

REPORT

OF THE

COMMISSIONERS OF FISHERIES

OF THE

STATE OF NEW JERSEY,

FOR THE YEAR

1878.



TRENTON, N. J.:
NAAB, DAY & NAAB, PRINTERS.

1878.



REPORT

OF THE

COMMISSIONERS OF FISHERIES

OF THE

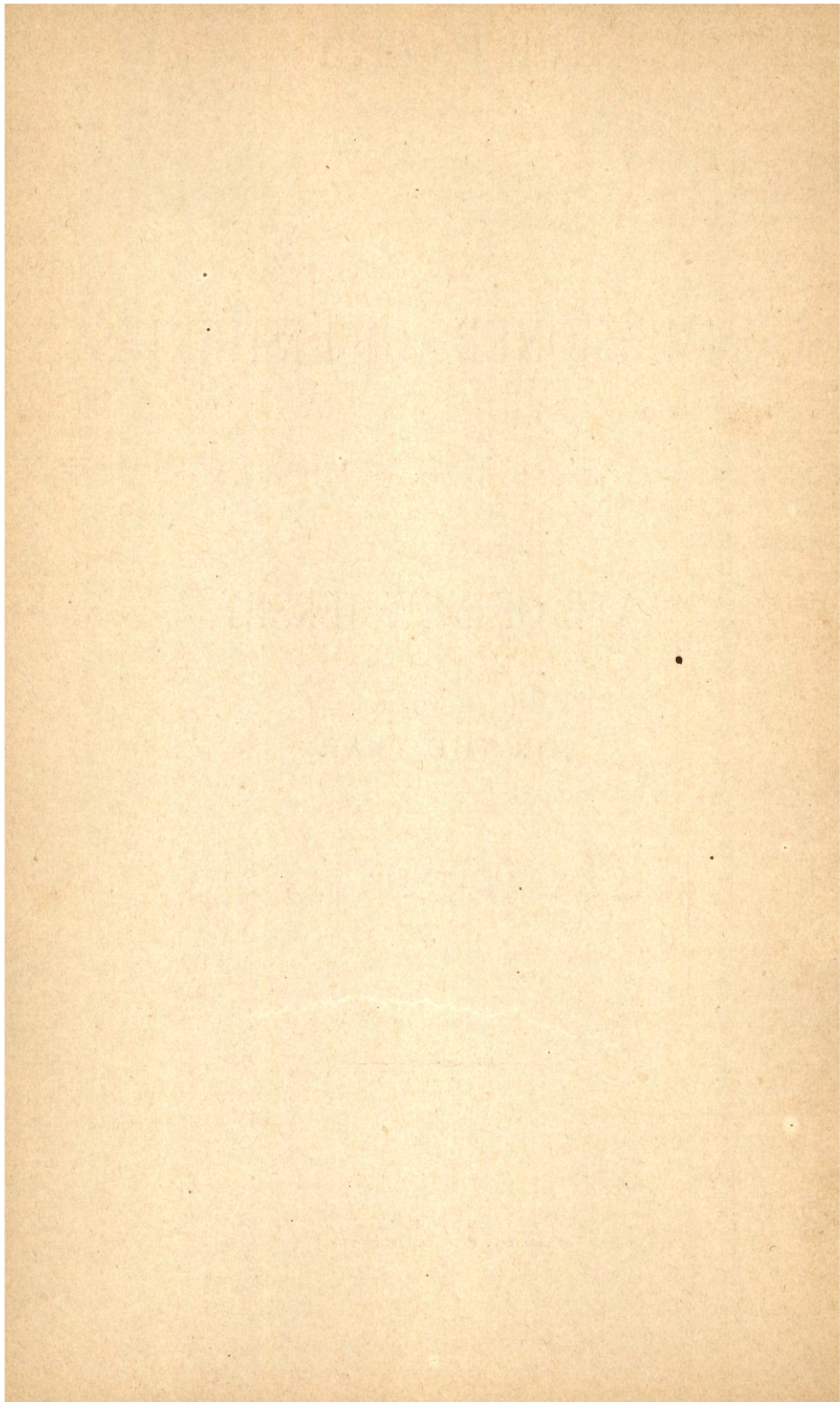
STATE OF NEW JERSEY,

FOR THE YEAR

1878.



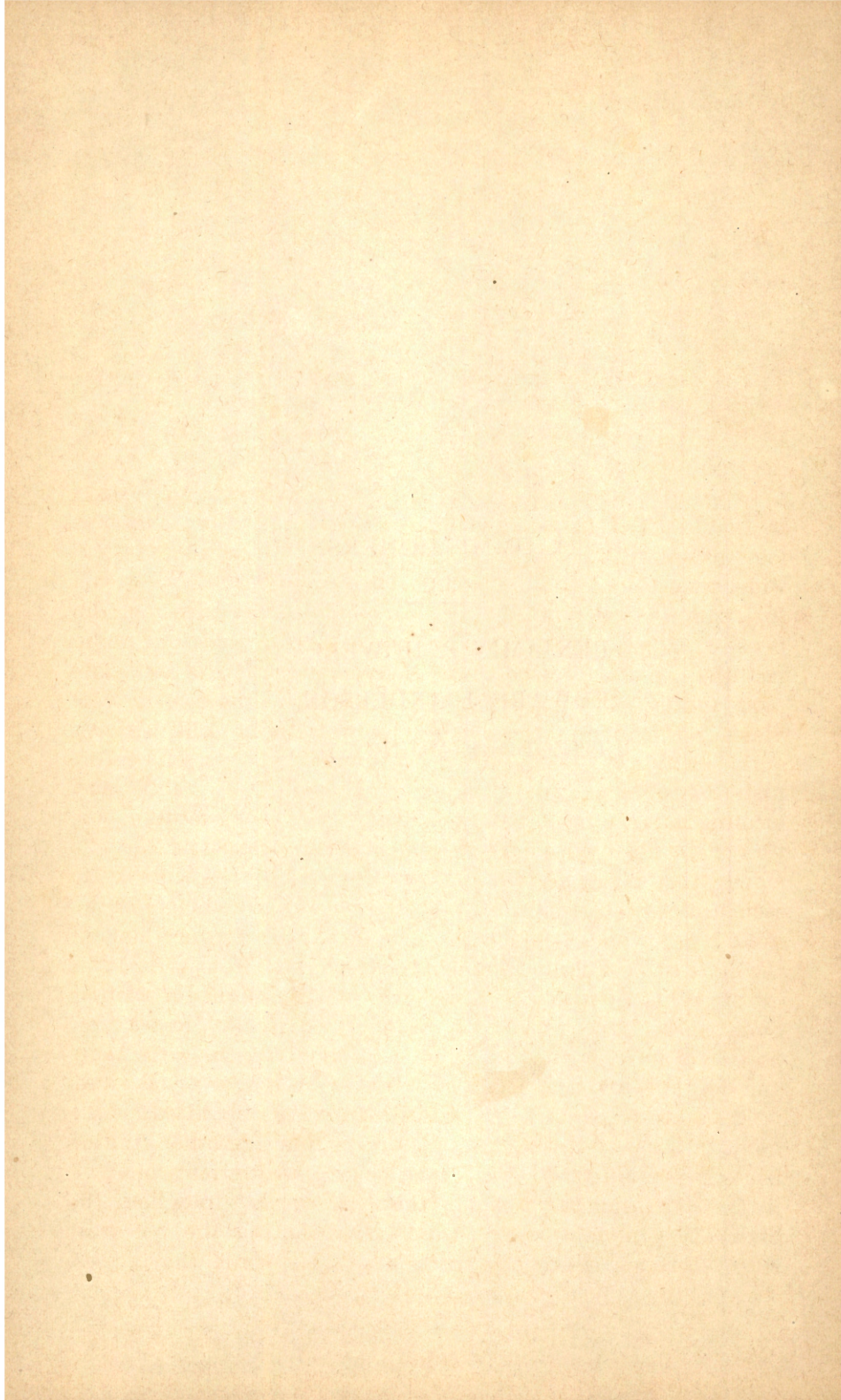
TRENTON, N. J.:
NAAR, DAY & NAAR, PRINTERS
1878.



COMMISSIONERS.



BENJAMIN P. HOWELL,
EDWARD J. ANDERSON,
THEODORE MORFORD.



REPORT.

DECEMBER 31, 1878.

To His Excellency, George B. McClellan, Governor of New Jersey ;

SIR—The Commissioners of Fisheries of the State of New Jersey, in presenting a report of their operations during the past year, desire to express their gratification at the increasing interest manifested by the people of the State in the propagation and distribution of food fishes. This increased interest is to be attributed to a wider knowledge of the advantages to be derived from the culture and protection of food fishes, a practical experience of the benefits of protectory laws, and a keener appreciation of the facilities possessed by the State for the production of an enormous supply of this class of food at a merely nominal cost. Few States in the Union possess equal natural fishing facilities with ours. Bounded on two sides by magnificent rivers, which furnish homes for many varieties of fish of local habits and forming natural runways for migratory fishes; the southern portion of the State skirted by the waters of the ocean and the bay which teem with an endless variety of sea fishes; the State intersected in every direction by tributaries of one or the other of the great rivers which lie on either side of us; the northern half of the State abounding in clear cold lakes, to and from which run innumerable mountain streams,—it may be questioned if another State can be found having within its boundaries so great a proportion of water suited to the production of the more valuable and desirable kinds of both permanent and migratory food fishes.

The lakes of the northern counties are peculiarly fitted for the home of the land-locked salmon, salmon trout, and other kindred fishes, the small streams furnish the most inviting retreats for brook trout, the innumerable small lakes and ponds throughout the State are admirably adapted to black bass, and the two great rivers between which the State is situated, while they possess

every requisite as permanent homes for the less valuable fishes, furnish also to the shad and salmon magnificent avenues from the sea to the cool, clear waters which instinct teaches them to seek as their spawning season approaches.

Many thousands of acres of our territory lie under water, and are deemed unproductive; but probably the richest farming lands in the State, with unceasing care, cultivation and fertilizing from year to year, fail to produce as great an amount of food per acre as these waters can be made to produce, with but a trifling outlay, and with an expense for protection that is wholly insignificant, when compared with that of producing food from the land.

And yet, with all these natural advantages, it is but about eight years since a Commission was established for the purpose of caring for the fishing interests of the State, and during a portion of that time it has been difficult, and sometimes impossible, to procure the necessary legislation to enable the Commissioners to carry out such projects as were obviously for the benefit of the whole people, in the protection of waters already abundantly supplied with fish, the restoration of fish to depleted waters, and the propagation of fish for waters which have heretofore furnished none at all, or, at best, none but the common and least valuable kinds.

Happily the prejudice against fish culture in this State is now giving way before a more widespread knowledge and appreciation of the benefits to be derived from it, and the ease and cheapness with which these benefits may be secured. It is not proposed in this report to present arguments in favor of the artificial propagation of fish. As the population increases the demand for fish greatly exceeds the supply furnished by natural increase, and the arguments in favor of augmenting the supply by artificial culture have been presented in a thousand forms; the theories originally advanced by scientists and enthusiasts have been demonstrated by actual results; nearly all civilized nations have recognized the importance of the work and the duty of encouraging or engaging in it, and the subject has passed out of the realm of legitimate discussion.

The same may be said concerning the passage and enforcement of laws to protect the fishing interests. No argument is needed to show those whose attention has been in the slightest degree

called to the subject, that without due protection from excessive and destructive modes of fishing, and the observance of a proper close season the most abundant supply must soon be exhausted, and information on this subject has been so generally diffused within a few years past that the wisdom and justice of laws regulating times and modes of fishing have come to be generally recognized by a majority of our people. There are, however, still to be found men who cling to the idea that the taking of fish at any time or in any manner, is a natural right which the law has no power or right to interfere with or regulate, and who cannot be made to see either the disadvantage to themselves, or the wrong to their neighbors, of taking fish of any age or kind, in season and out of season, with any device that ingenuity or inhumanity can suggest. There are, for instance, on the upper Delaware river, men who build racks or fish baskets in which to capture eels and catfish in the Autumn, into which racks run millions of young shad, which having been hatched further up the stream are making their way to the sea, and when they have accumulated in sufficient numbers to choke the rack they are shoveled out and used to fertilize the soil! In some of the most magnificent trout streams in Northern New Jersey, similar racks are constructed and by their means the streams are depleted of all trout of fair size, and when the streams are low, the few remaining fish are dipped with nets from the deeper portions of the stream in which they have congregated.

In some instances the efforts of these people to destroy the fishing have met with entire success, and some fine streams which formerly furnished not only good sport for the angler but a fair supply of food for the neighborhoods through which they run, are now wholly destitute of fish. It has been the desire and aim of the Commissioners to accomplish the protection of fish by securing the co-operation of the people rather than by a rigid enforcement of the laws. Enforcement of the laws without this co-operation is a practical impossibility. No amount of vigilance on the part of the fish wardens can prevent violation of the laws, and the prosecution and conviction of offenders is difficult in many instances, because of the impracticability of procuring the necessary evidence. For these reasons the Commissioners have endeavored to show that the work is for the benefit of all, and to awaken a general interest in fish protection,

and in this they have met with a gratifying measure of success. In a few instances, such as those mentioned above, it has been necessary to put the machinery of the law in operation, to destroy illegal fishing apparatus and to fine the violators of the law, but the marked improvement in feeling on this subject is shown by the increasing applications from all sections of the State for fish to stock lakes, ponds and streams, accompanied by promises of protection, and also by the testimony of the wardens of the several counties, who report a constant decrease in illegal fishing, a more general interest in the work of the commission and a more prevailing sentiment in favor of protectory laws.

Further strong evidence of the increasing interest felt in the subject of fish protection, is furnished by the constant formation of societies for this purpose. The West Jersey Game Protective Society has extended its operations over the six southern counties of the State, and has not only devoted much time and money to the increase of game in that region, but has given much attention to the care and distribution of food fishes, and through the instrumentality and at the expense of this society, many of the waters of the southern portion of the State have been stocked with valuable fishes. Societies of a similar character exist in Morris, Union and other counties, and not only furnish evidence of the interest felt by the people in the protection of fish, but also render the most valuable aid in the enforcement of the laws. The Commissioners earnestly recommend the encouragement of the formation of such associations, through any legislation which may be found necessary or desirable.

In the year 1873 the first steps were taken, through the Commission of this State, toward supplying fish to our waters, by artificial propagation. This was done at the instance of Prof. Spencer F. Baird, the United States Fish Commissioner, and the work consisted of placing a small quantity of salmon fry in a tributary of the Delaware.

Something had been done in the two preceding years by private parties toward introducing salmon into the Delaware, and of the work of the year 1873, performed by the Commissioners of this State, the entire expense was borne by the United States Fish Commission. In 1874 a small appropriation was made by the Legislature to enable New Jersey's Commissioners to continue the work, and each year since that time the Legislature

has authorized the expenditure of a moderate sum for the purpose of propagating and distributing food fishes in the waters of the State. The whole sum thus appropriated in five years has amounted to but fourteen thousand dollars (\$14,000,) and even with this small sum much has been accomplished.

It must be borne in mind that the money invested in the propagation of fish cannot be expected to yield an immediate return. Time must be allowed for the crop to grow, but it may be safely said, in view of the enormous importance of our fishing interests, that the public money can be expended in no manner which will ultimately yield a more abundant return. Fish once planted in a suitable stream or lake require no further care, involve no additional expense. Protect them against piratical fishing, and finding their own subsistence they increase in size and numbers and continue from year to year to furnish an abundant supply of food at the most trifling cost.

It is unfortunately impossible to procure statistics as to the number of pounds of this kind of food taken annually from the waters of this State, but, aside from the enormous quantities of fishes taken at our shad fisheries and in our bay and coast fisheries, it is safe to say that the value of those taken from our rivers and inland waters each year, far exceeds the whole sum expended by the State for fish culture since the establishment of the Commission. And it is not only in the value of the fish taken that the benefit accrues to the people of the State. By propagating fishes which furnish sport to the angler, such as the salmon, the trout, the black bass and other game fishes, the lakes, ponds and streams of our State become the resorts of that large and annually increasing class of people who make the rod and line their traveling companion, and who, being in search of health, recreation and pleasure, pay many times its value for every pound of fish they take. The summer tourist is attracted to the points at which there is known to be good fishing, the railroad company which carries him, the hotel keeper who boards him, the man who furnishes him boat and bait, and who often-times catches his fish for him, are all benefited to the extent of many dollars which would not come into the State but for the fishing which is the chief attraction. Our State is exceptionally rich in natural charms; fully one-half of it is mountainous and picturesque in the highest degree, presenting no common

attractions to visitors from the great cities which lie on either side of us, while our seaside resorts have a world-wide celebrity. Add to these attractions good sport for the angler, and the men who now go hundreds of miles, and spend each year many thousands of dollars in search of the place which will furnish them both the recreation that their minds and bodies need, and the sport that their souls delight in, will gladly come here, and our own citizens will be benefited by his presence.

An abundance of fish in our waters is therefore not to be viewed merely as so many pounds of food for the people. It also furnishes an attraction through which thousands of dollars are expended in the State which would not otherwise find their way here; and it is safe to say that the small sum expended by the State each year, in the culture and protection of fish, is returned with a tenfold increase. And this is not a sordid view of the subject. If we make our State attractive to strangers by the expenditure of money, they, coming here, will add to the prosperity of our people.

This, however, is perhaps the least important view of the question of the culture and propagation of fish by the State. Game fish, being associated inseparably with sport and entertainment, cannot rank in importance with the great interests involved in the shad fisheries of the Delaware, which for from three to four months in the year furnish thousands of men with their means of subsistence as fishermen, and supply the tables of many more thousands with this delicious fish, which has come to be almost one of the necessaries of life. The fishing on the sea coast and in the bays of the southern part of the State furnishes also a living to many men and families, and the State neglects a plain duty if it fails to foster and protect an interest in which the welfare of so many of its citizens is involved.

The Commissioners have endeavored to procure statistics to present to the Legislature, giving some idea of the annual value of the fish and oysters taken from waters within the jurisdiction of the State, but in this they have been but partially successful, owing to the great difficulties in the way of collecting information of this character. They hope, however, to be able during the coming year to put in operation some plans for the collection of data on these subjects, which were not practicable this year because of the late date at which the board was organized.

In presenting a report of the operations of the year, it is proper to say that the Commissioners have not instituted any scientific investigations or experiments, they have devoted no time nor money to the study of natural history in connection with fishes, but, taking a wholly economic view of their duties, and the wishes of the people, have confined themselves to the purpose of enhancing the value of the fisheries and increasing the food production of the waters of the State to the utmost extent possible with the means at their command.

The different kinds of fish which have been propagated and distributed, and the operations of the Commission in connection therewith, are treated of under their respective heads.

SHAD.

The vast importance of the shad fisheries of the State is not generally appreciated by those not living in the immediate vicinity of the streams in which this industry is carried on. For about three months in the year while the shad are ascending the rivers in search of suitable spawning grounds, thousands of men find profitable occupation in catching them for market, and many thousands of dollars are invested in the business. Any serious interference, therefore, with the run of shad or any serious diminution in the annual supply becomes a matter of vital importance to the people of a large portion of the State. The principal shad fisheries within the jurisdiction of this State are on the Delaware river, and while it has been impossible to procure perfectly accurate data as to the amount of capital invested, the number of men employed, or the proceeds of any single season's fishing, sufficient statistics have been furnished to give an approximate idea of the extent of this interest.

The Wardens of the several counties have made every effort to ascertain as nearly as possible the number of shad taken during the past season, and their reports show an aggregate of about seven hundred thousand taken in the Delaware river between the early part of March and the 15th of June, at which latter date the season closes above tide water. As nearly as can be ascertained there are about twelve hundred men employed in the work. The universal testimony is that the season has been a poor one, and the profits have been small, but at the average price at

which the fish were sold—twenty-five dollars per hundred—the waters of the Delaware yielded within three months one hundred and seventy-five thousand dollars worth of food, in shad alone.

The production of the shad fisheries in this river has steadily declined for some years past. Thousands were taken twenty years ago to hundreds that are taken now. The increase in population, and the extension of railroad facilities through which the market was enlarged has led to excessive fishing and the consequent decline of the fisheries. Fewer fish are allowed to ascend the rivers and deposit their spawn, and there is necessarily an annual decrease in the number of young fish produced. Many supposed remedies for this evil have been proposed, but it is believed that the only practicable ones are the strict observance of a proper close time and the annual addition of young fish by artificial propagation in as large numbers as possible. Our laws forbid the catching of shad from sunset on Saturday evening until twelve o'clock on Sunday night, and the necessity of such a law will not be disputed in the face of the statement that the aggregate length of the shad nets reported to the Commissioners as in operation during the past year in the Delaware was about five hundred thousand yards—over two hundred and eighty-four miles! This does not include nets fished from the opposite shore, concerning which no reports could be made. These are mostly drift or gilling nets, which are placed in the river and maintained in a perpendicular position across the stream by means of lead lines at the bottom and cork lines at the top. They are each from four to eight hundred fathoms in length, and there are hundreds of them in operation during the fishing season. To safely pass these nets and reach the head waters of the river, would sorely tax the ingenuity of a shad, but for the close season provided by law. The present wardens in the counties bordering on the Delaware are vigilant and efficient, and probably the efforts to compel observance of the law, with respect to the close time, have never been more vigorous or efficacious than during the past season. The effect of this activity was apparent in the increased number of young shad seen during the late summer and autumn, making their way to the sea. The wardens above the head of the tide report young shad seen going down in greater numbers than have been seen in many years,

and the Commissioners can bear testimony to this fact from actual observation.

Until within a few years past the upper part of the Delaware was literally filled with diabolical contrivances, called fish baskets, which were erected for the purpose of taking eels and rockfish as they made their way to the sea in the autumn, and which annually destroyed millions of young shad. These structures are forbidden by law, and during the past five or six years most of them had been removed. An inspection made by the Commissioners in July of the present year showed a number still existing, in defiance of law, in the river near the northern boundary of the State, and in September a sufficient force was taken there, under the direction of a member of the Commission, and a large number of these racks removed from the river and destroyed. A number of similar structures were also removed, during the past year, by the warden of Warren county, and there is no doubt in the minds of the Commissioners that a considerable portion of the increased run of young shad was due to the removal of these obstructions.

The Commissioners have no doubt that much can be done toward preventing the decay of our shad fisheries, and toward restoring their productiveness, by constantly supplying young fish by artificial propagation. It is estimated by practical fish culturists of long experience, that of the eggs spawned in the natural way not more than five per cent. produce fish which come to maturity, while by the artificial process not less than ninety-five per centum of the eggs are hatched, and a large proportion of these mature. Fish spawn is a favorite fish food, and the waters in which the spawn of shad is deposited so abounds in eels, catfish, sunfish, frogs and other creatures which eagerly devour the eggs, that it is a matter of surprise that any are allowed to hatch. By the artificial process, the eggs, after being taken from the parent fish and impregnated, are carefully kept from harm until the young fish are hatched, and these are kept until they reach an age at which they can care for themselves. The fact seems to be established that the male fish return to the river the second year, weighing only from one and a quarter to two pounds, but sufficiently matured to perform the work of propagation, while the females are not believed to return as adult fish until the third year, when they ascend the river to spawn.

The first efforts to improve the shad fisheries of the Delaware by artificial propagation were made in 1874, under the auspices of the United States Fish Commissioners, and the work has been carried on from year to year since that time, resulting in the addition of several millions to the supply of young fish. In June, 1878, the present Commissioners dispatched a party to commence operations, with orders to work from point to point along the river as the season advanced. They closed operations in August, at Shoemaker's Eddy, in Warren county, having successfully hatched and placed in the water about one million seven hundred thousand young shad. The greater portion of these were transported to Trenton and placed in the river below the falls, in order to give them the benefit of any doubt which might exist as to their liability to be destroyed by the back bass, which abound above tide water, but do not exist in any considerable numbers where the tide ebbs and flows. The number of shad produced in this way did not fully meet the anticipations of the Commissioners, the catch of ripe shad being unusually small, but there was abundant reason for this in the variations of weather, temperature, &c. The satisfactory results obtained in former years, in other rivers, and particularly those of New England, are such as to leave no doubt in the minds of the Commissioners of the advisability of this mode of adding to the annual production of young shad, and they earnestly recommend such legislation at the approaching session as will enable them to continue the work. They also recommend further legislation as to the size of mesh used in shad fishing, with a view to preventing the wholesale slaughter of shad weighing from one to two and a half pounds, which are now taken in great numbers, and which, being almost wholly valueless, are sold for so trifling a sum that they practically add nothing to the revenue of the fisheries, while their capture inflicts enormous damage upon the fishing interests.

SALMON.

The attention of fish culturists has for some years past been largely directed to the effort to introduce this magnificent fish into waters in which it had not heretofore been found.

The salmon found on the eastern side of this continent being

generally found in higher latitudes and, consequently, in colder water than that of any of the rivers of New Jersey, there were, naturally, doubts as to whether these fish would thrive in our rivers. But some of our streams, and notably the Delaware river, were so admirably adapted in other respects for this purpose that, in 1873, a beginning was made under the auspices of Prof. Spencer F. Baird, U. S. Fish Commissioner. The plan was to procure impregnated salmon ova, and after hatching the young fry and keeping them until they reached a proper size, liberate them in the stream, relying upon the well known instinct which leads them, after a sojourn in the sea, to return for the purpose of spawning to the rivers in which they were reared. A few eggs had been hatched and the fry liberated in the Delaware by private enterprise, in the years 1871 and 1872, but the operations of 1873 were the first with which the Commissioners of this State had any connection. In that year five thousand Rhine salmon fry and eighteen thousand Penobscot salmon fry were placed in a tributary of the Delaware, and in each succeeding year an increased number of young fish have been liberated in that stream and its tributaries, the whole number up to the date of the appointment of the present Commissioners having been, so far as has been ascertained, eight hundred and seventy-eight thousand and five hundred (878,500.) In addition to this, there had been placed in the Raritan, Passaic and Hackensack rivers, one hundred and eighteen thousand. All of the eggs from which these fish were produced were furnished by the United States Fish Commission, and a large majority of them were California salmon eggs from the United States Fishery in California, established for the purpose of taking the ova and furnishing them to the several States to be hatched and distributed. They are furnished to the Commissioners free of cost, excepting the expense of carriage, and are hatched and distributed at the expense of the State. No attempt has been made to capture any adult salmon which may have returned to our river, and it was not expected that they would make their reappearance until four or five years after they were placed in the stream. In the spring and summer of 1877, however, six or seven fish were taken in shad nets at different points on the river. They were medium sized fish, averaging about ten pounds, but had evidently been to the sea and had returned to the river to deposit their eggs.

This was deemed highly encouraging, and the next season was looked forward to with much anxiety by those who were interested in fish culture and who appreciated the immense importance of the success of the efforts to establish this valuable fish in the rivers of the State. On the fifth of April, in the present year, a magnificent salmon was taken in the Delaware river, within two miles of Trenton. This fish, which was three feet five inches in length and weighed twenty-three and a quarter pounds, came into the hands of the Commissioners and was by them forwarded to Prof. Spencer F. Baird, at Washington, who addressed the following letter to one of the Commissioners:

" UNITED STATES COMMISSION
" FISH AND FISHERIES. }
" WASHINGTON, D. C., April 11, 1878. }

" DEAR SIR :—You have rendered the United States Fish Commission a very great service by sending on the specimen of Delaware salmon as advised in yours of the 6th of April. It reached me in good condition Tuesday, and I have already had the pleasure of exhibiting it to the President, and the greater part of his cabinet, and a number of members of Congress who are interested in such matters, and who came to witness the realization of the efforts made toward stocking the Delaware with this noble fish. I shall have a plaster cast made, colored from nature and the specimen itself will be prepared and kept in alcohol in a jar of suitable size. I am awaiting the result of a conference of some experienced salmon fishermen as to whether this is to be considered as a fresh run fish from the sea, or a fish that has been in the river all winter, as is quite frequently the habit of salmon. The slight development of the hook of the jaw is rather an indication of the former supposition.

" From the size of the fish, I incline to refer it to the lot of Rhine salmon of which about 500,000 eggs were imported in 1873, but which, owing to the unprecedented heat of the weather in Germany and on board the vessel, arrived in poor condition, only about 5,000 surviving, and being hatched out at Dr. Slack's place at Bloomsbury. These were introduced into the Musconetcong, and doubtless made their way to the sea. A fish of this weight would require five years for its growth.

"I hope you will continue to gather all the data possible in regard to the occurrence of salmon in the Delaware, and that you may be able to detect among them some of the California salmon, which should be making their appearance.

"I am happy thus to open a communication with yourself as one of the Commissioners of New Jersey, and shall take pleasure in acting with you in the promotion of the common work of stocking our rivers with useful food fish.

"Yours, truly,

"SPENCER F. BAIRD,

"United States Commissioner of Fish and Fisheries.

"To E. J. ANDERSON,

"Commissioner of Fisheries, State of New Jersey."

During the shad fishing season, which closed below Trenton June 10, and above Trenton June 15, 1878, a number of salmon were taken by shad fishermen at different points on the Delaware. It has been impossible to procure information of all that were taken, but a sufficient number were reported to warrant the assertion that from fifty to one hundred were taken before June 10. All of those reported to the Commissioners were larger fish than any of those taken in the preceding year, and ranged in weight from twelve to twenty-nine pounds, only two or three weighing less than fifteen pounds. After the shad season closed and the nets were taken from the water, there was nothing to interrupt the progress of the salmon from the sea to the head waters of the stream, and doubtless many passed up and deposited their eggs, since the Commissioners are informed of a number of large ones having been seen at different points in the river between Trenton and Port Jervis.

In the Raritan river, one large fish was taken near New Brunswick, in the summer of 1878, but none have been reported as yet from the Passaic and Hackensack rivers.

The facts above stated concerning the presence of salmon in the Delaware, were deemed to go far toward demonstrating the success of the efforts to convert that river into a salmon stream, and the Commissioners were encouraged to continue their work. Accordingly in the spring of 1878 they applied to the United States Fish Commissioner for three hundred thousand eggs from the fishery in California, and received that number for account

of the State. Professor Baird had also offered to send one hundred and fifty thousand eggs to the West Jersey Game Protective Society, to be hatched by them and placed in the waters of the southern part of the State. This Society, not being prepared to take charge of the hatching and distribution of these eggs, proposed through their Secretary, Benjamin W. Richards, Esq., that they be added to the number forwarded for account of the State, and this proposition having been accepted, the entire lot of eggs was sent to the State Commissioners.

In addition to this, by direction of Professor Baird, twenty-five thousand eggs were forwarded for account of Hon. Abrm. S. Hewitt, which the Commissioners had offered to hatch, and which were intended by Mr. Hewitt for the purpose of stocking some inland waters in the northern part of the State. Thus the number of salmon eggs received was four hundred and seventy-five thousand, with an addition of twenty-five thousand to cover losses in transportation, making five hundred thousand in all.

An arrangement had been made with Mrs. J. H. Slack for the use of her fish-breeding establishment at Bloomsbury, and in October last these eggs were placed in the hatching house. Being in excellent condition they hatched out with a loss of but about ten per centum, and by the latter part of November the distribution commenced. This is a work of time and has not yet been completed, but, so far as it has progressed, has been as follows:

To the Delaware river, at Shoemaker's Eddy (about nine miles above Delaware Water Gap).....	150,000
To Great Egg Harbor river, near May's Landing, Atlantic county.....	25,000
To Great Egg Harbor river, near Winslow Junction, Camden county.....	25,000
To Alloways creek, near Alloways Station, Salem county,	25,000
To Maurice river, at Millville, Cumberland county.....	25,000
To Mullica river, near Atsion, Burlington county.....	25,000
To Raccoon creek, near Swedesboro, Gloucester county..	25,000
To Greenwood lake and Shepherds pond.....	25,000
	<hr/>
	325,000

There are now remaining in the hatching house about one hundred and twenty-five thousand fry, which are intended for distribution in the Raritan, Hackensack and Passaic rivers, where they will be placed during the month of January. The whole number placed in the Delaware river and its tributaries by the present Commissioners is two hundred and fifty thousand (250,000), and two hundred and twenty-five thousand were deposited in that river last winter by the late commission, making in all four hundred and seventy-five thousand young salmon which have been contributed to the Delaware during the past year. It has been deemed judicious by the Commissioners to direct their efforts toward salmon culture more especially to the Delaware than to any of the other rivers of the State, since that river is singularly free from dams, falls, or obstructions of any nature to interfere with the progress of the fish to suitable spawning grounds at the breeding season.

The other rivers of the State do not offer equal facilities for reaching such localities as the salmon choose for making their beds, and therefore while they have not been neglected the Delaware was considered the most suitable field of operations, and the one most likely to give the best results.

Should the anticipations of the Commissioners be realized, and the fish make annual returns to the river in considerable numbers a serious question will arise as to their protection until such time as they may be said to be fully established and shall visit the river in such numbers that they may properly be taken and marketed without risk of exhausting the original stock and leaving the river in its original condition. The salmon enter the river in the spring, and make their way gradually to the head waters to deposit their spawn in the autumn. During several months of the time that they are in the river the shad are also making their way to the upper waters, and the river is filled with shad nets, so literally filled that it is a matter of wonder that any shad ever escape capture and reach the spawning places of which they are in search. These nets must necessarily prove serious obstructions to the salmon. All the salmon taken heretofore in the river have been taken in shad, gilling and shore nets, and if the shad fishermen continue to take them it is obvious that but little addition to the stock can be expected by natural propagation, and equally obvious that artificial propagation can

not be depended upon to keep up the supply. By continuing for a few years to supply as large a quantity as possible of young fry and by protecting the adult fish until the river can be well populated a condition of affairs may be expected similar to that now existing in the case of the shad, which, notwithstanding the many difficulties they have to overcome, do succeed in producing immense numbers of their young each year, while many hundreds of thousands of adult fish are yearly taken for food.

The enactment of a law forbidding the taking of salmon in nets for at least three years is earnestly recommended, and would doubtless prove of immense benefit, for while its enforcement would be attended with many difficulties, were the shad fishermen disposed to violate it, there is reason to hope and believe that their appreciation of the immense benefits to accrue to them from an annual run of salmon, would be such as to lead them to respect such a law and aid in its enforcement. It is, perhaps, asking too much of weak human nature, that a magnificent salmon found struggling in a shad net shall be liberated, but what else can be done? The fish cannot reproduce their kind if they are taken to market, and the few hundred thousands of young fish which the State may be able to add to the stock from year to year will go but a little way towards replacing those taken out, if unlimited capture is permitted.

Let the salmon be exempt from capture a few years and they will add each year millions of young to the stock of the rivers, and in connection with those added each year by the Commissioners, will, it is confidently believed, firmly establish themselves and not only furnish our markets and our tables with an abundant supply of delicious food, but add enormously to the revenue of our fisheries. Legislation alone cannot accomplish this desirable result. Much depends upon the voluntary action of the men engaged in shad fishing, and it is earnestly hoped that they will appreciate the urgent reasons for giving the salmon a fair chance for at least three years.

BLACK BASS.

Until within a few years the black bass was a stranger to the waters of New Jersey. About the year 1870 a few were placed in the Delaware river, where, above tide water, they have in-

creased to an enormous extent, and furnish annually many thousand pounds of food as well as unlimited sport to the dwellers along the stream, and to hundreds of others who come from a distance to fish in waters which but a few years ago contained no game fishes and but the commoner sorts of food fishes.

It was soon apparent that the great increase of black bass would provide a supply from which the innumerable lakes and ponds of this State could be abundantly stocked. These ponds for the most part were inhabited by sunfish, catfish and pickerel, none of which could be classed as game fish, nor as superior table fish. In 1874 the work was commenced by the State Commissioners, of taking black bass from the Delaware and depositing them in the inland waters of the State. This work has been carried on from year to year until the present time, and there is probably no better or cheaper way of distributing food fishes throughout the State than this. There is no expense for hatching, no artificial propagation is needed, since the bass if placed in suitable waters—and almost all of our waters suit them—will proceed to reproduce their kind with a celerity and fecundity as surprising as it is gratifying. The only cost is that involved in capturing the fishes, their transportation to the waters to be stocked, and the services and expenses of an attendant to care for them on the way and properly deposit them. During the past year the Commissioners have caused two thousand five hundred of these fishes to be placed in suitable waters in the counties of Hunterdon, Ocean, Mercer, Cumberland, Camden, Gloucester, Morris, Union and Salem, and have received applications for many more, which they were unable to fill. The demand for bass has been great from all parts of the State, and furnishes the best evidence of the appreciation by the people of the work of the Commission.

Parties applying for them voluntarily agree to see that the waters are not fished for three years after being stocked, as the law requires, and in some cases have offered to pay the cost of transportation.

This work can only be carried on during a small portion of the year. Until September 1. the weather is too warm to admit of the safe transportation of the fishes, and after the last of October they can only be procured with difficulty from the river. The greater part of the distribution must be made,

therefore, within two months. Heretofore, almost the entire supply for the other waters of the State has been taken from the Delaware, and contracts are made by the Commissioners with fishermen at different points on the river, to supply the required number of fish, which are almost all taken with hook and line, and kept in live boxes until delivered to the agent of the Commissioners. During the past autumn many fish were engaged which were not furnished, and consequently the Commissioners found themselves unable to respond to many applications for fish to stock waters in different parts of the State. The manner in which these fish are taken from the river and furnished for other waters, is given here to counteract the impression which apparently prevails that the Commissioners have an inexhaustible store of black bass somewhere convenient, both in winter and summer, and that when application is made to them to stock a lake or pond, they have only to take out a few hundred fish and forward them. To the profound regret of the Commissioners, this is not the case. An approximation to this condition of affairs is, however, looked for in the near future, inasmuch as many of the ponds and lakes, stocked within the past few years, are now teeming with fish, and since the Commissioners have power to take fish from any of the public waters of the State for the purpose of stocking other waters, it is hoped and believed that the time is not far distant when the demand can be supplied with much greater ease and at less expense than is now possible.

The Commissioners deem the introduction of black bass into this State an event of the utmost importance. Their presence in the Delaware has aroused some opposition from those who feared that they would seriously diminish the number of young shad. Bass live mainly above tide-water, and the young shad after being hatched in the head waters of the rivers, must, in making their way to the sea, pass through the regions inhabited by the bass. It is not now generally believed, however, that any considerable number of infant shad are sacrificed to the voracious appetite of the bass. It is true that bass prey upon other fish, and it is equally true that they will eat young shad, but it is the opinion of close observers that they will not eat young shad if they can get any other kind of small fish. The Commissioners have frequently seen a black bass in full chase after a fleeing "minnow," while the water was fairly alive with young shad

with which he could have gorged himself had he been so disposed; and they have repeatedly found the stomachs of bass filled with other kinds of food, when the fish has just been taken from water in which young shad could be seen in thousands. It is not proposed to offer any explanation of this singular conduct on the part of the bass. It is simply given as a fact in opposition to the belief that bass are largely destructive to shad.

Much of the prejudice in the minds of persons living on the upper Delaware, against the presence of bass in the river has disappeared since the multiplication of shad nets in the lower part of the river has so interfered with the migration of shad as to render the shad fisheries above Trenton comparatively valueless. The bass have to some extent supplied the place of the shad, which a few years ago were reasonably abundant, and the bass being in season at a different time of year have furnished food, occupation and enjoyment to many persons to whom the shad was an object of little or no interest.

There is probably no fish procurable through which the inland waters of the State could have been so readily stocked with game and food fish as black bass. They furnish abundant sport to the angler during about four months in the year, and, as they are of rapid growth and very prolific, a lake or pond once stocked with them may be relied upon to furnish annually many hundreds of pounds of food. The reports of the wardens of several counties, the waters of which were stocked three or four years ago, show that the fishing during the past season has been very fine, and great quantities of fish have been taken from waters which before the introduction of bass produced only catfish, perch and pickerel.

It is the purpose of the Commissioners to continue the distribution of these fish throughout the State, if the means to do so are placed at their disposal.

LAND-LOCKED SALMON.

There is probably no fish of more value for stocking our small lakes than the land-locked salmon, which is similar in appearance to the sea salmon, but is smaller in size, and thrives and breeds in waters from which it has no access to the sea. This fish takes the fly readily and furnishes the finest sport to the

fisherman, while it is almost if not quite equal to its larger relative as a table fish. But little has been done in past years toward introducing it in our waters, probably because of the expense of procuring the ova, but in the year 1877 the State Commissioners procured a quantity of eggs and successfully hatched fifty-eight thousand young fish. On the 20th of March, 1878, thirty-nine thousand of these were placed in Strubel's pond, near Andover, Sussex county, a piece of water most admirably adapted for their growth and multiplication. The remainder (nineteen thousand) were turned over to the present Commissioners, and in May, 1878, ten thousand of them were placed in Green pond, Morris county, and nine thousand in Morris pond, Sussex county. Of course, nothing has been heard from them as yet, but there is no reason to doubt that they will thrive and, in a few years, abundantly populate the waters in which they were planted.

BROOK TROUT.

Until the present year no portion of the annual appropriation had been expended in the propagation of brook trout. Throughout a large part of the northern portion of the State, and in some sections of the southern portion, there are innumerable streams which are admirably suited to this most delightful game and table fish, and which, within a few years past, furnished an abundant supply of them. Notably in the counties of Sussex, Warren, Hunterdon, Morris, Passaic and Bergen, as well as in Camden, Gloucester, Salem and Cumberland, are there streams which once abounded in trout, but which, owing to excessive and destructive fishing, are now in the condition known as "fished out." One of the aims of the Commissioners has been and still is to restore the streams to their original, if not to a better condition. It is believed that the desirability of this restoration is so apparent that no extended statement is necessary of the reasons of the Commissioners for their action in this direction. It cannot be necessary to write an essay upon the many excellencies of brook trout, nor upon the advantages of having in our waters, if possible, an abundant supply of this most excellent game and food fish.

When the present Board of Commissioners was organized, the season was too far advanced to procure and hatch trout eggs,

and the only thing to be done toward supplying these fish was by purchase of the young fry. They succeeded in procuring forty-three thousand five hundred young fish of suitable age for distribution, and these were distributed as follows :

10,000 in the head waters of the Paulinskill, near Newton, Sussex county.

10,000 near Dover, Morris county, in several small brooks emptying into the North Branch of the Raritan river.

10,000 in the head waters of the Pequest river, near Newton, Sussex county.

6,000 in Saddle river, near Ramsey's, Bergen county.

6,500 in head waters of the Wallkill, near Newton, Sussex county.

1,000 in Cedar creek, near Plainfield, Union county.

In the selection of the waters for these fish, and in their distribution, the Commissioners were greatly aided by Hon. Francis M. Ward and Thos. Kays, Esq., of Sussex county, Hon. A. C. Canfield, of Morris county, Hon. Jno. W. Griggs, of Passaic county, and Col. W. H. Sterling, of Plainfield, all of whom took an active interest in the operations of the Commissioners, who embrace this opportunity to express their obligations.

During the summer of 1878 contracts were made for a supply of two hundred thousand trout eggs, which were received in November. These were placed in the hatching house at Bloomsbury, and are now hatched and awaiting their arrival at a suitable age for distribution, when they will be liberated at different points throughout the State.

Probably no step has been taken by the Commissioners which met with more general favor among the people than this distribution of trout. The sections of country in which they were placed are necessarily remote from the large fish producing regions, and the people of these sections promptly recognized this as a direct benefit to themselves. They eagerly offered to protect the young fish alike from the thoughtless small boy and the larger class of adults who go about committing infanticide on fish, and in every possible way to co-operate with the Commissioners in restoring the productiveness of the depleted streams. This was gratifying in the extreme, for without such aid no efforts on the part of the Commissioners toward supplying brook trout can possibly be successful. Trout will take a fly or a worm

at a wonderfully early age, and may be taken on a hook as soon they are large enough to get the hook in their mouths. It is not uncommon for persons calling themselves fishermen to commit the unspeakable barbarity of taking quantities of trout no larger than an ounce or two in weight—mere fingerlings. Unfortunately this is not, under our laws, a capital crime. Legislation cannot prevent it; fish wardens cannot prevent it; the only remedy lies with the citizens who reside in the neighborhood of the streams, and to them the Commissioners look for aid in preventing these outrages and protecting the fish until they are large enough for sport and for food, and old enough to do their share towards the further populating of the streams in which they have been placed.

SMELT.

The season for taking smelt has not recurred since the present Board of Commissioners was organized, and they are consequently not in the possession of any facts concerning this important interest, derived from their personal knowledge.

They have received, however, a communication from the former Board of Commissioners, detailing their operations subsequent to the date of their last report, in which they make the following statement concerning their efforts to add to the supply of smelt in the Hackensack river:

“We commenced smelt hatching under contract with Mr. A. A. Anderson, March 14, 1878, and closed operations April 6th. Mr. Anderson furnished all the apparatus. The work was not what we expected. About three million eggs were impregnated. The first lot was taken in pans and transferred to the hatching boxes. This process destroyed their vitality. Afterwards the eggs as they fell from the fish were placed in the trays and impregnated there. All these hatched well. When they hatched, however, it was found that no wire to be had there was fine enough to hold them, and they escaped as fast as they came out of the eggs.”

The present Commissioners have, within a few days, received a communication from Major T. B. Ferguson, Fish Commissioner of Maryland, who has given much attention to the subject of stocking the waters of that State with smelt, and who proposed

to proceed to either the Raritan or Hackensack rivers, with suitable apparatus, in the coming spring, and, in conjunction with the Commissioners of this State, engage in smelt hatching. To their great regret, the Commissioners were compelled to decline this proposition, owing to want of the necessary funds to defray their share of the expenses.

The smelt fisheries on the Raritan river have greatly declined within a few years past. The Commissioners are informed that it is but a few years since the catch of these fish averaged fifteen bushels a day for several weeks in the late winter and early spring, but that at the present time the daily catch is rarely over four bushels a day in the best seasons. Statistics have not been procured from the fisheries on the Passaic and Hackensack rivers, but they have doubtless suffered also from the excessive fishing resulting from the increased demand. All these fisheries could undoubtedly be improved, and perhaps fully restored, by artificial propagation, and as this interest is too important to be neglected, it is hoped that the interest felt on the subject of fish culture in the Legislature will result in placing at the disposal of the Commissioners a sufficient sum to enable them to give some attention to the improvement of the smelt fisheries.

WHITE FISH.

Within the present month a communication was received from the United States Fish Commissioner, proposing to send to the Commissioners of this State one hundred thousand eggs of white fish, of which fifty thousand were to be hatched for Hon. A. S. Hewitt and placed in waters in the northern part of the State, under his direction, and fifty thousand to be at the disposal of the Commissioners. This proposition was accepted and the eggs, upon their receipt, were at once placed in the hatching trays, where they are now progressing finely. The disposition of the fifty thousand under the control of the Commissioners has not yet been decided upon.

The white fish is an inhabitant of the great northern lakes, and it is believed, have no superior in economical importance among the food fishes of the country. None have before been introduced into the waters of New Jersey, and their introduction at the present time must be to some extent experimental, though

it is not doubted that the larger lakes in the northern portion of the State will prove favorable to their growth.

Of the other fresh water fishes of the State than those referred to above, it is not deemed necessary to make specific or extended mention. They are what are known as the commoner kinds of fish—the catfish, perch, pickerel, sunfish, sucker, &c.,—all of them contributing in their humble way to swell to an immense aggregate the supply of animal food which the waters yield so abundantly, but none of them of sufficient importance to engage the attention of the fish culturist, (except when viewed from a scientific standpoint,) nor to demand legislation or the expenditure of time and money for their propagation. Some of them are taken in sufficient quantities to furnish profitable occupation to many men during a portion of the year, and all of them are entitled to a share of respect as members of the great family which annually furnishes its millions of pounds of food to man, and asks of him neither food, care nor shelter.

Of the variety, extent and importance of our bay and river fisheries too much cannot be said. The inspection of them, which the law requires the Commissioners to make, has not been fully made by the present board for want of time, and the statistics concerning them, which it was hoped this report would contain, are not at hand. Enough is known, however, to justify the statement that the interests involved in these fisheries demand the most careful attention of the Legislature. The bays upon the eastern side of the State furnish line fishing of the most excellent description, and many of the people of that region depend almost wholly upon this for their subsistence. Without the passage and enforcement of laws to protect them in this they are at the mercy of those, who, in wanton disregard of both man and fish, sweep the fishing grounds with seines and in a few hours deprive hundreds of their neighbors of days and weeks of remunerative occupation. Many visitors are attracted to our seaside resorts mainly by the fishing, and many of our citizens support themselves and their families by furnishing boats and fishing appliances to these visitors, as well as by furnishing the daily table supply of fish for the thousands of seaside visitors.

It sometimes happens that in a single night, by a few sweeps of a seine, the fishing is destroyed or irretrievably damaged for the remainder of the season. Attempts have been made to remedy this evil, but owing to defective legislation the remedy has not proved entirely efficacious, and the attention of the Legislature is called again to this important subject.

STURGEON.

The sturgeon fisheries of New Jersey have not, until within a few years, been deemed of any considerable value; but they have lately been increasing in importance, not only by reason of an increased demand for the fish as food, but also because of a demand for the roe for the manufacture of caviare, which is now, to a large extent, manufactured in this country of as good quality as that obtained from abroad.

The wardens of Camden and Salem counties report the catch of sturgeon, during the past season, at about three thousand fish, and there were, doubtless, many more taken which were not reported. The warden of Salem county, in his report to the Commissioners, makes the following statement concerning this interest:

“The sturgeon fishing interest in this county is steadily on the increase. A few years since the whole business in our county was run by one man with two or three nets, employing half a dozen men, with a few hundred dollars capital invested, and with a catch of a few hundred fish in a season, while the past season there have been not less than fifty nets fished from the county, with an aggregate catch of from two to three thousand fish, employing more than one hundred men, and with thousands of dollars of capital invested. The sturgeon was formerly looked upon as a fish of no value, but rather as a pest and nuisance to the shad fishermen; consequently there have been no State enactments for their protection. But would it not be well, since the sturgeon has become such an important article of food, and has entered so largely into the trade and commerce of the State as a food fish, that some legislative action should be had at an early day looking to their protection by a reasonable close time and the better preservation of the young fish by returning them to the water when taken alive. Unless prompt action be taken

in the matter, it is my opinion that the time will come, in the near future, when the State will be deprived of the sturgeon fishing by the fish becoming extinct in our waters."

HERRING.

The herring fisheries of the State have declined in importance and the fish do not visit the rivers in such numbers as they did some years ago, or are not considered of sufficient value to engage the attention of our fishermen to the extent which they formerly did.

The Commissioners have been wholly unable to ascertain the extent of the catch during the past year. From Camden county the catch reported is one hundred and fifteen thousand, but from the other counties returns are not made, and this is doubtless but a small portion of the number actually taken. In the absence of accurate information on the subject the Commissioners have no suggestions to offer.

VIOLATIONS OF THE LAW.

As has before been stated, the wardens of the several counties report an increasing respect for protectory laws and a constant decrease in their violation, although, in some cases, a disposition has been shown to resist the efforts of the officers to enforce the law as to close time in shad fishing, and there have been, in several parts of the State, spasmodic attempts to set the laws at defiance. The principal opposition to the law as to close time on the shad fisheries of the Delaware has come from persons fishing from the other side of the river, and no pains seem to be taken by the authorities of Pennsylvania to compel observance of the law. The vigilance and activity of our wardens have been untiring, and, although but few arrests have been made, the capture of a few nets from persons engaged in illegal fishing, has sufficed to make the law (to use the language of one of the wardens) "feared if not respected."

During the summer, information was given to the wardens of Hunterdon and Warren counties of illegal structures for taking fish in some of the large tributaries of the Delaware, and, pursuant to the orders of the Commissioners, the wardens notified

the owners of these structures to remove them. Some complied, others refused. In the case of those who refused the structures were properly removed by the wardens. A number of these illegal contrivances for taking fish were removed from the main streams of the Delaware, and have already been referred to in treating of the shad fisheries.

In Atlantic county about twenty persons were arrested for violations of the law against seine fishing in the bays. They were fined by a justice of the peace, but appealed from his decision, and the cases were argued before Justice Reed of the Supreme Court, in December, the main point of the defence being that the law was unconstitutional because it applied to fishing in a particular locality, and could, therefore, not be deemed a general law. The court, however, decided that while the penalty was imposed against fishing in specified localities the prohibition was applicable to all the citizens of the State, and the law was, therefore, general and in entire accordance with the provisions of the constitution.

The present Commissioners inherited from their predecessors a suit brought against a warden for damages inflicted by him in removing a fish-basket or rack from one of the tributaries of the Delaware. The case had been heard by a justice of the peace and judgment given for the warden, but on appeal to the county court this judgment was reversed, the court taking the position, in a written opinion, that while the structure was illegal and the warden, in the discharge of his official duty, had a right to enter upon the owner's premises and remove it, he had no right to destroy the material of which it was composed. This material, the court said, was forfeited to the State, and might have been used by the State; the warden, therefore, had no right to destroy it, and, having done so, he must pay ten dollars damages to the man who erected it in violation of the law! There was a curious flavor about this decision which led to a desire on the part of the Commissioners to have the case heard by the Supreme Court and they gave their counsel directions to carry it to that court where it has not yet been argued.

The following summary is presented of the work done in procuring and distributing food fishes to the waters of the State, since the date of the last report of the Commissioners of Fisheries, and includes the fish distributed by the late Board, whose

operations ceased about four months after their last report was presented to the Legislature:

58,000 land-locked salmon hatched and liberated in lakes in the northern part of the State.

2,500 black bass distributed to lakes and ponds.

1,665,000 shad hatched and liberated in the Delaware river.

225,000 California salmon distributed in January, 1878.

500,000 California salmon hatched and now partly distributed.

43,500 brook trout purchased and distributed.

200,000 brook trout hatched and nearly ready for distribution.

100,000 white fish now in hatching house.

Adding to this the number of smelt hatched and liberated in the Hackensack river—which number cannot be accurately stated, but which may be safely estimated at seven hundred and fifty thousand—an aggregate is presented of over three and a half millions of valuable game and food fishes added during the year to the supply already in the waters of the State.

Of the ultimate advantages to the people of the State of this large addition to the food supply, the Commissioners entertain no doubt, and although the work accomplished has required no small amount of care and uncompensated labor, they will find in the realization of their anticipations and in legislative encouragement to continue their efforts in this direction, ample recompense for the the time and labor spent in the work committed to their charge.

Respectfully submitted,

BENJ. P. HOWELL,
E. J. ANDERSON,
THEO. MORFORD,

Commissioners.

FINANCIAL STATEMENT.

At the date of the last annual report the amount in the hands of the Commissioners then in office was	\$1,884 17
The amount expended for hatching and distributing bass, California salmon, land-locked salmon and smelt, to March 25, 1878, was.....	831 31
Amount paid to new Commission.....	\$1,052 86
Amount of appropriation of 1878, received from State Treasurer.....	4,000 00
	\$5,052 86
Paid for freight on 500,000 salmon eggs, from California.....	\$220 87
Paid for trout fry and eggs.....	1,022 00
Paid for rent of hatching house and appliances	600 00
Paid for expenses of hatching and distribution	2,605 43
	4,448 30
Balance on hand, required to defray expenses already incurred.....	\$604 56

E. J. ANDERSON,
Treasurer.

