

REPORT

OF THE

COMMISSIONERS OF FISHERIES

OF

MARYLAND,

G. W. DELAWDER. • E. W. HUMPHREYS,

Commissioners.



ANNAPOLIS:
JAMES YOUNG, STATE PRINTER.
1888.

REPORT.

To his Excellency Governor HENRY LLOYD :

In submitting this, our report of operations for year ending December 31, 1887, we beg leave to renew very much of our last printed report, because of the lateness of time at which the same came before the members of the Legislature, however through no fault of your commissioners. The documents were forwarded by us to your Excellency on the first day of January, the time prescribed by law, and were by him duly sent to the proper committee, but were then lost sight of by us, one of us having made three unsuccessful trips to Annapolis in search of them, and to see that the printing was properly done. Some time about the middle of February we learned from the State printer that the report had just been printed, and was then in the hands of the binder. We had had no proof sheets of it, and having found it at the bindery partially bound and full of errors, we were then and there obliged to attempt to correct it, to an extent that time and circumstances would allow. This necessitated an additional delay of a week or two. It was well on towards the latter part of February before the books, in a very imperfect form, were placed upon the desks. It was then, of course, read by few members, and some complained to us that they never saw it at all. Hence our reproduction in this of nearly all of the body of that report.

We are still pursuing, as our main purpose, the same policy which has resulted in the marked success of the Fish Commission in previous years, viz.: The propagation of the four principal kinds of spring fishes, the shad, rock, perch—in its various kinds—and herring.

About the time of the close of our last report our attention was particularly directed to the propagation of brook trout at Druid Hill Park, where the facilities for this work are so very superior to any locality in the immediate neighborhood. In these efforts we claim to have been eminently successful, as the result will show. Of 500,000 spawn placed in the hatching trays the loss did not exceed seven per cent. The brook trout, so deservedly popular the world over, and so well adapted to many of our small and rapid streams in the western portion of the State—streams, indeed, so small that they could not profitably be stocked with any other fish—has increased very greatly in favor, and the demand for it is becoming greater year by year. In order to comply with the many requests from those living beyond the tide-water regions, and consequently cut off from the variety of fish there obtainable, it will be necessary the coming year to put out much larger hatch than that reported above, and we propose to raise it to seven or eight hundred thousand. German carp have been freely distributed, in fact all applicants have been liberally supplied, and many have been planted in the rivers of the State.

The results of the work for a few years past have been greater than formerly on account of the advantages of the great recent progress in the science of pisciculture. Experience has given our force of employees greater efficiency, and recently improved hatching apparatus has enabled us to simplify, concentrate and greatly increase our operations. Up to the beginning of the season of 1884, we had only one hatching house, that at Druid Hill Park, Baltimore, where are hatched the brook trout, salmon trout, rainbow trout and land-locked salmon, in winter; and shad, the spawn of which is procured at Havre de Grace and transported hither in spring. We have now three additional hatching houses, each equipped with the finest hatching system in use, and located as follows:

Choptank hatchery, on Tuckahoe river, near Coward's Point, in Caroline county, about four miles from Hillsborough; Nanticoke hatchery, at Twiford's Mills, about one mile from Sharptown, and a half-mile from the Nanticoke river; Wicomico hatchery, at Salisbury, headwaters of the Wicomico river.

The Choptank station is intended to supply the waters of the upper Eastern shore with shad and perch. In this house there is a set of McDonald automatic hatching jars, having place upon a table 3x12 feet in size. The jars are supplied with water by pipes leading from an elevated tank, the water being pumped up into this by a sixth-inch Ryder hot-air engine with a guaranteed capacity of 1,200 gallons per hour. The water is pumped directly from the river, and is returned thereto through vent pipes from the hatching table. The building is substantially constructed of wood, and stands on piles over the edge of the river. Mr. J. H. Hines is superintendent of the work at this station, with a force of three subordinates.

The Nanticoke hatchery is intended to supply the Nanticoke river and the waters of Dorchester county with shad, rock, perch and herring. This house is also supplied with the McDonald jars. The water is obtained through pipes from the dam of the mills, just below which the house stands, the water having a fall of four or five feet. This hatchery may be described as generally identical with that at Coward's Point, except as to the water supply. The location was selected as being a central point of the fresh water fisheries of the Nanticoke river. Between Vienna and Seaford, (Del.) and the mouth of Marsh Hope river and Federalsburg there are extensive fisheries; hauling and floating seines and pound nets are principally used. Before the spring of 1884 these waters were not made use of in our work for obvious reasons. Having made a survey of them previously, we were persuaded that they might be made available by placing a hatchery at Sharptown and running a steam launch between

the three points, Seaford, Vienna and Federalsburg, a distance all around of about forty miles, to collect spawn and convey it to the hatchery, and in turn to transport the fry, after having been hatched, to various points within these limits for planting. These plans have been executed and the tabulated reports of the operations at this station will show that we have been successful in the work done under this new system. Capt. Jas. C. D. Adams is superintendent of this work, with a force of five subordinates.

The Wicomico hatchery is intended to supply the waters of the lower Eastern Shore with shad, perch and herring. It is supplied with water from the dam of the Locust Grove flour mills. The house is constructed upon the foundation of a large saw mill, now out of use as a saw mill but occupied as a warehouse. The same system of jars is employed here as at other stations. The eggs for this hatchery are gathered about Shad Point and the upper ferry, and at intermediate points along the Wicomico river. Thomas Hughlett, Jr., is superintendent of this station, and we have here a force of five subordinates. At this station have been hatched also about a million white fish, the fry of which were distributed to all the rivers of the eastern shore.*

We were fortunate in the selection of the sites for this and Nanticoke stations, as we secured at both of them a natural and inexhaustible supply of pure fresh water; whereas, at the Choptank hatchery we were forced to the use of an artificial supply, which is very much more expensive, and the water from this river is more or less muddy.

*NOTE.—The planting of white fish in Maryland waters is experimental. This fish belongs *naturally* to the great lakes, but it is reasonable to suppose that it may be colonized and acclimated. The expense being small, as the eggs were supplied by the U. S. Fish Commission, we considered it an experiment worth trying. We are supported in this view by the opinion of the eminent and greatly lamented Prof. S. F. Baird, late U. S. Commissioner. The white fish is one of the finest of our North American varieties, and the advantages to be obtained by its successful introduction into our waters will be invaluable.

At all the stations we use trays for the transportation of shad eggs from the fishing shores where they are impregnated, to the hatcheries. The trays consist of a coarse wire screen, fourteen to sixteen inches square for the bottom, attached to frames made of wooden pieces one-inch square and fastened at the corners. Over these are placed pieces of cheese cloth a little larger than the trays, upon which the fertilized eggs are spread two or three layers deep. A number of these trays being filled as described and stacked one upon another, and strapped together makes a package convenient to handle in transit by almost any means of conveyance, and affords a sure protection for the eggs. We have carried shad eggs in this manner one hundred and thirty-two miles by railroad without injury, the same being afterwards hatched with the same results as of those which had not been moved at all.

Although our work has greatly increased, and will, we have cause to believe, continue to increase yearly, yet we will not be satisfied that we have accomplished the full measure of success which we hope for, until we have done many times better than heretofore in regard to the numbers hatched, particularly of shad, rock and brook trout. We believe we can with advantage seek shad and rock spawn outside the limits of our own State and transport the same hither to our hatcheries by means of the trays above described. We made an effort in the summer of 1885 to inspect suitable waters, particularly Albemarle Sound and tributaries. Ex-commissioner S. G. Worth, of North Carolina, gave us the assurance of his cheerful co-operation, and being familiar by experience with the fisheries of the above-named waters, kindly offered to point out to us the fresh water shad fisheries at the most convenient points, and give any other information upon the subject, and such other advice as from his knowledge should be considered necessary whenever we might find it convenient to visit such points. But having applied to your Excellency for the use of one of the

steamers of the Oyster Navy, for the necessary cruise, we were sorry to learn that the Governor had no authority to order the boats beyond the borders of the State. Your Excellency, we deem it proper to say, expressed his regrets and assured us that he would have been glad to extend to us such assistance had he felt justified by law in so doing. We were, therefore, obliged to abandon our purpose for the present, but we shall hope for better fortune in the future.

It is with no small degree of pride and satisfaction that we call your attention to our increased and improved work, as shown by our tables and the certain evidences of good results. It is not a disposition to self praise which prompts this expression, but rather our admiration of and perfect faith in the science of fish culture, and especially artificial propagation and planting. The work of your commission has long since ceased to be experimental, but it has become practical and fully operative, and it is without doubt a *necessity*. Without it, in less than five years, it is the belief of observing people and those who are well informed as to the subject, our shad, the finest and most valued of our native fishes would become unknown in the waters of our State. The enormous and almost incredible number of persons who now engage in fishing in spring, the improved methods of capture consisting of every conceivable device, the unscrupulous manner of using these means and want of adequate protective laws, would, in the absence of artificial propagation, tend to the total destruction within a few years of all the most desirable kinds of fish. In the Wicomico river alone at least one hundred and fifty floating shad seines (and some estimate the number to be two hundred and fifty) are operated within the space of seventeen miles between Shad Point and White Haven. Now, if we allow the average catch of each net to be only two shad per day for sixty days, the total catch of the "floaters" within that area is eighteen thousand shad each season. This is said by some fisher-

men to be a ridiculously small estimate. Besides the floating seines there are, within the above named sections of the Wicomico, five hauling seines, the average catch of which we will say is ten shad each per day for sixty days, the total being three thousand. Besides the floating and hauling seines there are in the section named, numerous weirs and stake seines, the number of which, and the catch by them it would be difficult to estimate. Lower down this river towards its mouth there are about fifteen pound and fyke nets, with an average catch of at least twenty each per day for sixty days, a total of about eighteen thousand. In addition to the pounds and fykes there are at least treble this number of stake seines, and the average catch by them may be safely estimated to be five shad per day each, making a total of thirteen thousand five hundred. We do not here take into account the numerous weirs and small nets in the various parts, bays, creeks, &c., of the lower Wicomico, as the number of them and their catch cannot now be correctly computed.*

Reviewing the above estimates, we obtain a grand total of *fifty-two thousand five hundred shad*. We have taken into this account only one species of our native fishes, the shad, it being the most important, and we have done so for illustration of the numerous number of fish taken annually from one river only, and that one the smallest one of any importance in the State.

We employed means during the month of September last by which we obtained tolerably accurate information with regard to the actual catch of shad last spring.

*NOTE.—The method of setting the fykes and pounds is across the current. The pound (or trap) is placed at the edge of the channel, and from it is set a hedging of net reaching to the shore. The meshes of these nets are very small, allowing nothing but minnows to pass. In them are caught immense numbers of small fish which are entirely unmarketable. The fish, when taken out of these nets, are dumped into boats and carried some distance, often to a landing where they are overhauled and assorted, the time consumed in the process being almost always sufficiently long to destroy the small or "refuse" fish. These are some times thrown overboard, but far more often fed to hogs or thrown out for manure upon the land.

Through the kindness of the Board of Public Works, Commander Plowman, of the Oyster Navy, placed the steamer Gov. McLane at our disposal, and with this boat we visited so much of the waters of the State as we deemed practicable. The Eastern Shore rivers being considered the most important, we gave these our first attention, but owing to disagreeable weather, rains, fogs, &c., and being debarred from running at night, we were unable to inspect any of the Western Shore waters at all. In our table, pages 17-18, will be found, consequently, an account only of Eastern Shore rivers. It is a matter for happy congratulation that during the last two seasons our shad and herring fisheries have increased remarkably. So has there been a considerable increase in the catch of rock and perch. The latter two varieties we have no fear for, because they are not migratory. They are always with us and do not go outside of the Chesapeake bay to be headed off on their return by the inevitable barrier of hundreds of iniquitous *pound nets*. Of these destructive arrangements we will directly have something more to say. The shad fishermen generally report that such a catch as that of the spring of 1887 has not been known for twenty-five years. The catch of the spring of 1886 was somewhat less than that of 1887, but that also was said to be far in excess of any for twenty years previous. The fishing of 1886 was spasmodic, but that of 1887 was a steady run throughout the season. The catch in Choptank and Tuckahoe rivers was so much larger than for a long time past that its influence was even felt by the local banks in an increase of deposits, &c. One intelligent cashier, considering the unusual influx of money from certain quarters and depositors, investigated the matter and found it was all due to the above named causes. It is an unusual thing to see fish stranded and piled a foot or more deep upon acres of flats, nevertheless, such was the case with the herring on the Susquehanna last spring. This is a matter of narrative by reputable citizens, but we saw

with our own eyes, hundreds and perhaps thousands dead and floating along the shores of the Susquehanna, and the fishermen assured us these were the same as above mentioned, which had all died spontaneously. We mention these *facts* to prove to the most prejudiced person that there has been an unmistakable increase in our shad and herring fisheries; and it cannot be contradicted by the most unfair of the critics of the Fish Commission, either in regard to the provisions of the law or the administration of its affairs by the commissioners. Neither can the credit for the almost complete restoration of this, for a time, nearly totally destroyed industry, be withheld from the former and present Fish Commissioners who have faithfully and judiciously labored to reach the end attained.

The catch of the other spring fish, the rock, perch and herring, is somewhat less in respect to value, during the spring season, than that of the shad. The first two named, however, are taken the whole year through—though principally during winter and spring—and consequently the *average* catch is much larger—or to say the least as large,

Comparing the extent of the Wicomico, with that of the larger rivers, Nanticoke, Choptank, Chester, Susquehanna and a number of others some larger and some smaller, we conclude that the total catch in the *rivers* throughout the whole State, is at least forty times that of the Wicomico. Now the number of shad taken in this river being fifty-two thousand five hundred the value of the same at *twenty-five cents each* is over *thirteen thousand dollars*. Adding to this our estimate of the other fish usually taken we double this amount; and multiplying this by forty we have the grand product of *over a million dollars yearly*. Very few of the citizens of our State realize the importance of our fishing interests. These estimates are for the rivers alone as we have said nothing of the bay.

But it is outside of the rivers even and out into the bay that we must go, in consideration of the subject of

a thorough remedy for existing evils. We have asserted that artificial propagation especially of the shad and herring is a *necessity*. To further substantiate this we would remind you that there are, according to the official estimates of Col. M. McDonald, the enormous number of one thousand pound nets fringing the shores of the Chesapeake below the Potomac river. These are placed and set as herein previously described along the shoals, the natural feeding grounds of the shad, upon which the fish travel in their migrations towards the fresh waters of the rivers. They have to "run a muck" through all this intricate maze of traps in their journey to the spawning places at the headwaters of the tributary streams, to reach which is their sole object in leaving the deep waters of the ocean. It is a great wonder that any of them ever reach fresh water—that they do, however, and in considerable numbers we have shown. But comparatively few of them escape the traps here awaiting them, and deposit their eggs spontaneously and naturally, as very many are caught before spawning, or at just about the time of spawning. It is under these conditions that the employees of the Commission seek out among the fishermen such fish as are about to deposit their eggs when caught, and from such fish collect the spawn and impregnate and otherwise prepare it for artificial hatching. Our men are ordered to secure every "ripe" fish possible. We cannot, of course, with the means at our disposal, obtain all ripe fish, and it would be inexpedient to do so in isolated localities, even if our resources were unlimited. But those we do secure are *saved* from absolute destruction, because the offspring, after the eggs are hatched are returned to the waters to become in due time adult fish. Without such treatment who can doubt that every species of our anadromous fishes would, in a few years, entirely disappear.

This is one grand remedy for the evil of the general

and indiscriminate use of the various fish traps, the chief of which is the pound or fyke. But it is doubtful that this can hold out many years against such powerful odds. The number of these nets is increasing year by year, and at present the supply of fish is increasing in spite of it, but it cannot so continue for a very great while. We know that our fish protective laws are deplorably inadequate, and the meagre attention given to our fishery interests by the law makers in this age of progress is not easy to understand. Our fisheries need regulating, and we hope and believe that the suggestions which we will venture to make in this report will be favorably considered. Among many other things, steamboats, particularly side-wheelers, which now ply upon every river, play an important part in the destruction of our fish by washing the bottom and banks of the rivers, especially in the narrower parts, near the sources in fresh water, to which the fish invariably go for spawning. As the eggs are deposited, some (as the shad and rock) on the clean, sandy bottom, and others (as the perch and herring) on grasses and other growths, twigs, &c., it is easily seen how destructive the swells and eddies from the track of a passing steamer must be to these eggs, covering them up and burying them, or else washing them up high and dry upon the shore, there to remain and be lost. Hauling seines are also sources of destruction to fish eggs along the shores and upon the bars and flats upon which the seines are operated. But the fishing of these cannot be forbidden—it can only be regulated. Another great source of destruction is found in some species of our fishes which feed upon the spawn of their own and all other kinds. It is generally known they prefer this to any other food, as they always feed most ravenously upon it. The eggs *taken and hatched*, however, are subject to no accidents. The young fish are too small and too widely separated when planted to afford an opportunity for

a good mouthful for even a minnow ; while the spawn as in the process of spontaneous hatching lies unprotected when deposited in larger or smaller masses a tempting feast for such piscatorial poachers as happen to pass that way and to be had simply for the opening of the mouth and swallowing.

We call your attention to only a few causes of the depletion of our waters, but we believe we have mentioned the principal ones. We believe that artificial propagation and planting constitute the great remedy for these evils, but we believe just as strongly that these means should be supplemented by others ; and in reference to this matter we beg to recommend certain measures which we are convinced will, if adopted, prove of great advantage.

We would advise the establishing of a close season of two days in each week, from Saturday morning, 6 o'clock to Monday morning, 6 o'clock during the months of April and May, in which all net fishing should be prohibited. By this means the fish would be allowed to proceed undisturbed to their natural spawning places. The advantages of this are easily seen, and we think the great importance of the matter cannot be too strongly urged. For the Susquehanna and Nanticoke rivers and the Chesapeake bay co-operative legislation will be required, as each of these extend beyond our borders.

We would further recommend the regulation of the size of meshes in nets and other traps used in fishing, the meshes to be in no case smaller than one and a quarter inches square or two and a half inches extended or stretched. In any of the fish markets in this State dealers offer and sell white perch and yellow perch four or five inches in length, and rock fish but little longer. This ought to be prohibited by law, for it does seem to us a shame that a rock which will grow to a hundred pounds should be wilfully destroyed when weighing only a few ounces. It is nonsense to talk

about scarcity of fish while people are allowed not only to catch these infant fish, but to actually sell them in the public markets. We would endeavor to prohibit the catching or having in possession any fish except the sunperch or the gudgeon of less than *ten inches* in length. However, we think that in case fish of such size are accidentally caught, the offender should be exonerated by immediately returning the same to the water without further injury.

We would also earnestly recommend and urge that some more effective means be adopted for the protection of fish in the upper Potomac. The great difficulty we have met with in this locality lies in the fact that citizens of West Virginia place innumerable fish pots and other traps in the Potomac, which are near to and easily reached from the Virginia shore, and by such means and devices destroy the fish. It is impossible to prevent this system of wholesale slaughter without having some person or persons upon the ground, clothed with authority to make arrests and bring such offenders to punishment. We therefore suggest that a law be passed making such acts criminal and the offenders liable to indictment by grand jury. We also recommend the passage of an act empowering the Fish Commissioners to appoint a warden or wardens for this locality, whose duty it shall be to destroy all fish pots and other devices placed in said river. Such wardens to be employed during the months of October and November, inasmuch as, during that period, whilst the waters are swelling from the fall rains, the fish suffer most from the causes referred to. We believe that, by such a system as this, the fish slaughter houses, otherwise known as fish pots, would be destroyed in a short time. We think any law upon this subject, therefore, should give the commissioners a discretion as to the time such wardens should be employed, so that their services could at any time be dispensed with.

In closing this report, we desire to acknowledge the uniform kindness of your Excellency in co-operating with us in our work when occasion required his assistance. Our thanks are also due to the Board of Public Works for the use of a steamer in our inspection of the shad fisheries.

G. W. DELAWDER,

E. W. HUMPHREYS,

Commissioners.

DECEMBER 31, 1887.

An approximated estimate of the number of shad taken during the spring of 1887, in the following waters :

PCCOMOKE RIVER AND SOUND—

48 Scoop nets.....	20,160	
6 Floating seines	3,360	
28 Fykes	11 200	
8 Pounds.....	2,500	
		37,220

TANGIER SOUND AT MOUTH OF LITTLE ANNAMESSEX RIVER—

1 Pound.....	300	
6 Fykes	600	
		900

WICOMICO RIVER—

140 Floating seines	42,000	
5 Hauling “	2,500	
200 Stake “	15,000	
30 Fykes	6,000	
2 Pounds (at Rock Creek).....	4,000	
		69,500

MARSH HOPE RIVER—

110 Floating seines		
2 Pounds.....		
1 Hauling seine.....		
		9,040

NANTICOKE RIVER—

65 Gillling boats.....	70,000	
12 Hauling seines.....	10,000	
200 Stake nets.....	12,000	
14 Pounds.....	36,200	
		128,200

CHOPTANK RIVER—

42 Small pounds	4,200	
13 Large “	13,000	
28 Gillling boats.....	128,000	
10 Hauling seines.....	15,500	
800 Stake “	19,200	
		179,900

FISHING BAY—

12 Gillling boats.....	14,000
------------------------	--------

LITTLE CHOPTANK RIVER—

8 Pounds.....	1,800
---------------	-------

TUCKAHOE RIVER—

20 Gillling boats.....	20,000	
8 Hauling seines	12,500	
		32,500

TRED AVON RIVER—

8 Pounds.....	8,000
---------------	-------

CHESTER RIVER—

13 Pounds.....	6,500	
31 Gillig boats.....	5,450	
15 Fykes.....	180	
16 Stake nets.....	400	
2 Hauling seines	1,800	
		14,330

SASSAFRAS RIVER—

12 Small pounds.....	500
----------------------	-----

ELK AND BOHEMIA RIVERS—

20 Small pounds.....	600	
15 Gillig boats.....	5,000	
		5,600

NORTH EAST RIVER—

3 Small pounds.....	300
---------------------	-----

UPPER BAY BETWEEN HAVRE DE GRACE AND POOLS ISLAND—

6 Hauling seines....	120,150	
400 Floating “	276,205	
		396,355



APPENDIX.

(REFERRED TO IN REPORT.)

Showing in detail the date of Fish Taken, Eggs Fertilized.
Fry Hatched, Where Deposited, &c., at the
Different Stations



DISTRIBUTION OF TROUT.

1887. APRIL.

Harford County, to care Stevenson Archer.....	20,000
Baltimore County, to various persons.....	51,000
Carroll County, care committee, Westminster.....	41,000
Frederick County, and distributed by committee citizens..	41,000
Washington County, to care Protective Clubs.....	41,000
Garrett County	35,000
Prince George County.....	5,000
Montgomery County.....	6,000
Howard County, Cabin Branch.....	10,000
Patuxent.....	12,000
Plumer's Branch	9,000
St. Mary's, S. N. Hewks.....	500
St. Mary's, S. N. Hewks.....	2,000
Catonsville, Baltimore County.....	1,000

RAINBOW TROUT.

Fullerton, Baltimore County.....	2,500
Anne Arundel County, Louis Page.....	3,000
Alexander McCormack.....	2,500
A. L. Fringer.....	1,000
Gillis Falls.....	15,000
In various brooks and small streams in Carroll, Baltimore, Howard and Garrett Counties.....	115,000
	400,700

GERMAN CARP.

.....	50
Harford Co.....	100
Wm. H. Freshman.....	50
A. A. Co. L. A. Page.....	50
Howard Co.....	100
G. M. Clary.....	100
Frederick Co.....	50
Sam'l Fleming.....	50
B. S. Wolsten.....	50
Capt. Cassell.....	75
Taylor's Island, Dor.....	60
Louis Page.....	60
Geo. A. Abell.....	185
Brant Rettenhorne.....	50
Geo. M. Chambers.....	55
I. W. Duddro.....	50
W. H. Reid.....	200
Baltimore Co.....	50
Carroll Co.....	50
Geo. Hayward.....	50
I. H. Grimes.....	100
T. W. Hanson.....	50
F. Weller.....	100
Basil Woolstore.....	50
Alfred Engler.....	50
G. E. Hedrich.....	50
W. D. Stack.....	50
W. L. Jarvis.....	100
J. W. Tyler.....	50
Geo. Rhodes.....	50
P. P. Load.....	100
C. Slabaugh.....	50
W. Savage.....	50
D. Wilson.....	100
W. Morgan.....	100
Emory Zepp.....	100
Henry Donovan.....	200
Henry Fringer.....	50
A. D. Brown.....	50
J. Cable.....	50
John Helsinger.....	50
Thos. Echart.....	50
Little Youghegheny.....	500

DISTRIBUTION OF CARP TO RIVERS.

Transquaking River.....	5,000	
Chickamacomico “	5,000	
Choptank “	15,000	
Nanticoke “	10,000	
Miles “	5,000	
Chester “	5,000	
Tred Avon “	5,000	
Big Elk “	10,000	
Little Elk “	10,000	
Doe Creek, at Chesapeake City.....	5,000	
Blackwater River.....	5,000	
Pocomoke “	6,000	
Monokin “	6,000	
Wicomico “	6,000	
		98,000

SHAD.

Susquehanna.....	7,400,000	
Patuxent... ..	500,000	
Patapsco.....	300,000	
		8,200,000

SHAD HATCHING AT NANTICOKE STATION.

Date.	Fish Taken.	Eggs Fertilized	Fry Hatched.	Fry Deposited.
April 18	3	75,000	.....	
" 25.....	8	200,000	.....	
" 26.....	8	200,000	70,000	Nanticoke River.
" 29.....	11	275,000	.....	
May 2.....	21	525,000	180,000	Nanticoke River.
" 3.....	19	475,000	180,000	" "
" 4.....	16	400,000	250,000	" "
" 6.....	13	325,000	475,000	" "
" 7.....	..	.....	420,000	" "
" 8.....	..	.....	375,000	" "
" 9.....	12	300,000	.....	
" 10.....	14	350,000	300,000	Nanticoke River.
" 11.....	11	275,000	.....	
" 12.....	10	250,000	.....	
" 13.....	..	.....	275,000	Nanticoke River.
" 14.....	..	.....	300,000	" "
" 16.....	23	575,000	250,000	" "
" 17.....	15	375,000	.....	
" 18.....	4	100,000	.....	
" 20.....	..	.....	225,000	Nanticoke River.
" 21.....	..	.....	50,000	Marsh Hope River.
" 22.....	..	.....	40,000	" " "
" 23.....	..	.....	75,000	Nanticoke River.
		4,700,000	3,465,000	

SHAD HATCHING AT CHOPTANK STATION.

Date.	Fish Taken	Eggs Fertilized.	Fry Hatched.	Fry Deposited.
April 18.....	2	50,000	.....	
" 19.....	1	25,000	.....	
" 21.....	1	25,000	.....	
" 22.....	3	75,000	.....	
" 23.....	3	75,000	.....	
" 25.....	20	500,000	.....	
" 26.....	9	225,000	.....	
" 27.....	8	200,000	60,000	Tuckahoe River.
" 28.....	15	375,000	.....	
" 29.....	4	100,000	100,000	Tuckahoe River.
May 2.....	23	575,000	460,000	" "
" 3.....	8	200,000	215,000	" "
" 4.....	9	225,000	.....	
" 5.....	8	200,000	500,000	Big and Little Elk River.
" 6.....	6	150,000	100,000	Tuckahoe River.
" 9.....	5	125,000	400,000	Miles River.
" 10.....	15	375,000	400,000	Tred Avon River.
" 11.....	15	375,000	.....	
" 12.....	12	300,000	475,000	Tuckahoe River.
" 13.....	11	275,000	.....	
" 14.....	6	150,000	.....	
" 16.....	6	150,000	.....	
" 17.....	7	175,000	600,000	Chester River.
" 19.....	6	150,000	700,000	Choptank River.
" 20.....	2	50,000	.....	
" 21.....	1	25,000	.....	
" 23.....	5	125,000	460,000	Tuckahoe River.
" 24.....	3	75,000	70,000	" "
" 25.....	4	100,000	115,000	" "
" 28.....	..	.....	65,000	" "
" 29.....	..	.....	90,000	" "
		5,350,000	4,800,000	

SHAD HATCHING AT WICOMICO STATION.

Date.		Fry Hatched.	Fry Deposited.
April	17	200,000	Wicomico River.
"	18	75,000	" "
"	23	175,000	" "
"	26	225,000	Pocomoke River.
"	27	125,000	Wicomico River.
"	29	225,000	" "
May	1	125,000	" "
"	2	75,000	" "
"	3	325,000	" "
"	6	475,000	Pocomoke River.
"	7	175,000	Wicomico River.
"	10	150,000	" "
"	16	350,000	" "
"	19	575,000	Pocomoke River.
"	20	250,000	Wicomico River.
"	22	200,000	" "
"	27	250,000	" "
"	28	225,000	" "
June	4	200,000	" "
		4,400,000	

HERRING HATCHING AT WICOMICO STATION.

Date		Fry Hatched.	Fry Deposited.
April	13	180,000	Wicomico River.
"	14	150,000	" "
"	15	330,000	" "
"	16	90,000	" "
"	21	300,000	" "
"	22	300,000	" "
"	23	150,000	" "
"	26	360,000	" "
"	27	90,000	" "
"	30	150,000	" "
May	3	450,000	" "
"	7	210,000	" "
		2,760,000	

HERRING HATCHING AT NANTICOKE STATION.

Date.		Fish Taken.	Eggs Fertilized.	Fry Hatched.	Fry Deposited.
April	8.....	6	150,000		Nanticoke River.
"	9.....	10	250,000	.....	
"	12.....	4	100,000	.....	
"	13.....	8	225,000	200,000	
"	14.....	..	.....	75,000	
"	16.....	4	125,000	.....	
"	17.....	..	.....	200,000	
"	23.....	10	250,000	300,000	
"	25.....	6	150,000	.....	
"	26.....	10	200,000	.....	
"	27.....	8	200,000	.....	
"	28.....	4	100,000	.....	
"	29.....	18	400,000	125,000	
"	30.....	5	125,000	.....	
May	1.....	..	.....	350,000	
"	2.....	..	.....	400,000	
"	3.....	..	.....	100,000	
"	4.....	105	2,625,000	2,500,000	
"	7.....	..	.....	300,000	
"	9.....	13	325,000	.....	
"	12.....	86	2,150,000	2,000,000	
"	15.....	..	.....	300,000	
"	26.....	15	375,000		Marsh Hope River.
"	27.....	9	225,000	.....	
"	28.....	2	50,000	200,000	
"	29.....	24	500,000	40,000	
"	30.....	4	100,000	75,000	
June	1.....	..	.....	75,000	
"	2.....	..	.....	450,000	
			8,625,000	7,690,000	

WHITE PERCH HATCHING AT NANTICOKE STATION.

Date.	Fish. Taken.	Eggs Fertilized.	Fry Hatching.	Fry Deposited.
April 6.....	8	200,000	.....	
" 7.....	12	300,000	.....	
" 8.....	13	325,000	.....	
" 9.....	20	500,000	.....	
" 11.....	30	750,000	175,000	Nanticoke River.
" 12.....	6	150,000	275,000	" "
" 13.....	36	900,000	300,000	" "
" 14.....	..	.....	400,000	" "
" 16.....	..	.....	700,000	" "
" 17.....	..	.....	125,000	" "
" 18.....	..	.....	800,000	" "
		3,125,000	2,775,000	

LIST OF FISH COMMISSIONERS.

THE UNITED STATES—

Prof. G. Brown Goode, Washington, D. C.
 Maj. T. B. Ferguson, Assistant Commissioner, Washington, D. C.
 Col. M. McDonald, Chief of Division of Distribution, Washington,
 D. C.

ALABAMA—

Col. D. R. Hundley, Madison.
 Hon. Charles S. G. Doster, Prattville.

ARIZONA—

J. J. Gosper, P. O. address, Los Angeles, Cal.
 Richard Rule, Yuma.
 J. H. Taggart, Business Manager, Yuma.

ARKANSAS—

H. H. Rottaken, President, Little Rock.
 J. W. Calloway, Little Rock.
 W. B. Worthen, Little Rock.

CALIFORNIA—

Joseph Routier, President, Sacramento.
 Thos. J. Sherwood, Secretary, Marysville.
 J. Downie Harvey, Los Angeles.

DOMINION OF CANADA—

John Tilton, Deputy Minister of Fisheries, Ottawa, Ont.

PROVINCE OF NEW BRUNSWICK—

W. H. Venning, Inspector of Fisheries, St. John.

PROVINCE OF NOVA SCOTIA—

W. H. Rogers, Inspector, Amherst.
 A. C. Bertram, Assistant Inspector, North Sydney.

PROVINCE OF PRINCE EDWARD ISLAND—

J. H. Duvar, Inspector, Alberton.

PROVINCE OF QUEBEC—

W. Wakeham, Inspector Lower St. Lawrence and Gulf Division,
 Gaspe Basin.

PROVINCE OF BRITISH COLUMBIA—

Thos. Mowat, Inspector, New Westminster.

PROVINCE OF MANITOBA AND NORTHWEST TERRITORIES—

Alex. McQueen, Inspector, Winnipeg, Man.
 (S. Wilmot, Superintendent of Fishculture, New Castle, Ont.)

COLORADO—

John Pierce, Denver.

CONNECTICUT—

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

DELAWARE—

Elwood R. Norny, Odessa.

Dr. E. G. Shortlidge, Assistant and Superintendent of Hatcheries,
Wilmington.

GEORGIA—

Hon. John T. Henderson, Commissioner of Agriculture, Atlanta.

Dr. H. H. Cary, Sup. of Fisheries, LaGrange.

(Under the laws of the State these constitute the Board of Fish Commissioners.)

ILLINOIS—

N. K. Fairbank, President, Chicago.

S. P. Bartlett, Secretary, Quincy.

Maj. G. Breuning, Centralia.

INDIANA—

Enos B. Reed, Indianapolis (Term expires in 1887).

IOWA—

E. D. Carlton, Spirit Lake.

KANSAS—

S. Fee, Wamego, Pottawatomie county.

KENTUCKY—

Wm. Griffith, President, Louisville.

P. H. Darby, Princeton.

John B. Walker, Madisonville.

Hon. C. J. Walton, Mumfordsville.

Hon. John A. Steele, Midway.

W. C. Price, Danville.

Hon. J. M. Chambers, Independence.

A. H. Goble, Catlettsburg.

J. H. Mallory, Bowling Green.

MAINE—

E. M. Stillwell, Bangor.

Henry O. Stanley, Dixfield.

B. W. Counce, Thomastown, Sea and Shore Fisheries.

MARYLAND—

Dr. E. W. Humphreys, Salisbury.

G. W. Delawder, Oakland.

MASSACHUSETTS—

E. A. Brackett, Winchester.

F. W. Putnam, Cambridge.

E. H. Lathrop, Springfield.

MICHIGAN—

John H. Bissell, Detroit, President.

Herschel Witaker, Detroit.

Dr. J. C. Parker, Grand Rapids.

(Secretary, A. J. Kellogg, Detroit.)

(Superintendent, Walter D. Marks, Paris.)

MINNESOTA—

3d District—Dr. Robert Ormsby Sweeny, President, St. Paul.

2d District—Niles Carpenter, Rushford,

1st District—William Bird, Fairmount.

(Superintendent, S. S. Watkins, Willow Brook, St. Paul.)

MISSOURI—

H. M. Garlichs, Chairman, St. Joseph.

J. L. Smith, Jefferson City.

H. C. West, St. Louis.

A. P. Campbell, Secretary, St. Joseph.

(Superintendents: Philip Kopplin, Jr., St. Louis; Elias Cottrill, St. Joseph.)

NEBRASKA—

William L. May, Fremont.

Dr. Robert R. Livingston, Plattsmouth.

B. E. B. Kennedy, Omaha.

(Superintendent, M. E. O'Brien, South Bend.)

NEVADA—

W. M. Cary, Carson City.

NEW HAMPSHIRE—

George W. Riddle, Manchester.

Elliot B. Hodge, Plymouth.

John B. Kimball, Marlborough.

(Superintendent, E. B. Hodge, Plymouth.)

NEW JERSEY—

Richard S. Jenkins, Camden.

William Wright, Newark.

F. M. Ward, Newton.

NEW YORK—

Hon. R. B. Roosevelt, President, New York.

Gen. R. U. Sherman, New Harford.

E. G. Blackford, Fulton Market, New York.

Wm. H. Bowman, Rochester.

A. S. Joline, Tottenville.

E. G. Blackford, Shellfish Commissioner.

(Superintendents: Seth Green, Rochester; Fred. Mather, Cold Spring Harbor; Monroe A. Green, Mumford; James A. Marks, Bloomingdale. Secretary, H. H. Thompson, Brooklyn; Clerk of Shellfish Commission, E. P. Doyle, Tompkinsville.)

OHIO—

Hon. C. V. Osborn, President, Dayton. (Term expires 1891.)

John Hofer, Bellaire. (Term expires 1890.)

H. P. Ingalls, Huntsville. (Term expires 1889.)

A. C. Williams, Secretary, Chagrin Falls. (Term expires 1888.)

E. D. Potter, Toledo. (Term expires —.)

PENNSYLVANIA—

Henry C. Ford, President, 524 Walnut street, Philadelphia.
 James V. Long, 205 Ridge avenue, Allegheny City.
 H. C. Demuth, Secretary, Lancaster.
 S. B. Stilwell, Scranton.
 A. S. Dickson, Meadville.
 W. L. Powell, Harrisburg.

RHODE ISLAND—

John H. Barden, Rockland.
 Wm P. Morton, Providence.
 Henry T. Root, Providence.

(These Commissioners are appointed for three years by the Governor, and receive no compensation except actual expenses).

The following are the Shellfish Commissioners, who are elected by the Legislature and receive pay for their services:

James C. Collins, North Providence.
 N. P. S. Thomas, North Kingstown.
 James M. Wright, Foster.

SOUTH CAROLINA—

Hon. A. P. Butler, Columbia.

TENNESSEE—

W. W. McDowell, Memphis.
 H. H. Sneed, Chattanooga.
 Edward D. Hicks, Nashville.

VERMONT—

Hon. Herbert Brainerd, St. Albans.
 F. H. Atherton, Waterbury.

VIRGINIA—

Col. Marshall McDonald, Berryville.

WASHINGTON TERRITORY—

Albert T. Stream, North Cove, Pacific county.

WEST VIRGINIA—

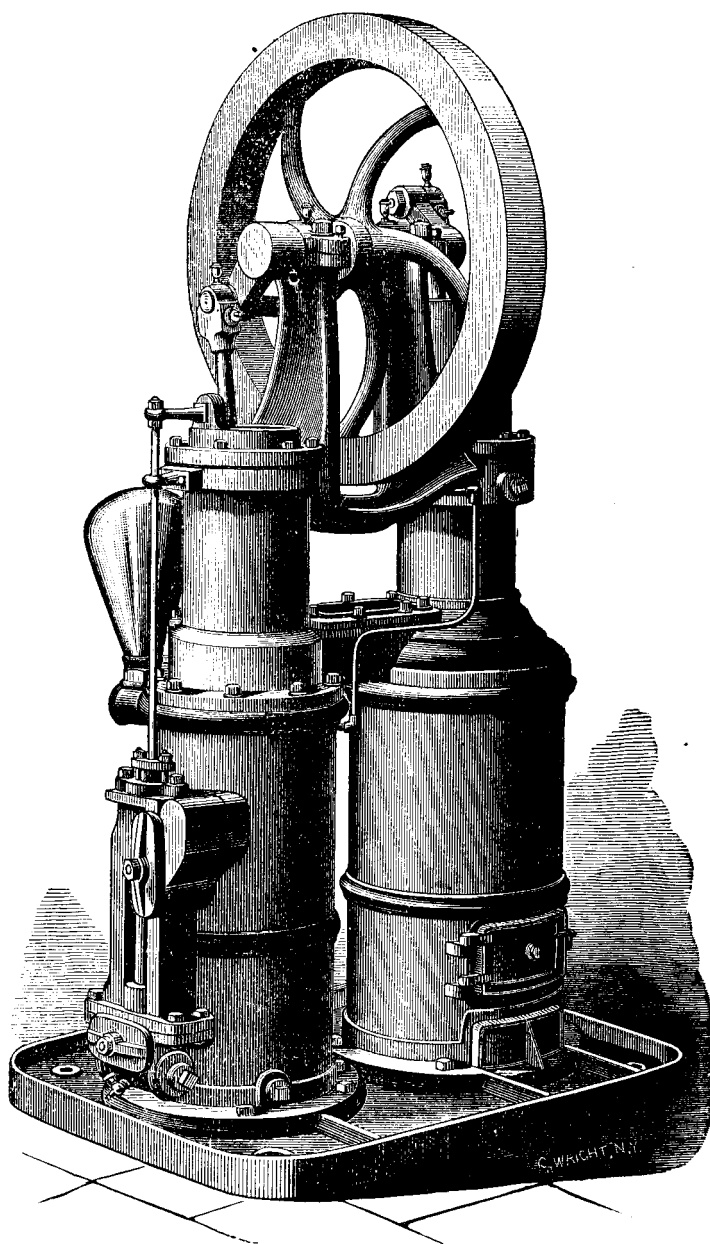
C. S. White, President, Romney.
 F. J. Baxter, Treasurer, Sutton.
 James H. Miller, Secretary, Hinton.

WISCONSIN—

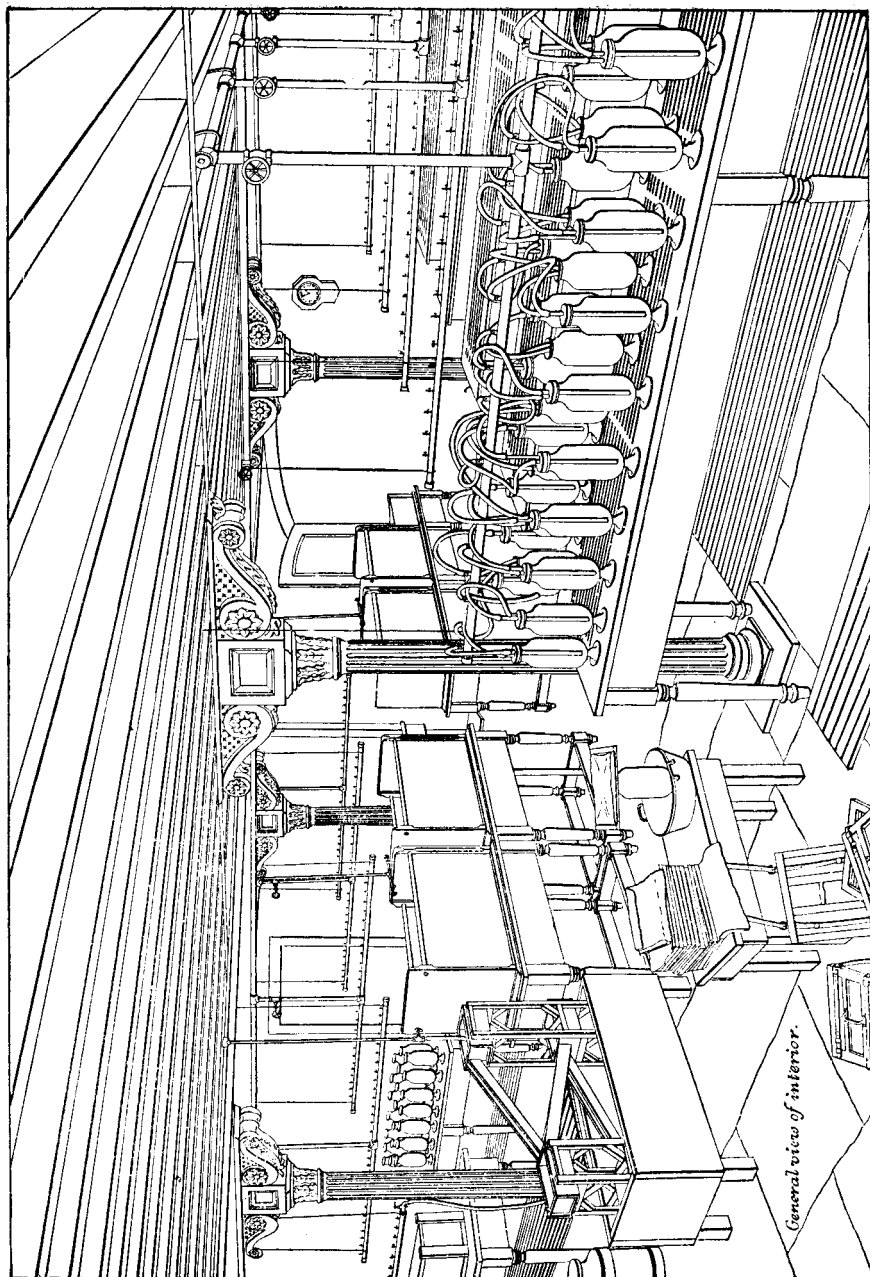
The Governor, *ex-officio*.
 Philo Dunning, President, Madison.
 C. L. Valentine, Secretary and Treasurer, Janesville.
 Mark Douglas, Melrose.
 A. V. H. Carpenter, Milwaukee.
 Calvert Spensley, Mineral Point.
 E. S. Miner, Sturgeon Bay.
 (James Nevin, Superintendent, Madison.)

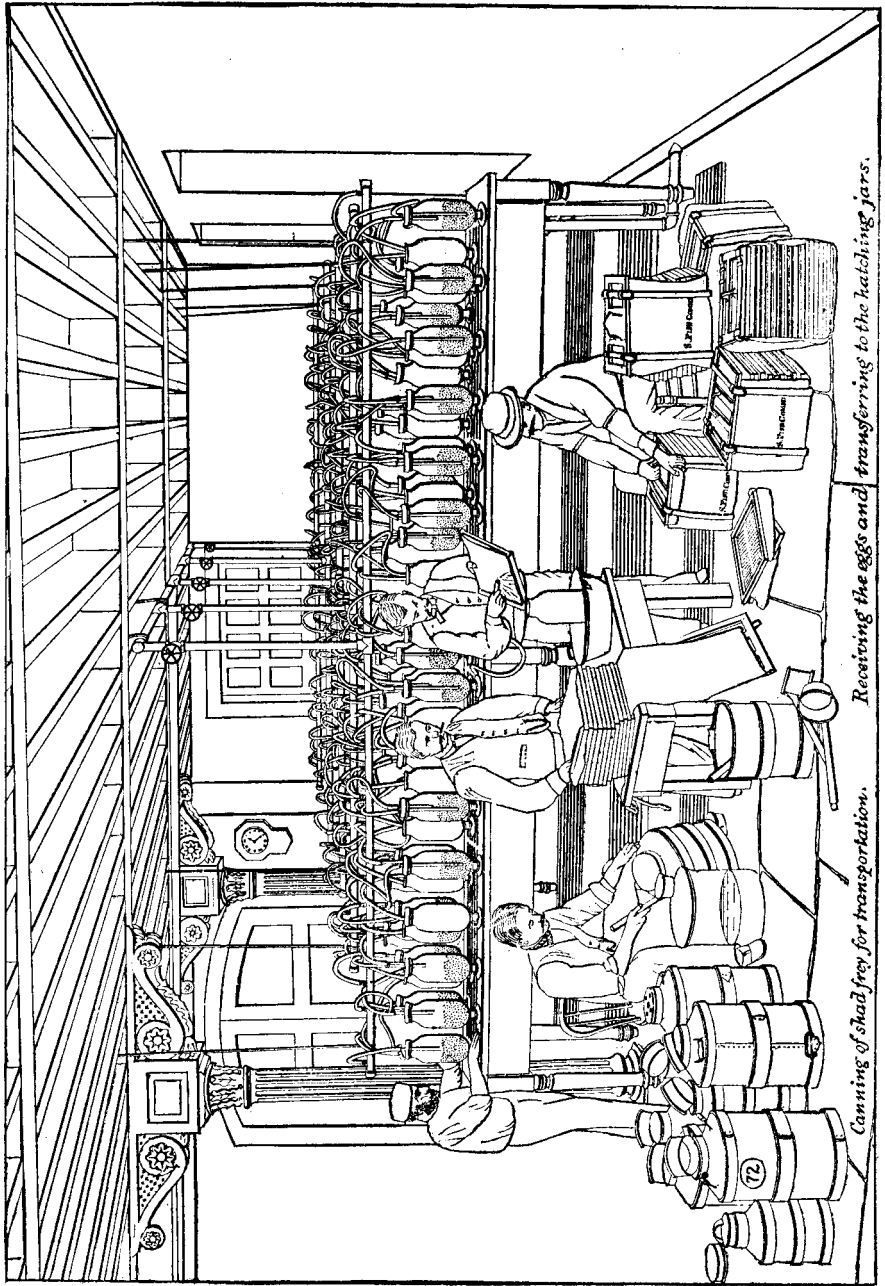
WYOMING TERRITORY—

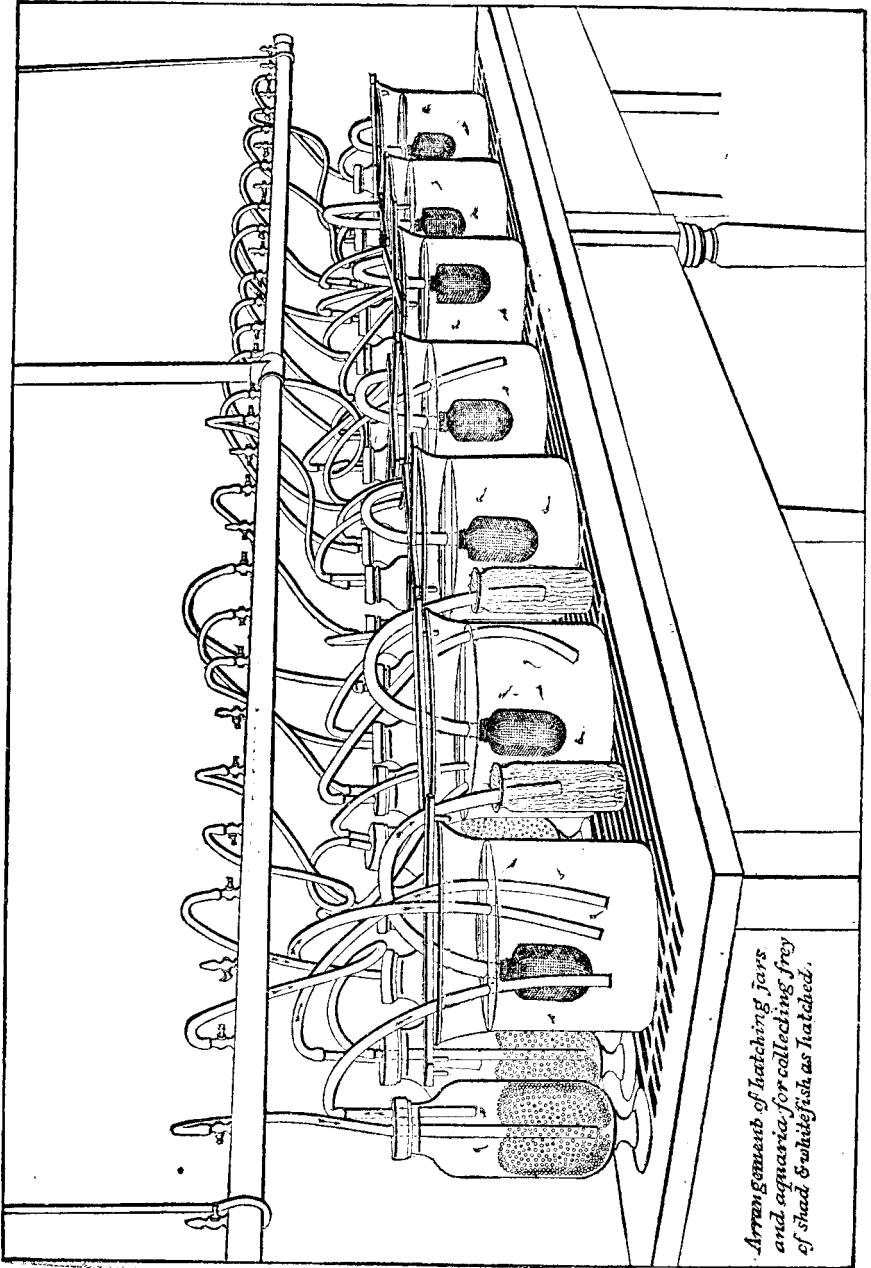
Otto Gramm, Laramie (Commissioner for the Territory.)
 For Carbon county, B. F. Northington, Rawlings.
 For Laramie county, Dr. W. N. Hunt, Cheyenne.



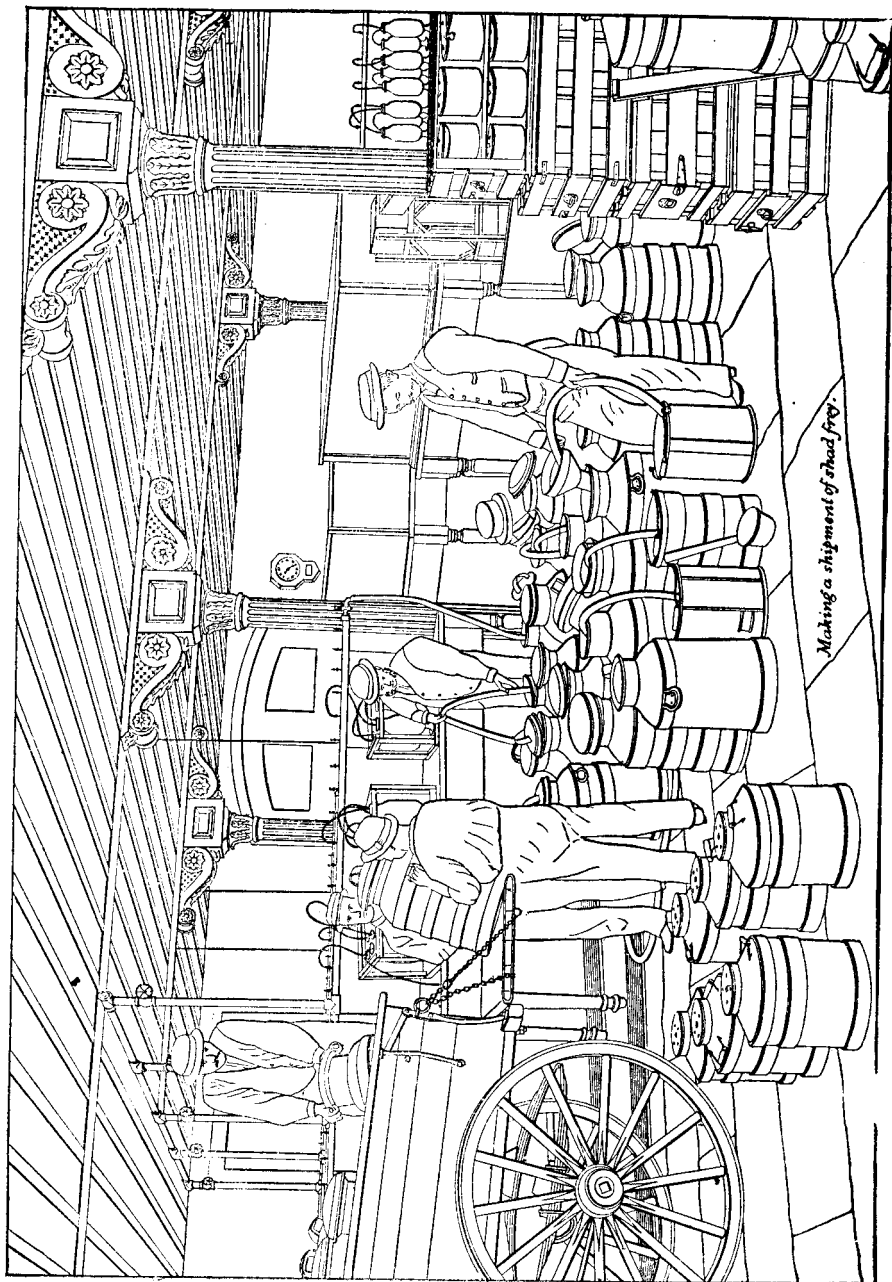
Rider Caloric Engine in use at Choptank Hatching Station.



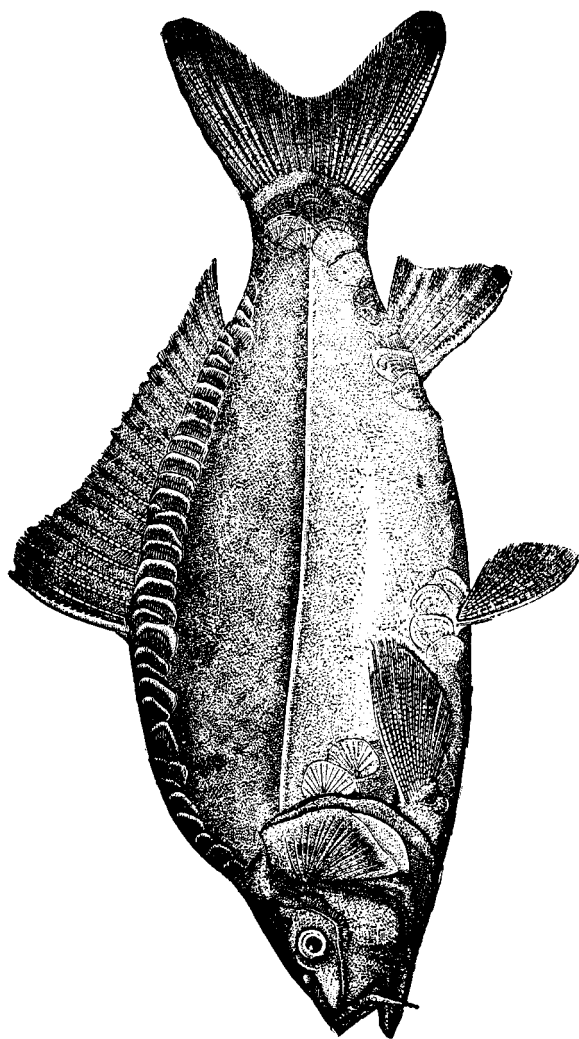




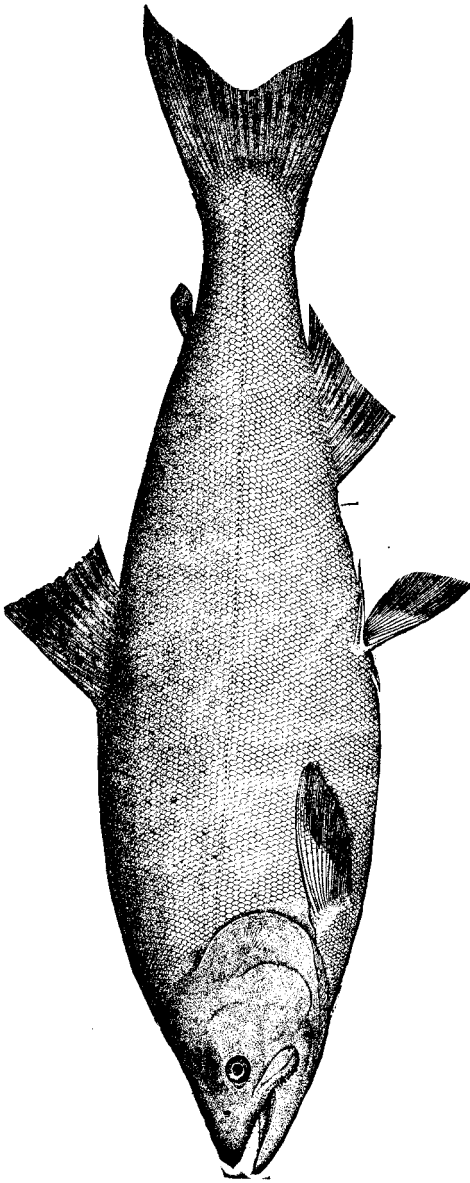
*Arrangement of hatching jars
and aquaria for collecting fry
of shad & whitefish as hatched.*



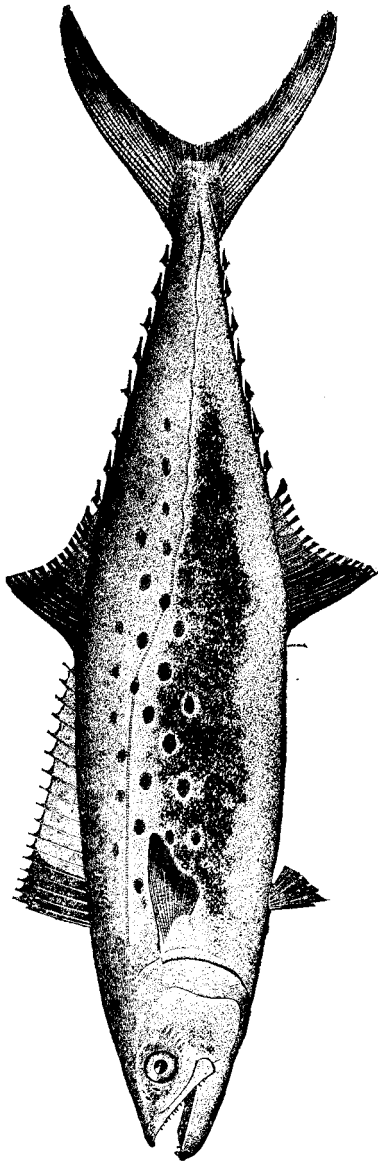
Making a shipment of shad fry.



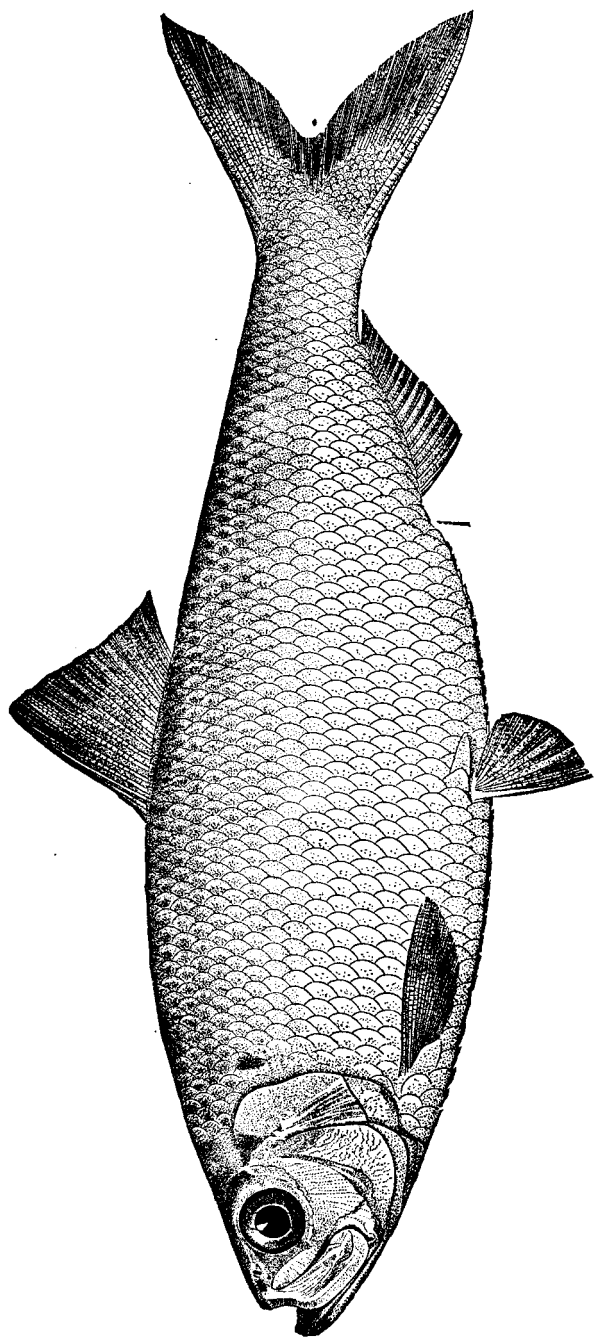
GERMAN (MIRROR) CARP (one-eighth natural size).



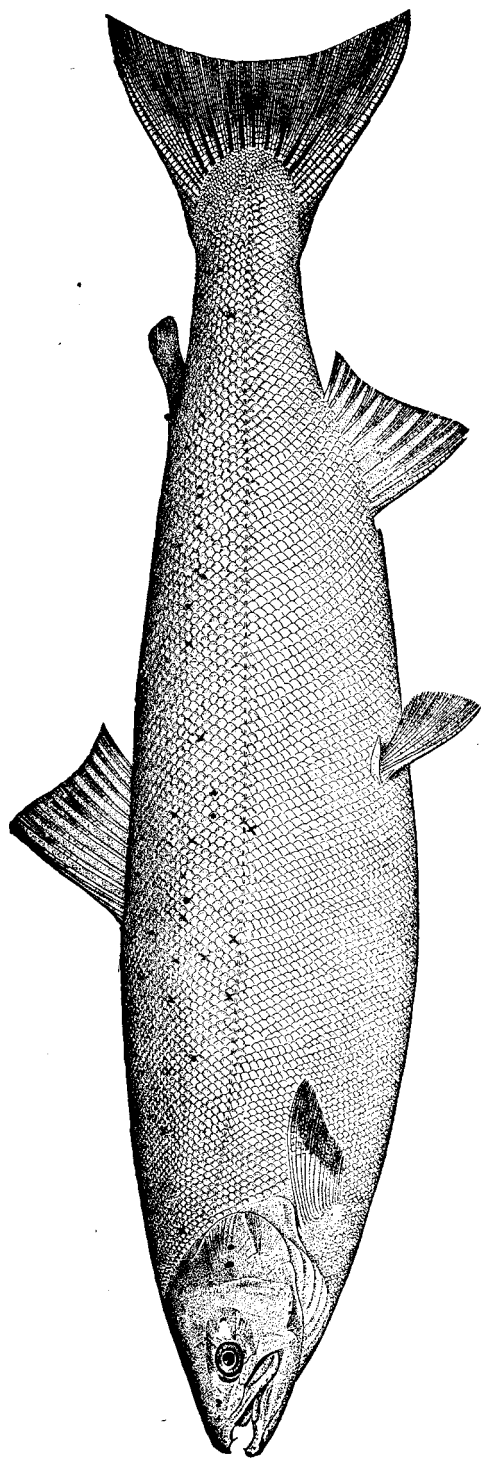
LAND-LOCKED SALMON.



SPANISH MACKEREL (one-quarter natural size).



SHAD, MALE (one-quarter natural size).



COLUMBIA RIVER SALMON (one-sixth natural size).