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EIGHTH ANNUAL REPORT

OF THE

COMMISSIONERS OF FISHERIES

OF THE

STATE OF NEW JERSEY,

FOR THE YEAR 1877.

Commissioners of Fisheries, 1877.

BENJAMIN P. HOWELL, Woodbury.

JACOB R. SHOTWELL, Rahway.

GEORGE ALLEN ANDERSON, Trenton.

REPORT.

To His Excellency, Joseph D. Bedle, Governor of the State of New Jersey:

SIR:—We have the honor of presenting to you this the eighth annual report of the Commissioners of Fisheries, of the State of New Jersey.

In view of the great importance of the fishing interest to the people of our State, we have, in our previous reports, shown how great that interest was in comparison to what it is now. We have also endeavored, from the most reliable data, to show the causes which have produced this untoward result.

We have also, in accordance with the act creating the Commission, "suggested such legislation," as to our minds seemed best calculated, not only to arrest further deterioration of so important an interest, but to restore our depleted waters to their former redundancy of food fishes. The following reports of the Wardens, for the lower counties bordering on the river Delaware, show that the chief causes of the great diminution of both the anadromous and permanent fishes of those waters still prevail, to wit: Excessive and destructive modes of fishing. To check these, and at the same time to regulate and keep within legitimate bounds fishing in these waters, we have made two attempts to have the laws regulating fishing in the river Delaware and its tributaries codified, in order to simplify them and rid them of many of the acts and parts of acts which have been repealed or supplied, but which, still appearing in the statute books, are calculated to embarrass and mislead those whom they are intended to govern. At the close of the session of 1876, the act proposed passed the Senate with only one dissenting vote, but reached the House just on the eve of its final adjournment—too late to be acted upon. We again offered it at the last session; it was referred to the Judiciary Committee of the Senate, with whom it remained. The legislature adjourned, and our bill was not acted upon. This we greatly deplored, for it is an important bill, not of a merely local character, but affecting the fishing interest along the whole length of the Delaware and its tributaries, within the jurisdiction, not only of New Jersey, but Pennsylvania. Delaware State having already adopted similar laws.

Laws regulating the fisheries annexed to the shores of Pennsylvania and New Jersey, may be enacted by those States severally, but such as regulate the common of fishery, such as drift netting, which is done in mid-channel only, must necessarily be concurrent.

We would call your Excellency's particular attention to this bill. It will be found in Appendix B, of our report of 1876.

SOUTHERN DEPARTMENT OF THE RIVER DELAWARE.

REPORTS OF FISH WARDENS.

DELAWARE BAY.

SHAD.—James Logue, Fish Warden for Cumberland county, reports thirty-six drift nets from his county, "an increase of two over last season, all of the usual large size of nets fished in the bay are from 500 to 600 fathoms in length."

"The catch this year was even poorer than that of the season of 1876," barely paying expenses, which the fishermen charge to high winds, and cold weather and the "Green Tails," (Menhaden) which made their appearance in immense numbers during the latter part of the season and entangled the nets, nearly putting an end to all fishing. The quality, this year, was very good; seven-pound shad seem to have been quite common.

The catch, per net, was about 1400; price, twenty-five cents. They found a market, for the limited number taken, at home, very few being shipped to New York.

STURGEON.—There were three sloops during the whole season, and a part of it four, engaged in fishing for sturgeon in the bay. Each had three boats with nets, and took a large number. One sloop's boats alone, took 270 in one day; the total catch was from 2,500 to 2,800.

COHANSEY RIVER.

Eighteen drift nets fished in this river the past season, an increase of four over the preceding one; also, two small shore or sweeping seines. Total catch only about 4,000.

The Warden had no trouble with the fishermen in the Cohansey, nor with those fishing in the bay, from his county. There were a few violations of the Sunday close time by parties from Hope creek, Salem county. It is a difficult matter to catch a wrong-doer in a skiff, on a part of a river ten miles wide.

BLACK BASS.—Some of the fishermen took a few of the black bass put into the Cohansey about two years ago, but they threw

them back immediately. They said they were growing finely, and would weigh from a pound to a pound and a half. Most, if not all the ponds in South Jersey, at least, are private mill ponds, and, as the Warden of Cumberland county, Mr. Logue, says, "The owners, while desirous of having them stocked, yet refuse to bind themselves, by any agreement, to throw the ponds open to the public at the end of three years." It may be good policy to stock, at public expense, even these private ponds, for the reason that the "bass" will not confine themselves to the ponds, but will seek the head waters of the streams that feed the ponds, and thus be distributed over an extensive area of territory.

JAMES S. HANNAH, WARDEN OF SALEM COUNTY,

Reports number of shore nets same as last year—three. No violation of the fishing laws on the part of those fishing them. About two hundred shad drift nets owned in, and fished from his county; and about one hundred and eighty owned and fished by non-residents during the early part of the season—a total of three hundred and eighty this year, against two hundred and twenty-five the previous season. The principal cause of great increase in number of drift nets is attributable to the dull times. Their outfit in materials is advanced to them in many cases, by those who sell their shad. Those nets fished in the bay in early part of the season, range in length from four to eight hundred fathoms—increasing in length every season. The Warden suggests legislative restriction in the length of drift nets, and thinks it would receive the approbation of a large portion of the fishermen themselves. Size of mesh about five inches. The catch of both residents and non-residents in the aggregate, was about 312,000 shad; that of shore seines about 5,000, or 317,000 against 251,233 last year, an increase of 65,767; while the average per net was but 835 shad, against 1,094 the year before. Price was the season through about $18 per hundred. Weight of shad from three to seven pounds.

HERRING—The catch was, perhaps, an ordinary one. Had no means of learning the exact number or the amount realized therefrom.

STURGEON—The number of persons engaged in this business is increasing yearly. I was unable to ascertain either the exact number taken or the profit derived from the catch.

THE BOUNDARY QUESTION—The Warden complains of the unsettled question of boundary between Delaware and New Jersey over the river within the "Twelve-mile circle."

Fishermen knowing the Warden's want of authority therein,

violate the weekly close time with impunity. The speedy settlement of this question, and the codification of the fishing law, amended as proposed by the Commission, properly enforced, would soon result in the suppression of outlawry of this kind.

H. V. HERITAGE, FISH WARDEN OF GLOUCESTER COUNTY,

Reports six shore fisheries, all fished by citizens of Pennsylvania. Indeed this is the case at all the fisheries annexed to the Jersey shore—save one—in the tidal portion of the river.

He thinks the catch at some of these fisheries amounted to 40,000 shad—at one 50,000 were taken.

He finds it impossible to ascertain from fishermen the real number of their catch. This applies to both classes. Many of the shore fishermen quit several days before the end of the season, June 10th. As a general thing their success was poor.

DRIFT NETS.—Some two hundred seines go out from this county. There were many violations of the law, chiefly by parties hailing from Philadelphia and Chester, rendering a modification of existing laws, and co-operation on the part of the authorities of Pennsylvania and Delaware exceedingly desirable.

The catch though indifferent as to numbers was excellent in point of size—instances of eight pound shad being caught—while he thinks the average weight would not fall short of five pounds.

FREDERICK SHINDLE, FISH WARDEN OF CAMDEN COUNTY,

Reports that the Sunday close time was strictly observed by the fishermen of his county. He says he was on the river at all hours of the night, and saw but one person attempt to lay out his net, "him he stopped." The season was very poor. The shore seines were obliged to cut out some time before the season was ended.

The shad were the largest caught for years. He saw one that weighed seven pounds and two ounces, and those weighing six pounds and a half were quite common.

The number of drift nets was as great as ever; he says they quit fishing at the end of the season.

LANGHORNE THORNE, WARDEN OF BURLINGTON COUNTY,

Reports 120 drift nets, an increase over last season to wit:

From Bordentown, Fieldsboro', Biddles Island and Florence, 36; average length, 165 fathoms; mesh, 5⅜ to 5⅝ inches; depth, 30 to 40 meshes; average catch of shad, 400; price, $35 per hundred.

From Burlington, Shedikers, Edgewater and Beverly, 37 drift nets; length, 100 fathoms; depth, 40 meshes, with 8 feet buoy lines; mesh, 5⅝ inches; catch of shad per net, 1,100; price, $35 per hundred.

From Delanco, Riverside, Bridgeboro and Riverton, 47 drift nets; average length, 150 fathoms; mesh, 5⅝ inches; depth, 50 meshes; buoy line, 10 feet; average catch per net, 1,600 shad; price, $28 per hundred.

From the opposite shore of Pennsylvania about the same number of nets were fished.

SHORE FISHERIES—Minor Joins Fishery—Captain John Forbes: Length of seine, 175 fathoms; depth, 24 feet. Crew, 13; daily hauls, 11. Commenced April 16th; quit June 7th.

Cash Point—Daniel English—Length of seine, 108 fathoms; depth, 24 feet; daily hauls, 11; crew, 13. Began April 18th, and quit June 7th.

Hedley's—Captain Lovett—Length of seine, 180 fathoms; depth, 24 feet; daily hauls, 12; crew, 13. Began April 12th; quit June 7th.

Hayes' Fishery—Captain Reil, Smith & Co., of Pa.—Length of seine, 250 fathoms; depth, 30 feet; crew, 30. Began April 12th; quit June 6th.

Badger's Island—Deven & Brothers—Length of seine, 180 fathoms; depth, 30 feet; daily hauls, 10. Began April 6th; quit June 7th.

Hawk Island—Joseph Dilks—Length of seine, 170 fathoms; depth, 30 feet; crew, 18; daily hauls, 10. Began April 6th; quit June 7th.

Haines' Point—H. Haines—Length of seine, 106 fathoms; depth, 28 feet; crew, 13; daily hauls, 10.

Taylor's Point—Jacob Gosser—Length of seine, 160 fathoms; depth, 30 feet; crew, 22; daily hauls, 11. Began April 8th; quit June 6th.

Number of shad taken at the above fisheries not given.

Cinnaminson Cove—Captain William Farmer—Length of seine, 160 fathoms; depth, 29 feet; crew, 13: daily hauls, 9. Number of shad 7,000. Price $28 per hundred.

The number of shad taken in the Rancocas was about 6,000. An increase of 1,000 over the catch of the previous season.

Below Bordentown the catch of herring was less by 571 pounds than that of 1876. Above Bordentown the supply was greater than the demand.

Black bass are increasing in the tide waters, both of the Delaware and in Crosswicks creek. A. King took one that weighed five pounds, and Captain William Farmer, one that weighed five and a-half pounds weight.

Large numbers of rock fish have been taken with hook and line, and quantities of pan rock with sturgeon roe for bait.

The fishing for sturgeon has been better than for several years. Some 300 have been taken in the Warden's district.

Cat fish have been greatly diminished by excessive and destructive use of fyke nets. The Warden thinks that but for the protection they get in the ponds and streams where they spawn, they would soon become extinct in the river. The most of these fishermen hail from Pennsylvania. The Warden has driven in the past year some five hundred fykes out of the tributaries. In this duty our own fisherman aid him, recognizing the importance of protecting this interest.

The size of the shad as compared with those of a few years back is larger, attributable to the better observance of the law. One shad seen by the Warden weighed eight and a-half pounds; while numbers—three at one haul—weighed 7 pounds.

Seven years ago, the Warden in a season took 375 shad, not one of which weighed over four pounds.

The young shad seen descending the river have been very numerous, probably, in part, the result of the artificial hatching last summer. There have been some violations of the law in his district, but the parties desisted and promised obedience to the law in the future. The fishermen begin to see their own interest in a stricter observance of the "close times." A fact from which he argues favorable results in the near future.

THE NON-TIDAL DEPARTMENT

OF THE DELAWARE RIVER, AND OTHER COUNTIES OF THE STATE.

We are glad to be able to present herewith reports from the wardens of every county in this department.

They are so full, so interesting, and show so clearly the great interest taken in the subject, not only by the Fish Wardens themselves, but by the citizens generally, that we think it unnecessary to enlarge upon them.

It will be seen from them that we have distributed black bass in the waters of every county in the State except Hudson, in which no waters were found suitable for them. The whole number thus sent out was nine thousand nine hundred and forty.

T. E. SMITH, WARDEN OF SUSSEX COUNTY.

NEWTON, N. J., Nov. 19, 1877.

Says: "My report from this county, I am afraid, will not be as interesting as you might wish for. The laws were not broken as much as in former years, although the laws are considered as a

dead letter as far as inland waters are concerned. I have made several complaints but was unable to get a justice of the peace to issue a warrant, as they were unable to find any law upon the subject.

I got a warrant against a party for hauling a net, but I was nonsuited. The laws were not obeyed from fear "but from a sense of justice." The sporting papers have elevated the people's ideas here more than the fear of law. We have black bass in nearly all of our lakes. I have visited most of the lakes that bass have been placed in for two years past, and find them full of young bass. The salmon trout that were placed in some of our lakes are doing well, and large numbers of the young are seen along the shores. I received 300 young bass from the Commissioners this fall, and they were placed in Hunt's pond and in Franklin pond, that is, the head waters of the Wallkill.

Several lakes were stocked by private parties. I placed 12 that weighed half pound each in Culver's lake; other parties caught about five hundred out of the Delaware and put them in the same lake.

Large numbers of black bass were taken along the Sussex shore, not less than three thousand were taken off an old pier at Dingman's Ferry. The largest number and the largest fish were taken at Flatbrookville and Fiddler's Elbow.

Young catfish were used largely for bait. I wish to speak of the laws; they are so complicated that no one can tell anything about them. If all the old laws were abolished and new ones made with no supplements, we could do something. As for the Delaware river, I am not able to find out how far my power extends and what the laws are for the season; the State of Pennsylvania has not concurred with this State. I hope to see the laws put in a shape so that the average lawyer can tell something about them.

I think the hard times is the main cause of the laws being broken.

JOHN C. ROE, WARDEN OF PASSAIC COUNTY.

On receipt of notices or copies of fish laws, I had them posted in every conspicuous place in the county, and renewed them from time to time. They have been a great benefit, as the violations of the law have been very few. The portion of the law prohibiting the catching of bass during the months of May and June, passed last winter, has also benefited us, as heretofore thousands were captured while on their spawning grounds. This season persons taking bass during that period would set them at liberty again.

I have not heard of a single instance where fish were taken and kept during that time. Black bass are considered with us the best

fish yet introduced, being decidedly game, perfectly hardy and a splendid fish for the table, and can be taken readily with nearly every kind of bait usually used to catch fish. I have watched their habits very closly, and find that they are less destructive to small fish than the pickerel, pike or perch, but as they are a fish that multiply very fast and are good feeders, I would recommend the placing of an equal number of the common mullet in all places stocked with bass, as they increase very rapidly and make excellent food for this species, thereby preventing the bass from destroying other game fish. Bass are caught with us in great numbers. I have known a single fisherman to take from 80 to 100 per day, some weighing five pounds each. They can be purchased for eight cents per pound the price heretofore paid for common suckers and mullets.

I have received a large number of bass from the Commissioners this season and placed them in Pompton lake, Echo lake and other waters suitable. The Passaic river may be considered thoroughly stocked, as thousands of young could be seen along the river shore this season.

I received also from the Commissioners 150,000 young shad in good order, and placed them in the Passaic river above tide water.

The Passaic river was visited in the latter part of May and the first part of June with a fish epidemic which destroyed thousands upon thousands of fish that generally feed from the bottom, such as mullets, suckers, roach, catfish, sunfish, &c. Quite a number of game fish died in consequence of eating diseased fish. My opinion of the cause is embodied in the following article which was prepared for the Paterson Guardian from data furnished by me.

THE DYING FISH.

"Fish Warden Roe, of this city, gives us some interesting facts in connection with the fish epidemic, as it is called. He laughs at the idea that it results from anything coming from the Powder Works, and says that it is equally ridiculous to imagine that it comes from the dye stuffs or other things which run into the river through the sewers of Paterson or Passaic. The powder theory has been knocked into a cocked hat, from the reason that the fish are dead way above that place, and even into the little brooks and tributaries of the river, where the influence of the powder never could reach. Furthermore, there would be nothing in the manufacture of powder, anyhow, that would interfere in the least with the fish, if there were powder works all along the river. And in addition to this there has been nothing of any account doing at the powder works for some time, it is said. In regard to the sewers, it is a fact that there is at the present time less dye stuff and other refuse being run into the river than there

has been in a long time past, in consequence of the dullness of business in the Paterson factories. And more than this, the fish were never affected with this stuff in times past, and why should they be now? Both these theories are ridiculous.

"In conversation with Mr. Roe on this matter, it should be remembered that he is an authority on the subject. There is, perhaps, no man in the State of New Jersey more qualified to speak on the subject of fish. He has made it his study for years, and knows all their habits and peculiarities, and his opinion among the piscatorialists in the New York Aquarium and other places is recognized as being good. What he says about this important matter, therefore, will be read with more than ordinary interest at this peculiar time. He has a theory to account for this disease among the fishes, that is based on actual scientific observation, he having given considerable attention to the matter. Briefly, his theory is this, so far as we could understand it, after a short conversation with him on the subject:

"It may not be generally known, but it is a fact, that all fresh water streams and bodies of water, or at least nearly all of them, undergo at certain times of the year a purifying process, which, among the scientific men, is called "purging." The cause of this phenomenon is not exactly explained; but at certain times of the year, generally in July or August, when the waters are the lowest, this process goes on. At this time of the year, there forms at the bottom of the river a sort of sediment, that seems to ferment and give forth a gas, which arises to the top of the water in bubbles, similar to the bubbles in a glass of soda water. It is believed that these bubbles contain a gas something of the nature of carbonic acid gas. The effect of it is, in a short time, to purify the water of all the impurities that gather and accumulate in it, and leave it pure and clear. Most fresh water streams "purge" themselves in this way once a year, but there are some that do it two or three times a year. The latter are those that have a good deal of decaying vegetable matter in them. On the other hand there are some that never undergo the purifying process. These are generally those bodies of water in the mountains or other high places that have a sandy bottom, and do not have so much of a vegetable sediment in them. There are several of the small mountain lakes in this county that never undergo the purifying process, and their waters are always pure and clear. But the Passaic river waters generally "purge" about once a year, and in the month of July or August. During the time that this process is going on, the fish are always sickly and mopish. They will eat nothing, and no matter how long a fisherman might wait for a bite with the most tempting bait, he would never get so much as a nibble. All the old fishermen know that there is no use in their wasting their time in trying to catch anything when the water is "purging." The fish

are very sickly, and if the "purging" continues long, many of them will die. After the water is clear again, however, they are hungry, and will bite at anything, and then fishing is good, although the fish themselves are not in their best condition.

"At the time when the 'purging' process generally comes on, the fish are in the best condition to stand the ordeal which they have to pass through. They seem to be in the proper condition for them to stand their fast. But when anything happens to make this process comes in an unusual season, they are not able to go through it so well and the number that die is greatly increased.

"These things explain the cause of the fatality among the fish at the present time, when we say that the river for the past week or so has been undergoing this "purging" process. For it to do so at this time of the year is an unusual, if not an unprecedented occurrence. The river is now lower for this time of the year than it has ever been before, it is said, or at least for a great many years. We have had an extraordinary, long, dry spell, and the Spring rains were a great deal less than they usually are. This has made the river low, and has brought on the "purging" process at a premature time of the year. It is also a time of the year when the fish are not in as good condition to stand the ordeal as they are in the Summer months, as it is sooner after their spawning season, and they have not had the advantage of the Summer food that gives them the strength and hardihood that they have in July and August. These circumstances are, in Mr. Roe's opinion, the cause of the epidemic that is prevailing among the fish at the present time.

"Mr. Roe says that there is no doubt about the rivers at the present time "purging," and the symptoms of the death of the fish are precisely those of death from the impurities and debility brought on during this peculiar process. He has not the slightest doubt of it. One of the proofs of this is in the fact that the fish that live at the bottom of the river are the most affected. They get their food from the unhealthy sediment at the bottom that is now giving forth this gas, and that causes their death. The fish that live in the water nearer the surface, are not affected in the same way. For instance the pickerel, which is a game fish, and lives mostly on the small fish, seem to be very seldom affected with the disease. Some of the pickerel have been found dead, but all that have been examined have been found to have eaten a fish that had been affected with the disease, so that they got it in that way, second handed, so to speak. Pickerel do not live at the bottom, and some of the other fish of a like nature are the same. But the suckers and other fish that do live and feed at the bottom of the river are greatly affected, except perhaps the catfish and the eels. These escape somewhat, from the fact that it is their nature to live in the midst of filth and im-

pure stuff, as everybody knows, and the more filthy the water the more healthy they appear to be generally. Consequently they do not seem to mind it so much as the others.

"Mr. Roe says that this epidemic among the fish will last only till a rain comes on. A good rain would put an end to the whole thing in short order. In fact in the upper parts of the county where they have had some pretty hard showers lately, the disease has almost disappeared in the tributary streams, and the general appearance of things shows that it is greatly on the decrease in the river. A good rain would stop the "purging" process, and end the whole cause of the so-called epidemic. As for its being a source of danger or alarm to the public, Mr. Roe thinks there is no reason to fear anything of the kind. The trouble will only be of temporary duration at the worst, and there is nothing in connection with the matter that is likely to cause it to be unhealthy to the persons who drink the water, as it will purify itself before it reaches the households and kitchens. A good many people will no doubt feel sceptical of this theory, but we give it as Mr. Roe's idea on the subject. He says that the class of people who are the most affected are those who live on the fish they catch from the river, and he says that this class is a great deal larger than any one not acquainted with the facts would imagine. These folks, deprived of their food, will be much affected, and are the most to be commiserated.

"If Mr. Roe's theory of this matter is correct, then the rain storm that is now upon us will put at end to the trouble at once. We hope that it will prove true. If, however, it should not turn out to be so, it is a sufficient matter of importance in our opinion for the authorities to take immediate action in regard to the matter, for in spite of Mr. Roe's belief, we cannot rid ourselves of the idea that the presence of so many dead fish in the river must be detrimental to the health of those who drink the water and use it in everything that they eat."

The fishing during the spring and early summer was injuriously affected by the myriads of seventeen year locusts upon which the fish of all kinds feed with great avidity. Since their disappearance fishing has been excellent, and continues so until the present time.

Since my last report I have destroyed three gill nets in Greenwood lake, averaging 85 feet each; two fykes in Passaic river, and one in Pompton feeder; prosecuted one suit successfully; commenced another and discontinued it, with the understanding that the party should pay the informant's fees and costs, and also bring the net to me to be destroyed—all of which was done.

I commenced a suit in Bergen county and lost it, owing to the fact that my witness could not swear that white was black as the opposite side did.

Since the removal of eel weirs, eels are plentiful. Rend & Bary's mills were stopped about two weeks ago, and upon examining the turbine wheel, between 300 and 400 pounds of eels were found, taken out, and divided among the employees.

A few salmon have been caught, the largest one by Henry Hazen, in Greenwood lake, weight about 14 oz. A few have been caught in tributaries of the Passaic—about 6 oz. each.

Brook trout are very scarce in this county, the drought of 1875 destroyed nearly all. We have as good trout streams in this county as anywhere in the State, and they should by all means be restocked.

I will close by stating that the interest felt for the advancement of fish culture and fish protection in this section is increasing greatly, nearly all our citizens are now taking an interest in it.

GEORGE RICARDO, WARDEN OF BERGEN COUNTY.

HACKENSACK, N. J., Nov. 12th, 1877.

I have removed the past season all fyke poles and other obstructions from the Hackensack river, from Durkintown to New Milford. I have heard of but two violations of the law this season, one was from a party of three from Durkintown, who fished in the Hackensack river, at West Wood, with a drive net. The party making complaint would not give any dates or other information to convict the offenders.

The other party is the owner of a mill at Oridel, who placed an eel weir under his mill, he refused to remove the same as it was on his own property.

I notified him if it was not removed immediately, I would take it out, and enter prosecution against him, since which time it has been removed.

I have placed the black bass furnished this season as follows: 250 in Hackensack river, at Etna; 50 in Berryman's pond, at Spring Valley; 164 in the Hackensack river, at Oridel, below the dam; 150 in Saddle river, at Rochelle Park.

A few black bass have been taken at Hackensack this season, by parties fishing for striped bass, one weighing 2¼ pounds. They are from the stock furnished by Dr. Slack some three years since.

The shad fishing the past season has been very poor, the largest catch being 106.

There was no tomcod fishing, in consequence of the heavy ice.

The smelt season was very good. Some of the small fykes would take 80 pounds per night. One net 2½ feet hoop, caught 98 pounds in one night, and about 1,800 pounds in the season.

I would recommend that the attention of the Legislature be

directed to the necessity of prohibiting the fishing with gill, drift, or pound nets in the Hackensack river in tide water; also of regulating the size of meshes for seine fishing; only allowing the use of small mesh fykes during the smelt and tomcod season, which, in our river, is from December 15th to May 1st, and also of having a closed season against the use of nets of all kinds from June 1st to November 1st, and from Saturday night at sundown to Monday morning sunrise.

N. H. HAVENS, WARDEN OF HUDSON COUNTY.

HOBOKEN, November 20, 1877.

I would respectfully report that since my appointment, (which was made on the 11th of September), I have examined the rivers and streams in the county, and do not find a single place suitable for stocking with black bass. The only stream we have in this county (except the Hudson) is the Hackensack, and the principal fish are striped bass, white perch, tomcods and, in the upper part of the river, catfish. I am informed that an attempt was made some four years ago to stock the upper part of the Hackensack with black bass, but failed. It has been reported that there have been fykes set in the northern and southern part of the county, in the Hudson river, but, after examining the law, I do not think it can be stopped, for the State of New York claims jurisdiction to low water mark. If we have any authority to stop them, please advise me.

I have no charges to make for services, simply because the information I obtained was while I was engaged "in casting a line on my own 'hook.'"

LAMBERT SPEER, WARDEN OF ESSEX COUNTY.

CALDWELL, N. J., November 19, 1877.

I will report that the law is all right, and wants no amendments if it proves constitutional. I have been unable to find that out yet. The suit at Morristown is still pending. I have been there nine times to try and get that suit settled, but have failed for some cause the lawyers best know. I have watched the waters in our county pretty closely this year, but the law has been strictly obeyed, and gives better satisfaction than last year. We have had better fishing this season than we have had for five years.

Black bass are increasing finely. They have been caught this season below the Little Falls, weighing from one to two and a half pounds. The fishing has been so good this year that it has made many more friends to the law.

I have received from the Commissioners of Fisheries five hundred blass bass, which I put in Varonia pond, which empties in Passaic river, below the Little Falls. I would recommend a fishway over the dam at Little Falls. All the bass caught this season were taken below the Falls.

WM. L. BROWN, WARDEN OF UNION COUNTY.

RAHWAY, N. J., November 19, 1877.

I received my commission, as Fish Warden for Union county, on the 18th of September last, and was duly qualified to enter upon the duties of the office. On the 16th of October the Commissioner sent for this county five cans containing six hundred black bass, and they were immediately distributed, without the loss of a single fish. They were deposited as follows:

In Milton lake, 112; in Brown's pond, 150; in Bloodgood's pond, 112; in the pond at Cranford, 226.

Since I received my commission I have not known a single case of illegal fishing in the county. In every case where the fish were deposited, I received assurances from the owners of the ponds, and also those adjacent to them owning lands, "of their entire approval and hearty co-operation with the efforts of the Commissioners, to afford protection to fish and to use all legal measures to prosecute offenders."

The waters of the county have now been thoroughly stocked, with the exception of Elizabeth river, which would have been done but for the high freshet in the Delaware river, which made it impossible to procure them in season for the fall stocking, but we are now assured of an ample supply for next year's distribution through the county.

In reference to the successful propagation of these fish, I have only to add, that in taking the temperature of the water and examining the bottom of the streams, the purity of their sources and their never failing supply of clear spring water, to which they have been accustomed, I have the assurance of Mr. A. A. Anderson, the agent of the Commissioners for the distribution of these fishes, and also of several amateurs, that this experiment, with proper care and protection, will be a success.

CHARLES J. PIERSON, WARDEN OF MORRIS COUNTY.

MORRISTOWN, Oct. 30th, 1877.

My appointment as Fish Warden for this county dates from October 24th, 1876. My predecessor put in my hands a large number of posters containing the laws for the protection of fish, which I had distributed throughout the county. After the pas-

sage of a supplement to the law of 1876, I was supplied with posters containing the supplement as approved March 8th, 1877. Those were also put up throughout the county. This plan gives the people an opportunity to become familiar with the laws. Thus giving them no excuse when detected in their violation.

I have made four arrests during the past year for violation of the fishing laws—two for using fykes, and two for taking fish during the close time, by shooting.

The suits for using fykes were brought before M. J. Easton, Esq., of this city. The parties acknowledged their guilt; one, being unable to pay a fine, was sentenced to ten days in jail. He served his time out, and told me on leaving that I would not have occasion to send for him again. He was an old offender, and had defied the laws and the wardens. He fished in the Passaic river. The other was fined twenty dollars, but would not pay. He was committed, but was released on habeas corpus. He had a hearing before Judge Dalrymple and was held; he continued the case and it is still pending. He fished in the Rockaway river. He has given me a great deal of trouble. The other cases were brought before Judge McChesney, of Essex county. One was convicted and fined twenty dollars. This case is also appealed. The other was cleared. These arrests have had a good effect. I have received from the Commissioners 602 black bass, they were in fine condition, and were carefully placed in the waters without loss.

Three hundred and fifty-seven were put in the Passaic river at the following points: at Cheapside, New Providence, and Vandoran's mills. Fifty were put in the Skellenger pond, at the head of the north branch of the Raritan river. The balance were put in ponds in this township. The stocking of the waters with these choice fish is very popular here. Many thanks for them. They are thriving well. I will give you an instance of how well some of them have done. It seems a little fishy, but it is true. One year ago this fall there was placed in Mr. D. L. Miller's pond, at Madison, in this county, fifty black bass, from two and a half to four inches in length. On the 17th of this month the water was drawn down for some repairs. The flume was so arranged as to catch any fish that should run out. Eleven bass were taken. They measured from 10 to 13 inches in length. This certainly is very satisfactory. They were put back in the pond.

I acknowledge valuable assistance from your Board, and from some members of the Morris County Fishing Club, and particularly from the Hon. A. W. Cutler, Francis Child, Esq., and George Werts, Esq., for legal counsel. Warden Speer, of Essex county, has rendered good assistance.

The fishing has been very good in the county during the past year. The pickerel fishing in the Passaic with hook is much

better than it was when nets were used. With proper protection the waters of this county will produce an immense amount of food fishes.

LEWIS J. WELLER, WARDEN OF WARREN COUNTY.

COLUMBIA, Nov. 1, 1877.

I present my sixth annual report as Fish Warden of Warren county, for the year ending November 1st, 1877.

The catch of shad in the Delaware river has been less than that of last year. The fishing did not commence until the first week in May, and the water was so very low by the first week in June the men could not run their seines.

The catch was very good for the short space of time that they were fishing. The shad fisheries in my district may be divided into two classes: 1. Day fisheries, when the shad cannot be caught at night. 2. Night fisheries, at which the reverse is the case. There was no violation of the shad law that came to my knowledge. All the fisheries were entered according to law. Great numbers of shad were seen ascending the river after the close of the fishing season, and the number of young shad descending appeared to be greater than usual. Suckers have been very abundant in the Delaware the past season. At the Water Gap, within a distance of two hundred yards, over one hundred thousand suckers of good size were taken. All along the Delaware, the whole extent of my district, they were very numerous.

The increase of the black bass has been wonderful. Large numbers have been caught the past season. All the season the river was spotted with small boats loaded with fishermen. I estimate the value of the bass taken in the Delaware, in the reach of shore that belongs to my district, to be five thousand dollars or over. Of the California salmon that were put in the Delaware and Paulinskill, very few have been seen the past season. Some have been caught by persons who did not know what kind of fish they were. It is presumed they have gone to the ocean.

I have had to destroy a great many unlawful structures in the Delaware and its tributaries—two fish baskets near the Sussex county line, and thirty-six structures in the Delaware from the Water Gap to Easton, with large wing walls laid up with plank sheeting, and one fall (like a fish basket), with a wire fyke at the end of the shute to take all the fish that passed down. All the fykes that we could find we destroyed. The offenders along the Delaware were all, or nearly all, Pennsylvania men. I have been trying hard to get hold of some of them, and intend to prosecute all violators of the fish laws against whom evidence can be obtained. Eleven fish baskets in the Pequest and five in the Paulinskill were destroyed.

Fish ways are greatly needed on the dams on the Paulinskill, Pequest and Beaver brook, tributaries of the Delaware.

A. J. SCARBOROUGH, WARDEN OF HUNTERDON COUNTY.

LAMBERTVILLE, N. J., October 29, 1877.

I take pleasure in presenting my sixth annual report, as Warden of Hunterdon county.

The number of fisheries in my district is the same as last year. No violations of the fishing laws of the Delaware river have been committed, to my knowledge, by parties fishing on the Jersey shore. I have heard of some on the Pennsylvania shore.

There is a good deal of complaint by the fishermen against the fishermen of Pennsylvania, for violation of law, some of which are not without good reason. There they catch black bass with nets, and no one interferes with them, and the question is asked, why do not the Pennsylvania Commissioners have Wardens appointed to enforce the laws? They do not complain against the laws regulating the Delaware river, but they do complain that the enforcement is all on our side, while the violations on the other side are such as your Warden cannot reach.

I know that they catch bass in their nets on the Pennsylvania side of the river; it is done from the upper to the lower end of Bucks county, and no effort is made to stop it. The only other violation that I have had any knowledge of, has been the setting of fykes in Wells' Falls, and a few other places. They are put in the river, and taken out again, at such times that it is very difficult to catch them, as they are done principally by persons living on the other side of the river.

I have not been able to capture any of the persons guilty of this practice. I have seen them taking their fykes to the opposite shore; three persons have been setting fykes in the Falls, that I have seen. After frequent visits I captured and destroyed two of their fykes; these I found in the Falls at midnight. "If there was a Warden in Bucks county," that practice could be stopped.

This season's fishing was better than the last one. The early part bid fair to be a very good one. There was a good freshet in the river in March, which took all the ice out, another the forepart of April, and fishermen hastened to get ready, expecting an early run of shad. The first caught was on the ninth day of April, two by H. Scarborough, at the Island fishery; on the tenth, twenty were caught on the opposite side of the river; from the 22d of April to the middle of May, they had a good run of shad, and very fine ones, numbers of them weighing seven and a half pounds each; on the 28th of May ten shad

were caught at the Dutch fishery, that weighed seven and a half pounds each.

The last of May the river got too low for fishing and kept so until the close of the season. Low water is a great drawback to a successful season's fishing, as it at once shuts off the run of shad. Fishing with hook and line this season was better than it has been for a number of years. Large numbers of rockfish, catfish, white and yellow perch, were taken in the months of May, June and July.

There were more white perch this season than for any two seasons the past six years. Through July and August large numbers of black bass were caught.

In September and October the fishing was not so good, owing to the roily condition of the river. The river being in that state two-thirds of the time.

I have lived near the river all my life, and I have never seen one-third as many persons fishing as I have this summer. You could count as high as thirty boats, with from one to three persons in them, in a distance of one mile on the river. A friend of mine counted seventy-three persons fishing in a two mile stretch on the river at Titusville.

There was one of the largest schools of white perch that I ever heard of in the Delaware river. Eight and ten dozen of them were caught in a day by single fishermen.

I would urge upon the Commission to have a law passed prohibiting the use of small mesh nets above Trenton Falls, so that there should be no net used of less mesh than four and a half inches, between the first day of April and the first day of October, except a small minnow net of not more than fifteen yards in length. Such a law is loudly called for along the river, and, if passed, it would be all the protection the black bass needs in the Delaware river. The canal and water power company have the river dammed up so that they force the greater part of the young shad into one or the other. These companies should be either prevented from damming the river and turning the young shad into the canal and water power, as they do or have done the past five years, or they should be required to put screens in to keep the young shad out.

It is useless to expend money to replenish the river with shad and then have them destroyed in this way. I watched the shad hatching while it was going on here, and the more I see of it the deeper are my convictions that if done it should be done in the fishing season. Fishermen complain of the catching and killing of shad that are not ripe. They say that they did not get more than one ripe shad out of ten caught, and they think that there should not be any caught after the season is out, for any purpose. My own observation of shad hatching convinces me that all work should be done in the fishing season.

This year while they were hatching shad here, spawned shad were coming down the river. The first that I saw was on the 25th of May. In June I caught young shad from three to five inches long in the river at this place. If experienced men were placed at up river fisheries from the 1st of May to the close of the fishing season, there could be a large number of shad hatched by using the ripe shad caught at night fisheries, the roe from which would otherwise be lost.

I think that if a trial of this was made one season, the result would be such as to induce the Commission to adopt it in future years, as a means of replenishing the river with shad. I hope for the best results to flow from your efforts to replenish the rivers with food fish.

JOHN S. BISHOP, WARDEN OF SOMERSET COUNTY.

BOUND BROOK, Nov. 9th, 1877.

My appointment as Warden of Somerset county, was made April 24th, 1877. I beg leave to report as follows:

There has not been any violation of the law in this county, so far as I have been able to ascertain; some complaints have been made, but on investigation I found them to be groundless.

Five hundred and seventy-eight black bass have been received from the Commissioners, which I have placed in the waters of this county, as follows:—In Raritan river at Bound Brook, 50; at Raritan, and the Raritan Water Power, 100; at Milltown, at the North Branch, and at North Branch, about 190; in the Millstone river, at Weston, 100; at Higgins' Mill and Neshanic, 88; in Green Brook, 50. In every respect the fish were in fine order when deposited in the water. Some very fine black bass have been taken from the Raritan river below the dam, some of them weighing from three to five pounds—which shows they are doing very nicely in our rivers.

I have distributed the laws, and have posted them up in public places through the county. The circulars have been posted near every stream I have stocked with bass.

The attention of the Legislature should be directed to the need that exists for a good fishway at the dam at the Raritan river near Bound Brook, so that the shad and other fishes could pass up the river, and thus supply the people above the dam with valuable food fishes. Complaints have been made about the mill—known as the Raritan Woollen Mill—in relation to the dyes that flow from the mill to the river. I have investigated the matter, and I do not think the dyes are doing any injury to the fish.

JOHN MILLER, WARDEN OF MIDDLESEX COUNTY.

BOUND BROOK, Nov. 1, 1877.

In making my report for the year 1877, I am happy to say, that the vigilance on the part of your obedient Fish Warden, for the past year or two, has not only been rewarded, but that the law has been complied with.

There have been sixty-one shad caught below the dam on the Raritan river and placed above it.

A large number of black bass were caught below the dam also, and carried to the stream above, and many were placed in Green Brook—one of the tributaries of the Raritan.

The catch of shad in the Raritan at this place the past season was not as good as usual from various causes, among which may be mentioned a very low state of water at the fishing season, and a greatly increased number of gill nets set at Amboy.

The Commissioners sent from the Delaware river twenty thousand young shad to be planted in the Raritan. They were received in good order, and placed in the river below the dam.

They also sent three hundred black bass, which were turned out in good condition into the Raritan river and Green Brook.

Sportsmen have enjoyed more pleasure in fishing for bass in the Raritan this year than ever before, large quantities having been caught, and the specimens having been fine, and parties fishing expressing themselves pleased at the fine prospects offered in the future for pleasure of this kind.

JOSEPH ASHMORE, WARDEN OF MERCER COUNTY.

TRENTON, September, 1877.

The Warden reports that the shad taken in the Delaware in his district this season have been of a finer quality and of larger size than for many previous years. Owing to the cold weather extending so far into the spring, the season was of brief duration, but when the fish started up the river they came "all in a heap," and while all the fisheries operated took as many, some took one-third more than usual. Generally speaking, the fishing was a great deal better than it was last year. Quite a number of shad were caught which weighed over seven pounds. The gilling seines have met with about the same success as they had last year.

The black bass are quite numerous and of good size, some weighing over four pounds.

It has been observed that more than the usual number of young shad have been going down the river this season.

It is still a subject of remark that numbers of shad are destroyed by getting into the Water Power race-way.

I have heard rumors of violations of the law by ill-disposed persons, but, upon following the rumors up, they were found to be either arising from spite or jealousy, or mere surmises, or without testimony sufficient to convict. If there have been any infringements of the law worthy of notice, they have not come to my knowledge.

From the experience of old fishermen, the enactment of the laws establishing the Fish Commission has proved to be of great benefit to the fishing interests.

As the shad have improved in size and increased in numbers, and thus added largely to the wealth and health of the community, I think it would be an advantage if the law as to shad fishing was so changed as to prohibit the fishing between Saturday night at sundown and sunrise on Monday morning. As it is now, the Warden must have watchers on the river all of Sunday night to detect violations of the law. I have no doubt that most, if not all, of the fishermen would be very well satisfied with the change, and illegal fishing could be more readily punished.

GEORGE CURTIS, WARDEN OF MONMOUTH COUNTY.

PARKERSVILLE, Nov. 14th, 1877.

I was appointed Fish Warden for Monmouth county in August last. I immediately made examination of Swimming river, wherein black bass had previously been planted under your instructions, and notified all persons owning nets along said river that black bass had been planted therein, and read the law to the said owners of nets and informed them of my appointment, and requested a number of other persons, residents near said stream, to notify me of any violation of the law in reference to seine fishing.

A rumor was circulated that the law had been violated, but as yet, after a complete investigation, I am unable to find any evidence of the reported violation.

Swimming river is a tide water stream until it degenerates into small brooks, which, in my opinion, are too shallow to warrant the success of bass therein. The black bass above referred to were planted where the tide ebbs and flows daily.

These bass may exist and thrive while small in some of these small brooks above tide waters, but the water will be too shallow after the fish obtain any size. I think there are no rivers or streams in this county, above tide waters, suitable for bass, except mill ponds and streams flowing therein, some of which no doubt could be advantageously stocked by the owners.

I recommend the passage of an act (similar to act of 1873 for South Shrewsbury river), for all tide water streams of this county.

Seine fishing (particularly for eels) destroys large quantities of small fish upon which the large and more valuable fish feed. For two or three years past, or since the South Shrewsbury river act has been enforced, striped bass, weakfish and many other varieties have become quite abundant in said river.

JOHN OSBORN, WARDEN OF OCEAN COUNTY.

BURRSVILLE, Nov. 13th, 1877.

My appointment as Fish Warden of this county is of so recent date, I have not much of interest to report.

The black bass furnished by the Commissioners were received in very good condition, and were distributed as follows, viz: Three hundred and fifteen in Bricksburg lake, one hundred and thirty-five in Goshen pond, and one hundred and fifty in Collins pond. Some violations of the law have occurred at Cedar creek, Mosquito cove and at the head of the bay at Beaver dam, where gill nets were placed for blue fish and pickerel. They were all removed without much trouble. Reports of other violations have reached me, but none of them were sustained by evidence. Our fishing and oyster interests are very much in need of more stringent laws to protect them, but I trust, in making such laws, the Legislature will have regard to the fact that many poor fishermen have their whole capital invested in nets and seines that might, if the law required a larger mesh, become almost worthless. If the law could be made to take effect next year it would remedy the difficulty.

A. J. RIDER, WARDEN OF ATLANTIC COUNTY.

ATSION, N. J., Nov. 10th, 1877.

I beg to submit the following report as Fish Warden for Atlantic county:

Black bass have been placed in the following waters:—Pleasant Mills pond, on Mullica river, 200; West Mill stream, 250; Mechesatauxin stream, 50. (Total 500.) The bass placed last year, have been seen frequently and are doing well. I think they are adapted to our waters without doubt.

There has been a general disposition to comply with the existing fish laws. Fishing with nets in our streams and lakes has been effectually stopped, and in consequence the native fishes are rapidly increasing.

We had a few violations of the law in the early part of the year, but they were principally by parties ignorant of the laws. Some nets, eels pots, &c., were destroyed, and the parties owning them were warned. A strict compliance with the law has been secured without any prosecutions. We should not have hesitated to bring the parties to justice, had the circumstances called for it.

E. F. WESTCOTT, WARDEN OF CAPE MAY COUNTY.

SOUTH SEAVILLE, N. J., Nov. 14th, 1877.

I would respectfully make the following report for the year ending Nov. 1, 1877:—I have been over the county putting up notices in reference to illegal fishing, as I thought circumstances required. On the 26th Sept., I received a shipment of 300 black bass from the Commissioners, which I distributed as follows:—175 in Van Gilder's lake, Dennis township; 125 in Cedar Swamp creek, in Upper township. On the 28th of September, I received another shipment of 200. 150 were placed in the Clint Ludlam pond, in Dennis township; and 50, in Van Gilder's lake. Making 225 in the last named waters. I have been requested to stock Goshen creek, in Middle township, which I propose to do with my next shipment. I have been over to Dennis creek several times, looking after the bass that were put in there in the fall of 1876, but could not find any. Tuckahoe river was stocked at the same time—they are said to be doing well there. Two or three were caught last spring, in seines, in fishing for herring, that were estimated to weigh one and a-half pounds each. On the 24th June, I received a communication from Commissioner Dr. B. P. Howell, stating that he had just received a complaint from J. F. Wallace, Secretary of the Curlew Bay Club, against persons who had been fishing with nets in the vicinity of the club house, and a few days previously had caught 105 sheephead. I investigated the matter, and found they had caught the fish in the surf at Corson's inlet. I took legal advice, and found I was powerless. About the 1st October, I received a similar complaint from a Mr. Samuel Thomas, of Newark, N. J., against a person who had been through the summer, stopping the thoroughfares with seines, and catching all the fish there were in them for one or two miles. Last summer it was nearly impossible to catch a mess with hook and line. And I would suggest the passing of a law by the next session of our Legislature, prohibiting the fishing with nets of all kinds from the 15th June to 15th September. Unless there are more stringent laws, I am satisfied the fish of our waters will be exterminated, and that soon, there would be but very few in this county who would oppose such a law.

TIDE WATER FISHERIES ALONG THE COAST.

The importance of the fishing and oyster interests in the tide water streams and bays of this State from Sandy Hook to Cape May can scarcely be overestimated.

Destructive and irregular methods of fishing and oystering in these waters have, in many places, nearly destroyed these valuable sources of pleasure, wealth and food. We desire to call your attention specially to this subject, and to solicit your aid in obtaining laws from our Legislature that will stay the waste and destruction now going on with this great source of food, sport and profit.

We take pleasure in laying before you extracts from letters received from persons who have passed their lives in the vicinity of these interests, and who have made themselves familiar with the subject in all its bearings.

From personal observation on the spot and from intercourse with many of the fishermen there, we are persuaded that they are not only willing but anxious to have laws passed that will tend to stay the wasteful and destructive modes of fishing and oystering now practiced.

They are convinced that their own interests will be best subserved by such laws. We are advised that petitions and bills will be presented at the next session of our Legislature embodying the views and wishes of the people residing along the coast and we trust they will receive the attention that the importance of the subject demands.

Extracts from letters received by the Commissioners of Fisheries in relation to the Fishing and Oyster Interests in Tide Waters along the Coast.

TOMS RIVER.

You request me to give you some information in regard to our fish and fishing interests.

We are pleased to know you are looking after these matters as we have felt heretofore we have been sadly neglected and the State has allowed one of our most important and productive industries to be almost destroyed for the want of protection.

As I stated to you when here, my object is and has been to look after and take care of the different varieties of fish nature has supplied us with, and many of them are of the choicest kind known, among them I will name the sheepshead, rock fish, blue fish, weak fish, perch, king fish, with many others natural to our waters. Very few citizens in our State outside of our shore counties have any idea of the extent of bays and rivers and the value of these waters if they could be properly pro-

tected. Thousands of pounds of small fish are destroyed annually by the used of small mesh seines dragging our bays. I have consulted with some of our most intelligent fishermen and they agree that 1½ inch bar or 3 inch in length mesh is as small as should be used in our waters, and that hauling seines in our bays during the months of June, July, August and September should be prohibited.

Our oyster interests are in still worse condition than our fishing. Our oyster beds are left without protection. We have appealed to the State in vain; all we ask is that our oyster plants be left in our waters until they become merchantable oysters, and then we say to all, come and share with us; but this the State will not grant, and the work of destruction goes on from year to year, and our people are impoverished. The oyster beds of Ocean county were formerly the most valuable property of our State, producing sufficient, not only for our shore, but nearly all the southern part of our State, and were the foundation of one of the most productive industries of our county. Now, they are almost barren, almost destroyed by the constant drain upon them by citizens of other counties, taking and carrying away our oysters in their infancy. When we ask for protection, adjoining counties oppose us, simply from the fact that they want our plants to stock their waters, that they may grow rich whilst our people are made poor; this is a great wrong, and should be remedied—a wrong, not only to our county, but to the State. If these oyster beds could be protected, they are mines of wealth. And we feel it to be a great injustice, not only to our county, but to the State, to let this valuable property be destroyed.

TUCKERTON.

In accordance with promise, I hereby submit the following facts, for your consideration:

The protection of fish, and fishing interests, is a subject that naturally concerns and interests nearly every resident of this section of our State, when so many are entirely dependent upon the products of our bay for subsistance, to say nothing of those who look forward to the fishing season as a time for delectation and amusement.

The waters of our bay (by which I mean Tuckerton bay proper, and all tide waters on eastern coast of Burlington county), are filled naturally, during the season, with varieties of fish in great quantities, including the sheepshead, the weak fish (or salt water trout), the barb (or king fish), the spot (pig fish or goody), the blue fish (or snapping mackerel), the drum fish, the flounder, the rock fish (or striped bass), the sea bass, the black fish and the porgy; these, with others I may have omitted, have, in years

past, thronged our waters and furnished no inconsiderable means of support to large numbers of our people, who were content with the unobjectionable line fishing, as being sufficiently remunerative.

Of late years, however, the nefarious system of seine fishing, has, at times, almost depopulated the bay of fish, and excited the just indignation of every individual truly and purely interested in the fishing question.

The ultimate pecuniary benefit to those engaged in this business, as compared with line fishing, is extremely doubtful; the immediate proceeds of a "haul," tis true, may be, and often are, quite large, but the seine fishers well know, that once having dragged a certain channel, the finding of fish there again in any quantities, the same season, is highly improbable, as they (the fish) instinctively avoid, for a great length of time, haunts that have proved dangerous for them. Thus, not only is the fishing business for the few seine owners destroyed at such place, or places, but of far greater importance, the line fishing for the many, may be utterly ruined for the season, and not only from localities is it possible that fish may be driven, for I, in common with so many others, have noticed a general evacuation of the bay by the fish (especially sheepshead), after repeated "hauls" with the seine. Great and unnecessary waste is sometimes the result of this manner of fishing, as I recollect, on one occasion, the burying in the ground of hundreds of pounds of sheepshead, by the owner of one of these seines, the same being fish that were left after supplying all the demands of the markets available to him.

Again, the fishing question is one of very considerable importance to this section, by reason of the attraction it affords to residents of other States to pass a portion of their summers at some of the pleasant and inviting places of resort recently established along our coast. The benefits arising from an influx of visitors of this class are substantial, and accrue chiefly to this very class of fishermen, whose business is so sadly interfered with by a few seine owners.

Fish in our bay the past season were noticeably scarce, and, unless the drawing of seines can be entirely prohibited, we have cause to fear a further depletion during the summer months.

We hope that we may be successful in securing the passage of such a law during the next session of our Legislature, and that your influence may be relied upon in furnishing aid to this end.

RED BANK.

I have been cognizant of the wholesale destruction of fishes in our waters. If not arrested, one of the most attractive features

of the coast will soon be a thing of the past. The setting of fish pounds at the mouths of our rivers should certainly be prohibited. Those employed in it say it is unprofitable, yet they persist in doing it every season, and thus prevent the fish from entering the rivers. I would suggest that the law be so worded as not to prohibit the use of pounds on the ocean side of the beach.

Our rivers once abounded with bass, or rock fish, weak fish, barb, or king fish, blue fish, sheepsheads, and many others of minor importance. If seines and pounds are prohibited, I see no reason why we should not have an abundance of fish, as the food they delight in is as abundant as ever.

TOMS RIVER.

The yield of fish from the head waters of our bay the past winter (perch and rock fish) has been about 150,000 pounds. These are shipped to the New York market, and the fishermen realize about $5 per hundred for them. Some fifty seines are employed in the fisheries during the winter months, with four men to each net. They use a small mesh drag net of about one inch, and, consequently, drag up large and small fish indiscriminately.

I do not doubt that in taking this amount of fish they have destroyed thousands of pounds of small fry. In fact, this is the evidence of parties living in the immediate locality of these fisheries; and this waste and destruction has been going on annually for years past. This was formerly a productive business, business, each net averaging at least $1,000 per year; but it is now almost destroyed, caused mainly by the use of the small mesh net. Many of our people are getting their eyes open to this great abuse, and strongly condemn it, and some of our fishermen are enlarging the meshes, thus allowing the small fish to escape. No seines should be used in the waters of our State of a length exceeding thirty fathoms, nor of less sized mesh than 1¾ inches bar, making a 3½-inch mesh. This would save us thousands of pounds of fish annually.

A large proportion of the fish taken the past winter would not average one-half pound each. They are destroyed before they arrive at a marketable size.

I do not think there is anything in New Jersey that needs intelligent legislation so much as these interests. Ocean county alone has thousands of acres of some of the best oyster grounds in the world, producing oysters of the finest flavour known, formerly supplying many of the northern counties of our State with an abundance. These oyster beds were worth to our county and State hundreds of thousands of dollars, and could not have been exhausted had they been protected as they should have been by good and wholesome laws, but now they are almost bar-

ren, caused by the taking and carrying away of all our seed oysters. Leaving our beds barren has destroyed one of our most productive industries. All we ask is a law protecting our small oysters, prohibiting the taking and carrying away out of the waters of any county in this State, by the citizens of other counties, any oysters of less size than three hundred to each bushel. Such an act would be worth thousands of dollars to the State. With such an act our now barren oyster beds would soon be replenished. Nature supplies us with an abundance of seed; all we need is protection for our small fish and oysters in their infancy.

Therefore, I do not hesitate in saying you cannot confer any greater benefit upon our shore counties than by recommending the abolishment of the use of the small mesh nets, and prohibiting the removal of small oysters out of the respective counties where they naturally grow. This is starting at the root of the evil and would, in my estimation, be productive of great good to not only these counties but the whole state.

SMELT.

We consider the smelt of New Jersey one of the finest fishes for the table to be found in any part of the world. It ascends our rivers from the ocean in the latter part of winter and beginning of spring for the purpose of spawning and is then taken in seines specially made for this kind of fishing with very small meshes.

It is generally thought that their numbers have decreased of late years, probably caused by excessive and unregulated fishing.

Their care, protection and increase are subjects well worthy the attention of our law makers.

Major Ferguson, the energetic Fish Commissioner of the State of Maryland, has succeeded in the artificial hatching of this fish.

We take the liberty of publishing the following extracts from a letter recently received from him on this subject which we think will be found very interesting:

BALTIMORE, Nov. 10th, 1877.

My Dear Sir:

Mr. Rice, whom I had making microscopic observations of the development of the smelt during my operations at New Brunswick, last season, is preparing me a full report on the subject, which will be illustrated with engravings showing the changes during the development of the egg, et cetera; this, however, will not be ready for the press before, perhaps, the middle of December, and will be embodied in my report to the Legislature which convenes on the first of January.

I cannot at this time give you more than a summary of the general results.

We commenced to take eggs on the third of March and ceased on or about the second of April; during that period we took about one million and a half (1,500,000) of eggs and succeeded in hatching about four hundred thousand (400,000) of these, which we transplanted in several of our rivers. We looked upon this as very fair success, considering our want of experience with this character of egg, and the imperfect and temporary apparatus that we used. I have no doubt that very much better results could be obtained by the use of other apparatus and the river, instead of the hydrant water with which the town is supplied. Should you desire it, I will send you a copy of the tables showing the ranges of temperature and the number of fish stripped, the eggs obtained, &c.; these tables, however, will be published in my report, but I have no objection to your making use of them and publishing them in your report if you see fit.

I should think it would be well worth your while to consider the matter of the artificial propagation of smelt, even if you do not do more than keep up the fast diminishing supplies of the Raritan river.

I do not think that I shall be able to repeat the experiment this season, but if I find that my means will allow it, I will of course ask your consent to make further experiments in this line.

I am very truly yours,

T. B. FERGUSON,
Commissioner.

MR. J. R. SHOTWELL, Rahway, N. J.

SHAD HATCHING.

The shad hatching operations on the Delaware river were commenced on the 19th of May, at Penns Grove, and finished on the 31st of July, at Columbia.

Out of four million two hundred and thirty thousand ova obtained, we think it safe to say that about four millions of young shad were hatched out. One hundred and fifty thousand of these were sent to the Passaic river, and fifty thousand to the Raritan river, all of the remainder being turned out in the Delaware.

The tables annexed show the results at the different points on the river, and will be of great value as guides in future operations. The very satisfactory results obtained by the Commissioners of Maryland from their operations in tide waters of the Potomac, led us to anticipate success in the tide waters of the Delaware.

The result has demonstrated that different conditions exist in

our river, and that the work can only be done successfully above tide water here.

Record of Shad Hatching operations conducted on the Delaware River for the year 1877, on account of the State of New Jersey, by A. A. Anderson.

STATION NO. 1. PENNSGROVE, SALEM COUNTY.

Date.	Hour.	Temperature of		Fish Taken.		Ripe Fish.		Eggs Obtained	Remarks.
		Air.	Water.	Males.	Females.	Males.	Females.		
May 20	4 P. M.	89	70	.....	.....	.....	.....	.....	
" 21	" "	87	73	52	60	.....	.....	.....	
" 22	" "	74	69	58	70	.....	.....	.....	
" 23	" "	60	65	46	73	.....	.....	.....	
" 24	" "	54	60	50	67	.....	.....	.....	
" 25	" "	56	54	23	51	.....	.....	.....	
" 26	" "	64	60	54	77	.....	.....	.....	
" 27	" "	68	63	.....	.....	.....	.....	.....	
" 28	" "	69	65	48	102	.....	.....	.....	
" 29	" "	74	70	45	75	.....	.....	.....	
" 30	" "	76	72	43	72	1	1	25,000	Eggs turned out before hatching and station abandoned.
" 31	" "	78	72	40	78	.....	.....	.....	
				459	725	1	1	25,000	

STATION NO. 2. BURLINGTON.

Date.	Hour.	Temperature of		Fish Taken.		Ripe Fish.		Eggs Obtained	Remarks.
		Air.	Water.	Males.	Females.	Males.	Females.		
June 1	7 P. M.	87	76	31	50	20	6	100,000	
" 2	" "	86	75	22	49	20	3	50,000	
" 3	" "	91	78	8	40	8	.....	.....	
" 4	" "	80	77	9	48	9	1	20,000	
" 5	" "	70	76	11	56	11	2	50,000	This is the only point
" 6	" "	72	74	14	41	14	1	20,000	on tide water where shad
" 7	.....	74	77	7	34	7	2	40,000	spawn.
" 8	.....	81	79	9	26	9	3	50,000	Fishermen reported
" 9	.....	87	79	8	22	8	2	40,000	ripe shad here on the
" 10	....	78	76	6	20	6	1	25,000	15th of May.
" 11	.....	76	74	10	14	10	1	20,000	
" 12	.....	76	71	8	13	8	1	25,000	
" 13	.....	80	75	6	10	6	2	40,000	
				149	423	136	25	480,000	

STATION NO. 3. BORDENTOWN.

Date.	Hour.	Temperature of		Fish Taken.		Ripe Fish.		Eggs Obtained	Remarks.
		Air.	Water.	Males.	Females.	Males.	Females.		
June 1	4 P. M.	89	78	28	79	.....	.....	.....	River rising, nets stopped on account of water, could not get a male fish, turned loose a box of fish and one of eggs, and left the station for Lambertville.
" 2	" "	87	79	19	61	.....	.....	.....	
" 3	" "	90	77	.....	.....	.....	.....	.....	
" 4	" "	82	76	23	81	.....	.....	.....	
" 5	" "	72	75	25	69	1	1	10,000	
" 6	" "	70	72	45	113	1	1	15,000	
" 7	" "	72	70	19	61	.....	.....	.....	
" 8	" "	83	68	.....	10	.....	1	.....	
				159	474	2	3	25,000	

STATION NO. 4. LAMBERTVILLE.

Date.	Hour.	Temp'ature of		Fish Taken.		Ripe Fish.		Eggs Obtained	Remarks.
		Air.	Water	Males.	Females.	Males.	Females.		
June 9	4 P. M.	82	72	23	67	.....	.....	.....	.....
" 10	" "	76	72	.....	.....	.....	.....	.....	.....
" 11	" "	74	70	37	73	.....	.....	.....	.....
" 12	" "	67	70	18	37	.....	.....	.....	.....
" 13	" "	80	72	13	34	.....	.....	.....	.....
" 14	.....	81	74	10	28	.....	.....	.....	.....
" 15	6:30 P. M.	77	75	28	41	2	4	100,000	.....
" 16	.....	79	77	5	9	3	5	100,000	.....
" 17	.....	80	77	.....	.....	.....	.....	.....	.....
" 18	.....	78	76	18	32	5	9	200,000	.....
" 19	.....	83	79	.....	4	.....	1	.....	.....
" 20	.....	77	75	9	15	4	6	100,000	.....
" 21	.....	79	76	7	13	3	4	80,000	.....
" 22	.....	65	68	2	22	2	3	50,000	.....
" 23	.....	68	70	4	14	.....	.....	.....	.....
" 24	.....	79	70	.....	.....	.....	.....	.....	.....
" 25	.....	83	76	14	11	4	5	100,000	.....
" 26	.....	82	78	.....	.....	.....	.....	.....	.....
" 27	.....	79	76	4	9	1	3	30,000	.....
" 28	.....	69	74	.....	.....	.....	.....	.....	.....
" 29	.....	72	74	.....	.....	.....	.....	.....	.....
" 30	.....	71	75	.....	.....	.....	.....	.....	.....
July 1	.....	83	76	.....	.....	.....	.....	.....	.....
" 2	.....	80	78	3	3	.....	.....	.....	.....
" 3	.....	76	77	4	8	.....	.....	.....	.....
" 4	.....	76	78	.....	.....	.....	.....	.....	.....
" 5	.....	78	76	.....	.....	.....	.....	.....	.....
" 6	.....	76	78	5	12	4	1	25,000	.....
" 7	.....	78	80	.....	4	.....	1	.....	.....
" 8	.....	80	83	.....	.....	.....	.....	.....	.....
" 11	.....	79	76	.....	2	.....	1	.....	.....
				204	438	28	43	785,000	.....

STATION NO. 5. POINT PLEASANT.

Date.	Hour.	Temperature of		Fish Taken.		Ripe Fish.		Eggs Obtained	Remarks.
		Air.	Water.	Males.	Females.	Males.	Females.		
June 15	7:30 P. M.	77	75	12	8	10	1	25,000	
" 16	" "	79	77	8	10	8	1	25,000	
" 18	" "	80	77	11	6	7	1	15,000	
" 19	" "	78	76	6	4	6	1	20,000	
" 20	.....	77	75	4	4	1	1	25,000	
" 21	.....	71	76	.....	6	.....	1	.....	
" 22	.....	64	74	2	12	2	3	50,000	
" 23	.....	68	77	1	8	1	1	25,000	
" 25	.....	69	79	4	10	4	2	50,000	
" 26	.....	83	81	8	14	8	5	100,000	
" 27	.....	79	77	6	8	6	3	50,000	
" 28	.....	69	78	4	3	4	3	75,000	
" 29	.....	72	78	5	4	5	4	75,000	
" 30	.....	71	77	.....	4	.....	1	.....	
July 2	.....	83	77	5	7	5	4	75,000	
" 3	.....	80	78	.....	3	.....	3	.....	
" 4	.....	76	77	4	4	4	4	60,000	
" 5	.....	78	77	4	6	4	4	80,000	
" 6	.....	77	77	.....	5	.....	2	.....	
" 7	.....	78	77	1	4	1	2	40,000	
" 8	.....	80	79	2	9	2	3	75,000	
" 9	.....	79	77	1	2	1	2	50,000	
" 10	.....	82	79	1	1	1	1	25,000	
" 11	.....	80	78	.....	.....	.....	.....	.....	
" 12	.....	78	79	2	.....	2	.....	.....	
" 13	.....	76	79	2	1	2	1	25,000	
" 14	.....	78	79	1	2	1	2	50,000	
" 15	.....	90	80	.....	.....	.....	.....	.....	
" 16	.....	86	80	.....	.....	.....	.....	.....	
" 17	.....	82	81	.....	3	.....	2	.....	
" 18	.....	80	81	1	2	1	2	30,000	
" 19	.....	82	81	1	3	1	2	40,000	
" 20	.....	80	81	.....	1	.....	1	.....	
" 21	.....	80	81	.....	.....	.....	.....	.....	
				96	144	87	63	1,085,000	Loss nine per cent.

STATION NO. 6. MILFORD.

Date.	Hour.	Temperature of		Fish Taken.		Ripe Fish.		Eggs Obtained	Remarks.
		Air.	Water.	Males.	Females.	Males.	Females.		
June 25	8 P. M.	78	76	21	35	12	4	100,000	
" 26	.....	80	77	3	11	3	4	100,000	
" 27	.....	82	78	2	13	2	2	40,000	
" 28	.....	72	76	4	14	6	5	100,000	
" 29	.....	76	78	.....	5	.....	1	.....	
" 30	.....	80	78	2	7	2	2	30,000	
July 1	.....	78	80	.....	.....	.....	.....	.....	
" 2	.....	80	78	4	10	4	2	40,000	
" 3	.....	82	80	11	5	1	3	45,000	
" 4	.....	80	78	.....	.....	.....	.....	.....	
" 5	.....	80	79	2	6	2	1	25,000	
" 6	.....	80	79	.....	5	.....	2	.....	
" 7	.....	82	80	3	7	3	3	60,000	
" 8	.....	82	80	.....	.....	.....	.....	.....	
" 9	.....	76	78	2	5	2	4	80,000	
" 10	.....	82	80	3	5	3	.....	.....	
" 11	.....	80	78	.....	.....	.....	.....	.....	
" 12	.....	78	80	1	2	1	2	50,000	
" 13	.....	76	78	1	1	1	.....	.....	
" 14	.....	78	80	.....	.....	.....	.....	.....	
" 15	.....	80	78	.....	.....	.....	.....	.....	
" 16	.....	86	88	.....	.....	.....	.....	.....	
" 17	.....	82	84	.....	1	.....	1	.....	
" 18	.....	80	82	.....	.....	.....	.....	.....	
" 19	.....	82	84	6	10	6	3	75,000	
" 20	.....	80	82	11	15	8	3	75,000	
" 21	.....	80	82	4	6	4	3	75,000	
" 22	.....	82	84	1	4	1	3	40,000	
" 23	.....	82	84	2	6	2	6	75,000	
" 24	.....	80	82	.....	8	.....	8	.....	
" 25	.....	80	82	5	13	5	2	40,000	
" 26	.....	82	84	.....	4	.....	6	.....	
" 27	.....	82	84	.....	9	.....	9	.....	
" 28	.....	80	82	.....	4	.....	4	.....	
" 29	.....	78	80	.....	8	.....	6	.....	
" 30	.....	80	82	.....	12	.....	9	.....	
" 31	.....	82	84	.....	4	.....	4	.....	
				90	237	68	102	1,050,000	Loss about 8 per cent.

STATION NO. 7. COLUMBIA.

Date.	Hours.	Temperature of		Fish Taken.		Ripe Fish.		Eggs Obtained	Remarks.
		Air.	Water.	Males.	Females.	Males.	Females.		
July 6	8 P. M.	80	79	11	14	11	6	100,000	
" 9	" "	76	78	10	12	12	9	100,000	
" 10	" "	74	76	1	8	1	7	50,000	
" 12	" "	74	76	4	13	4	12	75,000	
" 13	.....	77	76	2	18	2	17	100,000	
" 17	.....	80	78	1	9	1	9	25,000	
" 18	.....	80	78	4	18	4	12	125,000	
" 19	.....	83	78	6	14	6	10	100,000	
" 20	.....	80	78	.....	8	.....	8	.....	
" 21	.....	81	76	.....	.....	.....	.....	.....	
" 23	.....	78	75	.....	.....	.....	.....	.....	
" 24	.....	80	76	1	2	1	2	25,000	
" 25	.....	80	77	1	2	1	2	50,000	
" 26	.....	84	78	1	3	1	2	30,000	
" 27	.....	82	78	.....	.....	.....	.....	.....	
" 28	.....	83	78	.....	.....	.....	.....	.....	
" 29	.....	84	78	.....	.....	.....	.....	.....	
" 30	.....	84	78	.....	.....	.....	.....	.....	Loss 4 per cent.
				42	121	44	96	780,000	

Recapitulation.

May 19th to May 31st,	Penns Grove	25,000
June 1st to June 15th,	Burlington	480,000
June 1st to June 8th,	Bordentown	25,000
June 9th to July 11th,	Lambertville	785,000
June 15th to July 21st,	Point Pleasant	1,085,000
June 25th to July 31st,	Milford	1,050,000
July 6th to July 31st,	Columbia	780,000
Total		4,230,000

SALMON IN THE DELAWARE.

Your Commissioners have, at various times within the past few years, as their reports have shown, placed large numbers of the artificially hatched salmon from ova obtained both from Maine and California, chiefly from the latter, in the Delaware. It has been with no little solicitude that they have waited and watched for the result of this enterprise.

Though one swallow may not make a summer, yet the appearance of one swallow is prima facia evidence that summer is at hand. So with our salmon. They have not yet returned in such numbers as to prove the Delaware to be thoroughly stocked, yet sufficiently so, we hope, to show it to be a suitable habitat

for them. Nine salmon, of goodly size, have been taken and seen the past season, to wit: one by Peter Faunce, at Newcastle; two by Mr. William Faunce, we give his own account in a letter to the Warden of Burlington county:

RIVERTON, Oct. 30th, 1877.

Mr. Langhorn Thorne:

Dear Sir: The salmon we caught was in May—about 25 pounds; first one weighed about 8½ pounds. The second, which escaped, supposed to weigh 20 pounds. We also weighed a black bass, weight 5½ pounds.

WM. FAUNCE,
Cinnaminson Fishery.

Another, about the same time, was caught by Mr. Peter Faunce, near Newcastle, Delaware, weighing about 8 pounds. A fourth was caught by B. Consolly, between Bordentown and Trenton, also about the last of May, weighing 9 pounds, which was sent to Capt. Yard, of Trenton, who informed the Commissioners that it was as fine a salmon as he had ever tasted either in England, Scotland, or California. Those mentioned above were all taken in shore seines.

About the last of September or beginning of October, two of eight pounds each, were taken by a set line at the Delaware Water Gap; another in fish basket, of nine pounds, at Carpenter's Point, the northwest corner of New Jersey; and lastly, one taken and one seen, in the Bushkill in November last.

The fisherman who took the two at the "Gap" was ignorant of the species till informed by Mr. A. A. Anderson. The taking of the five last mentioned in the fall, and so far up stream, some 60 and 100 miles above tide, shows they were seeking spawning grounds at the head waters of the river, and if of the California variety, except the five last, at the usual season of their spawning. Whether others have been taken by persons ignorant of their kind, we know not. It is fair to suppose, however, that not all those, which returned from the sea, were taken. Many measuring from six to twelve inches, have also been caught, the past season with the hook.

CALIFORNIA SALMON.

On the tenth of October, we received from Spencer F. Baird, United States Commissioner of Fisheries, two hundred and fifty thousand ova of the salmon from the McCloud river, in California. They were placed in charge of Mrs. J. H. Slack, at her hatching establishment at Bloomsbury, and they are now (December 5th)

nearly ready to turn out. They were received in very good condition, and have hatched out with very small loss, We propose putting all of them into streams leading into the Delaware river. The facts set forth in this report in relation to the capture of salmon in this river proving to our satisfaction that it is well adapted to these fishes.

FISHWAYS.

In view of the unsatisfactory results of the efforts, hitherto, to construct a fishway for the passage of shad over dams, your Commissioners take the liberty of presenting two plans, with accompanying descriptions which, to their minds, conform more nearly to the natural slopes of equal or even greater rises, found in some of our rivers, up which shad are known to ascend with facility. It is greatly to be wished that success may crown this or some other plan. Some of the finest shad rivers in the country have been depopulated of shad and other valuable fishes, by insurmountable dams, among which we may mention our own Raritan—above New Brunswick—and along which streams the inhabitants are extremely desirious of having shad returned to them by means of fishways. See Appendices A and B.

DISTRIBUTION OF BLACK BASS THIS YEAR.

Counties.		
Cumberland—	100 in Elmers pond,	
	150 in Tumbling Dam pond,	
	50 in J. Eddy's pond,	—300
Salem—	180 in Game creek,	
	174 in Salem creek,	
	100 in Beaver brook,	—454
Gloucester—	50 in Woodbury creek,	
	125 in Mantua creek,	
	180 in Raccoon creek,	
	100 in Boody's pond,	—455
Camden—	100 in Little Timber creek,	
	100 in Big Timber creek,	
	100 in Newtown creek,	
	255 in White Horse pond,	—550
Burlington—	164 in Crosswicks creek,	
	100 in Dunn's mill pond,	
	50 in Stillwell's mill pond,	
	100 in Indian mill pond,	
	200 in South branch of the Rancocas—	—614

Counties.		
Cape May—	300 in Cedar Swamp creek,	
	150 in Ludlam's pond,	
	50 in Van Guilden's pond,	—500
Atlantic—	50 in the Mechesatauxin,	
	200 in Mullica river,	
	250 in West Mill Stream,	—500
Ocean—	315 in Brickburg lake,	
	135 in Goshen pond,	
	150 in Collin's pond,	—600
Monmouth—	149 in Swimming river,	
	100 in Tinton Falls river,	—249
Mercer—	236 in Whitehead's pond,	
	300 in Hutchinson's pond,	—536
Middlesex—	300 in the Raritan river,	—300
Somerset—	50 in Green brook,	
	50 in Raritan water power,	
	100 in Millstone river,	
	100 in Raritan river,	
	88 in South Branch,	
	190 in North Branch,	—578
Hunterdon—	300 in the Musconetcong,	
	150 in Rowland's pond,	
	150 in South Branch at Sunnyside,	—600
Warren—	288 in Cedar lake,	
	300 in Pohatcong creek,	—588
Morris—	357 in the Passaic river,	
	75 in Van Doren's pond,	
	50 in Skellinger's pond.	
	50 in Burnham's pond,	
	25 in Spreadall's pond,	
	20 in Ford's pond,	
	25 in Day's pond,	—604
Union—	112 in Milton lake,	
	150 in Brown's pond,	
	112 in Bloodgood's pond,	
	226 in Cranford pond,	—600
Essex—	500 in Verona lake,	—500

Counties.		
Bergen—	250 in the Hackensack,	
	50 in Spring Valley pond,	
	150 in the Saddle river,	
	164 in the Corydell river,	—614
Passaic—	250 in Pompton lake,	
	250 in Echo lake,	—500
Sussex—	100 in Hunt's pond,	
	200 in the Wallkill river,	—300
	Total,	—9940

In concluding this, our last report, we earnestly renew our recommendations made in previous reports in reference to legislation for the Delaware: that the law for fisheries in that river may not only concur with legislative action in Pennsylvania and Delaware, but may be so simple and easily understood that our successors may avoid the difficulties which the uncertainty of the law has imposed upon us. We congratulate the people interested upon the greatly improved state of feeling among fishermen in reference to protective legislation and the enforcement of wholesome laws, and point with pride to the results of enforcing in the Delaware the regulations as to the close time and the season limit. While we have faith in the work of artificial propagation of shad, we are convinced that the rigid observance of the "close time" is of greater advantage to the fishing interests than any other measure. We also ask once more for legislation to provide against the destruction of young shad by the dams of the Trenton Water Power Company and the Delaware and Raritan Canal Company. The necessity for this appears by our previous reports, and also by the reports of the Wardens of Mercer and Hunterdon counties submitted herewith.

The several prosecutions against violators of the fishing laws, commenced by the wardens and appealed to higher courts by defendants, will be vigorously pushed. The laws have been generally enforced, and are endorsed by the mass of citizens who have given the subject their attention.

The appointment of a warden for each county supplies a long-felt want, and their co-operation will make it possible to secure the good results which should flow from our work in stocking streams and lakes. We recommend that the introduction of new species should be continued, and that a suitable appropriation be made for that purpose. It is a matter of very general public interest, and will add greatly to the advantages and attractions of our State.

By permission of Prof. Spencer F. Baird, U. S. Commissioner of Fish and Fisheries, we append to this report a copy of an

article prepared by J. R. Shotwell, of this Commission, on the subject of purifying the waste from gas works before allowing it to pass into a stream. The article was written for Prof. Baird, and will appear in his annual report. We consider this a subject of great interest, as the waste from gas works flowing into waters inhabited by valuable fishes is well known to be very destructive in its effects, and has heretofore been thought unavoidable.

All of which is respectfully submitted.

B. P. HOWELL, M. D.,
J. R. SHOTWELL,
G. A. ANDERSON,
Commissioners.

Financial Statement.

Cash on hand November 14, 1876		$922 46
Cash received from balance of shad hatching appropriation of 1875		531 40
Cash, it being the full amount of the appropriation for 1877		5,000 00
		6,453 86
Cash paid for shad hatching on the Delaware and Raritan	$1,746 84	
Cash paid for black bass and their distribution	2,162 40	
Cash paid for hatching and care of 250,000 California salmon	500 00	
Cash paid freight and expenses on the above	160 45	
		4,569 69
Balance on hand December 5th		$1,884 17

APPENDICES.

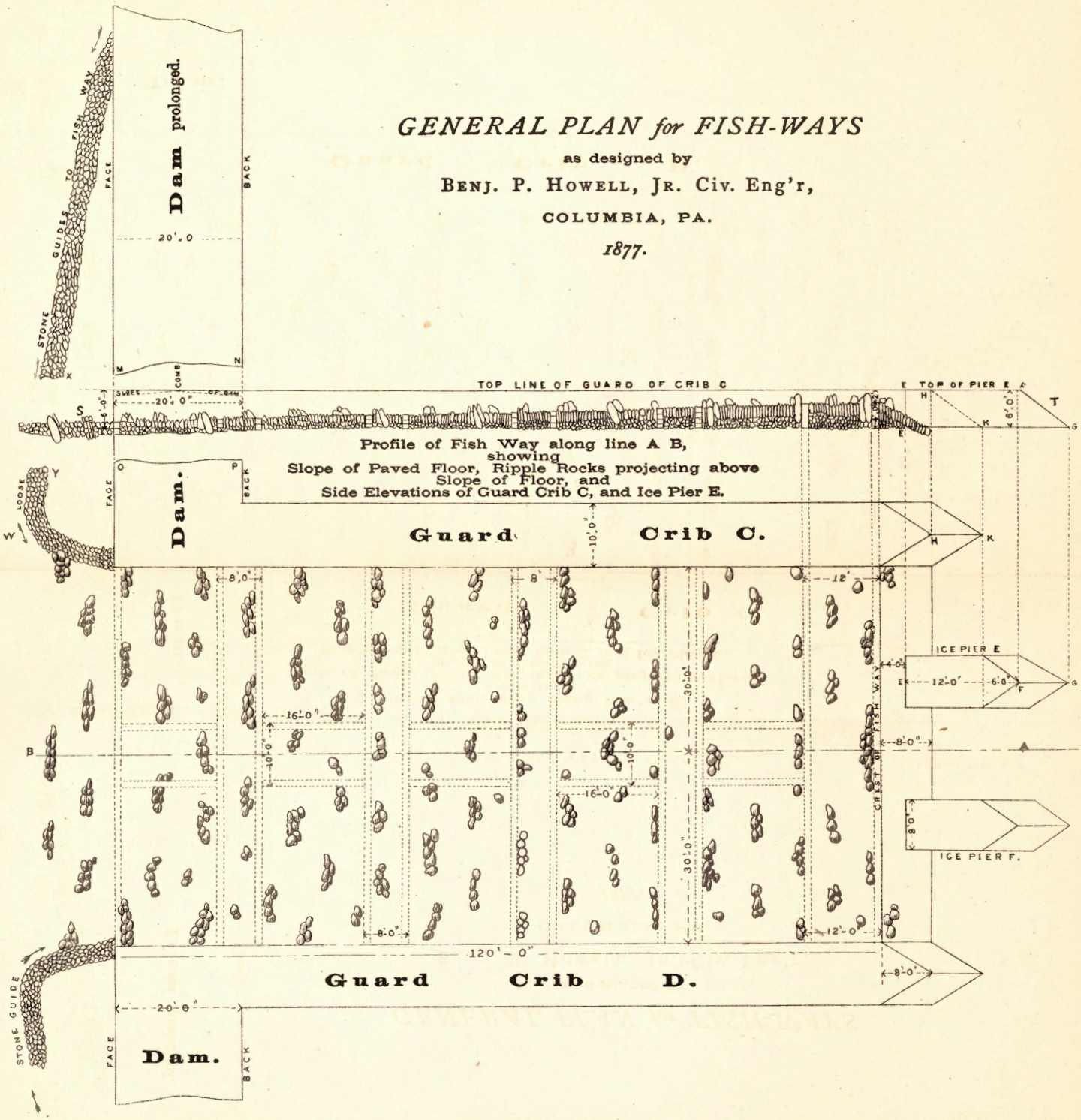
GENERAL PLAN for FISH-WAYS

as designed by

BENJ. P. HOWELL, JR. Civ. Eng'r,

COLUMBIA, PA.

1877.



Appendix A.

Benj. P. Howell, M. D., Commissioner of Fisheries for New Jersey:

My Dear Sir:—In conversation with you, some months ago, I expressed my surprise that no fish way had been designed, that resembled, in its essential points, the rapids, up which all fish must ascend that go annually to the head waters of many of our rivers.

Prior to, and since the conversation referred to, I have thought more or less upon a plan that would successfully carry out this idea.

Accompanying this you will find a plan, which, together with the following remarks and description, may serve to solve the problem now engaging the minds of so many pisciculturists.

For convenience, I have adopted the dimensions of the fish way in the Columbia dam, so far as length, width, slope of floor and size of guard cribs are concerned; and also in its relative position to the dam, that is, in cutting through and running up stream from the dam (which is undoubtedly the true one), and not running up to the top of the dam, from some point below it.

Description—The plan represents a fish way 120 feet in length from its crest to face of dam, width 60 feet in the clear between guard cribs, and a total rise of 3 feet. The slope commences 1 foot above the bed of river, thereby enabling me to leave the foot log of dam uncut, and rises to within 2 feet of the top of guard cribs, which are represented as being of the same height as the dam. The two guard cribs, lettered respectively, *C* and *D*, 10 feet in width, are, at their lower ends, built into the dam and at their upper ends connected with a crib, running at right angles, 12 feet wide at top and 20 feet wide at bottom, having its upper side sloping. Between this crib and the foot log of dam I have shown four cribs, whose ends are built into the guard cribs; they are 8 feet wide and allow spaces between of 16 feet, measuring with the fish way, and have their tops in the plane of the slope. These cribs are supported and bound together in their middle by a crib, running parallel with the guard cribs, 10 feet wide, and extending from foot log to crest crib, in clear sections of 16 feet lengths. These also have their tops in the plane of the slope. The positions of all the cribs, except guard cribs, are shown by dotted lines in the *plan* and by full lines in

elevation or *profile*, which merely represent the side logs of said cribs.

The entire fish way (cribs and intermediate spaces) is filled with broken stone of good size, packed and mauled into place; during this work large stones, from 3 to 5 feet long, are to be set on end, and firmly planted in the broken stone filling. They should be slightly pitched to the horizon, down stream, and so grouped as to form a support one to the other, the lower ones of a group projecting less above the slope than those touching and above them, thereby gaining greater resistance to action of drift, &c., and preventing the sudden plash of the water or reaction which would take place in its falling from the tops of the higher stones against the paved floor.

These stones I denominate *ripple stones* and form the resting places, which I claim are necessary for fish in making the ascent. They should project from 10 to 20 inches above the general surface of the floor. In the profile or elevation *S T*, which would be obtained by passing a vertical plane through the horizontal plan, along *A B*. I have shown the broken stone filling, the ripple stones set into it, and the stone paving, which I will mention below, besides the side views of the guard crib *C* and the ice pier *E*. As this work goes on, a grouting of sand and hydraulic cement must be run into the mass, being made just thin enough that it will run entirely through and fill up all spaces between the stones, thereby making one solid mass, upon hardening. Before grouting the upper layer of broken stone, a paving must be laid as shown, the stones of which should be from 14 to 20 inches in length, set on end as shown; uneven lengths being preferred, as the longer stones will then run down into the broken stone, and, when the whole thing is thoroughly grouted, form a good bond therewith, and the entire mass will be perfectly durable and solid upon the *setting* of the cement. The ripple stones are shown in the horizontal plan in shaded relief, and should be so grouped that they will break up the current and prevent a direct flow thereof. In making the ascent, fish will seek shelter under one group, and darting from behind it regain that of another higher up, before being overcome by the current. In support of this theory I will state, that when I was stationed at Safe Harbor, on the Susquehanna, there was a fall of $3\frac{1}{2}$ *feet in less than* 100 *feet*, caused by the destruction of an old dam, during an ice freshet several years previous. How did shad and other fish make their way up through that current? merely because it was broken up by the dismantled timbers and stone backing of the dam.

The ice piers lettered respectively *E* and *F*, are intended to serve a double purpose. First, as fenders against ice or large bodies of drift, and second, to produce eddies, into which fish can run in passing over the crest line of fish way.

This I consider a very important feature, as, at the crest, the tendency of the current is to turn a fish over on his back, when he comes up to it.

Besides, the fish is much more exhausted when he reaches that point than he is at any other in the ascent. By placing the ice piers, as shown, four feet from crest of fish way, each produces an eddy, the effect of which extends some distance below the crest and down into the fish way, thus unabling the fish to run over the crest line with ease and drop down below it, before leaving the shelter thus given by the pier.

These piers and the guard cribs are to be sheeted and filled with stone. Both are to be provided with *noses* or ice breakers, as shown, and as are usually given to bridge piers.

Below the foot log of dam, heavy stones should be grouped and confined, either by low cribs, by driving piles or by dowelling together as best can be done, gently falling with the slope of fish way and gradually conforming to that of river bed, thereby preventing reaction of the water.

At your suggestion, I have shown guides, formed by ridging up loose stone as is usually done in building the walls or guides to fish baskets.

One of these diverges from either side of fish way, and may be made to run as far down stream as necessary, when it may be returned gradually to the dam, as shown, if the stream is wide, or be carried on, still in an oblique direction, until it reaches the shore. This tends to gather the fish at the lower end of fish way as they nose along seeking an opening.

For want of space and also to allow for a vertical section or profile through *A B*, I have had to show the dam and stone guides, *v w*, broken as at *m n* and *o p* and at *x y*.

As is shown, the crest line of fish way is two feet below top of dam, thus insuring a depth of two feet of water throughout the "*way*." To prevent any increase in velocity, and any consequent lessening of depth in the lower end of fish way, I would place larger stones in larger groups, and a larger number of such groups, increasing the lower down I went. All the foregoing details are susceptible of modification. In many localities piling may be resorted to in building the cribs. It may be found advisable to give greater height to the guard cribs and ice piers, and have a greater number of the latter, so placed as to relieve each other. The guides below the dam can be made by driving sheet piling where the river bed will allow it.

In rivers, which are never subjected to sudden rises and are free from ice, as is the case in the southern States, I would even propose doing away entirely with the cement, and using as large stones as can be conveniently handled (if necessary by derrick); fill the cribs themselves and the spaces between with them. I

believe that this would answer every purpose in all but very turbulent streams.

Returning to the plan, I would say that points or lines lettered the same, show the same point or line, both in horizontal and vertical projection, as *h k* and *h k* represent the same line seen from different positions.

I am confident that this plan, if given a thorough trial, will answer every purpose, and will admit of the ascent of fish as readily as many of the rapids in this "Rocky river" do, up which even the timid shad ascend.

This plan I believe will admit of construction, at a contract price of $8,500, keeping the dimensions the same as denoted, and this I consider *a high estimate;* while the contract price of the one in this dam, and from which I have copied, so far as size and slope are concerned, was $9,500, and which was remodeled, *I think*, a year or two after its construction.

BENJAMIN P. HOWELL, JR.

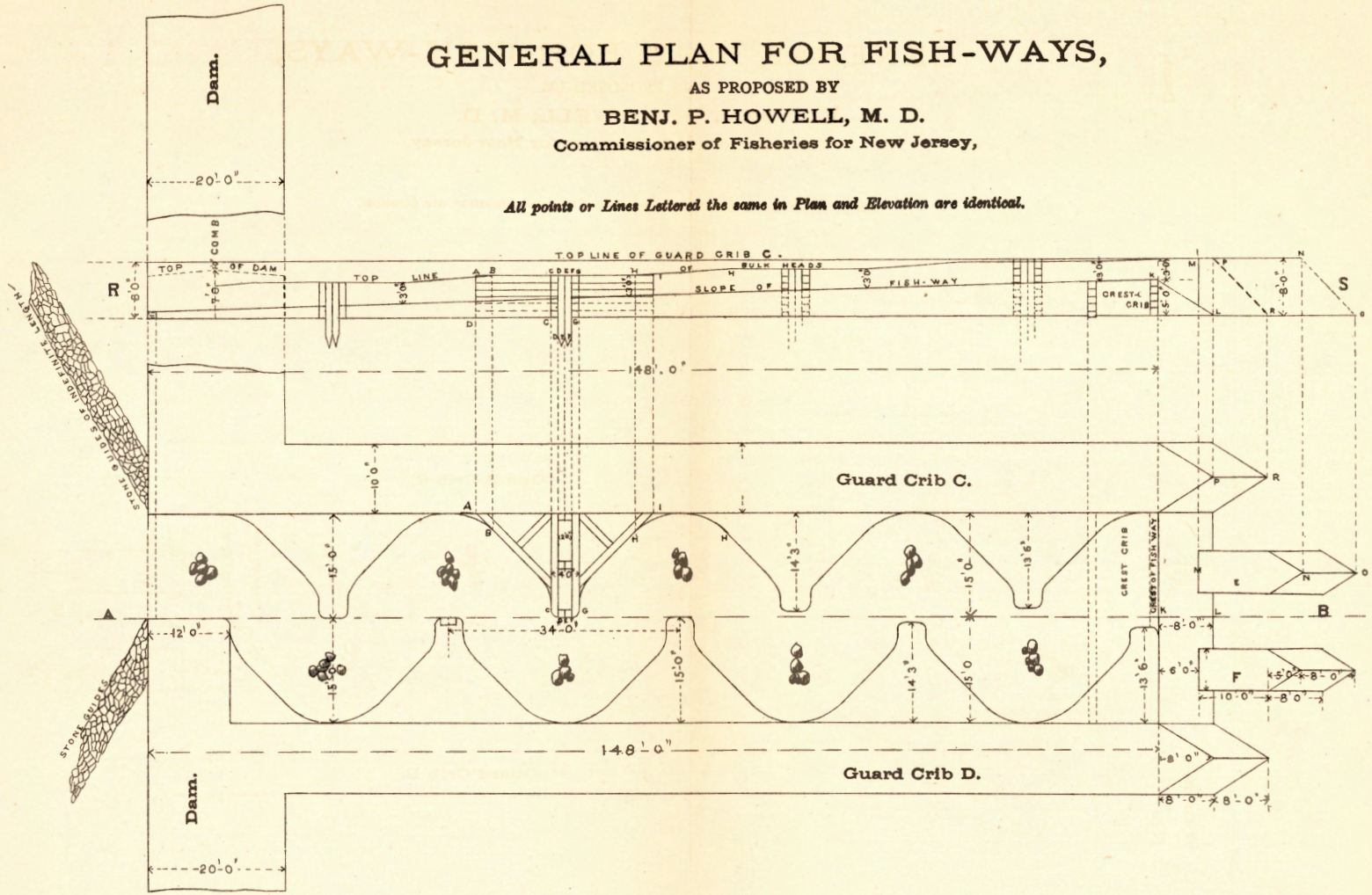
GENERAL PLAN FOR FISH-WAYS,

AS PROPOSED BY

BENJ. P. HOWELL, M. D.

Commissioner of Fisheries for New Jersey,

All points or Lines Lettered the same in Plan and Elevation are identical.



Appendix B.

Benj. P. Howell, M. D., Commissioner of Fisheries for New Jersey:

MY DEAR SIR:—Accompanying you will find plan and tracing of a fish way, designed, as far as possible, after the sketch sent by you.

The accompanying plans consist of a horizontal projection or *plan*, commonly called *ground ptan*, and also a vertical projection of one-half the same, or *elevation*, showing the inner side of guard crib *C*, the ends of the four bulkheads projecting from crib *C*, and the line of their tops and connections and the slope of the floor. In the second bulkhead on the right of fish way I have shown its manner of construction, being constructed of six piles (the tops of which are seen in *plan* and the lengths or sides of two of them in the elevation), against which ½-inch square timber is bolted (the tops of the two upper timbers being shown in *plan* and the ends in elevation), forming a crib four feet wide, which is braced up by square timber, as shown.

The angles made by the main braces with the sides of the bulkheads and with the sides of guard cribs, are round off by plain sheeting; and the ends of bulkheads are also rounded off. The guard cribs are one (1) foot higher than comb of dam, the foot of fish way one foot above base of dam or river bed, because it is necessary to leave the foot log (shown in dotted lines across the outlet) in, in order to form a support to foot of "way." The crest (*K*) of fish way is three feet below top of guard cribs, or two feet below top of dam, rising, therefore, four feet in one hundred and forty-eight feet total length, as shown in elevation. Starting at crest with a height between guard cribs of three feet, I have to keep it up the entire length of channel, therefore I keep the least height of bulkheads (in which term I now embrace the *main braces*) at least three feet (shown at *h* in elevation), and to simplify construction, keep the bulks level, as shown in elevation from *a* to *i*, and connected with next guard crib by inclined line *h h*, showing top line of curved sheeting, which is also represented by segment of curve *h h* in plan. All of which connected show a broken line against side of guard crib *C* in elevation, marked "top line of bulk heads."

The ice pier *E* does not contract the channel, being six feet away from crest, it serves the same ends as in my (former) plan,

while admitting of the flow of more water between its lower end and bevelled or battered end of guard crib *C*, and the end of upper bulk head, than will be able to pass between the ends of the two upper bulk heads themselves. Practice and theory both prove that after water attains a depth of one foot, in passing down a straight inclined way (at the crest of that way), it diminishes only 1–10 of its depth in reaching the bottom. I have increased the width 2–10 by shortening the upper two bulk heads 1' 6" each, and gradually narrowed by making the next two nine inches short. Without this precaution I don't think the water would depreciate in depth perceptibly, in a serpentine way of 148 feet length (straight).

The "ripple stones" are to be used in the same manner as described in Appendix A.

B. P. HOWELL, JR.

Appendix C.

RAHWAY, N. J., May 29, 1877.

MY DEAR SIR:—At our recent meeting in New York, you requested me to write you a description of the process, by which the Rahway Gas Light Company eliminates the offensive and injurious portions of the residual products resulting from the distillation of coal, in the manufacture of gas, before allowing them to pass off into the river. Our works are on the margin of a small stream, a branch of the Rahway river, whose banks, for nearly a mile below the works, are occupied by residences, and several streets cross it by bridges.

To avoid the annoyance to the community caused by the overflow from the tar wells, we built supplemental wells to receive and hold the ammonia water and light oils that constitute the overflow. Valves, with long rods reaching above the surface, were placed at the bottoms of these wells, and the men in charge of these works were directed to open the valves after midnight, so that the offensive products might be carried off by the current before morning. This plan did pretty well while the works were small, but as the quantity of gas made increased, the refuse necessarily increased also, and complaints multiplied against our defilement of the waters.

About two years since we adopted a plan, at the suggestion of Mr. George W. Edge, of the Jersey City Gas Light Company, of straining the overflow through a mass of finer particles of coke, technically called "breeze," before allowing it to pass off into the river. This has proved completely successful. The accompanying drawings and descriptions will show the simple and inexpensive method of accomplishing the very important result of removing the deleterious matter from the ammonia water, before it is allowed to flow into the river. We have one tar well at the retort house, and another at the purifying house, each one having its supplemental well. These wells have been adapted to the new process I have described, by merely dividing them by a horizontal partition, as shown in the drawings.

It will readily occur to any engineer of gas works, that the same process could be carried out in various ways.

One remarkable feature in our experience in this matter, is that we have never changed the breeze since it was first put in. We pump out the "dead oil" that accumulates at the bottom of

Appendix D.

FISH WARDENS OF THE STATE OF NEW JERSEY.

Counties.		
Cumberland	James Logue	Bridgeton.
Salem	James T. Hannah	Penns Grove.
Gloucester	H. W. Heritage	Woodbury.
Camden	Frederick Shindle	Gloucester City.
Burlington	Langhorne Thorne	Bordentown.
Cape May	Edwin F. Westcott	South Seaville.
Atlantic	A. J. Rider	Atsion.
Ocean	John Osborn	Burrsville.
Monmouth	George Curtis	Parkerville.
Mercer	Joseph Ashmore	Trenton.
Middlesex	John Miller	Bound Brook.
Somerset	John S. Bishop	Bound Brook.
Hunterdon	A. J. Scarborough	Lambertville.
Warren	Lewis C. Weller	Columbia.
Morris	Charles J. Pierson	Morristown.
Union	William L. Brown	Rahway.
Essex	Lambert Speer	Caldwell.
Hudson	Wm. H. Havens	Hoboken.
Bergen	George Ricardo	Hackensack.
Passaic	John C. Roe	Paterson.
Sussex	Thomas E. Smith	Newton.

Appendix E.

NAMES AND ADDRESS OF COMMISSIONERS OF FISHERIES.

UNITED STATES.

Prof. Spencer F. Baird (Smithsonian Institute).....Washington, D. C.

DOMINION OF CANADA.

W. F. Whitcher.....Ottawa.
W. H. Venming.....St. John.

ARKANSAS.

N. H. Fish.....Pine Bluffs.
J. R. Steelman.....Little Rock.
N. B. Pearce.....Fayetteville.

CALIFORNIA.

R. B. Redding.....Sacramento.
S. R. Throckmorton.....San Francisco.
J. D. Farwell.....San Francisco.

CONNECTICUT.

Wm. M. Hudson.....Hartford.
Robert G. Pike.....Middletown.
James A. Bill.....Lyme.

GEORGIA.

Thomas P. James (Commissioner of Agriculture and Fisheries)...Atlanta.

ILLINOIS.

W. A. Pratt.....Elgin.

IOWA.

B. F. Shaw (Commissioner and Superintendent).....Anamosa.

KENTUCKY.

Pack Thomas, President.....Louisville.
P. H. Darbey.....Caldwell county.
Polk Laffom.....Hopkins county.
S. W. Coombs.....Warren county.
C. J. Walton.....Hart county.
Jas. B. Casey.....Kenton county.
John A. Steele.....Woodford county.
J. H. Bruce.....Garran county.
T. T. Garrard.....Clay county.
W. C. Allen.....Bath county.

MAINE.

E. M. Stilwell.....Bangor.
Henry O. Stanley.....Dixfield.

MARYLAND.

T. B. Ferguson.....Baltimore.
P. W. Downes.....Denton.

MASSACHUSETTS.

Theodore Layman.....Brooklyn.
E. A. Brackitt.....Winchester.
Asa French.....South Braintree.

MICHIGAN.

Eli R. Miller.....Richland.
Andrew J. Kellogg.....Detroit.
George H. Jerome, Superintendent.....Niles.

MINNESOTA.

R. O. Sweeny.....St. Paul.
Wm. Golcher.....St. Paul.
Robert Ormsby.....

NEW HAMPSHIRE.

Samuel Webber.....Manchester.
Allenia H. Powers.....Grantham.
Luther H. Hayes.....Milton.

NEW JERSEY.

B. P. Howell.....Woodbury.
J. R. Shotwell.....Rahway.
G. A. Anderson.....Trenton.

NEW YORK.

Horatio Seymour.....Utica.
Edward M. Smith.....Rochester.
Robert B. Roosevelt.....New York City.

OHIO.

John C. Fisher, President.....Coshocton.
Robert Cummings, Treasurer.....Toledo.
John H. Klippart, Secretary.....Columbus.
Emory D. Potter, Superintendent.....Toledo.

PENNSYLVANIA.

B. L. Hewitt.....Hollidaysburg.
Howard J. Reeder.....Easton.
James Duffy.....Marietta.

RHODE ISLAND.

Newton Dexter.....Providence.
Alfred A. Reed, Jr.....Providence.
John H. Barden.....Scituate.

UTAH TERRITORY.

A. P. Rockwood.....Salt Lake City.

VERMONT.

W. H. Lord.....Montpelier.
M. Goldsmith.....Rutland.

VIRGINIA.

A. Mosely.....Richmond.
W. B. Robertson.....Lynchburg.
W. G. Ellzey.....Blacksburg.

WISCONSIN.

Gov. Harrison Ludington, ex officio.....Milwaukee.
Wm. Welch.....Madison.
A. Palmer.....Boscobel.
P. R. Hoy.....Racine.
H. F. Donsman.....Waterville.

Errata.

On page 9, near bottom, "Captain William Farmer" should read "Captain William Faunce."

On page 40, letter to Mr. Langhorn Thorne, "in May about 25 pounds" should read "in May, about 25th."

In "Appendix B," for "ground ptan" read "ground plan." (Line 5th).

Also, twelfth line, for "½ inch square" read "12 inches square."

Also, seventeenth line, for "round off" read "rounded off."