel as last year.

VERNAL CLIFFORD, net-man, set his pound for the first time this year, but did not do anything; did not get any run of tautog, sea-bass, or scup. Blue-fish were very scarce; some squid; very few mackerel. Plenty of fish were formerly taken here with hook and line, but this year none could be caught.

E. COTTLE said there were very few scup; no tautog; very few sea-bass and mackerel last season; about half as many blue-fish as last year. Squeteague and small scup quite plenty.

THOMAS NORTON, net-man, did not do much this year. The net was taken up early in the season. There was no run of scup, sea-bass, or tautog, and the business did not pay, and he was compelled to take up the pound. They could not catch any fish with hook and line.

JOHN LOAK kept no account this year, but did not do much. Blue fish were very scarce this year. Tautog, sea-bass, and scup were very few. Squeteague were plenty. No run of mackerel.

VINEYARD HAVEN.

B. D. CROWELL, overseer of herring fishery, had had charge of the herring fishery six years. When he first took the river he caught 800,000 to 1,000,000 in a season; but every year since the fish-pounds were set at Lambert's Cove the herring have been growing less. Last year he caught only 108,000. The scarcity is the same in all the rivers on the island.

B. CROMWELL, net-man, said blue-fish were very scarce there last season. Four years ago plenty of large scup could be taken in the immediate neighborhood, but they could get none this year. Very few sea-bass or tautog had been caught.

P. S.—I saw some of the fishermen in New Bedford yesterday, (November 26.) They say the tautog were very scarce at the mouth of the bay this fall. At Wood's Hole we obtained none after the 25th of October; all were very small.

A few blue-fish were taken at Noman's Land, on the 2d of November, with hook and line, while fishing for cod. English herring (*Clupea elongata*) have been very plenty there lately. Some of those taken were full of spawn.

VINAL N. EDWARDS.

WOOD'S HOLE, *November* 25, 1872.

ADDITIONAL NOTES TAKEN BY THE COMMISSIONER.

WOOD'S HOLE, *October* 8, 1872.

Captain J. B. EDWARDS says there has been a falling off of all kinds of fish this year as compared with last year, except herring, or alewives. They were more abundant in the spring than they had been for twenty years.

Blue-fish have not been caught anywhere in the sound as much as last year; and at Hyannis it has been the same. They have not caught as many this year as last.

Tautog fell off half in the early part of the season, and there have not been anything like as many caught this year as last.

English herring do not come here much in the spring, but in the fall they are taken for bait in gill-nets. November appears to be their running month.

The small scup, of the size that were plenty last year, have been quite scarce this year. A man can catch forty or possibly one hundred in a day on the best grounds here; but before we had pounds I could catch boat-loads in a day.

The pounds at Waquoit did not do much this year, but at the pounds below Falmouth they caught a great many herring. The alewives have been much more plenty than usual this season. I think Captain Spindel got five hundred and sixty Spanish mackerel at one time, and they got three hundred at Menemsha at the same time. Cod were much more plenty in the bay formerly than now.

Captain ISAIAH SPINDEL took up his pound last week, Tuesday, October 1. It did not pay as much this year as last, as there was no market for the menhaden. He had seen menhaden with spawn in them, not ripe, late in the spring. There is no spawn in them now, and they must have spawned some time since last spring. Menhaden are as large and fat in October as at any time.

We take a few English herring in the spring, possibly a thousand; they are what we call "blue-backs;" they come about the 10th or 12th of May. I have seen schools of the same fish in the bay, and have caught them in a purse-net in the spring. They come a little before the menhaden, among the early fish. We never catch any in the fall in pounds, though they are frequently taken in gill-nets.

The fishing was later this year than last. We got 35 barrels of scup about the 30th of May, very large, some weighing 4 pounds.

We did not get as many fish generally as last year; about as many tautog, not so many sea-bass nor scup; blue-fish, about one-fourth as many; squeteague, not one-fourth as many. We got eight hundred more Spanish mackerel than last year. The price of these averaged 20 cents a pound. We got five porpoises and many pilot-fish. We got twice as many ceros as last year, some of which weighed 23 pounds. We got 12½ cents a pound for them. The price for fish generally was about the same this year as last, though not quite so good for mackerel. They are always poor in the spring.

The blue-fish we got this year were small, averaging 2½ to 3 pounds, though we got a few that weighed 10 to 12 pounds.

I was on the coast of North Carolina last winter, and they said they got mackerel about the 20th of March. The run of mackerel that come inside of Massachusetts Bay are much larger than those outside. They do not bite, but are taken in seines and gill-nets. They weigh 3 pounds, many of them; are very fat, and a splendid fish. They are sold fresh.

They are the mackerel that are poor in the spring. They get them in Massachusetts Bay in January.

The small scup that were here last year now weigh not far short of half a pound; but there are not so many small ones, though I have some very small.

VINAL N. EDWARDS did not meet with many small scup like those seen a year ago, but there are many half-pound scup. He had not seen any mullet this season. There are many young menhaden. As he caught tautog with the hook, about the 1st of July, he had seen the spawn running out. The eggs are about the size of No. 3 shot. A part of the eggs seem to ripen at a time. The Quisset men told me they had not done half as well this year as last. Peter Davis, of Noank, who fished on Naushon, said he had not done half as well.

I did not find any menhaden with ripe spawn in them this summer, and I examined them carefully. I caught some last Saturday, but they had no spawn in them. We never see any young menhaden till July or August. I have caught them not more than an inch or an inch and a quarter long.

NEW BEDFORD, *October* 9, 1872.

Mr. CLARKE, fish-dealer, of the firm of Clarke & Bartlett, says blue-fish are as plenty in market this year as they were last, even if scarcer in the sound.

Scup have not been very plenty here. Ten years ago a man could load a boat with scup, here in the bay, in a day.

Fish, generally, are growing more and more scarce every year; and we can see a positive difference in the numbers between this year and last. The scarcity has been increasing for five years. The little scup that were here last year are not so plenty this year.

In this vicinity tautog are about run out; they are not worth fishing for.

The smacks are about killed off; they used to get a load in two weeks, but now they cannot get half a load in three weeks. We depend on traps mostly for fish. In the spring they catch the large tautog and glut the market with them, and after that they have to throw them away.

The regular retail price for tautog is 10 cents a pound. Cod retail at 8 cents, and scup about 8 cents, dressed.

We have had blue-fish in market all the time this season.

I think it would be better for the fishermen and all concerned if there were no traps in the world. As long as they can, the trappers will hire men to go before committees of the legislature and swear that fish grow more plenty all the time. The trap-men make all the money, while the smack-men make nothing all summer. I know two smack-men who have not made enough all summer to pay for their bread and butter, and they tried hard, too. There have been no large scup for about four years. Many poor families in this city suffer for the want of bread in consequence of the traps.

We got some pompanos this summer, for which we got 25 cents a pound. They came here last year, first, of any account.

Mr. WILLIAM A. BASSETT, a dealer in fish, says small scup are more plenty this year than last, (evidently referring to scup that weigh about 5 ounces.)

I think blue-fish have been as plenty as last year, but they are generally small, weighing $2\frac{1}{2}$ to 3 pounds.

They do not get as many squeteague on the Vineyard shore as last year, though small squeteague have been rather plenty this year. We get a few pompanos. Tautog are rather scarce.

English herring are brought here from about Noman's Land. They are about half as large as the alewives that we get in the spring. They are caught about the last of October.

Menhaden have been very plenty this year. There have been very few boats fishing in our harbor this year. Our common alewives were never more plenty than this spring; we could not sell them, they were so plenty; they could be bought for 25 cents a barrel. The Vineyard fishermen turned out a great many, because they could not sell them.

In Clarke's Cove the pound-men did pretty well, as the herring helped them out in the spring. There are seven pounds between this city and Mishaum Point.

Six of the small scup in the shop were weighed, amounting to 2 pounds and 1 ounce, or an average of a little over 5 ounces each.

Dates when the fish were first brought in.

Herring, April 3, from Westport. In 1870, from Edgartown, six hundred herring, April 1. *Tautog*, April 17, from North Tisbury, and one shad. *Mackerel*, about 2d of May. *Striped bass*, May 4, from the Vineyard. *Scup*, May 7. *Blue-fish*, about June 1; most plenty from 10th to 14th of June.

Mr. BASSETT said he had no doubt that the pounds had caused the decrease in the fish.

Mr. PRESBREY LUCE, of Martha's Vineyard, says he has a pound on the north side of the Vineyard, at Paintville. Scup were quite plenty there this year and last; he got 50 barrels at one time.

Blue-fish were more scarce about the Vineyard this year than last. The business of pound-fishing there has been overdone, and the pounds generally there have not done as well this year as the last. Mr. Luce thought the proposition in regard to a close time, as proposed in the bill prepared last year, a fair one, and did not think there would be any material opposition to such a law.

XIII.—PLEADINGS BEFORE THE SENATE COMMITTEE ON FISHERIES, OF THE RHODE ISLAND LEGISLATURE, AT ITS JANUARY SESSION OF 1872.

[I have already, on page 104, given the argument by Mr. Powel, before the Legislature of Rhode Island, on the subject of regulating the fisheries by law, as also the report of the special committee of the legislature on the same subject. The testimony and arguments presented to a subsequent committee have not been published, and I therefore embrace the opportunity, afforded by the courtesy of Mr. Pitman, to print from his manuscript the argument presented by him in January, 1872, in favor of legislation. I also give the substance of a lecture delivered by Captain Nathaniel Atwood, of Provincetown, Massachusetts, before the same committee, with the special object of showing that no such interference was necessary or proper.

As will be seen from my own report, I do not agree entirely with either line of argument thus presented, although both gentlemen present considerations worthy of careful consideration.—[S. F. BAIRD.]

ARGUMENT OF J. TALBOT PITMAN IN FAVOR OF A LAW PROHIBITING THE USE OF TRAPS AND POUNDS IN RHODE ISLAND.

Mr. CHAIRMAN: I do not propose to go into an examination in detail of the evidence presented at this inquiry further than is necessary in the course of the remarks I shall offer.

The record of this evidence, although necessarily imperfect, from the impossibility of taking down all that was stated by the witnesses, is in your hands, and where it is defective your recollection will doubtless supply the omissions.

The remarks will be chiefly confined to the discussion of the main points of the general question, in the endeavor, by the assistance of the information within my reach, and by the comparison of the facts presented with each other, to lead the minds of the committee to the conclusion that the grounds and theories upon which the trappers base their claim to continue this fishery, are unreliable and fallacious.

I shall take it for granted that the report of the joint special committee of 1870, and also the testimony of the witnesses annexed to it, although not allowed to be introduced in this inquiry, will not be entirely ignored by your honors, and that you will read that report and some of the testimony, especially that of Joseph Church, Daniel Church, Benjamin Munro, and Benjamin Tallman, all the witnesses presenting themselves on the part of the trapping interest; and also of Jeremiah B. and

William C. H. Whaley, C. H. Bassett, John Steere, John D. Swan, and George S. Burleigh, because all the evidence presented in that report ought to have as strong a claim to be considered as much of the testimony presented by the other side.

But before entering upon the subject, I wish to give a brief

HISTORY OF THE INVESTIGATION AS TO TRAPPING.

This question has been before the general assembly five times at least; was referred thrice to a committee of the house, once to a joint committee of both houses, and it is now before your honors as a committee of the senate.

In 1856 a petition was referred to Samuel B. Wheaton and others, a house committee, as would appear from the report, in relation to the effect of trapping on other fish; and in said report, made in 1857, recommending that the petitioners have leave to withdraw, it is stated—

"Your committee were satisfied that the fisheries * * should not be interfered with or restrained unless it seriously interfere with the fishing in the other waters of the State, or some other very important reason."

Again:

"But there was no evidence submitted to the committee that the number or size of these fish (scup) were injuriously affected by the trap or seine-fishing."

The inquiry, as now asked for, was not entered into by that committee, nor, so far as I can learn, by another committee, appointed in 1864, of which the late Hon. Samuel Ames was a member. I understand that the report made by this committee cannot be found among the files of the proceedings of the general assembly, and I have been unable to find any printed report in the papers of the day.

In 1870, upon a petition signed by a large number of citizens of the State, a third committee was requested to investigate and inquire into the scarcity of scup, and to report whether any legislation was proper.

After a long and patient hearing of the parties interested, four out of five joined in a report recommending the passage of an act prohibiting the use of traps and heart-seines, but excluded Seaconnet Point from the operation of the law, for the reasons, as are to be inferred from the report, viz, that—

"It was contended by remonstrants that the fish caught by the traps *at Seaconnet were leaving the waters of the State and would not return.* Also, that they were never *known to go up Seaconnet River and through Stone Bridge into Mount Hope Bay*," &c.

And the majority of this committee could not decide whether this was so or not, from the conflicting evidence, but they "were of the opinion, from the evidence, that the impurities in the water did not interfere with the fish spawning, feeding, or staying in the bay below Nayal Point."

The act recommended, after being amended, was passed by the house, but defeated in the senate.

And the matter was then referred to a joint special committee at the same January session.

This committee made a unanimous report, in which it is stated—

"It appears to the committee that some legislative restraint as to the use of new instrumentalities for fishing, which impair or destroy individual rights, should be provided and enforced.

"After a careful and anxious investigation of the subject, the committee have come to the unanimous conclusion to recommend that the

use of all traps and heart-seines, and other contrivances for catching fish, not including pike-nets, shore or purse-seines, be prohibited in all the waters of Rhode Island northerly of a line drawn from the southerly point of the rocks at Brenton's Reef to the southerly point of Point Judith, and north of Stone Bridge at Howland's Ferry."

Although satisfied with the conclusions thus unanimously arrived at by the committee, the act recommended by it did not meet the approval of many of the friends of the measure, for the reasons, that as Seaconnet Point and vicinity, excluded from the action of the proposed law, caught nine-tenths of all the scup trapped, it seemed to them that this locality was the very seat of the evil complained of, and it would be more fair to reverse the exclusion; that this exclusion made the law partial in its effects, and would be so distasteful to the common sense of the people of the State, on account of its injustice, that it could never stand; and that it was the opinion that the question, whether trapping was one of the chief causes of the scarcity, could only be tried by experiment, and to do this properly and fairly, all trapping should be prohibited during the time necessary to try it. Under the act as proposed, this question could never be decided; and upon its failure, as was sure to be the case, the trappers would then turn round and ask to have the act repealed, on the ground that, under our law, it was evident that some other cause than trapping was the chief cause of the scarcity. With this feeling, the act was amended in various ways in the house; it was passed and sent to the senate, and there defeated.

The present inquiry, for want of the act introduced at the last May session and referred to your committee, is raised under a petition to the same effect as those presented in January, 1870.

In investigating a business about which the committee had little or no personal knowledge, you would naturally rely upon that class of men whose occupation it is, for information upon all matters connected with it, and if reliable, your views and opinions would be much governed by their statements.

It would be presumed that, from their opportunities of observation and personal experience, the trappers would possess a large amount of correct knowledge as to the habits, food, modes of spawning, habitations in winter and summer, &c., of these fish, and be able to satisfy you upon the various questions that must necessarily arise in an inquiry whether scup and other fish have been diminished by the use of traps, or by other causes beyond or under the control of the legislature.

That these fishermen should know so little as to these fish, *beyond what is connected immediately with their pecuniary interests*, would have been a matter of surprise to me, had not this been already affirmed to be the case by Captain Atwood, who made the statement nearly two years ago, and re-affirmed it before you the other day. And not only is it his opinion, but it is that of the British commission, whose report will subsequently be referred to; and I shall endeavor to show that this is also confirmed by their own representations made to your honors.

For this reason any statement or theory emanating from the trappers is *presumptively made in favor of their pecuniary interests*, and, as such, should be thoroughly examined, subjected to all the tests by which it may be affected, and its soundness proved beyond a reasonable doubt, before it is accepted.

These are to be tested chiefly by the information received through the writings of those acquainted with these or similar fish, or obtained from the personal observation and experience of fishermen, but particularly by the examination of facts which, apparently isolated, may have been

accidentally brought out without the knowledge of their effects upon the subject-matter.

By comparing and examining these, it not unfrequently happens results are produced that completely overthrow the theory they were expected to support.

In order to arrive at a rational, careful, and correct judgment of the effect of traps upon these fish, I shall endeavor, by the light of the limited information we are able to obtain, and of some of the facts as to the habits of fish, to show that the theories upon which the trappers mostly rely are deceptive and unsound.

And, as a part of the information, I shall refer to various books on the general subject, and in relation to the particular subject-matter, to the report of the joint special committee, and to some of the statements of the witnesses accompanying it; the latter, however, to be taken as hearsay testimony, if no greater weight can be accorded them.

In an inquiry of the character now under consideration, the committee must, from its very nature, depend in a great degree upon the statements of the persons appearing before it, of whom many, if not all, are more or less interested, but none so much as the trappers and those connected with them. In the testimony of these last, much has been stated upon information derived from others. Desiring that the committee should be possessed of all the information the question afforded, I have not objected to the reception of such hearsay testimony, except for the reason that the testimony *taken under oath* before the joint special committee was ruled out.

I am yet to be convinced that this testimony, so taken, and for the purpose for which it was taken, is not as fully entitled to credit as much that was presented to the committee, especially since there has been nothing adduced to question its authenticity and correctness, or to contradict the facts or opinions therein stated, any further than the evidence at that inquiry on the part of the trappers tended.

With all due deference to the committee, I must confess that I am still of the opinion, particularly after conferring with gentlemen conversant with the usage prevailing in such investigations before committees of either house, that the committee was incorrect in its decision, and did not follow the customary practice usual and necessary in such cases.

Inasmuch as the question is one affecting the interests and rights of every citizen of the State, it would seem but reasonable that witnesses coming before the committee should be paid for their time and expenses; but as the honorable Senate declined to provide for this, and as there was no other way to procure the evidence of persons acquainted with the subject of and interested in the hook-and-line fishing, except by their voluntary appearance, I had to content myself with the few that did appear, and who were sufficient, and all, that in my opinion, were necessary to establish the main points of our case, trusting to prove the remainder by the testimony of the witnesses on the other side.

Several very important witnesses reside at such distances that they could not be expected to present themselves at their own expense.

I hold that the trappers are and have been endeavoring to establish, as the main support of their cause, two principal theories, viz:

1. That scup and other similar fish cannot be affected, as to numbers and size, by any kind or any amount of fishing.

2. That scup, when caught at Seaconnet Point in the traps, are on their way to the eastward, out of the waters of the State.

A third, subordinate to and connected with the last, is—

3. That scup found above Stone Bridge are lost fish, coming in by the

west passage and not by Stone Bridge, and to regain their course will not go down to the sea through Stone Bridge, but return by the west passage round Brenton's Reef, and then eastward.

All these are presented to subserve the purpose, and the only purpose, of preserving the great trapping-ground at Seaconnet Point from being interfered with. So long as the trapping at this locality is not restrained, the main opposers to a law to this end are indifferent, and do not care what the law is.

Not a word has been said in defense of trapping at other places, except so far as these interests could not be separated.

As this locality is the great head and front of the trapping interest, my attention will be chiefly confined to the discussion of matters connected with it.

The actual facts, shown by the testimony of the trapping interest, are substantially these:

That scup begin to appear at Seaconnet Point and along the coast in schools, and in three runs, of which the first remains about a week, the second follows immediately after and remains about ten days, when it is followed by the third.

That the two first runs are full of spawn, some of them spawning when taken; are sluggish, not moving faster than two or three miles an hour; will not bite at the hook; apparently do not eat; and when opened, nothing is found within them.

That at this period they are a surface fish. After they have spawned, the schools break up and scup become a bottom fish.

That the first run is to the second run as about 1 to 50.

That the traps are set so as to take the fish coming, as they allege, but do not prove, from the eastward.

That they were first set at Seaconnet Point in 1845, and none were set west of Brenton's Reef until after 1860.

That from 1823 to 1845 scup were very plenty above Stone Bridge, and from 1845 they have gradually been growing scarcer.

That in 1870 and 1871 from 15,000 to 20,000 barrels were caught each year.

FISHING.

Upon the evidence it is shown, that about the year 1823 purse-seines were used both at Seaconnet Point and also above Stone Bridge, about Common Fence Point, and at the latter place scup were caught in great quantities. That in 1845 or 1846 traps were first set at Seaconnet Point. That from the year 1845 scup began to diminish in numbers, especially above Stone Bridge, and a few years back purse-seining had been abandoned at this neighborhood on account of the scarcity.

In the opinion of Messrs. Rice, Barney, Steere and Thurber, the only witnesses who appeared on the part of the hook-and-line interest, this scarcity is attributable to the traps of all kinds. On the part of the trappers it is denied that the traps at Seaconnet Point (the only interest represented) have any effect on the number, but that it is owing to the impurities of the water, want of food, destruction by horse-mackerel and other fish, and that the scup are changing their grounds and seeking new homes; and in the opinion of some, that the passage of steamboats up and down the river frightens them off. These are not alluded to in the respondent's argument, nevertheless I believe it important for me to do so.

IMPURITIES OF THE WATER.

The two committees (as shown in the majority report of 1870 and that of the joint committee) that have preceded you, were satisfied that this was not the case.

Their opinion was based, I presume—at least that of the majority report—upon the report of the committee of the legislature in 1860, to investigate the subject of the effect of impurities from gas-works, &c., on the fish, &c., in our waters; upon the report of Professor Hill as to his analysis of the waters above Field's Point, and upon the opinion of many of the witnesses.

That putrid waters appear to be innocuous (J. C. Rep., p. 12) has been shown in various ways, but it is conclusively proved that fish will thrive and grow fat in waters which will affect them so as to render them unpalatable to man as food. The Hon. E. C. Clarke, of South Kingston, stated in his seat in the house, that he once caught fish in Robinsonville Pond, Attleborough, Massachusetts, that were handsome and very fat, but when opened, emitted so strong an effluvium of gas that they could not be eaten.[1] In the newspapers it was stated, that off New Bedford clams were dug for a chowder, and when the dish was set before the party it was so impregnated with gas flavor, produced from the clams, that no one could eat it.

The trappers attempt to establish their view by endeavoring to show that fish brought in wells to the Providence market will not live so long as formerly, and ascribe this to the increased impurity of the water. On the other side, it is in evidence that fish will not live in wells or smacks far down the river in warm weather, unless the vessels are frequently kept in motion, so as to change the water and the air. Besides, there is no question but what the current of the river at the Great Bridge has been weakened from what it was before the dam was put in, when the tide had free scope, and the water near where the State prison now stands was 6 to 8 feet deep.

Mr. Atwood, in his address, gives a sufficiently good reason why fish would not long live in this manner, especially if bottom fish, in the change from cold to warm water, and, he might have added, from salt to fresher water; yet if the change was a gradual one, he believes fish would live. He also thinks that the effect of impurity of water in driving away fish would arise more from the effect it produced on their food than from any direct influence.

WANT OF FOOD.

There is no evidence showing scarcity of food. It is shown that muscle-beds are constantly forming, dying out, and re-forming; and they do so in streams into which the waste water from the print-works in Apponaug is constantly thrown, and grow abundantly. Even this proof of the fact of the growth, however, establishes nothing beyond this, that where muscles grow and flourish, other food would be likely to be equally abundant. From the kind of teeth belonging to scup, it is doubtful whether they are able to feed upon muscles, except when young and their shells can be easily crushed. They probably feed upon the spawn of these and other shell, and of other fish, and animalcules and small shell-fish found with the sea-weeds, and upon the sea-weeds themselves.

[1] Mr. Clarke informs me that he visited this locality in February, 1872, and there learned that the same peculiarities still attach to the fish, so that they cannot be eaten.

It may be also assumed, that if food was plenty when scup were so abundant, the growing scarcity of the latter would allow of the greater increase of the former. And without some direct proof of such scarcity, and as we know that clams and other shell-fish are still found in abundance, in spite of the increased demand upon them, we believe there is no want of food.

HORSE-MACKEREL (BLUE-FISH).

These fish are known as a surface fish. Their teeth are formed not for grinding, but simply for cutting, and their food is taken in and swallowed whole. Their principal food is the menhaden, also known as a surface fish.

Scup are a bottom fish, except at the time of spawning and before the mackerel come in. Their armor of bristling fins renders them an uncomfortable morsel to swallow; their short, chubby form, in contradistinction to that of the long, slim blue-fish, enables them to turn more quickly than the latter, and to elude the attacks, if made, while their habitation in the eel-grass shelters them still more from the attacks of their enemies.

There is no doubt that blue-fish will capture a scup when the opportunity offers and it is hungry, for it will seize a bright piece of metal or a bit of rag; but I think he is equally sorry he has made the mistake, whether he finds he has taken a hook or the sharp fins of the scup. The blue-fish, as well as other fish, may take scup when small, and, from the evidence, I have no doubt do so; but these keep generally in shallow water and among the eel-grass.

ENEMIES OF SCUP.

I do not pretend that scup have no enemies and are not destroyed in vast numbers. It was for this reason the Creator provided them with such immense powers of reproduction.

The water-animals, like those on land, prey upon each other, and, in many cases, on their own species, the large destroying the small.

Nor do I maintain that they are not liable to disease or other destroying causes, independent of other direct enemies.

Otherwise, if thus undisturbed, they would increase in such numbers as to overbalance and upset the order established by nature's laws.

These fish are intended as an article of food for man, to be used at a season of the year when other fish are seeking cooler waters, and when the appetite has a distaste for the more solid food, and craves a lighter and more digestible diet, to conform to the state of inactivity induced by the hot weather.

Now, while admitting that scup and all other similar fish have numerous destroyers, and that their numbers are greatly decreased by them, we say that enough are provided for the use of man, provided they are taken at the time he needs them and in the ordinary mode. This time is when the warm weather continues, and the ordinary mode of hook and line has hitherto been able, until recently, to supply as large a quantity as can readily be consumed.

When, however, man resorts to these traps and catches them in large quantities, and at a time they are spawning, (as we expect to show,) the supply cannot meet the draught, and, it is contended, must gradually be diminished, until exterminated or the trap-fishing is no longer worth following, like the purse-seining at Stone Bridge.

The same assertion, now made by the trappers, was formerly used in

regard to salmon, shad, herring, to the wild fowl and the buffalo. It was thought nothing could affect the supply. The salmon are no longer found in our rivers, the shad are fast disappearing, and a very perceptible decrease as to the herring and the buffalo has taken place, showing that in time, unless the wanton destruction of the buffalo and the indiscriminate modes for taking shad and herring are prohibited, they will soon be among the things that were.

The Indian cared for the buffalo and regulated their destruction, with jealous care, killing only what was absolutely necessary for food, and in this way their numbers were kept up. But the white man destroyed them regardless of the consequences, and for no other purpose, apparently, than the mere love of destroying. The result is, that in some sections of the country they have entirely disappeared, and everywhere largely decreased.

The same cause and effect exist in regard to scup. In 1857 the trappers admitted to the committee that 60,000 barrels were taken in their traps, of which 45,000 were sold for food at 30 cents per barrel, and 15,000 for manure at 18 cents per barrel. But Mr. W. C. H. Whaley, at that time engaged in trapping, says that in 1856 150,000 were taken from Watch Hill and Seaconnet Point; in 1857 about 160,000; in 1858 about 115,000 barrels, and each season since the quantity has decreased. In the year 1869, as near as can be ascertained, only about 20,000 barrels were taken; in 1870 (9,000 to 10,000 up to May 16) about 12,000, and in 1871 about the same number, or perhaps a few more.

Is it to be supposed, in the face of the fact that these fish, in consequence of the foreign demand, are worth on the average $2 per barrel, (nearly seven times the price of 1857,) that the trappers do not catch all they can? Is it not self-evident that the reason they do not catch more is that they are not to be found, and that they have actually decreased in numbers to this extent?

HABITS OF SCUP.

In order to comprehend the questions involved in the inquiry in which you are now engaged, it will be necessary to consider the habits of other fish in relation to reproduction and how far the habits of scup coincide with them. To do this properly, we have to ascertain what are the habits of these other fish, and whether these habits are like those known of scup; that is to say, if we find that scup and other fish have certain known habits in common, we may conclude from the analogy between them that the former have certain other habits identically the same with those we know these other fish possess.

In making this examination, we must select those fish whose modes of spawning most nearly resemble the fish in question. For this reason we would consider those, for instance, that frequent our rivers and streams, such as the salmon, shad, herring, &c.

It is admitted that these fish enter our rivers in the early spring from the ocean, proceed to the place where they were born, to deposit their spawn, and having deposited it, that the herring break up the schools and disperse to their feeding-grounds.

We assume as a fact which cannot be disputed by any evidence, and which is supported by much, that scup, having hibernated not a great distance from the coast, on the approach of spring awake from a dormant state, and approach the coast for the purpose of spawning. Some of them take up their ground at Block Island, others at other favorable localities; some come to Seaconnet Point, others in the neighborhood of

Sichuest Beach, and some formerly came up to Mount Hope Bay; all coming to the place of their birth. They come in schools, remain so for a time, and then break up and disperse themselves over the feeding-grounds. That while in these schools and frequenting the shore of Church's Cove, we say that the first run of scup are spawning, and when this is finished they break up. We come to this conclusion, because the first run of scup are caught within a week; during this time they are sluggish in their movements, seem almost unconscious of danger, eat nothing, and the anal passage appears to be sealed up; they are full of spawn and are spawning—so Captain Benjamin Tallman himself states

The Report of the Commissioners of River Fisheries of Massachusetts, of 1869, page 17, says: "All fishes that go to fresh water to breed, seek their proper birth-place, and they are there concentrated and crowded together, and are, moreover, very tame, so that it then becomes possible to capture them in vast quantities and in a limited space; and unless they be at that time protected, they are liable to extinction in the particular waters where such wholesale destruction goes on."

Mr. Atwood stated, with regard to mackerel, some facts that throw strong light upon this point. He says that these fish begin to appear the middle of May, a few at a time, then in abundance, which, I suppose, means in schools. They will not touch the bait on the hook at this time, and are taken by nets out in the bay. From about the 28th of May to the 4th of June they were depositing spawn, and by the last date had finished and left for feeding-grounds.

The habits of mackerel, thus stated, as to assembling, refusing bait, and breaking up, and the time they are together, agree so well with those of scup while at Church's Cove, that if unsupported by any other evidence, most inquirers would be satisfied that scup were spawning while there, and that their disappearance was owing to their having completed their mission and dispersed to feed in the vicinity.

On the other hand, the trappers at Seaconnet Point require us to believe that these fish come into Church's Cove by accident on their way from Watch Hill, where they first took the coast on their way eastward to Buzzard's Bay and Nantucket Shoals. To the committee of 1857 they stated that they were bound there for the purpose of spawning, but they have since modified this, and now allege simply that they are bound there.

The reason why this has been so pertinaciously persisted in is, that as these fish were thus leaving the waters of the State it was contended the people of the State could not be injured by the taking of them, and therefore traps at this locality ought not to be interfered with. Therefore, if this theory could be successfully controverted and overthrown, no real ground would remain why these traps should be treated differently from the others, or should be allowed to continue in operation.

I have always argued that this theory was untrue, principally upon the belief that the instincts of fish were unerring and certain guides; that if it was ever intended they should summer in Buzzard's Bay, these instincts would have carried them there in a direct course from their winter-quarters. And this belief has been confirmed by facts that came out at the former committee investigations. One of these was the statement made by Captain Joseph Church, that upwards of twelve years ago he bought a barrel of scup caught at Waquoit Pond, five or eight days before scup were caught at Seaconnet Point, where the traps were set. This was self-evident proof that the scup caught at Waquoit Pond did not reach there by the way of Seaconnet Point. Another was, that scup were caught in Long Island Sound, at Gardner's Island, and other

places, in great abundance, several years ago. Every one admits that they did not get there by the way of New York and Hell-gate, but came in around Montauk Point; so that with regard to these fish, the theory that scup moved always toward the *east* was not true, as they went *westward.*

This belief has, at the present investigation, been still more strengthened by the honest and straightforward testimony of Lorenzo Tallman, who says that the trappers' theory is based solely on the ground that scup are usually caught at Watch Hill before they are caught at Newport, and at Newport before being caught at Seaconnet.

And further, he says that last season scup came in, to a breadth of sixty miles, at or about one time, and that a vessel-load of scup from Nantucket was brought into Newport Harbor, and immediately after, another from Seaconnet, before any were caught by the traps off Newport, and that the theory is completely upset.

SPAWNING.

In connection with and in order to understand all the bearings, it is necessary to consider the manner of *spawning.*

In the book called "Fishing in American Waters," we find considerable general information, and I propose to cite a few passages from it, not only in relation to scup, but with regard to some other fishes that are the subjects of this inquiry:

"These fish replenish their species by laying eggs, which are vivified by the milt of the male, and then, after a time, the eggs hatch in the water. This process is common to all egg-laying fishes; but while eggs of the *Salmo* genus require from three to four months to hatch, those of the *Clupea* genus hatch in as many days. Seth Green hatched *shad* artificially on the Connecticut River in forty hours from the time the ova and milt fell into the hatching-boxes in the stream. (Page 41.)

"The striped bass is eminently domestic in its habits. * * The female deposits her eggs in fresh and brackish waters, but never in the sea. In November the bass shoal and congregate in brackish-water ponds, or back waters of tidal rivers, or in the bays and bayous of rivers which have an outlet to the sea, after which time it will not take bait until the following spring, after having spawned and returned to active waters. (Page 47.)

"Upon the breeding-times of different fishes, and their resorts at certain seasons in the year to hibernate, there are no fixed data. (Page 406.)

"Most white-meated fish spawn in the spring, yet the fish known as the *white-fish* spawns early in the autumn. All members of the genus *Salmo* spawn in autumn.

"*Shad.*—It winters in the ocean, dallies among the nets in the estuaries during spring, after which it lays its ova in the sand above the tide-waters, and returns to salt water to recuperate. (Page 324.)

"The porgee ('scup') is supposed to spawn on the weedy banks, with sea-bass and tautog, early in spring, when the last year's hatch leave for the estuaries, purveying to the head of tide-waters." (Page 110.)

According to the best information I have been able to obtain, I am led to the conclusion that scup frequent the mouths of, or in, rivers into which fresh water empties, or in fresh-water streams, at the time of spawning, and nowhere else, for the benefit they derive from the fresh or brackish water, especially since it is shown by the experiments of the Coast Survey that salt and fresh water or waters of different temperatures do not readily unite. The Gulf Stream is an example of water of

different temperatures, and it is reported by the Coast-Survey that in the Hudson River a counter-current of salt water is found underlying the outward current of brackish water. This view receives some strength from the fact that scup keep near the surface while in the schools, and, as we believe, in the act of spawning. But however large the part this may play in the process of spawning, we desire to present some other phases of equal or greater importance.

I am informed by a gentleman that he once witnessed trout, kept in an aquarium, in the act of spawning; the whole process occupied three days. At intervals the female would eject a stream of ova into the water, and immediately the male would emit a quantity of fluid. When an egg came in contact with a particle of this fluid, it would sink to the bottom, while those that did not, rose to the top; the former was said to be impregnated and the latter were not, and were consequently lost.

If the same process takes place with regard to scup, (and I have no reason to doubt it,) one of the conditions to a successful spawning is to select water most protected from the wind, most exposed to the sun, and out of the reach and action of the tide, where it shall be as quiet as possible. Seaconnet River presents, especially at Church's Cove, these conditions more perfectly than either of the other passages of the river. There is, comparatively, less current, on account of the obstruction made by Stone Bridge; the water is shallow, and the eddy or counter-current at Church's Cove creates comparatively still water and is protected from the northeast wind, while the other passages are open to this wind, and the water is deeper. Another condition seems to be that as the males are to the females about as one to four, it is necessary for the impregnation of the ova that these fish should concentrate as closely as possible. By this mode a larger number of the eggs would be vivified than if they were separate and isolated.

Undoubtedly, particularly if the waters are in more than ordinary motion, caused by the winds, a very large proportion of the spawn escapes this fluid, and it is then only useful as food for other fish in attendance upon them. The vivified ova sink to the bottom, among the crevices formed by the rocky bottom, where they remain until hatched. This is the real cause, it seems to me, why scup are found at this period at Church's Cove.

Great stress is laid by the trappers on the fact that the traps are set with their mouths so as to take the fish coming down the shore. They assert that the fish are skirting the shores until they come to the mouth of the river; they then strike across until they reach the shores at Church's Cove, when they turn southwardly, down stream, and on their course are taken in the act of leaving the State waters and going to the eastward. Let us see whether this is actually the case.

It is admitted that the traps at Seaconnet Point take nine-tenths of all the fish trapped between Newport and this locality.

If the fish were following the shores as asserted, it would seem probable that a larger proportion would be caught by the other traps on the Newport side of coast; as this is not the case, the inference to be drawn is that they did not reach Seaconnet Point from that direction.

Further, from the evidence that the fish were caught this season at Nantucket and Seaconnet Point, respectively, before they were caught at the traps off Newport, the conclusion is, that of the two directions, eastward and westward, they came from the latter, if either.

Now, in this latter case, *the mouths of the traps should have been set the other way, but they were not*, and as about the same quantity were taken last season as the one before, it is evident that they came neither

from the east nor west, but direct from their winter-quarters to their summer-homes, and if unmolested would have spawned in our waters.

The truth is that these fishermen have studied the habits of these fish so far only as they contribute to their pecuniary interests, as suggested by Captain Atwood, and upon their knowledge of these habits, these traps are set where the fish most do congregate, and in such a manner as to catch them.

They profess that because these traps do not completely close the mouth of the river, they do not obstruct the fish going up it. It is undoubtedly the case that these fish, like other animals, have their roads and pathways, and any obstruction placed in these roads would be as effectual to bar their progress as if the river were completely closed.

It is a remarkable fact, taken in this connection, that while we are assured that acres and acres of scup are seen outside and away from the traps, and while it is the custom to unite two gangs, so that while one of them attends the traps, the other, with purse-seines, are out on the river looking for and catching menhaden, yet we never hear of their catching scup, which are so much more valuable, by these purse-seines.

To prove that the fish at Seaconnet Point are not connected with those above Stone Bridge, until after they have left the latter place, the trappers have set up another theory, which we shall attmept to show has no better foundation than the one last discussed. It is stated that some of the schools on their way eastward, from Watch Hill to Buzzard's Bay, lose their road and go up the west passage into Mount Hope Bay, toward Fall River; here they find they are off their course, and to regain it skirt along the southern shore of the bay until they reach Seaconnet River, then down along the eastern side of the river until they find the bridge, and the passage through which being too narrow, (although Captain Church admits that they have been seen going down, but not up,) they cross and go up on the west side to Common Fence Point. From the time they enter this river, until and up to Common Fence Point, they used to be caught in purse-seines, but from this place they disappear; it is held that they then go down the west passage, pass around Brenton's Reef and reach Seaconnet Point about a week after they allege they left Common Fence Point on their way eastward.

This entire theory is based on the *allegation* that scup used to be taken at Seaconnet Point about a week after they had disappeared at Common Fence Point; it is simply a bare allegation, and is unsupported by the least tittle of evidence. To believe this, one must accept as true that the scup, whom instinct has led them to, our shores, have suddenly lost it; that they must have passed quietly, unseen, and beneath the surface of the waters, when they had previously been on the surface, up through the west passage and through Mount Hope Bay, and did not appear in sight until they found they were on the wrong road, when they first appear on the surface, I suppose *to look round and see how the land lies;* they then keep near the surface, while skirting along the sides of the river, until they reach Common Fence Point, where they again disappear beneath the waters, and are not seen again until the sea is reached. It is not pretended that all the schools do this, for the others, better informed or led by a more experienced pilot, keep along the coast until they reach Seaconnet Point.

How this can be reconciled with the fact that the unlost schools are being taken as soon as they arrive at Seaconnet Point, several days or a week before the lost schools regain their proper course, coupled with the fact that the first run of scup do not continue more than a week at the most, I cannot conceive.

I shall attempt to account for the appearance of scup above Stone Bridge, and their gradual disappearance in another way.

I think there can be no doubt that formerly scup came up to Stone Bridge, by the way of Seaconnet Point, for the purpose of spawning, and did spawn there.

After the traps were set at Seaconnet Point, vast quantities were taken there, and many of the schools were broken up; and perhaps, if the idea prevalent among the trappers themselves is true, that each school had an old and experienced guide, they lost their leader, became thus disorganized, bewildered, and obstructed, and having lost their course spawned in that vicinity; while others, escaping the traps, reached their true spawning-ground, where they were taken, or deposited their spawn. But the reproduction there was not sufficient to fill up the deficiency at Stone Bridge caused by the purse-seining, so that the numbers gradually year after year diminished, until seining was abandoned in that vicinity. Only those would return who were born there, while the fish spawned at Seaconnet Point would deposit their spawn in that vicinity.

The statement of Mr. Lorenzo Tallman was that the fish at Stone Bridge remain there about a week; this would be about the time necessary after their appearance to complete the operation of spawning, and then, instead of going down the west passage, they disperse to their feeding-grounds. This to me appears the only reasonable way of accounting for their disappearance.

Allowing them a week there, and a week to reach Seaconnet Point, the season for this run, which does not, as is stated, continue much more than a week, must have taken, if this be true, a much longer time.

By comparing this assertion with the other facts admitted by the trappers, I am satisfied not only that the theory is unsound, and not supported by these facts, but that, on the other hand, it is completely controverted.

Why is it necessary, except for the purpose of sustaining a theory, under which alone can the continuance of the traps be justified, to assume that scup avoid during the summer the coast and our beautiful bay and river, when they are found in abundance on each side of us?

Mr. Scott, in his book, Fishing in American Waters, already quoted from, says of this fish, (page 109:)

"It is a greedy little shining sinner, which is both herbivorous and carnivorous, foraging on both fish and vegetable diets, and shoaling with the *omnium gatherum* of bottom fish, which make their *summer* habitation among the weedy banks called by their name all along the coast from Maine (?) to Georgia, from three to six miles from shore, purveying everywhere from their homes into all the estuaries and tidal back-sets for provender. The porgee is one of the most numerous of coast fishes, and as greedy as it is plenty. Dr. Brown, in his Anglers' Guide, states that the steamboat which runs daily to the porgee banks near Sandy Hook, in the summer, returns with many thousand porgees, beside the sea-bass and tautog averaging from six to ten thousand as their daily catch with the hand-line."

The trappers alleged that they were to be found in Buzzard's Bay and Vineyard Sound, &c. But I think Mr. Scott is in error when he says they are found on the coasts of Maine; I am inclined to believe they are not found on the other side of Cape Malabar.

Mr. Daniel Church says they are found the whole season off Charleston or Savannah; and the hook-and-line fishing in Hudson River and vicinity has at some seasons greatly interfered with him in the market.

Does it not seem contrary to reason and common sense to suppose that these fish would or could not remain in our waters from the spawning-season through, during the summer season, until they remove to their winter-quarters, if allowed to?

Can there be any question as to the purity of the water, at least from the coast-shore to a distance of three or six miles from the shore, or as to its suitableness as a habitation, as to depth, and character of the bottom? The Coast Survey charts represent our bottom and that of the Shoals and Buzzard's Bay to be the same, mostly of yellow, black and gray sand, with here and there clusters of rocks.

If, as now alleged, for the first time with any force, the scup are changing their grounds, and diminishing gradually from other causes, and will ultimately disappear, because there is a tradition that they had once before disappeared, about one hundred years ago, and without any known cause, I have merely to say that if this is to be the case, let us not hasten the evil day, by reducing their numbers every year while they do remain, through means of these traps. Let us preserve and protect them from all these modes of reckless destruction, at least while spawning. Perhaps by care they may be induced to remain with us entirely.

I do not believe, however, that when fish are about to leave a locality, they leave it gradually; when they go, all leave at once; I think this is in accordance with the experience in relation to the desertion of other fish.

CAPTAIN ATWOOD'S REMARKS.

I wish to say a few words respecting Captain Atwood's opinions and remarks.

I have a copy of the Yarmouth Register, May 27, 1870, which contains his speech before the Massachusetts senate, on the 19th of April, 1870, in relation to the fishery question then before that body. The language and tenor of his remarks are so nearly identical with what he said a few days since, before this committee, that I shall trespass on your time in citing a portion.

Speaking of the witnesses before the committee of which he was chairman, he says:

"Like the many fishermen I know, the witnesses were not well acquainted *with the habits of fish.* They study them no further than they contribute to their pecuniary interest; *at most* they possess only a local knowledge of the fish with which they come in contact. They prosecute the fisheries for their support, and do not make the habits of fish a special study."

AS TO CAUSES OR MODE OF DIMINISHING THE SUPPLY.

"One is to introduce the beam-trawl, which has not been used in our waters. * * This net being dragged over the bottom would destroy the young fish as it passed over them, and might tend to diminish their numbers."

I ask whether the use of traps to catch fish while in the act of spawning "*might not tend to the same result.*"

Again he says:

"If fish have diminished in any of the small arms of the sea, I should have no objection to the passage of a local act, provided it did not interfere with the rights of others."

If this is his opinion, he *would certainly be in favor of prohibiting the traps of Seaconnet Point.*

It will be recollected that his general remarks related entirely to sea-fishing, and to those fish that are caught in the sea, while in relation to scup or tautog, he says that he did not know anything about them.

From the statements of the trappers it would be presumed that Buzzard's Bay and Nantucket Shoals would swarm with scup, if they all arrive at the localities whither they allege they are bound. And it is therefore with some astonishment I find in the report of the Massachusetts senate committee on fisheries, and of which Mr. Atwood was chairman, made April 14, 1870, the following paragraph:

"Scup, tautog, sea-bass, striped bass, and other kinds of fish that are not used for bait, are caught by the weirs in our waters south of Cape Cod only in small quantities, and as a secondary and incidental matter; the amount of these kinds of fish caught by such weirs is too small to have any considerable effect upon the increase or diminution."

And in his remarks:

"All agreed that the scup, tautog, sea-bass, and striped bass had within a few years diminished in Buzzard's Bay, but failed to show that over-fishing was the cause of the diminution."

It is a little singular that Captain Atwood, unless he refers in his remarks *entirely* to sea-fishes, which seldom or never enter our rivers or streams, should be so blind to the fact that many fishes have been diminished by over-fishing, but I am inclined to think he includes these fishes also, for he says:

"If we wish to increase and stock our inland waters, it cannot be accomplished without protection. The building of dams across the streams, and throwing of deleterious substances into the waters, have diminished the fish. *But, in the great sea, man cannot pollulte its waters by anything he can do.*"

I am inclined to apply to him the same observation he makes with regard to the witnesses who appeared before his committee, just quoted, and believe he willfully shuts his eyes to every fact that tends to show that man can diminish any species of fish by over-fishing.

That such is the case seems too well known and understood to need any illustration. Salmon have totally disappeared. The shad have in many rivers been completely, in others nearly, extirpated. Great apprehension exists that the same effect will be produced upon the white-fish of the lakes; and the report of the commissioners of river fisheries, made to the General Court of Massachusetts for the year ending January 1, 1869, shows that such is their belief. They say (page 17) that unless fish that go to fresh water to breed are "at that time protected, they are liable to extinction in the particular waters where such wholesale destruction goes on."

Mr. Atwood, in his report of 1870, already referred to, seems to rely greatly upon the report of the British commission of 1865, as showing the correctness of the conclusion drawn by his committee.

This report of the British commission is very closely and admirably criticised by M. Rimbaud, and his views seem to be fully believed and adopted by the commissioners of river fisheries of Massachusetts, in their report for the year ending January 1, 1870. And the joint special committee of Rhode Island, in their report, made May, 1870, have quoted largely from the Massachusetts report.

Before we refer more particularly to Rimbaud's facts and conclusions, let us see what Mr. Atwood's opinion is of this gentleman. He says in his remarks, that—

"There were persons who did not wholly agree with the British commissioners; one of the most prominent is J. B. Rimbaud, who has published a work on the fishes of the southern coast of France. Himself a fisherman, he says that *the migratory* species, that go *off to sea in schools* and return each season, cannot be diminished by over-fishing, but *local fishes* can be exterminated by constantly fishing for them, and such has been the case in the locality where he has been accustomed to fish. Of the two, I allow Rimbaud to be the best judge, as he has acquired his knowledge by practical experience in the fisheries, and the British commissioners had gained their information from others."

Without questioning the value and correctness of Mr. Rimbaud's statement, Mr. Atwood goes on, for the purpose of undervaluing and showing the inapplicability of his conclusions as to the division and habits of fish to those of Massachusetts waters, to state that the extent of the French fishing-grounds and the range of temperature are limited, and the character of the shores are different, when compared with our fishing-grounds. This is offered to prove that fish on the coast of France are more permanently *local* than ours.

"Tell me, sir, how many are there of our fishes that are not more or less migratory?" is his last question; and answers, "Senators will see that our fish and fisheries are not like those of Europe."

In attempting to answer this question I will refer him to Cuvier, to whom he referred me, who shows that from the form, mouth, bones, teeth, and fins, we can decide as to the habits and mode of life of a fish. He and his disciples have carried comparative anatomy to that perfection that they can come to this conclusion from a single one of these elements. It is not therefore from their investigation too much to say that all fish similar in construction and organization have similar habits; that if a certain tribe of fishes in one part of the world are wandering fishes, other species of the same tribe in another quarter have the same habits. To a certain extent the temperature may act upon them, and some may be to a certain degree migratory in colder climates, so far, for instance, that they may seek their winter quarters at some short distance from the coast, but do not, like the wandering fishes, go to the extreme south for a warmer climate, and, as the warm weather comes on, take their course back again.

The reason that underlies and sustains the belief that wandering fishes as a general thing cannot be diminished by fishing, however destructive, is that these fish cannot be taken in nets in quantities while they are in spawn; for, as an exception, herring, which are classed as a wandering fish, are taken in schools and while in spawn by nets in our waters, and we know that their numbers in many localities have greatly decreased.

It is immaterial, however, in our view, whether they are simply bottom, white, or wandering fishes. If they are taken in large quantities and while in spawn, fishing may and will diminish their numbers.

In this connection the Massachusetts commissioners of river fisheries say, (referring to the British commission and Rimbaud):

"And while we cannot say that either party to the discussion has *proved* anything, the points indicated are the following:

"That no amount or kind of fishing can diminish the 'schooling' or wandering fishes *of the high sea*, such as herring, *(Clupea elongata,)* mackerel, *(Scomber vernalis,)* menhaden, *(Alosa menhaden,)* cod, *(Morrhua americana,)* &c.

"That the local and bottom fishes which are peculiar to certain limited areas near the shore may be greatly reduced or even practically annihi-

lated, in certain places, by improper fishing, such as the tautog, *(Tautoga americana,)* the sea-perch, *(Ctenolabrus cæruleus,)* the flounder, *(Platessa plana,)* the striped bass, *(Labrax lineatus,)* and the scup, *(Sparus argyrops,)*" &c.

It would seem that the question whether they may be diminished by fishing depends upon their *localization* at the time of breeding.

Whether the breed is destroyed when in spawn by traps, or, as on the coast of Spain when hatched, by the *trawl beam*, the mode suggested by Atwood, the effect will be to effect a diminution.

And we cite from the commissioners' report, (page 20,) another paragraph taken from the report of the river fisheries:

"We see that in 1831 Malaga caught less than any except San Lucar, but in 1861, *she took more than the three put together.* Further, Malaga took fifty per cent. *more fish to each man* than did others. On the Malaga coast, fishing with the great trawl net *(aux bœufs)* has been *prohibited* since 1828, while in the three other departments it has been *allowed* and much practiced."

A single other fact, and I will leave this part of the case.

In the American Angler's Guide, page 178, in the article on tautog or black-fish, it is remarked:

"The black-fish abounds in the vicinity of Long Island, and is a stationary inhabitant of the salt water."

"He may be kept for a long time in ponds or cars, and fed and even fatted there. When the cold of winter benumbs him, he refuses to eat any more, and a membrane is observed to form over the vent and close it. He begins to regain appetite with the return of warmth in the spring." (Page 179.)

Now we know that tautog hibernate among the rocks near the coast and in our rivers, and it has been stated by Mr. L. Tallman or Mr. Daniel Church that, some years ago, after a very cold snap, not only many tautog were washed ashore frozen stiff, but afterward quantities were also found dead among the rocks off the coast.

If, during the winter, they do not feed as stated above, and this membrane closes them up, the conclusion must be that they remain in a state of torpor or sleep during the cold weather.

Now it happens that the scup, when first taken by the traps, are in a similar state of torpor; they neither eat nor have any passage; it is probably sealed up like the tautog, and nothing in the shape of food is to be found within them. Some say they are blind, and they seem hardly able or willing to move.

The inference then is that scup have also been hibernating within a short distance of the coast, in the same state as the tautog. This would account for the stray scup mentioned by Mr. Southwick as having been occasionally found in March. A warm day wakes him up, and he visits the shore for a day or so and then returns.

To my mind this is a more reasonable way for accounting for his presence than to assume that he has been left behind.

If these facts are as stated, it is to be presumed that scup are a local fish, and do not leave their localities any more than tautog, about the propriety of the classification of which as a local fish there is no question.

HEART-SEINES AND FYKE-NETS.

It does not seem necessary to discuss the effect of these modes of fishing. Nothing has been said in their favor, nor does any one appear to represent parties interested. The heart-seines are of the same character

as the traps proper, and more or less take the place of the traps after the spawning season of scup is over. Through the whole season they are gobbling up what fish may have escaped the traps; and "*all is fish*" that comes to these nets; nothing however small escapes from them. The testimony of Mr. Steere proves beyond a doubt the effect of fyke nets upon flat fish and upon others also, and that they are set during the colder months preceding and succeeding winter.

SEA-BASS AND TAUTOG.

In May, 1870, I happened to be at Wakefield, South Kingston, and saw several cart-loads of small striped-bass, about 8 inches long, which, I was told, were going to the manure heap. They had been taken near Point Judith in traps; and with the permission of the committee, I will read some observations made by a gentleman having considerable acquaintance with the subject, and as they fully coincide with my own belief, I adopt them as a part of my argument:

"DEAR SIR: The bass taken by the traps (especially at Point Judith) are of a size varying from 6 ounces to 1 pound each. They are taken, when taken at all, in immense numbers.

"It is a fact, well known among fishermen, that these fish, at this age and size, cannot be taken by hook and line, shore-seine, or in any other way than by these wholesale and destructive engines.

"During the trapping seasons, within six or eight years, immense quantities of these small bass have been sold in South Kingston and vicinity for *manure*.

"Were these 'small fry' allowed to grow to a size suitable for market, and until which time they could not be taken by any other method than by traps, &c., these same fish would average from five to twenty times their size *when so destroyed*.

"Aside from the destruction of the older bass, when in spawn, by traps, the above wanton waste is well worth consideration.

"*Tautog*.—This fish it is not pretended is a wanderer. As soon as they commence to move in spring they skirt the coast, following the rocky shores and bottom.

"Every fisherman knows the above to be a fact, and that in May they are caught along the shore rocks, and off shore, on the sunken ledges, in any quantity.

"The effect of trapping is to 'gobble up' almost the entire 'spring run' of this fish.

"It cannot be (I believe is not) denied that our Rhode Island waters, where they were formerly so abundant, are depleted of tautog; while we have only to go from five to fifteen or twenty miles west of Point Judith to find these fish in their season as abundant as ever.

"I account for this upon this theory that the tautog, during winter, becomes dormant or torpid.

"All fishermen of experience agree, that late in fall a membrane forms and covers the vent, and that after the closing of the vent they will not bite at bait even the most tempting; that in their torpid state they are, of course, helpless, and by instinct seek safety for themselves in still water; that the major part at least 'winter' in the bays, salt ponds, coves, creeks, and estuaries, connecting with the open sea.

"I believe that the numerous bays and harbors in Long Island Sound and our own bay are natural winter-quarters of these fish.

"In proof of this, tautog were always caught in spring several days earlier at Pomham Rocks than at the mouth of the bay or at Point Ju-

dith, while in autumn they are caught at Bonnet Point and Boston Neck Point (mouth of bay) several days after the supply fails at Point Judith.

"I believe that the traps capture in spring nearly the whole supply that remained in the bay during the winter previous, besides destroying the increase; that in consequence comparatively none are left to supply our waters, while, as I have said, west of Point Judith (trapping being not followed in the bays, &c., of Long Island Sound) those waters are abundantly supplied.

"*Facts.*—During the past and previous seasons, the fishermen who have supplied the market at Narragansett Pier with tautog could not earn their salt east of Point Judith, while by going from six to twenty miles west of Point Judith (as far as yet ascertained the farther the better) they could and have caught as many tautog as they wanted.

"If 'scup' were entirely out of the question, this state of things ought of itself, as it seems to me, to be enough to warrant the interference of the legislature.

"E. C. CLARKE.

"P. S.—If nature has appointed bounds beyond which, in the matter of increase, fish cannot pass, and has appointed and supplied for every species their natural enemies, which, governed by laws of appetite not to be controlled, are still in effective operation; and if their natural enemies and diseases, to which every species is subject, are of themselves sufficient to hold each species in check and within the proper limits, why, I ask, will not such wholesale destruction, in addition to natural causes and at the very moment, effectively destroy the parent fish and the whole prospective increase? Why, I say, will not all, together, diminish their numbers?

"If traps, in destroying scup and other fish, would but destroy their enemies, and annihilate the diseases to which fish fit for food are subject, then, and in that case, there might be some doubts in this question; as it is, there cannot be.

"Your point on the vent closing and non-feeding of tautog at certain seasons, and its application to scup, in proof that scup, like tautog, are not wanderers, is a new one, but, in my opinion, exceedingly good. I don't believe the Tallmans can shake it. Had I the time I would wish, I would say much more, but (meaning no flattery) I consider your argument a good and strong one.

"E. C. C."

With regard to the appearance of small scup in our bay and rivers last season, I am not prepared to give a decided opinion. I think that their appearance does not, nor will, affect any of the conclusions set forth, nor show that scup are going to be more plenty in our rivers than before.

I believe that they were spawned close on the coast, and afterward, in purveying for food, aspreviously stated by Mr. Scott, and for protection, came up into the bay, and remained there during the warm weather. Whether they were spawned in March, or in the previous fall, cannot be proved. From the fact that March was unusually warm, I am inclined to believe the former was the case.

One of the reasons why I believe scup are not going to be any more plenty is that they will follow the same road into the bay (up Seaconnet River) as their ancestors, and will be taken in the traps; for it has been stated that this last season the traps at one time appeared to be full of scup, and, upon drawing them, it was found that they were small

fish, and all escaped through the meshes except 5 barrels. This year they will be bigger, and cannot get through so easily.[1]

A few words as to the value of Mr. Southwick's testimony upon the points I have been discussing:

Mr. Southwick presents himself in the character of an expert, from having, as he says, closely investigated the question, in a practical point of view, ever since the beginning of this controversy. He himself has been interested in a trap for six years, but last season turned it into a heart-seine. I have simply to remark that, with all his practical investigation of the subject, he makes no allusion to one fact, that, in my opinion, is of very great importance, viz: That scup did not come from the westward this last season, as stated by Lorenzo Tallman. He gives an opinion, positive and direct, that the nets at Seaconnet Point were set so that they could not catch scup coming from any other direction than from the westward.

As the nets were set last season the same way as they always had been; as about the same quantity of scup were caught last season as the season before; and as these fish came on to the coast last season not from the westward, but, if from either direction, from the eastward, his opinion is completely contradicted by the facts themselves.

The theory that scup, when taken, were leaving the waters of the State, is a mere assertion founded on false premises, and is destroyed by the following facts:

Scup first appear in a state of semi-torpor, sluggish, unwilling apparently to move; with nothing in them; in a state of readiness to spawn and some of them spawning; will not bite at the hook; and the first run are seen about a week before they disappear.

Other egg-bearing fishes, when about to spawn, are in like condition at the place of spawning as to motion, eating, and appearance.

We are informed by Captain Atwood that mackerel take about a week to spawn, during which time they will not bite, and after this they disperse to their feeding-grounds.

From these circumstances we are led to believe that, when taken, scup are in the vicinity of or in the place where they intend to spawn.

This view is sustained by facts developed as to the direction from which they are alleged to arrive at this place. The trappers' statement, that they come from the west and southwest is supported solely on this, that they are usually caught at Watch Hill, and then at Newport, before they take them at Seaconnet Point. But this last season, as Mr. L. Tallman says, this theory has been knocked all to pieces, for the reason that, if they came from either, it was from the east. This fact does not stand alone, for Mr. Joseph Church has stated that some twelve years before, scup were caught in Waquoit Pond several days before they were caught at Seaconnet Point, and it cannot be doubted that they took an eastward course to get into Long Island Sound. Moreover, the fact that the traps last season, although set the same way as always, caught about as many fish as the season before, shows that the catching does not depend on the direction from which the fish come.

The opinion that scup are a migratory fish has nothing to support it, except their absence; while, on the contrary, when we consider the condition of scup when they first appear, and observe how closely it resem-

[1] As further evidence to sustain the view that all scup came the same road as the rest, it was stated that small scup were found in the traps last season in such quantities as almost, apparently, to fill them. When, however, the trap was lifted, most of them were small enough to pass through the meshes, and only about 5 barrels were taken.

bles that of the tautog, a fish admitted to be local, it must be conceded that the evidence is in favor of classing them as local fish also.

The opinion or theory that the scup found at Common Fence Point are lost fish trying to find their way back to the sea, is based solely on the fact that they disappear from that neighborhood after staying there about a week. This disappearance can be more rationally and satisfactorily accounted for upon the presumption that, having deposited their spawn there, they had dispersed to their feeding-grounds like the mackerel, and, as we think is proved, like the scup at Seaconnet Point.

The assertion that fish cannot be diminished by any kind of fishing is not warranted by the facts. The history of the salmon in our waters shows that they have been exterminated. The same is the case with shad in some of the rivers, and in many they are very much diminished. Herring have diminished also. Rimbaud and Bertholet, mentioned in the joint-committee report, testify to the same result in the waters with which they were acquainted. In our own waters the striped bass and many other fish have become scarcer. The fact that scup were found in abundance up to 1845 above Stone Bridge, and since that time have been gradually diminishing until purse-seining has been abandoned there, shows that something has operated to produce this state of things. And as traps were first set at Seaconnet Point in 1846, and there, only, until 1860; and as nine-tenths of the scup were and are taken at that place, it is a conclusion not to be avoided, that the traps are this obstruction, and have produced the effect complained of.

And who are those that appear to oppose this prohibition? Are they the poor fishermen, whose daily bread would be snatched from their mouths should this kind of fishing be stopped, and for whom the sympathy of the community and this legislature is demanded?

There are about two hundred and fifteen men engaged in these gangs, and their earnings vary, according to the best estimates obtainable, from $175 to $40 per season. But these men do not appear here. The men who are now represented by counsel before you and appear as witnesses are owners of nets and buyers of fish. These men have an interest far exceeding those of the actual takers of the fish.

Perhaps we can form some opinion of the amount of this interest by estimating the value of their profits. One of this firm of buyers states, he and his partners bought 4,500 barrels of fish from the traps, at the average price of $2 per barrel, this past season $9,000.

Each barrel averaging 150 pounds, gives 775,000 pounds, at 5 cents per pound		$38,750
Deduct original cost of 4,500 barrels, at $2	$9,000	
Transportation of 4,500 barrels, at $1	4,500	
		13,500
		25,250

For three weeks' fishing.

This is the real head of the opposition, which, under the cloak of desiring to preserve the rights of the fishermen, are fighting for these profist.

VALUE OF TRAP PROPERTY.

Mr. Lorenzo Tallman says:

That of the gangs in which he is interested (4) each has 450 fathoms of leader, weighing 300 pounds to 80 fathoms, worth from $1.05 to 25 cents per pound, or, as he suggests, an average of 65 cents.

1,682 pounds, at 65 cents		$1,093 30
400 pounds twine for each of 2 traps, 800 pounds; 200 pounds twine for each pound, 400 pounds—1,200 lbs., at $1.05		1,260 00
12 anchors, averaging 50 to 250 pounds, costing from $2 to $10, averaging $6		72 00
3 small boats		140 00
2 large boats		1,100 00
Purse and mate boat		140 00
1,800 fathoms of lines, at 15 to 21 cents per pound, estimated by Mr. Sisson		200 00
		4,005 30
From this I deduct entirely the 2 large boats and the purse and mate boat, because they admit that they are also used in the menhaden fishery; consequently if not used here, they would last the longer in that business		1,240 00
		2,765 30
Mr. Tallman then said, the usual course was that all the leader and one of the traps and pounds were used up at the close of each season.		
The leader is worth	$1,093 30	
One trap and one pound	630 00	
		1,723 30
		1,042 00
The other trap and pound being new at the commencement of the season, and lasting only *two* seasons, would *now* beworth one-half of its original cost, or	$315 00	
The anchors weighing 1,600, would be worth as old iron 2 cents, or one-half	36 00	
The three small boats, may be safely estimated at one-half that	70 00	
The lines lasting but two years would be worth only one-half	100 00	
		521 00
Whole value now of the trap		521 00
From this is to be deducted value of 2,282 pounds old twine, say 4 cents per pound		91 28
Actual loss of property if trapping was prohibited *now*		429 82
24 gangs, at $429.82		$10,315 68

Which represents the actual loss of property if the law is passed *now*.

EFFECT UPON THE MARKET.

It is not denied that but few of these fish taken in traps are consumed in the State, most all being transported to New York, Philadelphia, and other ports, by vessels employed for the sole purpose; that while our markets, during the trapping season, are supplied at reasonable prices, there is no supply for the remainder of the year.

Under this condition of things, the question naturally presents itself to

the other co-tenants and owners of the fish in the waters of the State, *not engaged in trap-fishing*, whether the manner in which the privileges heretofore allowed these fishermen have been managed, is for the interest of the State and the people at large; whether it is most beneficial that an immense amount of fish, taken *in about seventeen days—while in spawn*—and *in such quantities that the major part must be sent to foreign markets or used for manure*, and our own markets for the few weeks overstocked and at low prices, and at a time when such food is not so much desired as afterward, when none can be had, and the price of fish becomes exorbitant, or that our markets, relying upon other fish until about the first of June, shall be supplied for the rest of the summer and fall, five months at least, with these fish at reasonable prices.

On the one hand, while the trappers are reaping the harvest, or rather taking the crop when at its least value, a large number of men, fishermen by *trade*, some from *choice*, many from *necessity*, poor, disabled from other labor, relying for their daily food for themselves and families in a great measure upon fishing—besides those who fish for amusement, and to this end give employment to a large number of boatmen—are deprived of their just and lawful rights and privileges in consequence of this general destruction. The number of men engaged in this river-fishing was estimated at 800, as their daily avocation, ten or twelve years ago.

On the other hand, if these fish are allowed to come up the river as formerly, they will come to the market at *the right season* in abundance, and from the competition that will naturally arise the price will be kept low.

A larger number will be enabled to pursue fishing with the prospect of a fair remuneration for their labor. The poor man can be supplied with a wholesome and cheap food. The boatman will ply his boat for fares, cheerfully paid by persons in pursuit of health and pleasure, who will employ him with the certainty of finding good fishing. The regular fisherman can earn his $2 to $4 per day, and the State will be richer by at least $200,000 per annum more than what is received by trapping.

Those who are benefited by trapping are about 216 fishermen, who, taking the value of the fish caught last season at $40.000, 20,000 barrels, at $2 per barrel, receive two-thirds, or about $124 each on the average; next, the owners of the traps, of which there are about 24 according to Mr. Benjamin Tallman's statement, among whom is to be divided the one-third, or $13,333, giving $444 to each trap.

This sum of $444, according to the estimate already given as to the cost and depreciation of the twine, &c., if correct, is not sufficient to cover the loss, and these owners, if this is all the benefit derived by them from it, ought to be obliged to the legislature, if it will prohibit this fishing.

But the fact is, as has before been shown, that it is the buyers and shippers of these fish that derive the great gain, and it is for this reason they are so *particularly* anxious to have it continue.

The low price of scup would create a ready market and relieve the demand for other articles of food, as demand, in a great degree, regulates their prices. In a short time, the supply being the same, the seller would find it necessary to reduce his prices, and all food would be affected and brought within the means of those who are now restricted by their narrow incomes.

As a matter of political economy, it is for the welfare and general in-

terest of the State that the legislature should, by every legal and reasonable means, in those matters over which it has jurisdiction, provide for the community, so that it may obtain good and healthy food at the lowest possible prices.

The true theory of government, mindful of the welfare of the governed, is to direct and provide such laws and regulations as will effect the greatest good to the greatest number.

This appears to be one of the cases in which it should so act that, by prohibiting the trap-fishing, although, perhaps, to the detriment of a few who have embarked their property in an enterprise from which they have already received ample compensation, and have continued to invest regardless of the results of the movements to stop it, the legislaure will open to the whole community a free fishery, and afford employment to an infinitely larger number of men who are obliged now to seek other avocations for a livelihood, and occupy branches of industry that could be filled by others who are seeking employment without success, by reason of the pre-occupation. Further, from public policy no business should be encouraged by a State whereby a large amount of food is destroyed or carried beyond the reach of the community when such food is required for its support.

Upon such ground the use of grain, in times of scarcity or apprehended scarcity, for conversion into spirits, has, at various times, been prohibited.

RIGHTS UNDER THE CHARTER AND CONSTITUTION—JURISDICTION OF THE UNITED STATES.

One of the reasons upon which I find the remonstrants claim the right to trap fish without restriction is based upon constitutional grounds, and upon the rights originally granted under the charter of Charles II.

It is undoubtedly true that the United States, as contradistinguished from an individual State, have, by the powers conceded to it by the several States, exclusive control and civil jurisdiction over the tide-waters, but it is only in questions involving the rights of commerce, post-roads, and navigation; and all its powers over the tide-waters arise under and as incidental to the right to regulate commerce and navigation, and to make post-roads, but under no other authority nor for any other purpose.

"It is admitted * * that the States may by law regulate the use of fisheries and oyster-beds within their territorial limits, though upon the navigable waters, provided the free use of the waters for purposes of navigation and commercial intercourse be not interrupted." (Kent, Com., I, p. 439.)

Upon this construction Massachusetts has passed laws prohibiting seining in her bays and rivers, and regulating the taking of fish. Connecticut has exercised the same right.

Our own State has assumed the same in prohibiting and regulating the fisheries in parts of our bay, as at Wickford for instance, and also in Seekonk River and elsewhere, and particularly as respects oysters, and the right has never been questioned.

In respect to the jurisdiction over the waters on the coast, if I understand the common law, it is that the jurisdiction extends to a marine league, or three miles, from and beyond a line drawn from headland to headland. Beyond that is what is termed the high seas, and there the General Government has exclusive and unlimited jurisdiction over every question that could arise there.

In the case, The City of New York *v.* Melis, (11 Peters, 102,) it is stated as settled that—

"All those powers which relate to merely municipal legislation, or which may be properly called internal police, are not surrendered by the State or restrained, and consequently in relation to those the authority of a State is complete, unqualified, and exclusive."

In case Fuller *v.* Spear, (2 Shepley, 417,) Weston, Chief Justice, gave the opinion of the court, and stated:

"It is undoubtedly competent for the legislative power," (meaning State legislative power,) "as well in these as in other waters, to appropriate and regulate fisheries otherwise public."

It would appear from these authorities as well settled that the State has the exclusive and unlimited authority to regulate the fisheries within its waters.

Any claim to exercise the right of fishing founded upon the charter of Charles II is derived from the following words:

"But they and every, or any of them, shall have full and free power and liberty to continue and use the trade of fishing upon the said coast, in any of the seas thereunto adjoining, or any arms of the seas or salt-water rivers and creeks, where they have been accustomed to fish," &c.

After summing up and specifying the different kinds of grants, among which are "rivers, waters, fishing," the *habendum* is as follows:

"To have and to hold the same unto the said governor and company, and their successors," (which is now the State in respect to such questions,) "forever, upon trust, for the use and benefit of themselves and their associates, freemen of the said colony, their heirs and assigns, to be holden of us, our heirs and successors, as of the manor of East Greenwich, in our county of Kent, *in free and common soccage*, and not in *capite* nor by knight-service."

Soccage is an old English term, now obsolete, and is understood to be "a tenure of lands for certain inferior or husbandry services to be performed for the lord of the fee." Free soccage is defined, where the services are not only certain but honorable, and means the same as if written *free and common tenure or tenancy*; that is to say, that the governor and company, and associates, freemen of the colony, were all *free tenants in common* of the "*rivers, waters, and fishing.*"

The constitution of the State adopted November 5, 1842, contains in its seventeenth section of Article I this provision:

"The people shall continue to enjoy and freely exercise all the rights of fishing and the privileges of the shore to which they have been heretofore entitled under the charter and usages of this State. But no new right is intended to be granted, nor any existing right impaired, by this declaration."

By this provision, then, no new rights are granted nor existing ones impaired, and the people shall continue to enjoy and freely exercise all the rights of fishing, as under the charter and usages.

As to the manner of exercising these rights, we presume it is the unquestionable right of the State to determine that no one has a right to fish in such a manner as will be detrimental to others; that each citizen has the same and an equal right (though it may remain unexercised) as another, but no more nor no less. Whoever takes fish must have some consideration for the rights of others; at least, if having been allowed to take more than his share, and no objection had been made to it for many years, yet when objection is made, and such objection is reasonable and based upon sufficient grounds, he ought to cease the offensive mode.

This is the state of things at present. And upon the petitioners coming in and asking, for the reason shown, that the legislature shall stop a mode of fishing by which they are enabled to take not only more

than their reasonable share, but to the detriment and injury of the other tenants in common, the remonstrants set up a right to continue, upon the ground that they have, by continual uses, acquired a prescriptive right thereby, and of which they ought not to be deprived.

However this might be between individuals, it is well settled that no right of this kind can be set up as against the State, nor against individuals if objection is made within the time limited by law.

To illustrate: Suppose a town owns a piece of land to be used in common by the inhabitants for the pasturage of cows. For some reason but few avail themselves of the privilege, who continue to use it for a number of years exclusively, and without any interference on the part of the others.

In time, finding the pasturage is more than is necessary for their cattle, these few conceive the field could be made more profitable, and conclude to turn the grass into hay, and in this manner they have not only enough for their own cows, but can send a large amount to market.

This course continues, but by and by some of the others wish also to avail themselves of their right, and undertake to turn their cows into the field. Upon this the old occupiers object, and say they have so long used the land for raising hay that no new occupiers can come in, or at least if they do they must wait until the crop is first gathered.

To do this would deprive them of most of the season, and the pasturage would be merely nominal or nothing.

Under a privilege to catch fish under the charter, to be exercised and enjoyed equally and reasonably with the remainder of the people, certain persons, not satisfied with the ordinary hook-and-line method, introduce purse-seines in or about 1822, continue this until 1846, when, finding another method by which they can take them in larger quantities than with seines, they introduce the trap-seines. This is so effectual that, it would appear by the statements of reliable persons, they have caught, *apparently*, every scup of any size that was formerly in the bay. And the petitioners, after remaining quiet for several years, after it was evident to them that scup were decreasing in numbers yearly, and that this decrease, in their opinion, was entirely owing to the trap-fishing, when they now come and ask for legislative action to stop the extermination, they are met by the trappers' assertion that they have a right to go on and continue, for the reason that they have acquired the right under the charter and constitution.

If this be sound doctrine, every one else, under the present state of the fish, is deprived of the rights granted him under the charter; *for the privilege of fishing where no fish are to be found, is equivalent to no right to catch fish.*

The right of fishing, when in common, must be construed to be confined within reasonable bounds; and what bounds and what is reasonable must and can only be determined by the legislature.

This fishing, as carried on, is a monopoly. There are twenty-eight traps or places for setting traps, and these have been in the hands of the same parties for nearly, if not quite, twenty-five years. It is so arranged among these parties, that it is practically impossible for any other to gain admission into this close-borough system. Let others attempt to occupy their ground, and from whom would we hear, or, if not hear, how soon would we understand the different view they would take of the doctrine they now set up?

It would no longer be the free power and liberty of fishing. The ground they would then assume would be, that they had acquired, by

long usage, a prescriptive right to occupy these places to the exclusion of all others.

It will be borne in mind that the committee who were appointed to make the investigation which was reported at the January session, 1857, and which report I have read to you, were appointed upon the petition, as we are informed by Mr. Childs, who was himself a member of that committee on the part of the senate, of persons engaged in tautog-fishing at and about Newport.

In their report they say that "no evidence was offered to the committee that these kinds of fishing in other parts of the bay were injured by the trap or seine-fishing in Seaconnet River;" and that they were satisfied that these fisheries "should not be interfered with or restrained, unless it seriously interfered with the fishery in the other waters of the State, or some other very important reason."

This opinion comprehends by implication also this, that if the fisheries in the other waters of the State were seriously interfered with by the trap-fisheries, then these last should themselves be interfered with and restrained; but there was no evidence of this nature brought before them.

Nearly fifteen years have passed away since this investigation was made, and now complaint is made by those interested in the fishery throughout the whole bay. Their opinion is clear and positive, that the trap fishery has not only seriously affected the scup-fishing, but has destroyed it; and whether it can be revived and restored to the state it was when the former committee was sitting, depends, in their opinion, upon the recommendation of this committee.

In concluding this presentation of the various questions that have arisen under and are necessarily connected with the inquiry referred to you by the legislature, I am sensible that I have not exhausted the subject, and that much more might *pertinently* be said to strengthen and support the position assumed by the petitioners; but rather than exhaust your patience, I will rely upon your own recollection of the various statements of those you have examined, with confidence that where I may have omitted to state correctly or to mention all the evidence bearing upon the points I have attempted to maintain, or upon others, you will not fail to give them their proper weight.

In the course of the investigation as to the cause of the scarcity, it is evident that not only does such scarcity prevail, but that the same is the case with the other fish caught in these traps, viz, sea-bass and tautog; and the conclusion is forced upon us that if, as the remonstrants contend, this scarcity is caused by the scup changing its former haunts for new ones; that the sea-bass and tautog are doing the same; and that our waters are to be deserted, or if this is not so, then that the scarcity is caused by the traps and heart-seines.

All the witnesses not interested in traps, I believe, without exception, some who have been engaged in the business, and some who are engaged in seining, are strongly of the opinion that trapping causes the scarcity, and that it ought to be prohibited.

And this leads me to observe that the efforts of the remonstrants have been entirely directed to prevent any interference with the Seaconnet traps, and, as it appears to me, they are ready to throw over all the outsiders if they can gain their object.

Should the committee think proper to report in favor of the petitioners, and to recommend the passage of an act prohibiting or regulating trap and other seine-fishing, I would urge that they be not excepted from such provisions.

There is no question but what these trap-fishings have been important

and valuable, but, in my judgment, they are destructive and to the detriment of bay fishing just in proportion to their value.

It has been suggested outside that the traps might be allowed to take fish three days out of a week.

In answer to this, I would simply say that if one of my theories is true, viz, that the same schools remain in the same locality, then these fish could *all* be taken just as well in three days as in a week, and the privilege would be as injurious as if they continued as formerly.

If the committee is satisfied that the breaking up of the traps at Seaconnet Point in 1862, and the comparative abundance of scup the same season in the bay, have any relation or connection with each other, I would respectfully say that this is sufficient ground to predicate a just claim on the part of hook-and-line fishermen and others, that the experiment shall be tried again.

These trappers have enjoyed the privilege of catching fish freely and uninterruptedly for nearly or quite twenty-six years. We now ask that, upon the evidence and opinion as to their injurious effect on other fishings, the opposing interest may be allowed a reasonable time to prove, by a full and unobstructed trial, whether the traps are the chief cause of this scarcity. From the probable fact that scup live about three years, that length of time ought to be taken. If at the end of that period our waters do not satisfactorily show, an abundance of scup, I for one will cheerfully abandon all further opposition to the employment of any and all kinds of traps.

That the experiment should be fairly made, it is essential that all the waters should be protected, otherwise no one will be satisfied or convinced by any trial that may be made.

ABSTRACT OF AN ADDRESS BY CAPTAIN NATHANIEL E. ATWOOD, IN OPPOSITION TO LEGISLATION.

Before the senate committee of Rhode Island legislature, January session, 1872.

We find upon examination that changes take place in a series of years in the great category of fishes, for which we can assign no reason. In Massachusetts Bay and along the coast of our State the kinds of fish are not the same to day that they were in the days of our boyhood. Those that were most abundant then have suffered great diminution, and sometimes have totally disappeared, perhaps never to return; while other varieties have perhaps, after gradually diminishing more and more for a series of years, increased again and become as abundant as before. Other species have come among us that were utterly unknown in our youthful years.

It is very important that in studying the science of fisheries, we should make ourselves familiar with the habits of migration of fish, the peculiarities of their food, and their times of depositing their spawn. This last is very difficult to ascertain with regard to many species. The statements of fishermen concerning it are not to be relied upon; for, as a class, they notice the fish which they take only in so far as their own pecuniary interest is concerned.

One of the most important among the fishes of our New England coast is the common mackerel. It is well known that mackerel are a migratory fish and are only with us a part of the season. At the pres-

ent time of the year they are absent from our waters. North of Cape Cod, as, for instance, in the southern portion of Barnstable Bay, we find them beginning to appear about the beginning of May, at first a few straggling specimens, and then in a few days a vast abundance. They cannot be taken by hook-fishermen, but by means of a long string of nets, made about eighteen feet deep, which hang vertically in the water and drift with the tide. Considerable quanties are thus taken in the night-time.

In 1855 a resolution was passed by the Massachusetts legislature authorizing the governor to appoint three commissioners to inquire into the practicability of the artificial breeding of fish. I was expecting to be appointed on that commission, and, as I had a great desire to know at precisely what time the mackerel deposited their spawn, I devoted considerable attention to the subject. While fishing for these mackerel, I found that about the 20th of May, and from that time to the 3d or 4th of June, they were spawning. As we took the fish into the boat the spawn was running freely from them. In a few days after that time they repaired to the feeding-ground, fed voraciously, and soon commenced to be fat. In a few days after this school had disappeared I received my commission, and thirty days after the height of their spawning-season I found immense schools of little mackerel in our bay. I caught some specimens and put them in alcohol, as I had before put the mature eggs, marking the date. Twenty-five days after that I went again into the bay, and found that they had grown to be some two inches in length, showing that it required not nearly so much time for the growth and development of this fish as for many other species. I took specimens to Professor Agassiz, who was very much delighted at the discoveries I had made.

Besides the large full-grown mackerel, there is the smaller kind, that come in later in the season. Dr. Mitchell and other writers have considered that these are two species, calling them "spring mackerel" and "flock mackerel;" but I am convinced that they are simply different ages of the same species. When the second school, or Dr. Mitchell's flock mackerel, arrive they are of very different sizes, and in the Boston market are designated as "full grown," "second size," "tinkers and blinks." The line of demarkation is so prominently drawn between these several sizes that people do not differ much in the designations given to them in the markets of different towns. Now, these mackerel that I watched for fifty-five days after they were spawned until they had grown to be three inches in length, before they left us in the fall had grown large enough to be rated as number "four," under the Massachusetts inspection laws. Those that come the next season are the "blinks," and, as we believe, were from the spawn of the preceding year. The next size, or the "tinkers," we believe were the "blinks" of the year before, and so on.

The question is asked, Where do mackerel stay in the winter? I do not think they stop in the Gulf stream, but somewhere short of that, probably in water deep enough to afford a congenial temperature.

During some seasons this fish is very much more plentiful than in others. In 1831 there were inspected, in Massachusetts, 383,559 barrels. From that time they began to diminish in numbers, and from 1839 to 1844. the number of barrels inspected did not exceed 75,000 and a few hundred per year. They continued to decrease for ten years, when the yearly catch was only 50,000 barrels. They then increased again, and in 1869 there were 234,000 barrels caught, the largest quantity previous to that time since 1831. In 1870 there were caught and inspected

318,000 barrels, being 83,000 barrels more than in any previous year for twenty years. This last year there was a falling off of 50,000 barrels.

I pass now to speak of our menhaden. In my early manhood I looked with surprise upon the vast quantity of these fish that visited our coast annually and then went away. At that time they seemed of no use, except that the fishermen used them occasionally for bait. But since they have become valuable for their oil and as a fertilizer, the question has been discussed with much interest whether they will be exterminated in consequence of the great extent to which this fishery is prosecuted. The Maine legislature some few years ago passed a law prohibiting the seining of them, and, after it had been in force a single year, the same parties who had signed the petition for the law were very desirous of having it repealed. I was called before a committee of that legislature, and gave it as my opinion that the efforts of man would have but little tendency to exterminate this species of fish, the number caught being but very trifling compared with the immense quantities that were produced in the waters. The legislature did not repeal the law, but they authorized the county commissioners along the coast to grant permits—for the sum of twenty dollars each—allowing parties to fish for the menhaden in the prohibited localities. The fishing has gone on since that time, and, so far from the menhaden being exterminated, I am informed that they were very abundant last year.

When do menhaden spawn? The mass of them, as is well known, pass off the coast in the latter part of the autumn. They keep passing out; and, in our Provincetown Harbor, where the land crooks round so as to detain them, we catch them a month later than that. When we look at the last of the menhaden we find that the ovaries begin to swell, and that the eggs begin to grow. When they get off the coast of Virginia, immense quantities of them spawn. The mass of the menhaden go away so far south that they do not get to our coast in the fall, but are off the capes of Delaware, above and below. I believe that the last ones that come out deposit their spawn soon after their departure, so that their young return to our harbor very soon afterward, for we find often one or two hundred there about that time. But when the year comes around again, we find the full-grown menhaden coming in in vast abundance.

Again, take the sea-herring. When the Georges fishermen went to the Georges Banks, there were great schools of them there, but they have long since disappeared, and now fishermen cannot get enough to bait their hooks with. They come up about the islands of Boston Harbor, and to another locality off Scituate, where they are, in the fall, in immense quantities depositing spawn. A fisherman who put out six nets had them all carried to the bottom the first night. They were filled with such vast numbers of fishes that he could raise only two of them, and from these he obtained enough fish for the rest of the season. This shows to how great an extent these fish change their localities.

Now, this depletion of fish at certain points is not caused by overfishing. We know that it has not resulted from the setting of any weirs, traps, or pounds, because none of these have been used in these localities.

In the days of my boyhood, my neighbors often spoke of a fish called "the drummer," which is the same variety that you call the squeteague, which were so plentiful that they could be taken by the boat-load. But in 1816, when I first went into a fishing-boat, they had disappeared, and I did not see a single specimen for many years. Since that time, however, they have commenced returning in considerable numbers, and we

shall probably have them back again as you are having them upon your coasts.

In Provincetown Harbor, from a very early period until the horse-mackerel made its appearance, the fish called "whiting" was immensely abundant. Since the horse-mackerel has appeared, they have been gradually driven out, and now a specimen is hardly ever seen. The horse-mackerel has driven out a great many other kinds of fish, for it is the avowed enemy of every species it can master. These fish first appeared south of Cape Cod about the year 1832. I was thirty years old before I saw a specimen. Finally they found their way into our harbor, and completely destroyed the mackerel fishery for a time, and even now render it nearly unprofitable.

If over-fishing were possible, it seems to me that we should see some of its results where great changes have taken place in the modes of our fisheries of cod and haddock in Massachusetts Bay. What is called "trawl-fishing" was first introduced about 1850, and it resulted in the taking of a vast number of fish of these varieties. In consequence of the competition in the business, the Swampscott people petitioned the legislature for a law prohibiting trawl-fishing, on the ground that it would exterminate the haddock. At that time I proved before the legislature that haddock was much more abundant than it had been at any previous time, and that I was selling them at 37½ cents per hundred pounds. That fishery has been going on ever since, and the amount taken was greater this last winter than for many years past. A fisherman in a dory fifteen feet long has often brought in as much as 1,800 pounds in a single day. There are eighty boats fishing out of the harbor, and 83,000 pounds have been caught in one day. This increase has taken place in spite of the constant practice of the new mode of fishing, by which twice as many are taken in the same time as formerly.

Perhaps the committee will ask if I do know of any fish that has diminished while I have been fishing. I would say that I do. I allude to the halibut. When I was twenty-five or thirty years old I was engaged in fishing along the Nantucket shore, and at that time halibut were much more plentiful than now. Whether the diminution is owing to over-fishing or not I am unable to say.

In regard to the effect produced in the way of driving out fishes by emptying impurities into the water, I am inclined to believe that as respects ocean waters it would be very trifling; in rivers, I think the effect would be considerable. At New Bedford there are works that throw deleterious substances into the water, but the driving away of the fish there was, in my opinion, effected by the destroying of the bait upon which they fed. I presume that fish that had never been in impure water, if they should rush into it suddenly would be much more effected by it than by a gradual fouling of the water. Fish need to be acclimated by degrees to any change of temperature in the water, and it is only by degrees that they can learn to live in impure water. In rivers where there are saw-mills, the sawdust from which is thrown into the water, when the water becomes so charged with it that the gills of fishes are clogged, they must of necessity be driven away. When the Massachusetts fishery commissioners were appointed, I was applied to to investigate the condition of the river fisheries. It was surprising to me that fish would come in from the broad ocean and pass up these narrow rivers filled with mud and with every possible obstruction, year after year, for the purpose of depositing their spawn. Yet they will invariably return annually to the same stream in spite of all the deleterious substances thrown into it.

The idea presented in the report of Professor Huxley to the British Parliament that man cannot destroy a race of fishes by over-catching has been scouted by a distinguished naturalist, who says that certain species of fish have been destroyed and caught out. But this was on the southern coast of France, where there is only a very small area of fishing-ground. And this naturalist himself says that these wandering fishes which go off in schools and return cannot be diminished by man's catching. We have an immense area of fishing-ground on our coast, which is flat and everywhere running off shoal. Look, for instance at the great chain of banks from the Nantucket shoals to the banks of Newfoundland. France, on the Mediterranean, has no such fishing-ground as that.

When I was a boy, great quantities of Spanish mackerel came into Provincetown Harbor. They afterward began to diminish in numbers, and I have not seen a specimen now for twenty years. They went away before the blue-fish came, and before a weir, trap, pound or anything of the kind was set in New England waters. I think the great enemy of the fish of our waters is the blue-fish. They are ready to eat almost every fish that they can take. We know that they drive almost everything.

It is my candid opinion that man cannot destroy a race of fishes. They go off from our coasts only to return again and bring us innumerable blessings. The fisheries of our coast are of immense value. They afford a vast amount of wholesome food to the people, as well as employment to a great number of men. Our fisheries are a nursery for seamen, and by accustoming those who engage in them to the hardships of the sea, they train them for service in our navies in time of war, as well as upon the decks of our merchantmen.

I hope that the fish peculiar to your waters will continue to be abundant, and that if the scup leave you some other variety equally valuable will come in and supply its place.

XIV.—NATURAL HISTORY OF SOME OF THE MORE IMPORTANT FOOD-FISHES OF THE SOUTH SHORE OF NEW ENGLAND.

I.—THE SCUP.

Stenotomus argyrops, (Linn.,) Gill.

Common names: Porgy; porgee;[1] scup; scuppaug; mishcup.

This species has a lesser variety of names than most others belonging to our coast, it being known in the Southern States, and northward to New Jersey, as porgy; while in Long Island Sound, and on the south coast of New England, it is the familiar scup or scuppaug, from mishcùp-paûoĝ of the Narragansett Indians.[2] In the time of Roger Williams its English appellation was bream, from the resemblance to the British fish of that name. Its southern range, as stated by Dr. Holbrook, extends to Cape Florida, and it occurs on the southern coast throughout the year, most abundantly, however, in June and July. It makes its appearance, at least in considerable quantity, on the coast of New England, about the middle of May, although the advance guard of very large fish arrive sometimes as early as the middle of April, and it is most abundant toward the 1st of June, and arrives in successive detachments or "runs," differing in size, the smallest fish coming last. The first run on the southern coast of New England, as stated, takes place about the beginning of May, and consists of large breeding fish, weighing from 2 to 4 pounds, and measuring up to 18 inches or more in length. The spawn is quite well developed at that time, and is said to be at first red, but gradually to become light yellow as it matures. The particular time and place, however, of laying the eggs, is not yet known, although it is probable that this occurs early in June, since the schools are said to break up about the middle of that month, and the fish to scatter. It is thought probable that the spawning takes place in the eel-grass which covers the shoal waters of Narragansett Bay and Vineyard Sound.

According to the fishermen generally, the scup, on first coming into the shores, do not take the hook readily, being apparently too much occupied in the business of reproduction, and two weeks usually elapse before they can be caught in this way. They present themselves in large schools of immense extent, and moving very slowly, at about the rate of three miles an hour. From the testimony presented before the committee of investigation of the Rhode Island legislature, they appear to come from the south and west, as when they enter Narragansett Bay they strike the western shore and move up along its edge. They are said, however, to drift slowly backward and forward with the tide, especially at the entrance of this bay. At this time they are very sluggish, and are said sometimes to appear as if blind, and can frequently be taken with the hand or a very short scoop-net.

[1] Not to be confounded with pogy or poagie, which is the menhaden.

[2] Roger Williams. Key to the Language of America, London, 1643. (Publications of Narragansett Club, I, page 138, 1866; J. H. Trumbull, editor.)

According to Captain Edwards, of Wood's Hole, in proceeding to their breeding-grounds, on the coast of New England, they are taken at Montauk Point three weeks earlier than at Wood's Hole, and a week earlier at Wood's Hole than at Hyannis, still farther east.

The scup feed upon a great variety of marine animals, such as worms, small crustaceans, mollusks, &c., and take the hook very freely during the greater part of their stay; in fact, the smaller ones become veritable nuisances to the fishermen, from the readiness with which they pounce upon the baited hook whenever thrown overboard.

The flesh of the scup is very much prized by most persons, as it is firm and flaky, and usually sweet, although occasionally a bitter flavor detracts from its palatability. Since the settlement of the coast by the whites, it has been by far the most important food-fish of Fisher and Vineyard Sounds, Narragansett Bay, and of Buzzard's Bay; and the rapid diminution in number has caused the greatest solicitude.

The scup is but little known, as far as accounts go, on the north side of Cape Cod; indeed, Dr. Storer states that they were introduced into Massachusetts Bay about 1833, and that they are taken only occasionally at the present date. Of their abundance on the south coast of New England in former times, almost incredible accounts are given. Thus, according to J. D. Swan, of Newport, at one place in Narragansett Bay, where the schools ran over a point where the water was 9 feet deep, they were so thick as to crowd each other out of the water. (See page 12 of the present report.) Mr. E. E. Taylor could catch five hundred fish in the morning and return in time to peddle them off in Newport, and then go out in the afternoon and get as many more. (Page 27.) Six hundred barrels have been taken at one haul of the seine at Tuckernuck, near Nantucket. (Page 40.) Captain Hallett has taken in one morning eight hundred scup, weighing 500 or 600 pounds, and eighteen boats have loaded a smack in a single day, (page 48.) Mr. Ryder, at the head of Buttermilk Bay, which opens out of Buzzard's Bay, twenty years ago could catch three boat-loads in a tide. In 1861, at Seconnet, 700 barrels were turned out of the traps because there was no sale for them. A subsequent capture netted only 18 cents a barrel.

The testimony of residents along the coast all tends to show that, until within not more than eight or ten years, scup, of large size, could be taken with a hook throughout the summer, at any point near the shore, from Point Judith to Cape Cod, almost as rapidly as a line with two baited hooks could be thrown over and hauled in.

The case, however, at the present date, is very different. Large numbers, it is true, are caught in traps and pounds for a few days in the spring, as the fish are on their way to their spawning-ground; after which only scattering individuals are taken in nets, and so few by lines as to remove them entirely out of the speculations of the fishermen, except, perhaps, on the coasts of New York and New Jersey.

In 1871 the diminution, even as compared with that of 1870, was very evident in most localities; Captain Hallett, of Hyannis, stating that not one-fourth as many were taken as in the previous year. (Page 48.)

The scup is a fish that grows with rapidity, and at two years is almost of sufficient size to be marketable. Throughout the summer young fish of the spring spawning are to be seen floating around in the eel-grass and over the sandy bottoms, having attained a length of from $2\frac{1}{2}$ to $3\frac{1}{4}$ inches by the 1st of October. When these fish re-appear the next season, thus completing one year of existence, they measure about 6 inches, six to eight or nine weighing a pound; and by the 1st of September attain an average length of 8 inches, including the tail, and a breadth of

3 inches. (Twelve individuals, measured on the 31st of August, measured from 7.75 to 9 inches in length, and from 2.75 to 3.25 inches in breadth, not including the dorsal and anal fins.) On the 8th of September twenty-five of this age weighed 4¾ pounds, or an average of little over 3 ounces each. In the third year of existence, or at the age of two years, they have increased considerably, though not so rapidly as was once supposed, measuring, on their re-appearance, about 10 inches, with an average weight of one-half pound. Six weighed in New Bedford, October 9, averaged but little over 5 ounces each, while the average of those on the stalls in New York, October 17, was a little over 8 ounces. After this they grow more quickly. One hundred and ninety-nine, presumed to be three years' fish, weighed on the 6th of September, averaged 1½ pounds each, and measured about 12 inches in length by 4½ inches in width, some individuals being larger and some smaller. The female fish of the second year not unfrequently contains mature eggs. It is in the fifth year, or after the lapse of four years from birth, that the scup presents its finest development; specimens believed to be of this age measured 14 or 15 inches by 5 to 6 inches or more, with a weight of 2½ to 3 pounds. They, however, still continue to grow, specimens being not unfrequently met with 18 inches long, and weighing 4 pounds and even more. The dimensions may belong to fish of six or more years of age; more probably, however, of five years. It is, of course, impossible to do more than give average estimates of the weight and size of fish of the same age, the differences probably depending on the fact whether they were spawned by old or young fish, and the period when the eggs were laid, this extending over a considerable length of time in each locality, although the great majority of fish undoubtedly spawn at nearly the same season.

Abundant as the scup has been during the greater part of the present century, there appears to be good evidence to show that prior to the year 1800 there was at least one period, if not more, when it was extremely rare. According to Mr. Southwick, (page 11,) there is a tradition that they first occurred at Newport about 1793, the sheep's-head disappearing about the same time. Mr. Lyman, in an article on the possible exhaustion of the sea fisheries, written in 1871, also quotes some negative evidence of the absence of this fish at Compton, Rhode Island, from 1794 to 1803, the "sheep's-head" (more probably the tautog is meant) being spoken of as common, and the scup not mentioned.

Mr. John C. Parker, an octogenarian of Falmouth, Massachusetts, states that the scup were observed there, according to his father's statement, sometime after 1790, and had become quite abundant by 1814. On the other hand, however, in 1621, again quoting from Mr. Lyman, Massasoit entertained his half-famished Puritan visitors with "fishes like bream, but three times so big, and better meat;" this fact, with the description, being applicable to no other fish than the scup. The European sea bream is very similar to the scup, and would readily be referred to the same species by the unobservant traveler.

Again, Roger Williams, in his "Key to the Language of the Indians," speaking of the scup says, "mushcup, the bream." "Of this fish there is abundance, which the natives dry in the sun and smoke, and some English begin to salt. Both ways they keep all the year, and it is hoped they may be as well accepted as cod at market, and better if once known." We find no reference to the occurrence of the fish from this date, 1642, up to 1794.

The time of the arrival of the scup on the coast varies with the locality. The young probably spend the winter in our southern waters or

out in the Gulf Stream, but in the spring commence their migration either along the coast or from the deep seas toward the waters on the south coast of New England. The latter supposition is the more probable, as no scup are taken on the southern coast of anything like the size of the breeders that visit New England, making their appearance at once in a huge body, extending, apparently, from Block Island to Martha's Vineyard.

The western division of this army appears to strike first at Watch Hill, to the west of Point Judith, and to make its way slowly along eastward, the smaller or eastern division moving through Vineyard Sound. According to Captain Luce, the Menemsha pounds take the scup three days or a week earlier than the pounds at Lombard's Cove, and nearly two weeks earlier than at the guano-works at Wood's Hole. The progress of this fish is at first very slow, scarcely exceeding a few miles a day, and their movements appear to be largely regulated by the flow of the tide, going forward with the flood, and partly retrograding with the ebb. According to Mr. Whalley, (page 24,) of Narragansett Pier, it occupies about four tides, or two days, in moving from Point Judith to Seaconnet Point.

The precise period of their reaching the coast varies with the season, although their abundance generally occurs from the 5th to the 12th of May. In 1871 the fish appeared much earlier than usual, and were on the shore before traps were down in readiness for their capture. Their occurrence was about the 15th to the 25th of April. Breeding scup were taken at Hyannis the same year on the 27th of April, at least two weeks earlier than usual. They were taken in the fish-pound at Wood's Hole on the 27th of April, but were most abundant on the 8th of May. In 1872 the season was late, and a few scattering scup were taken at Wood's Hole from the 10th to the 13th of May, but were most abundant at a later date. On the 17th of May 10 barrels were taken, and 150 barrels on the 9th of June. Some of those captured in the middle of May were of unusual size, weighing 4 pounds and over. At Newport they were most abundant on the 15th of May, or two days earlier than at Wood's Hole. Here, too, the number of mature fish was less than usual, but the average size greater. Over 1,000 barrels were taken in Luce's pound, at Menemsha Bight. It is mentioned as an unusual occurrence, that in the spring of 1872 large fish were caught in purse-nets five or ten miles off the shore of Newport, mostly with spawn, although very poor and thin.

As already remarked, the fishermen on the coast distinguish three runs of scup: the first, consisting of mature breeding fish, coming in from the 10th of April to the 20th of May, according to the season, varying in size from 1½ or 2 to 4 pounds; these represent the fish of three years old and upward. A second and separate run is said to be about ten days later, (sometimes nearly simultaneous,) and embraces fish of about a pound. This run is the largest in point of numbers, and, as already stated, has many spawning-fish in it, although not generally as many as the first run. Both these runs, according to Mr. Church, of Tiverton, are characterized by the presence of well-marked dark bars, something like those of the sheep's-head. The third run, according to the same authority, is without stripes. This comes in about ten days later, and embraces the scup weighing from one-fourth to one-half of a pound, evidently fish of the preceding year's hatching, and about twelve months old. These fish, according to Mr. Church, are not marketable, largely in consequence of their heating through and spoiling before they can be iced.

An apparently unusual occurrence in the history of the scup took

place in the spring of 1871, namely, the great number of young fish of the previous year, or those of the third run. These, however, besides their unusual abundance, were more mixed up with the first and second runs than usual. They swarmed in all the pounds, and, indeed, gave a great deal of trouble in the well-meant efforts of the fishermen to turn them out without injury. It is said that as many as 10,000 barrels were taken at one time in a single pound in Narragansett Bay in the middle of May, and a similar abundance was recorded by the fishermen along the entire coast, although in many localities the maximum was not seen until the end of June. The cause of this unexpected and unusual phenomenon is one that is difficult to explain. Although many fishermen insisted that these fish were hatched in 1871, it is quite certain that if so, they were not hatched in New England waters during that year. It has even been suggested that they may have been spawned in more southern waters very early in the season, subsequently moving forward to occupy the feeding-grounds of the New England coast. This hypothesis is, however, negatived by the statement of Thomas James, (page 185,) that late in the fall of 1870 his nets were filled with immense numbers of small scup of that season.

If these fish were really, as asserted, so much smaller than the supposed yearlings as to induce the impression that they were of the same year's spawning, it may be that they belonged to a late hatching of 1870. But as far as I could judge, from many observations, they were about the average represented by one year's growth. They grew very rapidly, so that by the end of September they measured nearly 6 inches in length. They continued along the coast in great abundance, and furnished capital sport for juvenile fishermen in taking them from the wharves; and when a seine was hauled in the small bays, bushels could be readily captured, although they were too small to be of any special service as food.

As expected, the small scup, to which reference was made as being very abundant in 1871, made their appearance again in 1872, of considerably larger size, weighing from a quarter to a half pound, and were marketed in large numbers. They were sent to New York, but were not very popular among the wholesale dealers. The persistence of this increase was more marked at Newport than elsewhere, where they were more plenty, according to the statements of several parties, than they had been for quite a number of years. As many as 10,000 barrels, according to Mr. Southwick, were turned out from the pounds outside of Narragansett Bay on the 21st of May. It is, however, not certain whether they were one or two years old. At Wood's Hole a similar increase of medium-sized fish was observed, but all agreed, as well at Newport as elsewhere, that there was nothing like the show of small scup which appeared in so marked a manner in 1871. The fish were evidently spawned in 1870, and were, of course, two years old in the summer of 1872. For this reason it is possible that after the present generation has reached maturity and been caught up, a scarcity of this particular species of fish may again be experienced. Both at Newport and farther east, scup of unusually large size were taken, some of them measuring 18 or 19 inches in length, with a weight of 4 pounds. But few of these, however, were captured with the hook, and they were taken during a few weeks only by the traps.

If the traps and pounds exercise so detrimental an influence upon the spawning fish as has been asserted, we could understand the appearance of yearling scup in unusual numbers in 1872, as it is well known that, owing to their unusually early appearance in 1871, they had been on their grounds some time before the nets were set for their capture. In

this way a large number would be able to discharge their spawn without any interruption, the result of which should have been seen in an increased number of young fish. This reasoning, however, would hardly explain the presence of so many young fish in 1871, since the traps were in position in 1870, before the spawning fish arrived.

According to Mr. Edwards, scup were still more scarce than usual at Wood's Hole in 1872 up to the 1st of July, a few small ones only being seen, and none of any size taken with the hook. After that date, however, the two-year fish made their appearance in considerable numbers.

In reference to the movement of the scup in Narragansett Bay, the testimony taken both by the Rhode Island commission, and by Mr. Theodore Lyman and myself, was quite contradictory, some maintaining that they enter by the west passage, and, passing round the north end, fall into the traps set for them in the eastern passage; others insisting that the fish enter both passages at the same time. The general impression, however, seemed to be that the army of old fish did not pass up into the bay, but that probably while the main body kept along the shore, from headland to headland, only those that were originally spawned up the bay turned off and proceeded up toward its head. The success of the traps at Seaconnet is probably due in large part to the peculiar funnel-shape of the river, by which the fish at flood-tide would be carried out of their course. The traps there being always set toward the north, it is likely that during the flood the fish pass up along the channel, and as the tide turns, losing their direction, they are scattered toward the shores, and in following down the ebb are taken in the traps.

According to Captain Thomas Hinckley, after passing Seaconnet Point and entering Buzzard's Bay, the scup keep along the northern shore and make almost the entire circuit of the bay before appearing at Quisset Harbor and Wood's Hole, their appearance being always later there than at the head of the bay or about New Bedford. Whether it is the fish alone that belong to Buzzard's Bay that enter it, or whether others pass directly between the Elizabeth Islands and Martha's Vineyard, is not yet satisfactorily ascertained. We know, however, that they reached Waquoit, the first pound on the north side of Vineyard Sound, in 1871 as early as April 25, but that the largest numbers were taken from the 10th to the 13th of May. This gives about a week's difference between this point and Newport.

On the south side of Vineyard Sound the fish are netted at Menemsha Bight, where there are several large and effective pounds, three days or a week earlier than at Lombard'sCove, and nearly two weeks earlier than at the Wood's Hole pound.

According to Mr. Luce, breeding-fish enter the tidal ponds on the north side of Martha's Vineyard (formerly in large numbers,) where they spawn, accomplishing this operation by the end of June, the ponds being filled with young in August. As soon as frost comes these fish leave for their winter abode.

As a general rule, in their movement along the coast the scup are not found in water shallower than a few fathoms; and it sometimes happens, in the course of heavy storms, that in consequence of the discoloration of the water near the shore, the fish move farther out to sea, and on such occasions measurably escape falling into the traps.

The scup is very largely a bottom-feeder, and depends very much upon mollusks or shell-fish for subsistence. I have been informed by the fishermen that they may frequently be seen feeding upon small bivalves of different species, rooting them out of the sand or mud. The stomachs of about two hundred 1½-pound scup were examined at one time in

the beginning of September. These almost exclusively, contained shells of various genera, with some worms, and a few amphipods.

Like all other small fish, they are devoured by their more rapacious fellows, and very largely by blue-fish, notwithstanding a general impression to the contrary. The extent to which this takes place will be considered under the head of the blue-fish. Halibut, cod, sharks, and other ground-feeders, likewise use them up in great numbers.

As already remarked, the breeding-fish do not appear to feed on their first arrival, being then too much occupied in carrying out the reproductive function. As, however, they can be taken with the hook about the 1st of June, we may infer that this is about the time they begin to feed for themselves. The younger fish probably feed as soon as they reach the shores. No remains of fish have hitherto been found in the stomachs of scup, and we may conclude that they are not piscivorous.

Although the period and the general region where the eggs are deposited has been pretty well ascertained, I regret that nothing is known of the peculiar method by which this is accomplished. I have been informed (page 47) that on hauling up of anchors of boats that have been lying over night in two fathoms of water, the rope is frequently found coated with spawn sticking upon it. The eggs are doubtless fertilized as discharged, and probably adhere to the gravel, grass, and other objects at the bottom; but as to the precise period of development, nothing is known.

The scup, like other shore-fish, not unfrequently suffer from changes of weather. Mr. Southwick informed me that he has evidence to show that in the early part of May in 1809, 1817, and 1838, after a cold spell in each of those years, large numbers were thrown on the shore. On the 29th of November, 1871, there was a fall of snow at Wood's Hole, and the next day scup and sea-bass came ashore in considerable numbers, generally, according to Mr. Edwards, about ten scup to every yard along the shore for a considerable distance. They were, however, all small fish. While scup were in greatest abundance, the other fish observed were sea-bass, butter-fish, mullet, &c. Similar facts have been observed in regard to tautog, which indeed seemed to suffer very much more than scup from this agency.

As may be inferred from what has already been said, the market at the present time is supplied with scup from the spring traps and pounds, the capture by these means having become almost entirely exclusive. Formerly, however, they could be taken with the hook from the latter end of May until the end of October, and in any desired abundance. There is no fish on the American coast that bites so freely when abundant, and which can be captured with so much ease.

I am informed by Mr. Dunham that in the deep holes of the pond at Nantucket, where he has been with his boat, he has sometimes thrown a stone overboard so as to give the scup a start toward the shore, and then following and throwing his dog overboard, he has driven the fish clear out of the water upon the beach, and has taken as many as five hundred in this way at one time. A similar mode of capture was reported to me as having taken place in the pond at Menemsha Bight.

The value of the scup as a marketable fish varies, of course, with the supply; and while they have been sold in early times as low as from 10 to 25 cents a barrel, and were used as a manure, they are now too scarce for any such purpose. They were worth in 1871 from 6 to 8 cents a pound at Newport and about 2 cents at Hyannis. At New Bedford they generally brought 10 cents as a maximum price.

On the coast of Carolina they are said to prefer deep, clear water,

with rocky bottom, although they may be taken in almost any locality in the region of their occurrence.

The scupremain along the northern coast until about the middle of October, when the larger ones at least, begin to leave the shores and moves out into deeper water. Mr. Vinal Edwards has, however, taken young fish at Wood's Hole as late as the 10th of December, and Captain John Rogers, of Noank, states that, in fishing for cod on Nantucket Shoals late in November, their stomachs are occasionally filled with small scup, which drop out of their mouths when hauled on deck, found to be to the extent of five or six at a time. It is quite possible that they, as well as other fish, seek in winter that portion of the Gulf Stream that corresponds in temperature to that of their summer abode; and as the mean summer temperature of the waters of Southern Massachusetts and Rhode Island amounts to about 63° Fahrenheit, they must go nearly to the latitude of Norfolk, Virginia, before they can find that same temperature in the winter season.

The European analogue of our American scup or porgy is the *Pagrus vulgaris*, the braize or becker, sometimes bream, of the fishermen. These come on to the European coast in the summer time, and are said to have much the same habits as the American species.

II.—THE BLUE-FISH.

Pomatomus saltatrix, (Linn.,) Gill.

Common names: Blue-fish; horse-mackerel; skip-jack; snap-mackerel; green-fish; white-fish.

Among the various species of marine fishes belonging to the eastern coast of the United States there is no one more conspicuous, wherever found, than the blue-fish. This prominence is due not alone to its value as an article of food, and to the sport which it furnishes to its captors, but it has a very important bearing upon the condition of our coast-fishes generally, and one worthy, perhaps, of much more attention than it has hitherto received.

The blue-fish, like most of our other fishes, has received a great variety of names. From New York northward the adults generally bear the name of blue-fish, except at Newport, where as on part of the Jersey coast, it is called horse-mackerel. It is the skip-jack of South Carolina, the green-fish of Virginia, and the tailor of Maryland, &c. They oung bear the name of skip-mackerel about New York, and white-fish higher up the Hudson River.

Its geographical distribution, if we may rely upon the accounts of writers, is very extensive. Prince Maximilian gives it as found on the coast of Brazil and Schomburg or British Guana; Webb and Berthelot record it at the Canaries; and others mention it as found in the Mediterranean Sea, off Madagascar, about Amboyna, and on the shores of New Holland.[1] Professor Poey, however, has not met with it in the vicinity of Cuba, and I find no positive evidence of its occurrence in the West Indies. On our own coastit is known from Georgia, and probably Florida, as far north as New Hampshire and Maine, although it appears to diminish in numbers to the north of Cape Ann. I have been unable to detect

[1] Castlenau, (Proceedings of the Zoological and Acclimatisation Society of Victoria, I, 1872, p. 118,) says it is one of the most common market fish in Melbourne, where it is generally of small size, although he has seen a specimen 30 inches long. He adds, that at the Cape of Good Hope, it is very common and of large dimensions. Guichenot says it is abundant and esteemed at Algiers.

any evidence of its occurrence in the Bay of Fundy, although I have been informed that it has been taken well over toward the coast of Nova Scotia.

The blue-fish is pre-eminently a pelagic or wandering fish, and like many others, especially of the *Scombridæ*, is apparently capricious in its movements, varying in numbers at particular localities with the year, and sometimes disappearing from certain regions for a large fraction of a century, again to return as before. The cause of this variation it is impossible to explain, being due in some instances, probably, to the disappearance of its favorite food in consequence of its own voracity, or for other undetermined reasons.

They occur during the summer throughout the entire range indicated for the United States, but are much larger in size and in greatest abundance from the coast of New Jersey northward. From New Jersey osuthward, in the season mentioned, with the exception of an occasional wandering school, they are generally only about 8 to 12 inches in length, representing, therefore, in all probability, individuals of the second year's growth.

They appear to have a regular migration along our coast, presenting themselves later and later in the spring the farther they are found to the north, and disappearing in the inverse order from the same regions in the autumn. First noticed on the Carolina coast as early as March and April, immense schools of them, bound eastward, are seen off the coast of the Middle States, from the middle of May to the middle of June; and in October similar bodies, perhaps embracing fewer individuals, pass to the southward. It is possible, however, that in the autumn some schools move well out to sea, and are, therefore, less likely to be observed. They leave the northern coast about the middle of October, and about the middle of November appear in vast numbers off the coast of North Carolina, where, from Nag's Head, in Currituck County, to Cape Lookout, there is a very extensive fishery prosecuted, which furnishes blue-fish for the northern markets. It is estimated that at least one hundred and fifty crews are engaged in this fall fishing, which lasts generally until late in December. At this time individuals may be taken weighing 15 to 18 pounds, although their average size is about 10.

Their occurrence in autumn, off the coast of North Carolina, is preceded and first indicated by the vast schools of menhaden, which they follow in, several miles from the sea, and by the usual accompaniment of flocks of gulls attending them to take a share in the feast. Of the particular mode of fishing in this neighborhood we shall take occasion to speak hereafter.

According to Dr. Yarrow, the blue-fish are first seen in spring on the North Carolina coast, (the smaller ones first,) in March or April, when, however, they are much less in size than the specimens referred to as occurring in the fall. The precise time of their appearance at most of the points farther north has not yet been ascertained. Whether they actually migrate from south to north, and *vice versa*, or merely come in from the outer seas in regular order, as is believed to be the case with the shad, &c., has not been settled, although the former supposition appears the more probable. They reach the New Jersey coast some time in the early part of May, and usually appear at Newport and in Vineyard Sound (the time varying with the season) from the middle of May to the first week in June. They are expected at Edgartown from the 25th to the 30th of May; but I am informed that, on their first arrival, they feed at the bottom, and sometimes for a while are not seen at the surface at all, seldom being taken with the hook, but caught in large

numbers in pounds and with the gill-net, usually along the lower edge of the net. According to Dr. Yarrow, they are not taken with the hook about Beaufort until about the 1st of July. They do not bite, however, in Vineyard Sound until from the 10th to the 15th of June, when they appear on the surface and are caught in large numbers, in the usual manner.

Great interest attaches to this fish in consequence of the changes that have taken place in its abundance, and even its actual occurrence on our coast, within the historic period. The precise nature and extent of this variation has not been established, nor whether it extended along the entire coast or not. Its earliest mention for our waters is in the work of Josselyn, ("New England Rarities Displayed," 1672,) where, on page 96, he mentions the "blew-fish, or horse," as being common in New England, (his residence was on the New Hampshire coast, or near by in Maine,) and "esteemed the best sort of fish next to rock-cod." He says: "It is usually as big as the Salmon, and a better meat by far." He also, on page 24, catalogues two kinds of "Blew-fish" or "Houndfish;" the "Speckled Houndfish" and the "Blew Houndfish, called Horsefish." There appears to be no species to which this reference could apply, excepting the subject of our present article, this being the opinion of Mr. J. Hammond Trumbull, who has devoted much research to determining the modern equivalents of ancient Indian names of animals, and to whom I am indebted for the hint. Mr. Trumbull also remarks that in a manuscript vocabulary obtained by President Stiles, in 1762, from a Pequod Indian at Groton, Connecticut, there is mentioned the "Aquaundunt or blue-fish," clearly the same as what now bears that name, which shows that this fish was found in Fisher's Island Sound in 1762.

Again, according to Zaccheus Macy,[1] the blue-fish were very abundant about Nantucket, from the first settlement of the English on the island, in 1659 to 1763, and were taken in immense numbers from the 1st of June to the middle of September. They all disappeared, however, in 1764, a period of great mortality among the Indians of that island. (See page —.) It has been suggested that the disease which attacked the Indians may have been in consequence of an epidemic in the fish upon which they fed, or else that it invaded both fish and Indians simultaneously, resulting in almost their entire extermination.

According to Dr. Mitchell, this fish was entirely unknown about New York prior to 1810; but they began to be taken in small numbers about the wharves in 1817, and were abundant in 1825. Immense numbers were caught at the Highlands in 1841. The doctor remarks, as has been done repeatedly by others, that as the blue-fish increased, the squeteague or weak-fish diminished in about the same ratio.

According to Mr. Smith, of Newport, (page 20 of testimony,) his father used to catch blue-fish some time about the year 1800, when they were very abundant and of large size, weighing from 16 to 18 pounds.

Captain Francis Pease, of Edgartown, also testified that his father spoke of large blue-fish at the end of the preceding century, some of them weighing 40 pounds. This leaves an interval between 1764 and toward the end of the century, in which no mention is made of the blue-fish, and which may probably indicate its absence, as during that time there were many works published relating to the local history and domestic economy of New England, and which would doubtless have taken note of so conspicuous a fish had it been present.

Whether they existed uninterruptedly during the century intervening

[1] Collections Massachusetts Historical Society for 1794, vol. iii, 1810.

between Josselyn's time, 1672, (or even 1659, according to Macy,) and 1764, I am at present unable to say. According to Captain Pease, they were known about Edgartown at the end of the last century. As already stated, Dr. Mitchell speaks of their first making their appearance about New York in 1810. They are noted as having been seen in Vineyard Sound again as early as 1820. It would therefore appear that they were in such small numbers about New York in 1810 that the young only were noticed flocking about the wharves, and that in ten years they were observed as far east as Nantucket, where the specimens seen, from 1824 to 1826, were very small, not over 4 inches. The next year they measured 7, and the third year 10 inches, according to the testimony of one witness, although this does not represent, in all probability, the rate of growth.

According to Captain Burgess, of Monument, Massachusetts, they were caught about Nantucket in 1825, and were very abundant in 1830. Dr. Storer states the first blue-fish recorded as having been noticed in the present century, north of Cape Cod, was captured on the 25th of October, 1837. Captain Atwood remarks that in 1838 he saw blue-fish for the first time about Provincetown. These were very small, the largest weighing only 2 pounds. In a few years, however, they became larger and more numerous, and finally increased to such an extent as to exercise a very marked influence upon the fisheries. According to the captain, (Proceedings of Boston Society of Natural History, 1863, p. 189,) they arrive in Massachusetts Bay in a body, coming at once, so as to almost fill the harbor at Provincetown. On one year they came in on the 22d of June, and although the day before eight thousand mackerel were taken, the day after not one was seen or captured. He says that they leave about the last of September, with the first cold northeasterly storm, although stragglers are taken as late as December at Provincetown.

According to Messrs. Marchant and Peter Sinclair, of Gloucester, (October, 1872,) blue-fish made their first appearance in numbers about Cape Ann twenty-five years ago, coming in great force and driving out all other fish. They are now much scarcer than twenty years ago; about the same as tautog; some seasons scarcely noticed.

Mr. J. C. Parker, an aged gentleman of Falmouth, says the first blue-fish seen at Wood's Hole in this century was taken in July, 1831; but his father informed him that they were abundant in the preceding century, about 1780 or 1790, at which time they disappeared; and that when the blue-fish left, the scup first made their appearance.

They are also noted as having shown themselves at the head of Buzzard's Bay in 1830 and 1831, and although numerous, were of small size, measuring about a foot in length.

To sum up the evidence, therefore, in regard to the periodical appearance of the blue-fish, we find notice of its occurrence in 1672, or even 1659, and up to 1764. How long it existed in the waters prior to that date cannot now be determined. The oral testimony of Mr. Parker refers to its occurrence at Wood's Hole in 1780 or 1790; and it is mentioned as being at Newport in 1800, (Mr. Smith, p. 20,) and at Edgartown, Massachusetts, about the same time, (Captain Pease, p. 39), Mitchell testifies to its occurrence in New York, of very small size, in 1810; and it is recorded as existing again at Nantucket in 1820, and about Wood's Hole and Buzzard's Bay in 1830 to 1831; and a little later at Hyannis. In 1830 it had become abundant about Nantucket, and in the fall of 1837 it was first noticed in Massachusetts Bay; and then year by year it became more and more numerous, until now it is very abundant. Several

accounts agree in reference to the very large size (even to 40 or 50 pounds) of those taken in the last century.

Further research into ancient records may tend to throw more light on the early history of the blue-fish, and even materially to change the conclusions already reached. It will be observed that the references to its occurrence, from 1780 to 1800, are on the testimony of aged persons who have heard their fathers speak of it, although I find no printed records anywhere in reference to it between 1764 and 1810. The rate of progression to the north of Cape Cod I have at present no means of indicating, although they probably gradually extended farther and farther north, and may possibly occur much farther east than we have any mention of at present.

During the present century the maximum of abundance of these fish off the middle coast of the United States appears to have been reached from 1850 to 1860. The testimony elicited from various parties, as well as from printed records, indicates a decrease since that period much greater in some localities than others. About New York they are said to have been unusually plenty in the summer of 1871, but farther east the diminution which had been observed in previous years appeared to continue. The testimony taken at Newport varied somewhat, some persons thinking the fish were decidedly scarcer than in previous years, others finding no appreciable difference. (See pp. 8, 11, 18.) Mr. Harmon, of Pasque Island, Vineyard Sound, stated that the blue-fish, within a very few years, had diminished to such an extent that, when fishing from the stands, not more than two or three could be taken in a day.

At Nantucket, those fishing with gill-nets considered the blue-fish as plenty as before, and even more abundant; but the unanimous testimony of a large number of line-fishermen was to the effect that there had been a very decided reduction. This expression of opinion was also shared by the line-fishermen at Edgartown as well as at Hyannis. Indeed it was asserted that while the reduction, up to 1870, had been gradual, it became abruptly much greater in 1871. If this be true, it may have been caused by a more limited range of the fish; perhaps in consequence of remaining off the coast of New York and New Jersey, where the number is believed to have been greater than in previous years.

All parties, however, agreed that there were fewer fish on the north side of Nantucket than usual.

The testimony at Hyannis was very emphatic in reference to a positive and abrupt decrease, although this was less in the case of the blue-fish than had been observed in regard to the scup, sea-bass, and tautog.

According to some persons, the number taken in 1871 was not half that of 1870; thus, while a year or two before 1870 five hundred pounds a day was a fair average for a single fisherman, one hundred pounds was a liberal allowance for 1871. (Page 50.) Ten or fifteen years ago, eighteen men at Hyannis could load a vessel with blue-fish in a day, to do this requiring fifteen hundred fish weighing five or six pounds each. This is now said to be entirely impossible, even with twice the number of men.

According to Captain Edwards, the blue-fish in 1871 were not more than half or one-fourth as plenty as they were a few years ago; this either in consequence of their extending their cruising-grounds farther to the east, or the diminution of their food.

Captain Thomas Hinckley, also of Wood's Hole, believes the decrease to be very decided, and states that it commenced four or five years ago.

On the other hand, Dr. Yarrow learns that blue-fish have increased on the Carolina coast, as compared with their abundance before the war.

I have been unable to learn whether any appreciable difference has presented itself on the north side of Cape Cod, corresponding to that on the south side. Of the fact of the decrease in 1871, along the entire coast from Newport to Monomoy Point, there can, I think, be no question, as, although the number captured was perhaps absolutely greater than in the previous year, these were taken mainly in a greatly increased number of traps, pounds, and gill-nets, while the line-fishermen, as already stated, on ground where formerly they could readily capture from one hundred to one hundred and fifty fish in a day, now found twenty or thirty a very large allowance for the average catch. I have myself been able to appreciate a very great difference in the abundance of blue-fish in the vicinity of Wood's Hole from 1863 to 1871.

In 1872 a continued decrease in the number of blue-fish was again apparent, the number being much less everywhere than before. At Hyannis, Wood's Hole, and Edgartown, the estimated decrease compared with 1871, varied from one-half to three-fourths; and they the fish were also said to be smaller than usual. These statements are corroborated by parties in New Bedford. According to the wholesale dealers in Fulton Market, they were less plenty than heretofore. At Edgartown and Nantucket, and in Vineyard Sound, comparatively few were taken with the line, the gill-nets being depended upon for a supply.

The decrease at Hyannis is noticeably shown by the statements on page 178, where it will be seen that with nearly twice the number of boats in 1872, as compared with 1871, fewer fish were landed at Baxter's wharf. Captain Handy took less than half as many fish as in the previous year, and Timothy Crocker and J. G. Loring both referred to a corresponding decrease.

The question now arises as to the causes of this decrease in abundance on the part of the blue-fish on the south side of New England, while they appear to be as plentiful as ever off the coast of New Jersey and Long Island. It is of importance in this inquiry that this variation in the number of blue-fish has been accompanied by a similar change in the other fishes, and especially in the scup and menhaden. As, however, there is no marked indication of decrease elsewhere than from Watch Hill to Monomoy, we are entitled to look for some local cause as affecting the number; and it is a curious coincidence at least, if not a relation of cause and effect, that it is precisely in this area of diminished abundance of particular kinds of fish that we find the summer-fishing, by means of traps, pounds, and gill-nets, to have received its highest and most rapid development.

Although fixed apparatus for the capture of fish have been in use in Narragansett Bay for a considerable number of years, the introduction of such engines into more eastern waters has been comparatively slow, and usually limited to a short season in the spring of the year. Within the last five or ten years, however, the pounds have not only increased in number, but have greatly extended the time of their operation, so that instead of being taken up in June, they are now kept down much later, many of them even into October. It is, however, not to any direct action of the pounds upon the blue-fish that I attribute their scarcity. That the blue-fish themselves destroy other fish in immense numbers, there can be no question; and a reduction of their food, whether caused by themselves or supplemented by other influences, will tend to induce them to seek other fields of supply. That this latter is the case, seems to be shown by their temporary increase at least off the coast of New York and New Jersey. Indeed, in reference to the question of the fish-supply, it may be considered as established that the fecun-

dity of fishes is so great that any ordinary influences acting upon them will exercise no particular effect, but that while the capture of fish, in ordinary seasons, by the usual human agencies, will be of comparatively little account, any disturbance of such fish, while on their spawning-grounds, must have some influence, however slight. This will be exhibited not only in the number of breeding-fish actually destroyed before their reproductive function can be accomplished, but in the breaking up of the schools, and thus keeping them from suitable spawning-grounds, causing them to waste the spawn in the waters, where, for one cause or another, a proper combination of the sexes cannot be effected, or where the eggs do not find a suitable *nidus* for development; or, again, where the young fish cannot be properly protected from the destructive agencies surrounding them. If, now, in addition to these influences, which would act perhaps very slowly and almost unappreciably for a great number of years, we introduce a new disturbance, in the form of immense numbers of the most voracious fish on record, which, from its earliest age to its maximum development is in the habit of destroying its own weight or more in fish every day, we can easily imagine what an effect must be produced.

As far as I can learn, there is no parallel in point of destructiveness to the blue-fish among the marine species on our coast, whatever may be the case among some of the carnivorous fish of the South American waters. The blue-fish has been well likened to an animated chopping-machine, the business of which is to cut to pieces and otherwise destroy as many fish as possible in a given space of time. All writers are unanimous in regard to the destructiveness of the blue-fish. Going in large schools, in pursuit of fish not much inferior to themselves in size, they move along like a pack of hungry wolves, destroying everything before them. Their trail is marked by fragments of fish and by the stain of blood in the sea, as, where the fish is too large to be swallowed entire, the hinder portion will be bitten off and the anterior part allowed to float away or sink. It is even maintained, with great earnestness, that such is the gluttony of the fish, that when the stomach becomes full, the contents are disgorged, and then again filled. It is certain that it kills many more fish than it requires for its own support.

The youngest fish, equally with the older, perform this function of destruction, and although they occasionally devour crabs, worms, &c., the bulk of their sustenance throughout the greater part of the year is derived from other fish. Nothing is more common than to find a small blue-fish of 6 or 8 inches in length, under a school of minnows or of making continual dashes and captures among them. The stomachs of the blue-fish of all sizes, with rare exceptions, are found loaded with the other fish, sometimes to the number of thirty or forty, either entire or in fragments.

As already referred to, it must also be borne in mind that it is not merely the small fry that are thus devoured, and which it is expected will fall a prey to other animals, but that the food of the blue-fish consists very largely of individuals which have already passed a large percentage of the chances against their attaining maturity, many of them, indeed, having arrived at the period of spawning. To make the case more clear, let us realize for a moment the numbers of blue-fish that exist on our coast in the summer season. As far as I can ascertain by the statistics obtained at the fishing-stations on the New England coast, as also from the records of the New York markets, kindly furnished by Middleton & Carman, of the Fulton Market, the capture of blue-fish, from New Jersey to Monomoy, during the season, amounts to not less

than one million individuals, averaging 5 or 6 pounds each. Those, however, who have seen the blue-fish in its native waters, and realized the immense number there existing, will be quite willing to admit that probably not one fish in a thousand is ever taken by man. If, therefore, we have an actual capture of one million, we may allow one thousand millions as occurring in the extent of our coasts referred to, even neglecting the smaller ones, which, perhaps, should also be taken into the account.

An allowance of ten fish per day to each blue-fish is not excessive, according to the testimony elicited from the fishermen and substantiated by the stomachs of those examined; this gives ten thousand millions of fish destroyed per day. And as the period of the stay of the blue-fish on the New England coast is at least one hundred and twenty days, we have in round numbers twelve hundred million millions of fish devoured in the course of a season. Again, if each blue-fish, averaging 5 pounds, devours or destroys even half its own weight of other fish per day, (and I am not sure that the estimate of some witnesses of twice this weight is not more nearly correct,) we will have, during the same period, a daily loss of twenty-five hundred million pounds, equal to three hundred thousand millions for the season.

This estimate applies to three or four year-old fish, of at least three to five pounds in weight. We must, however, allow for those of smaller size, and a hundred fold or more in number, all engaged simultaneously in the butchery referred to.

We can scarcely conceive of a number so vast; and however much we may diminish, within reason, the estimate of the number of blue-fish and the average of their captures, there still remains an appalling aggregate of destruction. While the smallest blue-fish feed upon the diminutive fry, those of which we have taken account capture fish of large size, many of them, if not capable of reproduction, being within at least one or two years of that period.

It is estimated by very good authority, that of the spawn deposited by any fish at a given time, not more than 30 per cent. are hatched, and that less than 10 per cent. attain an age when they are able to take care of themselves. As their age increases, the chances of reaching maturity become greater and greater. It is among the small residuum of this class that the agency of the blue-fish is exercised, and whatever reasonable reduction may be made in our estimate, we cannot doubt that they exert a material influence.

The rate of growth of the blue-fish is also an evidence of the immense amount of food they must consume. The young fish, which first appear along the shores of Vineyard Sound, about the middle of August, are about five inches in length. By the beginning of September, however, they have reached six or seven inches, and on their re appearance in the second year, they measure about twelve or fifteen inches.[1]

After this they increase in a still more rapid ratio. A fish which passes eastward from Vineyard Sound in the spring, weighing 5 pounds, is represented, according to the general impression, by the 10 to 15 pound fish of the autumn. If this be the fact, the fish of 3 or 4 pounds, which pass along the coast of North Carolina in March, return to it in October, weighing 10 to 15 pounds. The only parallel to the voracity and rapacity of the blue-fish in our waters is, perhaps, to be met with in the case of the common pickerel; and an experiment quoted by Mr. Theodore

[1] According to Genio C. Scott, the blue-fish weighs 2 pounds when it appears on the coast in its second year, (aged twelve months,) and by autumn, or at eighteen months, they weigh from 3 to 5 pounds.

Lyman may serve as a measure for both, and their resulting rate of growth. He states that a friend of his, Dr. Sturtevant, introduced two young pickerel, about 5 inches long, into a horse-trough, minnows of about an inch in length being supplied to them daily. On the first day they devoured one hundred and twenty-eight; the second, one hundred and thirty-two; and the third, one hundred and fifty; and they themselves increased one inch in length in forty-eight hours, consuming an average of about sixty-six fishes each per day, a weight much greater than their own.

In view of this fact, and bearing in mind that the blue-fish, by its pertinacity and its strength and vigorous motions, can find no difficulty in overtaking the prey that it attacks, the estimate of ten fish per day is probably much below the mark.

We now proceed to consider the respective action of the pounds and the blue-fish upon the fish supply. No one will deny that most of the shore fishes are taken, as already explained, while on their way to their spawning-beds, the erection of traps and pounds, in the line of their regular migration, being especially adapted to their capture. It will also be admitted by every unprejudiced person that, in addition to the large percentage actually captured by the pounds, a decided influence is produced by their interference with the course of the remaining fish, and causing them to spawn at improper times or in unsuitable localities. Supposing, however, that the percentage already mentioned escape the perils to which they are exposed, and perform their appropriate functions in due season, their eggs will, of course, be greedily devoured by the small fry attracted by them. Apart from fish attaining a considerable size, the water abounds in various diminutive species of *cyprinodonts*, *atherinas*, &c., which are never taken in the pounds, and which, of course, hold their own year by year, and, indeed, may multiply in consequence of a diminution of the number of larger fish that would otherwise devour them. These act both upon the spawn and the young fish, as also do the other marine animals, the various crustaceans, some of the radiates, &c. As all of these are on the spot, they doubtless devour as many eggs and young one year as another, and what is left by them while growing up has finally to run the gauntlet of capture by man in various ways, and by the blue-fish and other species that devour them after they reach a considerable size.

Should it be a matter of astonishment, then, in view of this combination of agencies of destruction, if the supply of fish were to decrease appreciably on those portions of the coast where all are acting in concert, even though their number may not have diminished perceptibly, where only one or the other occurs.

In this connection, I have confined my examination to the blue-fish; but it may be stated that the squeteague is almost equally destructive, devouring as it does immense numbers of fish of considerable size. There is this difference, however, that the squeteague, from the weakness of its teeth, appears unable to mangle its prey, and confines itself to satifying its appetite by swallowing the fishes whole. Nor is there any evidence that the squeteague empties its stomach when once filled, for the purpose of loading it again. For this reason the effect produced upon other fishes by an equal number of these two kinds of fish, of the same weight, would be very dissimilar, although that of both is doubtless quite appreciable.

As already remarked, the size of this fish varies considerably with season and locality, those spending the summer on the southern coast, according to good authority, rarely exceeding two or three pounds in

weight, and being generally considerably less. The largest summer specimens are those found farther to the eastward, where they are not unfrequently met with weighing from ten to fifteen pounds, although this latter weight is quite unusual. Mr. Snow, however, (page 44,) mentions having seen one of twenty-two pounds, and others give, as their maximum; from fourteen to twenty. The average size of the schools in Vineyard Sound, during the early season, is from 5 to 7 pounds. The schools, however, that make their appearance in October, embrace many individuals of from 10 to 15 pounds. It is therefore not improbable that the difference between the first-mentioned average and the last represents the increase by their summer feeding. As already remarked, blue-fish in the last century sometimes attained a weight of 40 or 50 pounds in Vineyard Sound; according to Zaccheus Macy, thirty of them would fill a barrel.

On getting back to the Carolina coast in the early part of November, according to Dr. Yarrow's statement, they are from 3 to 5 feet in length and weigh from 10 to 20 pounds. What becomes of these large fish, that so few of them are seen in the early spring, it is impossible to say. If it be really true that they are much scarcer than in the fall, we may infer that their increased size makes them a more ready prey to the larger fish and cetaceans, or that they have accomplished their ordinary period of life; possibly that they have broken up into smaller parties, less conspicuous to observation, or that they have materially changed their locality. The average length of the fish that appear in the spring off the coast of Virginia and the southern part of New Jersey, according to Dr. Coues, Dr. Yarrow, and my own observations, is about one foot, being probably about one year old. As a general rule, those of the smaller size keep close to the shore, and canal ways be met with, while the larger ones go in schools, and remain farther outside.

I was unable to obtain any very young fish about Wood's Hole in 1871, the smallest found making their appearance quite suddenly along the coast, especially in the little bays, about the middle of August, and then measuring about 5 inches by 1.20. By the end of September, however, these had reached a length of 7 or 8 inches, and at the age of about a year they probably constitute the 12 or 14 inch fish referred to as occurring along the southern coast. The fish of the third year, or those two years old, are possibly the 3-pound fish, while the 5 to 7 pound fish may be considered a year older still. Accurate observations are wanting, however, to determine these facts; as also whether they require two years, or three or more, to attain sufficient maturity for breeding. As far as I know, there is no appreciable difference between the sexes in their rate of growth or weight, excepting that the female is likely to be a little deeper in the body.

I have already referred to the principal facts connected with the migrations and movements of the blue-fish, and especially their arrival and departure. As already suggested, they appear to start along the southern coast in April, and move northward, parallel with the coast, in very large bodies, and extending sometimes several miles outside of the shore-line. Their presence at the surface is usually indicated by their "breaking," apparently in pursuit of their prey, and by the flocks of gulls and terns which hover over them. The birds become exceedingly eager on the occasion, and may be seen crowding together and darting continually at their food upon the surface of the water. No surer evidence of the presence of a school of blue-fish or Spanish mackerel, off the middle coast of the United States, can be given, in the summer-time, than the sight of gulls and terns so occupied.

The blue-fish sometimes make their way up the rivers to a considerable distance, the adults, however, apparently never entering the perfectly fresh water. They are found in the Potomac as far north as Acquia Creek, and also far up the Hudson; indeed, the young of the year are taken as high as Sing Sing on the Hudson and other tidal rivers, where the water is entirely fresh.

As already explained, the relationship of these fish to the other inhabitants of the sea is that of an unmitigated butcher; and it is able to contend successfully with any other species not superior to itself in size. It is not known whether an entire school ever unite in an attack upon a particular object of prey, as is said to be the case with the ferocious fishes of the South American rivers; should they do so, no animal, however large, could withstand their onslaught.

They appear to eat anything that swims of suitable size, fish of all kinds, but perhaps more especially the menhaden, which they seem to follow along the coast, and which they attack with such ferocity as to drive them on the shore, where they are sometimes piled up in windrows to the depth of a foot or more.

The amount of food they destroy, even if the whole of it be not actually consumed, is almost incredible. Mr. Westgate (page 33) estimates it at twice the weight of the fish in a day, and this is perhaps quite reasonable. Captain Spindel goes so far as to say that it will destroy a thousand fish in a day. This gentleman is also of the opinion that they do much more harm to the fishes of the coast than is caused by the pounds. They will generally swallow a fish of a very large size in proportion to their own, sometimes taking it down bodily; at others, only the posterior half. The peculiar armor of certain fish prevents their being taken entire; and it is not uncommon to find the head of a sculpin or other fish, whose body has evidently been cut off by the blue-fish. In the summer-time the young are quite apt to establish themselves singly in a favorite locality, and, indeed, to accompany the fry of other fishes, usually playing below them, and every now and then darting upward and capturing an unlucky individual, while the rest dash away in every direction. In this manner they attend upon the young mullet, atherinas, &c. They are very fond of squid, which may very frequently be detected in their stomachs. In August, 1870, about Fire Island, Mr. S. J. Smith, found their stomachs filled with marine worms, a species of *Heteronereis*, which, though usually burrowing in the mud, at that season swims freely toward the surface, in connection with the operation of reproduction. This, like the squid, is a favorite bait for the blue-fish; and they appear to care for little else when these are to be had. This fact probably explains the reason why, at certain seasons, no matter how abundant the fish may be, they cannot be taken with the drail.

Their influence upon other marine animals is not always injurious. Thus, according to Captain Atwood, the lobsters have multiplied fourfold in Massachusetts Bay since the blue-fish have appeared there, in consequence of their driving away the mackerel, which were the greatest enemy of the young lobsters. *Per contra*, however, he remarks that the blue-fish actually destroy great numbers of mackerel of all sizes, and they have almost entirely broken up the mackerel fishery in the vicinity of Provincetown, making it necessary for the fishermen to resort to far distant waters, to which blue-fish have not yet penetrated. According to Dr. Storer, the mackerel fisheries of Massachusetts Bay have been entirely ruined since 1847.

The fondness of the blue-fish for squid, Captain Atwood thinks, has

had a material influence upon the abundance of flounders, which have a similar proclivity, and appear to depend upon these animals in greater part for food. Flounders have, therefore, greatly diminished in Massachusetts Bay, either from being starved out or obliged to resort to other localities.

The blue-fish are not unfrequently found with crabs and shell-fish in their stomachs, (page 42,) as also eels, (page 44,) which probably they obtain at night, as it is understood they feed at the bottom at that time, coming to the surface by day. This is proved by the fact that blue-fish taken in gill-nets are taken at night near the middle line; but if taken by day, then near the upper edge.

In the discussion of the question as to whether the decrease of fish on the south coast of New England has arisen from the multiplication of traps and pounds, it has been denied that scup form any part of the food of the blue-fish, it being asserted that the spinous nature of the fins effectually prevents such a performance. Apart, however, from the positive testimony of a great number of persons on this point, I am able to state in the most emphatic manner that of the large number of blue-fish examined at Wood's Hole during the summer of 1871,[1] nine-tenths of them had their stomachs filled with scup in greater or less number. Most of these fish were taken in pounds, in which scup were also caught; and it would be but the exercise of a natural instinct for the one to prey upon the other under these circumstances; and, nevertheless, it is very clear that the natural defenses of the scup did not prevent their being swallowed. Furthermore, however, the examination of many blue-fish taken in gill-nets also resulted in finding scup in their stomachs. We may, therefore, readily infer that, while, perhaps, preferring menhaden and mackerel, as being either more savory or more easily taken from their swimming near the surface of the water, blue-fish will feed upon any animal life to be found in the sea, going nearer the bottom at night, and coming to the surface by day, and that whatever fish the sea affords in greatest abundance at the time will suffer most severely from their ravages.

As already stated, the first blue-fish of the season are caught at the bottom, while fishing for scup; and the evidence shows that they are first taken in gill-nets sunk to the bottom, before they are taken with the line at the top, this being the evidence of their presence, and before any indication is seen by their "breaking" at the surface.

According to Dr. Yarrow, this fish, on the southern coast, comes in from the sea into the inlets on the flood tide, the larger ones returning on the ebb, feeding in preference in water of 4 to 5 feet in depth.

As already explained, they seem to know no particular time for taking their food, being equally voracious day and night.

I regret to say that but little definite is known in regard to the reproduction of the blue-fish. Dr. Yarrow does not give any facts in regard to this subject, at Fort Macon, except that spawn was seen to run out of a small female caught July 14. Dr. Holbrook is also silent on this head. Mr. Genio C. Scott says the spawning-beds are visited by the parent in June, and consist of quiet nooks or bays. Mr. R. B. Roosevelt states that very diminutive young occur in immense numbers

[1] Of seven hundred blue-fish the stomachs of which were examined by my assistant, Dr. Palmer, at Wood's Hole, between the 2d of August and the middle of September, six hundred and fifty-five contained scup, in numbers varying from two to ten or more, the average being four or five. Next in number to the scup came the butterfish, the squid, small mackerel, and the sand-smelt. Even young blue-fish of the season had entire scup of the year within them.

along the coast at the end of September or beginning of October. (Game Fish of America, 1862, 159.) I found the young fish at Carson's Inlet, Beasley's Point, New Jersey, in July, 1854, two or three inches in length, and more compressed than the adult; but farther east, on Vineyard Sound, although diligent search was conducted, between the middle of June and the first of October, with most efficient apparatus in the way of fine meshed nets, I met with nothing excepting fish that made their appearance all at once along the edge of the bay and harbor.

According to Captain Edwards, of Wood's Hole, a very accurate observer, they have no spawn in them when in Vineyard Sound. This statement is corroborated by Captain Hinckley; and Captain Hallett, of Hyannis, (page 48,) "does not know where they spawn." The only positive evidence on this subject is that of Captain Pease, (page 38,) who states it as the general impression about Edgartown, that they spawn about the last of July or the first of August. He has seen them when he thought they were spawning on the sand, having caught them a short time before, full of spawn, and finding them afterward for a time thin and weak. He thinks their spawning-ground is on the white sandy bottom to the eastward of Martha's Vineyard, toward Muskeeget. While not discrediting the statement of Mr. Pease, it seems a little remarkable that so few persons on the eastern coast have noticed the spawning in summer of the blue-fish; and although there may be exceptions to the fact, it is not impossible that the spawning-ground is in very early spring or even in winter off New Jersey and Long Island or farther south. It is not impossible that, at a suitable period after spawning the young, in obedience to their migratory instinct, many move northward along the coast, growing rapidly as they proceed. This explains the almost sudden appearance of fish of five inches about Wood's Hole.

We have the statement of Dr. Yarrow that vast schools of small blue-fish were met with in Beaufort Harbor during the last week in December, 1871. These were in company with small schools of young menhaden and yellow-tailed shad, and were apparently working their way toward the sea by the route of the inlet. When observed, they were coming from the southward through the sound, moving very slowly, at times nearly leaving it, and then returning. The largest were about 4 inches in length, and others were much smaller; and as many as twenty schools were observed from the wharf at Fort Macon, each of them occupying an area of from 60 to 80 feet square, and apparently from 4 to 6 feet in depth. I would not be much surprised if these fish should prove to have been spawned late in the year off the southern coast.

The mode of taking these fish varies with the locality, the more productive method being either with weirs, or pounds, or by means of the gill-net. In Massachusetts Bay immense numbers are sometimes taken in the brush-weirs, which are very common in that region. During the night of the 14th of September, 1870, I happened to be anchored off Billingsgate Shoal, where one weir took a school of blue-fish estimated at 20,000 in number, weighing probably six pounds each. Fifteen carts were occupied the entire morning in hauling these fish up from the beach.

At Hyannis, Nantucket, and Edgartown they are taken principally by the line, although a large number are caught about Nantucket in gill-nets. In 1872, owing to the increasing scarcity, comparatively few were taken at these places with the line, the supply being furnished mainly by net.

Farther west, in Vineyard Sound and in Buzzard's Bay, they are taken principally in the pounds; while still farther to the west and in

Long Island Sound, they are taken very largely in gill-nets as well as with the line. Wherever they occur, of course large numbers are taken with the hook and line by sportsmen and amateurs.

The fish taken on the south side of New England, and off the coast of New York and New Jersey, are for the most part shipped to New York for consumption as fresh fish. They are packed in ice, if near a railway communicating with the cities, and put up in sugar-boxes, about 300 pounds in a box. The fish taken at Nantucket, however, and to some extent those at Edgartown, are salted and packed in barrels for winter use. These contain about 200 pounds each, and are worth $10 per barrel in good seasons.

According to Captain Atwood, (Proceedings Boston Society of Natural History, IX, 1863, p. 189,) in addition to their capture in Massachusetts Bay in weirs, they are taken very largely outside by gilling. For this purpose two boats, each with 450 yards of netting meet, and unite the ends of their respective nets, and then, moving in opposite directions, pay out the nets, and then nearly meet with the outer ends, the net forming a semi-circle. Just before coming together, they turn inward so as to form a helicoid-curve toward the net. Then, moving outside, they endeavor to drive the schools of fish into the concavity of the net, and thereby cause them to become gilled.

Formerly, when they first appeared they were taken only in the bay, but of later years, according to Captain Atwood, they have become hardy, stay later in the season, and are more frequently found on the outer edge of the cape.

About Nantucket the gill-nets are usually set in a nearly straight line parallel with the shore; and the fish, according to Mr. Snow, are captured on the ebb tide. The nets are 25 to 50 fathoms long, and from 30 to 50 meshes wide, the meshes varying from $4\frac{1}{4}$ to $4\frac{1}{2}$ inches, No. 15 or 16 thread. The gill-nets sometimes float at the surface of the water; sometimes are sunk nearly to the bottom, as already stated, the season, the time of day, and time of tide all requiring to be taken into account.

At Newport, according to Mr. Taylor, (page 27,) the nets used in that vicinity are 76 meshes deep, the mesh $4\frac{1}{2}$ inches. In these they are taken about midway, the weight of the fish varying from $2\frac{1}{2}$ pounds to 7 or 8.

The usual method of taking them with the line is by drailing or trolling, this consisting in fastening a hook to from 20 to 50 fathoms of line, the bait consisting simply of a bit of polished metal, which may be cast around the base of the hook, or of a bit of bone or ivory similarly placed. This is dragged rapidly through the water, under full sail. Sometimes the weighted hook is covered by a piece of inverted eel-skin, one end of which is tied down over the leaded portion, and extending nearly to the barb of the hook, with a small piece generally playing just beyond; the whole resembling a small shining fish, as it moves rapidly through the water. They are sometimes, indeed, taken with a bait of red flannel, or even a white rag; as, when ravenously inclined, they will snap at anything they see thus in rapid motion, especially if it has any resemblance to a moving fish. Menhaden or other shining fish may also be used to advantage; but it is seldom thought necessary to take this trouble. The shank of the hook, or metal fastening, must be sufficiently long to prevent the blue-fish, in their eager haste to seize their prey, from cutting the cord, as they would bite through it almost with the precision of a pair of nippers. Indeed, the end of the line is sometimes connected with the hook by means of a

small chain, or else coated with wire. This mode of taking the blue-fish is very exciting, as, when abundant, they usually bite at the drailing hook as rapidly as it is thrown out, several fish often being seen jumping at the same time to seize the coveted but delusive prize.

A mode recently introduced off the coast of New York and New Jersey consists in baiting certain fishing-grounds with chopped menhaden, and then anchoring the smack. Lines, with pewter squids, are then dropped overboard and hauled rapidly up. This proves to be very successful, much more so than trolling.

Although the sight of a school of fish playing in the water is generally the sign to thrown out the lines, it often happens that stragglers are picked up when their presence is not suspected, so that in regions where blue-fish are generally found, it is customary for fishermen to keep a line out at the stern while making their trips from point to point. Great care must be taken to keep the hook free from floating seaweed, which is very apt to become fastened around it, as this invariably prevents any further success.

Not unfrequently blue-fish are taken when fishing with deep-sea lines for scup or tautog, especially at night; although the surface fishing is most customary and most productive.

The fishermen of Edgartown and of some other localities on Vineyard Sound, keep their line, when fishing, well out by means of a stick of wood projecting from the side, although generally the line is held in the hand directly over the stern or side of the boat. By the use of a moderate degree of skill, at least three lines if not more can be managed well from a sail-boat, one from the stern and the others from either side.

Another method of taking them is in the surf, when they are near the shore, coming in either after menhaden or to lie in wait for the schools of young alewives, as they pass out from the ponds in which they have been bred. In this case the usual method consists in swinging a weighted hook several times around the head; then, by a dexterous fling, throwing it off as far as possible into the water, and then immediately hauling hand over hand very rapidly. If no fish is hooked, the same experiment is repeated. In this way many large fish are taken.

Sometimes also the fisherman turns, as soon as he sees the splash of the hook, and runs as rapidly as possible up the bank and from the shore; again to return and repeat the operation. Under favorable circumstances, this method of fishing is very productive, resulting in the capture of large numbers in a short time.

For fuller details of everything connected with the capture of blue-fish by means of lines, I must refer to the excellent works of Genio C. Scott, Mr. R. B. Roosevelt, Mr. Thaddeus Norris, and others, who have made such subjects a specialty.

Whether the numbers of the blue-fish can be considered as at all diminished by any or all these methods of fishing, it is impossible to state, although I am inclined to the opinion that, if any, it is very slight. As the fish are not taken when exclusively engaged in the operation of reproduction, there is no special interference with their spawning, and although there has been a variation in abundance, as already explained, this may be ascribed as well to some peculiar caprice on their part, or to their finding less food than they require; and consequently their going elsewhere in search of it.

The average catch with the hook of course varies with the abundance of the fish and their readiness to bite. According to Captain Pease, (page 40,) one man, a few years ago, could take about 1,500 pounds a day; while, as an illustration of their decrease in number, the largest

catch in one day in 1871 was 500 pounds, and the average at Edgartown and Hyannis not more than 100 pounds.

On the Carolina coast the best season for fishing is about at slack water, including the last of the ebb and young flood. At full tide the success is much less.

Reference has already been made to the number of blue-fish taken in Vineyard Sound during the season of 1871, these amounting to not far from a million of fish. At Hyannis alone, notwithstanding the decided diminution in number, as many as 100,000 fish, representing a weight of half a million pounds, were taken up to the 18th of September, and shipped by the cars to New York.

Of the winter fishing for blue-fish on the coast of North Carolina, the principal range, according to Dr. Yarrow, United States Army, extends from Nag's Head to Cape Lookout, the north bank near Nag's Head being a favorite locality. The fishing season there lasts about five or six weeks, from about the middle of November to the end of December; and in 1871 there were one hundred and fifty crews engaged. At this time the fish appear to come in direct from the sea, and, after spending some time there, they pass out again to sea in a southerly direction, this being possibly the time at which they come in to spawn, although Dr. Yarrow was unable to detect the presence of any spawn.

These fish are all large, some of them weighing 18 to 20 pounds, although their average, as already remarked, is about 10. They are captured by gill-nets made of No. 6 cotton-twine, 200 yards long and about 50 meshes deep, the mesh itself being 3 inches.

They are also captured, in less number, however, by means of the hook baited and thrown in the usual manner. Their first appearance is indicated by schools of menhaden, in pursuit of which they display so great eagerness as sometimes to run themselves upon the shore. When a school is seen to approach, the nets are let off from the boats about half a mile from the shore, so that the fish are gilled as they come in. The fish are generally of about the same size, and large, no young ones being found in their company.

A full outfit costs from seventy-five to one hundred dollars, and the boat's crew share the profits, which are sometimes very large; as in a good season the fish will bring about six cents per pound. As many as 4,000 fish have been taken out at a single haul, but this is unusual. A fair average is about 3,000 fish to a crew for a season. Allowing 2,000 as an average for the 150 crews, and we have 300,000 fish, which, at an average of ten pounds each, will give 3,000,000 pounds, amounting, at 5 cents per pound, to $150,000. These figures are believed to be fully within the mark.

Dr. Yarrow further states, in this connection, that no fish will swim in their company, large sharks even sometimes losing their fins by them. The only fish of the southern waters able to protect itself against them is the largest sized drum. They are, however, devoured in large numbers by the porpoises, which follow them to their grounds and make sad havoc among them. The same is the case farther north. Sharks, too, doubtless kill considerable numbers.

The economical value of the blue-fish as a food-fish is very great, constituting, as it does, a very large percentage of the food supply, during the summer, of the people of the coast from New Jersey to Massachusetts. It is to be met with in its season in all the markets, and is the principal reliance of summer boarding-places near the sea-coast, especially since the diminution in the number of the scup and other shore fishes. This is in strong contrast to the contempt manifested for them in the earlier part

of their occurrence during the present century. In one instance (page 183) a fisherman who caught two hundred could not induce people to steal them, although he left them out all night on a wharf for the express purpose. According to Dr. Storer, (Pr. Boston Soc. Nat. Hist., 1852, 289,) a bounty for its extermination was proposed, especially in view of its injury to the mackerel-fishing. The blue-fish is, however, very sweet and savory, but does not keep very well; and the difference in taste between a fish fresh from the water and one that has been out a few days, even though the latter be perfectly sweet, is very great. A great improvement in the flavor of the fish, as well as in the firmness and whiteness of its color, is effected by killing it as soon as caught and bleeding it, this operation being best performed by slashing the gills and cutting through the throat between them. The fish is well supplied with blood, as shown by its great muscular vigor, and bleeds very profusely; and persons accustomed to its taste when cooked, after being thus treated, are very unwilling to eat such as have been allowed to die in the ordinary manner.

As far as I could ascertain, very few blue-fish are used for the manufacture of manures or for oil, coming, as they do, when other kinds of food-fish are scarce. It is probable, however, that on the sea-coast, when a very large catch is made, the surplus is applied directly to the land, as is customary with the menhaden.

The wholesale value of the fresh blue-fish varies also with the season and the locality. At Edgartown the fish were sold in 1871 for about 1 cent a pound; and at Hyannis, Wood's Hole, and the pounds along the coast, at from 1½ to 2 cents a pound, the price varying with the immediate demand. At Beaufort, North Carolina, which is the principal market for the Carolina blue-fish, the wholesale value is 60 cents to $1 per hundred. The salted fish bring about $8 or $10 per barrel of 200 pounds. The retail price varies perhaps less than the wholesale, being generally, in the markets near the coast, about 8 cents a pound.

There appears to be no foreign commerce in this fish, the consumption being almost exclusively when fresh, and but to a limited extent when salted in barrels.

I have not learned whether the experiment has ever been made of salting and drying this fish, as is done with the cod family.

There appears to be no fish on the European coast presenting the same relationship to the other fishes as the blue-fish, which, as already remarked, exercises a terrorizing influence over other species, either destroying them bodily, or driving them away from their accustomed abode.

Captain Atwood refers to the influence they exert upon the shore-mackerel fisheries of New England. A similar effect is produced in Massachusetts Bay during the summer upon the fish of the cod family, the tautog, and other fish, it being understood that when the blue-fish appear all other fishing ceases for the time. Although such a result of the return of the blue-fish is not so marked on the south coast of New England, its exterminating qualities are evident, and need to be taken very seriously into account in considering the question as to the causes of the diminution of the food-fishes.

As already remarked, I feel quite assured that this combination of blue-fish, with the use of traps and pounds, has reduced the scup and tautog, sea-bass, &c., to their present scanty number on the south coast of New England. The two causes must be considered as working together, and deserving the accusations that have been brought against them. And possibly the effect is about equal, as, although the blue-fish

destroy the vastly greater number, yet these are the fish swimming in the open sea and taken after the operation of spawning has been accomplished, while the pounds secure particularly the spawning fish, and that, too, during the few weeks when they school near the shore for the purpose of depositing their eggs. Whether the British committee, which prosecuted the inquiry as to the influence of nets and traps upon the fishing, would have decided as they did, to the effect that they could observe no evil result therefrom, had the blue-fish been an inhabitant of their coast, is a very serious question.

XV.—DESCRIPTION OF APPARATUS USED IN CAPTURING FISH ON THE SEA-COAST AND LAKES OF THE UNITED STATES.

MODES OF CAPTURE.

The methods by which fish are captured in the United States are very varied, and in some of their modifications may be considered as superior to those in use in other countries.

The usual apparatus may be divided into: lines armed with hooks, nets and weirs, although other methods are in less extensive use, of which it is scarcely necessary to make extended mention here, these consisting in the main of spears, harpoons, the bow and arrow, poisoning, and explosive compounds.

PROJECTILES, EXPLOSIVES, AND POISON.

The *spear* is used more especially by the Indians in different parts of the country for taking salmon, and is not so well adapted to other fish.

The *bow and arrow* are extensively employed among the Esquimaux and the Indians of the northwest coast of America.

For *poisoning* fish, berries of the *Cocculus indicus*, or some other stupefying drug, are intimately mixed with bait and thrown into the water. The fish eating this became narcotized and floated to the surface, where they are taken. This method is of course available only in still localities, like mill-ponds, &c.

The *explosives* used consist of cartridges or torpedoes of gunpowder, dynamite, nitro-glycerine, &c., and sometimes, when set off in the vicinity of a large school of fish, destroy great numbers.

The *harpoon* is largely employed in the capture of the sword-fish off the New England coast. This consists of a barb with jointed ears, and fastened to one end of a rope of several hundred feet in length, to the other end of which is attached an empty, well-bunged barrel, to serve as a buoy. The end of a long handle carries a pointed iron stem, over which the socket of the harpoon-head referred to, usually called the lily-iron, is slipped. The fisherman stations himself at the end of the bowsprit of a small sloop or schooner, supported by a sort of iron frame, and when a sword-fish is seen resting idly upon the water the boat is steered directly toward it so as, if possible, to bring the harpooner immeditely over the fish, when the weapon is driven down with great force into the back of the neck; and if the lily-iron is fastened in the flesh, it slips off from the stem of the handle, which is pulled out as the fish darts away, and the rope and buoy are thrown overboard. The fish, of course, swims off with great velocity, diving to the bottom; but after a time, fatigued by the drag of the buoy, comes again to the surface. One of the fishermen then follows in a small boat, and, taking hold of the rope, draws the fish close up to him and kills it by means of a lance.

A harpoon of a somewhat similar character is sometimes fired from a shoulder-gun, either with or without a torpedo (bomb-lance) attachment. This method is rarely used on our coast for the true fishes, so far as I know being confined to the capture of whale.

The explosion of torpedoes under the water has only lately come into vogue, and it is said has been employed with much success on our southern coast. This method is used by poachers in England and Scotland for taking salmon and trout surreptitiously, the torpedo being fired, when sunk to the bottom, by means of a portable battery or otherwise. It is said that many fish are killed in this way, and that it is extremely difficult, if not impossible, to detect the poacher. A similar practice is said to have been recently introduced into New Jersey among the trout-ponds.

The Indians of Maine and New Brunswick are accustomed to kill porpoises in the bays and off the coast, and about the islands of Campobello and Grand Manan, with muskets loaded with buckshot. In this pursuit two Indians go out together in a canoe, when the sea is calm, and hunt for the porpoises as for other wild game, and when one is seen anywhere in the distance, they row with all their skill and might directly toward the object, and, when sufficiently near, fire at the head of the porpoise as it comes above the surface. Being good marksmen, they almost invariably wound and stun the fish; but as it would quickly sink beyond reach if killed, a lance with a long handle is made use of to fasten to and hold the game, which is soon deposited in the bottom of the canoe. About the northern head of Grand Manan, and in other favorable localities, the canoes of the Indians may be seen scattered over the water by dozens, upon a favorable day, watching for porpoises, the summer season being spent in temporary encampments on the shore by Indians from various parts of the northeast coast of Maine and New Brunswick.

These different methods, however, are of little moment compared with the use of the hook and line, nets, and weirs.

LINES.

Line fishing varies in its character, from the coarse, heavy cord used in taking fish at great depths in the sea, to the delicate apparatus of the trout, salmon, and striped-bass fishermen, the first-mentioned being the most important in an economical point of view. It may consist either of the hand-line or the set-line. In the case of the *hand-line* we have a single line and one or two hooks baited and sunk to or near the bottom, or thrown to any desired distance by means of a weight, and managed from the shore, or from a boat anchored or moving slowly; or the line may be drawn rapidly over the surface of the water behind a sail-boat, as in the capture of blue-fish, Spanish mackerel, striped bass, black bass, &c., either with or without a bait, other than some shining substance to attract the attention of the fish in question. This is known as trawling or trolling.

The more effective line apparatus, however, consists in the use of what is called in the United States the "*trawl-line*" or "trot-line;" in England known as "long-line," "spillans," "spillar," or "bultow." This consists essentially of a long line from forty fathoms to several miles in length, which is anchored at each end to the bottom, the position of the ends being shown by buoys, and short lines of about three feet attached at intervals of about seven or eight feet, with a hook at the other end. In some cases the hooks on a single line number as many as five thousand, although on the coast of Maine and Massachusetts there are usually from

four hundred to eight hundred. Bait of the proper kinds is placed upon these, and the lines allowed to remain down through a part of a tide. If set at half-tide, they are sometimes overhauled at intervals of half an hour or an hour. When taken up for examination, the fisherman, commencing at one end close to the buoy, lifts the main line to the surface and carries it along over the boat upon one side, which is hauled along under the line toward the other end. The fish found upon the hooks are dropped into the boat by the man who pulls up the line, while a companion, as the line passes over the boat, puts new bait, if necessary, upon the hooks and drops them again into the water. In this way the trawl is traversed from one end to the other, and, under favorable circumstances, as soon as the operation has been performed it can be again repeated, the line being taken up in an opposite direction. The principal fish taken in this way on our coast are the cod, hake, haddock, and skate, the pollock swimming too near the surface to be attracted by the bait.

In England a single trawl-line is usually forty fathoms in length, with twenty-six hooks attached by snoods. As many of these lines are united as is thought expedient, and these are shot across the tide as the vessel sails along, so that the snoods may hang clear. There is usually an anchor at each end, at intervals of forty fathoms, to keep the line in position at the bottom, as well as the buoys already referred to.

The same process is used very largely on the Banks of Newfoundland for taking cod, first introduced, I believe, by the French, and afterward imitated by men of other nationalities..

Much complaint has been made by fishermen in Massachusetts Bay and elsewhere of this mode of fishing, chiefly, however, on account of the large catch; but there seems no good reason for believing that it can exercise an injurious influence upon the supply of fishes, as none appear to be taken by it during the spawning season.

NETS.

Next to the lines come the nets, moveble or fixed. The simplest form of these is the *seine*, which, as is well known, consists of a webbing of net-work, provided with corks or floats at the upper edge, and with leads of greater or less weight at the lower, and used to inclose a certain area of water, and by bringing the ends together either to a boat or on the shore, to secure the fish that may happen to be in the inclosure, unable or unwilling to escape. The seine varies in length from one sufficient to take a few minnows to the shad-seine of a mile in length, hauled in by a windlass worked by the power of horses or oxen, or by a steam-engine.

Another equally simple form of net is the *gill-net*, which is generally fastened at one or both ends, and so arranged, by varying the weight upon the lower edge, so that it shall float near the surface of the water, at any intermediate depth, or near the bottom. When a net of this character is allowed to float with the tide, it becomes a drift-net. Both forms are used very extensively on our coast, the drift-net perhaps more frequently for taking salmon, mackerel, and herring. Shad are also taken very largely in nets of this construction; blue-fish and Spanish mackerel are more frequently captured in the fixed apparatus.

The gill-net used on Lake Michigan, (Fig. 1,) according to Mr. Milner, to whom I am indebted for the figure and descriptive account, is made of imported linen gilling-twine or thread, from No. 35 to as fine as No. 60. Its width is from fifty to eighty-one inches when stretched taut, having from twelve to eighteen meshes in the width. Each net is usually from one hundred and eighty to two hundred and seventy feet long. A light line, from "20 to 40 thread seine-twine," is seized on along the outer edges of the net—the seaming.

Another slightly heavier line—the meter—from "40 to 120 thread seine-twine," is stretched along the seaming and secured with seizings at intervals of a yard. The meter and seaming on one side of a net are usually together, about equal to from "60 to 140 thread" line, according to the exposure to storms at different fishing-grounds, and the depth of the water in which the nets are set.

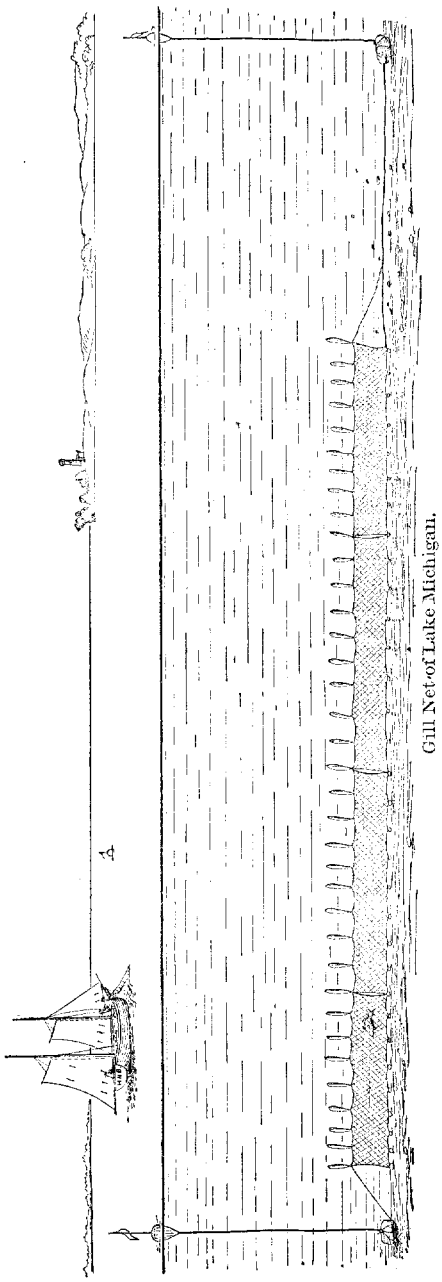


Fig. 1. Gill Net of Lake Michigan. Set at bottom of water, kept vertical by cedar floats,—only a few lengths of net represented.

The seaming is for the purpose of stretching the net, the meter for strength, and the attachment on one side of the stones, on the other the floats.

The floats are splinters of cedar, thirty inches long and about one and a fourth inches wide, and three-eighths of an inch thick. The stone is a small cobble-stone, weighing about one and a fourth pounds, notched on its edges to secure a string.

Both floats and stones are taken off, when the nets are drawn up from the lake. A few fishermen use gill-nets with permanent corks and leads, similar to those used on seines.

The mesh measured in its length, or when stretched so as to form two parallel lines, is barely from four and one-fourth to five inches. The commonest size, formerly, was four and one-half inches, but within a few years nets with four and one-fourth inches mesh have been on the increase. The gill-net captures a fish by entangling it in its meshes.

In setting the nets, the stones and floats are tied on in the shanty, and the nets, with the floats, are folded into bales on a tray, with the stones in another tray drawn up to the first. A "gang" of from eight to thirty-six nets are put in the boat, with three lines and two buoys. After reaching the fishing-ground, in from eighteen to seventy fathoms of water, a stone, weighing from fifty to seventy-five pounds, is tied on the ends of two lines, one a buoy line and the other a stretcher. The stone is lowered to the bottom, when a buoy is tied to the end of one line, and the end of a net to the stretcher. The boat is moved slowly ahead, while the gang of nets is paid out, one man throwing the stones and another the floats. The weights are so closely balanced to the buoyancy of the floats, that their points are seen standing above water in a long line astern, while they slowly sink. When they come to the last net, a line, with a stone attached, is tied on and lowered to the bottom, and to the upper end a buoy is fastened. These buoys have a flag-staff, with the flag six or seven feet above the surface. They guide the fishermen to the ends of the gang, and the two are often a mile apart.

Taking up the nets.—The nets are taken up by hauling in the line until the end of the net is reached, when they are drawn over a roller fixed in the bow of the boat—nets,

fish, floats, and stone, passing inboard over the roller. The stones and floats are removed and piled in racks and trays, the fish taken out and thrown into the box, and the nets doubled into bundles. Picking out sticks and leaves, rinsing the nets and drying them on stakes set in a long row for the purpose, complete the work up to tying on floats and stones again.

The cork and lead nets are dried on a large reel. At intervals of a few weeks the nets are boiled in soap-suds or lye, to rid them of fish-slime and confervæ, as otherwise the twine rots rapidly.

From two to four gangs are left in the lake at once, taking up each gang in from two to four days from the time it was set.

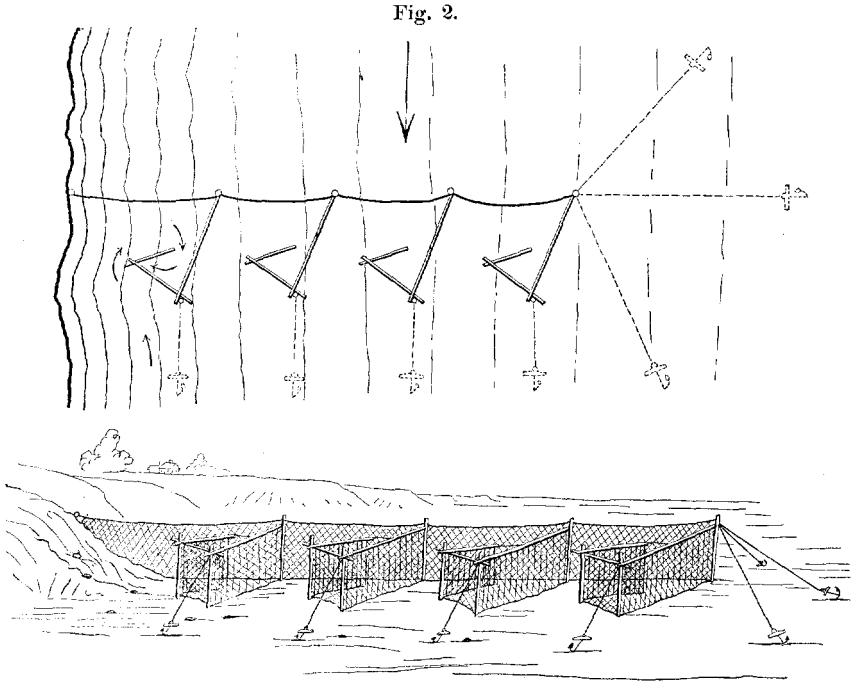
In the southern half of Lake Michigan the fishermen use a large boat, with five and six gangs to the boat, each gang having from twenty-five to thirty-six nets, and employing five men to the boat.

In the northern half of the lake light Mackinaw boats are used, two or three men to the boat, and from two to four gangs of nets, with eight to twenty nets to the gang.

When anchored, gill-nets are not unfrequently brought into a curve, one end being bent so as to form an acute and very narrow V; and the fish striking against the longer limb of the V and moving into the angle, gradually become entangled and are meshed. At other times both ends are brought around and fastened, so as to form a shape somewhat similar to that of the heart of a regular pound.

The fishery-acts of Canada, respecting the capture of salmon in their passage up the rivers at the spawning-season, provide that no net or other device shall be so used as to entirely obstruct the passage of fish, and that the main channel or course of any stream shall not be obstructed. While prohibiting the use of bag-nets, trap-nets, and fish-pounds, in the capture of salmon, it allows the use of a gill-net, (Figure 2,) known as the "stake-net," which is a net fence hung on stakes set

Fig. 2.



Gill Net, used for catching Salmon on the St. Lawrence.
DR. PIERRE FORTIN.

about seven yards apart, in a line at right angles with the shore. This portion of the net is termed the "bar-net." At from ten to fifteen yards

down the stream another row of stakes is set, each opposite a stake in the bar-net, and between these stakes a wing-net is stretched, having several yards of netting more than suffices for the distance. This end is carried round in the form of a triangle and held in position by poles lashed together at their ends. The free end of one pole is secured to the stake, and of the other to the seaming of the wing-net, and thus secured they float at the surface of the stream.

The triangular portion of the wing, or "hook" as it is called, is arranged so as to allow an opening between the end of the hook and the wing through which the salmon enter the triangle.

The netting is made of strong gilling-twine, the minimum mesh allowed being five inches.

The salmon swimming up the current come in contact with the bar-net, and turning to pass around it, find themselves opposed by the wing; they turn again up stream, and are pretty certain to enter the hook, the netting of which hangs slack. In their efforts to escape they become gilled.

Another kind of net, not unfrequently used in Europe, but less in this country, is what is called the "*trammel-net.*" This consists of three seines of similar outline, fastened together at their edges. The central net is very loose and full, and is of fine thread and small mesh. The two outer ones measure from three to six inches along the side of the mesh, and of coarser thread. The fish, in moving along on either side, especially if suddenly startled, pass readily through the first or coarser meshes and strike against the inner net, which is forced through on the opposite side, the fullness of the net readily permitting this protrusion. The fish is then held in a kind of pocket, and, in endeavoring to escape, is quite as likely to carry the bag the net has made across into another mesh, which, of course, holds it with perfect security. This net is much used in mill-ponds and other localities filled with brush or other obstructions preventing dragging-apparatus. Here, by muddying the vicinity of the net and then stirring around and making a great noise, the startled fish shoot in every direction, and frequently strike the net and are captured.

Next to the seine-nets of various forms, and far more productive than the gill-net, is the apparatus called "*trawl*" in England. This is simply a huge bag of netting, with an open mouth, drawn behind a vessel and dragging on the bottom of the sea, sweeping into itself the ground-fish, surface-shells, sea-weed, &c. Quite commonly this is about seventy feet long, with a semi-elliptical opening at the mouth of forty feet in breadth, diminishing gradually to the posterior end, where, however, there is a portion, of about ten feet in length, of a uniform diameter of four or five feet. The upper part of the mouth of the net is fastened to a beam of wood about forty feet long, supported at each end by two iron frames three feet high, and known as the trawl-heads or irons, the upper part of which has a socket into which the beam passes, and the lower side having a runner, turned up forward, on which the trawl rests. The trawl-net is fastened to the beam above, and to a leaded rope below, which extends from one runner to the other, exhibiting a considerable amount of slack. Ropes are fastened to each runner, which are brought together, after passing a certain distance, and to them the line itself is attached by which the apparatus is dragged along. Thus rigged, the apparatus is lowered over to the bottom, and is held behind a vessel of thirty-five to sixty tons, or even more, in moderate motion. The runners glide over the bottom, dragging the lead-line between them. The fish, as they are imbedded in the sand or concealed in the mud or weeds, if

not previously startled, are frightened from their hiding-places by the lead-line, and generally shoot upward to escape. They, however, meet the upper side of the net, and in the progress of the trawl are carried back toward the posterior extremity. Here pockets have been made, or *cul-de-sacs*, into which the fish make their way and find themselves unable to escape.

After a certain time the trawl is lifted and the fish removed, and the trawl thrown over again. As may be readily imagined, this trawl-net can be used only on smooth bottom, sandy bottom being preferred. If, however, the lead-line catch upon a rock or other obstacle, it is so arranged that it will break before the drag-rope parts, so that no damage will be done other than that of tearing the net, which, of course, is preferable to losing the entire apparatus.

Trawling is generally carried on in the direction of the tide, sometimes across, but never against it, as the trawl cannot be kept down against the tide. The rate of progress is usually from half a mile to two miles an hour, depending upon the kind of fish set for, the object being to keep the trawl steadily working on the ground.

It is not a little remarkable that this method of fishing should be entirely unknown in the United States, while in England nearly all the fishes of a certain class, such as the turbot, the sole, the plaice, &c., are captured by its means. I have used a net of this character of smaller size than that described, for several seasons, to great advantage in collecting specimens for investigation; but, with the exception of one constructed for my use and one used by Dr. Stimpson and Mr. Blatchford in Florida, I am unaware of others having been placed in American waters. It is possible that the unpopularity of the flat-fish in America may be the cause of this state of things, as the flounders and skates that are taken in so great quantity by this means are not marketable, or in very small numbers only.

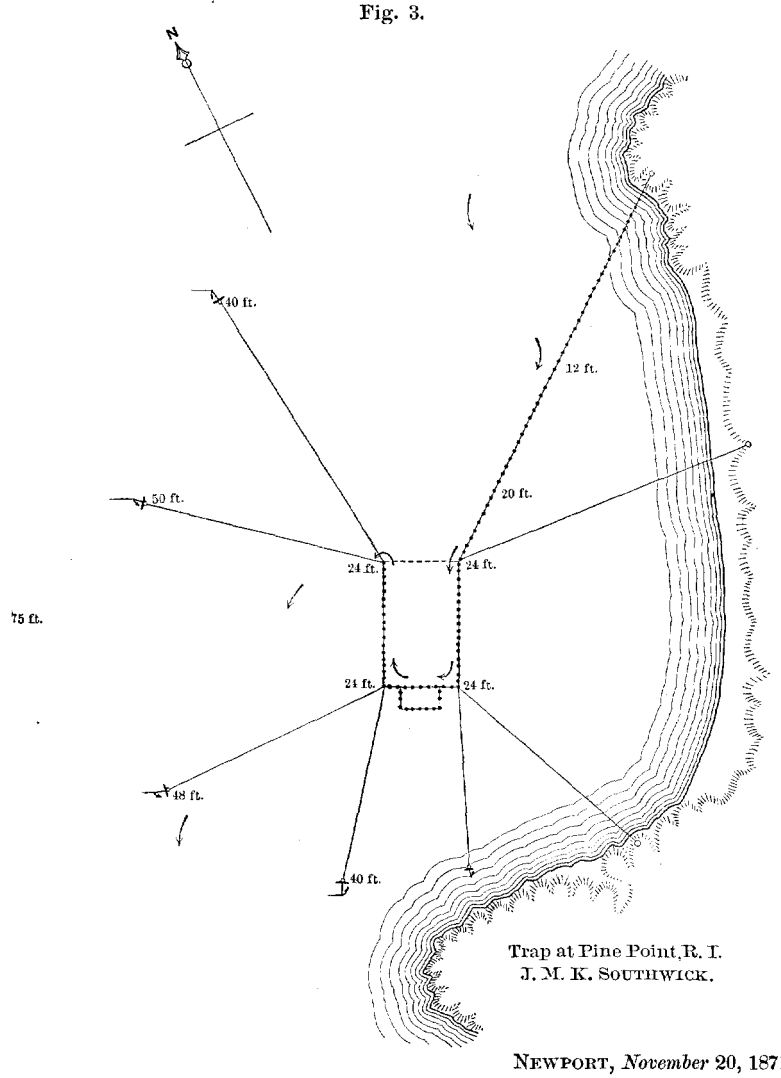
A net known as the "casting-net" is in extensive use in the West Indies, Florida, and elsewhere on the southern coast. This consists of a circle of netting, varying in diameter from four feet to fifteen or more, to the circumference of which are attached, at short intervals, leaden weights. There is a central opening in the net, usually constituted by a ferrule of bone or metal. One end of a long rope passes through this ferrule, and to it are attached numerous cords extending to the lead-rope. The net is used by gathering up the casting-rope in a coil on one arm, and taking the net itself on the other. By a dexterous fling of the arm containing the net, this is thrown in such a way as to spread out completely, and it is sometimes hurled to a distance of many feet, so as to fall perfectly flat on the surface of the water. The leads sink immediately, forming a circular inclosure, and imprisoning any fish that happen to be under it at the time. The rope is then hauled in from the other end, causing the entire circumference to pucker inwardly, and the leads and puckered portion come together in a compact mass, in which the fish are entangled. Much skill is of course required for success in the use of this net; but it is very efficient in taking such fish as the mullet, which, when captured with the common seine, will leap over the cork-line with the greatest ease and escape.

TRAPS, WEIRS, POUNDS, AND FYKES.

In the United States by far the greatest weight of summer market-fish, with the exception, perhaps, of the cod, shad, and menhaden, is taken in the more elaborate constructions, variously known as traps, pounds, heart

nets, weirs, &c. These may consist entirely of netting, of brush or of laths, or a combination of two or more of these materials, the construction, in form and material, varying in different parts of our sea-coast or of the great lakes. The apparatus constructed of nets is used principally on the south side of New England and on the lakes, and in its simplest form, is as described by Mr. Southwick on page 10, accompanied by a diagram. The trap-net proper (Fig. 3) is peculiar to the waters of Rhode Island, especially the Seaconnet River, and is illustrated in the accompanying figure, as well as by that on page 10. The following account of this trap, and the mode of using it, I owe to Mr. Southwick.

Fig. 3.



Trap at Pine Point, R. I.
J. M. K. SOUTHWICK.

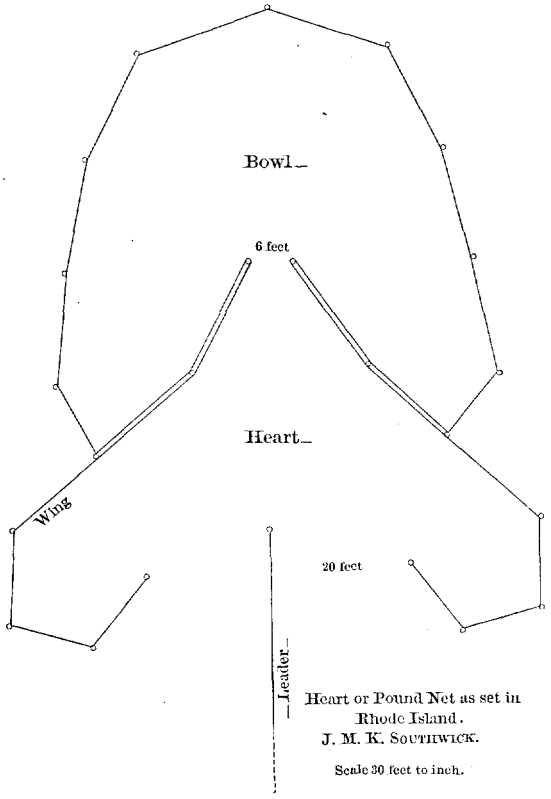
NEWPORT, *November* 20, 1871.

DEAR SIR: A trap, or "square trap" as sometimes called, is simply an oblong square box of netting, open at the inshore and above ends, to one edge of which is attached a leader running toward or on the shore, where it is fastened by an anchor or to some object. The lower edge of the leader is kept on the bottom by a chain or stones lashed

to it, and the upper edge of both leader and trap is floated by corks, and all kept in place by anchors attached by cables to the upper corners. There are no poles driven into the sea-bottom, as in the heart-seine. The netting, therefore, has a certain amount of swing with the tide.

The mouth of the trap (or upper end) is kept for the time on the bottom by leads strung on a line and seized to the line run through the meshes that passes across the bottom, up the end of the side opposite the leader, and thence away around the trap, to which is seized the cork-line. This line also runs across the top of the open end to prevent the trap from spreading. And here are two buoys of corks, with lines running to the bottom and attached to the lead-line, one of which is caught by each boat, and the bottom of the trap pulled up to the gunwale, when the setting is caught by the men and distributed among them, each holding as much as he can handle, and keeping a sharp lookout that no opening be left for the fish to pass by them. The netting is now overhauled, and passes under the boats and to the bottom while the fish are being bunted into the corner where the pound is attached. When they are crowded hard, and a good bunch of them, they will sink the corks, otherwise an oar is used to sink the corks, and they pass over into the pound or pocket. Any remaining seine is thrown from the boats, and by sinking the corks at the most convenient spot, with a scoop-net or oar, the boats go out of the trap, and are ready to try the same thing over again, and so on until the tide is too strong for them; when they go ashore to eat and sleep, or wait for another tide, that must be fished in the same way, come when it will, midnight or daylight. When fish are running, the traps are bunted five or six times each tide. It takes six good men to bunt, and another good man to cook for them. These traps are set the 1st of May and taken up about the 25th. They catch almost wholly scup and sea-bass, but comparatively few other fish.

Fig. 4.



Heart or Pound Net as set in Rhode Island.
J. M. K. SOUTHWICK.
Scale 30 feet to inch.

To give some idea of the proportion, I will give the following rough estimate of the catch to one trap: Scup, 1,500 barrels; sea-bass, 2,500 barrels; flat-fish, 1,000 barrels; tautog, 500 barrels; bass, 700 barrels; mackerel, 200 barrels; menhaden, sea-robins, bellows-fish, 200 barrels.

Nineteen-twentieths of the fish are caught during the great run in five or ten days, from the 10th to the 20th of May. We have known two-thirds of the season's catch to be taken in forty-eight hours.

These traps vary from twenty to thirty fathoms in length, from five to ten in depth, and ten to fifteen in width.

Yours, truly,

J. M. K. SOUTHWICK.

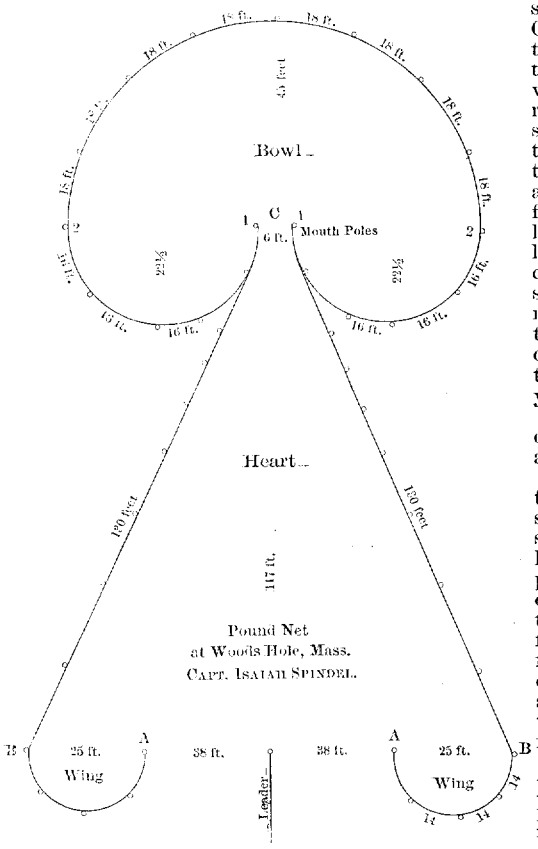
Professor BAIRD.

It will be seen that this net requires the constant supervision of the fishermen, as there is nothing to prevent the fish from swimming out after they have gone around the circuit of the inclosure. It is therefore necessary to be on the watch, so as to raise the forward part of the net

in time to prevent the escape of the fish. By this precaution the fish are gradually driven back and forced into the pocket, where they are kept until needed.

The *heart-net* or *pound* consists of three parts, the *leader*, *heart*, and *bowl*, and is variously constructed, according to the fancy of the fishermen or the special conditions of the locality. Fig. 4 shows in more detail the Rhode Island pound, figured and described by Mr. Southwick on page 10. In Fig. 5 will be seen a working plan of the very efficient pound commanded by Captain Spindel at Wood's Hole, the construction and management of which will be readily comprehended from the following directions supplied by him. This class of net does not require the constant watchfulness of the managers, as the fish, once in, usually remain until taken out. This is done once or even twice a day.

Fig. 5.



First set mouth-poles, 1 and 1, six feet apart; then from center, C, run a line forty-five feet long to 2 and set stake or pole, and the same to 3 and set pole, which will bring those four poles in range; then from center, C, sweep around the circle with this forty-five-feet line and set the poles about eighteen feet apart, until you come to 2; then from center of 1 and 2 fasten line twenty-two and a half feet long, and sweep the quarter circle, setting the poles about sixteen feet apart. A little judgment must be used in setting these poles, as it is not a true circle. Finish the other quarter circle in same way, and you will have the bowl poles set.

We set the bowl poles in circle, five feet larger than the bowl, and anchor each pole.

To set heart pieces, fasten line to mouth of bowl at C, and run straight line one hundred and seventeen feet and set a pole for leader; fasten line now to this pole, and measure off thirty-eight feet and set heart pole, A; then measure, say twenty-five feet, to B, and set pole; and from this pole set a straight line of poles, about twenty-five feet apart, to mouth-pole 1. Have the wing about twenty-seven feet deep, with three poles.

We have only one row of poles to bowl, and are set five feet larger than the bowl, so that the netting can be drawn out taut, both at the bottom and top, but not necessarily close to the poles. Each pole is guyed with anchor. Our leader is two hundred and sixty-five yards long, the poles being set about twenty feet apart.

ISAIAH SPINDEL.

The next figure represents another form of this pound, as erected at Quissett Harbor by Captain Rogers, of Noank, Connecticut, and party, consisting of four brothers. This is somewhat smaller than the other, and is more easily taken off or put on the poles. We are indebted to the captain for the following account of his apparatus. We may premise,

however, that the length of the leader varies with the locality, the object generally being to carry the bowl into water of from three to five fathoms in depth. This, in some cases, will be accomplished with a leader of one hundred and fifty yards, while, again, five hundred will be needed.

NOANK, CONNECTICUT, *December* 4, 1871.

DEAR SIR: I do not know whether I can give you a satisfactory account of the construction of my pound, but I will, at any rate, try to do so. The leaders are fastened upon the poles, beginning at the off-shore pole, stretching the top rope from one pole to the other, drawing it tight, fastening or seizing to every pole. The bottom rope of the leader is hauled down by ropes that are rove through every pole, close to the bottom, keeping the leader down without the use of chains, and the same throughout the whole gear, as you see by the drawing.

A center line runs round the bowl, marked on the net half way from the top to bottom, and is fastened to rings which slip up and down the poles when we haul and set the pounds, which keeps the net close to the poles, giving room inside the bowl.

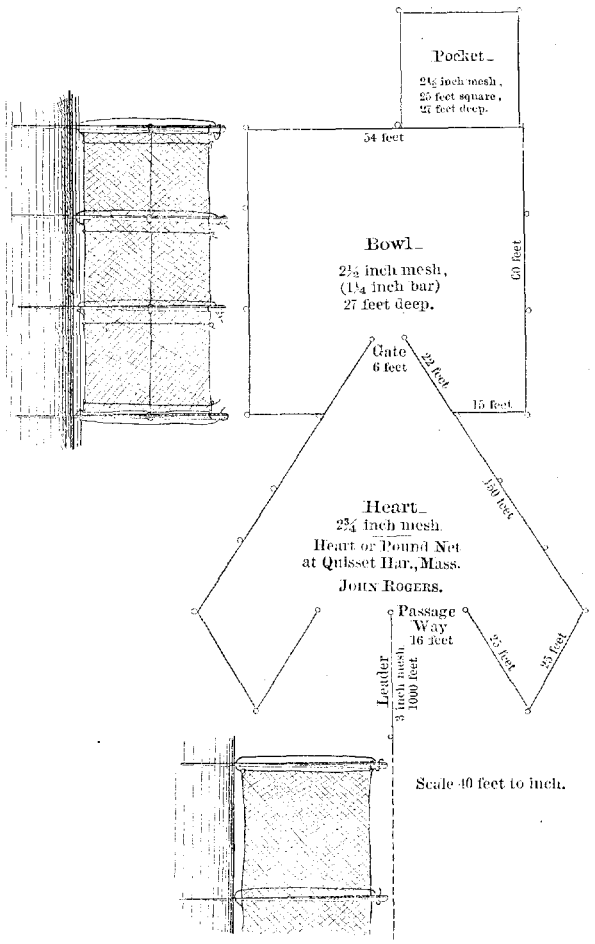
The door that opens from the "heart" into the pound is six feet wide, extending from the top rope of the bowl to the very bottom, like a gate-way.

The passage-way that runs from the leader into the heart, is sixteen feet wide on each side of the leader, extending from top to bottom.

The poles on the leader are driven at different distances, beginning at the off-shore end twenty-six feet, and varying up to forty feet apart. Poles on the heart and bowl are also driven at different distances apart, according to the shape of the net.

When we lift the pound we begin at the door, untying the ropes that hold the bowl to the bottom, pulling on the ropes that lift the bowl, following from one pole to the other round to the back, there being a haul-down rope and a lift-up rope to every pole that is attached to the bowl, which raises the whole bottom to the surface, the fish swimming ahead into the back of the bowl, and one or more boats going inside of the bowl and pursing up that part of the net, bring the fish into close compact.

Fig. 6.



Yours, truly,

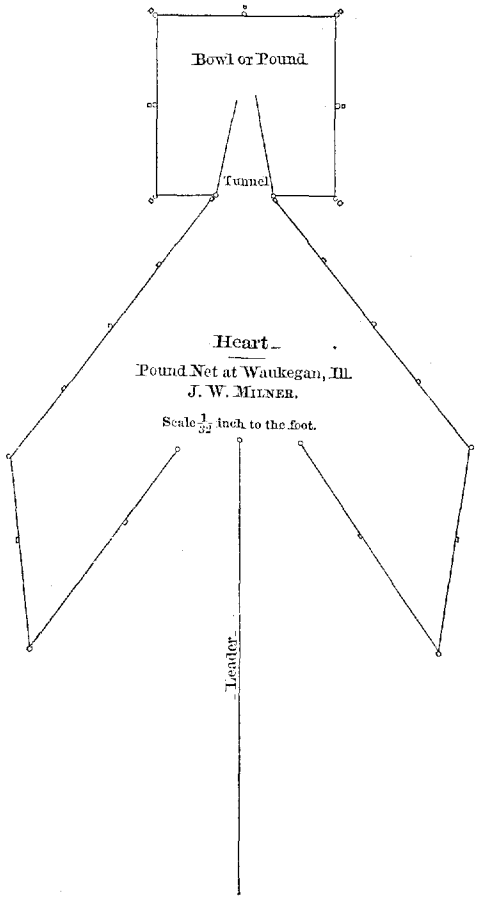
JOHN ROGERS.

Professor BAIRD.

A still more complicated arrangement of a heart-pound is that in use in Lake Michigan, and elsewhere in the great lakes, and preferred as by far the most efficient of all, as there is much less chance of the

escape of the fish when once in the bowl. For the description and illustrations of this (Figs. 7 to 12) I am indebted to Mr. James W. Milner.

Fig. 7.



The pound-nets are commonly made of 20-thread soft laid seine-twine, netted by hand or woven by machinery, and well saturated with tar. They have several parts, termed the "leader," the "heart," the "pot," "bowl," or "crib," and the "tunnel."

The Leader, (Fig. 7.)—The leader is merely a net fence that guides the fishes, in their attempt to get around it, into the heart.

Small piles, of six or seven inches diameter, are driven into the lake-bottom, until about two feet only stand above the surface. The piles

Fig. 8.

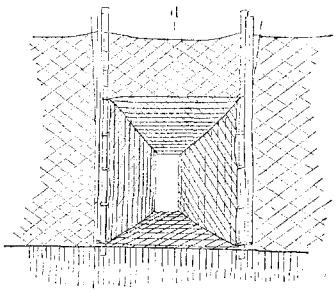
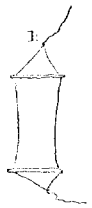


Fig. 9.

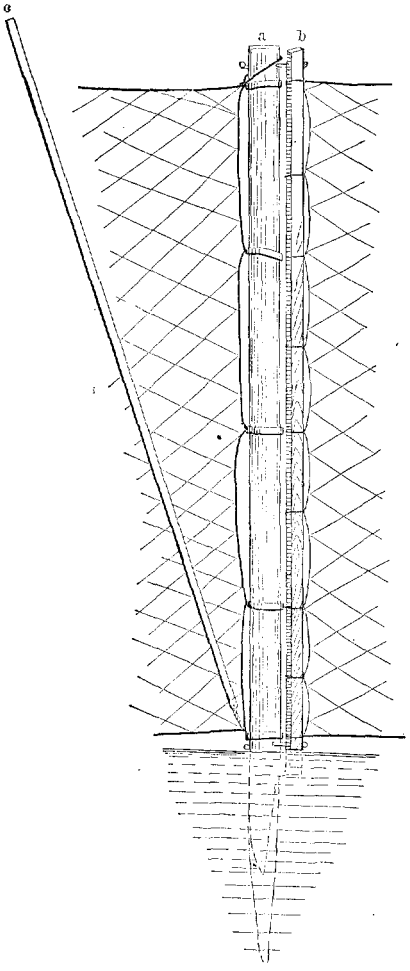


extend in a row, four rods apart, for a length of from sixty to two hundred rods, generally beginning near the shore, and extending directly out into the lake, but often started where there are favorable shoals, as far as four, and once even six miles from the shore. Upon these piles a net is stretched, extending from the top of the water to the bottom. The leader is made in pieces, ten rods in length. The top of the net is secured to the pile by a short rope, and weights are attached to the bottom, stones weighing from fifty to seventy-five pounds, every two rods. The mesh of the leader is $4\frac{1}{2}$ inches.

The Heart, (Figure 7.)—The shape of its outline gives this part of the net its name. Each side of the heart is a net, eight rods in length, set close to the lake-bottom, and reaching above the water two feet. The shore ends are secured to piles, driven each ten feet from the last pile of the leader, leaving an opening or entrance ten feet wide, on each side of the leader, through which the fish pass. The net is carried round inside of piles, arranged in the outline of the sides of a heart, until the outer ends approach each other to within ten feet, the width of the tunnel. These ends are tied fast to scantling, (*b*, fig. 11) and the scantlings are fastened snugly to the piles on each side of the tunnel-opening. The lower end of each scantling has attached an iron ring, which is put over the upper end of the pile and slid down to the bottom, while the upper end of the scantling is lashed to the head of the pile. There are three other piles on each side, besides those at the ends. The net is secured at the top by guys, three feet long, and the bottom is weighted with stones, the same as the leader, opposite and between the piles. The mesh of the heart is usually $3\frac{1}{2}$ to 4 inches, extension measure.

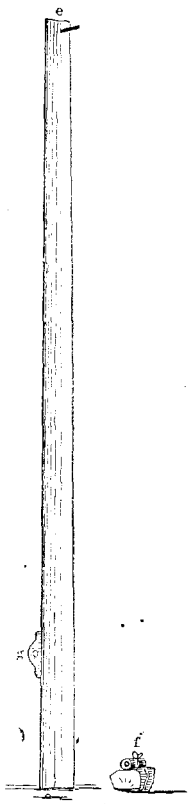
The Pot, Bowl, or Crib, (Fig. 7.)—The pot is in the shape of a room, having four walls and a floor. It is thirty feet square, and, in height, extends from the bottom to three feet above the surface. In the middle of the side next the heart is an opening ten feet wide and sixteen feet high, beginning at the bottom, in which is placed the tunnel. A pile is driven on the outside, at each corner, and one in the middle, on three sides, while on the heart side there are two, ten feet apart and ten feet from the corners. To all the piles, but the two mentioned, the net is made fast at the top by three-feet guys; at the bottom of each pile is sunk a stone of from seventy-five to eighty pounds' weight, and on the top of the stone is lashed a bull's-eye, (Fig. 10, *f*.) A rope tied to the bottom of the net, opposite the stone, is rove through the bull's-eye and passes upward to the top of the pile, where the end is made fast, leaving plenty of slack. When the net is set, the ropes are hauled taut and secured by half-hitches to a pin driven into the top of the pile, which serves also to coil up the slack. The mesh of the pot is from one and a half to three and one-quarter inches.

Fig. 11.



The Tunnel, (Figs. 7, 8.)—The tunnel is a netting, shaped something like a truncated cone. Its longer end is fitted and laced into the sides of the opening (*d*, fig. 8) in the heart side of the pot. The smaller end projects into the pot about sixteen feet and narrows to its outlet, an opening two and one-half feet by six, (*h*, fig. 9.) Short sticks are attached to the upper and lower sides of the outlet, having small bridles to which lines are made fast. The lower one is rove through a hole in a cleat (*g*, fig. 10) nailed to the side of the middle pile, opposite the tunnel outlet, and at five feet from the bottom, and from there passes upward to the top of the pile, where the end is made fast, leaving plenty of slack. The upper line passes directly to the top of the pile. When hauled taut they keep the tunnel standing open, for the free passage of the fish.

Fig. 10.



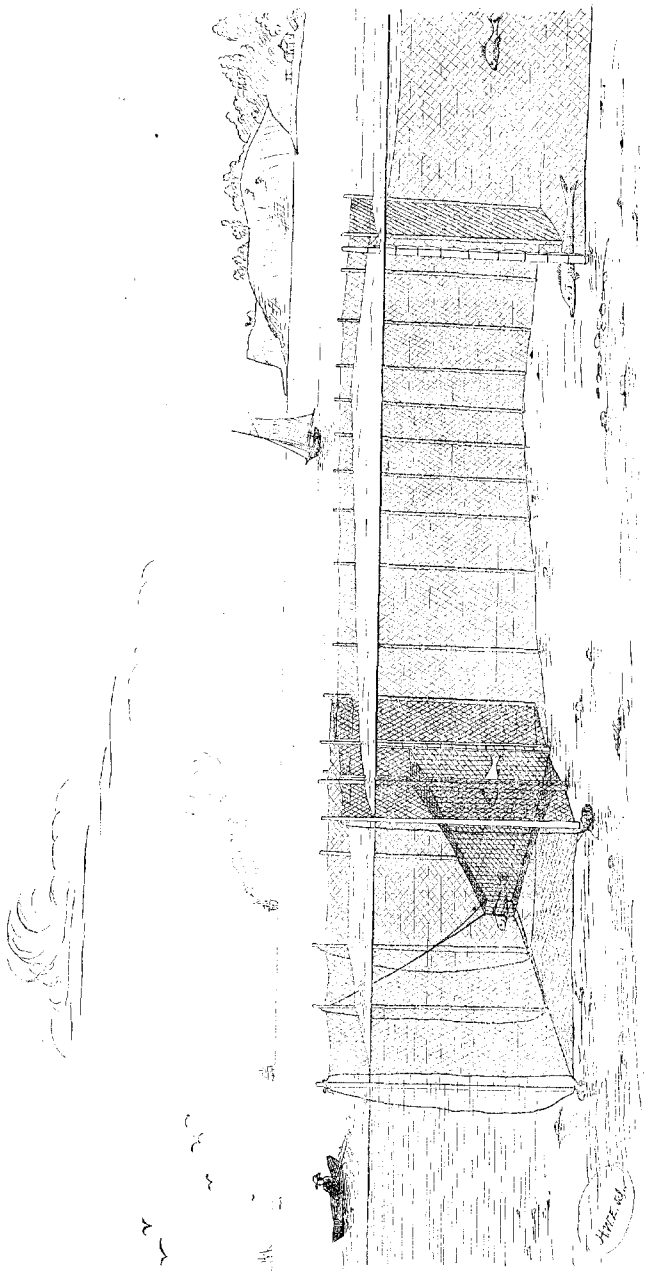
In the sides of the tunnel entrance are fastened hoops, five on each side. These hoops are put over the top of the adjacent piles, and allow the net to slide up and down readily, when the tunnel is closed for the purpose of taking out the fishes, and again when it is reset. To the bottom hoop is fastened a slender pole, called the shover, (*c*, fig. 11,) for use in closing and opening the tunnel entrance. The mesh of the tunnel is the same as that of the pot.

How the fishes get in.—The schools of fishes, in moving along near the shore, find the long leader obstructing their way, and although the meshes are large enough for them to pass through, so wary and cautious are their instincts that they will not come in contact with the net, but swim within a few inches of it, out from the shore, until they enter the heart.

At first sight the heart would appear of unnecessary dimensions, but it is contrived in accordance with a knowledge of the habits of the fish, which are not inclined to

turn at short angles, but prefer a course of straight lines or long curves. If the passage to the tunnel is narrow and contracted, a fish becoming alarmed is much more apt to turn short round and pass out at the opening it has just entered. In the large heart they are quite as apt to dart through the tunnel as to escape through the shoreward openings.

Fig. 12.



Like many other gregarious animals, the white-fish and lake herring will flock in behind a leader, just as sheep will through a gate. Once in the pot, they are not apt to find the small opening at the outlet of the tunnel, but swim around the sides, and, after a time, becoming familiar with the net, or crowded against the sides by the numbers within the pot, many attempt to pass through the meshes, the smaller ones escaping, and a few larger, becoming gilled, die. Still, no frantic effort at escape is made until the net is lifted.

Taking out the fishes.—In taking them out a boat is sent round, and the ropes staying the bottom of the pound, and the tunnel-guys, are all cast loose. The boat is now brought inside of the pot, the "shovers" are drawn up, closing the entrance to the tunnel, and the end of the tunnel is pulled up and thrown back over the side of the pot. The bottom of the net is raised by pulling up the tunnel side, until it is reached; it is then tripped along under the boat until the fishes are gathered into a corner, like shaking wheat into the middle of a sheet, when they are thrown into the boat with a scoop-net.

The stakes on which pound netting is fastened are usually driven into place by means of a pile-driver, and are never left down throughout the

winter on account of their almost certain destruction by storms and floating ice. They are piled up in the autumn and stored for use in the coming season. Sometimes they are set in large stones, about four feet square, and simply set on the bottom. This method is used on Prince Edward's Island, as in the pound of Mr. J. C. Hall of Charlottetown.

Not unfrequently the heart-pounds are so arranged that a second leader is started in a line with the first, running out from the outer side of the bowl to a given distance, and another heart and bowl attached, so as to cover a much larger portion of the channel-way. This is seen in the pound at Waquoit, Massachusetts, for a lucid description of which, with accompanying illustrations, I am indebted to the report of Theodore Lyman.

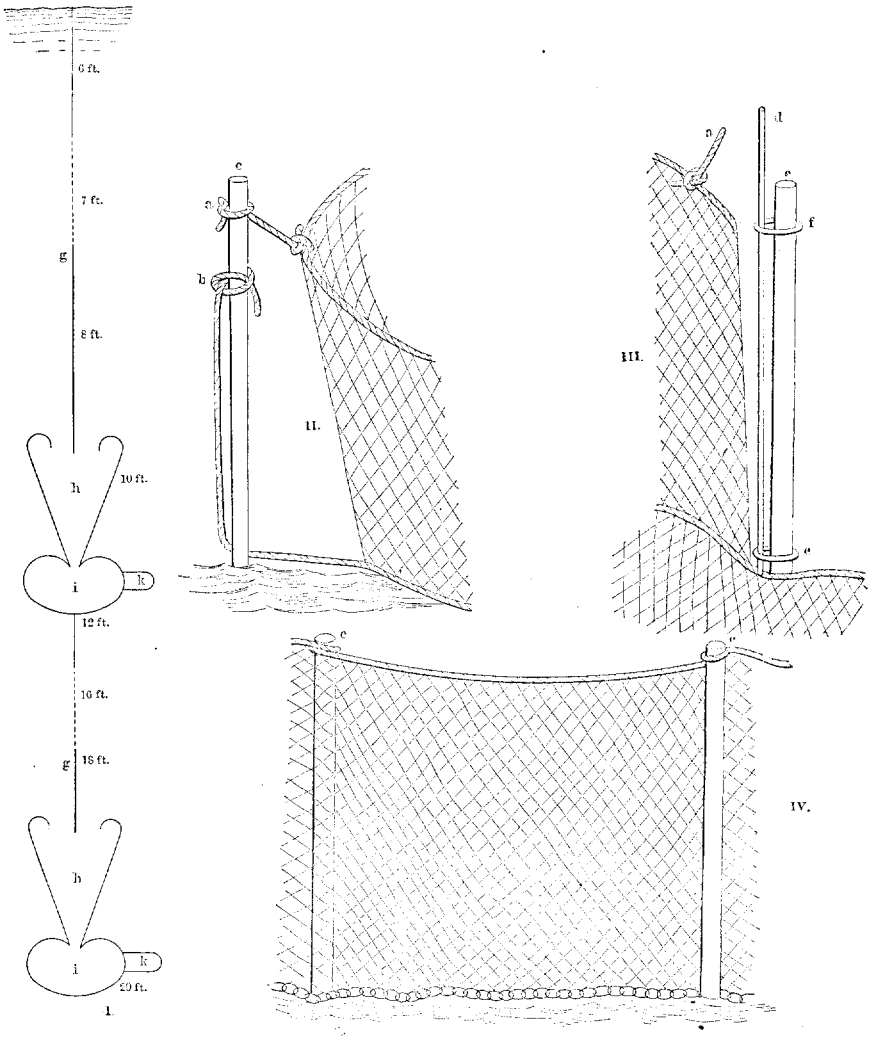
A pound or weir is an old and singular contrivance, whose success depends upon the fatal principle of fishes never to turn a sharp corner. A place is chosen where it is known that large schools are accustomed to coast along, parallel with the shore, and there a barrier is run out in a straight line. This barrier is called the "leader," and may be a stone wall, a fence of laths or of brush, or a net stretched on poles. At the end of this leader, and like a spear-head on its handle, is constructed a heart-shaped inclosure or "pound" (or "heart") having a narrow opening, on either side, next the point of the leader. On its off-shore end this heart again opens into a circular inclosure called the "bowl." A school coasting along shore is suddenly stopped by the leader, and immediately the fish turn toward deep water, and, swimming parallel with the barrier, pass into the heart, whence there is no escape save by a sharp backward turn, which, as before stated, is against their principle. Therefore they swim round and round and pass into the bowl, where they are left by the tide, or, if the bowl be in deep water, they are hauled up by a net-bottom.

The Waquoit weir is made like many of the same sort. About the middle of March, if the weather permits, the men begin to set the poles which are to support the "lint" as the netting is called. First a row of stout poles, or rather posts, running straight out, is firmly set by a floating pile-driver. The poles stand fifteen feet apart, and run directly seaward for seven hundred and fifty feet, to make the first "leader," (Fig. 13, I, *g*,) which here stops short at the mouth of the "heart," *h*, whose outline is marked out by the same kind of poles set nearer together, or about ten feet apart. The entrance to the heart is twenty-five feet wide on each side of the leader, or fifty wide in the whole; but it converges strongly toward its outer apex, so that the entrance to the "bowl" is only seven feet wide. This bowl, *i*, is marked out, like the heart, with poles set somewhat close together. Moreover, from its east side projects a sort of lobe, eighteen feet wide and thirty-six long, *k*, indicated by the five poles which are to support this "pocket" wherein fish may be kept alive. From the outer point of the bowl another row of leader-poles is driven, running seaward four hundred and fifty feet; and, at its extremity, posts are driven for the second heart, bowl and pocket, like the first. Then the lint is carried out in boats and hung on the leader-posts. It is composed of a pretty strong net, with a mesh of two and a half to three inches. Along its foot, where are placed the leads of a seine, there is made fast a chain; while along its upper edge runs an inch rope, (*i. e.*, an inch in circumference.) As the net is passed on alternate sides of the succeeding poles, a round turn is taken with the rope to hold it in place, while the chain, sinking to the bottom, maintains the lint in an upright position and closes the spaces between the poles, (13, IV.) The heart is hung with lint in the same way, but the bowl must be differently treated, for the bowl-net has a bottom as well as sides. It is in fact a great bag, forty feet long, eighty wide, and fifteen or twenty deep, and is hung in an oval of poles, fifty feet long and one hundred wide. For this purpose a one and a quarter inch rope runs, like a binding, entirely around the upper edge of the bowl-net, (Fig. II,) and opposite each pole there is made fast to this rope a head-line (13, II, *a*) whose other end is attached to the pole. These head-lines suspend the bowl-net, which cannot, however, be held down by chains or weights, because these would make it too heavy to handle when the weir is "hauled." Therefore there are bottom-lines (13. II, *b*) corresponding to the head-lines, except that they are attached to the lower edge of the bowl-net, whence they pass through a hole in the pole, are brought to the surface of the water, and are there made fast. When, now, the head-lines and bottom-lines are hauled taut and made fast, the bowl-net must be firmly set in position, namely, projecting about five feet above the water, and extending thence nearly or quite to the bottom. It remains only to show how the fish are admitted to the bowl and how the fatal door is closed on them. On either side of the entrance to the bowl stands a post, (13, III, *c*,) and, beside it, a long, slender pole (13, III, *d*) attached by rings (13, III, *f e*) to the post, but free to run up and down. The lower end of the pole is tied to the lower part of the bowl-net, and by

pushing the pole down till it touches bottom, the net is held firmly down; and a gap being left in the side of the net at this point, a free entrance is made for the fish. This entrance is closed by pulling up the sliding poles till they bring the net to the surface of the water.

The weir is "hauled" once a day, and always at slack water, because with a strong tide, running east or west, it is impossible to handle the bottom-lines. The men pull out in two parties; of which one, in a large scow, passes round the out-

Fig. 13.



Pound Net at Waquoit, Mass.

side of the bowl, casting off the bottom-lines; while the other, in a yawl-boat, pushes inside the bowls, pulls up the sliding poles, and closes the entrance. The slackening of the bottom-lines allows the bowl-net to hang free; and the crew inside begin to haul up the bottom of this net in such a way as to work the fish toward one corner, letting the net, as it comes to the surface, pass under their boat, which is thus slowly drawn across the bowl toward the corner where the capture is to take place, and where the scow is already waiting outside.

An arrangement, different in construction, but on the same general principle, largely in use from New York to New London, consists of what is called a fyke-net, as shown in the accompanying sketch, (Fig. 14 :)

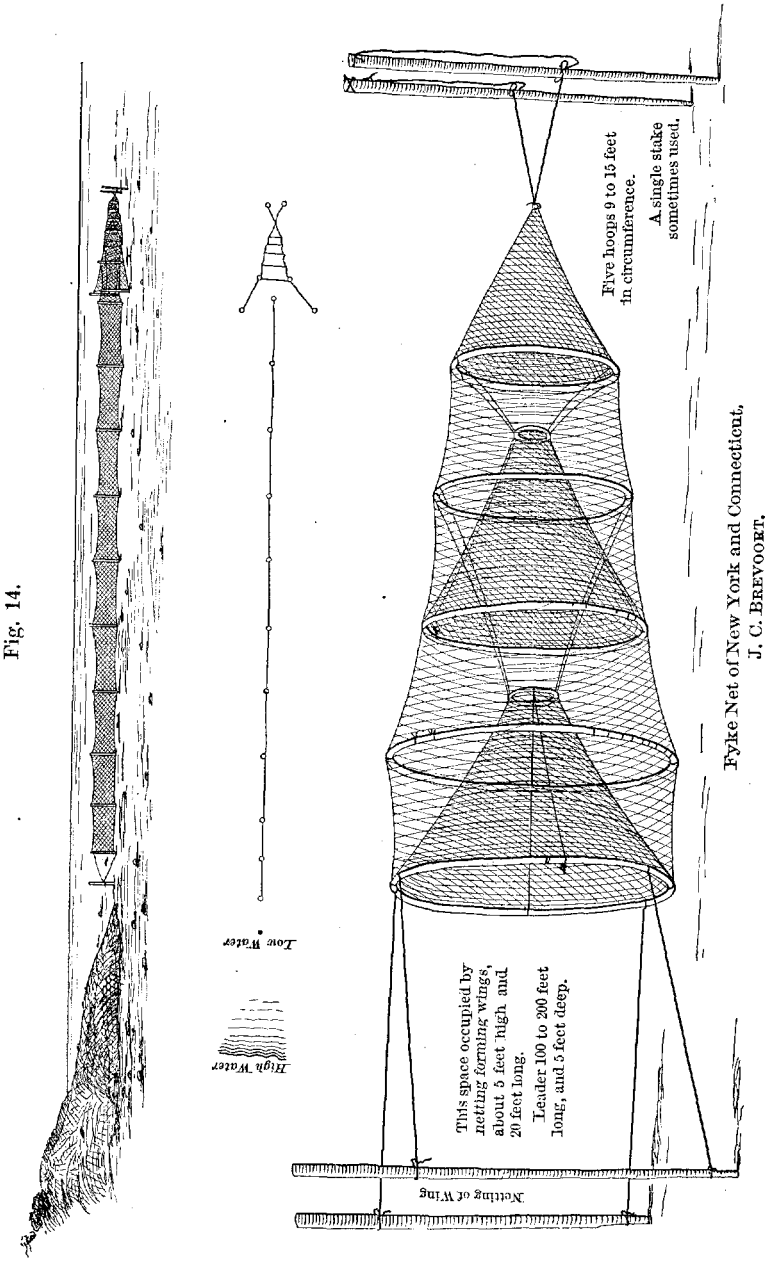


Fig. 14. Fyke Net of New York and Connecticut, J. C. Brevoort.

This is essentially a leader, of any length, ending between the extended arms of a fyke-net, which is nothing more than the ordinary set-net

of the rivers. The fish, in their movements, strike against the leader, are led unconsciously to this net and trapped, from which they cannot escape.

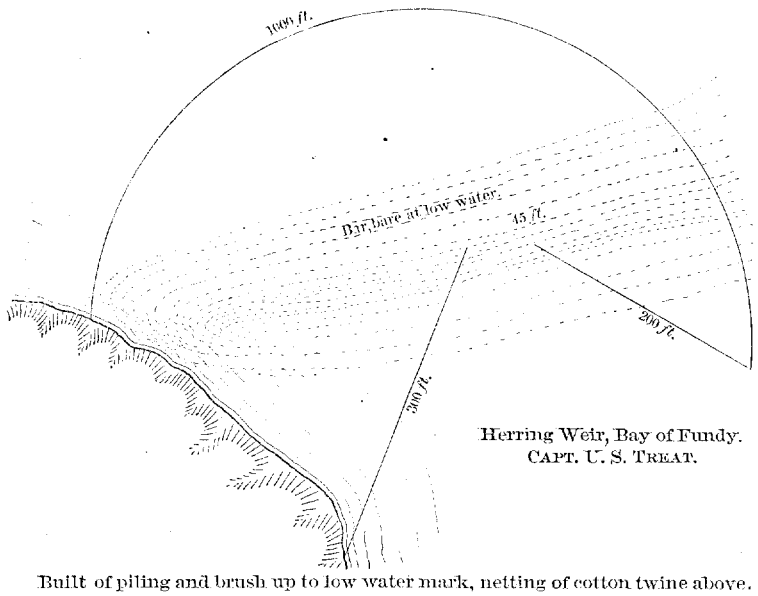
All these various forms of heart-pounds are so arranged as to take fish from either side, whether with the ebb or the flood, although it is perhaps more common for the fish to run along the shores in the ebb of the tide rather than the flood.

As we pass to the north of Cape Cod a different form of fixed apparatus comes into use, these generally the weir proper, which is commonly constructed of brush, and usually takes the fish at low tide, either leaving them inclosed in a small basin, from which they are seined, or causing them to be stranded on the bottom, where they are picked up.

The simplest form of a brush-weir consists of a mere fence of brush driven into the sand or mud, to prevent its floating away, and forming a curve concave to the ebb of the tide. As the water runs off, becoming more and more shallow, the fish which happen to be inside of the inclosure of this brush fence are detained, and left, when the water has run off, to be captured at leisure. For this arrangement no leader is required.

The ordinary construction of weirs for taking herring is seen in Fig. 15, illustrating one now in successful use by Captain U. S. Treat of Eastport.

Fig. 15.



Herring Weir, Bay of Fundy.
CAPT. U. S. TREAT.

Built of piling and brush up to low water mark, netting of cotton twine above. At low water the fish are seined and dipped into boats. At low water there is 18 ft. of water between the bar and the weir.

Into this the fish enter at high tide, through a narrow opening, and if the number of fish noticed as having come in is considerable, a gate of netting, suspended over the narrow entrance, is dropped, and the escape of the fish is cut off. As the tide falls the fish are gathered into the basin in the weir, from which they are drawn into a narrower space by means of the seine, and either hauled out to the shore or dipped out into boats by means of large dip-nets. As many as from one hundred and fifty to two hundred and fifty hogsheads of herring are frequently captured in this way in a single tide.

The fish usually enter in high water, either late in the evening or early in the morning, and when low water occurs between these periods few or no fish are taken.

At Eastport the weirs on the Campobello shore, as well as those at Grand Manan, take most fish when high water occurs in the evening, rendering it necessary to take out the herring about midnight, or a little later. At Captain Treat's weir and others adjacent to it, however, the best time for taking out the fish is usually from five or six o'clock in the morning until ten, a much more convenient arrangement.

Fig. 16.

South side lower St. Lawrence, Herring Weir. J. C. BREVOORT.

The variety of weirs in use in the vicinity of Eastport, and about Campobello and the island of Grand Manan, is very great, and the number in use, as well as the quantity of herring captured in them, is almost incredible.

This form of weir does not involve the use of a leader, and can be used to advantage only where the tide is very high and the shores especially adapted to them. Weirs with leaders are used more frequently where there is a long extent of shallow water, which is bare at low tide. A simple form of this leader is given in Fig. 16, kindly furnished by Mr. J. C. Brevoort, as used on the south side of the St. Lawrence River, from Quebec to near its mouth. Here the leader may be of indefinite length, (sometimes one thousand feet and over,) ending in either a bowl or a circle. The whole is constructed of stakes or osiers, or both. Sometimes a second leader, with its second bowl, is placed exterior to and in continuation of the first. This form of leader of a weir is the simplest of all, and the one more generally used in England, where our more complicated and more efficient arrangements appear not to be known.

This fact must be borne in mind in considering the decision of the British commission in reference to the amount of influence that such apparatus could exercise upon the fish supply, of which commission Professor Huxley was a member, to the effect that such apparatus exercised very little influence upon the persistence of the fish supply.

Weirs as used in Cape Cod are somewhat differently constructed, as they consist in large part of slats or boards. The figure and following description have been furnished by Captain Prince Crowell:

EAST DENNIS, MASSACHUSETTS, *December* 2, 1871.

DEAR SIR: The weirs on the north side of the cape are what are called dry weirs; they are set on the flats where the tide ebbs off and leaves them dry, at which time the fish are taken out. The flats extend from one-half to one mile from high-water mark; from six to eight feet water over them at high water.

The leaders and heart are constructed by nailing laths upon small poles worked into the sand, with a peg through the pole (when worked down) just under the surface of the sand, on which boards are placed, then stone ballast to keep them from working up, and the first and second pound-seines are usually used, the poles being fixed down the same as the heart and leader, although some are made of all laths. Some have only one pound instead of two. There are about fifteen of these weirs between Yarmouth and Provincetown. I know of no other kind. I inclose a little diagram, (Fig. 17,) without being drawn to any particular scale, and hope it will be intelligible.

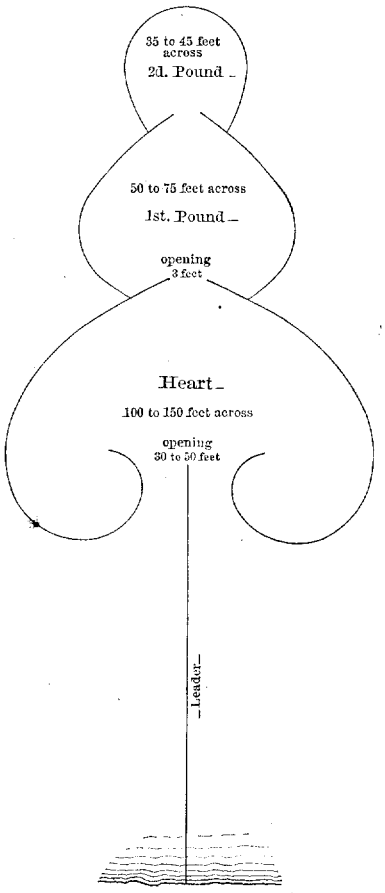
Yours, truly,

P. S. CROWELL.

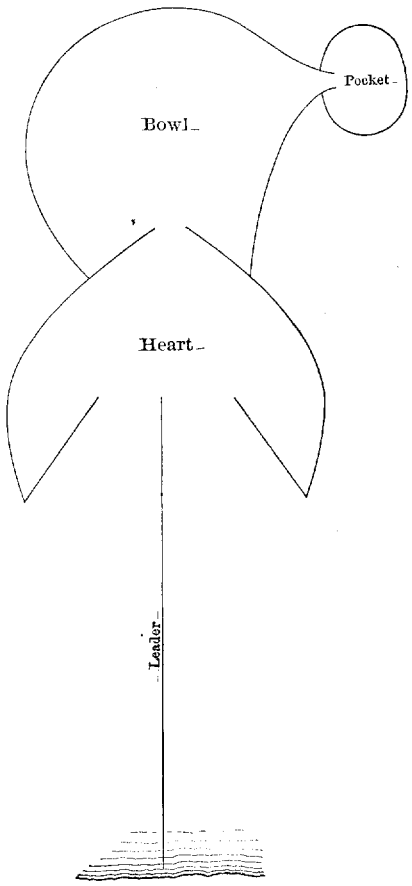
A modification of the heart-pound is largely used in the bays and mouths of the rivers of Maine and the provinces, for the capture of salmon, as illustrated in Fig. 18.

Here the leader is generally made of brush, up to the height of half-tide, and of netting the rest of the way. The heart is made of either brush or netting, and sometimes of slats. The bowl, instead of being placed at the outside of the heart, in a line with the leader, is placed either in the upper or lower side,

Fig. 17.



Slat Weir East Dennis, Mass. Bay.
CAPT. PRINCE CROWELL.



Brush Weir.
Deep Water Weir for taking Salmon, Shad &c: built into 18 to 20 feet of water. The pocket has a board floor, laid so that it is dry at low water for convenience of taking the fish.

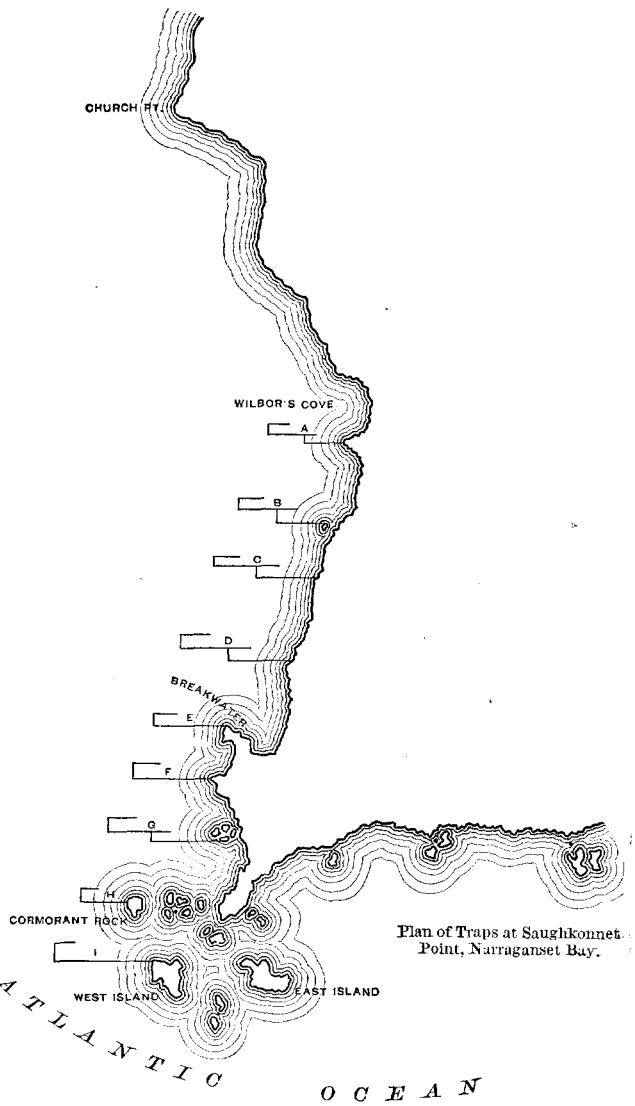
according to the nature of the coast, in some localities the efficiency being greater in the one case, while it is reversed in the other. The bowl may consist of netting or of slats, and the two forms are illustrated in the accompanying figures.

An ingenious apparatus, according to Perley, called the "spring-weir," is made use of in certain parts of the bay, where there is a very narrow entrance to a harbor, easily capable of being closed. This is so arranged as to drop flat to the bottom at low water, and allow the fish to pass over it with the incoming tide. At high water this is lifted up and worked from the shore by means of powerful capstans and ropes, forming an impassable barrier to the fish, which are retained as the tide passes out, and taken in large numbers, including shad, herring, salmon, &c.

LOCATION OF TRAPS, WEIRS, AND POUNDS, IN THE UNITED STATES.

I have thus indicated briefly the principal devices by which fishes are captured in the United States,[1] without attempting to represent all the individual modifications. The variety in the construction of traps, weirs, and pounds, is almost endless, depending very much upon the exposure, the nature of the bottom, the depth of water, the currents, the kind of fish to be taken, &c. I have given enough to illustrate the extent to which the simpler devices of the spear, the bow and arrow, and the hook, have been replaced by apparatus for a more wholesale destruction.

Fig. 19.



Plan of Traps at Saughkonnet Point, Narraganset Bay.

As already remarked, the seacoast weirs or pounds are used almost exclusively east of Connecticut, although fixed nets are in operation in or near the rivers of that State as well as of New York, principally for the capture of shad. The accompanying diagram (Fig. 19) is a plan of the traps at Seaconnet Point, on the eastern side of Narraganset Bay, as furnished by Mr. Southwick, and the details of which are given on page 260. In the large map of the south side of New England, accom-

[1] I am indebted to Dr. H. C. Yarrow for the account of an ingenious method employed in New York Harbor for trapping the *Morrhua pruinosa*, ("Tom-cod,") and which does not come under any of the classes of fishing referred to in the preceding pages.

A sufficient quantity of good rye or wheat straw is gathered into a sheaf and firmly

panying this report, the location of the principal traps and pounds in 1871 is indicated. The weirs of Cape Cod Bay are represented on a separate diagram, forming Plate XXXIX of the accompanying illustrations.

Finally, for the purpose of illustrating the subject of fish-pounds in the lakes, I give on the following page (Fig. 20) a diagram of the pound-nets erected and worked in 1871 in Lake Michigan, the nets being indicated by the short lines drawn perpendicular to the shore-line, in the water surface. A full account of the lake fisheries will be given in the report for 1872.

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tied in the middle; after being weighted with bricks or iron the ends of the sheaf are loosely tied; a rope is attached and the bundle lowered to the bottom of the water, where it is allowed to remain for a few days, until the fish become accustomed to its presence, after which it may be examined once or twice daily. In good localities the straw in the interstices will be literally crammed with fish. Whether they enter the straw for its warmth or for the friction received in their efforts I am unable to state.

The most suitable localities for setting the trap are near wharves or rafts of timber.

XVI.—LIST OF PATENTS GRANTED BY THE UNITED STATES TO THE END OF 1872, FOR INVENTIONS CONNECTED WITH THE CAPTURE, UTILIZATION, OR CULTIVATION OF FISHES AND MARINE INVERTEBRATES.

1. HOOKS.

Date of patent.	Number.	Inventor.	Subject of invention.
July 28, 1846	.....	Englebrecht & Skiff.....	Spring-hook. When fish pulls on bearded hook, a catch slips holding the spring-hook, which, being let loose, strikes the fish and holds him until taken off by the angler.
Aug. 21, 1847	.....	Stannton Pendleton.....	Spring-hook.
Aug. 21, 1847	.....	Job Johnson	Spring-hook.
Aug. 15, 1848	.....	Ellis & Gritty.....	Spring-hook. When fish pulls on the bearded hook, it slips the spring-hook, which strikes and holds the fish fast.
Aug. 15, 1848	.....	W. P. Blake.....	Spring-hook. When fish pulls on bait, it springs open, holding the jaws of the fish apart.
Sept. 5, 1848	.....	W. Jenks	Spring-hook.
Mar. 20, 1849	6,207	Job Johnson	Spring-hook; twenty-one different kinds of hook and method of attachment.
Oct. 8, 1850	7,709	Warner & Gaylord	Spring-hook.
April 6, 1852	8,853	Julio T. Buels.....	Trolling-hook.
April 11, 1854	10,771	.....do	Spring-hook.
April 11, 1854	10,761	Henry Siglers.....	Combination spring-hook.
Jan. 19, 1855	13,081	Richard F. Cook	Spring-hook.
Jan. 19, 1855	13,068	Charles De Saxe	Trolling-hook. Has a spring shield that covers the point of the hook when fishing among weeds.
Oct. 9, 1855	13,649	Job Johnson	Spring-hook.
April 22, 1856	14,706	Julio T. Buels.....	Fly or trolling hook.
July 14, 1857	17,803	Donald McLean.....	Self-setting trap-hook.
Sept. 20, 1859	25,507	Riley Haskels	Trolling-hook.
Feb. 12, 1861	31,396	W. L. Morris.....	Spring-hook. When the line is pulled, a catch slips off the ends or levers of the hook, and a spring draws the bearded points together into the fish.
Sept. 20, 1864	44,368	N. A. Gardner	Spring-hook. Two bearded hooks, forming part of a coil-wire spring with eyes, and rod bearing a line-eye for setting and releasing the hooks.
Nov. 7, 1865	50,799	Germond Crandell.....	Combination double-lever hook.
Dec. 19, 1865	51,651	Davis & Johnson	Spring-hook.
Nov. 20, 1866	59,844	Jacob King, jr	Spring-hook.
Nov. 20, 1866	59,893	C. O. Crosby.....	Fish-hook, (flattened in bend.)
Jan. 9, 1866	51,951	B. B. Livermore.....	Plain hook, with wire loop, to prevent fish from stealing the bait.
April 24, 1866	54,251	Johnson & Howarth	Spring or spear hook.
May 15, 1866	54,684	W. D. Chapman.....	Trolling-hook, with spring and fly, the latter easily removed.
Oct. 2, 1866	58,404	W. C. Goodwin.....	Plain hook; spiral spring around the hook to press the bait down to point.
Jan. 1, 1867	60,786	E. R. & J. W. Rhodes....	Spring-hook.
Feb. 12, 1867	62,042	B. Lee, jr.....	Hook; the shank made in form of spiral spring.
Aug. 27, 1867	68,027	F. Angilard.....	Lever-hook, so arranged that when fish pulls at bait another hook strikes it and makes fast.
Nov. 12, 1867	70,868	A. J. Leinhart.....	Spring-hook.
Nov. 12, 1867	70,913	Elisha Sterling.....	Extension or trap hook, with two or more hooks; one on swivel to hold bait, the other to grapple the fish while pulling from the water.
Sept. 24, 1867	69,221	D. Kidders.....	Spring-hook. Two hooks, one on either end of piece of wire or shank; when baited they are pressed together, but will separate when the fish bites.
April 28, 1868	77,365	R. A. Fish	Hook.
June 30, 1868	79,446	J. B. Christian	Trolling-hook, with artificial bait.
July 21, 1868	80,151	A. A. Dennett.....	Spring-hook.
Jan. 26, 1869	86,154	Martin Heltz	Hook, with an eye to attach hook.
Sept. 14, 1869	94,893	Francis Kemlo.....	Lock-hook.
Sept. 14, 1869	94,894	.....do	Lock-hook.
Sept. 14, 1869	94,895	.....do	Grapple-hook, with guard to prevent fish from getting loose from barb.

List of patents granted by the United States, &c.—Continued.

HOOKS—Continued.

Date of patent.	Number.	Inventor.	Subject of invention.
Oct. 12, 1869	95,755	F. T. Augers	Spring-hook. When set, the three hooks are close together; but when the line which is attached to the middle hook is pulled, it loosens the outer hooks, which expand in the mouth of the fish.
July 5, 1870	104,930	W. D. Chapman	Propeller or trolling hook.
Feb. 21, 1871	111,898	L. Arnold	Mode of attaching hook to line.
May 30, 1871	115,434	W. D. Chapman	Propeller or trolling hook.
Aug. 8, 1871	117,719	L. Arnold	Mode of attaching hooks to lines.
Nov. 21, 1871	121,182	J. H. Mann	Trolling spoon-hook.
Feb. 20, 1872	123,844	G. Sinclair	Trolling-hook.
July 16, 1872	129,053	E. Pitcher	Hook, with double spear, to thrust down into fish when caught by hook.

2. LINES, GRAPPLES, TRAPS, &c.

Mar. 3, 1868	75,075	D. C. Talbots	Fishing-tackle for anglers.
April 7, 1868	76,489	T. B. McCaughans	Fish-trap.
May 12, 1868	77,893	Joseph Koehlers	Fishing-apparatus.
Dec. 22, 1868	85,199	E. B. Beach	Fish-trap.
Nov. 4, 1856	16,014	Elmore Horton	Spear and grapple.
Dec. 9, 1856	16,217	Levi Van Hossen	Fish-trap.
May 25, 1858	20,343	Jacob Gail	Grapple.
Jan. 18, 1859	22,644	Robert Gray	Fish-trap.
Mar. 8, 1859	23,154	Daniel Bowmans	Fish trap.
Aug. 2, 1864	43,694	A. J. Leinharts	Fishing-tackle.
June 3, 1862	35,476	T. W. Roys	Method of raising whales.
Jan. 30, 1872	123,164	O. M. Faller	Fishing-apparatus.
Sept. 7, 1872	131,439	Harcourt & Cottingham	Fish and animal trap, made of wire, each wire of gate made movable.
Oct. 22, 1872	132,476	C. Lirandais	Trap-net, used in shallow water, umbrella fashion, to lie on bottom, and having springs to close by trigger.

3. REELS.

May 26, 1838	.....	Arrmah Tiffaney	Reel, for anglers' use.
July 26, 1838	.....	do	Reel or mackerel-latch, used in fishing from vessel.
Aug. 5, 1856	15,466	John A. Baileys	Reel.
Feb. 10, 1857	16,626	Edward Deacons	Reel.
Aug. 9, 1859	24,987	Edward Billinghurst	Reel.
Feb. 28, 1860	27,305	Mark S. Palmer	Reel, with guard to line to prevent it from clogging the reel.
Feb. 9, 1864	41,494	Andrew Dougherty	Reel, with brake.
July 5, 1864	43,460	W. H. Van Geison	Reel, with stop-attachment.
July 12, 1864	43,485	Darwin Ellis	Reel, with stop.
July 12, 1864	43,546	T. W. Cummings	Reel, (mode of attachment to pole,) by spring.
Aug. 29, 1865	49,663	W. M. Stewart	Reel, set inside of rod.
June 19, 1866	55,653	Anson Hatch	Reel, skeleton, similar to Billinghurst.
Aug. 7, 1866	56,937	A. B. Hartils	Reel.
Nov. 26, 1867	71,344	Julius Von Hofe	Reel.
Sept. 22, 1868	82,377	W. H. Bradley	Reel, with two concaved disks.
Nov. 3, 1868	83,740	J. Stetson	Clamp or reel, used for hand-line fishing.
Feb. 23, 1869	87,188	Francis Xavier	Reel, pivoted and made to screw into rod, bridge, or stick in ground, with bell attachment.
Mar. 23, 1869	88,026	C. S. H. Foster	Mackerel-latch.
Oct. 12, 1869	95,839	James J. Ross	Reel.
Nov. 9, 1869	96,652	P. A. Allmaires	Reel, set into rod.
May 31, 1870	103,668	G. C. Sheldons	Reel, more of a kite-string holder.
Mar. 7, 1871	112,326	E. L. Decker	Mackerel-latch.
Nov. 14, 1871	121,020	Silas B. Terry	Reel, with friction device.
June 18, 1872	128,137	A. H. Fowler	Reel, made of rubber skeleton.
June 14, 1873	134,917	George Mooney	Reel, manner of attaching to rod.
June 28, 1873	135,283	Charles L. Noe	Reel, similar to Billinghurst patent.

4. RODS.

Apr. 10, 1854	10,795	C. Desaxe	Rod, made hollow, to contain float, lines, &c.; peculiar float.
May 20, 1862	35,339	Julius Von Hofe	Rod; tip has a sheave or pulley on the end.
Oct. 16, 1866	58,833	R. N. Isaacs	Tips of rods enameled to prevent wear of line.
May 18, 1858	20,309	Underwood & Bargis	Rod, with pulley set in tip.
Oct. 4, 1859	25,693	Henry Pritchard	Guides for lines on rods.
Dec. 24, 1867	72,667	J. H. Montrose	Rod, hinged like parasol-handle.

List of patents granted by the United States, &c.—Continued.

RODS—Continued.

Date of patent.	Number.	Inventor.	Subject of invention.
Mar. 17, 1870	100, 895	W. J. Hubbard	Jointed rod, screwed together, to prevent slipping apart, by male and female screws.
Sept. 26, 1871	119, 251	Thomas Tout	Rod, principally of wood, with lameneal of whalebone running longitudinally.

5. FLOATS, SINKERS, AND SWIVELS.

Dec. 12, 1854	12, 060	J. W. Heard	Sinker, made hollow to contain shot, so that it may be adjusted to required weight.
Feb. 2, 1869	86, 609	J. A. Terrell	Float, made of glass.
Feb. 8, 1870	99, 572	James Ingram	Float, with ring and plugs in ends of it, so that it may be adjusted to line without slipping over ends of line.
May 26, 1872	127, 218	Brown & Jarvis	Float, made of vulcanized rubber, for seines.
July 9, 1872	128, 885	E. Jewell	Float, for ready attachment to line, to avoid slipping over ends of line; spiral wire in either end.
Apr. 1, 1856	14, 587	Wooster Smith	Fish-hook and sinkers, used for cod-fishing.
July 7, 1863	39, 192	William Woodbury	Sinker, with spring inside for deep-sea fishing.
July 21, 1865	46, 453	E. F. Decker	Sinker, with guard-ring and swivel.
Sept. 25, 1866	58, 211	L. A. Burnham	Sinker, with lever, &c.
July 31, 1866	56, 857	J. A. Martin	Sinker, with lever, &c.
July 29, 1867	61, 625	J. A. Martin	Sinker, with lever, &c.
Dec. 10, 1867	71, 879	Martin Hiltz	Swivel, for anglers' use.
May 5, 1868	77, 628	L. D. Lothrop	Swivel, for anglers' use.
May 12, 1868	77, 774	W. H. Smith	Sinker, made in several pieces, to increase or decrease weight.
June 2, 1868	78, 546	E. F. Stacey	Nipper, or latch, to hold line.
Nov. 3, 1868	83, 681	Sewall Albee	Jig, or sinker, three pieces, and method of attaching to hook.
Dec. 15, 1868	84, 885	Leach & Hutchins	Mode of attaching hook to sinker.
Feb. 9, 1869	86, 786	F. Telgmanns	Sinker, sectional.
Aug. 3, 1869	93, 220	R. T. Osgood	Sinker, with spring and swivel, egg-shape.
Sept. 5, 1871	118, 772	H. Camp	Metallic line, with loops and reel.

6. PROJECTILES.

July 29, 1841	2, 195	William Carseley	Spear.
Mar. 16, 1844	3, 490	Albert Moon	Harpoon; harpoon contains bottle of explosive material, which operates to throw the flukes out when it strikes.
Sept. 19, 1846	4, 764	Oliver Allen	Lance.
Nov. 24, 1846	4, 865	Holmes & West	Lance or harpoon, moveable flukes.
Dec. 3, 1846	4, 873	Charles Randall	Harpoon, moveable flukes.
Dec. 5, 1848	5, 949	Oliver Allen	Gun-harpoon.
June 4, 1850	7, 410	Robert Brown	Harpoon, mode of attaching line, } Gun-lances.
Aug. 20, 1850	7, 572	do	Harpoon lance, mode of attaching line }
Sept. 3, 1850	7, 610	C. F. Brown	Harpoon.
Nov. 19, 1850	7, 777	William Albertson	Harpoon.
May 6, 1851	8, 073	Charles Burt	Exploding harpoon.
Mar. 30, 1852	8, 843	Sonnenburg & Richten	Electric whaling-apparatus.
Apr. 6, 1852	8, 862	J. D. B. Stillman	Harpoon, moveable flukes and pulleys.
June 22, 1852	9, 044	C. C. Brand	Lance for killing whales. Re-issued August, 1856.
Aug. 19, 1856	15, 577	Nathan Schofield	Expanding spiral-winged projectile.
Mar. 10, 1857	16, 819	do	Bomb-lance, with springs. Re-issued July 7, 1857.
Apr. 28, 1857	17, 173	Rufus Sibley	Bomb-lance, with moveable flukes.
May 26, 1857	17, 370	Grudehos & Eggers	Bomb-lance, with springs and moveable flukes.
May 26, 1857	17, 407	Rufus Sibley	Projectile.
May 19, 1857	17, 312	C. C. Brand	Projectile.
Oct. 20, 1857	18, 458	J. Q. Kelly	Harpoon.
Nov. 10, 1857	18, 568	H. Bates	Bomb.
Dec. 9, 1857	18, 824	N. Schofield	Projectile.
Feb. 16, 1858	19, 363	H. W. Harkness	Harpoon and lance.
Aug. 17, 1858	21, 219	Rufus Sibley	Bomb-lance.
Aug. 24, 1858	21, 278	N. Schofield	Harpoon-lance.
Nov. 2, 1858	21, 949	George Doyle	Harpoon.
Nov. 16, 1858	22, 054	A. F. & J. H. Andrews	Bomb-lance.
May 3, 1859	23, 827	P. B. Comins	Bomb-lance.
June 14, 1859	24, 371	Robert Brown	Harpoon-bomb.
Aug. 9, 1859	25, 080	Isaac Goodspeed	Projectile.
Dec. 11, 1860	30, 869	Theodore Briggs	Harpoon-lance.
Jan. 22, 1861	31, 190	Thomas W. Roys	Shoulder-gun, for harpoons, lances, &c.
July 16, 1861	32, 830	Goodspeed & Crawley	Guide for bomb-lance.
June 3, 1862	35, 474	Thomas W. Roys	Rocket-harpoon.

List of patents granted by the United States, &c.—Continued.

PROJECTILES—Continued.

Date of patent.	Number.	Inventor.	Subject of invention.
Apr. 21, 1863	38,207	M. Adams	Harpoon, with semi-revolving head.
Oct. 27, 1863	40,387	Oliver Allen	Bomb-lance, with perforated fire-proof diaphragm.
Feb. 21, 1865	46,437	Silas Barker	Exploding-harpoon.
Aug. 22, 1865	49,548	Ebenezer Pierce	Apparatus for killing whales.
Apr. 24, 1866	54,211	Roys & Lieliendahl	Rocket-harpoon.
Apr. 23, 1867	64,045	Robert E. Smith	Shooting-harpoon, grooved head, to receive the pivoted barb.
Dec. 3, 1867	71,763	Z. Kelley	Harpoon, with stops, springs, and catches.
June 9, 1868	78,675	do	Bomb-lance.
June 1, 1869	90,868	E. Pierce	Bomb-lance.
Dec. 7, 1869	97,693	J. P. Rechtens	Gun-harpoon.
May 7, 1872	126,388	Charles Freeman	Bomb-harpoons.

7. NETS AND POUNDS.

Mar. 21, 1838	.....	Russell Evarts	Seine for deep-water fishing.
June 4, 1838	.....	B. W. Hale	Seine for deep-water mackerel fishing.
Sept. 19, 1838	.....	Cyrus Tracey	Seine.
Mar. 17, 1843	.....	Harris Cook	Gill-net.
Apr. 25, 1843	.....	John Downs	Form for making nets for taking eels.
Sept. 14, 1844	.....	Carr, Shannon & Co	Net or trap; place for bait similar to eel-pot.
Apr. 18, 1854	10,794	Charles De Saxe	Landing-net.
Apr. 27, 1858	20,125	Thomas Hall	Seine or net.
June 29, 1858	20,725	Benjamin Merritt	Seine for sea-fishing.
Apr. 8, 1862	34,887	F. Goodwin	Net or trap.
Apr. 25, 1863	39,676	W. Randolph	Net, to be anchored and used as trap.
June 19, 1866	55,635	Edw. A. Field	Net.
Aug. 7, 1866	56,917	Ferl & Larkin	Vertical deep-water fishing-net.
Nov. 6, 1866	59,429	William Maxwell	Net, double, with rigid mouth; can be anchored at any depth by floats and sinkers.
Feb. 26, 1867	62,481	C. C. Crossman	Net, attached to side of boat, so as to be lowered or raised.
Dec. 17, 1867	72,177	C. Drexel	Securing and feeding crabs.
Mar. 31, 1868	76,284	Daniel Will	Gill-net.
Apr. 7, 1868	76,387	Thomas Bell	Net-attachment for boats, with gauge to mast, to hoist or lower.
June 9, 1868	78,716	B. Arnold	Mode of making nets.
July 28, 1868	80,274	John Collins	Brace-seine.
Sept. 28, 1868	82,499	T. Cartwright	Set-net, to be anchored; the boat is attached about midway of the net, and a line is attached to small end of bag, and can be raised into boat and the fish taken out without disturbing the rest of the net.
Oct. 13, 1868	82,913	George D. Allen	Eel-pot.
Oct. 27, 1868	83,493	Smith Harper	Net.
Oct. 27, 1868	83,429	W. S. Wilcox	Pound net or trap.
Mar. 9, 1869	87,740	F. A. Wardmiller	Dip-net.
Feb. 8, 1870	99,713	P. C. Sabin	Purse-net, with bait-box, the net stretched on wires similar to umbrella, and, when ready to hoist, it is closed like a purse.
Apr. 4, 1871	113,292	J. E. Hammond	Fish-trap net.
Apr. 4, 1871	113,572	Benjamin Rider	Net-supporter.
Apr. 18, 1871	113,817	P. E. Tierman	Pound-net.
Aug. 15, 1871	117,957	L. H. Alexander	Net.
Nov. 14, 1871	120,974	R. Jeffrey	Seine.
Mar. 12, 1872	124,635	H. Smith	Seine, arranged so that portion of mouth may be below the surface.

8. OYSTER CULTURE AND GATHERING.

Mar. 2, 1858	19,516	Thomas Sheehan	Oyster rake or tongs.
Oct. 4, 1859	25,680	Thomas P. Sink	Reel or windlass, for hoisting oyster-dredges.
Oct. 11, 1864	44,634	George Jury	Reel for hoisting oyster tongs or dredges.
Oct. 2, 1866	58,426	Job Johnson	Oyster-rake.
Nov. 20, 1866	59,812	W. Belbin	Mode of hoisting oyster-dredge.
Mar. 17, 1868	75,550	Job Johnson	Oyster-tongs.
Apr. 14, 1868	76,697	Asa Barrett	Oyster-rake.
July 19, 1870	105,495	J. W. Sands	Grappling-tongs, (oyster.)
Sept. 27, 1870	107,740	E. Ward	Oyster-tongs.
Feb. 21, 1860	27,213	W. L. Force	Oyster-dredge.
May 20, 1862	35,324	J. H. Newcomb	Oyster-dredge.
May 5, 1863	38,436	Joseph Whitecars	Oyster-dredge.
Jan. 17, 1865	45,904	W. Belbin	Oyster-dredge.
June 5, 1866	55,228	Charles T. Belbin	Oyster-dredge.

List of patents granted by the United States, &c.—Continued.

OYSTER CULTURE AND GATHERING—Continued.

Date of patent.	Number.	Inventor.	Subject of invention.
Nov. 20, 1866	59,812	W. Belbin	Oyster-dredge.
Jan. 4, 1867	65,442	T. P. Sinks	Oyster-dredge.
Feb. 25, 1868	74,857	....do	Oyster-dredge.
Apr. 7, 1868	77,110	S. S. Shaw	Reel for oyster-dredge.
June 2, 1868	78,509	C. T. Belbin	Oyster-dredge.
Aug. 18, 1868	81,304	T. P. Sinks	Oyster-dredges.
June 19, 1869	85,936	Daniel Kellers	Oyster-dredge chuck.
Apr. 27, 1869	89,323	Thomas F. Mayhew	Oyster-dredge.
Nov. 30, 1869	97,420	....do	Oyster-dredge.
Feb. 15, 1870	99,900	R. O. & W. T. Howard	Reel for oyster-dredges.
Oct. 1, 1871	120,463	T. P. Sinks	Oyster-dredge.
Nov. 28, 1871	121,227	W. C. Baker	Oyster-dredge.
Nov. 28, 1871	121,249	E. B. Lake	Oyster-dredge.
Jan. 2, 1872	122,423	N. A. Williams	Oyster-dredge.
Jan. 16, 1872	122,843	T. F. Mayhew	Reel or windlass for oyster-dredge.
Apr. 23, 1872	125,964	T. W. Laudon	Oyster-dredge.
June 11, 1872	127,903	Benjamin F. Leyford	Oyster nurseries.
Aug. 20, 1872	130,631	E. H. Frazier	Shell-oyster bucket.
Oct. 29, 1872	132,668	J. A. Ketcham	Oyster-dredge.
Jan. 21, 1873	135,167	Isaac Smith	Oyster-tongs.

9. PRESERVATION AND UTILIZATION OF FISH.

Mar. 19, 1861	31,736	Enock Piper	Preserving fish and meat.
Dec. 15, 1864	1,618	James B. Herreshoff	Mode of treating fish-water for use in dyeing, &c. (Reissued December 15, 1864.)
Nov. 5, 1867	70,435	George H. Herron	Improved mode of preparing fish for food. (Reissued January 16, 1872.)
May 19, 1868	78,016	Benjamin Robinson	Improved process of obtaining gelatine from fish-heads.
Sept. 8, 1868	81,987	William D Cutler	Improved method of preparing, desiccating, and preserving fish.
Oct. 27, 1868	83,533	P. Nunan	Improvement in apparatus for preserving and freezing fish and meats, &c. (Drawing.)
Nov. 10, 1868	83,836	William D. Cutler	Articles of food prepared from fish and potatoes.
Dec. 8, 1868	84,801	Elisha Crowell	Improved article of prepared codfish.
Jan. 19, 1869	85,913	William Davis	Improvement in freezing-box for fish. (Drawing.)
Jan. 19, 1869	86,040	Thomas Sim	Improved compound for preserving fish.
Mar. 16, 1869	87,986	Benj. F. Stephens	Improvement in putting up codfish.
Mar. 23, 1869	88,064	J. Nicherson	Improved process of preparing fish for food.
May 25, 1869	90,334	John Atwood, jr	Improved process of curing and putting up codfish.
June 8, 1869	90,944	Havard & Harmony	Improved process of preserving meat, fowls, fish, &c.
Dec. 6, 1870	109,820	D. Y. Howell	Device for freezing fish, meats, &c. (Drawing.)
Feb. 28, 1871	112,129	Samuel H. Davis	Improvement in preserving fish by freezing.
May 21, 1872	127,115	Isaac L. Stanley	Improved process of preparing fish for food.
Oct. 15, 1872	132,316	Edward A. Pharo	Improvement in putting up salt mackerel and similar fish.
Dec. 15, 1868	84,855	Edward E. Burnham	Preservation and improvement in fish or bait used in catching fish.
Feb. 11, 1868	74,378	T. D. Kellogg	Improved method of preserving bait for fishing. (Drawing.)
Sept. 28, 1869	95,179	R. A. Adams	Improvement in preserving fish.
Oct. 26, 1869	96,288	George T. Thorp	Improved fish-bait.
Nov. 23, 1869	97,145	R. A. Adams	Improvement in curing and preserving fish.
Mar. 29, 1870	101,260	Silvanus Hamblin	Improved bait-mill for fishermen. (Drawing.)
Jan. 21, 1873	135,113	Samuel A. Goodman, jr	Bait, composed of vegetable and animal matter; is mixed with ordinary bait.

10. FISH-CULTURE.

Sept. 17, 1867	68,871	Seth Green	Spawn-hatching mackerel.
Jan. 16, 1868	78,952	W. H. Furman	Fish-breeding.
Mar. 16, 1868	78,952	W. H. Tierman	Fish-breeding device.
Aug. —, 1868	80,775	A. J. Smith	Transporting live fish.
June 11, 1872	127,903	Benjamin F. Leyford	Oyster-nurseries.
July 11, 1871	116,995	R. E. Sabin	Fish-nursery.
July 12, 1872	105,176	A. S. Collins	Fish-spawning screen.
Oct. 22, 1872	132,349	G. A. Brackett	Fishway.

List of patents granted by the United States, &c.—Continued.

11. PATENTS GRANTED PRIOR TO 1834.

[The order shows that patents were granted to these persons, but the drawings and applications were destroyed by fire in 1836.]

Date of patent.	Number.	Inventor.	Subject of invention.
1795	.....	Joseph Ellicott, Pa.....	Catching fish.
1802	.....	Nathaniel Robbins, N. J.	Mode of carrying fish in warm weather.
1809	.....	Philip Groff, Pa.....	Seine.
1812	.....	Samuel May, Pa	Seine.
1814	.....	James Wells, jr., N. J...	Vessels and nets for fishing.
1818	.....	James Drummond	Net.
1824	.....	Daniel Gordon, Pa.....	Catching fish.