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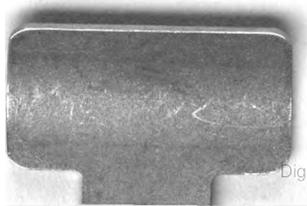
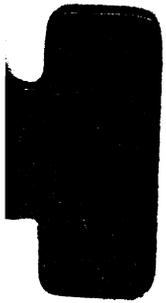
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PENNSYLVANIA

REPORT OF

DEPARTMENT OF FISHERIES





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COMMONWEALTH OF PENNSYLVANIA



Report of the

Department of Fisheries

From December 1, 1913, to
November 30, 1914

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COMMONWEALTH OF PENNSYLVANIA,
DEPARTMENT OF FISHERIES.

COMMISSIONER OF FISHERIES.

NATHAN R. BULLER, Office, Harrisburg.
CHIEF CLERK, Robert R. Featenby.

BOARD OF FISHERY COMMISSIONERS.

JOHN HAMBERGER, Erie.
W. A. LEISENRING, Mauch Chunk.
JOHN C. OGDEN, Johnstown.
JOHN H. WAGNER, Carnegie.

SUPERINTENDENTS OF HATCHERIES.

CORRY HATCHERY, No. 1, William Buller, Corry, Erie County.
ERIE HATCHERY, No. 2, Phil H. Hartman, Erie, Erie County.
BELLEFONTE HATCHERY, No. 3, W. F. Haas, Bellefonte, Centre
County.
WAYNE CO. HATCHERY, No. 4, G. W. Buller, Pleasant Mount.
TORRESDALE HATCHERY, No. 5, J. R. Berkhou, Torresdale,
Philadelphia.
ERIE AUXILIARY, No. 6, A. G. Buller, Union City, Erie County.



LETTER OF TRANSMITTAL

Honorable John K. Tener, Governor of Pennsylvania:

Sir:—Herewith we have the honor to transmit to you the report of the operations of the Department of Fisheries for the year ending November 30, 1914.

Respectfully,

(Signed) N. R. BULLER, Commissioner.
JOHN HAMBERGER,
W. A. LEISENRING,
JOHN C. OGDEN,
JOHN H. WAGNER.



REPORT
OF THE
BOARD OF FISHERY COMMISSION

Honorable John K. Tener, Governor of Pennsylvania:

Sir:—Herewith we have the honor to submit the report of the operations of the Department of Fisheries of Pennsylvania for the year ending November 30, 1914:

At the organization of the Board of Fishery Commission after your appointment of the present Commissioner of Fisheries, Honorable N. R. Buller, in accordance with your suggestion, the Board worked out an elaborate series of plans for the rehabilitation of the hatcheries and the replacement of all temporary structures by permanent ones, and the discontinuance of all temporary work that could possibly be avoided. Temporary work is a mere makeshift, and involves in a short time heavy expenses for repairs that in time equals or exceeds the first cost of the temporary structures, while temporary structures are always unsatisfactory.

Owing to the condition of the treasury, the Department was unable to receive all the money that it asked for, and it was therefore decided to concentrate the work of rebuilding upon as many hatcheries that could be finished with the funds provided. The hatcheries selected were those at Erie, Corry, Torresdale and Wayne county.

Erie has grown to be the largest fresh water fish market in the world, and the Department decided to erect there a hatchery which would be commensurate with the requirements of the station. Through the co-operation of the Water Commissioners of the city of Erie, the Department was granted a plot of ground on the filter plant grounds of the city, immediately on the lake shore which gave it unequalled facilities for receiving eggs and for loading the fish on the boat to be planted.

The site is an unequalled one for a fish hatchery by any site in the United States. In keeping with the character of the substantial and ornate buildings of the Water Commissioners, the Department erected a building of the substantial and fireproof character, and at the same time its architectural effects are in exact accord with the buildings of the city.

Here was installed the most perfect equipment known to the fish cultural science, and there is room for increasing the facilities for hatching the fish so that the hatchery will supply the demands of the business for many years, though in case the house should become overcrowded its work can be supplemented by the hatcheries at the Erie Auxiliary hatchery at Union City, the Wayne county hatchery at Pleasant Mount, and the Torresdale Fish hatchery on the Delaware river at Torresdale, Philadelphia.

For educational purposes a series of aquariums have been installed at the Erie hatchery which ought not only to afford much pleasure to visitors, but enable students to study fish life and fish culture. The hatchery is really an attraction and it numbers visitors from every section by the hundred every day.

At the Wayne County hatchery much permanent work was done in pond building, especially in improving the facilities for bass culture. Experience has shown that the bass can only be successfully cultivated in large areas of water and these areas are being provided for. The Department has solved the problem of feeding young bass, and last August had 500,000 black bass from three to four and a half inches long, with which it hoped to supply many of the waters in the State, but unfortunately these hopes were disappointed by a cloudburst which washed out the unfinished dams and allowed the fish to escape. This accident cannot happen again when the permanent work is entirely completed, and the water at the hatchery under absolute control.

At the Torresdale hatchery a complete and substantial hatchery was erected largely for the hatching of shad with which to keep the Delaware river stocked with this edible fish. The hatchery, however, has facilities for hatching other fish and can supplement the work of the Erie hatchery, and is also used for propagating catfish and yellow perch, as set out more fully in the report of the Commissioner and the Superintendent of the hatchery.

At Corry a large and complete hatchery of brick, concrete and steel has been erected, and is not only fitted to the work it is designed for but at the same time it is a worthy ornament to the Commonwealth. Nearly all the ponds there have been completed in the most substantial manner with concrete and steel, the result being much more complete and economical work. It is proposed during the coming year to extend the series of ponds for the cultivation of the brown trout, the demand for which is growing throughout the State, and then erect a large pond for black bass work, the water by this time having warmed up sufficient to enable the bass to be cultivated successfully.

It is hoped to secure from the next Legislature sufficient appropriations to complete the work at the four hatcheries mentioned, and also to rehabilitate the hatchery at Bellefonte where the buildings are sadly in need of repair.

The hatchery at Union City is somewhat of a problem on account of the water supply, and it is not proposed to do any work there until this matter of water is satisfactorily adjusted.

The first requisite of the success of a hatchery is the water supply, plenty of it, and all absolutely under the control of the Depart-

ment. Until such conditions can be secured it is not proposed, as said above, to spend any money.

The Board has given much consideration to the matter of fishways and it admits that the problem is one which has as yet never been satisfactorily solved. The large dam of the Pennsylvania Water and Power Company in the Susquehanna river at Holtwood proved an absolute barrier to the ascent of shad, and many plans have been submitted to the Commission by sanguine inventors, but in all of them there was a failure to consider the enormous destructive power of the concentrated water of the Susquehanna river with its heavy floods in the winter of ice and trash.

The Power Company has taken great interest in the matter of the fishway and has co-operated with the Department in every way, sparing no labor or expense. A fishway has been erected on the western shore of the river, which when completed, it seems ought to fulfill the conditions. The fishway extends on the top of the dam several hundred feet down to the main channel of the river, making a descent of water at about what it was before the dam was erected. Although constructed in the most substantial manner the lower end of the fishway could not withstand the enormous force of the winter flood, and there was a washout at the lower end. During the past year the company has extended the fishway several hundred feet, giving less fall, and it is hoped that it will now withstand the force of the current and that fish will ascend it.

While the Act of May 1, 1909, P. L. 353, provides for the appointment of thirty wardens, the Legislature has never appropriated enough money to allow the employment of this whole force. During the past year the Department was only able to employ ten, which gave each man an extremely large territory to cover and made it impossible to prevent the violations of the fish law that could be done if the force was normal and the men could better co-operate.

The fact that there are so few men renders the traveling expenses very much heavier than would be the personal expense of each man, if he only had to cover a small territory. To secure violators of the law it is necessary to patrol the streams, and it is impossible to thoroughly patrol so many miles of streams as Pennsylvania has, with a force of nine or ten men. The Board wishes to say, however, that the wardens have shown a commendable zeal, and have done much good work especially in bringing about a feeling among the manufacturers that they must take care of their pollution, because the streams in the State must be brought back to their pristine clearness, if they are to be the fields in which the food supply of fish is to be raised.

Quite a number of suits have been brought for pollution, and in every case they have been settled by the operators proceeding earnestly at work to put in clarification plants that will absolutely prevent refuse, deleterious to fish life, getting into the streams. The Department has no desire to harass the manufacturers with the expense of fines, but it is its sworn duty to enforce the law, and that is all that is insisted upon.

The importance of this clarification of the streams is evident to every one who is interested in having fish in the waters of the State,

and in accomplishing this the recent outbreak of the foot and mouth disease has shown another feature in the importance of this purification. One association of cattle breeders traced the outbreak of the foot and mouth disease to refuse from a tannery which had washed the hides of cattle infected with foot and mouth disease brought from China.

The Department therefore hopes that the Legislature will make a sufficient appropriation to give it all its force of wardens, unless in its wisdom it decides to place all protection under the charge of the Police Department, who could do the work if they were furnished with the additional men now allowed by law to the Department of Fisheries.

During the year the Department has actively co-operated with the Fish Departments of other States and with the United States Bureau of Fisheries, and with the authorities of the Dominion of Ontario, the result being that the Department has been enabled to secure a goodly supply of white fish eggs, pike perch eggs, lake trout eggs and muscallonge eggs.

The Board would again call the attention of the Legislature to the inadequate appropriation for the expenses of the Commission. Certain duties and responsibilities are placed upon them, but not sufficient money is provided to pay their expenses. As the Commissioners are expected to do their work without pay, they should at least be allowed enough expense money to enable them to carry out all of the duties placed upon them by law.

Very respectfully,

JOHN HAMBERGER,
JOHN C. OGDEN,
W. A. LEISENRING.
JOHN H. WAGNER.

REPORT OF THE COMMISSIONER OF FISHERIES

Hon. John K. Tener, Governor of Pennsylvania,
Harrisburg, Pa.

Sir:—Herewith is transmitted the report of the operations of the Department of Fisheries for the year ending November 30, 1914:

The past year has been one of achievement, as it has been devoted to carrying out the suggestions that you made on my taking office, that the building work at the hatcheries should be of the most substantial and permanent character, and the buildings worthy architecturally of the dignity of the Commonwealth.

Owing to the size of the appropriation it was decided to confine the work to the completion of four hatcheries, rather than spread the money over the whole six. There still remains a great deal of permanent work necessary to entirely complete the hatcheries, but it is hoped the Legislature will grant the necessary funds, and then Pennsylvania will have a Department of Fisheries worthy of the name and equal to any in the United States, or it is not too much to say, of the world.

The work of rebuilding the hatcheries has, of course, interfered greatly with the work of propagating fish, but the Department is glad to say that the conscientious work of the Superintendents shows in the good supply of fish which was turned out from the hatcheries. With the exception of the commercial fish, all the fish now sent from the hatcheries are yearlings, varying in size from two and a half to seven inches. This appears to give the very best satisfaction as is evidenced by the returns.

Each applicant for fish receives a notice of the number of fish sent him, with the request that he return the notice stating how many fish he actually received and in what condition. This is an absolute guarantee of the correctness of the figures of the number of fish sent out by the Department, and it also affords an opportunity for the recipients of the fish to express their views, and the Department is glad to say that it has hardly received a half dozen complaints during the whole year, while most of the applicants are enthusiastic over the size of the fish. The following is the distribution of fish for the year:

Yearling Brook Trout,	1,123,525
Yearling Brown Trout,	215,300
Adult Brown Trout,	300
Adult Brook Trout,	400
Brown Trout Eggs,	10,000
Lake Trout,	9,110
California Trout,	10

Brook Trout Eggs,	42,000
Pike Perch Fry,	40,736,400
Yellow Perch Fry,	78,005,000
Yellow Perch, Adults,	73,266
Muscallonge Fry,	592,500
Muscallonge, Yearlings,	106
Small Mouth Bass, Fingerling,	700
Herring Eggs,	235,273,000
White Fish Eggs,	4,960,000
Blue Gill Sunfish, Fingerling,	150
Yellow Perch, Fingerling,	1,125
Catfish, Yearling,	63,500
Catfish, Adult,	435
Tadpoles, 2 year old,	21,300
Goldfish, Yearling,	2,325
Goldfish, Adult,	18
White Fish, Fry,	80,000,000
Lake Herring,	14,760,000
Blue Gill Sunfish, Yearling,	139,370
Small Mouth Bass, Yearling,	39,305
Grass Pike, Yearling,	2
Tadpoles, Yearling,	130,300
Blue Gill Sunfish, 2 year old,	10,000
Brook Trout, 2 year old,	39,607
Minnnows, Yearling,	50,000
Blue Gill Sunfish, Adult,	1,850
Sunfish, Common, Adult,	520
Calico Bass, Adult,	94
Rock Bass, Adult,	69
Small Mouth Bass, Adult,	384
Large Mouth Bass, Adult,	10
Frogs, Adult,	10
Shad Fry,	11,540,000
Shad Eggs,	10,000
Pickereel, Adult,	85
Chubs, Adult,	20
Carp, Adult,	14
Suckers, Adult,	2
Sturgeon, Adult,	13
Eels,	550
Turtles,	8
Roach, Adult,	50
Total,	467,852,733

FINANCIAL STATEMENT.

The following is a statement of the receipts and expenditures of the Department of Fisheries for the year from December 1, 1913, to November 30, 1914.

	Received from State Treasurer.	Balance on hand Decem- ber 1, 1913.	Expenditures.	Balance on hand Novem- ber 30, 1914.
Hatcheries,	\$47,360 15	\$10 31	\$47,360 15	\$10 31
Wardens,	16,450 10	49 23	16,450 10	49 23
Contingent fund,	1,000 00	45 66	833 14	212 52
Commissioners expenses,	1,838 54		1,838 54	
Counsel fees,	2,205 19		2,205 19	
Operating launch,	4,769 26		4,769 26	
Buildings, ponds, extensions, etc.,	20,182 85		20,182 85	
Field work,	6,067 71		6,067 71	
Fishways,	3,062 85		3,062 85	
New hatchery at Erie,	16,871 85		16,871 85	
Presque Isle Peninsula,	17,932 39		17,932 39	

The following moneys were paid to the State Treasurer during the year being derived from the following sources:

Commercial Hatchery Licenses,	\$150 00
Fines for violations of the fish laws,	2,687 75
Seine Licenses,	81 00
Tidewater Seine Licenses,	12 00
Lake Erie Licenses,	2,976 00
Confiscated property sold,	2 85
Carp Permits,	115 00
Total,	\$6,024 60

ITEMIZED EXPENSES OF HATCHERIES.

The following table shows the itemized expenses of each hatchery for the year ending November 30, 1914:

Bellefonte,	\$3,475 00	\$171 32	\$1,631 82	\$1,088 24	\$1,831 28	\$851 09	\$9,148 75
Corry,	4,882 88	504 50	954 34	1,108 67	999 35	699 19	9,148 73
Erie,	2,110 00	422 66	643 38	1,357 39	219 51	649 61	5,402 55
Erie auxiliary,	3,168 81	246 30	907 79	351 79	18 51	440 35	5,133 55
Torresdale,	3,395 00	674 35	701 40	1,170 93	148 69	901 62	6,991 99
Wayne,	2,482 92	918 87	387 76	6,691 91	40 89	915 43	11,417 78
Miscellaneous,	\$19,494 41	\$2,938 00	\$5,226 49	\$11,768 93	\$3,258 23	\$4,557 29	\$47,243 35
Total,							116 80
							\$47,360 15

SHAD SEINE LICENSES.

During the season 30 licenses were issued and the licensees reported a take of 8,398 shad, valued at \$3,421.91. Other food fish taken were valued at \$695.56, making a total of all fish caught \$4,117.47. The catch of shad did not nearly equal the catch of the previous year, this being due to the low temperature of the water during the open season, the shad not coming up until the water was warmer and as this took place after the close of the season the catch was small. The following table does not show the real catch of shad as a great many were taken by dip nets and the actual catch can not be secured.

	Shad.		Suckers.		Carp.	
	Number.	Value.	Pounds.	Value.	Pounds.	Value.
Bucks,	369	\$221 05	7,662	\$622 86	435	\$43 70
Lancaster,	2,401	1,182 80	150	7 60
York,	4,628	2,018 06	279	21 60
	8,393	\$3,421 91	7,662	\$622 86	864	\$72 70

LAKE ERIE FISH INDUSTRY.

While the Commonwealth of Pennsylvania has only 40 miles of shore line on Lake Erie, the port of Erie is the largest fresh water fish market in the world. The amount of nets that are set every day run into hundreds of miles and the production of fish last year was 9,205,767 pounds, valued at wholesale at \$393,700.48. These figures convey forcibly the value of the fish business in Lake Erie, where the city of Erie is only one of a number of fishing ports. The value of the boats and tackle used in taking the fish and the warehouses where they are handled runs into millions of dollars and gives employment to hundreds of men.

The most remarkable thing, however, in this matter and one in which the Pennsylvania Department of Fisheries takes pride is the fact that all this immense business is due to the artificial propagation of fish by this Department and the United States Government and other States, and the whole restocking is done by the saving of the eggs which would be a waste product if it were not for the work of the hatchery men. There is not the slightest question in the minds of any fisherman as to the value of the work done by the Pennsylvania Department of Fisheries in this matter, because it was not many years ago, before the artificial propagation was taken up, that the catch of fish had so fallen off that the pursuit of fishing was no longer profitable.

The figures given above do not convey entirely the immensity of the business because they show the wholesale prices and the persons who use this large supply pay from 50 to 100 per cent. advance on these figures on account of freight and the handling by the fish dealers at their respective homes. Taken altogether the fish industry at Erie is a most valuable object lesson as to the value of artificial propagation of fish in furnishing a very important food supply to the people. If Lake Erie with the tremendous drain made upon it by the fishermen can be kept stocked with fish, it shows that the other lakes and streams in Pennsylvania can also be restocked to their former productiveness if the hatcheries are worked to their full capacity and the fishermen observe the laws against wasteful and destructive methods of fishing.

	Pounds.	Value.
Cisco or Lake Herring,	5,468,819	\$215,511 04
Blue Pike,	2,851,576	107,272 35
Yellow Perch,	81,094	3,420 85
White Fish,	596,232	60,425 65
Lake Trout,	448	34 22
Pike Perch,	7,342	787 20
Catfish,	2,044	191 41
Carp,	76,466	1,837 42
Sturgeon,	5,703	1,173 55
Miscellaneous,	116,043	3,046 79
Total,	9,205,767	\$393,700 48

The above statistics showing the take of fish on Lake Erie for the past year which the Department was able to gather, are as complete as possible to make them. In addition to these figures there were at least two million pounds of fish caught which it is impossible for the Department to get an accurate account of on account of the hook and line and trap net fishing which covers a number of species of fish. This is worth taking into consideration as the revenue amounts to considerable to the fishermen who make their living from the fishing in Lake Erie.

COMMERCIAL FISH HATCHERIES.

There were 15 licenses issued during the year 1914 for commercial fish hatcheries. These hatcheries did a business of \$47,478.91. These figures do not equal the figures of the previous year by \$16,000 which is due to the fact that one of the hatcheries did no business at all on account of building new ponds and reconstructing the hatchery in general and three of the licenses were not issued until the year was practically over, making it impossible for them to report a big business.

These hatcheries are compelled to take out a license, the fee of which is ten dollars, good for the year in which it is issued. There is no tax other than the license fee. Each shipment of fish must be accompanied by an invoice showing the number of the hatchery and the number and the weight of the fish, which invoice is good for six days.

Following is the report of the output of the hatcheries:

	Pounds.	Number.	Value.
Dead trout for market,	56,971	126,087	\$29,983 48
Trout, live, mature,		111,014	5,092 84
Brook trout, fingerlings,		11,500	540 00
Brook trout, advanced fry,		272,300	753 60
Brook trout, eyed eggs,		15,743,000	7,739 12
Brook trout, Green eggs,		6,816,818	2,887 07
Black Bass, fry,		3,000	60 00
Gold fish,		15,196	447 20
Sunfish,		1,212	25 60
Total,			\$47,478 91

WARDENS.

While the primary business of the Department of Fisheries is the propagation of fish and the restocking of the streams, the Legislature in its wisdom has also devolved upon it the important duties of enforcing the laws against forbidden methods of fishing, and also against the pollution of the streams.

The Commonwealth of Pennsylvania with its 46,000 square miles is an Empire in itself through which run thousands of streams and hundreds of lakes. To patrol these streams thoroughly would require a force too large to be considered, but in this case the Legislature has allowed to the Department the appointment of 30 wardens, yet in its wisdom it only appropriated sufficient money to pay for 10. This would give each warden about six counties and a territory so large that it is utterly impossible for him to do it the full justice that is demanded.

Complaints pour in constantly to the Department of infractions of the fish law and the Department does its best to cover the cases, but in most instances the distances are far, the traveling expenses are heavy, and by the time the warden reaches the spot the violators have either fled or their neighbors decline to testify against them.

With over 40,000 manufactories in the State it is utterly impossible for the small warden force to do full justice in regard to looking up the cases of pollution, especially as under the rigid requirements of the Courts the evidence has to be so direct and conclusive with no break whatever in the chain. There are many manufacturers that do not run a constant stream of refuse into the water, but at intervals. Some of them at night, showing, it would seem, a deliberate desire to evade the law. In no instance has the Department been able to secure a conviction of any such violators where it has had to depend upon the testimony of the residents of the place, because no one took the trouble to get samples of the refuse and to get them in such a way that there could be no mistake in showing to the court that the pollution in question came from the manufactory charged with the offense.

When all is considered, however, the Department is gratified with the splendid work done by its small force, not only in making would-be violators of the law timorous, but in many cases bringing about a clarification of the streams without resorting to the force of the law. By tact and persuasion they have induced the manufacturers to take steps to remedy the trouble, and the result, as said above, has been most gratifying.

Last Spring the Department called upon the Department of Police for assistance in enforcing the provisions of the law against illegal fishing. The Superintendent, Major John C. Groome, responded most heartily and furnished a number of details which were sent to the sections from which the most numerous complaints came, and the results attained merely went to prove how efficient a force Penn-

sylvania has in its State Police. In every instance where they appeared in the neighborhood they gathered in some violators of the law and by the swiftness of their action and the celerity of their movements they brought about such a feeling among would-be violators of the law that for the time being at least no further complaints were heard from those sections.

It is rather a curious fact that in some sections of the State the violations of the fish law by the inhabitants thereof are not regarded as flagrant, but woe betide the stranger who enters their gates and thinks that he will break the law. Upon these strangers the neighborhood calls upon the Department to inflict the direst penalties of the law, and in some of the cases where the State Police were sent in the result had rather a humorous side, because the State Police gathered up some of the natives they found violating the law, whereupon loud remonstrances poured into the Department that the police had been sent for to arrest the intruders from other sections and not the peaceful dwellers in their own community.

During August a number of persons were evidently intent on defying the law as they could be seen in broad daylight erecting wing walls in the Susquehanna river near Columbia. As many as a dozen men could be counted at work on walls in broad daylight showing an utter disregard for the law, because the wing walls could be intended for no other purpose than as extensions for eel baskets or nets.

The river is very wide there and one or two men would be useless in trying to enforce the law, so the Department again asked the State Police for a detail to go there and make some examples, and understanding the situation, the Department of Police sent a detail of four men who took up their quarters at Columbia and planned a campaign against the violators. When everything was in readiness the detail swooped down upon the violators of the law capturing four, who had used nets placed in the wingwalls. With the prisoners, boats and nets the policemen also confiscated a large number of fish which were sent to the Hospital.

The four men were promptly convicted and fined \$20.00 each, while the boats, nets and fish were confiscated. The lesson was a good one and made the other owners of the wingwalls shy about using them, because they could not tell whether another detachment of police were watching for them. The advantage of the police force in this case was due to the fact that the Police Department was able to send a detail at once to the scene of action and make the detail large enough to be efficient.

The lesson at Columbia did not seem to have such deterrent effect on other sections of the river as had been hoped for, so the detail was again asked for and made a tour along the river, landing thirteen more builders of walls who were using the wingwalls to guide the fish to the nets. These men were all convicted and fined. Any person caught red-handed using a net in wingwalls could have no possible excuse for amelioration of sentence, it being thoroughly understood that the use of this device was entirely forbidden by law.

Reports come from various other sections of the State that wingwalls were being erected and nets probably used, but except in the

cases of the State Police the Department was unable to secure any arrests. There is no more destructive device than fish baskets operating with wingwalls, or nets operating with wingwalls, because no fish escape. There are mythical stories that when the fish baskets were legal there were people who returned the game fish to the water, but no photographs of any returning such fish have been received by the Department. The trouble is that when a fish got into a fish basket it so injured itself that it could not be returned to the water so unharmed as to live.

The Department is considering in view of the violations of the law that much more stringent measures must be taken to prevent the use of this destructive method of fishing. Under the provisions of the law any person using any device to prevent the migration of fish can be fined \$100.00, and perhaps a lesson or two of this kind might bring about a better observance of the law. The remains of the old wingwalls in the streams is a temptation to the unthinking to rebuild them, and while the law provides that any Fish Commissioner, fish warden, deputy warden, sheriff, constable, or other special officer, or any peace officer in this Commonwealth is hereby authorized and commanded to proceed with such force of the county as may be necessary to destroy any device for catching fish, used contrary or prohibited by law, the Department finds it difficult to induce the officers in question to proceed to destroy such devices as the wingwalls used to fish baskets, because there does not seem to be any way by which the said officer can be reimbursed.

The section of the law commanding a sheriff, or other officer, to destroy any device, also provides that any sheriff, deputy sheriff, constable, special officer, or other peace officer of this Commonwealth who shall refuse or neglect to proceed with such force of the county to forthwith remove and destroy any existing devices illegally used for the catching of fish within his jurisdiction, after being notified in writing of the existence of such illegally used devices by the Commissioner of Fisheries, or who shall refuse or neglect to remove and destroy any such illegal devices for catching fish within this Commonwealth of which he shall have cognizance, shall on conviction thereof be subject to a fine of \$50.00, or be imprisoned in the county jail for a period of not less than three months nor more than six months.

In view of these provisions it seems almost impossible that at least some of the officers mentioned in Lancaster county are unable to see the unauthorized devices in the Susquehanna river below Columbia, because there are anywhere from twenty to forty in full view, yet not a single arrest has been made by any officer of that county, nor does the Department know of any device that such officers has destroyed in accordance with the law.

The Water Supply Commission, under the Act of June 25, 1913, can call upon the builders of the wingwalls to remove the obstructions and in case the order is not complied with can cause the removal of such obstructions themselves and collect the expense from the owner. There is nothing in the fish law which would enable the Department of Fisheries in case of ordering a sheriff to destroy wingwalls that would allow it to collect the costs from the builder of the wall.

It is an open question to the Department whether it would not be the best thing to take away from it the warden service and place all the protection and enforcing of the laws in the hands of the Police Department, which is so fully and thoroughly equipped for the work. The addition of the wardens now authorized by the Department to the Police Department would give that Department the necessary number of men to do the work efficiently, and one of the advantages that would arise would be from the fact that the police would have 250 to select their details from, and the men sent on an errand would not be familiar to the people in the section to which they are sent, as the wardens necessarily become from the fewness of their numbers. It probably would be desirable for the Department to have a force say of four wardens whose duty it would be to attend the pollution cases, because the pollution cases require certain training in order to bring the cases efficiently before the court.

The Department of Police is organized for the detection of criminals and their arrest and conviction. Every man is thoroughly trained at the quarters before he is put to work, and this police force is now acknowledged everywhere to be the most efficient body of men in the country. If the enforcement of the fish laws was given to this Department, and they had the added force of men now authorized for the Department of Fisheries, the State could be most efficiently patrolled, and in cases of necessity, as many men could be concentrated at a given point as would be required to do the work.

With the knowledge that the State Police were constantly looking after violators of the fish law, the Department is thoroughly convinced that violators would be very scarce, and with the scarcity of violators the public would learn the value of enforcing the fish laws from the increased number of fish there would be in the waters of the State, and with this knowledge would grow up the sentiment that the fish laws must be enforced.

The little force of wardens have been most efficient and active in performing their duties, but owing to the large territory which each one must necessarily cover, of course the showing is not so good in the total as it would be if the whole force of 30 men had been at work. Every complaint that reached the Department was investigated at the earliest possible moment, but it is extremely difficult, if not impossible, to secure convictions where the violators were not taken red handed by the wardens.

The scent grows cold in two or three days, and neighbors are loath to testify against another neighbor or are deterred by fear that the violator of the law will take his revenge by burning their buildings. In scarcely a dynamite case has the Department been able to secure conviction on information. So far as prosecutions of the pollution cases go, prosecutions on information fail absolutely, because the witnesses have not sufficient technical information or knowledge of the circumstances to furnish exact evidence which the court requires in cases of pollution.

It is very gratifying, however, to feel that the wardens have done good work, and in their immediate sections have almost entirely

broken up illegal fishing, and brought about the clarification of streams that seemed impossible two or three years ago. The Department insists that the wardens shall use tact and make no arrests for merely technical offenses. Women and children are rarely, if ever, willful violators of the law, and when found with illegally taken fish their attention is called to the matter and the law is explained to them and they are warned not to violate the law again.

Such cases have not been many, but have been purely technical violations where a fish is short part of an inch, or some fish like a rock bass has been taken for a sunfish. Indeed, experience has shown that where children have the law explained to them, they have really become valuable assistants in enforcing the law, for in their childish way, if they see a grown person taking a fish illegally, they are apt to promptly call his attention to the same.

The arrest of people for merely technical violations of the law, serve no good purpose, but is apt to prove an irritant to the community who will then raise a clamor that some innocent person is fined for killing a fish undersize, while a manufacturer who allows filth to run into a stream killing fish by the thousands, escapes with merely a light fine.

Of course, all laws are meant to be enforced, but to be enforced the law must be backed up by public sentiment, and this public sentiment will only sustain the law when it thoroughly understands its purpose. The Department is absolutely convinced that when the majority of the people of Pennsylvania understand the purpose and value of the fish laws they will support themselves with the same determination that they support the laws that are passed for the encouragement of the public schools.

The Delaware River where it flows between New York and Pennsylvania is an ideal stream for the fishermen. Its waters are pure and undefiled, and the scenery is for the most part of the wildest and most picturesque character. From the purity of its waters the river is essentially fitted for the life of fish, and as far back as 1889, the Fish Commissioners of New York and Pennsylvania held a meeting and provided for the protection of the fish of this section of the river by the passage of uniform laws for the Delaware River in each State.

These acts were passed and they forbid the use of any destructive devices, no method of taking fish being allowed except rod, hook and line, except in the case of the shad fishermen who are allowed to use nets.

Complaints reached the Department that eel wiers were being used in the river, and the Department asked the co-operation of the New York Conservation Commission in breaking up the practice. It has been the habit of the fishermen when approached by officers on one shore to flee to the other shore in the other State and thereby escape arrest, but by having the authorities of both States at work this method of escape was destroyed.

The Department requested a detail of State Police from the Superintendent, Major John C. Groome, and the request was promptly granted, several men being sent to Pike County where they captured four men operating an eel wier. These men were haled before a

Justice and convicted, but gave notice of appeal. Owing to a defect in the Magistrate's record the proceedings against the defendants have to be begun anew, but the matter is in charge of competent counsel of the Department and it is hoped to make such examples of these men that the practice of using eel wiers will be broken up. The penalty for using eel wiers in the Delaware River between New York and Pennsylvania is \$50.00.

The New York Conservation Commission is very much interested in preserving the Delaware as an ideal fishing ground, and have offered to co-operate with the Pennsylvania authorities in every way and if necessary a representative of the Attorney General's Department at Albany will assist the Pennsylvania counsel at the trial of the case.

The small number of wardens it is now possible to employ renders the traveling expenses exceedingly heavy owing to the distance that the men have to be sent. Another trouble is that it is difficult to detail two men for work on account of the expense, when experience has shown that the best work is performed by two men in company.

As one man complained after he had made an arrest of three men for gigging, that when he caught them they threw him in the river and tried to drown him, and after he had overcome them and got them before a Magistrate, they all three swore directly opposite to his testimony. There are many instances where it is actually unsafe for a warden to go alone, and in other cases along streams of any width, it is necessary to have two men, one on each side of the stream or the fishermen escape.

This is advanced as another reason why the Department should be given the number of men allowed by the law. With thirty wardens, each warden would have only about two counties to cover, and he could arrange with the wardens of the adjoining districts to patrol the bad spots together.

ARRESTS.

The following is the number of arrests and convictions made by the wardens during the year. The whole number of arrests was 267, and all the defendants were guilty excepting in the case of 12, which shows how careful the officers were in performing their duty. The amount of fines imposed was \$4,426.00. The Department is not desirous of imposing fines, but has instructed the wardens to make campaigns of education so that the people may know the fishlaws and not violate them so as to subject the offenders to a fine.

In the case of pollution the Department has always shown a desire to appreciate the co-operation of the offender, and when the

offender has complied with the law it has no desire to impose upon him the further expense of a fine.

Assault and battery,	1
Carp nets in Presque Isle,	3
Impersonating an officer,	2
Dynamiting fish,	14
Fishing with seine nets illegally,	6
Illegal dip nets,	25
Illegal fyke nets,	7
Fishing with nets in trout streams,	1
Spearing in trout streams,	6
Taking short trout,	13
Taking short bass,	7
Taking short pickerel,	1
Taking bass out of season,	2
Taking game fish out of season,	11
Fishing with lay-out lines,	26
Shooting fish,	1
Gigging,	12
Fishing on Sunday,	25
Fishing in waters controlled by the Department,	4
Illegal fish baskets,	1
Pollution of streams,	53
Using illegal devices not specified,	8
Fishing within 400 ft. of dam,	7
Excessive hand lines,	7
Net with wing walls,	14
Floats,	4
Looping,	3
Interfering with officer,	3
<hr/>	
Total,	267
Arrests,	267
Fines imposed,	\$4,426
Jail,	28
Acquitted,	12

POLLUTION.

The worst condition that the Department of fisheries has to face in its work or restocking the streams is the impurity of the waters due to the refuse of every kind which is run or allowed to run into the waters.

Before the white man took up his residence in Pennsylvania all the water in the lakes and streams was pure and undefiled, fitted for

man to drink, for the cattle to quench their thirst, and for the fish to live and prosper. There is no greater chemist than Dame Nature herself, and she works with a will and earnestness that should excite the emulation of man.

When a tree fell in the forests the oxygen in the air proceeded to make it useful, and the carbonic acid resulting from the work of the oxygen was taken up by the growing tree alongside of the fallen one, and the carbon converted into plant life, while the oxygen was once more given off free to the air to again resume its chemical work. Similar processes were transformed so that from day to day there was an everlasting work of the chemical forces to destroy those things which have lived their lives and to build up those which were beginning their lives.

Nothing in nature is without its use. If the trees and brush along the streams and lakes, in course of time, fall into the waters they become shelters in which the small fish could hide, the microscopic animalculae on which the little fish lived could propagate and thus subserve a useful end. There was no trash in those days when nature ruled supreme and man did not intervene his wasteful hand.

With the coming of man all these things changed. He saw only those things which he could convert instantly into value and carelessly allowed to run away everything that could not be turned into instant use without some extra course of treatment. In the mountainside a spring of pure cold water gushed forth and started for its trip to the ocean with as unerring an instinct as that which inspires the tendril of the pea vine to reach out for a support that it may climb heavenward.

The rill of water increases and grows as it pursues its way joined by other little rills until it becomes a creek, and then winds out to the river. In the clear, cold spring water nature planted that most gorgeous dandy of our native fishes, the brook trout, and he thrived and flourished, leaping in the ecstasy of the joys of life that he might rival in a show of gleaming colors the sunbeams that played upon the ripples that his antics started. As the stream grew wider, the water warmed under the sun's rays and the trout refused longer to dwell in the waters which enervated him as the Turkish bath enervates its devotees.

That game fish should still be at the call of the angler, nature placed in these warmer waters the black bass and the Susquehanna salmon. While with these in all the waters it placed the other fish that we classify as food fish, though more people enjoy the sport of taking these fish than there are anglers who think the highest joy is to struggle with a trout or a bass.

In almost every natural person there is a joy and delight in fishing, and when the fishing fever strikes the angler he gathers up his tackle and goes to the stream side filled with the bright hopes and joyous anticipation, while his imagination pictures his return with a string of fish that will be the envy of all his neighbors and the promise of a meal fit for the gods.

Has not the State passed laws which impose penalties upon those who use destructive devices for the taking of fish, or who take fish before they have reached the age that they can reproduce themselves,

or during the season when the breeding fish should be protected, and still heavier fines imposed upon that person or corporation who turns refuse into the water and poisons it so that the fish cannot live in it.

As the angler seats himself by the banks of the stream or wades out into the current, there comes an awakening and it is hugely jarred into his mind that there is no such thing as perpetual motion, and if he wishes the wheels of the Government to keep on turning and turning smoothly, he must at times apply his own shoulder to the wheel to assist the officers entrusted with the enforcement of the law.

During the past half century the Legislature of this State and other States of the Union have devoted much time and thought in the making of laws which would restore the streams to their original purity, prevent the wasteful and destructive devices from being used, and at the same time establish plants where fish can be raised artificially and used to restock the streams. Yet the man who is fishing has found himself, as said above, face to face with the fact that the laws do not enforce themselves, but can only be enforced by the consent and help of every citizen who believes that these laws are justified.

The common law which is the basis of our laws is merely crystallized common sense, evolved from the necessity and demands of the people for protection in property and personal rights. After this there have grown up statutory laws which are enactments of the representatives of the people called for by the force of circumstances and new conditions that constantly spring up. New laws are generally formulated by new interests that arise, and in most cases their proper enforcement demands that the public be taught their reason why and the benefit from their enforcement. This is largely true in the case of the laws governing the fishing which involve the protection of the fish and the clarification of the streams and the restocking of the same by artificial methods.

Every man and child in the State understands both from moral teaching and in the innate right he feels he has to protect his property from the thief why the laws against thieving were made. He must, therefore, to fully understand the value of fish laws, be taught the reason why such and such laws have become necessary. When there was nobody to take the fish it was not necessary to have any laws in the matter. As the population grew and the number of fishermen increased it has become necessary that the rights of the people in the fish shall be guarded by law in the same manner as the rights of the people in property are guarded. It is a self evident proposition to people who look into the matter that fish should not be taken during the spawning season, and while the fish are on the nest, or else there will be no supply of young fish to grow up to take the place of the larger ones who furnish the sport and food.

No persons in their sane senses would take the setting hen from her nest to furnish a meal for the suddenly arriving guest, and the same should be true in regard to taking a fish which is guarding its nest, and at which time it is as easily caught as the hen nestling on her eggs.

The farmer who kills all his chickens before they reach the egg laying period will in a short time have no eggs, and the same is true of the persons who take the small fish before they reach the size and age when they can reproduce themselves. To have fried chicken for supper it is not necessary that all the little chickens be massacred in order to catch a large one, and the same is true as to fish. It is not necessary to use a destructive device whereby the man who wants a few large fish destroys hundreds or even thousands of little fish to attain his desire.

It is to prevent such wasteful destruction that the laws were formulated and this Department is sure that if the people can be educated to understand the reasons for these laws, as set out above, they will be as common an assent to their enforcement as there is to the enforcement of the laws protecting people in their rights of property.

The fish of the State are the property of the Commonwealth and are for the use and benefit of the whole people, not only as a very important food supply, but as a means of sport and recreation. The importance of laws protecting fish from wasteful methods of fishing are not new, as we find them to have been enacted in England as far back as the 12th century. Having taught the people the importance of the laws protecting the fish so that they will propagate and multiply, it will be an easy matter to create an aroused public sentiment of the absolute importance of keeping the waters of the Commonwealth pure and undefiled so that the fish may live and thrive therein.

That this time will come there can be no doubt, as in its short life the Department of Fisheries has seen a wonderful growth of public sentiment in this matter, and this public sentiment is further stimulated by the fact that public health, outside of the question of fish life, demands that pure water be had at the behest of the people of the Commonwealth.

When the white men came to Pennsylvania they saw in the trees the possibilities of lumber and sawmills were erected. The question of the disposal of the sawdust they settled satisfactorily in their minds by running the sawdust into the streams whereby it would be carried off without the trouble of paying for handling it. What the sawdust would do to the man down the stream did not enter into the calculation, the motto seeming to be everyone for himself and the devil take the hindmost.

Then as the country settled up other manufacturers located on the streams which afforded in many instances the power to operate the manufactories. To each of these manufacturers the same idea occurred as to the sawmill man; that the easiest way to get rid of his refuse was to send it down the stream and whether it would mar the stream was a matter of no consequence to him. They had not learned to respect the ultimate idea of liberty; that the liberty of each citizen ends where the liberty of the next citizen begins.

As the country grew in population, towns were built and cities grew up, and to the citizens thereof the streams seemed to be the proper place to dispose of the sewage. One hundred and fifty years of this sort of disposal of refuse resulted in such defilement of the streams that in many of them fish would no longer live and the municipalities using the water were compelled to spend thousands of dollars to

erect plants that would so purify the water that it could be used for drinking purposes.

At last it began to dawn upon the people that every one had the right to the use of the water as nature gave it, and after he had used his share of the water he must return it undefiled and unpolluted to the stream. Hence there began to be legislation looking to the clarification of the streams, but, of course, this legislation naturally met with opposition from the persons polluting the streams as it put them to an expense to put in clarification plants, and there were loud talks of destroying the manufacturing interests of the communities. But year by year public sentiment has grown stronger and stronger, and now there is an almost universal demand that the streams be restored to their pristine purity.

It is due to the manufacturers to say that the majority of them recognize the rights of their neighbors, and when their attention is called to the trouble they are prompt to express a willingness to do what they can to see that the provisions of the law are carried out. Here and there is a recalcitrant operator who sets up the question of expense and that he has exercised all reasonable and practicable means to comply with the law.

That refuse runs from his establishment into the stream shows that he has not exercised all practicable means, because it is practicable to remove every vestige of the pollution from the water before it is returned to the stream, though in some cases it would be extremely expensive.

The Superintendent of one of the largest manufacturing establishments in the State, whose establishment is situated on one of the most polluted streams in the State, said they could at less cost purify the pollution running from their manufactory than it now costs them to purify the water they have to take from the river to use in their plants, because they know every constituent that goes into their operations and they know exactly what would neutralize it.

With the small force of wardens at the disposal of the Department and the exceedingly meagre appropriation, it is impossible for the Department to make a general crusade against all the offending manufacturers in the State, so by the advice of the Governor of Pennsylvania, it is concentrating its efforts upon taking up one watershed at a time and notifying or bringing suit against every manufacturer along that shed that he must no longer allow pollution to get into the stream.

In one instance wardens went from the headwaters of the Sinnemahoning to its mouth and from there to Williamsport and notified every establishment that pollution must cease, and later when no decisive steps had been taken prosecution was brought against every manufacturer, about 20 in all. The result was that they all got busy and made decided efforts to comply with the law, which the Department thinks in every instance, except one, has been successfully accomplished, and that one is making energetic efforts to accomplish the desired result.

It is a curious phase of human nature that it always demands that trouble should be stirred up at some other place. When complaints come to the Department of pollution and an examination is made, if it should turn out that some of the manufacturers offending are

at the place where the complainants live, there are instantly appeals from the very complainants themselves that to prosecute the offenders at that point would be to cripple industries, but that the offenders above who are sending down polluted water should be proceeded against.

It is not enough that the manufacturers shall be compelled to desist from running refuse into the streams, but every citizen should be educated up to the point of knowing that he must give his individual effort in seeing that he himself is not an offender. The sewers of a city carry in all sorts of death-dealing refuse, and yet so many of the citizens complacently think that they have provided for the health of every town by the complete sewage system that carries off all their refuse, little regarding the feelings of the people who live below. If every citizen of the State would see to it that he is not an offender in allowing refuse to run into the stream, he would be in a much better position to complain about the manufacturer who is an offender. It is no palliation of the manufacturer's offense to set up the offense of the private citizen, but the private citizen who complains against him is much in the position of the man who lives in glass house and throws stones.

Laws were the growth of the feeling of man as they gathered in communities that steps must be taken to protect life and property. From these steps grew up the common law that is the basis of all the laws in the United States. The pollution of the streams is a menace not only to the property but the life of the citizens of the State, and it is therefore eminently proper that steps should be taken to bring about the clarification of the streams.

Pollution is simply waste, and all waste is contrary to economic laws. When a stream is polluted so that fish will not live in it and cattle will not drink it and the dweller on the water cannot use it for household purposes, certainly his property rights are invaded, and when in addition that pollution threatens his health, his life is in danger. Therefore were enacted the laws forbidding the pollution of the streams.

If every one had observed the Golden Rule, "Do unto others as you would have them do unto you," there would have been no necessity for laws in regard to pollution, but in the beginning there was much thoughtlessness in the matter and finally it got to be so that many persons thought they had a vested right to use the streams as sewers. It is much more difficult to cure than to prevent, and it is the cure that now faces the dwellers of this Commonwealth.

The control of the waters of this State is vested in the Water Supply Commission, and upon them devolve certain things in the way of preventing pollution. Upon the Department of Health devolves the duty of solving the problem of sewage, while upon the Department of Fisheries is placed the matter of preventing such refuse getting into the waters as is inimical to fish and aquatic life. The law quotes numerous substances which are forbidden to be run into the streams, and then gives the sweeping provision forbidding any deleterious, destructive or poisonous substances of any kind or character to be turned into or allow to run, flow, wash or be emptied into any waters of the Commonwealth.

The law goes on to say in the case of the pollution of waters by substances known to be injurious to fishes or fish food, it shall not be necessary to prove that such substances have actually caused the death of any particular fish. As the proceedings are criminal the Court holds the testimony down to the strictest point, and while the Department has in cases shown that by experiment pollution from a manufactory will kill fish, the Courts have insisted that the Department must show by chemical analysis that the ingredients of the refuse are deleterious.

This of itself involves a very large expense, which it seems is needless where it can be shown that below a manufactory which runs refuse in a stream no fish will live, while above the manufactory the fish will thrive. In some cases the Court has refused to convict where it is shown that the deleterious substances run into the stream would in course of time become innocuous by dilution.

This complicates matters, because while it is true that dilution of the poisons destroys its efficiency, yet it makes it almost impossible under this ruling to prove anything against a single manufactory which is one of many that is running refuse into the stream, and altogether make that stream uninhabitable for fish.

Laws are only enforced where they are backed by a strong public sentiment, and it is the hope of the Department that by education public sentiment will be so directed to this matter of pollution that the public will not tolerate the running of pollution into water. Why should a municipality spend thousands, even millions of dollars, to **purify the waste of a stream** so that it can be used for domestic purposes, when far less sums in the total used by the manufacturer would absolutely prevent the pollution getting into the waters

The processes of the law are necessarily slow and the Department has no desire to needlessly hamper the manufacturers who show an earnest effort to improve conditions. The general public, however, does not understand this slowness of improvement, and in many cases have criticised the Department where the criticism was not deserved. They cannot understand why where a river is full of dead fish it is not sufficient evidence to convict somebody of violating the law. Yet of these complainants the Department has never been able to obtain any witnesses who could testify absolutely as to the cause of the death of the fish and from where that cause originated. When they stand before the Court their evidence is ruled out as having no weight whatever.

The Department of Fisheries is very much in earnest in its efforts to bring about the clarification of the streams, because its success in restocking those streams and waters depends almost entirely upon the fact that those waters will sustain fish life, not destroy it. The coral reefs grow almost imperceptibly in the building by the tiny insects, but they finally become mighty structures. It was from their example that the Department is going along doing the best work it can slowly, but trying to be sure that accomplishment is not far in the future.

The trouble in regard to pollution running in the streams does not always come from the fact that the pollution in question contains substances of themselves deleterious to fish life, but because the

mere fact that refuse matter gets into a stream becomes a menace to fish life, and probably is more destructive in the aggregate than the combined poisonous refuse.

The fish breathe the free air held mechanically in the water, and it is estimated that at least three per cent. of free air is necessary for the fish to thrive. Whenever any pollution gets into a stream, the oxygen in this free air proceeds under the original laws of nature to oxygenize the pollution and try to restore the stream to its pure state. This process of oxygenization diminishes the supply of air for the fish to breathe, and it can readily be seen if there is much of the pollution that the supply of air becomes so used up that the water will no longer allow fish to live in it. This condition of affairs can be seen in many streams where the supply of air is used up in the chemical process of destroying the pollution, and therefore the fish desert that water.

The ruling of the Montgomery County Court that the dyestuff run into the stream was harmless because it was not poisonous, is not borne out by the facts, because that dye-stuff used up the air in the water of the stream, and when the water became airless the fish no longer could or would live in the water. Therefore, so far as fishing is concerned, the result is the same as if the pollution had been poisonous.

The mere fact that water looks pure and undefiled is no proof whatever as there are plenty of such waters which carry with them all kinds of diseases. From the causes mentioned above of the use of the air in the water for the oxidation of pollution, there are numbers of streams in Pennsylvania which are absolutely devoid of fish life, because the fish have nothing to breathe. While it is true as the Court reads the law that it is intended that the pollution going into a stream shall be proved to be such as will kill fish, it is also a likely conclusion that where pollution is allowed to run into the stream and uses up the free air in oxidizing it, that that same pollution is as deleterious to fish life as would be sulphuric acid or chlorine.

While the Department agrees with the court that the Act of May 1, 1909, was intended only to apply to pollution which is deleterious to fish, it is also firmly of the opinion that the court should give credit to the effect of pollution which of itself is not deleterious, becomes so when it is run into water and uses up the supply of air in oxidizing it. This is certainly deleterious to fish because fish cannot live in water that does not have an adequate supply of air. Too much air in the water is as bad for the fish as too little, as is shown in one of the fish hatcheries of the United States Government, where the water is so charged with air that it has to be treated to reduce the quantity of air or the fish will be destroyed.

This chemical work of nature is shown every season in the small lakes and other waters of the State when the lakes are what is ordinarily called "working." When the lakes are working numerous fish come to the surface dead and large numbers come to the top gasping for air and to the tyro who is not acquainted, this is such a curious phenomenon that he writes to the Department telling of some curious thing that is devastating the fish.

The cause of this working is due to the vegetation in the water. The plants grow, attain their maturity and then die. Nature then

steps in to destroy the ripened plants the same as she does to destroy the giant of the forest which has fallen to the ground. She takes the oxygen from the air to burn up the tree, and she takes the oxygen from the water to burn up the plants, but in taking the oxygen from the water the water is deprived of its life giving powers to the fish, and in proportion to the amount of oxygen so absorbed is the water destroyed of its life giving character.

Let not the average citizen lay the flattering unction to his soul that he is no way responsible for the pollution in the stream. The citizens of large cities and towns are the greatest offenders in so far that up to within a recent time it was thought the best place to empty the sewage of a community was in the river or stream that flowed past the community. Perhaps the sewage of itself could not be construed as poisonous to fish life, yet it contributed to making the water undesirable for the fish. The solid contents of the pollution settled on the bottom destroying the spawning beds for the fish and killing off the plants that had grown up there to furnish a garden in which grew the food of the small fish. The sewage tainted the water, and most people thought undesirable food, fish taken from sewage polluted water. It added an increment to the elements to be oxidized by the free oxygen of the water, and in fact, as shown above, the sewage was an undesirable element to place in the streams. The best fish live only in the purest waters, and it is well known that the bass will desert streams in which the carp so befoul the stream with mud that the fastidious bass will no longer remain in the water. It is plain therefore that in the clarification of the streams so that they are fit for fish life, the matter of disposal of sewage in some other way than by running it into the streams must be considered.

Of course the question of public health has become largely a factor in late years, and the Department of Health is doing good work in compelling municipalities to take care of their sewage in some other manner than by running it into the streams. When this is accomplished it will be readily seen that long steps have been taken forward. If every citizen in the Commonwealth who is interested in the conservation of fish will carefully examine into his own record as to what he does in the way of pollution, much good will be accomplished if he takes steps to prevent any further fouling of the streams on his part.

The Department is glad to feel that the courts are swinging round in accord with the public sentiment that the streams must be purified. A number of years ago the Supreme Court of Pennsylvania decided in a suit brought against a coal company for running mine water into a stream that spoiled plaintiff's water supply, that "to encourage the development of great natural resources of a country, trifling inconvenience to particular persons must sometimes give way to the necessities of a great community," and, therefore, that "the use and enjoyment of a stream of pure water for domestic purposes by the lower riparian owners who purchased their land, built their homes and laid out their grounds before the opening of the coal mines, the acidulous waters from which rendered the stream entirely useless for domestic purposes, must ex necessitate give way to the interests of the community in order to permit the development of the

natural resources of the country and make possible the prosecution of the lawful business of mining coal."

But in that case it was said: "We do not say that a case may not arise in which a stream from such pollution may not become a nuisance and that the public interest, as involved in the general health and well being of the community, may not require the abatement of that nuisance."

This shows that the court felt at that time that even the great coal mining interests might under special circumstances be suppressed in the interest of the greater community dependent upon waters contaminated by the mines.

The community has a right to an adequate supply of pure water, a prime necessity of life, and another prime necessity of life is food, and fish are an important factor in supplying a cheap food to the public.

In a case of the Commonwealth vs. Russell, the Commonwealth joined with a Water Company in enforcing its rights to pure water which it furnished to a community of twenty or more thousand people. In the case in question the defendants were oil operators and for each gallon of oil they pumped from the well, they pumped many gallons of salt water, which salt water ran into the source of supply of the Water Company and made that water unfit for domestic purposes. The Court said:

"By reason of the public interest in the business of the Company, the State assumes a visitorial control of it, inquires into the quality and quantity of the water furnished by it, and makes such orders as may be necessary to secure for the public a wholesome and adequate supply. The business of the oil and coal operators is a private use. Such business has a certain relation to the general volume of business being carried on in the region, but it is not to be distinguished from the production or manufacture of other commodities in common use and that enter into the commerce of the country.

"Such operations may be begun or relinquished, increased or diminished at the will of the operator without public control or interference, but the supply of water, light and heat are necessary to the health and comfort of densely populated districts, and is not left to the absolute control of the companies undertaking to provide. The State in the exercise of its police powers, asserts its right to inquire into the efficiency and good faith with which the public is served, and to correct through the courts any defects or abuse in the conduct of the business of gathering or distributing the supply or of securing a quantity of the commodity furnished that is suitable for use."

These remarks of the court are significant as indicating that the court feels that the welfare of the public should be considered rather than that of the smaller property of individuals engaged in private enterprise. When a community is formed, a person enters it gives up certain rights which he might have, but which interfere with the right of other persons in that community. No riparian owner has the right to run pollution in the stream which flows over his land for that is a privilege which belongs to him neither as a citizen of Pennsylvania or of the United States.

In case of Commonwealth vs. Emmens, 33 Sup. 151, the Court decided to pollute water flowing in its natural channels is a nuisance,

and for a natural nuisance there can be no excuse. Care and skill is no defense, and equity will enjoin it at the suit of a private party.

The Legislature of Pennsylvania has seen fit to establish the Department of Fisheries of Pennsylvania whose duties are prescribed to be the propagating of fish and the restocking of the streams of the State with these fish so that the streams may once more become an important factor as places for the raising of a food supply. As pure water is an essential in the waters in which fish are to be raised the Legislature has authorized the Department to prosecute any person who ran anything into a water which is detrimental to fish life.

This act makes the duties of the Department in the line of the decisions quoted, because the question of a fish supply depends upon the purity of the water, and this purity is therefore a question of the public welfare. Feeling this, the Department has instituted a test suit against a Coal Company which began its operations a short time ago and allowed its mine water to run into a stream which had hitherto not been polluted. It is a notorious fact that if this pollution is allowed to run into the stream that it is only a question of a very short time when that stream will be barren of fish. The question of fish is no longer a matter for a few riparian owners along the stream below the mine in question, but it is a question in which every person in Pennsylvania is interested, if the clarification of the streams is to be accomplished.

The defendants were convicted before a Justice of the Peace and have taken an appeal to the court, setting up the decision in the case of Sanderson, and also the wording of the law which says that the defendants can show that all reasonable and practicable methods have been taken. The question of reasonableness is raised on the grounds that to purify the pollution would involve such a heavy expense that it would mean to close the operation.

In the case of the Water Company the court decided that that was not a factor. That if the oil men could not purify their water then they must cease to run it into the stream. In addition to this it is a matter of fact that the Coal Company in question has taken no steps whatever to purify the mine water running into the stream. The Department is prepared to prove that this acidulous water can be rendered harmless and innocuous by a very simple and cheap apparatus, the cost of maintaining which amounts to very little.

The Department hopes to win in this case, and if it secures a strong opinion from the highest court in the State, will then set out to secure the purification of those streams which are now, owing to this mine water, absolutely devoid of any life whatever. Incidentally the purification of the streams, which the Department of Fisheries hopes to bring about, because of the necessity of having pure water for the fish, will result in other advantages to the public. It is a well attested fact that cattle which have waded into streams in which tannery refuse has run have contracted anthrax from the washing from the hides of infected animals.

In the recent outbreak of the mouth and foot disease, one Association has traced the infection to a stream into which tannery

refuse ran, and where hides had been treated taken in China from animals infected with the mouth and foot disease. This is mentioned here to show that the public has a larger interest in the purifying of the streams than the mere placing the waters in the State in a condition to support fish life.

PRESQUE ISLE PENINSULA.

The last Legislature made an appropriation of \$20,000.00 for the dredging and opening up the old ponds on Presque Isle Peninsula, which are the only available natural spawning grounds left for fish. This Peninsula some years ago was ceded to the United States Government for defensive purposes, but in 1909 the Congress of the United States receded part of the Peninsula to the Commonwealth of Pennsylvania to be used by the Department of Fisheries for hatchery purposes, and the Department took possession of the same.

Last Spring a contract was made with the T. A. Gillespie Company, of Pittsburgh, to do the work of dredging in the Peninsula, and they entered upon the work as soon as the weather became favorable. Their dredge is a very powerful one and the work that they have accomplished has gratified the Department and astonished the visitors.

The dredge began work in Misery Bay at the mouth of the old Graveyard channel and worked right through Graveyard Pond for a distance of two thousand five hundred feet. In this distance are two basins—one two hundred feet in diameter and the other three hundred feet in diameter. About seven hundred feet from the north end of Graveyard Pond, a cut was made through the ridge by a channel fifty-five feet wide into what is known as Raccoon Pond. This connected Graveyard, Raccoon, Big Pond and Long Pond, so that all are now one body of water of three hundred or more acres, and between a mile and a half and two miles in length, right through the dense forest on each side.

The dredge pumped at the rate of fourteen hundred yards of sand and gravel a day of material, which is being used to make a shore line and filling all the stagnant ponds and swamps which has done more to eliminate the pests of the mosquitoes than the most sanguine hoped for, it being most noticeable at the end of the Peninsula where the Department of Fisheries is working.

Where the depth of water was from two to four feet, averaging three feet, there is now a depth from eight to twelve feet, the depth in the channels being from twelve to fifteen feet. It is hoped that the next Legislature will appropriate sufficient money to complete the work of opening up all the ponds, and then there will be available

the finest natural spawning grounds on Lake Erie, and probably it is not exaggeration to say, that no State will have a finer natural spawning grounds from which so much can be expected.

In addition to its value as a spawning ground, the Peninsula is capable of wonderful development as a recreation spot or park, for it is well covered with fine trees, largely oaks, and with the opening up of the ponds and the filling in of the swamps, life is no longer rendered unendurable by the mosquitoes.

A number of public spirited citizens of Erie are now discussing the question of raising a fund to build a road around the Peninsula and developing the beauties of the place. As remarked above, the amount of work accomplished in opening up the water courses was a surprise to many, and the Department is pleased to say that the result was largely due to the personal interest taken in the matter by the dredgers.

FISHWAYS.

The question of fishways is an unsolved problem in the minds of most of the fish authorities of the United States and the various States. At the meeting of the American Fisheries Society where thirty States were represented, not one officer would state that he knew of a fishway that worked satisfactorily, except in the case of the salmon in Maine, and with brook trout, both of which fish are extremely active and might almost be called climbers.

The Act of May 1, 1909, governing the internal waters of the Commonwealth, provides that the owners of the dams shall erect therein such devices as the Board of Fishery Commission may decide necessary to enable fish to ascend and descend the waters at all seasons of the year. In by far the larger number of streams in Pennsylvania there are really no fishways necessary, because there are no truly migratory fish, and the erection of a dam is really a help to the fisherman as it affords a larger body of water in which the fish can dwell.

The Department has given this matter of fishways much consideration, and has done its best to evolve a fishway that will solve the problem, this being rendered necessary by a resolution passed by the last Legislature ordering a proper fishway in the dam at McCall's Ferry, of the Pennsylvania Water & Power Company. This dam is 65 feet high and effectively stopped the ascent of the shad up the Susquehanna River.

The Cail fishway had been ordered in the dam by the Board of Fishery Commission, but examination showed that no fish ascended this fishway, and if they did it was so small a capacity that it was virtually valueless.

The Power Company have offered to assist in any manner, regardless of expense, the placing of a fishway in the dam that would answer the purpose. On the York County side they have built a slope

of rocks and concrete that would afford passage for the fish through a current and ascent about the same as before the erection of the dam. Such is the tremendous force of the current and the heavy amount of ice carried down in the winter, that although this fishway was built in the most substantial manner there was a washout at the lower end which made a fall too high for the shad to get up.

During the past year the Power Company have extended this fishway several hundred feet, reducing the fall and carrying the mouth of the fishway further out into the main channel of the river. Last year showed shad at the foot of the fishway, and it is hoped and expected that with the coming shad season the fish may be found ascending the new fishway. The proposition is such an important one that the Department has received letters from nearly every Fish Department in the United States, including the United States Bureau of Fisheries, and even Japan has asked for the plans and the latter has published a picture of the fishway furnished by the Department.

This interest shows that the fishway problem is far from being solved by any one, unless the Pennsylvania Department of Fisheries has solved it at the McCall's Ferry Dam. It might be said here that the Department has received a large number of plans from various enthusiasts who think they have solved the problem of a successful fishway, but in every case not one of these inventors has realized the tremendous force of the water at the McCall's Ferry Dam, and the enormous masses of ice weighing tons that sweep over the dam sometimes carrying rocks that weigh tons. Nothing but the most substantial work will stand the enormous power for destruction exercised by this flood of water, ice, stone and floating trash.

FAIRMOUNT PARK AQUARIUM.

The Department of Fisheries has continued its co-operation with the Philadelphia Park Aquarium in the way of keeping up its supply of fish, and feels that in doing so it has helped to furnish much information and pleasure to the visitors at the Aquarium in Fairmount Park. The following is the report of the Superintendent of the fish caught by the employees of the Aquarium during the year 1914:

Gold Fish,	99
Sunfish,	10
Calico Bass,	3
Large Mouth Bass,	2
Small Mouth Bass,	2
Total,	116

This does not include a few eels and few suckers as it is stated in the permit returns are not asked for.

FISH CAR.

A number of years ago the Fish Commission purchased a fish car which was complete with all the requirements for successfully shipping fish so far as those requirements were then known, but with the years the requirements of the rolling stock on the railroads have grown so onerous that the car had become obsolete, and to enable it to be hauled on the railroads would have required a large outlay of money. Experience has shown that shipment by the car was not the most economic method of shipping fish as compared with the present method of shipping by messenger, so the last Legislature was asked permission to dispose of the car. It was turned over to the Board of Public Grounds and Buildings which sold it.

CABINET FOR PUBLIC SCHOOLS.

For the purpose of enlisting the rising generation as the friends of the fish the Department has placed in a number of the public schools of the Commonwealth a bronze cabinet of ornate design which contains a number of glass vials containing some phase of the growth of the brook trout and the white fish from generation to maturity. Accompanying the cabinet is a bulletin describing it. This cabinet has proven to be of much interest to the schools who have made application and received it and the Department believes that it will show good and lasting results. The Department still has a number for distribution.

The following schools have received the cabinet and bulletin:

Scranton Technical High School, Scranton, Penna.
Grove City Public Schools, Grove City, Pa.
Minersville Public Schools, Minersville, Pa.
Danville High School, Danville, Pa.
Northampton Public Schools, Seigfried, Pa.
Westmont School, Johnstown, Pa.
Laceyville Schools, Laceyville, Pa.
Mt. Pleasant High School, Pleasant Mount, Pa.
Public School, (H. R. Ruch), Allentown, Pa.
Garfield Schools, Allentown, Pa.
Department of Public Instruction, Easton, Pa.
Trexlerstown High School, Trexlerstown, Pa.
Public School No. 4, Erie, Pa.

Public High School, Herrick, Centre, Pa.
Woodlawn Borough Schools, Woodlawn, Pa.
Public Schools, State College, Pa.
Beaver Falls School District, Beaver Falls, Pa.
Springboro Public School, Springboro, Pa.
Cochrannton High School, Cochrannton, Pa.
Cambridge Springs Public Schools, Cambridge Springs, Pa.
Rocky Grove Schools, Franklin, Pa.
Northeast Public Schools, Northeast, Pa.
Ephrata Public School, Ephrata, Pa.
Lehigh Township Public School, Walnutport, Pa.
Wilson Township School, Easton, Pa. (Hay High School)
Nazareth Public School, Nazareth, Pa.
Dalton Public School, Dalton, Pa.
Sharpsville High School, Sharpsville, Pa.
Haverford Township High School, Llanerch, Pa.
Sandy Lake Public School, Sandy Lake, Pa.
Evans City Public School, Evans City, Pa.
Aleppo Township High School, Aleppo, Pa.
First District Public School, Allentown, Pa.
Jackson School Building, Allentown, Pa.
Union Township High School, Belleville, Pa.
Keystone State Normal School, Kutztown, Pa.
Richhill High School, Wind Ridge, Pa.
Portage Public School, Portage, Pa.
Nineveh High School, Nineveh, Pa.
New Holland Borough Schools, New Holland, Pa.
Jefferson Township High School, Jefferson, Pa.
Titusville High School, Titusville, Pa.
Edinboro Public School, Edinboro, Pa.
Honesdale High School, Honesdale, Pa.
Mt. Morris High School, Mt. Morris, Pa.
Warren Borough School District, Warren, Pa.
McKinley School Building, Allentown, Pa.
Waynesburg High School, Waynesburg, Pa.
Boalsburg High School, Boalsburg, Pa.
Sharon High School, Sharon, Pa.
Penn School Building, Altoona, Pa.
Pottsville Public High School, Pottsville, Pa.
Emlenton Public School, Emlenton, Pa.
Seidersville Public Schools, Seidersville, Pa.
Bellefonte High School, Bellefonte, Pa.
Black River School, Foglesville, Pa.
Fayette City Pubic School, Fayette City, Pa.
Montoursville Public School, Montoursville, Pa.
Mt. Pleasant Grammar School, Iron Hill, S. Bethlehem, Pa.
Cleveland Building, Allentown, Pa.
Lock Haven High School, Lock Haven, Pa.
Clarrington High School, Clarrington, Pa.
West Pottsgrove Township High School, Pottstown, Pa.
Palmyra High School, Palmyra, Pa.
Bridgeport School District, Bridgeport, Pa.

Souderton Public School, Souderton, Pa.
East Greenville High School, East Greenville, Pa.
Drumore High School, Drumore, Pa.
Mill Hall Public School, Mill Hall, Pa.
Collegeville Public School, Collegeville, Pa.
Saegertown Schools, Saegertown, Pa.
Blooming Valley School, Meadville, Pa.
Emporium Public Schools, Emporium, Pa.
Townville Borough Schools, Townville, Pa.
Lansdowne School Board, Lansdowne, Pa.
Moscow Public School, Moscow, Pa.
Johnstown Public School, Johnstown, Pa.
Shippen High School, Emporium, Pa.

CORRY HATCHERY.

Very satisfactory progress in rehabilitation and completion was made at the Corry hatchery during the year just past. There were some unexpected delays due to the fact that the contractor was unable to always get the labor necessary to complete his work. The number of ponds finished during the year was 14. The entire number of ponds contemplated in the plan is 64, and with the 48 finished last year, and the 14 this year, the entire series is nearly completed. They are all finished in concrete in the most substantial and workmanlike manner, and topped with a cornice that gives them an ornamental finish.

One of the first requisites of a successful hatchery is an ample water supply which should be wholly under the control of the hatchery, and this requisite is entirely met at the Corry hatchery. The lay of the ground is such that it is possible to have ample pondage and keep the water completely aerated, there being a 14 foot fall that is available. This water has a temperature of 46 degrees F., and with this temperature and the availability for aeration, it is possible to carry an unusual number of fish.

The new ponds are arranged in a series, each series having a flume to convey the water from one section to another with good aeration and each pond has its own entrance and outlet so that it can be drained and cleaned without interfering with any of the others. They vary in size, the depth running from two feet to six feet, and in length from 20 to 90 feet, with a breadth of 16 feet to 24 feet.

The walls are all built of re-enforced concrete running from 10 to 14 inches in thickness, and the bottoms also are of concrete. The walls are all topped with a six inch coping which projects two inches and gives a nicer appearance, so that while the ponds are of the

best for fish culture, they are also good to look upon with an artistic eye. The flumes are 21 inches wide allowing ample flow of water, and where necessary are four feet wide. There are several reservoirs for sedimentation of the water before it enters the hatchery which are built the same as the ponds. With these ponds all concrete it is much easier to keep them clean and in perfect order, while it is utterly impossible for the banks to be invaded by muskrats or crayfish, those enemies of ponds burying in the banks and leaving the water out of the ponds at unexpected times causing a loss of thousands of fish. These ponds should hold a million and a quarter of fish until they are a year old. There is still room on the grounds for 20 more ponds, which it is proposed to build, and then there is room for bass ponds, the water by the time it reaches the last ponds being warm enough for bass work. With this series of ponds an additional hatching house is proposed which can be used for the brown trout work.

With the warming up of so many streams in Pennsylvania, the propagation of brown trout has become a very important matter, because the brown trout will live and thrive in water that is too warm for the brook trout. The brown trout is the trout whose praises are sung by old Izaak Walton, and it grows to a larger size than the brook trout, and to the devotee of old Izaak its taking affords much sport and excitement.

The new hatching house has been completed and it is not too much to say that it has no superior in detail and completeness in the United States. It is built of Corry Oriental brick with black mortar, covered with a cement roof with a tile cornice, the architectural effect being good. It is all finished in steel and re-enforced cement so that it is absolutely fireproof, while it is heated with hot water so that the trout work can be done in the winter time by the employes with a comfort not possible in the old unheated houses. There are 19 double troughs 18 feet long set on steel trestles. The supply trough is 10 inches deep and 12 inches wide.

There are 11 ornamental aquariums arranged along one of the walls which will be used for exhibition purposes of the various fish and is an object lesson for the visitors who are much interested in the occupants. In one end of the house is the office of the Superintendent. There are two entrances, one to take up the cans and the other leading to the office. A steel stairway leads to the second story which has a concrete floor and will be used for the storage of the cans and other property. Everything is the most complete character and up to the latest thing in fish culture.

A bronze plate bearing the coat of arms of the Commonwealth of Pennsylvania carries the name of the Department, the names of the Commissioner of Fisheries, the Board of Fishery Commission, and the Superintendent of the hatchery. There is a concrete pavement in front of the building for convenience in loading and unloading the cans. In fact it has been the effort to provide for every detail that is needed to make the building the most complete of its kind.

The ornate character of the building and its generally artistic beauty attracts much favorable comment from visitors who commend it as in keeping with the dignity of such a great Common-

wealth as Pennsylvania. The only trouble is that it had to be erected on low ground on account of the water supply, and therefore it does not show off as well as if it would be on high ground where its beauty would be more in evidence.

Much work has been done in putting the grounds in the shape that their natural capabilities deserve. The grounds were thoroughly ditched and then drain tile was placed, after which the grounds were graded and sown with grass. Walks and drives are built and graveled ornamental steps are built in the terraces. A fountain was erected near the hatching house with an ornate basin of rock work in which gold fish disport themselves like glimmers of golden sunlight and the plashing of the fountain mingles its music with the murmur of the water that falls from one pond to another.

The old office building has been fitted up as a retiring room for ladies, a convenience much appreciated by the numerous visitors and which will be supplemented with a similar place for the men. A number of retaining walls have been built where the grade rendered them necessary. All the buildings have been repainted and all the concrete work is painted with a special preparation to make it non-absorbent of water and thus keep it from being affected by the frost. This paint also adds to the appearance of the concrete making it look like marble. A lagoon was built along the east side of the drive in which will be kept the mature fish that will be used in the aquariums, and mature fish have a greater attraction for visitors than the small ones.

The question of a fence along the front of the grounds has been a problem, owing to fences previously used being so unsatisfactory. It was finally decided to erect a fence of concrete posts connected by a chain which gives a fence of a highly artistic character and in thorough consonance with the grounds.

BELLEFONTE HATCHERY.

Under the appropriation made by the last Legislature it was not possible to complete the work planned to complete the hatcheries in the State owing to the fact that the appropriation was reduced from the amount asked by the Department. As the general policy of the Department had been decided that the hatcheries should be completed with work of a permanent character, it was planned that the money received should be concentrated to the completion of some of the hatcheries rather than divided up among them all.

It is therefore concluded to leave Bellefonte until after another appropriation has been obtained so the work done there during the past year has been merely such as is absolutely necessary. A new

roof, which was absolutely necessary, was placed upon the barn, and the roof of the hatching house was rendered waterproof. Necessary new shades were added to the ponds and 200 feet of iron pipe was laid to run water from the creek when water is necessary.

The old fish car which had outlived its usefulness was turned over to the Board of Public Grounds and Buildings and sold. The work of raising fish was very successful and the fish shipped ranged in size from four to eight inches in length, and all the recipients were loud in their praise of the same, they being in the most splendid condition.

WAYNE HATCHERY.

During the year much work was done at this hatchery in the way of completeing and trimming up the grounds, a new stable being erected of the permanent and ornamental character, which is now the policy of the Department to erect.

A storm burst in August caused a very heavy loss of fish owing to the breaking out of the incompleted ponds, which only illustrates the difficulty a Superintendent labors under when he is trying to raise fish and build ponds. This hatchery is the most favorably situated of any in the State for doing what is called field work, because in its immediate neighborhood there are hundreds of lakes which can be made breeding places for fish in inexhaustible quantities, and supply enough to do all the work of restocking the streams in the eastern section of the State. Of course it is impossible to get the best work until the hatchery is entirely completed, which it is hoped will be during the coming year or two.

TORRESDALE HATCHERY.

The question of the supply of shad has come to depend upon artificial propagation, owing to the extensive wasteful fishing in all sections. Some years ago the Connecticut River was entirely denuded of shad, and fishing for shad had become one of the lost arts. Artificial propagation was taken up by the United States authorities

who began planting the river with shad, the result being that in a few years the shad once more became abundant and the fishermen were paid for their efforts.

The Delaware River felt the effects of extensive fishing so the Fish Commission of Pennsylvania, which preceded the present Department of Fisheries, a number of years ago established a hatchery on the Delaware River at Bristol where shad were hatched for several years, when the hatchery was removed to Torresdale to a site on the filter plant grounds which was leased from the city of Philadelphia at a nominal rent, while the city voted several thousand dollars to help put the hatchery in working order.

The old frame hatching house was floated down the river from Bristol to the new site where it has been used for several years until it has come to be like a wreck left over from a bombardment by the German army.

It was an expensive hatchery to operate as it was necessary to get the water supply from the Delaware River by means of pumps which were uncertain owing to the choking of the supply pipes by ice and trash, and the breaking down of the pumps. It was therefore decided to replace the ruin with a new and permanent structure, which would be up to date in all the requirements of a modern fish hatchery, while architecturally it should meet the requirements of the Art Commission of Philadelphia. The plans of the hatching house were prepared by an architect, and after their approval by the Art Commission, the contract for the building was let last Spring, and this Fall saw a completed building that meets all the requirements of a modern fish culturist's art, and at the same time is an architectural addition to the show structures of the leading city of the Commonwealth.

The city is proposing to build a new boulevard along the Delaware River, which will run directly in front of the hatchery, and therefore it is eminently proper that the new hatchery building should be entirely worthy of the dignity of the Commonwealth.

The new boulevard is plotted right through the old hatchery so that unsightly structure will have to come down and no longer insult the eye of the aesthetic visitor. The new hatchery building is of brick, Colonial style, with black headers and tile roof and dormer windows. In front is a tower, which while architecturally, is an adornment, affords space for the stairs to the second floor. The floors of the building are all concrete and steel, and with the dampness that goes with a fish hatchery, the building is virtually fire-proof.

The building is directly on the banks of the Delaware River, and the plant contemplates additions as they are needed for additional tank room and aquariums. It is proposed to dredge out a channel from the house to the river so that the fishermen may come up with their boats directly to the house and deliver their take of eggs.

The batteries are constructed of the best material and with the latest improvements for the handling of the eggs and fry. The water supply is no longer dependent upon the pumps of the hatchery, but will be obtained from the city water works before the river water is filtered, experience having shown that the filtered water is lack-

ing in the necessary life-giving elements for the hatching of the eggs. There is ample storage room in the building, a much needed requirement, where convenience in handling implements means a saving of time and labor. The whole building is lighted with electric lights which enable the work to be done as well at night as by day, and during the season when the batteries are full of eggs there is no time in the twenty-four hours that there does not have to be constant watchfulness and care. It might be mentioned that the hatchery has most abundant window space so that it is an extremely light and cheerful building.

The new building will supply a much needed want, as there is no longer any doubt in the minds of the fishermen that the supply of shad in the Delaware River depends upon the ability of the Pennsylvania Department of Fisheries to hatch out enough young shad to make up for all the shad taken by the fishermen. So much are they impressed with this that the Department no longer has any trouble to get them to bring every possible shad egg they can save to the hatchery to be propagated. At the shore fisheries the fishermen take as much interest in picking out the ripe fish as do the employes of the hatchery sent to gather the eggs.

How successful this artificial propagation has been is shown by the fact that although the last season was an unfavorable one in various ways, the plant of young shad was a fair one and fine catches of shad were reported from the Delaware River as far up as Hancock, New York.

Besides hatching shad the new hatchery will hatch white fish and herring eggs from Lake Erie, and pike perch, yellow perch and catfish eggs from other sources. The capacity of the batteries will run into millions and there is room to add to the batteries when that room is needed.

The report of the Superintendent of the hatchery shows that the experiment of artificial hatching catfish to be most successful and its success has awakened the attention of fish culturists of other sections who have visited the plant to look over the rather wonderful results. The Department feels sure from the result of these experiments in the artificial propagation of catfish that with a little more experience there will be no trouble in meeting all the demands that may be made upon it for these fish, and a general acquaintance with these fish will convince the public that as an addition to the bill of fare it is hard to find any superior viand.

During the year the Department purchased for the use of the Torresdale hatchery a cruiser motor boat of sufficient size and capacity for gathering the shad and other eggs on the Delaware River. It was also used for the planting of the shad fry in the Delaware River from Trenton to the Delaware State line. It could go no further north than Trenton on account of the Falls, or it would have gone on to as near the Pennsylvania line as navigation would permit. The shad planted above Trenton Falls were sent by messengers on the railroad.

During the year the Department tried the experiment of planting some shad in the ponds to raise them to the size of fingerlings. It was eminently successful and the larger fish were transferred to the

Delaware River in the Fall. The shad being one of the most delicate fish it is almost impossible to handle it without causing death, so the Department contemplates building some ponds at the Torresdale hatchery which will be within the limit of the tide so that when the time for releasing the fish comes all that will be necessary will be to open the gates and let the fish pass out with the tide.

ERIE HATCHERY.

The Department feels that it must congratulate the citizens of the Commonwealth of Pennsylvania in having in the Erie hatchery a plant that has no superior in the United States, the new hatching house having been finished during the year. It is situated on the shores of the lake on the grounds of the water works or filter plant, the ground having been ceded to the Department of Fisheries for the purpose, and no more suitable place could be found for such a hatchery in the United States.

It is at a corner of the dock with water on both sides and when the water lot is dredged, which the Water Commission will do shortly, the Department's boat, the Commodore Perry, can come right up to the house and load and unload the fish and eggs, thus saving the drayage bills that were necessary when the old hatchery was occupied at the corner of Second and Sassafras Streets, and all the eggs and fish had to be hauled from the water to the hatchery and from the hatchery to the water.

The new house is a two story building of brick and concrete with a tile roof, so that it is absolutely fire proof, and it architecturally conforms with the buildings of the filter plant, thus making an ornamental adjunct to the park. It is built of red brick with Illinois sand stone trimmings, and the interior is all finished with cement plaster. Externally the building is an architectural credit to the State and an ornament to the water works grounds. It is fronted by a lawn, which when placed in order, will make the plant still more ornamental.

The house is sixty by eighty feet and the equipment is the very latest up-to-date. It is lighted with electricity and heated by steam so that night work can be as well done as day work, while with the heat, winter will have no terrors for the fish culturist as it had in the old unheated hatchery.

As the visitor enters the building he is struck by the apparent size of the interior, with its glistening white walls. The batteries are to the right and are supplied with raw water from the lake, the eggs of the fish not having vitality enough to hatch in the treated water, which was the cause of the necessity of the removal of the

hatchery to its present position where it is possible to get the untreated water. There are thirteen fry tanks which give most ample room for the handling of the fry and this is in strong contrast with the cramped accommodations of the old house. A large gallery surrounds the interior and makes a roomy second story, while the opening in the center allows the skylight in the roof to add to the lightness of the lower floor, while it also adds to its impressiveness.

All the plumbing and waterfixtures are of the best and latest design and everything is under perfect control. All the plumbing is carried in open conduits so that if it is required to get at any of the plumbing it is only necessary to remove the iron covering over the conduit without disturbing the floor.

As the walls and floors are all of concrete and all painted with a water proof preparation, it is possible to keep everything in an immaculate condition, and this possibility excites envy in the mind of the women visitors when they mentally compare it with their kitchens. Indeed when one goes over all the merits of this new hatchery the Department feels, as it said above, that it can heartily congratulate the people of this great Commonwealth on having the most complete fish hatchery of its kind in the United States, and it would be no exaggeration to say in the world.

While Pennsylvania has only forty miles of shore line on Lake Erie, the fishermen of Erie have millions of dollars invested in the fish business. They set hundreds of miles of twine, which is the technical term for nets, a day, and have made Erie the largest fresh water fish market in the world. This constant fishing would long since have depleted the lake and fishing would have been a lost art, as is shown in the case of the white fish, which fifteen or more years ago had become so fished out that fishing for them was no longer profitable.

Then the United States Government, the Fish Commission of Pennsylvania, and the State of Ohio, took up the matter of artificial propagation, and by persistent hatching and planting have restored this white fish industry until it grows better every day, so that now all the fisherman of Erie fully appreciate the advantage of artificial propagation and know that their industry depends upon co-operation with the Department, and this co-operation they now cheerfully extend.

Another thing that should be borne in mind is that the eggs obtained from Lake Erie are all taken from commercial fish, which eggs would be waste product, if they were not taken to the hatchery to be hatched out.

The new hatchery is already a place of much interest to visitors and will be more so as it becomes more generally known. Live fish in captivity have a wonderful attraction for most people, and it is proposed to gratify such people by installing a number of aquariums in which the various species of fish will disport themselves for the pleasure of the dwellers on land.

During the hatching season it will be possible to study the process of incubation from the egg stage until the little fish emerge ready to face life in the waters of the lake. It will be possible to handle with the present facilities, of the largest size eggs, those of

the white fish seventy-two millions, and of the smallest, those of the blue pike, four hundred and thirty millions. In addition to these two varieties there are hatched at Lake Erie Station, lake herring, wall-eyed pike, better known on the lake shore as yellow pike, and on the Susquehanna River as salmon, and that well known fish, the yellow perch.

In fact the capacity of the hatchery is only limited to the eggs it is possible to obtain, and even if it is overtaxed the surplus can be taken by the Erie Auxiliary, the Torresdale hatchery or the Wayne hatchery. Fortunately, all the eggs do not come in at the same time; the white fish and the herring come in in November and December, the wall-eyed pike in April, and the blue pike and yellow perch in May. It will thus be seen that they get out of each other's way.

Everything from this hatchery is planted as soon as it is hatched. In fact it would be impossible to hold them, so rapidly do they emerge from the eggs after they have once started. There are times when they come out by the millions in twenty-four hours. It would be impossible to supply the food for such a myriad of fish, even if we knew what the food is, and besides nature turns the fish loose at this stage when they are hatched naturally.

One of the advantages of artificial propagation is the much larger percentage of eggs which are hatched than when the eggs are laid naturally by the fish and left to shift for themselves, so to speak. In the batteries they are not at the mercy of numerous enemies nor the chance of being covered by mud swept over them by storms. Hence there are more fish to go to make up the future supply.

ERIE AUXILIARY HATCHERY.

Nothing was done at this hatchery during the year in the way of permanent improvements, but everything was kept in thorough repair. The report of the Superintendent shows that a goodly amount of work was done, but part of the work was destroyed through an act of carelessness on the part of the borough authorities in cleaning out the reservoir above the hatchery thereby allowing all the filth to escape into the hatchery supply pond, where from lack of notice, it was impossible to take precautionary measures to prevent this filth escaping into two of the ponds where it destroyed a large number of fish. It is hoped, however, through the co-operation with the borough authorities that this trouble will not occur again. The calamity is, however, another striking proof of the absolute necessity of a hatchery having its supply under its entire control.

The experience at this hatchery shows the great benefit derived from the proper preparation of the eggs before being sent to the hatcheries. The pike-perch eggs at Union City were obtained from

the New York Conservation Commission, the fish being taken in trap nets and the eggs carefully taken from the ripe females and then fertilized and prepared with great care before being packed for shipment. The result is shown by the Superintendent to be the hatching of nearly one hundred per cent. of the catch, while the eggs obtained from the United States Station at Put-in-Bay, owing to lack of due preparation, shows a very low percentage of hatching.

It has been the desire of the Department that the United States Government should allow its men to go to the United States Station and prepare its eggs properly for shipment, so that so much time shall not be lost at the hatchery in handling poor eggs. The Department hopes that it will be able to secure this arrangement from the United States Government.

The hatchery also received from New York a shipment of muscallonge eggs which were duly hatched and planted in Lake Erie and other lakes now inhabited by these fish. These fish are of wonderfully rapid growth and are favorites with the angler, but they are most undesirable fish to plant in any waters not now inhabited by muscallonge owing to their tremendous voracity.

While the loss of fish at this hatchery due to the reservoir trouble was very heavy, the Superintendent reports that he was able to fill nearly all his applications for yellow perch and bluegills.

THE COMMODORE PERRY.

During the year the steam tug Commodore Perry was virtually entirely rebuilt, a very necessary thing, as six years of constant and arduous service had made her rather a risky craft in which to send a crew during the stormy winter months, when some of her most important work was to be done.

The capacity of the boat for its required work has been greatly increased by the changes, and more comfortable quarters made for the crew. Tanks take the place of cans for holding the fish to be planted, and opening a valve allows the fish to glide into the water. While the Commodore Perry has faithfully done the work for which she was designed, she has made a record for herself and crew by her daring work in storm and stress in saving lives and boats when other crews hesitated to go out on the lake.

Unfortunately, the boat is hampered by the strict regulations of the United States Bureau of Navigation, and she is required to carry a top hamper, which materially interferes with her seaworthiness. One of the troubles that is now experienced in regard to the Commodore Perry is the condition of the canal basin on which is situated the State boat house. At low stages of the lake the water in the basin is too shallow to allow the Perry to be taken in and out, and then she cannot be used. This greatly hampers her work.

Four years ago an appropriation was made by the Legislature for the dredging of the basin in connection with some other work, and the amount available was not sufficient to do the dredging. It is therefore hoped that the funds for this dredging will be granted by the next Legislature. The work is not only needed for the relief of the Perry, but for the docking purpose of the large fishing fleets which are now much hampered by lack of places to tie up.

ARTIFICIAL PROPAGATION.

The fact that fishes which are artificially propagated are still in abundance and on the increase shows that artificial propagation must be depended on in the future to keep up the supply of fish. This advance is especially shown with the commercial fishes; white fish, herring, blue pike, and wall-eyed pike. Fish that are not artificially propagated are on the decrease. This is noticeable even down to the lowly estimated sucker, which has to run the gauntlet of the dip net, the fyke net, the outline and the gig. No spawn is taken artificially; the fish are killed; nothing is put back, as in the case of the commercial fishes, and the result can only be extermination, unless the wasteful methods of taking are prevented and artificial propagation aids nature.

What is true of the sucker is true of many other varieties, and every trout fisherman knows that but for artificial propagation and restocking of the streams, the trout would be one of the extinct fishes in Pennsylvania. This fact is being impressed upon the popular mind, and people are beginning to understand the value of artificial propagation in keeping up the supply of fish.

PERMITS.

The Department is authorized to issue permits, under the Act of May 1, 1909, for the purpose of taking fish for scientific purposes, removal of fish to suitable waters, use explosives, &c., and under this act the following permits were issued during the year:

To transplant fish to suitable waters,	17
To use explosives,	13
To take fish or specimens of aquatic life for scientific purposes, ..	12
To close fishway on account of low water,	1
To remove carp,	4
To screen an artificial pond to lower water to make repairs, ..	1
To take fish for spawning purposes,	3

The number of permits issued for the purpose of transplanting fish to suitable waters shows that the fishermen and sportsmen throughout the Commonwealth are taking an interest in the saving of fish life as many fish would be left stranded high and dry if it were not for the transferring of these fish to a more suitable habitat.

The issuing of permits for the use of explosives were generally for the blasting of rocks to make a channel in the rivers of the Commonwealth, but in some instances they were for the raising of a body.

TIDE WATER SEINE LICENSES.

Under the provisions of the Act of June 3, 1911, the Department issued six (6) licenses to persons in Delaware county authorizing them to use a haul seine in the tide water streams wholly within the Commonwealth and within the limits of tide water of said streams for the taking of carp, suckers, mullets and catfish.

TRAINING SCHOOL FOR FISH CULTURISTS.

One of the most important needs of the Department of Fisheries is trained fish culturists and the need grows stronger every day that the Department comes nearer to the completion of its plans in rebuilding and rehabilitating the various hatcheries. With its ponds all built in the most permanent manner and with hatching houses equipped with the best devices known to the science of fish culture, the Department is sure that it will be able to respond to all the calls that may be made upon it for fish if it is able to secure a corps of trained men who will be able to use to the highest advantage the facilities at their command.

When the first Fish Commission began its work the science of artificial propagation of fish was as yet in a crude state and experiments were more the work of the culturist rather than the proved methods of to-day. In fact to the general public the artificial propagation of fish was regarded as an experiment from which only failure could be expected. But investigation and experiment by many workers brought about the conditions of to-day when results show

that but for the artificial propagation of fish there would be a sad diminution of the fish supply and in many cases extermination. This is really shown in two well known cases. A few years ago the white fish in Lake Erie had become so depleted by the constant fishing that it was no longer profitable to fish for them. Then the United States Government, the Commonwealth of Pennsylvania and the State of Ohio began to propagate the white fish artificially with the result that the supply of these fish is growing greater every year and the fishermen are once more fishing for them enabling thousands of people to enjoy these truly delicious fish. On the other hand no success has been attained in the artificial propagation of the sturgeon owing to the fact that it has never been possible to obtain the male and female fish at the same time in a ripe stage. The result has been, owing to the value of the fish it has been fished for so continuously, that it is threatened with extinction although it has great fecundity. Could anything demonstrate more clearly the value of artificial propagation than the two examples above quoted.

When the first Pennsylvania Fish Commission began its work in the early seventies its methods were crude, not only from lack of facilities and absence of proved methods, but also it was hampered by lack of funds for the Legislature did not share the enthusiasm of the members of the Commission in regard to the possibilities of increasing a valuable food supply by helping Nature. The first employes of the commission were therefore expected to be workers in every direction. They dug the ponds and did all the labor on the place while at the same time they were expected to attend to the fish. That they were able to get men to do this work is rather surprising to the people of this day, but they did and the result is shown by the fact that Pennsylvania has to-day a corps of hatchery Superintendents all trained in this school, which has no superiors in the country.

But such a school is not desirable in these days for what is needed in the fish culturists is more brains and mental training than muscle, because the muscle when needed is always available from the unskilled labor of the country, while to-day the Department does not know where to turn in an emergency that would demand the skilled culturist. Fish culture to-day is an exact science and the successful fish culturist must be a man with an education that will make him observant and understand the advantages of training. The better education and mental training a man has the better fish culturist he will make, the same rule applying to him as it does to the lawyer or the doctor.

To-day the need of the hatcheries is a larger force of trained men who would be available at any time to respond to any call. The splendid facilities of the Department for supplying fish will be wasted to a great extent if it does not have the force to use those facilities to the limit. These men should be a permanent corps, always ready to respond to calls, because now when there is a demand for helpers there are none available and the untrained man is no use even as a messenger because it requires a man with a knowledge of fish life to carry fish in cans for hours and not let them die. The Department, of course, has been hampered in the past in getting suitable men from the small amount of salaries it has been able to pay. A salary

of fifty dollars a month to begin with and a prospective rise in the future to seventy-five dollars a month is not a very enticing prospect to a high school or college graduate who has aspirations in the way of learning to be a fish culturist and when he does come under the employ of the Department as soon as he becomes proficient he is enticed away by the offer of a higher salary.

To the lover of Nature there is no more attractive pursuit than that of fish culture and it becomes more and more fascinating every day as its possibilities are developed. The Department of Forestry has established a school for the training of young men in the scientific part of forestry and the work it is doing is admitted to be most important. Why then should there not be established a school for educating men in the lore of fish culture. It is admitted that fish are among the most important sources of food supply and the man who can make two fish grow where only one grew before is as much a benefactor to his race as the man who makes two blades of grass grow where only one did before. In view of the importance of this subject the Department proposes to establish such a training school though at first only in a modest sort of way. When the contemplated improvements at the Wayne hatchery are all completed it is designed to take on there a few assistants with a view of giving them such a complete training that they will be fitted for any work in the Department from the care of fish in the hatchery to the gathering of fish in the field.

The Wayne hatchery is peculiarly well fitted for this work as every branch of fish cultural work can be studied there. In the hatchery the student can learn trout culture and battery work, in the ponds he can study pond culture and the many lakes in the neighborhood give every opportunity to study field work. It is hoped that the scheme may prove attractive to bright young men and that they will avail themselves of the opportunity to qualify themselves for the profession which is growing in importance every day, because there is no question that the opportunities offered by the raising of fish for market will attract capital and that capital will need the trained fish culturist to make his venture a success.

If Pennsylvania is to get out of its hatcheries all that they are capable of doing she must increase her force of trained men who will be induced to stay in the service by making their salaries at least the same as any one else will pay. It will be economy to do this because then the hatcheries can be worked to the limit of their capacities and the results will far more than balance the increased expense. What the people want is fish and the Department feels that it can give them all the fish they want if it only has the employes to do the work but these employes must be trained so that there may be no accidents due to lack of knowledge and no losses due to the same cause. A sudden stoppage in the water supply may mean the death of thousands of fish in the troughs or millions in the batteries and an ignorant messenger may arrive at his destination with nothing but dead fish in his cans.

The Wayne hatchery is peculiarly fitted for a school for the teaching of fish culture. It is situated at Pleasant Mount, Wayne county, a section of the lake region of Pennsylvania, and there are many lakes within easy reach of the hatchery. These lakes are all capable of

being made to teem with fish which cannot be exhausted if wasteful and destructive methods of fishing are prohibited. Experiments made during the last few years absolutely prove this. Here then is the broadest kind of field for what is called field work, that is using these lakes as breeding places from which the rest of the State can be supplied while the field work increases the fish in the lakes by the constant changes of blood, for fish deteriorate by inbreeding. The fish in these lakes are the pickerel, the basses, sunfish, yellow perch, catfish and minnows, the latter so much needed for food for the other fish. These are the fish which are the main reliance in restocking and keeping up the supply of fish in the waters of the Commonwealth. The taking of these fish is done by what is called field work and it is by this field work that by far the larger part of the restocking of the streams of the State is accomplished, as is also the replenishing of the waters of Lake Erie, in the latter instance the fish are all gathered by field work and the fish saved from what would otherwise be entirely a waste product.

Hence the importance of field work and it can be thoroughly learned in all its parts by the student at Wayne hatchery. In addition as the student works on the lakes he can study the habits and life of the fish in its native element free from any artificial surroundings and train himself to those close habits of observation so necessary to the successful fish culturist. Then to the fish in the lakes is added the frogs from whose annual spawning it is possible to obtain as many eggs to hatch for tadpoles as there are required by the most exacting demands, the number to be had being limited only by the ability of the field men to handle them. It is a curious fact that there never seem to be any more than a certain number of frogs in a given pond and this number does not seem to vary no matter how many of the spawn may be taken away to a hatchery to be sent somewhere else when they become tadpoles. There is a growing demand for artificial cultivation of frogs but the data in regard to their life is yet insufficient to give the matter a standing above the experimental stage. The student at the school who has an interest in his work may be able to work out the problem of frog life that cultivators may take hold of the business with the same certainty that does the raiser of trout. With frogs commanding forty cents a pound and an ever ready market the business of raising them ought to be profitable if the secret of their lives is found out.

The hatchery also has in connection with it a trout hatchery with all the modern appliances and the student can become proficient in all the secrets of raising trout, from the taking of the eggs from the female fish, the impregnation of the same by the milt of the male, the placing on the trays and the control of the water, for the man at the spigot is as important as the man behind the gun. Too much water is as fatal at times as too little. Then too there is a battery for the hatching of the eggs of such fish as the perch, the catfish and all the commercial fish from Lake Erie and here knowledge, judgment and watchfulness come into full play. No mere prentice hand can successfully do the work here for surmise and guessing cannot take the place of knowledge. No two kinds of fish eggs in a battery can be handled the same way and it was only after long study and experiment that the problem was solved at all. The splendid practical

training of the Superintendents of the Pennsylvania hatcheries has stood them in good stead in many an experiment in handling the various kinds of fish eggs in the batteries.

The Wayne hatchery has the largest area of ponds by far of any of the other hatcheries and this makes possible the raising of the black bass, the fish so much demanded by sportsmen, the demand exceeding that for trout. The black bass cannot be handled as other fish by taking the roe but must be allowed to breed naturally and experience has shown that to successfully raise bass large areas of water are necessary. Supplementing the ponds which cover a number of acres the hatchery has control of the Beaver Flow reservoir, at one time a feeder of the Delaware and Hudson Canal, and this covers about two hundred acres. Here is ample space for the bass to grow and thrive but it will be made an object lesson as to what can be accomplished in the way of stocking, and keeping stocked, a body of water so that if no method of fishing, except a rod and line, is permitted the supply of fish will be inexhaustible and every fisherman will be able to every day get his legal number of fish. The bass problem is a most interesting one but the Pennsylvania Department has in the last few years done much to solve it and successfully raised the little fish to the length of several inches, something before thought impossible owing to the cannibalistic character of the fish. Last year, in his report, Superintendent A. G. Buller told how he taught the little fish to feed and they took to the food so willingly that they stopped eating each other. With the Wayne facilities the student will have most ample opportunity to study the life of the bass as he could do no where else.

A graduate of the proposed school if he takes an interest in his studies and avails himself of all his opportunities will at the end of his term be fitted to fill with credit any position in a fish hatchery and be able to give to the Commonwealth of Pennsylvania those results the Department of Fisheries is so anxious to attain.

FIELD WORK.

One of the most important adjuncts in the propagation of fish for restocking the waters of Pennsylvania is what is termed "Field Work"; that is gathering fish or spawn from the various waters of the State and transplanting them to other waters, thereby securing millions of fish that otherwise would be lost and at the same time infusing new blood. This is by no means an experiment, it having been tested for a number of years. Constant inbreeding results in the deterioration of fish the same as it results in human beings and animal life. The Japanese have for years been the most wonderful

students of fish culture and by inbreeding have produced a scaleless fish, which is of itself a sign of weakness.

In some sections where the field work is being done there come complaints that the Department of Fisheries is robbing the waters of fish that should be left for the use of the dwellers in the neighborhood. This charge of robbery is without foundation, as the work is beneficial inasmuch as it takes the fish from one water to another, thereby infusing new blood in the fish in the water to which the new fish are brought and other fish are taken back to the first water to replace those removed, thereby infusing new blood in that place. As remarked above, this practice is no longer an experiment but a decided success, having been tried various times within the last few years in various lakes in Northeastern Pennsylvania where the field work has been more largely carried on than in any other section of the State except on Lake Erie.

There are fish like the yellow perch for instance, which deposit their eggs in long strings, attaching them to branches whose movement by the wind and water keeps up the movement necessary for the successful hatching of the eggs. The yellow perch is most prolific and the annual deposit of the eggs runs into the hundreds of millions. Storms drive the eggs ashore in incalculable numbers where they are left to die and the lashing waters cover the strings of eggs with mud smothering the eggs. If these eggs are gathered in time and taken to the hatchery they can be hatched out, the percentage running from seventy to ninety-five per cent. The supply of eggs is limitless and therefore the number of eggs that can be gathered by field work is only limited by the number of men that can be employed to do the work.

Catfish lay their eggs in holes where they can be readily gathered by the field men, and where in too many cases, if left to nature's work, the eggs are smothered by mud or devoured by snakes and other predaceous creatures. The experiment at Torresdale, which is reported by the Superintendent, shows that in the case of catfish, as in the case of yellow perch, the number of eggs that can be gathered is limited only by the number of men that can be put to work to gather them.

On Lake Erie the field work means the gathering of hundreds of millions of eggs that otherwise would be entirely lost. The commercial fishermen on the Lake are always ready to co-operate with the Department of Fisheries in gathering these eggs as they fully appreciate the benefits to be derived. The eggs taken from the fish of the commercial fishermen would all be wasted if it were not for the work of the Department. The eggs are taken from the ripe fish and sent to the hatchery to be hatched. The work of the men on field duty is best done by men who are trained to it and the Department has heretofore been much hampered in its work owing to its inability to obtain trained men, it being impossible to secure men for short periods of time. What is imperatively needed by the Department is such a liberal appropriation that it can employ by the year men who can be sent to any part of the State to do the field work.

Besides gathering the eggs the field men also gather the fingerling fish from various waters for transplanting to other waters, this being the case with such fish as pickerel. Field men also gather the breeding fish of the bass and yellow perch to be placed in the ponds at the hatcheries for breeding purposes.

BROOK TROUT.

The gorgeous colored brook trout of Pennsylvania is the favorite fish of the angler, and every Spring crowds of fishermen hasten to the streams to fish for these dandies of the Pennsylvania waters. There are still many trout streams in Pennsylvania that afford full creels to the angler, but with the ever increasing army of fishermen it is absolutely essential that the supply must be kept up by restocking with artificially raised fish, because the streams under natural propagation will not furnish fish equal to the demand, because natural propagation in any streams is really but a small factor when the number of fishermen is considered.

The Department has thoroughly rehabilitated the Corry hatchery until it is equal to any trout hatchery in the world, and it hopes within the next year to complete the hatcheries at Bellefonte and Pleasant Mount in the same manner, when it believes it can furnish all the brooktrout that are needed to keep the Pennsylvania streams in good condition.

BROWN TROUT.

With the warming up of the waters of the State through the clearing off of the timber, there are many former trout streams that are no longer cold enough for the fastidious brook trout. In such waters, experience shows that the brown trout will thrive, and while not so gamey as the brook trout, yet they afford really more sport to more people than the brook trout, because the streams are more accessible and less difficult to fish.

These brown trout have been called the German brown trout, because they happened to be introduced to this country by a German, yet the fact is that these brown trout are the English brook trout, over which Izaak Walton so much rhapsodized. The Department is making every effort to be able to furnish all the demands for brown trout, and is increasing yearly the number of its breeders so that the output of fish will equal the demand upon it. The Department knows of no other persons raising brown trout and therefore has to depend upon its own supply of breeders for its young fish.

MUSCALLONGE.

Through co-operation with the New York Conservation Commission, the Department of Fisheries was again enabled to obtain a supply of muscallonge eggs from Chatauqua Lake, New York. These eggs were hatched and the fish were planted in those western lakes in which the muscallonge was already an inhabitant. The muscallonge is a most rapid grower attaining a size of 12 inches in a very few months, but to attain this size he eats an enormous lot of food, causing him to be a dangerous fish to place in ordinary waters. Jordan and Evermann say that a full size muscallonge represents several tons of fish which he has devoured during his life time.

The ardent angler desires the muscallonge on account of his size and the hard fight he puts up when hooked, but where the muscallonge abound in small streams, very few other fish are found, so that when the take of the year is measured by fish in pounds, the yield of muscallonge is far below in the way of food than the amount taken from waters where the muscallonge does not live.

PIKE-PERCH.

The pike-perch, or as it is known in Lake Erie, the yellow pike, and in the inland waters as the Susquehanna salmon, are a valuable fish, both from a commercial point of view and as a game fish. In Lake Erie they are classified as a food fish, while in the inland waters of the State they are classified as game fish.

Last year, through co-operation with the Conservation Commission of New York, the Department was able to obtain a supply of pike-perch eggs from Constantia, New York. These eggs were in prime condition, due, as is shown by the reports of the Superintendents of Pennsylvania hatcheries, to the care with which the eggs were handled at the New York station. The reports of the catch of Susquehanna salmon in the rivers of the State show good catches and the fish of fine size.

FROGS.

The experience of the Department has shown that to raise frogs large areas of water are necessary, and such areas of water the Department does not have. It has been successful in a small way in raising frogs at some of the hatcheries, but it finds it is much more

satisfactory to gather the spawn and tadpoles by field work, and then ship the frogs to the applicants. There seems to be no limit to the amount of frog spawn that can be gathered, and no matter how many millions of spawn is gathered, there seems to be no diminution of frogs at the source of supply.

The Department would suggest the enactment of a better law in regard to the protection of frogs, as the present act is not entirely satisfactory.

CATFISH.

The catfish needs no introduction to the average boy, and the grown-up recalls with pleasure the days when he went fishing for catfish. The catfish thrives in most any waters, even if not the purest, and he shows a family instinct that is to be commended to other members of the fish family. The catfish watches carefully over their eggs, and after the little fish are hatched they round them up in a ball after the manner of the western cowboy rounding up his cattle, and guards them with a courage as energetic and persistent as the care with which he watched over their eggs.

During the past year the Department has been experimenting with the propagation of catfish, and it feels sure that it will soon be in a position to furnish an inexhaustible supply of these fish.

Owing to the habits of the catfish to seek shoal water to lay its eggs, millions of these fish perish annually by their eggs being left stranded. These eggs are now gathered by the field men and hatched in the batteries at the hatcheries. The eggs hatch in about five days and the yield of fish is very good. The little ones are pink in color when first hatched, and true to their family instincts, roll around in balls until they attain a certain size when they separate.

Catfish and waffles were at one time one of the attractions for visitors at Philadelphia, and by once more making these fish abundant the Department hopes to place catfish and waffles within the reach of every one who will take the trouble to go fishing.

The experience of the Department has been that the best catfish for Pennsylvania waters are the native catfish or bull-head. They thrive and do better than the imported fish, but do not attain the size of some of the other catfish which some persons desire to introduce. The policy of the Department is to go slow on introducing any new fish into the waters of the Commonwealth, because experience has proved that such fish are not entirely desirable, as shown in the case of the German carp.

YELLOW PERCH.

One of the daintiest of fresh water food fishes is the yellow perch, and it is one of the few fish that survived from the Devonian period. Owing to its fecundity it abounds in such large numbers in some of the northeastern lakes that they are considered a nuisance by the angler who thinks that black bass are the only foeman worthy of his steel. These fish thrive and do well in almost any pure waters, though hardly so well in rapidly running waters.

The Department hopes with its completed hatcheries to be able to furnish the waters of the State with an abundant supply of this valuable fish. What can be done by heavy stocking is shown by Presque Isle Bay at Erie, where yellow perch have been planted heavily for several years, the result being that the hundreds of fishermen who daily frequent the Bay are rewarded with large strings of the yellow perch.

In its bulletin, *What an Acre of Water Will Do*, the Department recommends the yellow perch as one of two fish which will be most profitable for the farmer to raise.

BLUEGILL SUNFISH.

There are few fish which afford so much entertainment and sport as do the family of sunfish, this being especially true as to women and children to whom the taking of sunfish is an ever continuous joy and delight. There are quite a number of species of these fish varying in size, but all of them are gamey and ever ready to take the hook, thus giving the amateur a chance, which he gets from few or no other fish.

The aristocrat of the sunfish family is the bluegill sunfish which abounds in Lake Erie. This fish grows from three-quarters of a pound to a pound in weight, and as an edible fish has no superior, while it is so gamey within certain limits that the daintiest fly fisher does not disdain to fish for it for sport. It is very productive and will thrive in any pure water. Its very gameness is, however, against it as it will rush for a hook when it is barely an inch long and will return again and again to be taken if thrown back into the water, seeming to learn nothing by experience.

Appreciating the value of this fish for food and sport, the Department is making great efforts to raise the blue gill in quantities so that they may be disseminated in all the waters of the State. There are many small bodies of water in the State which would render large returns in the way of food if restocked with the bluegills instead of the black bass, which the average person seems to think would be the fish that he wants in the water. The yield of blue gills would be thousands of pounds in a year where it would not be hundreds of pounds if black bass were planted. In the case of the blue gills, it not only means more food, but more sport for more people.

LAKE HERRING.

Cisco or lake herring are much the most valuable fish in the Pennsylvania waters as we have our own fields in our own waters where the fish can be taken. For the last two years the Department has made strenuous efforts to collect the eggs of this fish, and this year there were more eggs of lake herring taken than ever before by many millions. The fish are taken by the gill net fishermen who now cooperate eagerly with the Department, furnishing every facility for getting the eggs.

The lake herring is very like the white fish but not so large. Its enormous numbers make it a most valuable adjunct to the food supply. The lake herring will take the hook, and fifteen years ago they were caught in Presque Isle Bay through the ice, but since the Bay has become so polluted with sewage the herring no longer come into the Bay.

WHITE FISH.

The Department has been dependent largely upon the station of the United State Bureau of Fisheries at Put-in-Bay, Ohio, for its supply of white fish eggs, but this has not been entirely satisfactory owing to the lack of care in preparing the eggs before they are shipped to the Erie station. Bad weather has also cut off the supply of fish at that station, so this year, through the courtesy of the fishery officials of the Province of Ontario, the Department has been able to obtain a supply of white fish eggs from the Canadian fisheries. These eggs were handled by the Department's own employes, and they arrived at the Pennsylvania hatcheries in a first class condition, the large percentage of the eggs hatching, showing the advantage of the carefully handling of eggs before shipment.

While it is not many years ago since the white fish industry in Lake Erie was so poor that it did not pay the fishermen to fish for them, under the restocking that has been made by the United States Government and the Pennsylvania Department of Fisheries, the supply of white fish has again grown to large proportions. During the year past the Erie fishermen report the best fishing for white fish in years, some of the boats bringing in seven thousand pounds at a haul. This is a most encouraging showing and has convinced the fishermen on Lake Erie that if they wish to keep in business they must co-operate with the Department in this work of artificial propagation.

MINNOWS.

One of the necessities of successfully stocking the streams and waters of the State with fish is a plentiful supply of food. The water plants are the gardens that furnish the food for the little fish, but as the fish advance in size they need more than microscopic food. The largest source of supply for most fish are members of the minnow family, and in the original balance established by nature the supply of minnows was equal to the demands of the fish population of the waters. Of late years this balance has been destroyed, partly due to the introduction of other fish, such as carp and bass, which destroyed the previous balance established by nature.

The fishermen are also in a way responsible for the diminution in the supply of minnows, because they draw on them for bait and waste very many more than they use. In the absence of minnows the fish prey upon their own young, and this is plainly shown in small streams that have been stocked with bass.

There are streams in Pennsylvania of small size which formerly furnished good fishing in the way of native fish, but they were planted with bass which proceeded to eat up all the native fish, and then no longer having these fish for food, they preyed upon their own young, and as food became scarcer and scarcer they abandoned the waters altogether.

The Department has been considering this question of minnow supply and will take steps to plant minnows in those waters of the State where the supply has become attenuated or exhausted. The Superintendent of the Erie Auxiliary hatchery made several plantings of minnows during the year in streams where examination showed the minnows were about all gone.

BLACK BASS.

The Department of Fisheries has the gratified feeling that it has solved the problem of propagating black bass. These fish cannot be propagated as trout, but must be allowed to build their nests and lay their eggs naturally. For this purpose it is found that large areas of water are necessary, and the Department has done much in securing such areas and is still working in that line.

A series of experiments has shown the possibility of teaching the little bass to feed, and educating them up to the knowledge that they can do just as well on the artificial food as they can by eating each other. The Department has been able to hold these bass without an appreciable loss until they reach a length of from three and a half to

seven inches, at which size when planted in the streams they are fully able to take care of themselves, and at the same time by their fine appearance afford much satisfaction to the recipients of the fish.

During the past year the Department was able to raise 500,000 small mouth black bass at the Wayne hatchery until they had reached a size of three and a half to four inches, but unfortunately a cloudburst, which is described in the Superintendent's report, carried them away, because the unfinished condition of the ponds prevented them from withstanding the rush of water. However, it is to be hoped that the bulk of the fish reached the Delaware River, and the people on that stream should have excellent fishing for some time to come.

There is an exceedingly large demand for the black bass, but the Department is exercising its discretion in shipping the bass to waters that are not suitable for them. The small mouth bass requires large areas of water and is a destructive fish, not only being very voracious, but is also given to killing fish for the mere sport of it, as any observer can note by watching the black bass chasing a school of minnows.

The Department therefore recommends persons who apply for bass for small areas of water to change their application for other fish which are not so destructive, and in time will give better results, that is more fish and more pounds of food.

BLUE PIKE.

There was a heavy run of blue pike this year and the Department has been able to secure a good supply of eggs. The blue pike are most largely caught in this end of the lake and rarely in the upper end. They are fully equal to the yellow pike as food. For a number of years such prominent ichthyologists as David Starr Jordan insisted that blue pike and yellow pike were the same fish as ichthyologists class fish. Within a few years the Department has convinced these scientists that the fish are different, as the blue pike is distinguished by its color and by the fact that it does not spawn at the same time as the yellow pike.

HATCHERY REPORTS.

The reports of the Superintendents of the various hatcheries give in detail the work at the hatcheries during the past year. The Superintendents labored under many disadvantages, some owing to the work of reconstruction which was going on, and others because the Department does not have the absolute control of the water supply.

By their unswerving loyalty and persistent energy they produced results greater than was hoped for, and the Department returns to them its most hearty thanks. Indeed, the Commonwealth of Pennsylvania is to be congratulated upon its force of Superintendents of hatcheries who are not excelled in fish lore and ability by the force of any other State. They have all been in the service many years, and with one exception, were all trained in the old finished school, which expected an employe of a hatchery to be ready to do any work, from digging a pond to taking eggs from a fish.

The old system was much the same as that of Mr. Squeers, of the famous Dotheboy Hall, who explained the mysteries of teaching at that school to Nicholas by calling up a small boy and propounded for spelling the word window. "Winder," said Mr. Squeers, "and now that you know how to spell it, go wash the windows in the kitchen and then you will never forget."

It was a hard school, but a thorough one, but as before remarked in this report, it is no longer the proper system of education to be followed for a fish culturist. The fish culturist to-day is a man of science whose brains count for more than his muscle, and the work of the muscle can be done by the laborer who is not expected to employ much brain power.

CORRY HATCHERY.

Corry, Pa., November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—Herewith is transmitted my annual report for the year ending November 30, 1914.

The year has been a very busy one, because we are endeavoring to propagate fish while rebuilding the ponds and erecting a new hatching house, and at the same time the work of grading and grassing the grounds was kept up. Propagating fish and rehabilitating ponds do not go well together, but the results attained were on the whole much better than our most sanguine expectations had pictured, and we feel that we were repaid for our extra efforts, exhausting as they were.

The first trout eggs were received in November and were carried in the old hatching house which was overcrowded, but the fish had to be kept there until spring owing to the fact that the ponds were not ready to receive them. When the available ponds were gotten ready there were not enough for the fish so the young trout had to be crowded owing to this lack of room, the result being that there were heavy losses of the little ones. To the overcrowding was added the working of the new concrete which affected the water and this undoubtedly contributed to the killing of the fish, as when the fish

were removed back to the old hatching house they quickly recovered and again began to feed which they would not do in the new ponds. When the epidemic struck them they died off so fast that it was absolutely discouraging, and myself and the men almost lost heart. Our courage returned, however, when it was found that the fish recovered when placed back in the old hatching house where the water was not affected by the new concrete.

The new ponds were then drained and thoroughly dried out, several inches of gravel placed in the bottoms and the water again let in, after which the trout were returned, and there has been no more trouble since with the fish. This seems to prove to me that it is not safe to place fish in new concrete ponds until they have been allowed to stand for awhile with the water in them until the soluble parts of the concrete are all taken up by the water, after which the water should be drained off, the concrete thoroughly dried, and then painted with some water tight compound which will not only prevent any absorption of anything from the cement, but by rendering the cement water tight will render it proof against freezing which would disintegrate the concrete.

From my experience last winter I am convinced that unless the concrete is water proof it will be so much effected by the frost as to disintegrate. This was exemplified in the ponds at the points where the ice formed and the level of the water varied. At all these points it is necessary in the spring to reface the concrete. I am also of the opinion that it is better to have earth bottoms in the ponds rather than concrete, because there seems to be some life-giving property in the earth bottom that it imparts to the water and this life-giving power is cut off when the bottom is concreted.

After the overcrowding and the trouble from the concrete was overcome, the fish did finely, and it is possible to fill all the applications for brook trout, but not all of the brown trout applications. This was due to the unusually large demand for the brown trout. There are, however, at the hatchery this year a fine lot of brown trout breeders, and the indications are that there will be enough eggs available to produce all the brown trout required to meet all the applications of next year. It is evident from the large number of applications for the brown trout that the hatcheries must be prepared to meet an increasing demand each year. During the year there were several ponds built especially for the brown trout breeders, being six feet deep. It is also intended to have several additional ponds constructed especially for the brown trout breeders.

It is suggested that the water available on the east side of the hatchery be gathered and used in twenty new ponds to be built with the new hatching house all to be used for the brown trout work, which is growing to be of so much importance and is especially Pennsylvania's work, it being impossible to get any eggs but what we breed from our fish as I do not know anywhere else where the brown trout are propagated. This water, after use in the brown trout ponds, can be united with the water from the other series of ponds and made available for bass culture, the water by this time having reached the temperature necessary for bass work.

After the completion of the ponds and hatching house suggested as required to complete the facilities of this hatchery, I may safely

say there will be no hatchery in the United States that will be its superior in completeness of detail and ornateness in design, while it will be equal or superior to any in its possibilities to turn out fish. The water supply is ample and completely under its control, the two most important elements in the success of a fish hatchery. To this may be added the fact that the hatchery has the advantage of being situated at a fine shipping point so that it can get its fish out.

During the year the new hatching house has been completed and will be ready for use when the eggs begin coming in. It is thoroughly equipped with all the necessary adjuncts for handling the eggs and fry to the best advantage, and a hot water system of heating will rob the work of the terrors it used to have to men working in ice cold water in temperatures approximating zero when it became a question frequently whether one's fingers were still a part of the personal anatomy, so numb were they. The house is of Oriental brick, very ornate in design, and draws many complimentary remarks from the visitors to the hatcheries.

The old office building has been transformed into a retiring room for the women visitors, a most desirable thing, and it is proposed to make similar arrangements for the men. From the constantly increasing number of visitors these public comfort stations were an absolute necessity.

All the buildings have been painted to bring them in harmony with the new hatchery and also all the shades on the ponds. It is proposed to move the barn to a new position on the other side of the road where it will be on high ground and drier than the present location. In its present location the building is not in harmony with its surroundings and it also obstructs the view of the grounds and hatching house from the road. It is also proposed to move the meat house to another place where its odor will not be so much in evidence to the visitors, for in spite of the utmost care the meat house will announce its location through the nose.

A new building is imperatively needed in the place of the house occupied by one of the assistants. The present structure is one of the oldest buildings in this neighborhood, and it is so decrepit with age that it is a wonder that it does not fall down without waiting to be torn down.

The grading in the upper part of the grounds was all completed and sown with white clover and lawn grass seed which have made an elegant set, assuring a beautiful lawn next season. Where necessary at the terraces ornamental concrete steps were built. The trees were all trimmed up and unsightly one taken out, these being replaced with new ones. The roses and other plants made the grounds a thing of beauty, but their charm was marred by the fact that there was frost every month in the year except July.

A lagoon was constructed along the east side of the drive about 200 feet long and 16 feet wide, which will be supplied with what is now superfluous water, and after being used here will go to the gold fish pond. This lagoon will be used for keeping the exhibition fish for the aquariums, and those used for sending to public aquariums. It is quite an ornamental feature as well as a useful one, as the fish

in it will be mostly mature ones and possess more interest to the average visitor who would rather see whales than minnows.

The shipments of fish seem to have been most successful, as so far only one complaint has come to my knowledge and that was due to a shortage of ice at a point where the fish had to be held all night. A second shipment was made to replace this one, and with the previous knowledge, ample preparation was made and all the fish went through in good shape.

It is 34 years since I first took charge of the Corry hatchery, and I think I know thoroughly its capabilities to raising trout. During that time I have visited many hatcheries and have never seen one which is so well equipped as to the quantity of the water and the fall. This makes me confident that the Corry hatchery with its new and complete hatching house and ponds will be one that the Commonwealth of Pennsylvania can point to with pride as having no superior anywhere.

One of the tribulations of the Superintendent of a hatchery is due to the depredations of fur and feathered creatures who have an appetite for trout. King fishers gather in such numbers around a pond that one wonders where they all come from while cranes and herons have a most wonderful taste for trout. Coons, minks, cats and even the house rat are fishers for trout, and as much vigilance is required to keep off these enemies as is said to be the price of liberty.

In years gone by one of the pests at the hatchery was minks who are most adept fishers with the appetite of the largest size ostriches, but the bounty on them together with the value of the hides, supplemented the traps, and for the last five or six years no minks were apparent. This year when the fish were removed to the old hatching house the fact was one morning disclosed when a whole trough of a thousand or more trout had been despoiled by some lively fishermen. Cats were suspected, but unjustly, for when the traps were set, lo and behold, four minks were caught, one of which is still being in captivity by one of the boys to raise a fur that the European war has made valuable. The wonder is where did all those minks come from.

Attached hereto is the distribution of fish during the year.

Respectfully,

WILLIAM BULLER,
Superintendent.

The following is the distribution of fish made during the year:

YEARLING BROOK TROUT.

Allegheny County,	2,100
Crawford county,	3,000
Clinton county,	13,100
Cameron county,	27,300
Clearfield county,	9,900
Erie county,	18,300
Elk county,	17,400

Fayette county,	7,800
Forest county,	10,500
Jefferson county,	15,000
Lycoming county,	31,800
Lackawanna county,	2,400
Luzerne county,	2,400
McKean county,	22,200
Northumberland county,	900
Pike county,	5,700
Potter county,	80,700
Sullivan county,	1,800
Susquehanna county,	7,200
Somerset county,	5,400
Tioga county,	8,400
Venango county,	18,000
Wayne county,	6,900
Warren county,	15,000
Total,	333,200

YEARLING BROWN TROUT.

Allegheny county,	2,700
Blair county,	600
Berks county,	4,800
Bradford county,	1,800
Crawford county,	2,900
Chester county,	300
Columbia county,	5,100
Clarion county,	2,400
Clearfield county,	21,300
Dauphin county,	4,800
Elk county,	1,200
Erie county,	1,800
Fayette county,	10,500
Franklin county,	8,100
Jefferson county,	9,000
Lycoming county,	6,600
Lancaster county,	600
Lebanon county,	2,400
Lackawanna county,	13,200
Lehigh county,	4,000
Luzerne county,	42,800
Lawrence county,	3,000
Monroe county,	600
Mifflin county,	18,900
Northampton county,	17,100
Northumberland county,	1,500
Philadelphia county,	600
Potter county,	1,500
Perry county,	600

Somerset county,	7,800
Sullivan county,	1,500
Schuylkill county,	1,500
Tioga county,	1,500
Union county,	1,800
Venango county,	2,400
Wyoming county,	4,500
Washington county,	1,200
Warren county,	1,800
York county,	600
Total,	215,300

ADULT BROWN TROUT.

Allegheny county,	300
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ADULT BROOK TROUT.

Erie county,	300
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FISH FURNISHED FOR CONNEAUT LAKE FAIR—ADULTS.

Brook trout,	20
Brown trout,	20
Lake trout,	10
California trout,	10

BROWN TROUT

Yearlings,	20
Eyed brown trout eggs sent to Rhode Island Fish Commission in exchange,	10,000

SUMMARY.

Adult brook trout,	320
Adult brown trout,	320
Lake trout,	10
California trout,	10
Yearling brook trout,	333,200
Yearling brown trout,	215,300
Eyed brown trout eggs,	10,000

REPORT OF ERIE HATCHERY.

Erie, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—I herewith submit my annual report for the year ending November 30, 1914:

The annual output of the Erie hatchery will not show up to its usual standard owing to the building operations under way during the past year, which necessarily prevented full operations in fish cultural work. The new hatchery is situated in the Water Works Park at the foot of Chestnut Street on the harbor front. It can be approached by boat at the north and east doors, and by a drive at the south and west doors. The building was accepted in July from the contractor, so far as his part of the construction was concerned.

After its acceptance I was directed to complete such further work as putting in the concrete walks from the building to the concrete seawalls on the north and east sides of eighteen feet and eight feet widths. Built up terraces on the balance of the grounds and made drives. The interior of the building having only one coat of paint, two more were put on. This included the ceilings, walls and floors. The building is constructed of red shale brick, structural iron for the second floor, and roof trussing with red Spanish tile on the roof, and plastered throughout with cement plaster. The foundation is of concrete twenty inches thick, twelve feet deep, and is down to bed rock.

Upon entering the building to the right are two hatching batteries, one for MacDonald jars, the other for Meehan jars. The batteries are of cypress, painted a gloss white, which is in keeping with the balance of the interior. On the left hand taking up the entire length of the building are 13 fry tanks, all painted white, giving the Erie hatchery the largest fry holding capacity of any known battery system.

All the piping system is laid in concrete trenches with corrugated iron coverings, so that in case of trouble, repairs can be made without tearing up the cement floors.

On the second floor it is intended to install aquariums for scientific and educational purposes, and at the same time it will make one of the most attractive places to visit all the year round for strangers to the city, as well as to our own citizens.

The architectural structure of the building is such that it conforms with the filtration and pumping station of the Water Commission on the grounds. The plot of ground given to the Department of Fisheries is 100 feet by 100 feet, the hatchery building being sixty feet by eighty feet. On two sides of the building, those on the water front, there has been a space of eighteen feet left between the dock and

building so that there was very little ground left for a lawn or other purposes.

The Water Commissioners, Messrs. F. D. Schultz, William Hamilton and B. B. Nagle, again came to the front and turned over to the use of the Department a plot of 100 feet by 125 feet so that we now have the entire outer or north end of the dock, and thus will be able to have a fine terraced lawn and sunken driveway on the west side of the hatchery.

There is one more improvement that must be carried out to complete the hatchery. This is the dredging out of the waterways to the hatchery and the building of a seawall for the protection of the Commodore Perry and other craft against the sea while making a landing or mooring at the dock. This improvement can be made to answer a three-fold accommodation to the Commonwealth: The first is for the protection and use of the Department of Fisheries.

Second, for the State Naval Reserve boat, the Wolverine. This boat has (excuse the expression) no more home than a rabbit, and this new dock extension would give this ship a permanent home.

Third. We have the resurrected and rebuilt flagship Niagara in which sailed Commodore Perry when he won the great historic battle of Lake Erie, and only for that great victory, who knows what would be written in history today, and today she is like the Wolverine, having no more home than a rabbit, and this great flagship could also be moored to this dock.

Here the State could have all its most important properties concentrated; all could be taken care of with one appropriation for the Department of Fisheries, and what is more it cannot be disputed, this location is the most suitable that could be found anywhere on the shores of Presque Isle Bay.

Another important and necessary improvement is that of the east and west canal basins used almost exclusively for commercial and fishing purposes. This work was started with an appropriation made by the Legislature of 1911, but there was not enough money to complete the work contemplated in one basin, the left one.

This improvement should receive attention for the reason that it is State property, does not only benefit the citizens of Erie, but is of great importance to every dweller in the city and to the State itself. First: Pennsylvania has concentrated here in Erie in these two small basins a fleet of steam fishing tugs, 70 in number, averaging 70 feet over all, and on the banks are the fish houses that make Erie the largest fresh water fishing port in the world.

Second: Here we catch annually 10,000 tons or more of fresh water fish, to help take nature's part in the food supply for the people, and this supply plays an active part in keeping down the cost of living.

Third: This fishing industry plays the most important part to the port of Erie. The amount of license fees collected by the Department of Fisheries from this field this year is the largest amount ever collected, \$3,071.00, showing a steady increase each year.

The collections would be still more if the canal basins were improved so as to give mooring space for a larger fleet. All these fees go directly to the State Treasurer and would pay the interest on a much larger appropriation than is needed to do the work.

We know the fishing industry is a very valuable asset. It is great but let us make it greater by providing every possible facility.

Another very important movement undertaken by Commissioner Buller, and one that is well under way, is the dredging of the ponds on Presque Isle Peninsula. This is an improvement that when completed will be of vast importance and give Pennsylvania the finest spawning grounds in the United States. The dredging of the ponds will be a great aid to the Department in the furtherance of extending fish cultural work; will open a waterway for live craft so that many people may, for the first time, see what a wonderful gift of nature has been hidden there from view for so many years.

The clearing out of the dense like underbrush will eliminate the dangers of forest fires of which there have been in the past some dangerous ones. At the beginning of this work the dredge Centriff, of the Gilesie Construction Company, of Pittsburgh, Pa., started dredging at the mouth of what is known as Graveyard Pond. Worked through and completed this pond, which is 2,500 feet long with two basins in it, 200 and 300 feet in diameter, and the balance is 75 feet wide.

Near the north end of Graveyard Pond a cut to the west was made through a ridge of sand and gravel 55 feet wide into what is known as Raccoon Pond, thus connecting Graveyard Pond, Raccoon Pond, Boat House Pond, Big and Long Pond into one body of water, making a stretch of water nearly two miles in length, restoring and making better nature's former biggest and best natural spawning preserve in Pennsylvania.

All the sand and gravel pumped, on an average of 1,400 yards per day, was used to fill the marshy lowlands surrounding Graveyard and Raccoon Ponds, while several small landlocked, shallow and stagnant ponds were also filled. This filling eliminated at least a great part of the mosquito nuisance, and medical authorities say it is the only sure way of exterminating the mosquito.

The amount of work accomplished during the year has been a great surprise to most visitors, and it is hoped that the next Legislature will appropriate enough money to further carry on the good work to completion.

The State tug Commodore Perry was rebuilt and reconstructed to give more deck room and make her more seaworthy. The work was completed as per contract, and she was gotten out on the time agreed upon, but unfortunately from the time of her inspection, the first week in June and up to September 1, I am sorry to report, she was but little use to the Department for the following reasons:

At the time of the inspection by the United States local inspectors she was passed and O.K.'d in every way. She was inspected as a fish patrol supposed to cover everything in line with the work of the Department of Fisheries, and under which character she has sailed since she was built in 1907. This finding of the local inspectors was reversed by Supervising Inspector N. B. Nelson, of Cleveland, Ohio, whose interpretation of the rules and laws are that there is no authority at law for the issuance of papers for a fish patrol, and that if we wished to carry other people than the crew, the character of the boat should be changed to that of a passenger steamer, which has since been done.

This put the Department of Fisheries to considerable expense, trouble and delay, and I wish to state very plainly that with the extra equipment that we are forced to carry the boat is not as safe as heretofore. She is too heavily loaded with extra equipment on her canopy roof.

It was desired to change her character to a fishing steamer, but the Supervising Inspector says you dare not carry any one other than the crew or those engaged in fishing to Canada; that spawn-takers taken to Canada to go out in fishing boats are not actively engaged in fishing. The Commodore Perry is not used for hire nor gain, neither does she carry passengers for hire. She is used exclusively for fishing patrol and conservation of fish, and to rate her as a passenger steamer is a great hardship, and under this ruling an extra \$3,000.00 must be added to the appropriation for maintenance for the next two years to cover salary for another seaman that must be added to the crew and for extra equipment required.

Carp licenses were issued to 23 applicants to fish in Presque Isle Bay, and \$115.00 in fees were collected. There were 72,999 pounds of carp taken out of the Bay.

Fished with seine in the Spring for bluegills and other varieties for exhibition purposes; also fished three trap nets in Lake Erie for adult small mouth bass for breeding purposes. The number of fish so caught will be found in the table of output.

From August 31 to September 4, I was at Exposition Park, Conneaut Lake, on duty with the annual fish exhibit for the Conneaut Lake Fair Association. This year's exhibit was the finest ever put on, and the exhibits are more and more appreciated every year by the thousands of visitors at the Fair.

October 28 and 29, was at Huntingdon with an exhibit for the Boy's and Girl's Fair. While the varieties displayed were not as many as were exhibited at Conneaut Lake, it was due to lack of aquarium room. There were only six fair size display tanks, but by putting doubles and trebles in the aquariums we were able to display 14 different varieties. The display was very much an attraction to the children and adults, while at the same time it added much value along educational lines, because the fair was intended for the youngsters.

Pike-perch eggs that we were to receive from the United States Bureau of Fisheries last April were turned back. None were accepted for the reason that the number of bad eggs far outbalanced the number of apparently good ones. In other words, the green eggs from that field, particularly the first ones we were to have, did not look to be more than fifty per cent. fertile. My representative was informed that he would have to take them as they run or none, so I instructed him to accept none and come home.

Blue pike eggs were a complete failure, the same as the Spring of 1913. The run of blue pike was so light that the fishing fleet laid up previous to the spawning period.

While the Erie hatchery was nowhere nearly completed, last March, by working day and night we were able to temporarily get the batteries, fry tanks and water supply in such shape that March 24th, when we received the first shipment of white fish and herring eggs

that were developed at Union City, we hatched them here. This saved a heavy draying expense and the nearly impossible feat of transporting such a vast number of fry without loss.

The same arrangements were made with the Canadian authorities for taking white fish eggs as were made in 1913, but the white fishing on the grounds we have been operating, from Port Dover to Selkirk, Ontario, was nearly a complete failure. After the Superintendent of the Sarnia, Ontario, hatchery, left the field we took it over for a week, but were only able to get a million eggs. I am at present working on a plan with the Superintendent of the Sarnia hatchery whereby, if it meets with approval, we will co-operate and pen vast numbers of unripe fish for another year for spawning purposes. This should help materially to increase the number of eggs.

The take of herring eggs this Fall is most gratifying, especially so when the herring catch was so far below the average, as was the case here this Fall. Reports from all the fishing ports are the same that the herring catch was very light and the run short. In addition to filling the Erie hatchery I was able to ship a good supply of herring eggs to the Union City hatchery, the hatchery at Constantia, New York, and co-operated, as is becoming an annual work, with the Superintendent of Bemus Point, New York, hatchery, in taking the herring eggs. The number of eggs taken and where shipped will be found in the table of output hereto attached, also of fish distribution.

LAKE HERRING EGGS.

Erie hatchery,	139,370,000
Union City hatchery,	35,000,000
Bemus Point, New York, hatchery,	21,816,000
Constantia, New York, hatchery,	7,070,000
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Total,	203,256,000

WHITE FISH EGGS FROM CANADA.

Erie hatchery,	1,000,000
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ADULT SMALL MOUTH BASS.

Erie county, Union City,	79
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SMALL MOUTH BASS, FINGERLINGS.

Crawford county,	200
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BLUEGILL SUNFISH, YEARLINGS.

Crawford county,	100
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BLUEGILL SUNFISH, FINGERLINGS.

Crawford county, 150

YELLOW PERCH, FINGERLINGS.

Beaver county,	450
Indiana county,	300
Crawford county,	375
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Total,	1,125

The following is a list of licenses, kind of and amount of same issued during the year:

Pound nets, 72 @ \$10.00,	\$720.00
Trap nets, 145 @ \$5.00,	725.00
Steam tugs, 61 @ \$20.00,	1,220.00
Steam tugs, 7 @ \$15.00,	105.00
Gas tugs, 8 @ \$10.00,	80.00
Gas tugs, 11 @ \$5.00,	55.00
Row boats, 4 @ \$5.00,	20.00
Night lines, 40 @ \$1.00,	40.00
Steam tug, 1 @ \$20.00,	20.00
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Total,	\$2,985.00

Thanking you for your hearty co-operation and support accorded me.

Yours very respectfully,

PHIL. H. HARTMAN,
Superintendent.

BELLEFONTE HATCHERY.

Bellefonte, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—The following is the annual report of the work at the Bellefonte hatchery for the year ending November 30, 1914:

The year opened with the troughs filled with brook trout eggs all in good shape and promising the best results. During December 500,000 brook trout eggs were shipped to Bath, New York, for the New York Conservation Commission in exchange for muscallonge and pike-perch eggs. By Christmas there were 28 troughs of trout hatched out and by the last day of January all the fish had been hatched and were in fine condition. I do not believe that I ever saw finer fish in my life.

These fish all took to feeding promptly and thrived until April when an epidemic broke out and the fish died by the thousands in spite of every effort on my part to check the trouble. The epidemic ran its course by June and it cost many thousands of fish. My opinion is that the trouble was due to the fact that the water was working and this made it poisonous to the little fish by depriving the water of its necessary quantity of oxygen, because after the water stopped working there was no more trouble to speak of.

The fish then began to grow rapidly and when the shipping commenced in September the ponds contained as fine a lot of brook trout as ever were assembled in the hatchery. There was a large number that ran from six to eight inches in length, which will make fine game for the anglers next Spring.

At this point I wish to say that all the reports received by me from recipients of fish expressed the highest satisfaction at the condition in which the fish arrived at their destination, but all praise in the most enthusiastic language the size of the fish. From this testimony it would seem that the persons who are stocking the streams with trout believe in getting fewer fish of larger size rather than a larger number of fry, whose size is so small that they can hardly be seen in the cans. The eye of the recipient is evidently on what he bases his judgment. Certainly it was an agreeable sight to the recipients to see a can containing so many trout, almost or entirely ready to meet the requirements of the law as to the size to be taken by the angler.

All the fish shipped are accompanied by a messenger to their destination and the results have been there has not been one single complaint come in about the condition of the fish. In addition each recipient is requested to report the number of fish he receives and their condition, thus enabling the Department to keep tabs on every shipment. Under your orders also the number of fish sent out on a

shipment is strictly limited to a number that the messenger can take care of, which is most essential.

There is one problem that is insolvable in a satisfactory way to both parties, and in view of the work of the messengers, must be solved in favor of the messenger. All runs of fish are arranged so the shipments may be full and for a certain locality or section of the State. The shipments are arranged so that the fish will be the shortest possible time on the road, both for the health of the fish and the comfort of the messenger. Necessarily, the cans for the end of a run, which starts in the morning, arrive in the afternoon or towards evening, and some of the applicants for such fish write pettishly to know if their fish cannot be sent to arrive in the morning, not taking the trouble to look up the matter and see that if the fish were so shipped it would mean that the messenger be compelled to lay over with those fish at some point all night, keeping the fish in the cans that many extra hours, which is a difficult problem, while the messenger would have to spend the night aerating the cans which means back breaking work, and if a trout fisherman wishes a good healthy job which involves plenty of exercise he should try staying up all night dipping water in twenty or more cans to keep an assortment of young trout from asphyxiating.

The applicants for fish can rest assured that at this hatchery every effort is made to get the fish to the applicant in the shortest possible time so that the fish may arrive in a perfectly healthy condition and any other arrangement would mean to keep the fish longer on the road, which in nine cases out of ten would mean a deterioration.

There were received in March from the Wayne hatchery 100,000 lake trout eggs which were hatched in the troughs. Sixty thousand were shipped to Erie to be planted in Lake Erie and the rest are held in the hatchery to be planted in various lakes in the State. They are in fine condition and all of good size.

The hatching house has been falling rapidly into a state of dissolution until it is not really safe for the men to work in when the wind blows, the building having sunk three inches, and it will undoubtedly collapse if a violent storm should occur when the building is covered with snow. The roof was so bad that it no longer turned rain, the sky being visible through the holes. By your orders the roof was made water tight by a paper roofing put on by the hatchery force. This building must be replaced at the earliest possible date, because I do not believe it can be used another year and it is to be hoped that the next Legislature will appreciate the necessity and make an appropriation that will permit the erection of a permanent hatching house in keeping with the good work done by this hatchery.

The barn is in a bad state of health being a very old structure and should be replaced by a new one. A number of the ponds need complete rebuilding before they can be used. The new series of ponds which are on the plans for the rebuilding of the hatchery are very badly needed, and it is to be hoped also that the money will be granted by the next Legislature for their erection.

The old fish car of the Department had been left behind in the progress of railroading and would no longer be hauled by the railroad companies unless entirely overhauled and fitted with the var-

ious new appliances demanded by the Interstate Railroad Commission. This would have involved a large expenditure of money, and the distribution of fish by car is no longer as economical as the present method by messenger, so you decided to sell the car. It was turned over by you to the Board of Public Grounds and Buildings, together with a horse, that had outlived its usefulness, and both were sold by that board. On orders of the Superintendent of the Board of Public Grounds and Buildings the car and horse were turned over to the purchasers.

The roof of the car barn has about become a thing of the past and a stiff breeze will probably send the building to the scrap heap for its work is done and usefulness outlived, while the value of the material in it is about nil.

The trees on the hatchery grounds have all been growing nicely and indicate in a way the future beauty of the grounds. The grass has been kept trimmed and the grounds really present a very pretty park-like appearance, attractive to the visitors and the passers-by the gates.

Attached hereto is the distribution of fish for the year.

Respectfully,

WILLIAM F. HAAS,
Superintendent.

The following is the distribution of fish made during the year:

BROOK TROUT, ONE YEAR OLD.

Blair county,	21,300
Berks county,	8,700
Bradford county,	11,100
Bucks county,	14,125
Bedford county,	5,700
Cambria county,	33,900
Carbon county,	16,200
Centre county,	82,700
Chester county,	3,650
Clearfield county,	59,000
Clinton county,	7,500
Columbia county,	49,200
Cumberland county,	20,400
Dauphin county,	10,800
Fayette county,	12,300
Franklin county,	9,300
Huntingdon county,	17,100
Indiana county,	11,700
Juniata county,	600
Lackawanna county,	26,400
Lancaster county,	9,000
Lebanon county,	10,200
Lehigh county,	51,300

Lycoming county,	35,250
Mifflin county,	13,500
Monroe county,	50,400
Montgomery county,	6,300
Montour county,	300
Northampton county,	29,100
Northumberland county,	3,000
Philadelphia county,	1,200
Pike county,	3,000
Schuylkill county,	21,600
Snyder county,	300
Somerset county,	35,700
Sullivan county,	57,300
Susquehanna county,	6,600
Tioga county,	14,100
Union county,	5,700
Washington county,	1,000
Wayne county,	11,100
Wyoming county,	1,800
York county,	900
Total,	790,325

LAKE TROUT.

Erie county,	7,500
Lackawanna county,	1,600
Total,	9,100

ADULT BROOK TROUT.

Centre county,	100
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BROOK TROUT EGGS.

Steuben county, New York,	42,000
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REPORT OF WAYNE COUNTY HATCHERY.

Pleasant Mount, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—Herewith is my report of the operations of the Wayne County Hatchery for the year ending November 30, 1914:

In the Spring the hatching house was stocked up with pike-perch eggs received from Constantia, New York, through the courtesy of the New York Conservation Commission. These eggs were in the very finest condition, and consequently the hatch showed a very heavy percentage of fish. The eggs received from Constantia did much better than those previously received from Lake Erie, as the eggs from the latter place were taken from gilled fish, and in addition there are not the facilities to handle eggs before shipping, such as exist at the New York hatchery at Constantia. These fish were all planted in the rivers and lakes in northeastern Pennsylvania. There were a number of shipments made of two year old trout, and nearly 75,000 adult yellow perch. There were also a number of shipments made of adult pickerel.

The yield of small mouth black bass promised to be the best the Department of Fisheries ever had. The adult bass in the ponds built their nests, and it was estimated that over 500,000 fish were hatched. The little bass were separated from the adults and were growing finely, as shown by the fact that by August the fish had reached a size of from three and a half to four and a half inches in length.

The problem of feeding the little black bass seems to have been satisfactorily solved by the experiments of the Department of Fisheries, the fish now preferring the artificial diet to the old fashioned method of eating each other. Owing to the work of rehabilitating the hatchery, the ponds containing these young bass were not entirely completed.

August 11, the hatchery was visited by three cloud bursts, which swept out the ponds and allowed the little bass to escape. Most of them got into the Lackawaxen River, but very many were stranded on the banks and left to perish when the high waters receded. While this flood deprived the hatchery of its ability to ship black bass to many points in the State, the people living along the Delaware River will profit by the catastrophe, showing that it is an ill wind that blows nobody any good.

There were 80,000 adult yellow perch in the ponds that went out, and nearly 500,000 yearlings, all of which escaped in the flood. These heavy losses of fish rendered it impossible to fill many applications, causing much disappointment, but it was one of those unpreventable accidents, due to a necessarily incompleated state of the ponds, and exemplified the difficulty of trying to raise fish while building a hatchery.

The whole season has been a busy one in completeing the ponds on the hatchery grounds and repairing the damage done by the storm. A very large amount of grading was done to complete the grounds and improve the drainage. A wall 350 feet long and three feet wide was built along the dam that was washed out, so that it will be safe in the future from washouts. A new stable was built of concrete and stucco, in keeping with the substantial structures that are now being erected at the various hatcheries, due to the policy of the Department to erect only permanent structures, which are at the same time artistic.

An electric light plant was installed which furnishes light to all the buildings on the grounds, a vast improvement on lanterns and coal oil lamps.

In April the field forces at Wayne hatchery were put to work upon the various lakes in the vicinity. The forces consisted of four men and a team of two horses. The first work was to take out the small yellow perch from the lakes, which perch were stunted from inbreeding. These perch were taken to the hatchery from which other perch were taken to the lakes to furnish new blood, it being a well established fact in fish culture that if a fish supply is to be kept up to the highest standard, there must be changes of blood. The stunted fish when placed in new surroundings and fresh water all developed and grew to their proper size. This yellow perch work was kept up until August when the flood came.

Similar work has been done for several years, the good results being plainly apparent by the increased number of yellow perch and their better size in the lakes so treated.

Some pickerel were also gathered from the lakes by the field men for shipment to other waters.

There were some persons who had first objected to the taking of fish from the lakes by the field men, but since they have had visibly displayed to them the good results of the work, they are now among its most earnest advocates.

The distribution of fish from the hatchery follows:

Respectfully,

G. W. BULLER,
Superintendent.

ADULT YELLOW PERCH.

Franklin county,	5,800
Lackawanna county,	8,450
Lancaster county,	8,900
Lebanon county,	4,670
Luzerne county,	10,700
Lycoming county,	5,457
Monroe county,	8,900
Tioga county,	9,390
Sullivan county,	3,750
Wyoming county,	3,900
Total,	69,917

ADVANCED FRY, WALL-EYED PIKE.

Columbia county,	800,000
Lackawanna county,	3,000,000
Luzerne county,	1,400,000
Monroe county,	1,600,000
Northampton county,	1,400,000
Pike county,	1,200,000
Susquehanna county,	2,200,000
Wayne county,	5,000,000
Wyoming county,	3,800,000
Total,	20,400,000

TWO YEAR OLD BROOK TROUT.

Carbon county,	6,300
Luzerne county,	5,100
Monroe county,	10,000
Northampton county,	5,000
Susquehanna county,	4,557
Wayne county,	8,650
Total,	39,607

April 22, Received from Constantia three cases of pike eggs.

April 22, Shipped J. R. Berkous one case of pike eggs.

May 10, 15,000 pike in Sly Lake.

May 10, 15,000 pike in Long Pond.

May 10, 18,000 pike in Bigelow Lake.

May 10, 6,000,000 pike in Beaver Meadow.

May 11, M. J. Tinkler, Susquehanna, 12,000,000.

SMALL MOUTH BASS, FINGERLINGS.

Northampton county,	500
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TORRESDALE HATCHERY.

Torresdale, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—Herewith is transmitted the report of the operations of the Torresdale Fish Hatchery for the year ending November 30, 1914:

At the beginning of the year, December 1, 1913, there were received from the Erie hatchery 47,400,000 herring eggs and 12,528,000 white fish eggs. The herring eggs were better than the year before, but the white fish eggs were a very bad lot, and the consequence was that they took an unusual amount of time and labor because there were so many dead eggs to be removed.

These eggs were nearly all taken by the United States authorities at Put-in-Bay, Ohio, and their bad condition was due to the lack of care taken in preparing them for shipment. The condition of these eggs fully proved the desirability of having the eggs prepared at the point of taking by the Department's own men, a condition which you have tried to insist upon with the United States Bureau of Fisheries, and which it is to be hoped will be granted at the coming fishing season.

In striking contrast with these white fish eggs taken by the United States authorities were those in one case of eggs received from Canada in which case the eggs had been prepared for shipment by the employes of the Pennsylvania Department of Fisheries. These eggs were in an almost perfect condition and the number of bad eggs taken from them was almost of a neglectable character. This fully exemplifies the importance of the proper preparation of the eggs for shipment, because it is a waste of time and money to handle eggs in which a large proportion turn out to be bad.

The herring eggs were taken by the employes of the Pennsylvania Department of Fisheries and were carefully prepared before shipping, the result being that the proportion of good eggs was in far larger proportion than in the case of the badly handled white fish eggs. The herring eggs were obtained from fish caught in gill nets, and it is not to be expected that eggs from fish so caught should be as good as those taken from fish taken in pound nets or trap nets. All the white fish eggs and herring eggs received during November of the previous year were eyed up and shipped to the Erie Auxiliary hatchery at Union City.

In January the canal at Yardley was drawn off, and as a canal seems to be a favorite breeding place for fish, two men were sent to look after the fish, which would otherwise be stranded and lost. The weather was very unfavorable, the cold making ice, which interfered with the work, but the men succeeded in obtaining a number of fish.

The adult fish taken were brought to the hatchery and placed in the breeding ponds. There were:

Large mouth bass, 222. Catfish, 1. Rock bass, 6. Pike-perch, 3. Small mouth bass, 29. Pickerel, 36. Yellow perch, 120. Sunfish, 192. Calico bass, 3.

These fish spawned in the Spring and were then distributed in the various streams in this neighborhood. The pickerel spawned before the ice got off the pond, and I was deprived of the use of the pond for quite some time, as the pickerel were so small they could not be netted out, yet they were so voracious that they ate up everything else that was placed in the pond. There were little catfish and sunfish in the pond, and on such a delicious appetite the little pickerel took a start at growing in a way that was surprising, there being pickerel here now which were hatched last Spring that measure over twelve inches in length, and have appetites that would excite the bitterest envy in the most confirmed dyspeptic.

This was my first experiment with raising pickerel and if they always eat and grow in this way I can recommend them as good fish to keep out of small ponds where the fisherman wishes to get nice strings of fish. In the way of appetite the pickerel is a close competitor to his cousin, the muscallonge. As an experiment, I took some spawn from adult pickerel and hatched them in a jar. About fifty per cent. of the eggs hatched. The eggs were no trouble whatever.

The first yellow perch were collected from the hatchery ponds March 30 and placed in jars for hatching. The yellow perch continued to spawn until the latter part of April. The water kept cold but the weather conditions were favorable during the spawning time. There were a great many eggs gathered from the hatchery brood ponds and also from the Bristol Lake, all the eggs being very nice and hatched with very little loss. There were also a number of yellow perch eggs gathered from the streams in the neighborhood of the hatchery.

By May 9 there were 100 quarts of yellow perch eggs received from the Wayne hatchery. They were in good shape as all the eggs from that hatchery are, and a very large percentage hatched. By the gathering of the eggs of the yellow perch and placing them in the jars to be hatched artificially there is a tremendous gain in the number of fish hatched out. The artificially treated eggs will hatch from 90 to 95 per cent., while the eggs left where they are deposited naturally will not hatch out more than five to ten per cent. The reasons are evident. The fish will ascend, for instance, a tide water stream at high tide and go to shallow water to spawn, which means that when the tide goes out the eggs will be left high and dry, our men while gathering the spawn finding many strings of eggs so stranded, the number of eggs probably running into millions.

In streams not tide water the mucilaginous character of the strings causes them to gather mud and other sediment that smother the eggs, but when the eggs are placed in jars they are safe from these various destructive effects, especially from the grown fish, which usually stand over the hatching strings of eggs and the moment a little fish appears devours it.

The watchful eye of the fish culturist sees that there is no lack of water supply, while the constant feathering of the eggs prevents the collection of a smothering sediment. Yellow perch is one of the most prolific of fish. A female yellow perch over six inches long will lay a string of eggs over five feet long, the eggs being joined together by a mucilaginous substance, and the string presents the appearance of a lace handkerchief.

April 23rd I received 50 quarts of pike-perch eggs from the Wayne hatchery, all in good condition, and fine eggs. They were hatched out with very little loss and the fish were shipped to the various sections of the State that the applications called for. The pike-perch have been planted in the Delaware River for a number of years, but it was not until within the last two or three years that they are beginning to show in the lower Delaware, indicating that they are finding this part of the stream as a desirable habitat. Fish have decided views as to the water they will live in, and it is useless to plant fish in certain waters because they will not live there. Last Spring some very large pike-perch were caught in the shad nets, and in many cases the fishermen did not know what they were, never having seen them before. One fisherman brought to the hatchery a very large specimen he had caught in a gill net, and asked excitedly what sort of a fish such a giant could be.

The pike-perch is a very desirable fish for streams like the Delaware River, and the Department is to be congratulated upon its success in establishing it as one of the sources of a supply of fish food in the Delaware River.

Owing to the late Spring the water in the Delaware River did not warm up, but remained cold all through the months of April and May, the result being that the shad did not ascend the river in any considerable numbers, so the receipts of eggs was rather small. The first shad eggs were received May 5th. Towards June the shad began coming faster, but the water remained cold and the adult shad were very scarce. The eggs placed in the jars were a longer time in hatching than if the water had been warmer, but the fry when hatched were very strong.

Suspecting that the condition of the water in the Delaware River, due to pollution, rendered it in a way unfit for the hatching of shad, I determined to try the experiment of hatching the eggs in pond water. This pond water comes from springs, but by the time it reaches the ponds it has warmed up to a higher degree than the river water. I therefore placed some eggs in a jar of the pond water and the result fully convinced me that my suspicions were correct. The eggs hatched out better and the fry were much stronger than those hatched in the river water, for in the latter case many of the fry did not have the life to get out of the jars. I would therefore suggest that only pond water be used this coming Spring for the hatching of shad.

The experience of the New York authorities at Lithlingo on the Hudson River corresponds with mine. The Hudson River is also badly polluted and the shad eggs there are hatched in pond water which

comes from springs, the same as the water does at Torresdale. Fortunately, the hatchery here has ample pond water to do the work, and is therefore sure of being able to secure the best results.

By our own boat it was possible to plant the shad fry as far up the Delaware River as Trenton, where the Falls stopped further progress. There were, however, a number of plants of fry made as far up the Delaware River as the Delaware Water Gap, the fish being sent by messengers on the trains on the railroad. Experience has shown that the best results are obtained by planting the shad fry as far up the river as possible. The water is purer the higher up the stream you get and there are fewer enemies than there are in the lower river where eels and other fish with voracious appetites are constantly on the lookout for such dainties as the young shad.

During the fishing season the most cordial relations were established with the shad fishermen on the Delaware River who showed the greatest desire to co-operate with the hatchery in securing every possible egg. This is strong evidence of how the fishermen are learning that their future business depends upon the work of the Pennsylvania Department of Fisheries in keeping up the supply of shad by artificial propagation. This hatchery is now the only one engaged in restocking the Delaware River, the United States Bureau of Fisheries which had a boat here for several years having given up three years ago.

The hatchery furnished the New York Conservation Commission with a million shad eggs for planting in their waters. Owing to the cold water in their streams the New Yorkers were able to get very few eggs in their own waters.

After the close of the season for taking shad, by order of the Commissioner of Fisheries, an experimental drift was made in the Delaware River, the net only being in the water a very short time, and on lifting it it was found to have 38 shad. After the 10th of June when the season for taking shad closed the weather got warm and the water in the river warmed up to about 70 degrees. The experimental haul showed, with other facts, that the shad which were not in evidence during the season were then running.

Of the females in the 38 shad taken only two or three had spawned, and the other females were hard, and probably would not be ripe for two or three weeks. As the fishermen could not fish owing to the close of the legal open season, there is no doubt that these fish got up the river and spawned, which ought to make up for the fish not hatched this year at the hatchery.

The shad caught in the Delaware River have been running larger in size from year to year during the last few years. The fishermen all claim that this is due to the work of the Department by its artificial hatching. Schools of young shad could be seen going down the river this Fall, some of them taking an hour to pass, and there were undoubtedly millions of the little shad running over three inches in length.

A number of the young shad were placed in the ponds to see if they could be held until the fall months and then turned loose in the river

when they had attained a size of several inches, so that a judgment could be formed as to whether it is better to plant the fish in the fry stage or hold them until they are larger, and possibly better able to take care of themselves, a plan adopted by the Department of Fisheries in the case of trout, and proving eminently satisfactory to the recipients of the trout.

The little shad thrived and grew very fast, taking no food except what life they got out of the water. They were liberated in September in the Delaware River. The shad is the most delicate of fish and cannot be handled, so the greatest care had to be taken in transplanting them. They were drawn to the edge of the ponds in nets and then dipped up in buckets and carried to the river.

The demand for catfish is yearly growing, and an effort was made to see if the yield of the hatchery could not be increased, and the experiment was a most satisfactory one. The catfish build their nests in holes dug in the mud in tide water and other streams. They are like the yellow perch laying their eggs at high tide, so that many eggs are apt to be left high and dry when the tide goes out.

The employes of the hatchery were sent out to gather those eggs which are found in the deep end of the hole in a gelatinous mass, the male and the female being generally in the hole with their prospective offspring, but sometimes when the searcher for eggs puts his hand in the hole, he finds that the parent fish have been driven out by a snake who is making a dainty lunch on the eggs. The finding of the snake is a most unwelcome surprise party, and the hand is withdrawn from the hole as quickly as the small boy drops a piece of hot iron in a blacksmith shop.

The eggs were placed in the hatching jars and took about five days to hatch. The eggs are in a gelatinous mass and unusually heavy, so it is necessary to run an extra lot of water to keep the eggs rolling. The yield is a very heavy percentage of fish. The number of eggs that can be taken is only limited by the number of men that can be placed in the field to gather them. The little catfish are of a pink color when hatched, and do not, like other fish, pass out the jar when hatched, but remain in the bottom of the jar in a little round ball for three weeks, some of them sticking to the bottom of the jar until they are an inch long.

When placed in the ponds they go round the edges in a rolling ball until they attain the size of an inch or an inch and a half. After this they scatter over the pond, but in the Fall of the year they school up again. They are little, if any, cannibalistic, and it is possible to carry all sizes in the ponds without trouble.

The bluegill sunfish began to spawn in the early part of July. The breeders were left in the ponds to build their nests and spawn naturally. The yield of young fish was very satisfactory, all the applications being filled, and numerous large plants made by the Department in various rivers. The fish were all planted in the yearling stage, running larger in size than ever before. May 2nd there were 300 adult bluegill sunfish received from the Union City hatchery, which makes the supply of breeders here ample.

The frogs at this hatchery are allowed to wander to any pond which strikes their fancy, and they seem to get along most amicably with the adult catfish and bluegill sunfish. They deposited their eggs where it suited their fancy and the tadpoles hatched out in sufficient numbers to supply all demands. The bull-frog appears to be a vagrant, and experience here seems to show that they do better if they are allowed to gratify their vagrant habits. From reports received from around the neighborhood it would seem that some of the frogs migrated to considerable distance to spring houses where they found places they thought desirable to hibernate in.

A quantity of calico bass were gathered from the river in the early Spring and placed in the hatchery pond where they were allowed to spawn in the natural way. The yield of little fish from so few brood fish was simply amazing, and I wondered how there could have been so many. There are no applications on hand for them.

There are a few sturgeon still living in the breeding ponds. This summer they showed no signs of spawning, all seeming to be barren. They feed well and keep in a very good condition.

During the year the new hatchery was built on the banks of the Delaware River, and affords an ornamental adjunct to the grounds, while it will give to the hatchery the very latest requirements in the work of fish culture. It will be all ready to take care of the eggs of the coming season.

Last Spring the hatchery was visited by a flood which carried off a number of catfish from the two lower ponds where the water is not controlled as in the upper ponds by an outside canal, and this flood shows the importance of extending the canal around the lower ponds so that the water can be controlled in such a contingency as a flood. I would also suggest that the mud be dredged out of the lower pond and a hard gravel bottom be put in. This would make the pond a most useful one where it is now useless owing to the depth of the mud on the bottom. The other ponds should have concrete walls on the sides on account of the muskrats coming in from the river and doing much damage to the bank. By building these walls around the ponds, it will be possible to keep the ponds much cleaner as it would stop the washing in of dirt by the rains.

I would also suggest the building of ponds on the waste land at the new hatchery for the purpose of holding the young shad until the fingerling stage, which the experiment quoted above shows to be desirable, releasing them in the Fall, and as the ponds would be within the tide limit, the fish could be liberated without having to be handled in any way whatever.

It is also very desirable that an addition be built to the new hatching house for the purpose of installing fry tanks and aquariums. The number of visitors to the hatchery is annually increasing, and aquariums would serve to awaken their interest in fish life and fish conservation. To these adult visitors must be added the school children and the school classes that are brought to the hatchery for educational purposes and from the study of the aquariums they would learn many useful lessons.

A permanent landing is badly needed to take the place of the present slip which is only a temporary structure. This landing is needed

for the fishermen who bring the eggs to the hatchery, and for the hatchery employes whose work takes them out on the river. There is also a constantly increasing number of visitors who come to the hatchery in boats.

Last Spring a new cruiser motor boat built up to the requirements of the hatchery was purchased under a special appropriation for the purpose. It was badly needed for the gathering of shad eggs from the fishermen and for field work. The night of July 17 the small gilling skiff, a motor boat, was stolen, and in spite of every effort to trace it, the boat has never been recovered.

A new horse was received from the Wayne hatchery July 18, in fine condition, and supplied a much-needed want in the way of a helper.

The grounds were kept in good condition during the summer season, all the fish sorted, and all the ponds cleaned out and put in good condition for the coming season. The grounds are capable of being made very ornamental and each year a step was taken to bringing them into a condition that will make Philadelphia proud of them as a park.

In closing this report I desire to extend my warmest thanks for the cordial assistance and hearty co-operation received at the hands of the Commissioner of Fisheries during the year.

The distribution of fish during the year follows:

Respectfully,

J. R. BERKHOUS,
Superintendent.

Following is the distribution of fish and eggs from the Torresdale Hatchery for the year ending November 30, 1914:

ADAMS COUNTY.

Yearling sunfish,	3,000
Yearling catfish,	200
Tadpoles,	2,000

BEDFORD COUNTY.

Yearling sunfish,	600
Yearling catfish,	300

BERKS COUNTY.

Yearling sunfish,	7,800
Yearling catfish,	3,650

BUCKS COUNTY.

Yearling sunfish,	6,600
Yearling catfish,	14,950

Tadpoles,	4,000
Yellow perch fry,	2,000,000
Pike-perch fry,	1,000,000
Adult black bass,	60
Adult pickerel,	20

CAMBRIA COUNTY.

Yearling catfish,	200
Yearling sunfish,	1,800

CARBON COUNTY.

Yearling catfish,	100
Yearling sunfish,	2,100
Tadpoles,	2,000

CHESTER COUNTY.

Yearling catfish,	550
Yearling sunfish,	2,400

CLARION COUNTY.

Yearling sunfish,	300
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CLINTON COUNTY.

Adult catfish,	160
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COLUMBIA COUNTY.

Yearling sunfish,	600
Yearling catfish,	200

CRAWFORD COUNTY.

Adult catfish,	24
Adult goldfish,	14
Adult frogs,	8
Adult sturgeon,	4
Eels,	50
Turtles,	8

CUMBERLAND COUNTY.

Yearling catfish,	100
Yearling sunfish,	2,700
Pike-perch fry,	200,000

DELAWARE COUNTY.

Yearling catfish,	700
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ERIE COUNTY.

Adult goldfish,	4
Yearling goldfish,	200
Eels,	500
Eyed white fish eggs,	3,960,000
Eyed lake herring eggs,	32,017,000
River minnows,	10,000

FRANKLIN COUNTY.

Yearling sunfish,	7,200
Tadpoles,	1,000

FULTON COUNTY.

Yearling sunfish,	3,000
Pike-perch fry,	200,000

HUNTINGDON COUNTY.

Yearling sunfish,	2,400
Yearling catfish,	1,550

INDIANA COUNTY.

Yearling sunfish,	300
Yearling catfish,	200

JUNIATA COUNTY.

Yearling catfish,	100
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LACKAWANNA COUNTY.

Yearling goldfish,	100
Yearling sunfish,	1,500

LANCASTER COUNTY.

Yearling catfish,	5,500
Yearling sunfish,	9,600
Tadpoles,	2,000
Pike-perch fry,	1,400,000

LEBANON COUNTY.

Tadpoles,	1,000
Yearling catfish,	1,100
Yearling sunfish,	4,500
Pike-perch fry,	1,200,000

LEHIGH COUNTY.

Yearling sunfish,	2,100
Yearling catfish,	1,500
Pike-perch fry,	100,000

LUZERNE COUNTY.

Yearling catfish,	300
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LYCOMING COUNTY.

Adult catfish,	168
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MIFFLIN COUNTY.

Yearling catfish,	250
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MONROE COUNTY.

Yearling catfish,	150
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MONTGOMERY COUNTY.

Yearling goldfish,	100
Yearling sunfish,	8,100
Yearling catfish,	5,350
Tadpoles,	1,000
Pike-perch fry,	200,000

NORTHAMPTON COUNTY.

Yearling sunfish,	13,200
Yearling catfish,	3,900
Tadpoles,	1,000

NORTHAMPTON COUNTY.

Adult pickerel,	20
Adult black bass,	30

NORTHUMBERLAND COUNTY.

Yearling catfish,	100
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PERRY COUNTY.

Yearling sunfish,	300
Yearling catfish,	290

PHILADELPHIA COUNTY.

Tadpoles,	1,300
Yearling sunfish,	1,625
Yearling catfish,	20,100
Adult catfish,	83

PLANTED IN DELAWARE RIVER AND TRIBUTARIES.

Yellow perch fry,	36,005,000
Adult yellow perch,	74
Adult sunfish,	470
Yearling goldfish,	1,865
Adult sturgeon,	9
Pike-perch fry,	3,005,000

PLANTED IN DELAWARE RIVER.

Shad fry,	11,540,000
Shad eggs eyed,	10,000
Adult rock bass,	44
Adult roach,	50
Adult pickerel,	45
Adult bass,	200
Adult chubs,	20
Adult calico bass,	59
Adult carp,	14
Adult suckers,	2

PIKE COUNTY.

Yearling sunfish,	1,200
Yearling catfish,	900

SCHUYLKILL COUNTY.

Tadpoles,	5,000
Yearling sunfish,	300

SOMERSET COUNTY.

Yearling sunfish,	600
Yearling catfish,	350

SULLIVAN COUNTY.

Yearling catfish, 700

WAYNE COUNTY.

Yearling sunfish, 900

YORK COUNTY.

Yearling sunfish, 2,100
 Tadpoles, 1,000
 Yearling catfish, 300
 Yearling goldfish, 60
 Pike-perch fry, 200,000

SUMMARY.

Shad fry, 11,540,000
 Yellow perch fry, 38,005,000
 Pike-perch fry, 7,505,000
 Shad eggs, 10,000
 White fish, eyed eggs, 3,960,000
 Herring eggs, eyed, 32,017,000
 River minnows, 10,000
 Yearling sunfish, 88,525
 Yearling catfish, 63,500
 Adult catfish, 435
 Tadpoles, two year olds, 21,300
 Yearling goldfish, 2,325
 Adult goldfish, 18
 Adult black bass, 290
 Adult pickerel, 85
 Adult calico bass, 59
 Adult chubbs, 20
 Adult sunfish, 470
 Adult rock bass, 44
 Adult carp, 14
 Adult suckers, 2
 Adult sturgeon, 13
 Adult yellow perch, 74
 Eels, 550
 Adult roach, 50
 Adult frogs, 8
 Turtles, 8

Total, 93,224,790

Respectfully,

J. R. BERKHOUS,
 Superintendent.

ERIE AUXILIARY HATCHERY.

Union City, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—Herewith is submitted my annual report of the operations of the Erie Auxiliary Hatchery at Union City for the year ending November 30, 1914:

The year opened with the batteries filled with 34,000,000 white fish eggs and 83,940,000 herring eggs received during the previous month of November. The white fish eggs were received from the United States station at Put-in-Bay, Ohio, and were a very poor lot of eggs, the number of fish hatched out being only 10,800,000, an exceedingly low percentage. This was due to the poor care taken in the handling of the eggs before being shipped, a condition that you desired to remedy by having your own men at Put-in-Bay to take care of the eggs.

The herring eggs were taken by the Department at Erie and were much better, the yield being 52,000,000, which is considered a very good showing, as all the eggs were taken from fish caught in gill nets. Eggs taken from such fish are not considered first class, as there are many instances where the fish may have struggled in the nets for several days prematurely ripening the eggs, which fact cannot be detected at the time of putting the eggs in the batteries, but show up later as unhatchable. These fish when hatched were all sent to Erie and planted in the lake.

The batteries were next filled with pike-perch eggs, there being received fifteen million eggs. These eggs were of a very superior character, being shipped from Constantia, New York, through the courtesy of the New York Conservation Commission. The eggs were taken from Lake Oneida. By your orders I went to Constantia with three men and assisted the New York hatchery men in taking and preparing the eggs for shipment. These eggs were much superior to any eggs obtained from the commercial fishermen owing to the manner of their taking and the care with which they were treated.

The fish are taken in trap nets which are visited every morning and the live fish taken to the house where the ripe fish are separated the unripe females being placed in troughs with running water to ripen. The eggs are taken from the ripe females and the milt from the male fish, after which about ten quarts of the eggs are placed in a bowl and stirred together slowly with a feather for an hour after which they are carefully washed and hardened. They are then ready for placing in the batteries or for shipment. The result of this great care is that the eggs are in perfect condition and do not mat together, the result being that nearly 100 per cent. of the eggs hatch.

In the case of the eggs obtained from the commercial fishermen the eggs do not receive all this care, the result being that the eggs will gather in thick masses that are hard to separate and in separating many of the eggs become hurt and therefore are spoiled.

The weather last spring was very unfavorable and though more nets were set than usual, the catch was the smallest for a number of years. Usually the fish as the water warms come to the shallow waters to spawn, but last spring as the weather kept cool the fish clung to the deeper water, and the number of eggs obtained was not so large as expected, but the character of the eggs made the matter much more satisfactory than when the eggs were obtained from the commercial sources, it being most discouraging to fill up a battery with a million eggs only to find that the hatch is a very small percentage.

This arrangement with New York for the exchange of eggs is so exceedingly satisfactory that it is to be hoped it will be continued. The New York Commission have a perfect plant at Constantia for taking care of and gathering the eggs and the lake teems with fish so nothing could be more favorable for getting full supplies for both States of first class eggs. The experience with the eggs taken from commercial fish has been so unsatisfactory in the past that it is not desirable to return to that system, except when there is room in the hatcheries to save what otherwise would be a waste.

After the pike-perch eggs were in the hatchery there were forty million yellow perch eggs received from the Wayne hatchery. These eggs were all in the best condition, a very large percentage hatching, and the fry were all planted in Lake Erie. This planting of yellow perch in Lake Erie has begun to produce the finest results, and every fisherman who goes to the lake with his rod and line is sure to take home a string of these delicious table fish.

With the opening of the spawning beds on the Peninsula, which beds are now being dredged out, the yellow perch will undoubtedly occupy these old beds and by their fecundity add many fish to the stock now already in the lake.

From the New York Conservation Commission by exchange the Pennsylvania Department of Fisheries receives muscallonge eggs. These eggs were obtained from Lake Chautauqua. The first eggs were shipped here May fifth in a green state, an experience whose success was doubted by Mr. Winchester, the Superintendent. When received here the eggs seemed to be in perfect condition, but in a few hours they were all dead. Later the New York Commission kindly ordered another shipment of 500,000 eggs to replace the lost shipment, and these were sent in the eyed stage. They came through all right and when hatched were planted in Lake Erie and other lakes in the western part of the State now inhabited by these fish. Canadohta Lake was formerly inhabited by the muscallonge, but they had all died out. Two years ago some more of these fish were planted in this lake and in September last a muscallonge was caught which measured twenty-two inches in length, showing the rapid growth of this fish.

They are, however, a fish very undesirable to place in any waters not now inhabited by them, because of their intense voracity, and a small body of water will soon become entirely barren of every

other species. There are two or three ponds or small lakes in this vicinity in which there are muscallonge, but it is only on the rarest occasions that any other fish are caught. Therefore, if persons planting fish desire results from the small bodies of water they should select fish with less voracious habits and more fecundity. By results is meant that when a man goes fishing he will catch fish.

The black bass work seemed to promise this year the best of any season I have had. The ponds were all well filled with fry which were feeding nicely and growing steadily when along about the middle of June the Health Department ordered the city reservoir cleaned. This reservoir is on the stream supplying the hatchery with water and is above the hatchery so that when the reservoir was being cleaned and scoured out all the muddy water and filth from the reservoir ran down into the hatchery supply pond. A telephone message at eight o'clock one evening announced that the reservoir would be cleaned, the work to begin at half past four the next morning. It was not possible to do any thing on such short notice to prevent trouble. From the supply pond, owing to no time for preventive measures, the filthy water from the reservoir got into the two upper ponds and killed everything alive in them, fish and tadpoles. It also got down to the hatching house and killed a large number of bluegills that were there ready to be shipped. The number of bass destroyed in the two ponds was very large and their loss is much to be deplored.

The destruction by this cleaning of the reservoir shows that it is most desirable for the Department to have absolute control of its water supply in order to prevent any such contingency. It might be remarked here that the work of cleaning the reservoir could just as well have been done at some time of the year when there are no fish in the ponds, and I have taken up the matter with the borough authorities and they have promised to use more care in the future.

Even with the heavy loss in the two ponds the hatchery has had a good supply of bass and has filled nearly all its applications. As it could not fill all the applications it has been the endeavor to so divide up the fish that every locality would get a share of the black bass.

There was a fine lot of bluegills for distribution this fall and all the applications were filled. These fish are becoming more popular as their superior qualities become known, and people who want to accomplish results, that is have fish to catch, want bluegills. The bluegills in a way are an extremely gamey fish and afford even the trained angler much sport, while as a table fish they rank among the highest.

The tadpole supply, even with the loss mentioned above, was ample to meet the demands. These tadpoles are of the large size frogs and the most desirable for stocking.

All the buildings were repainted and where repairs were necessary they were made. I would suggest that several small concrete ponds be built for the purpose of sorting fish and holding them for shipment.

The planting of minnows is a new work which has been taken up at this station, and I would recommend that this work be carried

on more extensively in the future, as from investigation I know that many streams are practically cleaned out of minnows. It is upon the supply of minnows that most of the fish obtain their food, and if they do not have the minnows to prey upon they will prey upon their own offspring. Part of the reduction of the number of minnows in the stream is due to the heavy drafts made upon them by the fishermen for use as bait fish. A man will take a whole bucketful of minnows for a day's fishing, and after using a very few of them, the rest will be left to die.

In June I went along French creek for a distance of about three miles and located about 1,000 bass nests. While I could see lots of adult bass, small bass and minnows were very scarce, showing plainly that the adult bass were feeding on their own young, as there was nothing else for them to feed on.

By restocking the streams with minnows as much as possible it is my belief that many little bass will be saved, as their natural instinct will tell them how to hide, and the minnows furnishing food for the large bass will cause the adult fish to give up hunting their own little ones, which will then have a chance to grow up.

The following are the names of the streams stocked with minnows, together with the number:

Canadohta Lake, Crawford county, 2,000; Bald Eagle creek, Clinton county, 2,000; French creek, Erie county, 10,000.

Attached hereto is the distribution of fish for the year:

Respectfully,

A. G. BULLER,

Superintendent.

Fish distributed from December 1, 1913, to November 30, 1914:

PIKE-PERCH FRY.

Armstrong county,	354,000
Bedford county,	159,300
Blair county,	88,500
Butler county,	619,500
Centre county,	88,500
Clinton county,	708,000
Cambria county,	566,000
Crawford county,	1,229,000
Clearfield county,	177,000
Erie county,	2,035,500
Fayette county,	407,100
Fulton county,	570,400
Huntingdon county,	1,239,000
Lawrence county,	354,000
Lycoming county,	1,633,700
Mercer county,	177,000
Mifflin county,	177,000
Snyder county,	354,000

Somerset county,	389,400
Union county,	177,000
Venango county,	796,500
Washington county,	88,500
Warren county,	442,500
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Total,	12,831,400
Yellow perch fry,	40,000,000

YELLOW PERCH ADULTS.

Clinton county,	1,600
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MUSCALLONGE FRY.

Crawford county,	105,000
Erie county,	367,500
Lawrence county,	75,000
McKean county,	45,000
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Total,	592,500

MUSCALLONGE YEARLINGS.

Erie county,	100
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MINNOWS, YEARLINGS.

Clinton county,	2,000
Erie county,	12,000
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Total,	14,000

ADULTS.

Bluegills,	1,850
Common sunfish,	50
Yellow perch,	1,675
Calico bass,	35
Rock bass,	25
Small mouth bass,	15
Large mouth bass,	10
Frogs,	2
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Total,	3,662

TWO YEAR OLDS.

Bluegills,	10,000
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YEARLINGS.

Bluegills,	50,745
Small mouth bass,	29,305
Minnows,	14,000
Tadpoles,	130,700
Muscallonge,	106
Grass pike,	2
Total,	224,858

FRY.

Muscallonge,	592,500
Yellow perch,	40,000,000
White fish,	80,000,000
Lake herring,	14,760,000
Pike-perch,	12,831,400
Total,	148,183,900

White fish fry planted in Lake Erie,	80,103,000
Lake herring fry planted in Lake Erie,	14,760,000

Fish sent to Conneaut Lake Fair for exhibition then liberated in Conneaut Lake:

ADULTS.

Bluegills,	25
Common sunfish,	50
Yellow perch,	25
Calico bass,	10
Small mouth bass,	10
Large mouth bass,	10

YEARLINGS.

Bluegills,	50
Small mouth bass,	50
Grass pike,	2
Muscallonge,	6
Tadpoles,	200
Large frogs,	2

SMALL MOUTH BASS—YEARLINGS.

Adams county,	300
Allegheny county,	1,100
Armstrong county,	300
Beaver county,	400

Bradford county,	1,120
Butler county,	600
Bucks county,	2,100
Berks county,	500
Crawford county,	2,800
Cumberland county,	500
Columbia county,	1,500
Chester county,	950
Cambria county,	1,410
Clearfield county,	500
Clarion county,	200
Erie county,	3,200
Forest county,	500
Franklin county,	1,100
Huntingdon county,	2,600
Indiana county,	800
Lawrence county,	1,400
Lycoming county,	1,200
Lancaster county,	725
Lebanon county,	900
Mifflin county,	1,000
Montgomery county,	2,050
Mercer county,	1,900
Philadelphia county,	2,600
Somerset county,	1,200
Union county,	800
Venango county,	900
Washington county,	500
York county,	1,600
Total,	<hr/> 39,255

BLUEGILLS—YEARLINGS.

Armstrong county,	2,600
Allegheny county,	4,700
Butler county,	1,500
Clinton county,	1,400
Crawford county,	4,600
Clarion county,	1,400
Erie county,	3,500
Fayette county,	1,000
Forest county,	3,500
Indiana county,	4,700
Jefferson county,	1,600
Lycoming county,	800
Lawrence county,	1,270
Luzerne county,	500
Mercer county,	5,000
Northumberland county,	1,600
Snyder county,	2,175
Somerset county,	1,500

Sullivan county,	2,950
Venango county,	2,000
Wyoming county,	500
Washington county,	1,400
York county,	500
Total,	50,695

TADPOLES—YEARLINGS.

Armstrong county,	8,000
Butler county,	3,000
Cambria county,	10,000
Crawford county,	15,000
Clearfield county,	10,000
Clinton county,	10,000
Erie county,	34,000
Forest county,	8,000
Indiana county,	6,000
Jefferson county,	1,600
Lawrence county,	10,000
Somerset county,	3,000
Mercer county,	5,000
Snyder county,	2,500
Venango county,	5,000
Total,	130,100

BLUEGILLS—ADULTS.

Crawford county,	200
Cambria county,	500
Dauphin county,	500
Erie county,	600
Total,	1,800

TWO YEAR OLD BLUEGILLS.

Lancaster county, McCall's Ferry Dam,	10,000
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FISH SENT TO CORRY HATCHERY FOR THE AQUARIUMS.

Yellow perch,	50
Rock bass,	25
Calico bass,	25
Small mouth bass,	5
Bluegills,	25

WARDENS' REPORTS.

The following are the reports of the various wardens of their work during the year:

REPORT OF WARDEN C. R. HOLLAND.

Beach Haven, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—I have the honor herewith to report my work for the year ending November 30, 1914:

December 10, 1913, I was taken with a severe attack of rheumatism, contracted by wading the river, some nights before. Having received information that a party of outliners intended to fish illegally from an island, I engaged a boatman to take me there. The boatman in spite of orders fraternized with the campers who treated him so liberally with whiskey that he got drunk and developed my plans to the would-be violators.

The party, including the boatman, and my boat, then went ashore, leaving me marooned on the island where there was no boat or other method of crossing the stream. The night was very cold so I concluded to wade to the shore and found the water about as cold as any ice I ever met. In fact the water was barely fluid. On reaching the shore I had to walk eight miles in my wet clothes before reaching home. It was certainly anything but a pleasant experience, and I mention it as showing some of the incidents of a warden's life. It was really a more unpleasant episode than the time the three giggers threw me in the water and tried to drown me.

April 13, I was ordered to go to the McCall's Ferry Dam on the Susquehanna River at Holtwood, to remain there during the shad fishing season. During April the weather was very cold and the water high. Very few shad were caught and many of the fishermen left for home discouraged.

Found and destroyed a gill net at Chestnut Island on April 25. It belonged to a fishing party from Maryland.

The new fishway was not quite finished and there was a drop of several feet at the lower end due to a wash-out, owing to the unfinished condition of the work. I think the fishway would have been a success if it had been completed, as I understand it has been since, by extending it several hundred feet further down into the eddy, for during May when the water was low, I saw a large number of shad and hundreds of other fish trying to ascend the Falls at the bottom of the incomplete fishway.

During May the shad came very slowly, but prices were good. Buck shad brought 60 cents and roe shad a dollar each, yet the fishermen complained that they were not catching enough fish to buy their groceries. The parties at the dam would complain to me that one of the largest fishermen below the dam was shingling the river and keeping the shad from coming up. Then if shad were being caught at the dam, and not below, the men down below would complain that the upper men were shingling and keeping the shad from dropping back to the deep water at night, as they always do, so between the two factions I was kept busy, but when both parties got shad, all accusations were forgotten and the warden had a rest until the next time.

Gill nets began to come in, but I captured and destroyed three at Turkey Island, and this lesson was sufficient. The shad season during May as compared to last year was a failure.

Returned home in June and took up all complaints of illegal fishing and pollution. An examination of the complaints show that in only one case would there be sufficient testimony that would convict, and in that case the statute of limitations had expired. This is the trouble of taking up cases on information, as when it comes to the point the witnesses fail.

During June, I took a horse and buckboard, and camping during the day, I at night covered the Huntingdon and Pine creeks and the trout streams of the North Mountain to the Forks on Fishing Creek. I examined many camps and baskets and found no illegal fishing. I have never before seen so many camping parties as there were on the Huntingdon and Fishing Creeks this past summer, many coming from the coal fields, some renting camps and others living in tents.

From Bloomsburg to Benton these camps were so near together that most of them were within call of each other, which of itself had a tendency to prevent illegal fishing, one set of campers being afraid of the others.

All the trout fishermen praised the Commissioner of Fisheries for stocking the streams with yearling trout instead of the small fingerlings. I can truly say that I never saw so many baskets of large trout as I saw this season.

In July I went to Jamison City, Columbia county, to examine into a complaint that the tannery there was turning its refuse directly into Fishing Creek. Four years ago I arrested the Superintendent of this tannery and he was fined \$100.00. The tannery people then put in a series of sumps and dams and they did fairly well, while they were kept clean, but the present Superintendent failed to do this, and the plant no longer did its work. The Superintendent was given notice to clean the sumps and keep them clean, but in a few days I received a complaint that nothing had been done.

August 28, I returned to Jamison City and gave the Superintendent a notice to put in a filter which must be in operation inside of 60 days, and if he failed to do so, the Department would prosecute. Later, I visited the tannery and found the stream in very good shape, the sumps having been all cleaned out so that the filter would do its work.

Investigating a complaint that some men from Hazleton were fishing illegally in Hemlock creek, I found that the alleged offenders

were boys from 12 to 16 years of age, who had no intention of violating the law but what they did was through ignorance. As the Department has no desire to make criminals of boys for purely technical offenses, I explained the whole thing to the boys and gave them a copy of the game and fish laws. When I left they gave three cheers for the warden and the Commissioner of Fisheries.

Visited a number of sawmills and explained the law to the operators so that all of them promised to take care in the future that none of the sawdust got into the stream.

During September, patrolled the river from Pittston to Northumberland, and since June up to that time I have seen but four parties gigging at night on the river. It looks as if that kind of fishing had been made unpopular by me this summer. Other years I have counted as many as 10 lights in three miles.

The bass and salmon fishing here this year has been greatly interfered with by the coal dredgers, but there has been much less illegal fishing than heretofore.

In October, visited the tannery at Millville, as a complaint had been made against it. I found that an addition was being built to the plant and some surface water got into the mill race. As soon as the building is finished pipes will be laid to the sump and the filter now at work there will take care of it. These pipes will take care of the refuse and I think there will be no more trouble. Mr. Fred Carey, the Superintendent, is willing and anxious to do all that the Department asks.

While I was at Middleburg, October 13, to examine a tannery, six well known violators of the law between Shickshinny and Nescopeck cleaned the gravel out of the mouths of eight old eel walls expecting to fish them with nets. October 22, I got six State Policemen to help capture these violators. Two were stationed at Hick's Ferry, two at Beach Haven, two near Berwick, and myself at Nescopeck. The boatman I have used since 1887 fell flat, got drunk and gave the campaign away, so but one person came to a wall.

The police at that point got their boat on a wall, broke an oar, and then shooting started along the river for several miles. The pirate got away, and after midnight I found that my stool pigeon had given me away, as told above. Since that time I located eight of the nets. They are six and eight feet at the mouth and 12 feet long. I watched constantly, but the operators failed to show up so I destroyed them on November 16, and tore the mouths of the walls out this week, so that if it is attempted to build them up next Fall, I will see some of the persons at work and get them.

Received a letter from the Superintendent of the tannery at Jamison City saying that he had finished the filter and that it was in operation, so November 18 I went there and found a small filter, but a good one like the one at Galeton, so after four years' work I have finally succeeded in getting this tannery to do what it should.

This tannery is situated on one of the best trout streams in the State, yet by its running its pollution into the stream it so fouled the water that complaints were continuously pouring in in regard to it. The Company exhibits an anxiety to comply with the law and will do their best to prevent any pollution getting into the stream in the future, which is very satisfactory to all the fishermen.

Examined into a very large number of complaints of sawmill men for allowing sawdust to get into the creeks, there being an unusual number of portable sawmills in operation this year. I found in nearly all the cases there was really no cause for complaint, and where sawdust was being allowed to escape the operators promised to take care of it.

Examined the old eel walls from the Lycoming line to West Milton and found no signs of their being used this year.

During June and July I investigated a number of complaints from persons living on the larger streams who were sure that lime or dynamite was being used to kill fish. In every case I found that only suckers, mullets, catfish and white chubs were killed, there being no game fish, nor little fish of any kind found among the dead ones. This shows that these fish all died with a spawning weakness as they do nearly every year. It is very difficult, however, especially at mills where the fish float down into the dams and make a showing to convince the people that no explosives were used. Lime is more disastrous than dynamite, when confined in a glass jar say half full of lime, the top perforated and the bottle sunk to the bottom of a pool of water, the lime generates gas which when it explodes kills everything within a number of feet and then poisons the water below.

Dynamite kills the fish in a pool where it is exploded, but it does no injury below the point where it is exploded. Where either is used, all kinds of fish, big or little, are killed, and if lime was used the cap of the jar can always be found in the pool.

The water has been lower this year than at any time since I became a fish warden in 1887.

Thanking you for your many kind and encouraging words and great assistance, I am,

Very Respectfully,

C. R. HOLLAND.

REPORT OF WARDEN J. P. ALBERT.

Warren, Penn'a, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—I have the honor herewith to submit my annual report for the year ending November 30, 1914:

My work this year was largely on pollution. Had twenty-one arrests in all. Three were for dynamiting, one for game fish out of season, seventeen for pollution and confiscated one seine. The seventeen cases for pollution were successfully prosecuted. Out of

the seventeen companies prosecuted, thirteen have installed filtering systems which put their plants in proper condition to take care of their refuse. The remaining four companies asked to have their cases continued so they might finish the filters and traps they are installing.

In the cases of the three dynamiters; they were discharged. Although sufficient evidence was produced to warrant conviction, the Justice decreed otherwise. Notwithstanding the defendants were discharged, the prosecutions left a lasting effect in the community where the offence was committed and no more dynamiting has since been tried.

In the case of the game fish out of season, the defendant plead guilty and paid fine and cost.

In the year's work on pollution I visited and inspected one hundred and twenty plants. These plants comprise tanneries, chemical works, acid works, oil refineries, paper mills, glass plants, silica plants, gasoline refineries, furniture companies, glycerine plants, iron and ore furnaces, saw mills and oil companies. Served seven written pollution notices and ninety-three verbal notices. In almost all of the cases the companies took immediate steps to put their plants in proper condition. The oil companies in the last year have ditched and put traps around their oil wells to the number of four hundred and seventy-five, and are now taking care of their waste oil.

The district covered in serving pollution notices and arrests made for pollution comprises the following counties: Erie, Crawford, Forest, Warren, Clarion, McKean, Venango and Lawrence. In the district I collected sixty jugs and bottles of effluent of the different plants.

The streams cleared from pollution and showing great improvement are: Allegheny River, from Warren to Oil City, a distance of fifty-six miles. The river is now practically clear of oil and refuse where before the matter of purifying the streams was taken up by the Department of Fisheries it was a continual flow of oil, acids and refuse of all kinds. Conewango Creek shows a great improvement and when the one plant on this stream is completed, which will be in a short time, then the stream will be entirely clear of oil, acid and other refuse.

Indian Run, Possum Run, Farnsworth Creek, Arnt Creek, Brokenstraw Creek, Reynolds Run, Widowfield Run, Four Mile Run, Spring Creek, Morrison Run, Elk Run, Hemlock Run, Ackley Run, Brown Run, Dutchman's Run, Cornplanter Run, Ott Run, Allegheny Springs Run, Dunn's Run, Rhinds Run, Hooks Run and its tributaries. These streams were polluted either with sawmills or oil wells and are now free from pollution. They are all situated in Warren county.

In Forest and Venango counties the streams that have been cleared of pollution are: Hickory Creek, West Hickory Creek, Middle Creek, Bobbs Creek, Little Salmon Creek, Upper Sheriff Creek, Hemlock Creek and its tributaries, Hunter's Run, Dawson Run, Big Salmon Creek, Little Tionesta Creek, John's Run and Queen Run. These streams were all polluted with sawdust and oil.

In Clarion County so far only one stream has been cleared of refuse, namely: Paint Creek. Owing to the amount of work in the other counties mentioned, I have not been able to clear up the streams in this county.

The streams in Crawford and Erie counties, with the exception of one, on which there is a plant at Union City, and from Titusville to Oil City, are cleared of pollution. The plant at Union City has made arrangements with me to take up the matter as soon as possible and install a clarification plant. The names of the streams that are cleared of pollution or show a great improvement are: French Creek and its tributaries, Lake Erie, Elk Creek, Federal Run, Muddy Creek, Oil Creek from Titusville north to Conadohta Lake. These streams were polluted with sawdust, acid, paper mill waste and tannery refuse. The Tionesta Creek which flows through Warren and Forest counties is seventy-five miles in length and the work done on this stream has begun to show improvement as to pollution, but there are numerous tributaries extending into McKean and Elk counties which I have not yet had a chance to visit but by the first of the year I will take up the work on these tributaries. All work on the main stream is finished from its mouth at the Allegheny River at Tionesta up to Sheffield and Brookston, a distance of about forty miles. After the tributaries are worked and the manufacturers along them are compelled to take care of their refuse, then the stream will be practically clear.

In addition to the work on pollution while on the streams, I investigated many complaints of fish violations and in most cases found the charges to be groundless. The violations of the fish law have been at a minimum in my district. There are many fish associations in this section and they are taking an active part in helping to keep down the violations of the fish law. This is especially true in regard to the associations at Meadville, Franklin, Oil City and Garland. The association at Garland has three special wardens commissioned by the Department and they are co-operating with me in every way. These special wardens have been very active in the past year, the result being that violations of the fish law have almost become a thing of the past in that section.

Streams patrolled during the year were: Allegheny River, Conewango Creek, Four Mile Creek, Tionesta Creek, Six Mile Run, Brown Run, Hooks Run, Two Mile Run, Hemlock Run, Farnsworth Creek, Reynolds Run, Cornplanter Run, Ackley Run, Johns Run, Widowfield Run, Columbus Lake, Coffee Creek, Tomes Run, Hatch Run, Seagrist Run, Jackson Run, Indian Run, Glade Run, Possum Run, Brokenstraw Creek, Winton Run, Wild Cat Run, Mullengar Run, Osmore Run, Kinzua Creek, Allegheny Springs Run, Dunn's Run, Rhinds Run and Mead Run. All these streams are in Warren County.

Streams patrolled in Forest County were: Bobbs Creek, Upper Sheriff Creek, Blue Jay Creek, West Hickory Creek, Hickory Creek, Dawson Run, Hunter's Run, Stewarts Run, Middle Creek, Little Salmon Creek, Big Salmon Creek and Queen Run.

Streams patrolled in Venango County were: Hemlock Creek and tributaries, Oil Creek and French Creek.

Streams patrolled in Crawford and Erie counties were: French Creek, Federal Run, Conadohta Lake, Conneautte Lake, Conneaut Lake, Lake Erie, Elk Creek, Cassawago Creek and Muddy Creek.

Streams patrolled in Clarion County were: Paint Creek and tributaries.

Streams patrolled in Mercer and Lawrence counties were: Shenango River and Neshannock Creek.

As to my observation as to the increase of fish in these waters of my district, namely: Conewango Creek, Allegheny River, Brokenstraw Creek, Canadolita Lake, Columbus Lake, Conneaut Lake, Conneautte Lake and French Creek, I must report that the fishing this year has been remarkably good. I have seen many fishermen with the limit of bass and other fish. There is also a decided increase in the number of fish in the streams including black bass, muscullonge, rock bass, yellow perch, pike-perch or Susquehanna salmon, crappie or calico bass, sunfish, suckers, bullheads and all of the bait fish.

The brook trout have shown a decided increase in the following streams: Farnsworth Creek, Tionesta Creek, Four Mile Run, Six Mile Creek, Arnt Creek, Hickory Creek, Tubs Run, Dawson Run, Spring Creek, Widowfield Run, Wild Cat Run, Blue Jay Creek, Hatch Run, Blue Eye Creek, Andrew's Run, Hemlock Creek, Big Salmon Creek, Little Salmon Creek, Little Tionesta Creek, Queen Creek and Middle Creek.

During the early part of the season I saw many fishermen with their limit of trout of forty a day. Owing to the heavy drought of the past year, it has been very severe on many streams. Many streams and springs have dried up where they have never been known to dry up before. In such streams the lack of water was very severe on the fish.

My observation convinced me that one of the most wasteful ways of fishing is that of gigging or spearing which the law allows four months in the year. There are hundreds of spearing boats in this section and there are always two or three men to a boat. I have found hundreds of dead or dying fish, which after examining, I found were struck by a spear. I have interviewed about 90% of the fishermen who use the gig, and they all admit that they cannot distinguish the kind of a fish they struck at while the fish was in the water. When a mistake is made, the fisherman that wants to live up to the law, or don't want to be caught with a fish that may not be taken with a spear, pulls the fish from the spear and throws it back into the stream where of course it dies. The reason why I call this fishing so wasteful is because thousands and thousands of fish are killed annually in this way, and the fish are no good to the fisherman that strikes them or to anyone else.

There is still another foe that is more deadly to our fish, and that is pollution that is allowed to escape into the streams. In this section a number of streams flow in from New York, and last spring there were tons and tons of dead fish came down the Allegheny River and the Conewango Creek from over the New York State line, from a section over which we have no jurisdiction. The number of dead fish was so great that the health officers had to bury them. They were undoubtedly killed by some deadly refuse run into the streams by New York operators.

As I remarked previously, when a company was notified about their pollution this year, they at once took steps to eliminate their trouble with the exception of a very few who were disposed to over-bearing and insulting, but this manner is fast disappearing.

All manufacturing companies are beginning to see that they are losers by allowing their waste to run away as there is an economic value to the refuse. When I first went to see the different manufacturers about their waste and induce them to try to keep it out of the streams, they thought it could not be done, and that to compel them to do so, would be to work hardships and great expense with no practical results. My experience in pollution for several years, enabled me to convince these people that it was very little trouble to take care of their refuse and prevent it from getting into the streams, while on the other hand waste from the different plants could be turned into a profit. Now, after the companies at my suggestion, installed large tanks, traps and filter plants at their plants, they found after a few months use that the money disbursed in installing these plants was well expended, and what was formerly allowed to run away now brings in a revenue far exceeding the interest on the expenditure.

Take for instance an oil refinery: One man told me that since he installed his purifier, as high as nine barrels of oil were being taken from the tanks in one day, which before the installing of the tanks was allowed to run into the streams.

In the case of a tannery, the waste such as lime, hair, fleshings and other refuse can be sold for fertilizers. Acids from the acid mills can be reclaimed. In the case of chemical mills, where heretofore all of the waste went into the streams, they now burn the tar and other wastes, thereby saving one-half the fuel. In the case of oil wells, by ditching and placing a barrel in the ground with a syphon attached, barrels of oil are saved yearly, which heretofore have flowed into the streams and been lost.

In the case of a sawmill, there is absolutely no excuse for the mill to turn sawdust into the stream. There were hundreds of them in this section when I came here, but today they are all keeping sawdust out of the streams and are selling it or burning it for fuel. As I said, there is no excuse for a sawmill man to turn his sawdust into the streams, as usually they have on either side of them thousands of acres of waste land where the sawdust can be dumped.

There were a few exceptions in this section where sawmills were built seventy-five or one hundred years ago over the streams for the very purpose of having the streams carry the sawdust away. It worked a little hardship on these mills to take care of their sawdust, but today they are doing it.

In the discharge of my duty during the past year I have traveled by railroad, street car, team and on foot almost eleven thousand miles.

Respectfully,

J. P. ALBERT.

REPORT OF WARDEN ALEX. MACDONALD.

Erie, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—I respectfully submit my report of the work done during the year ending November 30, 1914:

Last December spent a week in Canada securing spawn for the Erie hatchery tacked caution signs and patrolled on the ice Presque Isle Bay. During the Spring there was much night work in looking after the illegal fishing.

During the year patrolled the shores of Lake Erie, from the Ohio line to the New York State line, covering all the streams entering into the lake.

Measured all the twine in use along the lake shore to see that it came within the provisions of the law. The twine was measured twice, before and after being used in the water. Twine is the technical term used by the fishermen in regard to their nets.

Spent considerable time working on the State boat Commodore Perry, and assisting local fish hatchery.

Seined Presque Isle Bay on several occasions for fish for breeding and exhibition purposes.

Patrolled the inland lakes, that is Edinboro, Lake Pleasant, and Waterford Lake, the fishing in the first named is better than in former years, as regards game fish, the lake having been heavily stocked with fish from the Department of Fisheries for several years.

Have distributed and explained some hundred copies of the digest of the game, fish and forestry laws, and have been interviewed by many fishermen desiring information.

Never in the history of living fishermen has fishing been as good in the Bay for muscallonge and grass pike.

Late in the year made trips on the fish boats to secure spawn for the hatchery at Erie.

Assisted J. P. Albert, at Warren, in taking samples from 17 different factories, such as paper mills, chemical works, tanneries and oil refineries. Prosecutions were brought against the offending parties, which resulted in all of them, excepting two, agreeing to stop running their waste in the streams. In two cases the offenders appealed to court, but these cases have been decided by the offenders withdrawing the appeals, paying all the costs, and agreeing to keep the pollution out of the streams. These pollutions covered four counties, Erie, Warren, Crawford and Forest.

Following are the arrests made during the year:

Game fish out of season, four; fishing with illegal devices, six; dynamite, three; total arrests, thirteen; convictions, five; discharged, four; pending, four; arrests for pollution, with Warden Albert, seventeen; confiscated nets valued at \$100.00; confiscated boat valued at \$30.00; value of fines and property collected, \$250.00.

Respectfully,

ALEX. MACDONALD.

REPORT OF E. W. KNAUSS.

Allentown, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—The following is my report for the year ending November 30, 1914:

Having been appointed warden July 1, 1914, my report necessarily covers only five months. In company with Warden W. J. Acker have patrolled the streams in the counties of Lehigh, Berks, Bucks, Northampton, Carbon, Monroe, Pike, Wayne and Franklin. Twelve persons were arrested for violation of the fish laws, ten being convicted and the cases of the other two held under advisement. The offenses were:

Outlining in trout streams, four; outlining without tags, two; operating fish basket, two; using explosives, one; impersonating an officer, two; polluting streams, one.

During my short experience I have learned that conditions are practically similar throughout all the localities. In all cases of pollution the managers of the manufactories, when their attention is called to the matter, seem to be ever ready to comply with any request made on our part. In most instances different corporations are without threat of prosecution, willing to arrange waste pipes and establish filter plants at the expense of considerable time, money and labor.

I believe with the co-operation of the good citizens and the anglers and drastic measures used with those few who willfully and knowingly violate the fish laws, conditions are rapidly improving, thus affording sport for the angler and food for the law abiding citizens, with a lesser inclination to violations by those not honest.

I herewith beg to return my appreciation of the many courtesies extended to me and my co-worker, Warden W. J. Acker, on whose long experience I relied for training and assistance.

Respectfully,

E. W. KNAUSS.

REPORT OF WARDEN RAYMOND O. McINTOSH.

Johnstown, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—I have the honor to submit the following report of my duties as a State fish warden for nine months from March 1, 1914, to November 30, 1914:

During the first six months as a warden I was not assigned to a regular district, and during this time my duties called me to the following counties: Potter, Tioga, Union, Northumberland, Schuylkill, Berks, Lehigh, Lancaster, Lebanon, York, Adams, Franklin, Cumberland, Perry, Somerset and Dauphin.

During March my time was taken up in assisting Warden Acker with pollution cases at Allentown, Galeton, Westfield and Elkland. Then I worked in the vicinity of Harrisburg and Carlisle, serving a number of pollution notices on companies at New Cumberland.

During April I patrolled a number of trout streams in Franklin, Cumberland and Adams counties, making one arrest for using hand lines in trout streams, one for using fyke net of illegal size, and three for spearing fish out of season, securing four convictions out of five.

I also served a number of pollution notices during that time.

During May I patrolled a number of streams in various counties, and made eight arrests for using dip nets of illegal mesh, and one for using three hand lines, securing seven convictions out of nine.

I investigated a number of pollution cases in Franklin, Somerset and Lancaster counties, also took a number of samples of polluted water on different occasions.

During June I patrolled a number of streams in Northumberland, Adams, Franklin, Cumberland, Perry and Union counties. Also investigated a number of complaints during that time. I served several notices for pollution of streams in various counties, also assisted Warden Acker in pollution case at Galeton.

During July, I spent considerable time patrolling the Susquehanna River at points near McCall's Ferry, Middletown and Harrisburg. Also patrolled several trout streams in Cumberland county.

I spent a number of days in company with two State Police at Reading, supervising the drawing off of the water from the Antietam Dam, which is located on Stony Creek. No fish were destroyed or transferred during the operation.

During August, I patrolled a number of streams in Cumberland, Dauphin, Franklin, Schuylkill and Somerset counties. Made two arrests for using fyke nets in trout streams, securing one conviction, also confiscated seven wing fyke nets. I served several notices for pollution and secured several samples of polluted water from streams in Somerset County.

During the last three months I was assigned to a western district, comprising the following counties: Washington, Greene, Fayette, Westmoreland, Somerset and Cambria.

During September I patrolled a number of streams in Somerset, Fayette, Westmoreland and Cambria counties, finding no violations with the exception of the polluted streams, which are numerous in this district.

Investigated a number of pollution cases in Somerset and Westmoreland counties, serving several pollution notices.

During October I patrolled a number of streams in Somerset, Westmoreland, Indiana and Cambria counties.

Considerable time was taken up with a pollution case in Somerset County, in which the defendant was found guilty and appealed the case to December term of court.

During November I patrolled a number of streams in Washington, Greene, Fayette, Westmoreland and Cambria counties. The streams in Greene and Washington counties are in fair condition, while those in Fayette, Westmoreland and Cambria are very low.

I have spent considerable time with a pollution case in Westmoreland County, which is in the hands of the attorney.

In the past nine months I have patrolled the following streams: Cedar Creek, Little Lehigh and Jordan rivers, in Lehigh County; Pine Creek, Lyman and Nine Mile runs, in Potter County; Cowanesque River, in Tioga County; Susquehanna River, from Sunbury to McCall's Ferry; Conodoguinet, Yellow Breeches and Mountain creeks, Letort and Big Springs, in Cumberland County; Juniata and Susquehanna rivers and Sherman's Creek in Perry County; Back, Conodogwinet and Conococheague creeks, and Dickey Run, in Franklin County; Little Conewago and Slagel creeks, in Adams County; Stony Creek, in Lebanon County; Wiconisco, Stony, Clark's, Rattling and Swatara creeks in Dauphin County; Schuylkill river, Tulpehocken, Maiden and Stony creeks in Berks County; Conestoga and Conewago creeks, in Lancaster County; Sparkling Springs creek, in Union County; Muddy Creek, in York County; Dark, Clear Shade and Ben's creeks, and Quehahoning River, in Somerset County; Salt Lick, South Fork and Mill creeks, Hinckston and Laurel runs, in Cambria County; Indian, Mennaaries, Mill and Loyalhanna creeks, Tubmill, McGees, Three Mile, Lynn, Fish, Powdermill and Laurel runs, in Westmoreland County; Black Lick, Brush Creek and Pryor Run, in Indiana County; Youghiogeny River, Indian Creek, Mill, Buck and Poplar runs, in Fayette County; North Ten Mile Run, in Washington County; South Ten Mile Run, in Greene County.

In pursuance of my duties I have received valuable assistance from members of the State Police Force, who have been detailed at various times to act as wardens for the Department of Fisheries.

I have also received valuable assistance from local fish associations and the United Sportsmen in different localities.

In some parts of the State where I have worked the people have no regard for the law and no use for a fish warden, which makes it very hard for the warden to work. These places, however, are the places to look for violations, for where the warden has a few friends the violators soon know it and become afraid to operate, as in the case where the United Sportsmen, or some good associations are active.

I have been compelled to hire assistance at different times in places where it was impossible to handle the work alone, and in every case except one was successful in bringing the violators to justice.

Following is a tabel of arrests which I made during my service as a warden. Also a list of illegal devices destroyed or confiscated as ordered by the Department of Fisheries:

Arrests for the use of illegal mesh dip-nets,	8
Convictions,	6
Arrests for spearing fish out of season,	3
Convictions,	3
Arrests for using handlines in trout stream,	1
Convictions,	0
Arrests for using over limit of handlines,	1
Convictions,	1
Arrests for using fyke nets in trout stream,	2
Convictions,	1
Arests for using illegal size fyke net,	1
Convictions,	1
Arrests for pollution of public streams,	1
Convictions,	1

One case of pollution was appealed to court, making a total of 17 arrests, 12 convictions and one appeal.

Confiscated four spears and two lanterns, which were turned over to the Department of Fisheries, and disposed of according to law. I also destroyed 10 dip-nets of illegal mesh, and eight illegal fyke nets.

The amount of fines imposed in all cases were \$240.00, which were paid into the State Treasury, for the use of the Commonwealth, as prescribed by law.

Very respectfully,

RAYMOND O. McINTOSH.

REPORT OF WARDEN J. E. CONKLIN.

Pittsburgh, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Dear Sir:—I have the honor to submit the following report of my work and observations from December 1, 1913, to November 30, 1914:

I received notice in December, 1913, to leave Bradford, McKean County, to go into Fayette, Greene, Somerset and Cambria counties, to cover the district and decide where to have my headquarters.

I went into said counties January 6, 1914. While there covered the district generally, learning the different streams and where the fish laws had been violated.

By instruction from the Department, patrolled the waters of Dark Shade, Clear Shade and Light Shade creeks. (Trout streams). Found new coal mines opening up on said waters, namely, The Loyalhanna Coal Company, the Berwind-White Coal & Coke Company, and Logan Coal Company. Reported same to Department, with names of the officials and the companies.

Some of the streams patrolled were the Monongahela River, Casselman River, Dunkard Creek, Youghiogeny River, Laurel Hill Creek Run to Conemaugh River. Served notice on Fred Adams to stop running sawdust in Wild Cat Run, Cambria County. Visited the mill one week after notice and found he had stopped running the sawdust into the stream.

February 21st, I was assigned another district, namely, Indiana, Armstrong, Butler, Allegheny, Beaver, Lawrence and Westmoreland counties. I covered this territory and decided to make my headquarters in Pittsburgh.

Having a report that there were some parties at Millport, Westmoreland County, on Mill Creek, who every Spring took trout and sold them in defiance of the law and wardens, I put in several days in that locality, before the season opened, but the heavy snows and ice in the mountain streams kept them from getting trout before the season.

The trout streams polluted were: Tub Mill Run, headwaters of Loyalhanna and tributaries, which are Powder Mill Run, Lins Run, Furnace Run, Laughlinstown Run, Rock Run and Mill Creek. Headwaters of Indian Creek and tributaries, which are Roaring Run, Pike Run and Camp Run. I gave these streams the greater part of my time during the trout season. Also trout streams in Indiana County, Rock Run, Boiling Spring Run and Schreyoek Run.

Other streams patrolled were: Allegheny River, Ohio River to Beaver, Beaver, Little Beaver, Raccoon, Connoquenessing, Slippery Rock and Neshannock creeks.

Have investigated all reports of violations of the fish laws in my district, but none of the reports led to a conviction. While there have been some violations of the law, there are not nearly as many as I was impressed there would be. Early in the Spring there was some dynamiting done near Rimerton and below Templeton on the Allegheny River. Also had one report of dynamiting on the Connoquenessing.

The general report from the people along the streams in this district is that they have not known of the fish laws being so well observed for years as they have been this year. Very little outlining or spearing was done. Had reports of seining on Raccoon Creek, also on Slippery Rock, but no evidence to convict.

While patrolling Raccoon Creek I made an arrest for taking bass in the closed season, as the laws had been violated on this stream very flagrantly in the past.

I patrolled the stream several times, but was told by different farmers along the stream that they never knew of as few violations

as there had been on the creek this year. One arrest and patrolling the streams different times had the effect of stopping the violations for a while at least.

The fishing generally throughout this district is not the best. Streams have not been stocked regularly, and fishermen generally seem to think of how many fish they can get instead of stocking and protecting streams. Yet in Lawrence County the sportsmen have been very active this year in stocking streams and helping to enforce the laws. The sentiment generally is no Sunday fishing.

I inspected four different dams on the Connoquenessing Creek from Butler to Ellwood City, and two on Big Buffalo Creek. Reported height of dams, size of streams, and date when dams were built.

Pollution. The waters of the Monongahela, Shenango, Allegheny and Ohio rivers are very much polluted from the various coal mines, and all the different manufacturing plants running refuse into the streams.

The industries started this year are the Berwind-White Coal & Coke Company, the Loyalhanna Coal Company, Logan Coal Company, on the waters of Shade Creek, Somerset County. Lake Trade Coal Company on the headwaters of Slippery Rock, and paper mill on the Neshannock Creek above New Castle, Lawrence County, known as the New Castle Paper Mill Company.

Owing to reports of the waters of Slippery Rock Creek, Buffalo Creek and Bear Creek being polluted, I patrolled said streams and found the pollution in Slippery Rock waters came from the different coal mines; Buffalo Creek (Big and Little) from said plants. Bear Creek is polluted from the different oil refineries. Investigated and reported conditions to the Department.

Notices served for polluting streams from sawmills, two. Called at mills. After the time given to abate the pollution lapsed, found they had taken care of the sawdust, not running any more into the stream.

The work is very much handicapped with the very limited amount of funds available and the large district assigned. I sincerely hope this can be adjusted soon.

SUMMARY OF ARRESTS AND DISPOSITION OF CASES.

Arrests,	8
Convictions,	8
Jail,	5
Discharged with bond to pay fine,	3
Fines imposed,	\$180 00
Fines pending with bond,	60 00
Fines paid,	80 00

The above is respectfully submitted.

J. E. CONKLIN.

REPORT OF FRANK F. SAYLOR.

Ironridge, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—Herewith is submitted report of my work from June 15, 1914, when I received my commission, to November 30, 1914:

While I did not find many violations strong enough to warrant me to make arrests, I feel that I have accomplished much good for the Department in breaking up many violations, especially among women and boys, and I know that the Department has the confidence and respect of all the good people in this district again. This district has mostly law-abiding people and when it is known that a warden is in the district, that of itself prevents the would-be violators from breaking the law.

From June 17 to June 20, in company with Warden R. O. McIntosh patrolled Little Conewago Creek in York and Adams counties by night. From June 23rd to June 26th, I was in company with State Policemen N. E. Tipton and James Savage, in Columbia County, patrolling Fishing Creek by night, from Benton to Bloomsburg.

June 24th, assisted in arresting three men for fishing with hand-lines in Fishing Creek, a trout stream. One of the men plead guilty and paid his fine, while the others were discharged.

June 27th and 28th, in company with Warden McIntosh, patrolled Little Conewago Creek by night in the neighborhood of McSherrystown.

June 29th and 30th, in company with the State Police, was at Duncannon patrolling the river there.

In July patrolled the Perkiomen Creek from Perkiomen Junction to Green Lane, and the Schuylkill River from Port Kennedy to the Montgomery County Home, the West Branch of Swamp Creek from Zeiglersville to Reed's Mill, and the Skippack Creek from its mouth to its source.

July 21st, I was assisted by Deputy Sheriff William H. Fox, of Montgomery County, Irwin A. Reiff and Amos Schultz, removing all the fish from the place drained in the Skippack Creek to the main water. There were a number of bass, yellow perch, suckers, sunfish, and various other fish at this place, which were safely placed in the main stream. Had this not been done they would have perished. In August I patrolled the following streams:

Perkiomen Creek from Perkiomen Junction to Palm; Pickering Creek from Phoenixville to Chester Springs; French Creek from Phoenixville to French Creek Falls; the Manatawney from Pottstown to Glasgow; the Schuylkill River from Pottstown to Royersford; the Octorara Creek from the Maryland line to Christiana; the Brandywine from Coatesville to the Delaware line.

This stream is so badly polluted from the steel mills at Coatesville that the fish are very scarce from Coatesville down, and the stream is very small from Coatesville up.

In Delaware County the Chester Creek from Lenni to Chester is badly polluted by the Victoria Plush Mills at Lenni. Ridley Creek from Swarthmore to Eddystone is polluted from the Victoria Plush Mills at Swarthmore, and the same mills also pollute the Crum Creek from Swarthmore to Eddystone. Darby Creek is polluted from Bermount to Darby from Knits Woolen Mills at Bermount. Cobb's Creek is polluted from Fernwood to Darby from the sewage from Lansdowne.

In September I patrolled the following streams:

Perkiomen Creek from East Greenville to Perkiomen Junction; Schuylkill River from Birdsboro to Norristown; Skipack Creek from Ridge Pike to the mill at Keyzers; Scotch Run from Birdsboro to the mouth at French Creek; French Creek from its source to St. Peters.

September 12, made an arrest, the defendant using four handlines in the Schuylkill River near Royersford. The defendant was found guilty and paid his fine of \$20.00. Destroyed two set nets and four outlines, and broke up many minor violations along Scotch Run, a stream that is inhabited by trout. Got the people to understand that this is a trout stream, and find that since that time the law is obeyed.

During October patrolled five streams.

October 1st, arrested three men for illegal fishing in the Schuylkill River near Phoenixville with too many handlines. The defendants were found guilty and committed to jail in default of the payment of their fines of \$20.00. Destroyed eight handlines.

Illegal fishing was reported at Pawlings Dam at Perkiomen Junction, so patrolled it on the nights of October 17 and 24, but the violations were not repeated.

In November patrolled five streams.

The water getting low in the private pond at the State Hospital at Norristown, it was desirable to remove the fish, and November 15, with the assistance of John P. Reiff, Recording Secretary of the Norristown Fish & Game Protective Association, removed 1,262 bass from this pond and planted them in the Perkiomen Creek near Collegeville.

Respectfully,

FRANK F. SAYLOR.

REPORT OF W. E. SHOEMAKER.

Laceyville, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—Herewith is the report of my operations for the year ending November 30, 1914:

There are some people who are persistent violators of the fish laws, and no matter how many times they are arrested, they pay the penalty and immediately start in again to violate the laws. There is a class of people called Pools in Bradford County, especially at or near Towanda, who are of this class of violators of the fish laws.

From the time the ice goes out of the river in the Spring until it again freezes up the next Winter, some of these people are constantly on the river using lay-out lines, nets in wingwalls, and other devices and dynamite. They take anything and everything which comes into their hands. They have got the use of dynamite down to a science, and it is almost impossible for anyone to get near enough to identify them so as to secure conviction.

Before using the dynamite guards are posted from a quarter to a half mile away, and at the first sight of any stranger, every one is signalled to get out of the way. Jail has no terrors for these people as the sentences usually are only twenty to thirty days. It would be a more severe punishment for these people if there was some other way of compelling them to work out a money fine. In my opinion there should be a more severe jail sentence imposed for second offenses, as I think that would have a tendency to scare off some of the violators who are not so depraved as the Pools.

In October I convicted three of the Pools, two of them having been convicted by me five times each, and the other only four times, yet that same night they were out on the river with a net in the wingwalls.

Outside of the Pools the people have learned the advantage of complying with the fish laws, and therefore they are co-operating more and more with the fish warden by giving information. As a rule lately a large share of the information is accurate and valuable, though once in a while some smart fellow starts a warden on a wild goose chase. Recently an examination of a complaint made to the Department involved a trip of one hundred and sixty miles, and when the sawmill in question was reached it was found that it had not been running for over six months.

Two or three persistent violators of the smarter kind who could not be caught were picked up by my son, whom I had appointed as a special warden for two counties for the sole purpose of getting some of this kind of violators. The lesson was a salutary one.

There is one feature of the warden's work to which I desire especially to call attention. It is not because I am afraid to go out alone to make arrests or get evidence, but because when one man goes out alone and gets in a group of four to six people whom he finds violating the law, he is much hampered, because these same men will go upon the witness stand and absolutely swear to lies, which if believed, would land the officer in jail.

The Department appreciates this necessity as is shown by the orders that in many cases the warden is not to go alone on the duty, but he is to have some one go with him. The worst violators of the fish laws go in gangs, and it is impossible for one man to do as good work as if he had some one go with him. I have noticed that the State Police always hunt in couples. There are many cases come under my observation where it would have been impossible to secure convictions if the warden had to depend upon his own uncorroborated testimony.

I have been in touch with one of the New York State Game and Fish Protectors at Ithaca, New York, and the man at Waverly, New York, and Mr. Charles E. Lee, of Poughkeepsie. None of these men go out unless they have from two to three men with them whenever a raid is planned. They say the violators will swear to anything to get the officers into trouble.

I am convinced that there are a number of people who will go to any lengths to get a warden sent to jail. For the above reasons I think it is for the good of the Department that two men would work together, but I appreciate the difficulty at this time when the limited appropriation only allows ten wardens to cover the State. If the Legislature would appropriate sufficient money to allow the employment of the thirty wardens authorized by law, each warden would have only two counties, and the adjoining wardens could so arrange their work as to be able to work together. There is no question that the result would be far more satisfactory than it is at present.

During the past year the condition of our streams, so far as the Department of Fisheries has any jurisdiction, has been very much improved in my district. All the acid factories have arranged matters so that nothing deleterious can get into the streams. There were very few complaints of sawdust and these cases were adjusted at once. Two or three creameries were bad but the owners when notified arranged at once to keep their refuse out of the stream.

The tanneries have tried several methods of filtration and seem to be anxious to comply with the law. At every one that I have inspected the owners have stopped running the refuse into the stream, or have installed filters, which are apparently doing the work of clarifying the water satisfactorily. One tannery in Snyder county has been a continual offender and the Superintendent was placed under arrest, but the case was continued with the understanding that steps would be taken to comply with the law.

These people experimented with a system of small settling basins, filtering the water through stones and coal ashes, yet even after going through this process, samples of the water taken from the stream, just as it came from the tannery, would kill fish in from one to five minutes.

The management are now working on a new filter plant similar to the filter in use at the tannery at Tunkhannock. The tannery at Noxen, Wyoming County, is now installing a filter similar to the one in use at Tunkhannock.

The Dye Works at Towanda have tried to devise some method of filtering their refuse before it gets into the river. They have met with some success, but so far the plant has not been satisfactory to me.

A large woolen mill at Seeleyville, Wayne County, apparently have built a filter that is giving good results.

I wish to call the attention of the Department to a very destructive method of getting fish for bait and that is the use of a hammer, or some other method of striking the stones on the bottom of the stream, for the purpose of getting stone catfish. The blow will only stun the catfish and it will soon come to, but it actually kills the small black bass and the rock bass. I would suggest that this method be forbidden. The stone catfish can be taken with nets after dark and are in a better condition when taken that way than the ones that are stunned.

I am not in favor of the use of the gig or spear as it is very destructive way of taking fish, especially in our smaller streams, and more especially during the time when the water is very low. During the past season I did not find any violations of the law, but found the giggers anxious to comply with the law, yet if by accident any fish is struck, that is the end of the fish, because it will certainly die. If the spearing could be confined to the large streams, not so much harm could be done. The spear could be allowed during the day time for the taking of eels, as it is practically impossible to strike a game fish in the day time.

I wish to call your attention to the quantities of small black bass of this year's hatch which were along both shores of the North Branch of the Susquehanna River, between the New York State line and Pittston, where the sulphur water and coal dirt comes into the stream. You personally saw some of them while at Towanda, and I will say that for a distance of ninety miles the same condition exists.

Last season's experience shows that lay-out lines is an extremely destructive method of fishing, especially when used by a foreigner, who takes everything that gets on the line, whether game fish or not, and most of them use live bait. Even if the fish are returned to the waters they have usually swallowed the hook and die. For the game fish I am sure the outline is about as destructive a method as can be used in our waters.

The worst violators of the law in this section are the foreigners who use any device or method to get fish regardless of size or quantities, and it is immaterial to them whether they take game fish or net out of season. They have no respect for the law, and even the severest penalties seem to have no deterrent effect upon them.

Owing to the high water at the opening of the game fish season, June 15, and to vast quantities of green moss floating in the river, the fishing was very poor and very few catches were made. During the latter part of September and nearly all of October, quantities of

game fish were taken at several points along the river. Two of us were practically on the river day and night. There is work enough on this ninety miles of river for two men all the time.

For a few years back the hiding places in the river for the little fish that is furnished by weeds and aquatic plants were nearly all gone. It is claimed by some that the German carp have destroyed everything of that kind, being vegetarians who feed on the roots of the plants. I am glad to report that this season the weed known locally as eel grass has again got a good start in the river.

During the year I have made calls upon thirty different men and firms relative to stopping pollution. Destroyed one fish basket in Pike County whose owner could not be found.

Thirty-two arrests were made and 32 convictions secured. Six nets and eight outlines were confiscated and destroyed. Five or six boats were confiscated, but in all cases the parties plead guilty and did not stand the suit, so I returned the boats on their promise that they would not violate the fish laws again.

Outside of the district near Towanda only two nets were used in wingwalls. Three arrests were made for using nets in wingwalls. Two arrests for taking game fish in fyke nets. Two arrests for using nets without name and address, and fishing from Saturday noon until Monday morning, and four arrests for trespassing on Beaver Meadow Reservoir in Wayne County, a State reservation. Two arrests for fishing outlines in the day time, between the hours of 7:00 A. M. and 5:00 P. M. Six arrests for catching game fish on outlines. Two arrests for fishing on Sunday. Two arrests for interfering and resisting arrest. Nine arrests were made for having short fish. Twenty-nine of the convictions were secured by the defendants pleading guilty, only three of the defendants standing trial before a Justice of the Peace.

I have tried to cover all the points for the past year that seem to be material, and trust that this report be satisfactory.

Very respectfully,

W. E. SHOEMAKER.

REPORT OF J. D. SIZER.

Huntingdon, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—The following is my report of the work done during the year ending November 30th, 1914:

The greater part of my time was taken up in patrolling the streams in the various counties in my district in which there are many

streams that afford good fishing, and I think that the knowledge that I was on constant watch deterred many would-be violators of the law.

In Mifflin County I served notice on H. O. Swartzmiller to discontinue running sawdust in the Tuscarora Creek, which order he immediately complied with, the sawdust pile being moved at once, and running sawdust into the stream discontinued.

June 30, notified the Vincent Lumber Company, at Denholm, to discontinue running the sawdust into Little Black Log Creek, which order the company immediately complied with. July 12, notified J. A. Marks to discontinue running sawdust in Mill Creek, and removed a pile that was in danger getting into the stream. He at once obeyed the order.

June 10, there was dynamiting done in the Juniata River between Mill Creek and Mapleton, at the stone arch bridge. I received notice by telephone and proceeded there at once with a deputy. Found some of the stones blown out of the pier of the bridge, but the dynamiters had disappeared. Shortly after I arrived two railroad policemen arrived and there was close watch kept on the river and railroad bridge, but we were unable to find out who did the work.

June 30, I heard a report of a dynamite explosion in the Juniata River two and a half miles east of Lewistown, and hurried to the spot. There I found that the dynamiters had gotten a permit to try to raise the body of a drowned man.

June 15, at Chaneyville, Bedford County, there was dynamiting done by a man named Daniel O'Neil, who resides in Cumberland, Maryland, but I was unable to get him.

During the year the paper mills in Blair County, owned by the West Virginia Pulp and Paper Company, have erected a number of settling beds, and the Tyrone mill has built a fertilizer plant, which uses up the sediment. There is now no refuse going into the river that I find injurious. The Williamsburg paper mill is building a plant to make fertilizer out of their waste sediment. On October 3, the mill had an accident which was not the fault of the Superintendent, but the Company is now trying to have such a clarification plant that accidents cannot happen.

During the past year the fishing has improved considerably in the Juniata River.

During the year the Elk Tanning Company, in Bedford County, has taken many steps to prevent the pollution of the streams. They have built a purification plant that clarifies all the water before it is returned to the stream. The result is that small minnows and other fish are becoming very plentiful in the west end of the Rays-town Branch of the Juniata near Hyndman.

The Gas Company in Huntingdon County and Mifflin County have discontinued the escape of the gas into the river by building concrete beds.

The Dye Works and Woolen Mills in Mifflin County, and the Carpet Mill at Belleville have discontinued allowing any pollution to escape into the stream.

During the year I destroyed seven set nets, five dip nets, eight wing-walls, and confiscated two gigs on the Juniata River, and destroyed one fish basket and two wingwalls in Penn's Creek, Centre County.

November 5, I caught Lemuel Beerly, of Bogg's Township, Centre County, hauling his apple pumice and dumping it into the Bald Eagle Creek. I took him into custody but he plead ignorance of the law, and agreed that no more pumice would be allowed to get into the stream.

During the month of March I transferred fish which had become stranded in the mud at Petersburg, Huntingdon County, to safe waters. There were 337 fish transferred, among them being 37 bass and 99 yellow perch. On the Tuscarora Creek I transferred 17 suckers nine rock bass and 18 black bass, from low pools along the creek to the creek.

In September I was directed to go to Jersey Mills, Lycoming County, to arrest some one who was using a set net in an old fish basket wall. After watching for several nights and no one turning up, I tore out the walls. In Fulton County I found an old wingwall in the Spring Creek between Needmore and McConnellsburg. This I tore out.

I also visited a sawmill on the mountain located on a tributary of Spring Creek. The sawdust was just about to reach the water mark, but it was removed at once by the owner when I notified him that if it got into the stream he would be liable to a penalty.

October 3d, I notified S. A. Thompson, at Frankstown, Blair County, to discontinue running apple pumice into the stream. He at once cleaned up everything and is hauling his pumice to his barnyard. The same day I visited Mr. Eckley, at Duncansville, and notified him that he could not empty his pumice into the stream. He discontinued the practice and by my direction removed the pumice that was in the stream.

I also served notice on J. E. Wrights, Everett, to discontinue running his pumice into the Juniata River, which he at once agreed to do.

During the year I made the following arrests:

Four men in Centre County for killing fish with mallets through the ice. Two of them were convicted and were fined \$20.00 each, the other two being discharged.

At Hollidaysburg I arrested two men for using a dip net and having one bass in their possession. They were fined \$10.00 for the bass.

At Lock Haven, Clinton County, I arrested two men for gigging in Fishing Creek, a trout stream. They were convicted and sentenced to pay a fine of \$20.00 each, and in lieu of payment were committed to jail for twenty days.

The following streams were patrolled by me during the year:

Mifflin County—Honey Creek, Coffee Creek, Kishacoquillas Creek, Jack's Creek, Penn's Creek, Little Black Log and the Juniata River.

Centre County—Bald Eagle, Spring Creek, Logan Branch, Penn's Creek, Beech Creek, Elk Creek.

Clinton County—Beech Creek, Penn's Creek, West Branch of the Susquehanna River and Bald Eagle Creek.

Lycoming County—Pine Creek, Trout Run.

Blair County—Bald Eagle Creek, Little Juniata, Blair's Gap, Dunning's Creek, Rising Springs, Piney Creek, Cove Creek.

Bedford County—Will's Creek, Wilt's Creek, Bobb's Creek, Queen Run, Duncan Creek, Brush Creek, Cove Creek, Yellow Creek, Spring Creek, Raystown Branch of the Juniata, Rising Springs, Piney.

Huntingdon County—Big Juniata, Little Juniata, Shaffer's Creek, Trout Run, Barr's Creek, Crooked Creek, Standing Stone, Mill Creek, Trough Creek, Little Trough, Augwick, Big Black Log and Three Springs Run.

It affords me much pleasure to report the various streams including the Juniata River in better condition this year, and fish seemed to be more plentiful than a year ago. Owing to the number of industries, including the railroad shops not working more than half time, a large number of the shop men have been camping along the Raystown Branch and the Juniata to enjoy the fishing.

There were 167 camps between Mifflin and Bedford during the months of July and August. The least number of fishermen I saw in any one camp was two men. Between Hollidaysburg and Petersburg there were 29 camps, including tents and club houses.

Very respectfully,

J. D. SIZER.

REPORT OF WARDEN W. J. ACKER.

Allentown, November 30, 1914.

Hon. N. R. Buller,
Commissioner of Fisheries,
Harrisburg, Pa.

Sir:—I have the honor to submit this report of work done during the year ending November 30th, 1914:

The past year has been a very busy one as I have been assigned to work in nearly every county in the State, necessitating much travel and expense, this being due to the limited number of wardens under your control.

December 2nd, 1913, went to Emporium, Cameron County, to investigate a powder manufactory and arranged for the installation of filter plants. Had a meeting with the officials of the Dupont, Keystone and Cameron plants who agreed to put in such clarification plants as would comply with the wishes of the Department. After that I proceeded to Williamsport, where I arranged for the case of pollution by the manufacturers at and around Williamsport. Tested samples on fish life and prepared other testimonial, then went to Lock Haven relative to the case against the Lock Haven Paper Mill Company, making information against the Paper Mill for pollution.

December 11th, went to Easton to look up a complaint of a lot of dead fish in the river, located a manufactory that was allowing acid to flow into the river; then went up the Lehigh River and made two arrests for fyke netting.

December 17th, went to Williamsport, and with the Department's attorney made information against six manufacturers for polluting the river; then went to Lock Haven to consult with the Department's attorney and made an examination of the tannery there; got back to Easton and arranged to prosecute the manufacturer who allowed the acid to run into the river; then went to Allentown where I arrested a man for having an eel basket in the tail race of his mill in the Jordan River. Returning to Easton made information against a manufacturer for polluting the Lehigh River and the killing of fish.

During the month of December made eight arrests for pollution, two for fyke netting and one for using a fish basket, a total of eleven arrests.

January, 1914, was a very busy month on account of all the hearings being carried over from December and other pollution cases. Went to Lock Haven where the case of pollution against the Paper Mill was arranged for hearing January 6th, but at the hearing continuance was asked to February 18th, after this went to Williamsport to work on a pollution case, returning to Allentown. Went to Easton where the hearing of the pollution case was postponed until January 16th. Went to Bethlehem on complaint of pollution on the Monocacy Creek, returning to Allentown and prepared the pollution case, testing the samples and other requirements so as to be ready to make the information; then went to Coudersport, Austin and Costello, Potter County, where the charge of pollution was withdrawn against the manufacturer at Costello, he having complied with the law. Later went to Emporium where the charges of pollution were withdrawn because satisfactory filter plants had been installed by the Cameron and Dupont Powder plants and the Keystone Company promising to have theirs complete later. Returned to Allentown and then went to Easton to meet the Board of Trade relative to the pollution cases in that city. Was then ordered to Williamsport on a complaint that there were a lot of dead fish in Mosquito Creek, examined the case and reported to the Department. Went to Allentown and made information against eleven manufacturers for polluting the Jordan and Little Lehigh rivers. Eleven pollution cases in January.

February, 1914: Got pollution cases in shape for hearing. Visited the Soap Manufacturing Company and served notices and made information against three more concerns for polluting the Jordan River. Went to Williamsport where there were hearings in five pollution cases, which were continued that the defendants might arrange to comply with the law. Returned to Bethlehem and investigated and got ready for cases against two manufacturing companies for polluting Monocacy Creek. Made information for a hearing. Returned to Allentown and later went to Coopersburg on a complaint of pollution; got samples of the refuse and made information against the manufacturer for polluting the East Branch of Soucon Creek. Went to Glades Run, Warren County and inspected a filter plant put in

by the Elk Tanning Company. Went to Easton where hearing was postponed on account of Court. Returned to Allentown and made information against two manufacturers for pollution. At Easton for the hearing of the pollution cases, getting back to Allentown, arrested a man for having a fish basket in the tail-race of his mill. Later visited all of the defendants in the pollution cases in Allentown and got all these cases ready for hearing.

During the month of February had four cases of pollution and one fish basket case.

March: The cases at Allentown were continued on account of License Court. Investigated manufacturing plant at Didre which was charged with pollution. Went to Galeton, Potter County, to examine into a report of a lot of dead fish in Lyman Run; found the trouble was due to the chemical works allowing their refuse to get into the creek. Went to Elkland, Tioga County, and inspected a filter plant being installed and then went to Westfield and made report of the condition of the tanneries there. After this went to Harrison Valley to examine a tannery there. Then went to Coudersport to arrange for a hearing in the case of the Chemical Works polluting Lyman Run, making information against the works. Investigated cases of pollution on the West Branch at Williamsport after which I went to Catasauqua to investigate complaint against the Rubber Plant and Silk Mills, on which notices were served and the defendants arranged to take care of their refuse. Returned to Allentown and arrested seven men for illegal dip-netting in the Jordan and Little Lehigh rivers, who, after hearings, either paid their fines or went to jail. Had a meeting with some of the Superintendents arrested for pollution on how to take care of their waste products. Patrolled the Little Lehigh and Jordan rivers for illegal fishing. After the hearing of the case in Coopersburg for pollution, the defendant agreed to install a plant to take care of all waste material.

During the month of March arrested seven illegal netters and had one case of pollution.

April: After hearings of the sixteen cases at Allentown, the cases were continued in order that the defendants might have an opportunity to install plants to take care of their waste products. Arrested a man for illegal fishing in the Little Lehigh and after hearing he paid fine. Searched the old water works for illegal nets, confiscated and destroyed all found. Went to Williamsport and Lock Haven concerning the cases of pollution at those places. Returned to Allentown and arrested one man for illegal outlining in a trout stream and three men for illegal dip-netting. All of the defendants paid their fine. Went to Catasauqua to examine the filter plant put in by the Rubber Company. Went to Bethlehem to examine the Gas Company's filter plant for taking care of their refuse. Afterwards went to Lenhards, Lehigh County, on fish basket case. Patrolled the Little Lehigh and later had a hearing in pollution case at Allentown. Was at Williamsport to consult with the attorney on the Lycoming County cases. Went to Galeton for a hearing on the Chemical Works case, which was postponed until June 23rd. Inspected the filter plant of the Paper Mill at Austin and the tanneries

at Westfield, Elkland and Harrison Valley. Returned to Williamsport and made inspection of the tanneries at Newberry, Roaring Branch and Ralston. At Harrisburg and joined with the State Police in investigating a case, after which returned to Allentown and patrolled the Little Lehigh and confiscated an illegal fyke net. Went to Easton and Reigelsville on complaint of wingwalls.

During the month of April arrested three dip-netters and one outliner.

May: At Allentown made arrest of a man for interfering and threatening an officer while making an arrest. Arrested one man for looping Cedar Creek. Went to Emporium, Cameron County, to a hearing on the case of pollution in that county. Returned to Williamsport and made a visit to the tannery at Newberry. Returned to Allentown and then went to Lenhards, Lehigh County, on complaint of a gang that was using fyke nets, watched for and arrested the gang who after hearing plead guilty and paid fines. Returned to Allentown for court on an appeal case. Went to Bethlehem and arrested a man for looping in Monocacy Creek, who paid his fine. Went to Norristown to inspect a complaint. Returned to Allentown and spent the night on the Jordan River and arrested three for seining who after hearing paid their fines. At Coopersburg on a pollution case. At Bethlehem on a pollution case. Helped messenger of the Corry Hatchery plant 20,000 trout in the Jordan River.

During the month of May arrested three seiners, one for interfering, one looper and one fyke netter.

June: Went to Williamsport at the preliminary hearings of the pollution cases which were continued until September 17th in order to give the defendants a chance to comply with the law. At Hellertown and arrested a man for outlining, he was convicted and paid his fine. At Shamrock, Berks County, investigated a complaint that minnow seines were used for taking other fish. Investigated case at Coopersburg, Lehigh County. At Allentown arrested a man for seining in the Jordan and he was duly fined. Inspected pollution complaint at Bethlehem and later arrested a man for looping, for which he was fined. At Center Valley, Lehigh County, arrested three men for illegal outlining in a trout stream. Patrolled the streams in Lehigh County and attended hearings in pollution cases. At Galeton at the hearing of the Chemical Works case after which went to Coudersport and Austin to inspect plants there. Inspected the Elk Tannery at Coudersport and visited the plants at Elkland and Westfield and Harrison Valley. Went to Ulysses and then returned to Coudersport and Port Allegany after which went to Emporium making an inspection of the manufactories situated along the streams on that watershed. Stopped at Driftwood on complaint of pollution after which returned to Williamsport for preliminary hearing of the pollution cases there. Went to Lock Haven and visited tannery there after which returned to Lehigh County where I made arrest for fyke netting.

During the month of June arrested four outliners, one seiner, one looper and two for using illegal fyke nets. Making a total of eight.

July: First night arrested six men for illegal spearing in a trout stream who after hearing paid their fines, afterwards arrested two

for illegal outlining in a trout stream and they were fined. Patrolled various streams in Lehigh County and afterwards went to Quakertown on complaint of parties catching game fish in minnow nets. Went to Bethlehem to inspect report of pollution at Coke Works. At Schwenksville to investigate complaint of illegal fyke netting, then went to the upper end of Lehigh County where I arrested two men for illegal outlining. They were unable to pay their fine and went to jail. Returned to Allentown and patrolled the Little Lehigh arresting two men for outlining in a trout stream, who after hearing paid their fines. Went to Bucks County and patrolled Indian Creek. Returned to Lehigh County and investigated complaint of dynamiting in the River Jordan at Fogelsville and in company with Warden Knauss arrested a habitual dynamiter, arresting with him two foreigens for assisting, but they were later discharged. The offender received one hundred days in jail. With Warden Knauss arrested two men for impersonating fish wardens. They would go along the streams and arrest parties and if the arrested persons had any money they settled with them and left them go. When we arrested them they were fully armed. After hearing one was sent to Rittersville Asylum and one paid his fine. This put a stop to the robbing of innocent persons. With Warden Knauss patrolled the streams to investigate numerous complaints.

During the month of July arrested six for illegal spearing, seven for illegal outlining, two for dynamiting and two for impersonating fish wardens, making a total of seventeen.

August: Went to Bethlehem where I arrested one man for looping in Monocacy Creek and he was sent to jail in default of fine. During the greater part of the month, patrolled the streams in Lehigh, Northampton, Carbon and Pike counties.

During the month of August had two cases, one for looping and one for dynamiting.

September: At Palmerton, Carbon County, investigating a complaint of a large number of dead fish in Aquashicola Creek. At Reading on complaint of gigging game fish in Maiden Creek. At Bowmans on complaint of dead fish in the creek which was caused by the cement used in the bridge being built on the creek. Returned to Allentown and arrested a man for outlining in a trout stream. Went to Williamsport, visited the tanneries at Newberry, Ralston and Roaring Branch. Returned to Lehigh County and arrested a man for assault and battery. Went to Palmerton to prepare the case against the persons who allowed the stuff to run into the stream killing the fish.

During the month of September made two arrests, one for outlining and one for assault and battery.

October: Patrolled Ontelone Creek returning to Northampton on a complaint relative to wingwalls. At Hosensack arrested two men for illegal outlining who paid their fines. At Newberry inspected filter plant at tannery. Went to Mauch Chunk in regard to the pollution case at Palmerton. At Williamsport and then to Driftwood, Emporium, Port Allegany, Coudersport, Austin, Costello, Wheaton, First Fork and Sinnemahoning to examine into pollution cases. At Williamsport had hearing of the tannery case at Newberry.

Arrests during the month of October were two for outlining.

November: With Warden Knauss patrolled streams in Lehigh County until the 10th of the month when we went to Greencastle, Franklin County, and arrested two men for interfering with the migration of fish, two for using fish basket and one for selling short bass. Returned to Chambersburg and made information, fixing the hearing for December 4th. Went to Elkland, Westfield, Harrison Valley, Galeton, Ansonia and Williamsport to examine pollution cases there.

In the matter of pollution I found that in nearly all of the cases the manufacturers are anxious to co-operate with the Department of Fisheries in its endeavoring to clean up the streams and make them suitable for the restocking of fish.

The showing made during the year indicates that with more appropriation so that there can be a full number of wardens to carry out the law, it will not be very many years before a large majority of the streams in the Commonwealth are restored to a state of purity and there will be fishing for everybody.

The present method of planting fish one year old and from four to seven inches in length seems to afford universal satisfaction and the majority of fishermen think it will bring far better results than the planting of fingerlings.

The following shows the number of arrests made by me during the year:

Arrests,	82
Convicted,	76
Jail,	11
Fines,	\$860 00

The following are the various causes of arrests:

Pollution,	25
Fish Baskets,	4
Fyke Nets,	5
Dip Nets,	10
Interfering with officer,	2
Seineing,	4
Lay-out lines,	15
Looping,	3
Dynamiters,	3
Spearing,	6
Impersonating Warden,	2
Stopping migration of fish,	2
Short Bass,	1

Respectfully,

W. J. ACKER.

PERMITS.

Permits are issued under the provisions of the Act of May 1, 1909, for the collection of aquatic life, for scientific purposes, use of explosives in dams, and various other purposes. Permits for scientific purposes are issued good for the calendar year, and the users are directed to report the results of their labor to the Department. As the Departmental year ends November 30 and the calendar year December 31, this makes some confusion as the reports for the year are received too late for insertion in the report of that year. It is hoped to remedy this in future by directing holders of permits to report at the close of the month of November and have the reports in in time to get them in the proper year.

CONCLUSION.

In closing my report I wish to express my gratitude to the Board of Fishery Commission, my Chief Clerk and my various Superintendents for their hearty co-operation and assistance in the work of the Department during the year. I agree with the report of the Commissioners that the amount appropriated for the expenses of the Commission is not commensurate for the work the members are asked to do. They are willing to devote their time and labor and they should at least be compensated for their traveling expenses incurred in the duties impressed upon them.

I also wish to extend to you my most sincere thanks for the many courtesies received at your hands and the extremely useful advice with which you have assisted my labors.

Respectfully,

N. R. BULLER,
Commissioner of Fisheries.

REPORT OF PROFESSOR HENRY W. FOWLER,
PHILADELPHIA.

The following is the report of the fishes collected in Pennsylvania during 1913, by Henry W. Fowler, for the Academy of Natural Sciences of Philadelphia, together with notes and lists of the species observed at the respective localities.

1. Pigeon Swamp Run, a tributary of Mill Creek in the basin of the Delaware River in lower Bucks County, at "Rocky Woods", now Headley Manor, March 25th.

Umbra pygmaea.—The mud minnow was found abundant and spawning. A variety of interesting animal life was also noted in this locality, including various water beetles, numerous daphnids, cyclops, water asels (*Asellus communis*), fairy shrimps *Eubranchippus vermalis*, fresh water mollusks (*Lymnea columella*, *Physa heterostropha*, *Planorbis dilatatus*, *Segmentaria armigera*, *Pisidium abditum*), amphibians (*Acius gryllus crepitans*, *Hyla pickeringii*, *Rana clamata*), and reptiles (*Natrix sipedon*, *Coluber constrictor*, *Thamnophis sirtalis*, *Chrysemys picta*).

2. Delaware River at the Tullytown Fishery, Bucks County, on May 26th.

Pomolobus pseudoharengus.
Alosa sapidissima.
Auguilla chrysope.
Abramis crysoleucas.
Notropis Whipp lii analostanus.
Cyprinus carpio.
Catostomus commersonnii.
Ameiurus nebulosus.
Esox americanus.
Pomoxis sparoides.
Pomotis gibbosus.
Perca flavescens.
Roccus ilneatus.
Morone americana.

Also found the water snake (*Natrix sipedon*).

3. Tributary of the Saucon Creek, basin of the Lehigh River, near Hellertown, Northampton County, on May 27th.

Salvelinus fontinalis. Young common.
Semotilus atromaculatus. This and the following were all abundant.
Abramis crysoleucas.
Notropis hifrenatus.
Notropis comutus.
Phinichthys atronasmus.
Boleosana nigrum olmstedii.
Larval salamanders (*Desmognathus fusca*) with newts (*Diemictylus viridescens*) and pickerel frogs (*Rana palustris*) common.

4. Saylor's Lake, in Monroe County, May 27th.

Microscopic life abundant, also water beetles, leeches and crustaceans (*Gammarus fasciatus* and *Asellus communis*). Several red-backed salamanders (*Plethodon crythronotus*) were found, and newts (*Diemictylus viridescens*), were common. The only fish seen were *Pomotis gibbosus*.

5. Pocono Creek, a tributary of McMichael's Creek, in the basin of Broadhead's Creek, Monroe County, May 27th.

Salvelinus fontinalis.

6. Tributary of the Tunkhanna Creek, basin of the Tobyhanna River, in Monroe County, May 28th.

Salvelinus fontinalis.

Semotilus atranaculatus.

Abramis crysoleucas.

Rhinichthys atronasus.

Also found several salamanders (*Plethodon erythronotus* and *Diemictylus viridescens*). In Beaver Creek at Tannersville young *Salvelinus*, (*Asellus communis*, *Bufo americanus* and *Hyla pickeringii*) were found. Later in the day Tobyhanna Creek was visited, and all the above fishes noticed were *Semotilus* and *Rhinichthys*. Additional species were *Notropis cornutus*, *Esox americanus* and *Boleosoma nigrum olmstedii*, with several amphibians (*Desmognathus fusca*, *Bufo*, *Hyla*, *Rana clamata*) and crustaceans (*Asellus*).

7. Tributary of Pocono Lake, Monroe County, May 29.

Salvelinus fontinalis.

Semotilus atromaculatus.

Rhinichthys atronasus.

Esox americanus.

Boleosoma nigrum olmstedii.

Amphibians (*Desmognathus fusca*, *Diemictylus viridescens*, *Rana clamata*), crustaceans (*Asellus*) and mollusks *Physa*, *Planorbis*, *Sphaerium*, *Helix*) were found about the shores. In Broadhead's Creek, near Snyderville, *Salvelinus*, *Semotilus*, *Rhinichthys* and *Boleosoma* were found, together with small mollusks (*Planorbis* and *Sphaerium*).

8. Tullytown Creek, at Tullytown, Bucks County, June 22nd.

Abramis crysoleucas.

Notropis whipplii analostanus.

Amenirus nebulosus.

Fundulus diaphanus.

Lepomis auritus.

Pomotis gibbosus.

Micropterus dolomieu.

Perca flavescens.

Besides these were amphibians (*Bufo americanus* and *Rana catesbeiana*) and turtles (*Chrysemys picta*).

9. Cash Ledge Bar in the Delaware River above Tullytown, Bucks County, June 28th.

Anquilla chrisypa.

Abramis crysoleucas.

Notropis bifrenatus.

Notropis whipplii analostanus.

Ameiurus nebulosus.

Fundulus betereclitus macrolepidotus.

Fundulus diaphanus.

Lepomis auritus.

Boleosoma nigrum olmstedii.

Also the amphibians (*Bufo americanus*, *Rana pipiens*, *Rana clamata*).

10. Estuary of Scott's Creek, in lower Bucks County, June 28th.

Anguilla chrisypa.

Abramis crysoleucas.

Notropis whipplii analostanus.

Ameiurus nebulosus.

Esox americanus.

Fundulus heteroclitus macrolepidotus.

Fundulus diaphanus.

Pomotis gibbosus.

Amphibians (*Acris gryllus crepitans*, *Rana pipiens*, *Rana catesbeiana*) and turtles (*Sternotherus odoratus*) were also found.

11. Muddy Creek, a tributary of the Susquehanna River, in York County, July 21st.

Anquilla chrisypa. One taken.

Notropis hudsonius amarus. Common.

Notropis whipplii analostanus. Common.

Notropis cornutus. Abundant.

Exoglossum maxillingua. Common.

Lepomis auritus. Many taken.

Pomotis gibbosus. Common. Several other fishes were reported, (*Catostomus commersonnii*, *Ameiurus nebulosus* and *Micropterus dolomieu*). We also found several amphibians (*Desmognathus fusca*, *Bufo americanus*, *Rana clamata*, *Rana catesbeiana*, *Rana palustris*) and turtles (*Chrysemys picta*, *Clemmys insculpta*, *Terrapene carolina*).

12. Sowege Creek at Peach Bottom, York County, July 22nd.

Notropis cornutus. Several.

Exoglossum maxillingua. Common.

Hybopsis kentuckiensis. Abundant, several large.

Rhinichthys atronasmus. Several.

Catostomus commersonnii. Common in the spring. Eels (*Anguilla chrisypa*) and stone cats (*Schilbeodes insignis*) were reported, and we found several amphibians (*Desmognathus*, *Bufo*, *Rana clamata*, *Rana catesbeiana*, *Rana palustris*) and tortoises (*Terrapene carolina*).

13. Shores of the Susquehanna River, below Peach Bottom, York County, July 22nd.

Pimephales notatus. Common.

Semotilus bullaris. Few.

Notropis proene. Several.

Notropis hudsonius amarus. Several.

Notropis whipplii analostanus.

Notropis cornutus.

Notropis photogenis amoenus. Frequent.

Hybopsis kentuckiensis. Young common.

Catostomus commersonnii.

Moxostoma macrolepidotum. Young common.

Tylosurus marinus. Young abundant.

Pomotis gibbosus.

Boleosoma nigrum olmstedii. Common.

Schilbeodes insignis.

Micropterus dolomieu.

14. Tributary of the Delaware River, just below Tullytown, Bucks County, August 24th.

Anguilla chrisypa. Common.

Semotilus bullaris. Young.

Abramis crysoleucas. Young common.

Notropis bifrenatus. Several.

Erimyzon sucetta oblongus. Small and young.

Ameiurus nebulosus. Young.

Esox americanus. Several.

Fundulus diaphanus. Few.

Lepomis auritus. One young.

Pomotis gibbosus. Adult and young.

Enneacanthus gloriosus. Two.

Boleosoma nigrum olmstedii. Several.

Besides the above, water-boatman, *Phinatra*, water-striders, leeches, crustaceans (*Gammarus fasciatus*, *Asellus communis*, *Cambarus limosus*), and mollusks (*Lymnea columella*, *Campeloma decisum*) were abundant.

15. Tullytown Creek, near Falsington, Bucks County, August 24th.

Semotilus bullaris.

Abramis crysoleucas.

Notropis bifrenatus.

Catostomus commersonnii.

Erimyzon sucetta oblongus.

Esox americanus.

Pomotis gibbosus.

Several amphibians were also noticed (*Rana clamata*, *Rana pipiens*, *Rana palustris*, *Rana sylvatica*).

16. Scott's Creek and its tributaries in Penn's Manor, Bucks County, November 19th.

Petromyzon marinus. One young example.

Anguilla chrisypa.

Abramis crysoleucas.

Notropis chalybaeus.

Esox americanus.

Umbra pygmaea.

Enneacanthus gloriosus. Several small ones.

Pomotis gibbosus.

Besides *Rhinatra*, water-boatmen, water-beetles, several amphibians (*Acris gryllus crepitans*, *Hyla piceringii*), a turtle (*Sternotherus odoratus*) and a crustacean (*Gammarus fasciatus*) were noted.

THE ACADEMY OF NATURAL SCIENCES
OF PHILADELPHIA.

March 19, 1914.

FREE OR PUBLIC WATERS.

Each year the number of inquiries grows greater and greater as to the rights of fishermen to fish in the streams and waters of the State. The various acts passed by the Legislature on the subject of fishing show that the policy of the Legislature was to allow fishing in all the waters of the State, and the Department of Fisheries is fully in accord with this policy.

The larger streams of the Commonwealth, such as lakes, rivers and creeks, have been decided to be public waters in the case of *Coovert vs. O'Connor*, 8 W. 470. The Court said:

"All rivers, lakes and streams comprehended within the charter bounds of the province passed to William Penn in the same manner as the soil. In grants of tracts of vacant lands by him or his successors during the proprietary times, and by the Commonwealth since, streams not navigable, falling within the lines of a survey, were covered by it, and belong to the owners of the tract who might afterwards convey the body of the stream to one person, and the adjoining lands to another. (2 Pet. 64). When streams not navigable formed the boundary of such tract, the grantee acquired a title *ad filum aquae*. The larger rivers and principle streams by nature navigable belong to the Commonwealth as well as where there was no tide, as where the tide ebbed and flowed, contrary to the principles of common law, and of some of the State, in which, in all rivers and streams where the tides did not ebb and flow, the grant of land, with a boundary on the stream extended *ad filum aquae* (*Carson v. Blazer*, 2 Binn. 475; *Shunk v. Schuylkill Navigation Company*, 14 Sergt. & Rawle 71)".

In the cases of *Ball vs. Slack*, 2 Wharton 538, which case was elaborately argued and much considered, Judge Houston who delivered the opinion of the Court, lays it down as a settled principle in Pennsylvania that when a grant or survey is bounded on a river or creek it extends to that river or creek and (except in a case of large navigable streams), extends to the middle of the creek.

Such being the law as laid down by the Supreme Court it is evident that the Commonwealth cannot authorize public fishing without providing just compensation to the owners of such lands.

Judge Bittenger, presiding justice of York County, in a case of *Commonwealth vs. Baker*, in considering this matter of public streams, said:

"The several enactments by the Legislature show that the policy of the Commonwealth is in favor of public fishing whenever the right can be conferred without violation of the constitutional rights of the owner of the land."

This is in exact accord with the opinion of the Department of Fisheries expressed above.

That the Legislature claimed the right to bring the waters of the State within the use of the public is shown by the number of acts passed declaring streams to be public streams for navigable purposes, so that the streams might be used as highways by the citizens of the Commonwealth in spite of the claims of the owners of the adjacent lands that they own the whole stream.

Many of these acts are over a century old and by their unopposed usage can no longer be attacked. As early as April 8, 1867, the Legislature passed an act "that Lake Pleasant in the County of Erie, Commonwealth of Pennsylvania, and the outlet of said lake, to French Creek, be and the same are hereby declared forever a public highway, open and free to all of the people of said Commonwealth for fishing, navigation, and all purposes whatsoever."

It will be noticed in this act that the waters are declared open for fishing, and this seems to be the first of the decided acts of the Legislature that it was the intention of the Legislature to secure for the citizens the right to take fish which forms an important article of food.

In the Act of May 1, 1909, the Legislature, in Section 19, prescribes the duties of the Commissioner of Fisheries in making free distribution, or the planting of fish, produced by the State Fish hatcheries. after providing for various waters it goes on to say:

"Fourth. To the waters whose owners are non-resident and unknown, or who by habit and custom permit the public to fish therein."

The section then goes on that when fish are planted in any of the waters mentioned in the section that "during the open season for game or food fish, the owner, lessee or occupant of the real estate, through which or over which, the stream so stocked with game or food fish shall pass, or the owner, lessee, or occupant of the bank of any natural lake or pond so stocked with game or food fish, shall hereafter not have the authority to forbid fishing along the banks or in the said stream or waters."

Here comes in the constitutional provision that no property shall be taken without due authority of law, and to meet this constitutional requirement the act in question goes on to say:

"Provided further, that all persons fishing on or over the land of others by virtue of the provision thereof, shall be liable for all damage they may cause during such occupation."

Here it is seen that the Legislature provides a requirement that meets the constitutional provision. There are no streams or waters in the Commonwealth of Pennsylvania in which for a century or more the citizens of the Commonwealth did not have free access for fishing, requirement the act in question goes on to say:

Judge Bittinger, in the opinion quoted above, speaking of the rights of the defendant, said that the defendant was entitled to fish in the stream in question, the stream having been used by the public for fishing purposes for fifty years and therefore the public had acquired the right to fish in the stream by usage.

The Department of Fisheries was organized by the Legislature for the purpose of restocking the waters of the State and causing them to add to the food products of the Commonwealth. If the public are to be debarred from fishing in those waters, then the fish are for the

benefit of only a favored few who own the land bordering the waters, and the very paramount object of the law to furnish a food supply for the poorest of the State's inhabitants would be defeated.

There is a tendency to organize associations in the State who take up by lease or purchase, hundreds or thousands of acres of land as private preserves and strive to debar the public from fishing thereon. That they cannot do so is fully the opinion of the Department, because, as said above, the public had acquired a right to fish in these waters through usage, and that any damage done to the property of the owners of the land bordering the waters can be recovered against the offender.

In cases where the individual farmers have posted their lands it has been found in the large majority of cases that by the use of tact and the dissemination of information in regard to the value of fishing, the farmer can be brought to see the right of others to fish in the streams, while at the same time they respect his rights. Much of this feeling in regard to trespass is due to the fact that there are a number of people in a community who have no regard for the rights of others. They seem to think that they can do anything and when they go to fish they can trample on a man's crops, break down his fences and leave his stock to escape to the roads. Thus it is that the large majority of the people who are well meaning and believe in the Golden Rule have to suffer for the faults of a few. This is no new complaint, but dates back for centuries. In an old "Tretyse of Fishing With the Angle," a writer older than Izaak Walton, gives this good advice:

"Take good hede that in going about your disportes ye open no man's gates but that ye shet them again."

That advice is as good today as it was in the good old days before our forefathers had come hither from England.

The happiest communities are those where the inhabitants dwell in harmony, and if every one will heed the good advice of the old angler given above, and respect the rights of the farmer, as he expects that farmer to respect his rights, the Department thinks the problem of free streams will be quickly settled, and when anybody wishes a string of fish from the restocked streams of Pennsylvania, he only need go to the stream-side, cast in his line, and soon a meal will be in his creel or on his string.

The Legislature has, since its organization, and prior to the adoption of the constitution of 1874, passed numerous acts declaring certain rivers, creeks and streams, or parts thereof, public streams or highways, for the purpose of navigation. These acts, as remarked above, show that the Legislature claims the right to itself to pass laws giving the public the right to use the streams as highways, in spite of the fact of the ownership of the bed of the streams by private ownership. In 1890, Frederick J. Geiger, Esq., of the Philadelphia Bar, prepared for the Pennsylvania Fish Protective Association, a list of these various acts declaring streams, etc., public highways, and this list is herewith published as a matter of general information at this time:

TABLE.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
A.	
1798, March 21. Rec'd Law Book No. VI, p. 245.	Allegheny River from the mouth thereof to the boundary of the State.
1807, March 4. Rec'd Law Book No. X, p. 443, P. L. 42.	so much of, in the counties of Potter and McKean as lies southwardly of the north line of the State.
1873, April 2. P. L. 486.	Amis creek, in the township of Taylor, in the county of Centre, from Mount Pleasant, on the Tyrone and Clearfield Railroad, to the sawmill of John Copenhaver, in said township, for the passage of logs.
	Analomink river. See Broadhead's creek.*
1813, March 26. Law Book XIV, p. 1, P. L. 189.	Anderson's creek. See Little Anderson's Creek. **in the county of Clearfield, from the mouth thereof ten miles up the same.
1854, May 5. P. L. 560,	Andrew's run, in Pittsfield township, Warren county.
1822, April 1. P. L. 117.	Auchwick creek, in the counties of Huntingdon and Bedford, from the mouth thereof to John Wilde's mill.
B.	
	Babb's creek. See Pine creek, second fork of, in the county of Tioga (acts 4 April, 1844, and 7 February, 1860).
1871, May 4. P. L. 553.	Bailey's run, in Wharton township, Potter county, from its mouth, at the Sinnamahoning, to the county line, a distance of about ten miles.
1771, March 9. Rec'd A Vol. V., p. 401.	Bald Eagle stream, as far up as Spring creek.
1807, March 4. Rec'd Law Book No. X, p. 443, P. L. 42.	Bald Eagle creek, in Centre county, all that part of situate and lying between Milesburg and Joseph William's land, a distance of about eight miles. from Joseph Williams' saw-mill to the mouth of Laurel run.
1822, April 1. P. L. 117.....	
1850, March 25. P. L. 280....	Bear creek, in the county of Elk, from its junction with the Clarion river, for one mile up said creek.
1850, March 25. P. L. 281.....	Beaver creek, in the county of Cambria, from the mouth to Killbuck creek.
1863, April 14 P. L. 419.....	Beaver Dam branch of Moshannon creek, in Decatur township, Clearfield county, from its mouth to where Coal run empties into said Beaver Dam branch. See Beaver Dam run.

*The act of 3d April, 1829, recorded in Law Book No. XXI, p. 515, provides for the erection of a bridge over "Analomink river, also called Broadhead's creek, at or near Stroudsburg."

**The act of 27th March, 1819, repeals the act "passed the 13th day of March, 1813, declaring Anderson's creek, in Clearfield County, a public highway." There appears to be no act of 13th March, 1813.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1850, March 25. P. L. 281.....	Beaver Dam creek, in the county of Cambria, from the mouth to the place where the township road crosses it.
1844, April 30. P. L. 541.....	Beaver Dam run, in the county of Clearfield.
1864, March 17. P. L. 54.....	Beaver Dam run, one of the upper tributaries of the Moshannon creek, in the county of Clearfield, from its mouth to the sources thereof.
1863, April 14. P. L. 419.....	Beaver run, in Decatur township, Clearfield county, from its mouth to the mill now owned by John Cuttle.
1829, March 7. Rec'd Law Book No. XXI, p. 479, P. L. 60.	Beaver run, in Lycoming county, from the mouth thereof up to the copper works.
1815, March 4. Rec'd Law Book No. XV, p. 129, P. L. 65.	Beech creek, in the county of Centre, from its mouth up to Eddy Lick.
1845, April 16. P. L. 475.....	Beech creek, from Jacob Gratz's saw-mill, near where the turnpike road from Bellefonte to Karthaus crosses the same, to its mouth.
1860, April 3, P. L. 617.....	Bell's run, in Ceres township, McKean county, from the mouth thereof six miles up said stream.
1818, March 23. Rec'd Law Book, No. XVII, p. 116, P. L. 264.	Bennet's branch of the Sinnamahoning, in the county of Clearfield, from the mouth thereof up to the Beaver Dams, so called.
1792, April 3. Rec'd Law Book No. IV, p. 317.	Big or Poco Poco creek, in Northampton county, from the mouth to the falls thereof.
1793, March 6. Rec'd Law Book No. V, p. 55.	from the falls thereof, inclusive, up to Jan Sherbantje's mill dam.
1798, March 21. Rec'd Law Book No. VI, p. 245.	Big Beaver creek, from the mouth to the first fork, in the Seventh district of Donation land.
1827, March 2. Rec'd Law Book No. XX, p. 511, P. L. 57.	Big Brokenstraw creek, from the second forks of said creek, in Warren county, to the New York State Line, a distance of about fifteen miles.
1829, March 30. Rec'd Law Book No. XXI, p. 510, P. L. 109.	Big Bushkill creek, in the county of Pike, from the mouth of said creek to the falls, near the fifteen mile pond.
1813, March 29. Rec'd Law Book No. XIV, p. 74, P. L. 236.	Big Connoquenessing creek, from the town of Butler, in the county of Butler, to its confluence with Big Beaver creek, in the county of Beaver.
1815, March 4. Rec'd Law Book No. XV, p. 129, P. L. 65.	Big Catawissa creek, in the county of Luzerne, from its confluence with Little Catawissa creek, up to Andrew Gilbert's saw-mill.
1846, February 13. P. L. 47....	Big Equinunk creek, in the county of Wayne, from Alexander Lanthin's mill, to the mouth of said creek, where it empties into the Delaware river, for the passing of logs, lumber and rafts.
1804, April 3. Rec'd Law Book No. X, p. 18, P. L. 474.	Big Fishing creek, in the county of Northumberland, from the mouth of Little Fishing creek, up to Jonathan Colly's mill.
1830, January 23. P. L. 30....	Big Hickory creek, from its mouth to the Warren county line.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1808, March 21. Rec'd Law Book No. XI, p. 201, P. L. 92.	Big Mahoning creek, from its confluence with the Allegheny river, in Armstrong county, up said creek to the mouth of Canoe creek, in Indiana county.
1835, April 13. P. L. 212.....	in Jefferson county, from the mouth of Canoe creek to the forks of Stump creek, in said county.
1849, April 10. P. L. 629.....	Big Mill creek, in the county of Elk, from its mouth to a point two miles up said creek.
1860, March 7. P. L. 116.....	Big Mill creek, from the saw-mill of Thomas Hall, on said creek, in the county of Jefferson, to the mouth of said creek, in Clarion county.
1855, March 27. P. L. 133.....	Big run, from the residence of William Bests, in Young township, Jefferson county, to the mouth of the same, where it empties into the Big Mahoning creek.
1836, March 26. Rec'd Law Book No. XIII, p. 536.	Big Sandy creek, from its confluence with the Allegheny river up to where the State road, leading from the town of Mercer to Meadville, crosses the same.
1831, April 2. P. L. 371.....	Big Schuylkill. See Schuylkill.
1833, March 30. P. L. 109.....	Big Sugar creek, in Venango county, from the mouth thereof, and up the said stream, as far as the mouth of Proper's run. from Goodwin's mill, in Venango county, to Proper's forks, in Crawford county.
1813, March 26. Rec'd Law Book No. XIII, p. 537, P. L. 186.	Birds creek. See Loyalsock creek and its tributaries.
1828, April 14. Rec'd Law Book No. XXI, p. 407.	Blacklick (Black Lick) creek, in the county of Indiana, from Charles Campbell's mill to its mouth. from Charles Campbell's mill dam up to the mouth of Two Lick creek as far as the mill now occupied by Alexander T. Moorehead, on said creek.
1829, March 7. Rec'd Law Book No. XXI, p. 479, P. L. 60.	Blacklick (Black Lick) creek, in Indiana and Cambria counties, from the mouth thereof to the bridge on the North Branch, where the Ebensburg and Indiana turnpike crosses the same in Cambria county.
1851, April 12. P. L. 479.....	in the county of Indiana, from its mouth or junction with the Conemaugh river up to the mouth of Two Lick creek.
1849, April 10. P. L. 629.....	Blue-Eye run, in the county of Warren, from its mouth to a point one-half mile up said run.
1813, March 26. Rec'd Law Book No. XIV, p. 1, P. L. 186.	Bowman's creek, in Luzerne county, from its mouth to Parishes mills, at the Big Falls.
1815, March 1. Rec'd Law Book No. XV, p. 127, P. L. 62.	Broadhead's creek, from the mill of John Price, in Pike county, to the mouth of said creek, at Delaware river, in Northampton county. in Pike county, from John Price's mill to Eleazer Price's mill.
1829, March 30. Rec'd Law Book No. XXI, p. 510, P. L. 109.	from Eleazer Price's mill dam, in Pike county, to forks.
1832, May 3. P. L. 430.....	the West Branch of, to Nicholas Bush's, to the forks of said Broadhead's creek.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
	Brokenstraw. See Big Brokenstraw; Little Brokenstraw.
1798, March 21. Rec'd Law Book No. VI, p. 245. 1855, April 30. P. L. 377.....	Brokenstraw creek, from the mouth to the second fork. in Warren county, from the second fork to the New York State line.
1807, March 4. Rec'd Law Book No. X, p. 443, P. L. 42.	Brush creek, all that part of, situate between the mouth thereof and the mouth of Shaver's creek, in the county of Bedford.
1838, April 16. P. L. 583.....	Buffalo(e) run, from its mouth, at the Raystown branch of the Juniata, up the same to the mouth of Sulphur Spring run, in Clearfield county.
1863, April 15. P. L. 485.....	Burned Dam run, from the point where it is now a highway up to the forks of said run, and thence up the South branch of said run as far as Andrew Carle's saw-mill, and up the North Branch of said run as far as the farm of Valentine Krise, Sr.
	Bushkill. See Big Bushkill.
	C.
1848, April 1. P. L. 321.....	Canoe creek, from its mouth to Henry Stoner's sawmill, in Indiana county.
	Cattawissa. See Big Cattawissa.
1804, April 3. Rec'd Law Book No. X, p. 18, P. L. 474.	Cattawissa creek, in the county of Northumberland, up to Cherrington's mill.
1798, March 21. Law Book VI, p. 245.	Cansawago creek, from the mouth up to the main forks.
1813, March 26. Rec'd Law Book No. XIV, p. 1, P. L. 189.	Cowanesque creek, in the county of Tioga, from its mouth to Bethlehem Thompson's mill.
1848, April 11. P. L. 539.....	Cedar run, in the counties of Lycoming and Tioga, from above the mill dam of Harres & Miller, at the mouth, to the mouth of Fahnestock branch of the same, in the county of Tioga.
1867, February 27. P. L. 261..	the creek known as, in the township of Elk, Tioga county, from Billing's steam mill, in said township, to its mouth, (a distance of nine miles), to Pine creek.
	Chapel fork. See Kinzua creek.
1833, April 6. P. L. 196.....	Cheat river, from the mouth thereof and up the said stream as far as the Virginia State line.
1826, April 10. Rec'd Law Book No. XX, p. 412, P. L. 343....	Chest creek, in the county of Clearfield, from its junction with the Susquehanna river to the line of Clearfield and Cambria counties.
1830, April 6. P. L. 308.....	in Clearfield county, from the mouth thereof to the point where the division line between the counties of Clearfield and Cambria crosses the same.
1831, April 1. P. L. 341.....	Chester creek, in the county of Delaware, from the mouth thereof, at the river Delaware, up to Richard Fowler's mills.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
	Chichester. See Lower Chichester creek.
1827, March 2. Rec'd Law Book No. XX, p. 511.	Chillisquaque creek, from its confluence with the Susquehanna river as far up as the Limestone Lick farm, in Columbia county.
	Clarion river. See Wilson's fork of.
1848, February 7. P. L. 22....	Clarion river, West branch of, in the county of Elk, from the mouth to Buena Vista, a distance of about six miles up the said West branch.
1861, March 22. P. L. 190.....	West fork of, above Buena Vista, and the several tributaries thereof, in the counties of Elk and McKean, for the passage of rafts and logs.
1828, April 14. Rec'd Law Book No. XXI, p. 407.	Clark's creek, in Dauphin county, from the mouth thereof up to Whittell's mill.
1867, April 8. P. L. 943.....	Clear creek, in the county of Cameron.
1804, February 13. Rec'd Law Book No. IX, p. 348, P. L. 109.	Clearfield creek, in the county of Huntingdon, from the mouth to the forks thereof, at the place called the Driftwood.
1814, March 26. Rec'd Law Book No. XIV, p. 404, P. L. 200.	from the Beaver Dam branch up to Hugh Gallagher's mill dam in Cambria county.
1833, April 6. P. L. 209.....	in the county of Clearfield, commencing at a point where the said creek is declared and known to be a public highway to a point known as the "Narrows."
1863, April 14. P. L. 419.....	Coal run, in Decatur township, Clearfield county, from its mouth (where it empties into Beaver Dam branch of Moshannon creek) to Daniel Albert's sawmill.
1794, February 5. Rec'd Law Book No. V, p. 183.....	Cockalamus creek, in Cumberland and Mifflin counties, from the mouth thereof up to the forks at David Cargil's for the passage of rafts.
1801, February 27. Rec'd Law Book No. VIII, p. 7.	Codorus river, in York county, from the forks to the Susquehanna river.
1836, March 29. P. L. 212.....	Coffee creek, in Warren county, from the east line of Columbus township to its mouth.
1797, February 27. Rec'd Law Book No. VI, p. 147.	Cohocksink creek, from the mouth to the bridge on the road leading from Frankford.
1829, April 16. Rec'd Law Book No. XXI, p. 544, P. L. 163.	or Canal street, in the county of Philadelphia, from the bridge on the road leading to Frankford up to Sixth street, according to the plans and surveys made by Robert Brooke, Esq., and others.
1860, April 2. P. L. 510.....	Collwee creek, Warren county, from its mouth to where the Enterprise and Mulingar road crosses.
1804, March 5. Rec'd Law Book No. IX, p. 409, P. L. 197.	Conodogwinet creek, from the Cove fording to the Franklin county line. See Connodoguinet.
1771, March 9. Rec'd A, Vol. V, p. 401.	Conestogae, as far up as Slough's mill dam.
1870, April 2. P. L. 821,	Conestoga creek, in the county of Lancaster, from the mouth up to the intersection of Muddy creek, for the protection of fish.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1798, March 21. Rec'd Law Book No. VI, p. 245.	Conewago creek, from the mouth to the main forks.
1801, February 27. Rec'd Law Book No. VIII, p. 7.	Conewago river, from the mouth of Bermudian creek to the Susquehanna river.
1846, March 20. P. L. 150.....	the portion of, known as Conewago Gut. Said highway shall commence at the mouth of the Conewago, where it empties into the Susquehanna, and terminates at the mill dam of George Ewing, in Dover township, York county, below the point where the Bermudian empties into the Conewago. So much of the act to which this is a supplement (act February 27, 1801) as is hereby altered or supplied, is hereby repealed.
	Coniate. See Little Coniate.
1829, April 23. P. L. 360.....	Connearittee creek, in the county of Crawford, from the junction thereof with French creek to join John Marvin's mill, a distance of about two miles.
1771, March 9. Rec'd Law Book No. V, p. 401.	Connodoguinot, as far up as the Cove fording. See Conedogwinet.
1807, March 4. Rec'd Law Book No. X, p. 443, P. L. 42.	Conondare, or Six's creek, all that part of which lies between the town of Smethport, in the county of McKean, and the mouth of said creek.
	Conoquinessing. See Big Conoquinessing.
1848, April 1. P. L. 321.....	Cowanesque creek, in the county of Tioga, from its mouth to the junction of said creek and so called North Fork creek.
1816, March 19. Rec'd Law Book No. XV, p. 572, P. L. 182.	Crooked creek, in the county of Armstrong, from its mouth to Jacob Frantz's mill.
1817, February 10. Rec'd Law Book No. XVI, p. 83.	in the county of Tioga, from the mouth thereof up the same to the forks.
1864, April 20. P. L. 507.....	Cross Forks creek, in the county of Potter, from its mouth up said creek a distance of ten miles.
1852, April 7. P. L. 272.....	Crush creek, from the mouth of said creek, or where it empties into the Susquehanna river, in Burnside township, Clearfield county, as far up as the forks, where the North and South branches unite in Indiana county.
1771, March 9. Rec'd A, Vol. V, p. 401.	D. Delaware river.
1864, April 18. P. L. 460.....	Dent's run, in the county of Elk, from its mouth to the sources thereof.
1867, April 10. P. L. 1073.....	Driftwood creek, from the mouth of North creek, to the east line of warrant number two thousand three hundred and forty-three, in the county of Cameron, for the passage of timber, logs, rafts and shingles.
1799, April 5. Rec'd Law Book No. VI, p. 434.	Dunkard creek, from the mouth to main fork (or the several parts thereof which pass through this Commonwealth).

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1873, March 1. P. L. 200.....	Dyberry creek, the East branch of, in the county of Wayne, from the house of Obediah Freeman to the mouth of said creek, for the purpose of floating logs and timber down the same to the main stream.
E.	
1848, April 1. P. L. 321.....	East branch of Mahoning creek, in Clearfield county, to all intents and purposes as other streams that have been declared navigable.
1825, April 11. Rec'd Law Book No. XX, p. 101, P. L. 235.	East Branch of the Sinnemahoning, or the first fork from its mouth, in the county of Lycoming, as far up as the mouth of the South Lick branch of the said stream.
	East Fork. See Sinnemahoning creek, East Fork of.
1830, January 23. P. L. 30.....	East Sandy creek, in Venango county, from the mouth thereof to the point where the Susquehanna and Waterford turnpike road crosses the same.
1834, April 10. P. L. 263.....	Elk creek, in the county of Centre, commencing at the town of Melheim, where the turnpike road crosses the same to the junction of said creek with Pine creek at Dennin's fulling mill.
1851, April 12. P. L. 454.....	that so much of existing laws as makes Elk creek, in Penn township, Centre county, a public highway be and the same is hereby repealed.
1872, April 3. P. L. 878.....	in the township of Miles, in the county of Centre, from Jacob Wolf's mills eastward to Daniel Walker's mills, in said township, for the passage of logs.
1848, February 7. P. L. 22.....	Elk creek, in the county of Elk, from its mouth to the first forks, below St. Mary's.
1838, April 16. P. L. 582.....	Elk creek, in the county of Jefferson, from the mouth thereof, up the said stream to the mills of Washburn and Clover.
1876, May 2. P. L. 196.....	Elk creek and its several branches in the county of Sullivan.
1865, March 21. P. L. 516.....	Elk-horn creek, from its mouth in Tioga township, in the county of Tioga, to the land of A. J. McKenney, in Farmington township, in said county.
	Equinunk. See Big Equinunk creek.
F.	
1870, April 16. P. L. 1180.....	Fish creek, Pennsylvania, Fork of, running through Springhill township, in the county of Greene, from the town of New Freeport, in said township, to the State line, during the time of freshets, for all forms of merchantable timber, saw logs, railroad cross-ties, cooper stuff, etc.
1870, March 3. P. L. 329.....	Fish Dam run, in the county of Clinton, for the distance of five miles up from its mouth.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
	Fishing creek. See Big Fishing creek; Huntingdon creek, Act 19 March, 1816; Little Fishing creek.
1824, February 18. Rec'd Law Book No. XIX, p. 369, P. L. 24.	Fishing creek from the mouth of Banks run to the lands of Joseph Anthony, in Logan township, Centre county. (See Fishing creek, Lycoming county).
1868, April 1. P. L. 590.....	so much of the Act of 18 February, 1824, as declares that part of Fishing creek running or passing through the premises and property now in the possession of and owned by Henry L. Diffenbach, in the township of Lamar, county of Clinton, a public highway, repealed.
1816, March 19. Rec'd Law Book No. XV, p. 572, P. L. 182.	Fishing creek, commonly called Huntingdon creek, from the junction of said creek with Pine creek, in the county of Columbia, to the North mountain, in the county of Luzerne.
1797, March 4. Rec'd Law Book No. VI, p. 155.	Fishing creek, in the county of Lycoming, from the mouth, as far up as the mouth of Bank's run. (See Fishing Creek, Centre county.)
1799, April 11. Rec'd Law Book No. VII, p. 2.	Fishing creek in the county of Northumberland, from the mouth to main fork, and that branch commonly called Little Fishing Creek, from the mouth to John Eve's mill.
1858, February 16. P. L. 28....	Five Mile run, in Jefferson county, from the mouth where it enters into Sandy Lick creek, to R. J. Nicholson's Mill in Knox township, Jefferson county.
1863, March 6. P. L. 111.....	Forge run, otherwise called Six Mile run, in Centre county, from the mouth thereof where it enters into Big Moshannon creek up to the fork near the Wolf rocks, for the passage of logs and lumber.
1799, January 16. Rec'd Law Book No. VI, p. 317.	Frankford creek, in the county of Philadelphia, from the mouth thereof up to Joseph I. Miller's land opposite to the race bridge across the Bristol road on main street of Frankford.
1813, March 26. Rec'd Law Book No. XIV, p. 1, P. L. 189.	Frankstown branch of Juniata river, from the forks near Lazarus Lowries mill, up the west branch to the town of Hollidaysburg, in Huntingdon county.
	French creek. See Pleasant Lake, outlet of, into French creek.
1798, March 21. Rec'd Law Book No. VI, p. 245.	French creek to the town of Le Boeuff.
1810, February 12. Rec'd Law Book No. XII, p. 16, P. L. 18.	in Erie county, from its junction with Le-Boeuff creek, to the sawmill now or formerly owned by Leverick Bissell.
1832, May 3. P. L. 400.	French creek, East branch of, commencing at the point of its junction with the West branch of French creek, in the county of Erie, on or near the forty-second degree of north latitude, and thence up said East branch to the west line of the State of New York.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1840, January 6. P. L. 18,	East branch of, commonly known as Mile's branch, in the county of Erie, commencing at its junction with the main creek, to the mill of Stockum & Coe, on the said creek.
1867, March 1. P. L. 315,	Freeman's run, in Potter county. So much thereof as is situated between the north line of the farm of E. O. Austin and the Sinnemahoning creek.
G.	
1857, March 20. P. L. 115,	Genessee river, in the township of Genessee and Bingham, in the county of Potter, from the New York State line to the mouth of Turner creek, in said township of Bingham.
1810, February 21. Rec'd Law Book No. XII, p. 33, P. L. 35.	Green creek, in the county of Northumberland, from the mouth up to the main fork thereof, and from thence up the North and Northwest branches thereof into the sawmill now or formerly owned by John Lemon, on the North branch, and unto the sawmill now or formerly owned by Samuel Watt on the Northwest branch thereof.
H.	
1870, March 3. P. L. 329,	Hall's run, in the county of Clinton, for the distance of five miles up from its mouth
1837, March 29. P. L. 109,	Haneyoy creek, a branch of the Oswago, from the junction of the same with the Oswago creek to the New York State line.
1836, March 29. P. L. 212,	Hare's creek, within the county of Warren.
1848, April 10. P. L. 470,	in Erie county from where the same crosses the line of Warren county to where it crosses the line of the State of New York.
1851, April 14. P. L. 716; Appendix Vol. 39.	Harris' run, in Lycoming county, from its connection with Pine creek, four miles up the said run.
1871, March 2. P. L. 161,	Harvey's creek, from its mouth to and including Harvey's Lake, in the county of Luzerne.
	Harvey's Lake. See Harvey's creek.
	Hickory. See Big Hickory creek.
1868, March 24. P. L. 460,	Hiner's run, a tributary of the West branch of the Susquehanna river, in the county of Clinton, for the distance of eight miles up from its mouth.
1811, April 2. Rec'd Law Book No. XII, p. 439.	Huntingdon creek, from the mouth thereof, thence up the same to the mouth of Pine creek, thence up Pine creek to Charles Buckalew's sawmill.
1816, March 19. Law Book XV, p. 572, P. I. 182.	the East branch of Fishing creek, commonly called Huntingdon creek, from the junction of said creek with Pine creek, in the county of Columbia, to the North Mountain, in the county of Luzerne.
J.	
1869, April 9. P. L. 794,	Jerry run, in the county of Cameron, from the north line of warrant numbered five thousand four hundred and seventeen, to the place where it empties into the Sinnemahoning.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1850, April 11. P. L. 500,	Johnson's run, in Fox township, Elk county, from the mouth of said run to where the same crosses the west line of warrant number four thousand three hundred and ninety-six.
1771, March 9. Rec'd A, Vol. V, p. 412.	Juniata. See Frankstown branch of; Little Juniata; Raystown branch of. Juniata up to Bedford and Frankstown.
1830, January 29. P. L. 31, ..	K. Kinzua creek, which empties into the Allegheny river, in Warren county, from the mouth thereof up to the second forks in McKean county.
1853, April 18. P. L. Vol. 41, Appendix p. 827.	Kinzua creek, from the mouth of the South fork of the same to the old Kittanning road, and the South fork of said Kinzua creek from its mouth to the Second fork of said South fork and the Chapel fork to the fork of said creek.
1771, March 9. Rec'd A, Vol. V, p. 401.	Kiskiminetas river.
1815, March 4. Rec'd Law Book No. XV, p. 129, P. L. 65.	Kittle creek, in the county of Lycoming, from its mouth up to the second fork.
1850, March 1. P. L. 87.	Knapp's creek, in the county of McKean, from mouth to the upper dams now erected on the north and south branch of the same.
1813, March 26. Law Book XIV, p. 1, P. L. 189.	L. Lackawanna creek, in the county of Luzerne, from the mouth thereof to Ragged Island, at the mouth of Rush creek.
1771, March 9. Rec'd A, Vol. V, p. 404.	Lackawaxen. Lackawaxin stream as far up as the falls thereof.
1808, February 1. Law Book XI, p. 151, P. L. 18.	Lackawaxen river, in the county of Wayne, from the falls thereof to the Dyberry forks, and thence up the Dyberry branch and West branch to the great falls of the respective branches.
1814, March 26. Law Book XIV, p. 404, P. L. 200.	Lackawaxen creek, the Western branch of, from Colonel Seely's mills to Silas Kellog's, in Mount Pleasant township, in the county of Wayne.
1867, April 8. P. L. 890,	Lake Pleasant, in the county of Erie, and the Commonwealth of Pennsylvania, and the outlet of said lake to French creek, open and free to all the people of the said Commonwealth, for fishing, navigation and all purposes whatsoever.
1817, March 24. Law Book XVI, p. 252, P. L. 219.	Larry's creek, in the county of Lycoming, from the mouth thereof to where the State road crosses the same.
1852, May 4. P. L. 568,	Larrie's creek, in Lycoming county, from where the State road crosses the same, thence up said creek, a distance of five miles.
	Leckawaxin. See Lackawaxin, Leckawaxin stream.
	Lehigh. See Little Lehigh.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1771, March 9. Rec'd A, Vol. V, p. 404.	Lehigh, the, declared a public highway.
	Lick creek. See Loyalsock creek and its tributaries.
1820, March 28. Law Book XVIII, p. 105.	Lick creek, from its mouth up to Henry Nueff's, Jr., sawmill, in the county of Jefferson.
1842, March 17. P. L. 102,	Lick run, in the county of Clearfield, from its junction with the Susquehanna river up to Fork Licks, on said run.
1870, March 28. P. L. 610,	Little Anderson's creek, in the county of Clearfield, a stream which empties into Anderson's creek near and below Bridgeport, in said county, from its mouth to the source thereof.
1825, April 11. Law Book XX, p. 101, P. L. 235.	Little Brokenstraw creek, in the county of Warren; from the mouth thereof to the place where the State road, from the New York State line through the said county to the Ohio State line, crosses the same, a distance of about ten miles.
1829, April 23. Law Book XXI, p. 633, P. L. 297.	in Warren county, from Nathan Abbott's sawmill, on said creek, to the New York State line.
1854, April 13. P. L. 341,	in the county of Warren, from the mouth thereof to the New York State line.
1838, April 16. P. L. 582,	Little Clearfield creek, in the county of Clearfield, commencing at its junction with Big Clearfield creek to the first fork of the said Little Clearfield creek, southwest from William Dunlap's and the Raystown Branch of the Juniata, thence up the same to the mouth of Buffaloe (sic) run; thence up the same to the mouth of Sulphur Spring run, in the same county.
1798, March 21. Law Book VI, p. 245.	Little Coniate creek, from the mouth to the inlet of Little Coniate lake.
1830, April 6. P. L. 307,	Little Fishing creek, in the county of Northumberland, Act 11 April, 1799.
	Little Fishing creek, in Columbia county, from formerly Eve's now Master's mill, in Greenwood township, to Cole's mill, in Madison township, and the West branch of said Little Fishing creek, from the mouth thereof to Lyon's mill.
1794, February 5. Law Book V, p. 1882.	Little Juniata, in the county of Huntingdon, from the mouth up to the head of Logan's Narrows.
1808, March 26. Law Book XI, p. 233, P. L. 141.	Little Juniata river, from Logan's Narrows to the mills of Edward Bell, in Allegheny township, Huntingdon county.
1822, April 1. P. L. 117,	Little Juniata river, in Antis township, in Huntingdon county, as far up the said river as the sawmill dam of Alexander and Daniel Ale.
1830, January 23. P. L. 28, ...	Little Mahoning creek, in Indiana county, from the mouth to the North fork.
1867, April 5. P. L. 832,	North branch of, in Indiana county, from its confluence with the South branch of said creek, up to Tiger's sawmill.
1867, April 5. P. L. 832,	Uber branch of, from its mouth up to Cessna's sawmill, in Indiana county.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1848, April 1. P. L. 321, 1873, March 18, P. L. 308,....	Little Mill creek, in the county of Jefferson, in Warsaw and Pine creek townships, in the county of Jefferson, from the mouth of Laurel run to the mouth thereof at Big Mill creek.
1851, April 14. P. L. Vol. 39, Appendix p. 716.	Little Mushannon, in the county of Clearfield, from its connection with the West branch of the Susquehanna river, the distance of ten miles up the said creek.
1852, March 3. P. L. 522,	in Snowshoe township, Centre county, from its mouth to the Mushannon mills.
1828, April 14. Law Book XXI, p. 407.	Little Oil creek, in Crawford county, from the mouth thereof to the upper part of said creek.
1837, April 4. P. L. 380,	Little Pine creek, from its mouth, in Columbia county, to Columbus, in Luzerne county.
1851, April 14. P. L. Vol. 39, Appendix p. 716.	Little Sandy creek, the North branch of, from its junction with Redbank creek, in Armstrong county, up said stream to Alexander McKinsty's sawmill, in Jefferson county. South branch of, from its junction with the North branch of, at Geist's mill dam, up said South branch to Campbell's and Mundorff's mill, formerly known as Sprinkle's mill, in Jefferson county.
	Little Schuylkill. See Tamaqua. •
1799, April 10. Law Book VII, p. 7.	Little Schuylkill, the, from George Roushe's sawmill, up to Jacob Shelley's sawmill.
1869, April 13. P. L. 890,	Little Shenango creek, in the county of Mercer, from its mouth, at Greenville, to Salem Mills, near Leech's Corners, in said county.
1814, March 26. Law Book XIV, p. 404, P. L. 200.	Little Swatara creek, in the county of Schuylkill, from its junction with the Big Swatara creek, up the same to John Fidler's sawmill.
1828, April 14. Law Book XXI, p. 407.	Little Toby's creek, in the counties of Clearfield and Jefferson, from the mouth of John Sheaffer's mill run, on the main branch of Toby's creek and from the forks of Brandy Camp (or Kersey creek) to the Clarion river.
1862, March 27. P. L. 218,	Little Toby creek, from the point where it is now a highway up to Patrick Whalen's, in the township of Fox, county of Elk.
1864, April 8. P. L. 346,	Long run, emptying into Pine creek, in the township of Gaines, in the county of Tioga, for the distance of eight miles up from its mouth.
1817, March 24. Law Book XVI, p. 252, P. L. 219.	Lower Chichester creek, in the county of Delaware, from the mouth thereof up the same to the mill of David Trainer and Gideon Jaques.
1816, March 19. Law Book XV, p. 572, P. L. 182.	Loyalsock creek, in the county of Lycoming, from the mouth thereof up the same to Roger's factory, on said creek.
1881, April 12. P. L. 428,	Loyalsock creek and its tributaries, Bird's creek and Lick creek, in the county of Sullivan.
1811, March 20. Law Book XII, p. 296, P. L. 74.	Lycoming creek, in the county of Lycoming, from the mouth thereof up the same to where the line of Tioga county crosses the said creek.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
M.	
1870, March 3. P. L. 329,	McSherry's run, in the county of Clinton, for the distance of five miles up from its mouth.
1806, March 1. Law Book X, p. 253, P. L. 389.	Mahantango creek, forming the division line between Dauphin and Northumberland counties, from the mouth thereof up to the junction of Pine and Deep creeks, in Berks county.
1814, March 26. Law Book XIV, p. 404, P. L. 200.	Mahantango creek, in Schuylkill county, from the mouth of Pine creek up to Samuel Keim's sawmill.
	Mahoning. See Big Mahoning.
	Mahoning creek. See East branch of. See Little Mahoning.
1869, April 2. P. L. 594,	Mahoning creek, from its mouth to the Mahoning iron works, in the county of Armstrong.
1816, March 19. Law Book XV, p. 572, P. L. 182.	Mahoopany creek, from its mouth to the forks of the north and south branches thereof.
1869, April 2. P. L. 607,	Maple creek, in the county of Forest, from its mouth up to Cook & Leichner's mill, for the passage of logs.
1813, January 16. Law Book XIII, p. 288, P. L. 31.	Marsh creek, in the county of Centre, from its confluence with the Bald Eagle creek to Jacob Boone's sawmill, being about the distance of five miles.
1842, March 14. P. L. 77,	Marsh run, from its junction with Oil creek, in the township of Troy, county of Crawford, to Ralph Clap's mill, in Athens township, county aforesaid.
1868, February 21. P. L. 192,	Marvin creek, in McKean county, from the crossing of the Howard Hill road to Potato creek.
1832, February 15. P. L. 70, ..	Matthews run, in Warren county, from its mouth where it empties into Brokenstraw creek, to the township line between Brokenstraw and Sugar Grove townships.
1851, April 14. P. L. Vol. 39, Appendix p. 716.	Medock's run, in the county of Elk, from its connection with Bennett's branch of the Sinnemahoning, six miles up said run.
1825, April 11. Law Book XV, p. 101, P. L. 235.	Middle creek, in the county of Union, from the mouth thereof, at the Susquehanna river, up to George Miller's mill dam, in Beaver township.
	Miles branch of the French creek. See French creek.
	Mill creek. See Big Mill creek. see Little Mill creek, in the county of Jefferson. see Oil creek, commonly called Mill creek. see Oil creek, commonly called Mill creek, in the county of Crawford.
1827, March 2. Law Book XX, p. 511, P. L. 57.	Mill creek, in the county of Huntingdon, from the mouth thereof, to Matthew Wilson's mill.
1832, April 16. P. L. 582,	in Jefferson county, from the mouth thereof, to Burtoff road.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1847, February 16. P. L. 109, ..	in the county of Jefferson, from its mouth to Perrin's mill.
1868, April 13. P. L. 935,	a tributary of Loyalsock, in Sullivan county, from its mouth up to the north line of the Joseph Lewis tract on the North branch, and to the west line of the Thomas Leiper tract on the West branch.
1865, March 23. P. L. 687,	Mill run, in the townships of Browne and McHenry, in the county of Lycoming, a tributary of Pine creek.
1867, April 8. P. L. 899,	in the township of McHenry, in the county of Lycoming.
1869, April 13. P. L. 904,	in the township of McHenry, and county of Lycoming, for the purpose of floating logs and lumber down the same.
1848, April 11. P. L. 503,	Millstown creek, in the county of Jefferson, from its mouth ten miles up the same.
1851, April 14. P. L. Vol. 39, Appendix p. 716.	Mix run, in the county of Elk, from its connection with Bennett's branch of the Sinnemahoning, eight miles up said run.
1869, April 9. P. L. 794,	in the county of Cameron, from the floating dam of Brown, Early & Co., to the place where it empties into Bennett's branch of the Sinnemahoning.
1782, April 13. Law Book No. 1, p. 522.	Monongahela river, as far up as it can be made navigable.
1867, March 22. P. L. 527,	Montgomery creek, a tributary to the West branch of the Susquehanna river, in the county of Clearfield, from the mouth to the sources thereof.
1874, May 21. P. L. 299,	Montgomery creek and its several branches, in the county of Clearfield, for the purpose of driving and floating logs, lumber, etc., down said stream or streams.
1863, April 14. P. L. 399,	Morgan's run, in Clearfield county, from where it empties into Clearfield creek, up to where the road, leading from McClarren's farm to Clearfield creek, crosses the road at or near Powell's sawmill.
	Moshannon creek. See Beaver Dam branch of. See Mushannon.
1808, February 1. Law Book XI, p. 151, P. L. 17.	Muddy creek, from its junction with Hutcheson's sawmill to its confluence with French creek.
1831, April 2. P. L. 371,	Muddy creek, in the county of Crawford, from the mouth of Hutchin's run, up said creek, so far as the east line of donation tract, numbered one hundred and twenty-one, of five hundred acres.
1861, May 1. P. L. 618,	Muddy run and the east and west branches thereof, in the county of Clearfield, for the distance of twelve miles above its mouth.
1810, January 30. Law Book XII, p. 5, P. L. 6.	Muncy creek, in the county of Lycoming, and its branches, to wit: from the mouth thereof, up to the mouth of Beaver creek on the east branch, and from the mouth of the north branch up the same as far as Elk Lick.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
	Mushannon. See Little Mushannon. See Mo-shannon.
1804, March 5. Law Book IX, p. 361, P. L. 130.	Mushannon creek (a boundary line between the counties of Centre and Huntingdon), from the mouth thereof to the forks of the same, about five miles above the town of Phillipsburg.
N.	
1816, March 19. Law Book XV, p. 572, P. L. 182.	Nescopeck creek, in the counties of Columbia and Luzerne, from its mouth to Mount Yorger.
1771, March 9. Rec'd A, Vol. V, p. 401.	Neshaminy creek, as far up as Barnsley's Fork.
1850, March 25. P. L. 281,	North Beaver Dam run, in the county of Cambria, from the mouth of, to Gill's sawmill.
1837, April 4. P. L. 330,	North branch of the Tionesta creek, in the county of Warren, from the mouth of said branch, fifteen miles up said stream.
1867, April 10. P. L. 1073,	North creek, from its junction with the Driftwood creek, up to where it crosses the public highway, at a place called Harper's Ferry, in the county of Cameron, for the passage of timber, logs, rafts and shingles.
O.	
1798, March 21. Law Book VI, p. 245.	Ohio river, from the western boundary of the State to the Monongahela river.
1798, March 21. Law Book VI, p. 245.	Oil creek. See Little Oil creek.
1810, March 10. Law Book XII, p. 64, P. L. 66.	from the mouth of the second fork. in the counties of Venango and Crawford, from the lower forks in Venango county, to the upper forks at McCreeth's sawmill, in Crawford county.
1810, March 9. Law Book XV, p. 572, P. L. 182.	commonly called Mill creek, in the county of Crawford, from its mouth to the southern boundary of a tract of land belonging to Charles Plumb in the counties of Crawford and Warren.
1830, January 29. P. L. 31, ...	the east branch of, from the dam of the old Holland mill, in Crawford county to the point at which the road leading from Richard Henderson's to the Allegheny river, crosses the said creek in Warren county.
1832, May 3. P. L. 430,	the east branch of, from Centreville to the State road, in Sparta township, in the county of Crawford.
1848, April 11. P. L. 502,	Oil creek, Thompson's branch of, in the county of Crawford, from its confluence with another branch of said creek, in the township of Oil creek, in the county aforesaid, to a sawmill built by Chancy Goodrick, in the township of Rome and county aforesaid.
1818, March 3. XVI, p. 559, P. L. 145	the west branch of, from the upper forks thereof, at M'Crat's, now Winten's mill, up to James Hamilton's mill, in Bloomfield township, in the county of Crawford.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1807, March 4. Law Book X, p. 443, P. L. 43.	Oswayo creek, all that part of, in the counties of Potter and McKean, which lies between the north line of this State and the forks of the said creek, about twenty miles from its mouth.
1850, April 6. P. L. 398,	Oswayo creek, in the county of Potter, from the town of Millport, up to the town of Oswayo, a distance of about six miles.
1851, April 14. P. L. Vol. 39, Appendix p. 716.	Otter run, in the county of Lycoming, from its connection with the first fork of Pine creek, three miles up the same.
1852, March 27. P. L. 196,	in Brown township, in the county of Lycoming, the first fork of, from the main stream, for one-half mile up said branch.
1864, March 18. P. L. 63,	Oyster run, in Fox township, Elk county, from its mouth where it empties into Little Toby creek, to its forks, a distance of one and one-fourth miles.
P.	
1826, April 10. Law Book XX, p. 412, P. L.	Panther creek, from its junction with the Little Schuylkill, or Tamaqua, to Martin Yoder's sawmill on said creek.
1816, March 19. Law Book XX, 572, P. L. 182.	Pemmapecha, commonly called Pennepack, in the county of Philadelphia, from its mouth to David Lewis' sawmill race.
	Pennapack. See Pemmapecha.
1771, March 9. Rec'd A, Vol. V, p. 401.	Penn's creek, twenty miles up the courses thereof.
1792, April 3. Law Book IV, p. 317.	in the county of Northumberland, below the mouth of Sinking creek, not heretofore declared a public highway, from the mouth thereof, to the mouth of Sinking creek.
1827, March 2. XX, p. 511, P. L. 57.	in Centre county, from the mouth of Sinking creek to the source of the said Penn's creek.*
1864, April 8. P. L. 346,	Phoenix run, emptying into Pine creek, in the township of Gaines, in the county of Tioga, for the distance of eight miles up from its mouth.
	Pine Bottom run. See Upper Pine Bottom run.
	Pine creek. See Huntingdon creek (Act 2 April, 1811).
	see Little Pine creek.
	see Mill run, in Lycoming county, a tributary of.
1827, March 2. Law Book XX, p. 511, P. L. 57.	see Phoenix run and Long run, emptying into Centre county, from the mouth thereof, up to John Neidigh's sawmill.
1868, April 13. P. L. 987,	Pine creek, in the township of Haines, in the county of Centre, from the mouth thereof, at Penn's creek, up to six miles above Mortz's.

*The Act of 27 May, 1841, P. L. 404, Provides: So much of the public highway on Penn's creek, in Centre county, as lies between Duncan's mill and the head of said creek is hereby vacated, and so much of the second section of the Act passed 2 March, 1827, as is inconsistent herewith, is hereby repealed.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1811, April 2. Law Book XII, p. 439. 1814, March 26. Law Book XIV, p. 404, P. L. 200.	Pine creek, from its mouth at Huntingdon creek, to Amos Buckelew's sawmill. from Amos Buckelew's sawmill, in Columbia county, to the main forks above Jonathan Westover's sawmill, in Hunting township, Luzerne county.
1798, March 16. Law Book VI, p. 249.	Pine creek, in the county of Lycoming, from the mouth up to the third fork thereof.
1805, April 4. Law Book X, p. 175, P. L. 237.	Pine creek, the West branch of, from the third fork, in the county of Tioga, to the forks of the Elk Lick, in the county of Potter, and also the said third fork, from its mouth to Morris' marsh in the said county of Tioga.
1810, March 10. P. L. 68,	so much of the second fork of, in the county of Lycoming, as lies between its confluence and the point where it is intersected by the State road.
1829, March 30. Law Book XXI, p. 510, P. L. 109.	in Lycoming and Tioga counties, from the mouth thereof to the forks of said creek, above the big meadows in Tioga county.
1832, May 3. P. L. 430,	the first fork of, in the county of Lycoming, from the mouth thereof up to the Block House fork.
1844, April 4. P. L. 188,	second fork of, commonly called Babb's creek, in the county of Tioga, from its mouth to where William Babb now resides.
1860, February 7. P. L. 33, ...	second fork of, called Babb's creek, in the county of Tioga, from William Babb's sawmill to the mouth of Mickle run.
1833, January 14. P. L. 3,	Pine creek, in Potter county, from the first forks above Big Elk Lick, on said creek, to the forks above William Ellsworth's on said creek.
1847, March 16. P. L. 402,	west branch of, in the county of Potter, the distance of eight miles from its mouth up the said West branch.
1859, February 25. P. L. 81, ..	Pine creek, in Warren county, from its mouth to Carpenter's mill.
	Pleasant. See Lake Pleasant.
1859, February 10. P. L. 34, ..	Plunket's creek, a tributary of Loyalsock, in Lycoming county, from its mouth up to Feronea Falls, on the West branch, to the Beaver Meadow, on the North branch, and to the north line of the Henry Hill tract on the East Branch.
1792, April 3. Law Book IV, p. 317.	Poco Poco, or Big creek, in Northampton county from the mouth to the falls thereof.
1793, March 6. Law Book V, p. 55.	or Big creek, in Northampton county, from the falls thereof inclusive, up to Jan Sherbantje's mill dam.
1859, April 13. P. L. 558,	Portage branch of the Sinnemahoning creek, from its mouth in Shippen township, McKean county, up to Cooley's branch, in Portage township, in the county of Potter.
	Portage creek. See Susquehanna Portage creek.
1855, April 18. P. L. 250,	Potato creek, in the county of McKean, from the mouth thereof to the point where the same crosses the road leading from Smethport to Shippen.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1859, March 30. P. L. 313,	Potts run, in Clearfield county, from the mouth thereof, where it empties into Clearfield creek, up to Kelly's mill.
1818, February 7. P. L. 85, ...	Powell's creek, in the county of Dauphin, from the mouth thereof to the forks of said creek. Pymatuning creek. See Shenango creek.
R.	
1846, March 30. P. L. 207,	Raccoon creek in the county of Clarion, from its mouth to the mouth of Little Raccoon creek, to all intents and purposes as are other streams that have been declared navigable.
1857, May 12. P. L. 458,	Rattlesnake creek, which enters into Little Toby's creek, in the township of Snyder, Jefferson county.
1838, April 16. P. L. 583,	Raystown branch of the Juniata, from Morrison's mills, in Clearfield county, up the same to the mouth of Buffalo run, thence up the same to the mouth of Sulphur Spring run, in the same county. Red Bank creek. See Sandy Lick creek.
1831, April 1. P. L. 341,	Ridley creek, in the county of Delaware, from the mouth thereof at the river Delaware, up to Pierce Crosby's mills.
1860, March 12. P. L. 147,	Roaring run, a tributary of Clearfield creek, in Bradford township, Clearfield county, from the mouth thereof to its sources.
S.	
1861, May 1. P. L. 641,	Salt run, as far as the forks of said stream, in Cameron county, for the passage of rafts and logs. Sandy creek. See East Sandy creek; Little Sandy creek.
1798, March 21. Law Book VI, p. 245.	Sandy Lick, or Red Bank, creek, from the mouth to the second great fork.
1820, March 28. P. L. 188,	creek from its mouth up to Henry Nueff's, Jr., mill, in the county of Jefferson.
1826, April 10. Law Book XX, p. 412, P. L. 339.	or Red Bank, creek, from the eastern boundary of Jefferson county to its mouth, only for the passage of boats, rafts, etc., descending.
1833, March 30. P. L. 109,	creek, the north fork of, in the county of Jefferson, from the mouth thereof to Ridgway, in said county.
1800, March 1. Law Book VII, p. 111.	Schuylkill, Big, from the mouth of Norwegian creek, where it empties into said river, up to where the Catawissa road crosses the same. the west branch of, from its junction with the north branch, up the same to Thomas Reed's sawmill, and then five miles higher up said stream, and the westernmost branch from its junction with the last mentioned stream, six miles up the same.
1803, April 1. Law Book IX, p. 186, P. L. 582.	Schuylkill, Little. See Tamaqua.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1833, April 8. P. L. 349,	Shamokin creek, in the county of Northumberland, from Samuel Sober's mill to its confluence with the Susquehanna.
1800, February 19. Law Book VII, p. 94.	Shaver's creek, in the county of Huntingdon, from its mouth up to the line of John and James Crawford's land.
1825, April 11. Law Book XX, p. 101, P. L. 235.	in the county of Huntingdon, from the mouth thereof to the bridge across the same at or near Ennis' fording.
1803, April 4. Law Book IX, p. 249, P. L. 661.	Shenango, or Pymatuning creek, a branch of Beaver creek, from the mouth of the same up to its source.
1822, April 1. P. L. 117,	Sidling Hill creek, from its mouth to the mouth of Woodenbridge creek.
1826, December 21. Law Book XX, p. 479, P. L. 3.	Sinking creek, in Centre county, from the mouth thereof to Christian Keller's mill.
	Sinamahoning. See Wikoff's (or Wykoff's) run, a tributary of Sinnamahoning creek.
1804, February 13. P. L. 109, ..	Sinnamahoning (or Sinnemahoning) creek. Sinnamahoning creek, in the county of Lycoming, from the mouth to the forks thereof, at the place called the Driftwood.
1818, March 23. Law Book XVII, p. 116, P. L. 264.	Bennett's branch of Sinnamahoning, in the county of Clearfield, from the mouth thereof up to the Beaver dams, so called.
1822, April 1. P. L. 117,	Sinnamahoning creek, the North branch in McKean county, from the Driftwood to the mouth of North creek.
1825, April 11. Law Book XX, p. 101, P. L. 235.	east branch of the Sinnamahoning, or the first fork from its mouth, in the county of Lycoming, as far up as the mouth of the South Lick branch of the said stream.
1849, April 10. P. L. 629,	Sinnemahoning creek, from the point where it is now a highway, up to Stephen Bundy's in Houston township, Clearfield county.
1850, April 2. P. L. 321,	east fork of Sinnemahoning creek, from the mouth thereof to the mouth of Jamison branch of said east fork, in Potter county.
1859, April 13. P. L. 558,	Portage branch of the Sinnemahoning creek, from its mouth in Shippen township, McKean county, up to Cowley's branch, in Portage township, in the county of Potter.
1874, May 21. P. L. 290,	the first fork of Sinnemahoning creek, in the county of Potter, from the mouth of the South Lick branch thereof, as far up as the mouth of the Prouty run.
	Six's creek. See Conondau creek.
	Six Mile run. See Forge run in Centre county.
	Slate, or Tomb's run. See Tomb's run.
1850, March 25. P. L. 281,	Slate Lick run, in the county of Cambria, from the mouth of, to the Phillipsburg road. run in the county of Cambria (one of the branches of Beaver dams) from the Ebensburg and Phillipsburg road, at or near James McGough's saw-mill, to John Adams' saw-mill, near St Augustine, in Clearfield township, in said county of Cambria.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1861, May 1, P. L. 658,	Soldier run, in the county of Jefferson, from the mill of William H. Reynolds to the Clearfield county line.
1873, April 10. P. L. 722,	in the county of Jefferson, from McCreight and Warnock's (formerly William H. Reynold's) mill to the Sandy Lick creek, in Winslow township, in said county.
1846, March 30. P. L. 207,	Spring creek, in the county of Elk, from the big forks of said Spring creek to its mouth, to all intents and purposes as are other streams that have been declared navigable. see Spring run.
1796, February 26. Law Book VI, p. 58.	Spring creek, in the county of Mifflin, from the mouth of same as far up as the mouth of Logan's creek.
1830, January 23. P. L. 28,....	Spring creek, in Warren county, from its mouth to a point where the road leading from Franklin through Warren county, in a direction to Chautauqua lake, crosses the same.
1846, April 8. P. L. 281,	in the county of Warren, the main branch of from the mouth of said stream to where the same crosses the Crawford county line, and also the southern branch of said stream, from the mouth of said southern branch, until where the same crosses the Titusville road, in Warren county.
1863, April 22. P. L. 526,	Spring run, from its junction with Trout run, up to the Spring run mills, now owned by W. H. Earley, L. D. Brewster and Charles St. John, in the township of Jay, in the county of Elk, and all dams erected or hereafter to be erected shall have chutes so constructed as to allow the free passage of lumber, timber and logs.
1820, March 6. P. L. 48,	Stony creek, from its mouth up to Peter Berkey's mills, in the county of Somerset.
1822, April 1. P. L. 117,	from and immediately below the mill dam of Peter Berkey, Esq., to the mill dam of George Kimmel, Esq.
1864, April 8. P. L. 335,	Stoney Fork creek, in Delmar and Morris townships, in the county of Tioga, from its mouth up to Daniel Osborn's, in Delmar township.
1848, April 11. P. L. 541,	Stump creek, in the county of Jefferson, from the forks of Big Mahoning to the Clearfield county line.
1858, February 25. P. L. 56, ..	Susquehanna Portage creek, in the township of Portage, in the county of Potter, from the sawmill of E. D. Sizer, up to the Salt Works in said township.
1785, March 31. Law Book II, p. 493.	Susquehanna river, from the division line of Maryland, upwards to the town of Northumberland, and thence through the two branches throughout the whole length.
1801, February 21. Law Book VII, p. 249.	down to the Maryland line.
1831, January 17. P. L. 21,...	the West branch of the river Susquehanna, from the Cherry Tree or Canoe Place, up to John Douglass's saw-mill.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1832, May 3. P. L. 431,	the West branch of the river Susquehanna, from John Douglass' saw-mill, in Cambria county, up to the fork of said branch, a distance of about three miles.
1814, March 26. Law Book XIV, p. 404, P. L. 200.	Sugar creek. See Big Sugar creek. in the county of Bradford, from the mouth thereof, up the main branch to Rich's mills.
1830, April 6. P. L. 309,	Sugar Creek lake, the outlet thereof, in Crawford county, from Sugar Creek lake to where it enters Big Sugar creek.
1852, April 14. P. L. 344,	and its inlet westerly, as far as the Oil creek road, in the county of Crawford.
1771, March 9. Rec'd A, Vol. V, p. 401.	Swatara. See Little Swatara. as far up as P. Kettle's mill dam.
1831, March 29. Law Book XIV, p. 74, P. L. 237.	Swatara creek, from John Weidman's forge dam, in the county of Dauphin, to Good Spring creek, in the county of Schuylkill.
1815, March 4. Law Book XV, p. 129, P. L. 65.	the south branch of, in Schuylkill county, from the mouth thereof, to Jacob Capp's saw-mill.
T.	
1816, March 19. Law Book XV, p. 572, P. L. 182.	Tamaqua, commonly called Little Schuylkill, from its confluence with Big Schuylkill to David Longairre's saw-mill.
1802, February 22. Law Book VIII, p. 52, P. L. 73.	Ten-mile creek, from the mouth thereof at the Monongahela river up to the main fork, and thence up the south branch of said creek, as far as Jacob Adam's saw-mill, near Waynesburg, in the county of Greene.*
	Teonista. See Tionesta.
	Tionesta (or Teonista) creek.
1827, March 2. Law Book XX, p. 511.	Teonista creek, from its mouth where it enters the Allegheny river in Venango county, to the main fork of said creek, in Warren county, about six miles above the north line of Jefferson county.
1837, April 4. P. L. 380,	the north branch of Teonista creek, in the county of Warren, from the mouth of said branch fifteen miles up said stream.
1852, May 3. P. L. 526,	Tionesta creek, from the forks in Warren county, to the south line of Sergeant township, in McKean county.
1855, March 27. P. L. 133,	the west branch of Tionesta creek, in Warren county, as far up said stream as the west line of lot number five hundred and ninety-seven, in Cherry Grove township, in said county.
1857, May 12. P. L. 462,	and the branches thereof above Joseph Hall's mill, in Mead township, Warren county.
	Thompson's branch. See Oil creek, Thompson's branch of.
1836, March 29. P. L. 212,	Tidyute creek, in the county of Warren, from its mouth to the second fork of the same.

*The Act 6 March, 1863, P. L. 113, repeals "any act of Assembly now in force, declaring Ten-mile creek a public highway, so far as relates to said creek from its head waters to the borough of Waynesburg, in the county of Greene."

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1815, March 13. Law Book XV, p. 314, P. L. 181.	Tioga river, from the line of the State of New York to Peter's Camp, in the county of Tioga.
1838, April 16. P. L. 591,	Tobyhanna creek, in the county of Monroe, from the river Lehigh to the junction of the Tunkhanna.
	Toby's (or Toby) creek. See Little Toby's creek.
1798, March 21. Law Book VI, p. 245.	Toby's creek, from the mouth of the second fork.
1851, April 14. P. L. Vol. 39, Appendix p. 716.	Tomb's run. Slate or Tomb's run, in the county of Lycoming from its connection with Pine creek, six miles up said run.
1859, April 11. P. L. 506,	Tomb's run emptying into Pine creek, in the county of Lycoming, to its sources.
1816, March 19. Law Book XV, p. 572, P. L. 182.	Tombhicken creek, a branch of Cattawissa creek, from its mouth to the line of a tract of land patented to Jeremiah Warder, Jeremiah Parker and Richard Parker, called Turn Hick.
1813, March 26. Law Book XIV, p. 1, P. L. 189.	Towanda creek, in the county of Bradford, from the mouth thereof up the main branch to Spalding's mills.
1826, April 10. Law Book XX, p. 412, P. L. 343.	in Bradford county, from the mouth thereof up to the mouth of Roger's creek.
1851, April 8. P. L. 384,	south branch of, in Bradford county, from the mouth to David Miller's, in Albany township, in said county.
1863, April 22. P. L. 526,	Trout run, from its mouth to the mouth of Spring run. And all dams erected or hereafter to be erected, shall have chutes so constructed as to allow free passage of lumber, timber and logs. in the county of Clearfield, from the mouth of said run, to the saw-mill of Joseph Shaw, upon said run.
1852, May 4. P. L. 568,	
1851, April 14. P. L. Vol. 39, Appendix p. 716.	in the county of Elk, from its connection with Bennett's branch of the Sinnemahoning, ten miles up said run.
1849, April 10. P. L. 623,	in Brown township, in the county of Lycoming, from its mouth three miles up said stream.
1870, April 16. P. L. 1218,	in the county of Lycoming, from its mouth on lands of A. H. McHenry, where it empties into Pine creek, to the head of its main branch, in said county.
1866, February 15. P. L. 48, ..	Tunkhannock creek, from its mouth in Tunkhannock borough, in Wyoming county, to a point where the Delaware, Lackawanna and Western railroad bridge crosses said creek, in Nicholson township, in said county.
	Tuneanquant or Tunnagwant creek.
1828, April 14. Law Book XXI, p. 427, P. L. 478.	Tunnangwant creek, in McKean county, from the New York State line, up the stream to the junction of the south and west branches and to continue up the west branch one mile and up the south branch two miles, from said junction.
1860, April 3. P. L. 618,	Tuneanquant creek, in Bradford township, McKean county, from the mouth thereof, six miles up said creek.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
	Tunnangwant. See Teneanquant.
1838, April 16. P. L. 582,	Turtle creek, in Allegheny county, from the mouth thereof, up the said stream as far as Brush creek, in Westmoreland county.
1851, April 12. P. L. 479,	Twolick creek, from its mouth (at Blacklick creek, in the county of Indiana), up said creek to the junction of the north branch of said creek.
1860, April 2. P. L. 576,	east branch of, from its mouth up to the bridge over said creek, on the public road from Greenville to the Cherry Tree, in Indiana county.
1850, April 11. P. L. 494,	north branch of, from its mouth, near the line of Greene and Cherryhill townships, in Indiana county, up to John Butterbaugh's mill, in said township of Greene.
1796, February 26. Law Book VI, p. 61.	Tuscarora creek, in Milford township, in the county of Mifflin, from the mouth thereof, to Thomas Beale's mill-dam.
1805, April 4. Law Book X, p. 196, P. L. 277.	all that part of, situate between the mouth thereof and the forks near to Morrow's mill, which has not been declared a public highway by the act to which this is a supplement, passed the twenty-sixth day of February, one thousand seven hundred and ninety-six.
1854, April 20. P. L. 396,	Two-mile run, in Sheffield township Warren county, from its mouth to where it intersects the line of lot known as sub-division number two hundred and thirty-one, McKean county.
U.	
	Uber branch. See Little Mahoning creek.
1851, April 14. P. L. Vol. 39, Appendix p. 716.	Upper Pine Bottom run, in the county of Lycoming, from its connection with Pine creek, three miles up said run.
W.	
1808, February 4. Law Book XI, p. 163, P. L. 34.	Wallenpaupack creek, in the county of Wayne, from the falls thereof at Wilsonville, to the forks of said creek, and thence up the west branch, to where the north and south road crosses, and up the south branch to the upper end of Newfoundland settlement.
1835, April 13. P. L. 212,	Wapaseening creek, in Bradford county, from the New York State line up to Joseph Elbree's mill.
1805, April 4. Law Book X, p. 174, P. L. 236.	Wyalusing creek, all that part of, situate between the mouth thereof and Pickett's mill, near the forks of said creek.
	West branch. See Susquehanna river, West Branch of.
1852, May 4. P. L. 568,	West creek, in the county of McKean, from the mouth of said creek to the Elk county line.
1867, April 5. P. L. 819,	in the counties of Cameron and Elk, from the mouth to the source thereof.
	West fork. See Clarion river, West fork of.

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1857, May 12. P. L. 458,	Whetstone creek, in Clearfield county, from its mouth three miles up said creek.
1864, May 21. P. L. Vol. 52, Appendix p. 929.	White Deer creek (a tributary of the West branch of the Susquehanna river) and the north and south forks, for ten miles from the mouths of said forks, subject to the further provisions of this act.*
1813, March 26. Law Book XIV, p. 1, P. L. 189.	White Deer hole, in the county of Northumberland, from its confluence with the West Branch of the Susquehanna, up to Samuel Foreman's mill dam.**
1860, April 2. P. L. 578,	Whitmore run or creek, in the county of Clearfield, from its mouth to Joseph Patterson's saw-mills, in said county.
	Wicoff's. See Wycoff's run.
	Wiconisco or Wyconisco.
1805, April 1. Law Book X, p. 156, P. L. 200.	Wyconisco creek, in the county of Dauphin, from the mouth thereof to Isaac Ferree's mill-dam.
1867, March 1. P. L. 317,	Wiconisco creek, from Oakdale forge, in Dauphin county, to the public road leading from Clark's Valley to Tremont, in Schuylkill county.
1859, April 11. P. L. 467,	Willow creek, from its mouth, in Warren county, to its source, in McKean county.
1824, March 29. Law Book XIX, p. 501, P. L. 198.	Will's creek, that part of, in the county of Bedford, between the saw-mill erected by Henry Lyborger and the Maryland line.
1870, April 6. P. L. 1006,	Wilson's fork of the Clarion river, from the town of Wilcox, in Elk county, to where the McKean county line crosses said stream, for the passage of rafts, logs, timber and the ordinary purposes of descending navigation as necessary for lumbering purposes.
1865, March 21. P. L. 441,	Wilson's run, in the township of Chest, in the county of Clearfield, from its mouth to the first fork of said run, in the Henry Musser survey.
1838, April 16. P. L. 582,	Wooden Bridge creek, in the county of Bedford, from the mouth thereof and up the said stream as far as Houston's saw-mill.
1858, April 21. P. L. 404,	Wollis' run, in the county of Lycoming.
1869, April 10. P. L. 837,	Woodcock creek, in the county of Crawford.
1850, March 25. P. L. 280,	Wycoff's or Wicoff's run. Wycoff's run, in the county of Clinton, from its junction with the Sinnemahoning, for six miles up said run.

* An act to incorporate the White Deer Improvement Company.

** The Act of 30 March, 1822, repeals "so much of the Act of 26 March, 1813, as declares the White Deer Hole creek a public highway from Stitzel's forge to Samuel Foreman's mill dam, in Northumberland (now Lycoming) county."

TABLE—Continued.

DATE OF THE ACT.	RIVER OR STREAM DECLARED A PUBLIC HIGHWAY.
1873, March 26. P. L. 421,	Wicoff's run, a tributary of the Sinnemahoning creek, in the county of Cameron, from its mouth to the sources thereof.
1804, February 6. Law Book IX, p. 311, P. L. 64.	Wysox or Wysox creek. Wysox creek, in the town of Claverack, in the county of Luzerne, from the mouth of the same to Jacob Myers's mill dam.
1823, January 21. Law Book XIX, p. 131, P. L. 13.	Wysox creek, in the county of Bradford, from Myers' mill to Barnes' mill, the distance of about four miles.
1827, March 2. Law Book XX, p. 511, P. L. 57.	from Sylvester Barnes' mill up to Lent's saw-mill, in Bradford county.
Y.	
1860, March 27. P. L. 295,	Yellow creek, in the county of Indiana, from its mouth to the forks of the said creek, near the line of Brush Valley and Pine townships, in said county.
1782, April 13. Law Book No. 1, p. 522.	Youghiogany river, as far up as it can be made navigable with boats and crafts.
1842, August 2. P. L. 467,	Youngwoman's creek, in the county of Clinton, commencing at the mouth of said creek and extending twenty miles up said creek.
1848, April 11. P. L. 539,	Youngwomanstown creek, in the county of Clinton, and its four principal branches, from their mouths to the northern part of Clinton county.

OPINIONS OF THE COURTS.

Evidence Necessary to Prove Deleterious Pollution.

Two operators of manufacturing concerns were arrested in Montgomery County for violation of Section 16 of the Act of May 1, 1909, P. L. 353, for allowing dye stuff or poisonous and destructive matter to escape into Gulph Creek. Both defendants were convicted before the Magistrate and fined \$100.00 each, and from this decision the defendants took an appeal to the Court of Quarter Sessions of Montgomery County. Associate Judge Weand heard the cases and on February 24, 1914, over-ruled the verdict of the Magistrate and declared the defendants not guilty.

The Commonwealth showed that the operators of the mills used dye stuff in their operations and the waste that escaped from the mills made the whole stream a blue black to such an extent that the owners of the land below the mills complained that they could not use it for domestic purposes, and that their live stock objected to drinking it.

The Commonwealth's witness also testified that they had tested the effluent by placing some small fish in a bucket of it and the fish died. The defense employed chemists to testify that the waste was merely a by-product and was neither deleterious, poisonous or destructive to fish.

The act in question, among other things, states that no dye stuff must be run into the stream. The fact that the waste escaping from the mills rendered the stream of a disagreeable color did not seem to impress the court, although it seems to the Department that it is proof of the wisdom of the Legislature in declaring that dye stuff should not be run into the stream. Few people like to use water discolored from any source, even from mud. It has been the theory of common law for years that the users of water are entitled to take it from a stream and after having used it, return it to the stream in the same pure condition in which they took it.

This view has been taken very strongly by the highest Court of Appeals of New York, whose opinion was published in the report of the Department of Fisheries of 1913, and there are several decisions in Pennsylvania which point to the same construction. Chemical analysis may show that water contains no really poisonous substances and yet people will decline to use that water for domestic purposes, and live stock cannot be tempted to drink it.

Some years ago before a filter plant was installed at Harrisburg, at certain stages of high water, the water pumped from the river to the reservoir for public use was so muddy that the washerwomen could not wash their clothes clean, and private filters were installed to remove this mud from the water to make it potable. There was nothing in this water really that was poisonous, but it was highly objectionable to the users.

It is well known that many species of fish object even to muddy water and that carp drive away the bass from streams by their habit of uprooting the plants from the bottom of the water and rendering the stream dense with mud. For this reason there are loud complaints from fishermen demanding the removal of carp and because of the discoloration of water by the refuse from manufactories there were loud demands that the manufacturers be compelled to comply with the common law requirements that water must be returned to the stream as pure as when it was taken out. The following are the opinions of the court:

IN THE COURT OF QUARTER SESSIONS OF MONTGOMERY COUNTY, PENNA.

<p>COMMONWEALTH vs. BENJAMIN B. CROWTHER.</p>	<p>} No. 47, December Term, 1913. } Trial before the Court on Appeal.</p>
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This case comes before us on an appeal from a Summary Conviction before a Magistrate.

The defendant was charged with a violation of Sec. 16 of the Act of May 1st, 1909, P. L. 353.

The information charged that the defendant "did unlawfully put and place and allow and cause dye-stuff and other deleterious, de-

structive or poisonous substances to be turned into and run and flow into and upon the waters of the Gulph Creek, etc., without averring any resultant harm therefrom, and it is contended by the Commonwealth that the mere fact of placing or allowing to flow into the stream any dye stuff, is a violation of the act.

The purpose of the act was to prevent some harm to fish or to the water, and not to inflict a penalty for a harmless act. The title of the act declares its purpose "to classify fish . . . and to protect fish from being destroyed or injured by destructive means." No words could more plainly declare the purpose of the act and no one can be convicted under the penal provisions of the act unless he has offended in the manner stated.

The 16th section of the act imposing a penalty provides that "it shall be unlawful for any person to put or place in any water within the Commonwealth any electricity or any explosive or poisonous substance whatsoever, or any drug, or any poison bait, or to allow any dye stuff, &c., or any deleterious, destructive or poisonous substance of any kind or character to be turned into or allowed to run, flow, wash or be emptied into any of the waters aforesaid, &c. To give this act the literal construction claimed by the Commonwealth would make it an offense to place in the water any drug however harmless. Drugs are used by man and beast and not all are injurious—the Legislature only intended to prohibit those that were harmful and not those that were not injurious.

The same may be said of dyestuffs. Not all are injurious and the introduction of the harmless is not an offense within the meaning of the act. This is apparent from the use of the word "or any deleterious, destructive or poisonous substance of any kind or character."

In *Philadelphia vs. Costello*, 17 Pa. Superior Ct. 339, it was said, "It is to be observed that this is a penal ordinance and is not to be extended by implication to cases not included within the clear and obvious import of the language. It has been held in the construction of penal statutes that where an act contains an ambiguity as to leave a reasonable doubt of its meaning, it is the duty of the Court not to inflict the penalty; *Commonwealth vs. Standard Oil Company*, 101 Pa. 119, 150. The same principle applies in this case. Here we find no ambiguity but plain language expressing the purpose of the act.

The defendant operated a mill on the Gulph Creek used for dyeing cotton, cotton yarn and skeins, and the dye stuff escapes into the mill race and then into the Gulph Creek.

The testimony of the Commonwealth consisted of that given by Chas. F. Gehman, a fish warden, and George W. Groff, and consisted in seeing that "the whole stream was blue black from the dye stuff coming from the Crowther mill. This was the extent of the Commonwealth's testimony. No examination was made of the water or the dye stuff, and no evidence whatever that it affected the fish in the stream. If the case had been tried before a jury, how could they have found the defendant guilty.

The evidence of the defendant's two chemists who had analyzed the dye stuff and water was to the same effect that it was not deleter-

ious, destructive or poisonous and would not affect fish or fish life or organic life. The testimony of these two chemists who had analyzed the dye stuff and the water shows conclusively that defendant had not introduced anything into the stream that was either deleterious, destructive or poisonous to fish life in violation of the act.

In addition it was shown that fish abounded in the stream before and after defendant operated the mill. That fish were caught and eaten. That no dead fish were seen. We are sitting as a jury and bound by the same rules of law as if the case was before a jury and we are convinced from the weakness of the Commonwealth's testimony and the strength of that of the defendant that there is not only a reasonable doubt of defendant's guilt but positive evidence of his innocence.

And now February 24, 1914, verdict of Not Guilty. County to pay costs of prosecution.

BY THE COURT,
(Signed) H. K. WEAND, J.

IN THE COURT OF QUARTER SESSIONS OF MONTGOMERY
COUNTY, PENNA.

COMMONWEALTH	} No. 48, December Term, 1913.
vs.	
WILLIAM H. LUNT.	

} Appeal from Summary Conviction.

This defendant is the Superintendent of a Fibre Company operating a mill located along the Gulph Creek. He was charged with a violation of Section 16 of the Act of May 1, 1909, P. L. 353, by allowing dye stuff or poisonous or destructive matter to escape into the Gulph Creek.

The only evidence on the part of the Commonwealth showing that the liquid was injurious to fish was that some small fish placed in a bucket of the water had died. On the part of the defendant it was shown by chemists who had analyzed the water that it was neither deleterious, poisonous or destructive to fish and that fact was also shown by experiments and by the fact that the stream is inhabited by fish and that many persons go there to fish. The matter complained of was not a dye-stuff, none being used in the mill, but waste water from the engine. We cannot discard the testimony of the chemists or of the other witnesses for defense showing that the matter allowed to enter the stream is not of the character forbidden by the act which is for the protection and propagation of fish.

We are in the criminal court and before there can be a conviction the evidence must show the defendant's guilt beyond a reasonable doubt.

For a fuller discussion of the case, we refer to our opinion just filed in Commonwealth vs. Crowther, 47 December Term, 1913.

And now, 24th, 1914, verdict of not guilty, the county to pay the costs.

BY THE COURT,
(Signed) H. K. WEAND, J.

DELETERIOUS MATTER MUST BE PROVEN.

Four manufacturers in Lancaster were arrested under the provisions of Section 16 of the Act of May 1, 1909, charged with allowing poisons and deleterious substances to escape into the Conestoga Creek. The pollution in question was emptied into a sewer built by the city, which was at one time a stream known as Hoffman's Run, and it was a tributary of the Conestoga Creek.

The defendants were convicted before the Alderman in the city and fined \$100.00 each. They appealed from the decision of the Magistrate and the case was heard in the Quarter Sessions of Lancaster County before Judge Hassler, who on July 11, 1914, rendered an opinion deciding that the defendants were not guilty under the terms of the complaint. The Court held that the emptying of dye-stuffs and chemicals by a factory in a city into a stream that had been transformed into a city sewer is not a violation of Section 16 of the Act of May 1, 1909, P. L. 353. If there is a violation of the act it is by the city and not by the parties using the sewer.

The court ruled that in order to sustain a conviction under Section 16 of the Act of May 1, 1909, the Commonwealth must prove that the substances put into the water are injurious and dangerous to fish. It also ruled if putting any of the substances named into the water is declared to be unlawful for any reason other than because they were injurious and dangerous to fish, the section of the act so declaring would be unconstitutional as not being expressed in the title.

The general purpose of the act declared in the title is the protection of fish. If the title of the Act of May 1, 1909, could be construed to give notice of an intention to prohibit the pollution of waters independent of the protection of fish, the act would be unconstitutional as containing two subjects. The court held that the Act of May 1, 1909, was for the preservation of fish, and therefore it was necessary for the Commonwealth to prove that the substances mentioned in the complaint are injurious and dangerous to fish. Whether they are injurious and dangerous, the Court said, is a matter of susceptible proof and the Court held that as the Commonwealth had failed to prove this essential element of its case, a case could not be made out against the defendants.

It would thus seem that under the opinions of the Montgomery County Court in the case of the Commonwealth vs. Crowther, and in these cases, that the showing that the pollution from a manufactory will kill fish is not sufficient, but that in addition it is necessary for the Commonwealth to prove by a chemical analysis that the constituents of the refuse are shown to be such as are deleterious to fish life. The following is the opinion of the Court:

Appeal from summary conviction for polluting stream. Q. S. of Lancaster Co., April Sessions, 1914, No. 19.
July 11, 1914. Opinion by Hassler, J.

The defendants were convicted before an alderman of this city of a violation of Section 16 of the Act of May 1, 1909, P. L. 353, and from that conviction they have taken this appeal.

The complaint before the alderman charges a violation of the Act of Assembly referred to "by allowing and permitting tan bark, vitriol and compounds thereof, lime and other deleterious, destructive or poisonous substances to be turned into, and run, flow, wash and empty into a tributary of the Conestoga Creek in the City of Lancaster, Pa., one of the waters of the Commonwealth, &c."

The testimony taken before the alderman, and which, by agreement, is to be considered as having been taken on the hearing of the appeal, shows that the defendants did "turn or permit to run, flow, wash and empty" some or all of the substances mentioned in the complaint, into a sewer, which was at one time a stream known as Hoffman's Run, and which was a tributary of the Conestoga Creek. This stream has been changed in its course at some places, is covered over, and has been for a long time used as part of its sewer system by the City of Lancaster. The defendant's tannery is connected with this sewer, through an arrangement with the City of Lancaster, and the sewage from it is emptied into it.

It will be observed that the Act of Assembly declares it to be unlawful to put or place any of the substances mentioned into "any waters within the Commonwealth" or to permit them to flow, &c., into the same. The words "waters within the Commonwealth" cannot be literally construed, else it would result in prohibiting the use of many of these substances for any purpose, as dye-stuffs and many others can only be used when mixed with water. It was not the intention of the Legislature to prohibit the putting and placing of these substances in waters other than that of streams or lakes where fish are found, or in tributaries which flow into them, as the purpose of the act, as shown by its title, is to protect fish. When water is taken possession of for any purpose it ceases to be such water as is contemplated by the Act of Assembly, so that when the City of Lancaster appropriated Hoffman's Run as part of its sewer system, and ran it into and through one of its sewers, it ceased to be water that any one was forbidden to put or place the substances mentioned into, and those who occupied buildings connected with the sewers of the city were not prohibited from emptying sewage into them, because it would mix with water of what had once been a stream, which the city saw fit to appropriate and run into and through its sewer. The fact that the city permitted it to flow from its sewer into the Conestoga Creek, the same as it did before it was so used, does not affect the case. That is a matter between the Commonwealth and the city, and not between it and those whom the city, for a consideration, permits to empty their sewage into its sewer. It is the duty of the city to dispose of the sewage it takes into its sewers, as we said in *Howell v. West Chester*, 26 L. L. R. 201, and everyone whose house or factory is connected with the sewer is not to be made liable to a criminal prosecution because the city has run a stream through its sewer and permits the contents of that sewer to run into a stream containing fish. This would be the result if the interpretation placed upon this act by the Commonwealth is correct, but with it we do not agree.

But even though we concede that Hoffman's Run is a water within the Commonwealth, into which it is unlawful to put or place the substances complained of, we could not sustain this conviction, because the Commonwealth has not proven that the substance put into the water was injurious and dangerous to fish. If putting any of these substances in the water is declared to be unlawful for any reason other than because they were injurious and dangerous to fish, the section of the act so declaring would be unconstitutional.

Section 3 of Article 3 of the Constitution of Pennsylvania provides that "No bill, except general appropriation bills, shall be passed containing more than one subject, which shall be clearly expressed in its title." In declaring what is a violation of this section, it is said by Judge Smith, in *Com. v. Jones*, 4 Sup. 326, that "the unity of a subject of a statute is to be determined by its paramount purpose rather than by the details through which that purpose is to be accomplished. The subject may have but one object, while the measures necessary for the attainment of that object may necessarily embrace many subordinate subjects, differing in their nature and particular effect, yet all contributing to it, and comprised within the principal subject. Everything which the nature of the subject of a title reasonably suggests as necessary or appropriate for the accomplishment of its expressed purpose is sufficiently indicated by such title." In *Charity Hospital*, 198 Pa. 270, it is decided that if a statute seeks to accomplish one general purpose by one general means, it will be deemed to contain but one subject, even though the details or specific means are multiplied to any extent, provided they are in fact subordinate to and germane to the general aim. In *Payne v. School District*, 168 Pa. 386, it is decided that where an act contains two subjects, which are distinct and unrelated to each other, it is unconstitutional. When the title of an act does not state its real purpose fairly or with sufficient definiteness to put those interested on inquiry as to its contents, it is unconstitutional and void: *Gackenbach v. Lehigh County*, 166 Pa. 448; *Com. v. Hazen*, 207 Pa. 52.

The title of the act in question is "To classify the fish in the waters within this Commonwealth, declaring which are game fish, which are food fish and which are bait fish, and to regulate the catching and sale and encourage the propagation of the same; to protect the waters within this Commonwealth from unfair, improper, wasteful and destructive fishing, and to protect fish from being destroyed or injured by destructive means; to provide for the appointment of fish wardens, and to declare their official powers and duties; to encourage and regulate the propagation of fish within this Commonwealth, and regulate the free distribution of the same by the Department of Fisheries in the waters within the same; to define powers and duties of the Department of Fisheries; to regulate the sale and shipment of fish artificially propagated for profit; to forbid the sale of unlawful devices for catching fish; and to provide penalties and punishments for the violation of the provisions of this act, and providing how and by whom the costs shall be paid." Section 16 provides: "That it shall be unlawful for any person to put or place in any waters within this Commonwealth . . . or to allow any dyestuffs, coal or gas tar, coal oil, sawdust, tan bark, cocculus indicus (otherwise known as fish berries), lime, vitriol, or any of the compounds thereof, refuse from gas houses, oil tanks, pipes or vessels,

or any deleterious, destructive or poisonous substances of any kind or character, to be turned into, or allowed to run, flow, wash, or be emptied into, any of the waters aforesaid, &c.”

If permitting these substances to flow or wash into the waters within the Commonwealth is declared to be unlawful only to prevent pollution, then there is nothing in the title of the act to give notice of it, and it is void. On the other hand, if anything in the title can be construed to give notice that these acts are prohibited so as to prevent the pollution of waters, then the act would contain two subjects, and be void on that account. If, however, it means that these substances shall not be turned or emptied or allowed to flow into the waters of the Commonwealth because they are injurious and dangerous to fish, and it is capable of this construction, then it is one of the details through which the purpose of the act is to be attained, viz., the preservation of fish, and is part of the single subject of the act. That this is the interpretation to be placed upon it, is shown by that clause of the title which gives notice that its purpose is to protect fish from being destroyed or injured by destructive means, as well as by the whole of Section 16, and we must construe it, if at all possible, . . . so as to permit it to stand. This being the construction to be placed upon the act, it is necessary for the Commonwealth to prove that the substances mentioned in the complaint are injurious and dangerous to fish. Whether they are injurious and dangerous is a matter that is susceptible of proof, and as the Commonwealth has failed to prove this essential element of its case, a case has not been made out against the defendants. This same view was taken by Judge Weand in an opinion which, though not reported, has been submitted to us with defendant's brief. It is the case of the Commonwealth v. Crowther, decided in the courts of Montgomery County on February 24, 1914. (See following case). We find the defendants not guilty and impose the costs upon the county.

Commonwealth v. John Farnum & Co.

Appeal from summary conviction for polluting stream. Q. S. of Lancaster Co., April Sessions, 1914, No. 20.

July 11, 1914. Opinion by Hassler, J.

For the reasons given in an opinion filed in this Court today in the case of Commonwealth v. Grove Locher, et al., we find the defendant not guilty and direct the county to pay the costs.

Commonwealth v. Schum, et al.

Appeal from summary conviction for polluting stream. Q. S. of Lancaster Co., April Sessions, 1914, No. 21.

July 11, 1914. Opinion by Hassler, J.

For the reasons given in an opinion filed in this Court today in the case of Commonwealth v. Grove Locher, et al., we find the defendant not guilty and direct the county to pay the costs.

Commonwealth v. Groetzinger.

Appeal from summary conviction for polluting stream. Q. S. of Lancaster Co., April Sessions, 1914, No. 22.

July 11, 1914. Opinion by Hassler, J.

For the reasons given in an opinion filed in this Court today in the case of Commonwealth v. Grove Locher, et al., we find the defendant not guilty and direct the county to pay the costs.

ADDRESSES.

The following addresses were made by the Commissioner of Fisheries to the sportsmen of the State during the year:

Johnstown Camp No. 76.

Few people who have never held official positions can realize how much an officer chosen to enforce the laws feels the necessity of the co-operation, sympathy and help of all the people. Laws do not enforce themselves and an official who is not backed up, at least by a majority of the people, will find his most earnest efforts checked and blocked in all kinds of ways.

The common law which is the basis of our laws, is merely crystallized common sense, evolved from the necessity and demands of the people for protection in property and personal rights. After this there have grown up statutory laws, which are enactments of the representatives of the people called for by the force of circumstances and new conditions that constantly arise. New laws are generally formulated by new interests that arise, and in most cases their proper enforcement demands that the average public be taught their reason why and the benefit to be derived from their enforcement. This is largely true in the case of the laws governing fishing which involves the protection of the fish, the clarification of the streams and the restocking of the same by artificial methods.

Up to say half a century ago the streams of Pennsylvania depended for their supply of fish upon the natural methods of propagation. Natural propagation had been more than sufficient to keep the streams teeming with fish when the first colonists came to Pennsylvania, and indeed would have been more than sufficient but for the fact that Nature in her balance had set off many varieties of fish to prey upon the others, but with the increase of population the demand for fish increased more rapidly than the natural methods of nature would or could supply, while to wasteful and extravagant methods of fishing was added the scourge of pollution which destroyed the purities of the water, and either poisoned the fish or drove them away from lack of nourishment caused by the refuse covering up the bottoms of the streams and destroying the aquatic vegetation so necessary for fish life.

During the past half century the Legislature of this State, and all other States in the Union, had devoted much time and thought to the making of laws which would restore the streams to their original purity, prevent destructive and wasteful devices from being used, and at the same time would be plants where fish could be raised artificially and used to restock the streams. The laws as in the case of nearly all laws, have been based on the presumption that the way to prevent anything was to declare it illegal and impose penalties.

The man who went fishing found himself face to face with the provisions that he could only use such and such device at such and such time, while the number of fish he could take was limited, and to this limit was added that no fish under a certain size could be taken, while to the man who ran refuse in the stream was rendered liable to a penalty for so doing. To the average person there was nothing in the law to explain to him why his previous freedom to do anything was restricted, and the majority were inclined to risk an infringement as to their personal freedom such as had been enjoyed by their fathers and grandfathers before them, who perhaps had been famous fishermen and left behind them stories of fishing that sounded like fairy tales to the fishermen of the later generations.

Yet for all these laws there was a reason and if those reasons could be brought plainly before the minds of the people there would be a greater growth of sympathy for the law, and a readiness to assist the sworn officers to enforce them.

It is through such associations as yours that the Department feels the highest good can be attained by the interest the members take in the matter of fishing, and therefore strive to educate the people as to the whys and wherefores of the law. At a certain season of the year a man looks into the stream and sees a black bass, apparently motionless, and he returns the next day to see the bass in the same place. In his eyes it is a desirable fish for the table, and it seems so easily taken that he resorts to any method, takes the fish and consigns it to the cook. For this offense he is haled before the magistrate and upon him is imposed a fine for violation of the law, and he goes forth swearing at the injustice which deprives him of his money.

But get that man and teach him that at that particular season of the year the law forbids the taking of the bass because the fish is guarding his nest from which will emerge, if the fish is not disturbed, several hundred little fish to replenish the stock of fish in the stream, and by his taking the fish as he did he caused the death of all those prospective little fish. Tell him that this is the reason that close seasons are made and after he understands it you will find in him an advocate for the enforcement of the laws.

The same is true in regard to the ban placed upon wasteful and destructive devices, for if every one knew the damage such devices do there would be a better sentiment against them that would so assist the officer of the law that it would be a hardened law breaker indeed that would attempt to use the devices in question.

It is a pleasant duty therefore for the Commissioners of Fisheries to meet with you on occasions of this kind so that he may, if possible, still more interest you in the good work of enforcing the laws in regard to fishing.

Upon the Department of Fisheries, besides this course of education, devolves the duty of propagating fish in such quantities and in such varieties that the streams and waters of the Commonwealth may once again afford not only sport for the angler, but a very important food supply. To do this work the Department feels it must have the latest and best facilities possible. An expert workman can do

good work with any kind of tools, but he can do even better work and far more economical, if he has the very best. For this reason the Department of Fisheries has planned to concentrate its work at its hatcheries best fitted by their water supply and the lay of the land to accomplish the results required of them, and then equip them in the most substantial way.

At Corry on to this plant a new hatching house has been erected of brick and steel and equipped with the most approved troughs and water appliances. The ponds have nearly all been rebuilt with concrete and steel so that they are of the most permanent character, and will for years to come require little or no repairs, while their completeness enables them to be handled and cleaned in the shortest possible time with the result of much economy.

At Union City, which is an auxiliary to the Erie hatchery, the ponds have all been enlarged so that they will better do the work required of them. In the hatchery at Union City there are batteries for the hatching of lake fish, or those fish that afford the fish for the commercial fishermen at Lake Erie, although from the same hatchery there are sent forth millions of wall-eyed pike, or Susquehanna salmon, to stock the inland waters of the Commonwealth, where they rank as game fish.

The ponds at Union City are not concreted, except at such points where it is necessary to use that sort of work to stand the resistance of water, especially in the case of the supply pond. The ponds are used for raising black bass, bluegill sunfish and yellow perch, and experience has shown that as near natural conditions as it is possible to obtain are the best for those species of fishes.

At Wayne County it is proposed to erect a substantial fish hatchery of brick and steel, similar to the one at Corry, while the ponds at the plant have been largely increased in size, and the Department has secured the control of the Beaver Meadow reservoir with an area of about 150 acres. These large ponds will be used for breeding bass, pickerel and yellow perch, the supply of which will be largely supplemented by field work, which means the gathering of the fish from the hundreds of lakes that abound in that section of the State.

The Beaver Meadow reservoir will also be used as an object lesson to show what can be done if a body of water is kept restocked and the fishing restricted to rod and line. The Department feels sure that in a year or two when this reservoir is open to the public it will furnish all through the fishing season all the fish that the angler may desire, and prove what the Department is insisting on, that with proper protection and the entire abolition of wasteful devices, there is no trouble in the future for any one who desires a mess of fish to go out and get them.

At Torresdale another permanent brick hatchery will be erected this year, not only with all the modern requirements of fishing, but as in the case of the other hatcheries, a structure architecturally a credit to the State.

At Erie where, owing to the necessity of treating the city water by the Health Board, the present hatchery can no longer be used, an ornate and permanent structure is in process of erection on the lake

shore, where the fish boat of the Department can lie at the door to unload the eggs which it brings in from the fishermen, or to take away for planting, the fish hatched in the building. This, you can readily see, means economy.

There is a fascination about fish culture and the study of fishes which grows and grows the more it is pursued. The Department is sure that if every boy and girl in the schools could be shown the habits and life of the fish they would each and all become enthusiasts in enforcing the laws for the conservation of fish and the maintenance of the supply. What boy or girl after being shown a sunfishes nest, which is constructed with all the care that a bird exercises in constructing its nest, and the manner in which it resents the intrusion of any foreign substance that comes near to mar the neatness of its housekeeping, not to say to himself or herself that no one during this housekeeping season should tempt that fish with a baited hook, which in the fishes desire to remove, would impale him, thereby leaving a whole nest full of prospective little sunfishes to perish, as in the case of the bass removed from its nest, spoken of above.

The work of the fish culturist, however, during the hatching season is arduous and he has long hours. The trout begin to spawn in October and in a natural state the male and female seek a small stream up where they make a nest, deposit their eggs, cover them with gravel and leave them for Dame Nature to do the rest. At the hatchery as the trout ripen they are taken by the culturist and first the eggs are taken from a female and placed in a pan, after which a male is stripped and the milt and roe are stirred with a fishes' tail, as the best implement until every egg is thoroughly impregnated. Then the eggs are taken to a hatching house where they are placed on trays made of wire cloth of so small a mesh that the eggs cannot fall through the meshes. Into this trough runs the water supply with such force and quantity as will keep the eggs on the trays in constant motion, the continual motion being a large factor upon which depends the success of the hatch.

From 40 to 60 days are required to hatch these eggs, depending on the temperature of the water and other conditions. After a few days there develops in the egg two black spots, the eyes of the coming fish, and then the eggs are called eyed eggs. From these eyes grow down a V shape which finally unites as the bony skeleton of the fish and around this is built up the fish, which when nearly ready to hatch swims around in the egg with a constancy that would bring joy to the soul of a hunter for perpetual motion.

Finally the fish makes its exit from the egg bearing with it the yolk in a sac attached to the body. This is taken up by the absorption for several days affording the nourishment to the growing fish. After the absorption is completed the fish is ready to start upon its mission in the world, and the first thing it does is to learn to eat. Eating is such an important part of its mission in life that if the food is not furnished him at regular intervals and sufficient quantities it takes to eating its comrades, who by some defect in maturity are smaller than idiots. As one of the oldest superintendents of a hatchery remarked as he looked at a depleted trough "the

miserable things eat all the food you give them and then try to eat each other up for desert."

During all these days of incubation the most constant watchfulness is required. Dead eggs must be removed else they fungus and carry disease and death to the other eggs, dead eggs being the result of faulty or no impregnation and other causes that are destructive to such minor life. Hence the fish culturist must be always on the his job day and night, because if the water supply for any reason should be shut off or should increase to too much volume, it would mean death and destruction to the eggs, for too much water is as bad as not enough.

The temperature of trout water is usually from 40 to 50 degrees and the temperature of the hatching house not much higher than that outside, which runs at Corry for instance or Wayne County sometimes as low as 20 degrees below zero. To this low temperature is added the moisture of the air, due to the constant emanation from the warmer spring water, and when you fit these conditions together you will find that the fish culturist in his work can picture Eskimos in the snow hut as enjoying summer weather. It is proposed in the new hatcheries of the Department of Fisheries to have them heated by steam so that they will be more suitable to work in, ice cold fingers and frosty ears being no more conducive to industry than to happiness.

The bass cannot be stripped artificially like the trout but must be left to deposit their eggs naturally. The male bass builds the nest the same as the sunfish to which family he belongs, and having prepared the house goes forth to seek a spouse. Having secured one he leads her to the new domicile and the eggs are deposited, after which the female departs and the male remains to guard the nest. This is a condition of affairs which will probably commend itself to those women who have grown tired of the monotonous round of household duties and think that the men should lend a hand. Woe betide any enemy who seeks to invade the sanctity of a basses' nest. He darts at him with the ferocity of a bulldog and always comes off the victor.

After the fish are hatched the fish culturist places over them a crib made of cloth which prevents them from wandering away, and after a few days the little fish rise to the surface when they are taken out and placed in the breeding ponds. It is curious to observe the intense attachment of the paternal bass for the young ones. After they are cribbed he will make desperate assaults on the crib, which is made of cheese cloth, in his efforts to reach them, and in some cases will be able to force his way through the cheese cloth. It is rather satire, however, when after the fish have attained a certain size he deserts them entirely, leaving them to their own resources and at the end of a few days he returns to the nest with the fell desire of eating all that approach, if they have not taken to hiding or been saved by the fish culturist.

The bass is one of the most cannibalistic fish that there is, and the Department therefore does not recommend him for placing in small bodies of water, as his appetite is not only enormous, but he kills for the very same desire to kill that is felt by the rat terrier

when placed in a pit full of rats. This cannibalistic tendency has been a hard nut to crack while fish culturists were studying the problem of raising the bass to a proper size to plant. The Department thinks it has solved this problem, however, and that it will not be long until it is able to furnish all the bass for the waters in which the same should be placed.

Having hatched out our fish and having them ready for the stream, the next grave question is to have the water ready for the fish. Manufacturers by the thousands, coal mines in infinite numbers and cities, towns, hamlets, and even farm houses have been using the streams as cheap sewers to carry away all the refuse that anybody saw fit to put in them. Such use of the stream is an absolute defiance of the best law in the world "do unto your neighbor as you would have him do unto you."

But the fellow up stream did not care anything for the feelings of the man below, but his own feelings got badly hurt when some one kept up on the stream above him and did the same to him as he was doing to the fellow down stream. Pollution has been getting worse and worse as the population increased and manufacturers and towns grew along the streams. The pollution became a menace to public health and a destroyer of fish life in the streams, so public sentiment has forced the Legislature to enact laws prohibiting it.

For some time the Department of Fisheries has been calling the attention of the violators of the law to the absolute necessity of using such devices as will absolutely prevent any pollution reaching the waters of the Commonwealth. It is glad to say that in a majority of cases it has found that the manufacturers are willing to co-operate with the Department, but there are other cases where it has been found that the penalties of the law must be resorted to. Many men were profuse in promises but slow in performance, and like the lazy horse, needed a goad.

Sporadic cases accomplished little, and at the suggestion of the Governor, the Department has resorted to taking up a watershed at a time and bringing prosecution against every person along that stream who is allowing pollution to escape into the water. The Department has met with the clamor that it is harassing the manufacturers upon whom so much of the wealth of the State depends, but the Department is only doing its duty in enforcing the laws, and to show that it is not desirous of hampering it, it has in every case advised the defendant that if he will proceed at once to put in clarification plants, time will be given him, and when results are attained the prosecution will be withdrawn.

It is rather amusing to the Department to which constant complaints of pollution pour in, to find that when one of these series of suits is brought that the inhabitants of a particular community instantly became defenders of the offenders and insist that the Department shall withdraw its suits against manufacturers in that particular community, but push to the limit the people that live somewhere else. Now a community is only as clean really as the cleanliness of the average citizen, because if every resident in Johnstown should keep his residence and its surroundings immaculately clean, while at the same time he allowed no refuse to escape into the sewers to

go down and defile the stream below, he would be in a much better position to throw stones at the glass house of his neighbor, because he would have no glass himself to be broken by returning stones.

Municipalities have wasted thousands of dollars or even millions in all sorts of so-called improvements and find themselves today faced with the problem of sewers and sewage. The citizens of these municipalities must now take up the problem of disposing of that sewage in such a way that he will not defile the stream for the man below, and the fishermen of that municipality should see to it that this cleanness is brought about, and then they can complain with more grace of the man who runs deleterious matter from the manufactory into the stream. Certainly no one here can say that the sewage from Johnstown is a desirable thing to be run into the Cone-maugh River, either for the user of the water or for the conservation of fish and fish food.

Norristown Association.

I want to assure you that it gives me the greatest pleasure to meet with you this evening, because it is with the co-operation of just such associations as this that the Department of Fisheries hopes to accomplish its best work. Better results are always quicker attained by personal contact, because one can judge far surer the personality of a man by the grasp of his hand and looking into his eyes than he can through reading a dozen of his letters.

Bishop Talbot, one of the stalwart clergy of Pennsylvania tells a story of when he was a missionary bishop in one of the western States. The town he was in was a bad one and one bad man did his utmost to irritate the bishop, finally actually assaulting him. The bishop, who is even larger than Governor Tener, turned on the man, downed him and shook him up in a violent manner until the victim cried enough. When he got up the bad man insisted on shaking hands with the bishop and remarked: "I'm awfully glad to have had this chance of meeting you, for I didn't have an idea you had so much sport in you."

I feel sure that you judge me better now that you have seen me and met me than you ever could if I was always far off at Harrisburg.

With the growth of population it has become evident to all thinking persons that the natural resources of the Commonwealth, which were so ruthlessly destroyed through the carelessness of our forefathers can only be restored in a great measure by artificial means. No longer will the fish in the streams be able to keep those streams stocked in a natural way. It has been estimated that only from three to five per cent. of the fish that spawn naturally grow to mature size. This was the condition when the streams ran through the virgin forests of Pennsylvania. Today the fish have to fight against many enemies and conditions which did not exist in the early

days. The banks of the streams have become populated and in a measure the streams have dried up. The latter is owing to deforestation. Floods are more numerous and the water runs away leaving the streams to dwindle in times of drought, which droughts were far less frequent when the streams were shaded and the sun did not get in its absorbent rays.

Experience has shown that where only so small a percentage of the fish hatched naturally ever attained any size at all, and while the large percentage of the eggs are never hatched, by using artificial methods, from 70 to 98 per cent. of the fish are hatched and then preserved from their enemies until they have a chance to attain a size which not only gives them speed to run away when attacked or spied by an enemy, but also gives them a chance to develop those natural instincts which enable them to discern an enemy and thus flee from him.

It was this necessity of artificial propagation that induced the Legislature of Pennsylvania to establish the Department of Fisheries, but the Department of Fisheries, to do this work, should avail itself of every known practical adjunct. In addition, the fish hatcheries of Pennsylvania should be second to none in permanency and attractive surroundings. With this end in view the Department, at the suggestion of the Governor, has decided that all the buildings and ponds of the hatcheries should be built in the most permanent manner and that each hatchery should devote itself to the rearing of those fish for which it is best suited. It seems to me that a few hatcheries fitted up in the most complete manner will do far better work than a larger number of incomplete working places. It can be no possible moment to the angler who applies for fish what part of the State his fish come from so that he gets the fish.

During the past year the Department has been doing much work of a permanent character principally in fitting up the ponds, and this work, of course, has interfered in a large degree with the output of fish, but when the work is all completed the Department hopes that the people of the Commonwealth can point with pride to its hatcheries as second to none in the United States, or in the world, for that matter, and the output of fish is commensurate to the character of the hatcheries.

The Department has inaugurated the distribution of fish at a larger size, feeling as said before, that the larger fish are better able to take care of themselves, and therefore better results will be attained, and from the letters received from the various persons who have received these larger fish it is judged that recipients are entirely satisfied. It is a fact that the average man who can see the fish plainly in the can feels better contented than if he had a larger number of small fish which seem almost invisible to him. He is sure that in the larger fish he sees more chance for a better crop full next year. This is aside from the question which has been discussed by the American Fisheries Society as to which is the best for stocking, fingerlings or yearlings. The method of planting the two is entirely different and the average person either through ignorance or desiring less labor does not plant the fingerlings properly.

One of the greatest problems that faces the Department of Fisheries is that of the pollution of the streams. For years the streams have

been looked upon by everybody as the sewers into which with the least expense their particular kind of refuse could be run and thus gotten rid of, but as the shores of the streams became populated it was developed that something must be done in regard to water for the people and their stock to drink. Outbreaks of typhoid fever and other diseases call attention to this pollution in louder tones than anything else, and the Department of Health has been invested with enormous powers to try and bring about a change so far as the public health is concerned.

Next came the question of the life of the fishes, and while this seemed a small matter to some persons, yet the majority of the people recognize that in fish there is an enormous food supply, and food supplies in these days of high prices must be conserved, if high prices are ever to be brought down.

Beside the sordid question of food supply there is also the question of sport. What more health giving recreation can there be found than a day or a week spent on the banks of the streams and lakes with which Pennsylvania abounds. The fresh air fills the lungs and drives away many an ache and care and helps build up the tissues of another fight with the world in the office or in the store. It is not a question of the size of the fish that brings joy to the women and children, but the fact that a fish has been landed by his or her lure, and what is more cheery than the shouts of the returning fisherman as he waves his string of fish in the air for the admiration of the welcoming throng.

While the Department is endowed by the law with much power to bring about the clarification of the streams, it has never been endowed with those sinews of war necessary to fight aggressive campaigns, that is money, to haul into court the recalcitrant manufacturer, or other person, who runs his foul stuff into the water. One thousand dollars a year is the munificent sum which the Legislature has seen fit in its wisdom to give the Department to fight its battles with the polluters in the courts. You will readily understand, all of you, how utterly inadequate such a paltry sum is.

It is with much gratification, however, that the Department has found that in a majority of cases the manufacturers are willing to co-operate in this matter of polluting the streams. They clearly understand from the decisions of the courts that public interests are paramount to those of private interests. In the west the oil polluters have been told that they cannot dump oil where by so doing they pollute the water supply of the city and the tendency of the courts shows that it will not be long until the force of public opinion compels the mine operators to take care of their sulphur water which is so destructive to fish life, and also to the users of boilers for making steam and steel boats for navigating the streams.

While it is not fair to judge the motives of people the Department has found that the operators themselves have discovered that while it is a cheap process to get rid of the refuse to let it run into the stream without regarding the rights of the people below, it is a very expensive process when somebody above the manufacturer pollutes the stream so much that this lower manufacturer must put in an expensive plant to purify the polluted water before he can use it himself. Rome was not built in a day and it cannot be expected

that the Department of Fisheries can all at once bring about the clarification of the streams when it is considered that the number of manufacturers in Pennsylvania is in the neighborhood of 50,000 but the coral insect builds enormous reefs and islands by tiny cells and the Department hopes with the help of such good citizens as you to finally attain the result that will virtually mean that the streams of Pennsylvania run clearer and bright to the sea.

If the supply of fish in Pennsylvania is to afford any sort of return to the angler it is evident that all the destructive methods of taking fish must be declared illegal. The Department has carefully considered the matter and feels that with the possible exception of the Delaware, the Susquehanna, the Juniata, the Allegheny and the Monongahela rivers, all the streams in Pennsylvania are small or comparatively small. The same, with the exception of Lake Erie, is true in regard to lakes. The Department will therefore suggest that hereafter no method of fishing shall be permitted in inland waters except by means of rod, hook and line, and if it is desirable, that the catch of each person be limited to a certain number of fish irrespective of size. While it finds that most anglers are willing to agree as to the abolishing of all methods of fishing except rod and line, there are others who object to the abolition of the size limit.

The experience of fish culturists has shown that very few fish handled by any one except a trained fish culturist will survive, nearly all dying in a short time. Even if unharmed by the hook, the touch of the hand removes the water proof covering of the fish and fungus sets in. This fungus grows rapidly, the fish weakens and even before it can die it falls a prey to its many enemies from which in its enfeebled condition it cannot escape.

How many small or now called undersize bass taken by a fisherman from your Perkiomen, do you members of the Association think survive when returned to the water by the average fisherman? The Department has had one experience that I mention which shows the difficulty of keeping fish that are handled. Once to obtain a stock of pickerel the men were sent to a lake and secured 225. These were all handled with great care yet only 20 survived. If this is the case when fish are handled by experts, what do you think will be the result when handled by inexperienced fishermen.

The work of restocking the streams and their purification requires the co-operation of every one, and I feel sure, as I look into your eyes this evening, that this association will co-operate in every way in the campaign of education. The Department has no desire to arrest persons for violation of the fish law and compel them to pay fines, but would far rather start a campaign of education, so that every one would become more or less of an adept in the fish lore, and then fish would once more be abundant in Pennsylvania waters.

Again thanking you for your courteous invitation to be present this evening, I wish you all full creels in the next angling season.

Renovo Camp.

It is a source of much pleasure to be invited to meet such an assemblage as this, composed of persons who find pleasure in the sports of the field and stream, for it is in the co-operation of such persons that an officer of the Government finds his hands much strengthened.

The average citizen ordinarily goes about his business feeling that the constituted officers of the law will see to it that everything runs smoothly, and that his life, liberty and pursuit of happiness will be in no way interfered with. He usually feels that no responsibility of any kind devolves upon him to assist the officers of the law in bringing about that delightful situation which is so important to him in his pursuit of happiness.

The little spring in the mountain side starts a rill of water which increases and grows the longer it pursues its way, until it finally broadens out into the river. In this spring water nature has planted trout, and as the stream grows and the water becomes warmer nature places in it the bass, the Susquehanna salmon, and all the other fish which give sport to the angler and food for many people.

When the fishing fever strikes the angler he gathers up his tackle and goes to the stream side filled with bright hopes and joyous anticipation that a string of fish will be his reward. Has not the State passed laws which impose a penalty upon the man who uses destructive devices for the taking of fish or who takes fish under-size or out of season, and still heavier fines upon the man who turns refuse into the stream and poisons it so that the fish cannot live in it?

As the angler seats himself by the bank of the stream there comes an awakening and it is rudely jarred into his mind that there is no such thing as perpetual motion, and if he wishes the wheels of the Government to keep on turning and turning smoothly, he must at times apply his own shoulder to the wheel to assist the officers entrusted with the enforcement of the laws.

Beside your town the Susquehanna River rolls its way to the sea, and it is here that the angler was accustomed to take many fish. If the conditions favored him as to weather and water, a goodly string rewarded him, and the size of the fish that he took was told to listening audience according to the brilliancy of his imagination and the restraining efforts of the education he got in his youth in the way of truth telling.

But the Susquehanna River no longer is a thing of beauty to the eye, nor a stream which rewards the angler as he hopes to be rewarded. For years the manufacturers who located along the banks of the Susquehanna and its tributaries have looked upon these waters as divinely constructed sewers opened up by the upheavals of nature for the purpose of carrying away from their works, without expense, the various substances they did not know what to do with.

The dwellers of the towns and cities, and also the farms along the stream coincided with the ideas of the manufacturers and added their toll of refuse to the stream.

As the constantly increasing refuse poured into the stream the indignant water declined to receive it as an element desired as the refuse gave a bad taste with a tendency to poison it, covered the surface with a disagreeable scum and the disgruntled water deposited the solid particles on the bottom as various kinds of nasty slime. The cattle along the stream declined to drink it, or if they did, took sick and died, and finally the fish concluded that life was no longer worth living if it had to be lived in such surroundings.

The lack of potability of the water has caused cities and towns to spend millions of dollars for filtration plants to render the water serviceable for domestic use, while the manufacturers themselves have been compelled to install purification plants so as to render the water, fouled by persons above them, fit for their use. If these enormous sums of money had been spent in the first place to prevent the pollution getting into the streams they would today be as pure as they were in the early days, and as one looks over the balance sheet it seems very plain that the expenditure required to keep the water pure would have been much less than has been required since to purify it.

While the water is constantly polluted, accidents and other causes have brought sudden increases in the quantity of pollution in the stream, and the dwellers along the Susquehanna have awakened several times to find the river covered with dead and dying fish in numbers that told if the thing was not stopped, the stories of the fishermen of their catches would be like fairy tales which are told of the past and received with incredulity by people living in the later age.

The laws of the Commonwealth make it a crime in case any one defiles the streams and waters with substances that destroy fish or that aquatic life, which, growing upon the bottoms of the streams, makes the garden in which the fish, especially the small ones, find their nourishment. If there is no garden there is nothing for the daphne and other microscopic food to grow upon, and without this food the little fish cannot live, and without little fish there will soon be no big fish.

The statutes direct that where a stream is polluted the Department shall order the abatement of the trouble and impose a penalty, the said penalty being \$100.00, not a very princely sum to intimidate a violator of the law who counts his profits by thousands of dollars. Fortunately, or rather properly, the suits are criminal which involve a jail sentence, if the fine is not promptly paid, and people with any ideas of respectability shrink from the thought of imprisonment, because the jails of Pennsylvania have not the reputation of being the most desirable resorts for spending an enforced vacation.

To be sure, under the law it is the duty of every citizen to prosecute every violator of the law that comes to his attention, but as remarked above, the average citizen troubles himself little as to the enforcement of the law, unless he finds that it interferes with

his comfort, like the Sybarite who found the rose leaf curled in his bed. When his comfort and his pleasures are interfered with he calls loudly upon the officer of the law to bring about a better situation, and indignantly writes to the Governor, if the matter is not rectified immediately.

Yet right here attention should be called to the fact that this lack of interest in enforcing the laws has brought about a condition that cripples the officers whose duty is to enforce the law. The citizens of the Commonwealth elect the members of the Legislature who vote the sinews of war, the money that is to pay the expenses of the officers who are to see that the law is not violated. It will be found that most of the people who complain of the tardiness of the officers have never in any way seen to it that sufficient money is voted by their Representatives to enable the best work to be done by the officers whose duty is to enforce the law.

The Department of Fisheries has only sufficient funds to employ nine regular wardens to cover the whole State of Pennsylvania with its 46,000 square miles, and its hundreds, nay thousands of miles of streams and water. To this is added the beggarly sum of \$1,500.00 a year to pay the expenses of the courts in which the suits must be brought. Is there anybody in this audience who is astonished that the Department has not been able to do the work it desired.

The business reporters say that there are over 48,000 manufacturers in the State of Pennsylvania, and you know that most of them, if it is possible, are disposing of their stuff in the easiest and cheapest way, by letting it run into the stream. Do you not think that this is rather a large bundle to be distributed among nine men? For years the Department of Fisheries has studied the problem and aimed to bring about that purification of the water so necessary for the preservation of fish, its work being confined to fish, that of the health of human beings devolving upon the Department of Health. It has tried in every possible way to disseminate knowledge to show the horribleness of the pollution, and the absolute necessity of the clarification of the streams and waters.

With its very limited appropriations it has not raised wild cries of alarm nor beat toms-toms like the Chinese to carry terror to the people it is fighting. Some things it accomplished; some it did not, but the result of its work is shown in the growth of public sentiment and in the aroused feeling of the citizens who awakened to the fact that their absolute contentment and satisfaction, together with the pursuit of happiness, cannot be obtained without some action of their own.

When the people who reside in the ten counties that comprise the West Branch Valley and its tributaries awakened to the fact that unless something is done the fishing in the river and most of its tributaries is a thing of the past, they began to consider and gather in meetings such as this. There is an old story in mythology that when a teamster whose wagon was stuck in the mud called loudly to Hercules to aid him, but when Hercules appeared he suggested to the teamster that in order to get out of the mud he should also apply his shoulder to the wheel.

The Department responds to the call for help from you, but it is compelled like Hercules in the case quoted, to suggest that to obtain the best results, all hands should turn in to help to bring about the change. The absolute cleanliness of a municipality is brought about by a majority if its citizens and the same is true in regard to everything else. If every citizen in the Commonwealth would see to it that he adds nothing to defile the stream, then that stream will never be defiled.

To have all the manufacturers taking care of their refuse will not solve the problem before us, because besides the manufacturers thousands of other persons are allowing their gallons of refuse to flow into the stream to the detriment of the dweller down below.

When the Department urges the manufacturer to take care of his refuse the manufacturer promptly arises the question of expense and to insist upon carrying out the plans of the Department will be to close the industry, and this in spite of the fact that in most cases a small part of the money wasted in the erection of the factory would have provided for turning the water back into the stream as clear and undefiled as when it was taken out.

It is a curious phase of human nature that when the attention of some one is called to a disagreeable thing, that person is apt to insist that the trouble arises originally from somewhere else. When the hotel keeper's attention is called to mosquitoes he is apt to say that those are due to the carelessness of neighbors, and when the Department has insisted upon certain manufacturers taking care of their pollution, it is met by committees from the community who point out that the pollution complained of is small compared to that which comes from above, and insists that the crusade be made above.

In the case of the Susquehanna River the Department has acted on the principle of cleaning up a whole tributary, taking the Sinnemahoning, and against every manufacturer along that stream it has brought suit for violation of the law, and today every one of those manufacturers is taking serious steps to prevent any refuse getting into the stream in any way, and must so provide that even in case of accident there can be no pollution of the stream, for one dose of poison may so depopulate that stream of fish that it will take several years to restore it to its original position.

Taking care of the stream above is all very well as far as that goes, but it does not benefit the man lower down the stream below the point where the clarification has ceased. The clarification of the streams means not only that fish can live in them, but human health and human comfort insists on it, while the farmer demands it for his stock. No laws will enforce themselves and the officers in whose hands is placed the enforcement of a law can do little unless the sentiment of the majority of the people is in full accord with the law.

The Department in its earlier years found, it is sorry to say, but little sympathy in regard to enforcing the laws in regard to fish. The average citizen thought it was a curtailment of his rights if he could not use all the devices for taking fish that his forefathers had used, and that it was absurd to think that he could not take

fish of any size and at any time of the year. Gradually through the dissemination of information it is beginning to be understood that if the streams are to be restocked with fish, the laws must be enforced or the efforts of the Department will be in vain.

For weeks before the spawning of the fish the female is most voracious and seizes at anything in the food line that comes in her way. It is for this reason that the law has established a close season, because it is a well known fact that of all the fish taken during this time nine out of ten will be females, the males being inert, and each female caught means the destruction of hundreds of prospective small ones. As this knowledge has permeated through the State and the people saw the reason for the law, they have come to respect it, and to insist that carelessness and viciousness shall not destroy the prospect of a future harvest.

In regard to pollution, the act is very plain that nothing whatever detrimental to fish or fish life shall be allowed to run or flow into a stream. The law says that any person violating the provisions of this act must be prosecuted and fined. For years the Department has tried the policy of persuasion. It has called the attention of the operators to the law and what they are doing and if they are violating the law that they should take immediate steps to do what the law says.

While the large majority of operators expressed a willingness to co-operate with the Department, the Department has found that promises are easily made, but results do not follow. The intentions of the operator when he made the promises were probably all right, but you all know the unmentionable place that is paved with good intentions. Moral suasion failing to bring results the Department has started in a more drastic campaign of invoking the terrors of the law by means of suits. It has no intention whatever to harass the manufacturers who are such important factors in the wealth and growth of the Commonwealth, but it feels that its sworn duty is to enforce the law and if it is at all lax in the performance of this duty, public sentiment would insist that it be strengthened.

The imposition of a fine or a jail sentence is asked with regret by the Department in every instance and it stands ready to lend a helping hand as far as it is possible in every case. Where prosecutions have been brought and the operators promised to at once take steps to abate the trouble, the Department has directed all its counsel to arrange to give the operators a specified time in which to prove their sincerity, and if at the end of that time they have made good their promise, the suits will be withdrawn.

The Department is asking nothing more than the Representatives of the people have placed in the law and this is nothing more than is demanded in carrying out that law "do unto your neighbor as you would have him do unto you." The complaint that to stop the pollution would compel the expending of large sums of money is no argument whatever, and to set up the claim that large sums of money have been expended in the construction of the plant can make no difference in its rights to the stream. The highest Court of Appeals in New York has decided in a pollution case that "before locating a plant the owners were bound to know that every riparian owner

is entitled to have the waters of a stream that washes his land come to it without obstruction, diversion or corruption, subject only to the reasonable use of the water by those similarly entitled for such domestic purposes as are inseparately from and necessary for the free use of their land. They were bound also to know the character of their proposed business, and to determine for themselves at their own peril whether they should be able to conduct their business upon a stream without injury to their neighbors, and the magnitude of their investment and their freedom from malice furnishes no reason why they should escape the consequence of their own folly."

Every man in this assemblage I feel is interested in bringing about the condition of the streams that they were in when the first settlers came here. It can only be accomplished by every one of you determining to assist the Department in its work, and each one can do something to help. If pollution comes to his knowledge he should not fail to take such action as will enable the Department to bring a successful prosecution against the violator of the law, and the term "informer" will have no terrors to a good citizen when every good citizen insists that the law must be borne out to the letter.

With every good citizen on the alert to see that the laws for the protection of fish are fully enforced, the question of pollution of the streams and the restocking of those streams with fish will be settled. Of course, there will always be a small minority who will perpetrate crimes, just as there are thieves in every community, but there are few members of a community who will not at once aid in enforcing the law against thieves, and when the same spirit prevails towards enforcing the fish laws, as said above, the matter is as good as settled in favor of the law.

To accomplish results it is only necessary that we all act on the old familiar advice: "A long pull, a strong pull and a pull altogether."

ADDRESS DELIVERED TO THE WEST VIRGINIA FOREST,
FISH AND GAME PROTECTIVE ASSOCIATION, WHEEL-
ING, WEST VIRGINIA.

It was with the greatest pleasure that I accepted the invitation of Mr. J. A. Viquesney, your president, to meet with you here and assist you as far as I possibly could by telling you the experiences of the Commonwealth of Pennsylvania in its work of the conservation of fish.

It is nearly half a century since Pennsylvania took up the work of restocking its waters with fish, and applied to the work the artificial methods of propagation. The first hatchery was established at Donegal, Lancaster County, and was devoted to the propagation of brook

trout, which was really the first fish that the advocates of artificial propagation applied their work, because the hatching and raising of brook trout is as simple a question as the raising of poultry. By this I mean that the matter is a simple one, but success is only attained by hard work and constant care.

Cleanliness is next to Godliness, and cleanliness is the basic principle of success at a fish hatchery, and you all know that cleanliness involves work. From that single hatchery at Donegal has grown up the successful propagation of fish in Pennsylvania. The Department of Fisheries now has under its control six hatcheries whose output of fish runs into millions, and whose work is so appreciated by the fishermen that they are all active in co-operating with the Department in securing spawn.

That the restocking of the waters of Pennsylvania depends on artificial propagation is now admitted by every one, and what can be done by the hatcheries is only limited by the funds at the disposal of the Department.

Artificial propagation is no longer in an experimental stage and the Department of Fisheries of Pennsylvania extends to the State of West Virginia its congratulations that it is moving to take upon itself the establishment of fish hatcheries, because it feels that in no other line can the tax payer get a better return for the money spent, both in the way of a food supply and a source of recreation.

West Virginia abounds in streams in which that gamiest of all fresh water fish, the brook or speckled trout, lives and thrives. No fish gives such thrills to the angler as does the speckled trout when he seizes the angler's fly, and no fish affords a more brilliant spectacle than this same trout, when in his struggle to escape, leaps from the stream and displays his gorgeous coloring in the sunlight.

There is no form of recreation equal to that of the angler. He breathes the pure air of the country, while his eyes feast on the scenery, which West Virginia boasts has no superior in the world, and as the fish rewards his efforts, he experiences a thrill such as a warrior feels when he successfully ends a furious onslaught on the enemy. The sport is one which brings a man to become better acquainted with himself as he sits or walks beside the purling brook, and in this close communion with nature he forgets the sordid cares of the world and becomes, at least, for the time being, a better man.

Civilization has brought in its train a number of things which have been disastrous to the fish supply in the streams in this country. As the white man settled up the country he took the quicker methods to dispose of waste, and made the streams in many cases common sewers by the refuse he poured into them. Where a solitary red man used to entice the fish from the brook, now 100 white men pursue the same game, and with little regard for the future, uses methods as destructive to fish as the modern methods of warfare are destructive to human kind. To meet this severe drain it is necessary to resort to artificial propagation, supplemented by rigid laws, which forbid the employment of those destructive agencies whereby one man to obtain a few large fish, destroys myriads of small fish, which if left alone would grow up to furnish fish for many people.

There are few people who really have given a thought of the future of fish as an economic factor in the food supply, yet it is possible with artificial propagation and proper protection of the streams, to make the water almost as valuable in producing a food supply as the lands of the farmer are in producing his share of the things which men use as food.

The construction of a hatchery involves first the selection of a piece of land which will come as near as possible to meeting the requirements of the work. There should be an ample water supply, absolutely under the control of the hatchery, because this water supply is really the first requisite, and its failure at any minute may involve the loss of all the fish in the hatchery. When the eggs of the fish are in the troughs or the batteries, success is absolutely dependent upon the supply of water, and too much water can be as fatal as too little. Care should be taken that this water supply can never be contaminated in any way, because the vital forces of the egg are so weak that the slightest contamination may prove fatal.

Pennsylvania has gone through the experience of hatcheries in which it did not absolutely control the water supply, and I cannot impress upon you too strongly the importance of your being absolutely master of the situation. Then the lay of the land must be such that the water may be conducted through the various necessary ponds with a sufficient fall to aerate it, as it flows from one series of ponds to another. The Pennsylvania trout hatchery at Corry is almost an ideal one in this respect. The water supply is ample; it is entirely under the control of the Department; there is no danger of contamination, and there is 17 feet of fall from the source of the supply to where it leaves the trout ponds, sufficiently warmed up to feed a large pond, which may be devoted to the cultivation of that warm water fish, the black bass.

There must be in West Virginia numerous sites which meet all these requirements, and there should be no trouble in acquiring such a site. What you will need then is a hatching house which can be equipped with troughs for the hatching of brook trout, and with jars for the propagation of such fish as the pike-perch, sunfish, yellow perch, and all the other varieties of fish that are natives of the streams of West Virginia.

As a piece of advice, which has been learned by rather bitter experiences, devote your first efforts to the raising of those fish whose home is the West Virginia waters. Nature has shown you that these fish will live and thrive, while the introduced fish in many instances will not thrive, and in some other cases prove an undesirable fish in the streams, such as the carp, which was introduced from Germany, has proven in the streams of Pennsylvania. The carp, unfortunately, took kindly to American waters and has thrived and prospered, and today it occupies a very important place in the fish supply of many places, but it is not by any means as desirable a fish as many of our native species, and its introduction up-set that balance which nature made for it is an enemy; in fact it is a vegetarian which preys upon the roots of plants, thus destroying the garden that furnishes the food and hiding places for the little native fish.

Pennsylvania, for years, strove to introduce the California or rainbow trout, and millions of them were planted in the waters of Penn-

sylvania, yet the returns were exceedingly small. A visit to Denver, Colorado, to attend a meeting of the American Fisheries Society two years ago, gave the explanation why the introduction of the rainbow trout was a failure. The rainbow trout lives in the waters that come from the snow banks of the Rocky Mountains and they never leave those cold waters for the warmer waters in the lower part of the stream. There are no waters in Pennsylvania which approximate any coldness to these Rocky Mountain streams, and therefore the failure of the fish to thrive in Pennsylvania was explained.

When you build your hatchery, do so in a permanent way. There is no economy in temporary structures, because they soon decay and must be replaced, while work cannot be done nearly so advantageously in a temporary structure as it can in one solidly and permanently built. This, of course, requires a larger appropriation to begin the work, and as I understand it, your association has to educate the Legislature to the advantages of a hatchery and does not want to scare them by asking what would seem to the average legislator a large amount of money.

There is nothing so convincing to a legislator as to show him the distribution of fish, and this is an object lesson that Pennsylvania is able to impress upon her legislators. This object lesson, of course, is not possible for you to bring to bear upon your legislators, but you can point him to the work that the United States Government has done in the way of propagating fish, and also to the work that is being done in Pennsylvania. Pennsylvania, for instance, ships to the applicants cans of yearling fish, which in the case say of brook trout run from four to seven inches in length. These appeal to the fisherman who sees in the can of fish perspective catches next year, and thousands of these, who were in doubt as to the artificial stocking of the streams, have come within a few years to be the most ardent advocates of the work of the Department of Fisheries of Pennsylvania. Streams that were barren have once more become resorts of the angler, because he can get fish.

In addition to supplying the fish, the Department of Fisheries has taken upon itself to educate the people as to the proper fish to be planted in streams, if results, that is, strings of fish are to be obtained. No longer will the Department supply trout to an applicant for a stream in which the warmth of the water makes it apparent that the trout would never thrive, but instead the applicant is advised that what he needs are such and such fishes that the Department knows will thrive in the water he desires to stock.

The muscallonge, for instance, is in great favor with many anglers on account of its size and the fierce defence it makes when it strikes the angler's hook, yet the Department knows by experience that the muscallonge is a dangerous fish to plant in any waters except where he now lives, because with his voracious appetite he requires a fish diet of many tons to bring him to the size of a hundred or more pounds, and thus the waters in which he lives are more apt to be rendered barren of any other fish. A few muscallonge affords sport for a few anglers, while an unlimited supply of yellow perch, bluegill sunfish, catfish and other native fish afford sport for a large number of people, and a food supply that is worth considering as an economic factor.

Hatcheries would enable you to restock your streams and thereby not only make them a source of pleasure and food for the inhabitants of your State, but good fishing brings visitors from other sections, men of means, who desire the sport of angling, and these visitors bring large sums of money to the communities where they come to angle. There are counties in Pennsylvania where the money of the trout fishers from New York is the largest source of revenue in those counties, and in Maine the revenue from the fishermen runs into millions of dollars annually.

Recognizing the value of the waters of the State as the medium for furnishing a valuable food supply, the question naturally is then how shall these streams and waters be made to produce all that they are capable. Science has aided the farmer in increasing the productiveness of his land and more than doubling his crops. Science steps in as the aid in restocking the streams and making them do all the work that they are capable in the way of furnishing food. Experience has shown that no longer can nature be depended upon to keep up the supply of fish in the streams, because the balance which existed a hundred or more years ago has been up-set by the advance of civilization.

Pollution has defiled the waters and destructive devices given the fish anything but a fair chance to thrive. As remarked above, rigid laws are demanded to put a stop to the pollution of the streams and to prohibit entirely the use of destructive devices. Then science comes to the front and says it can improve upon nature and by consistent effort once more stock the streams with fish.

Fish have a greater fecundity than almost every other living creature, and it has been estimated that if all the spawn of the fish should survive and reach maturity, there would not be enough water to float them. This fecundity is balanced, as nature does everything, by numerous voracious enemies which prey upon the eggs as they are being hatched and upon the little fish, before they have learned enough wisdom to hide or are swift enough to escape from their enemies.

The trout, for instance, as the spawning season approaches ascends to the head waters of the stream as they make their nests in shallow water and small streams where instinct teaches them there are not so many enemies. Fierce combats ensue between the males for the favors of the females, and the younger and more virile males are apt to be driven away by the larger and heavier fish. This is undesirable in the point of successful fertilization of the eggs of the female. The trout deposits its eggs in the gravel and they are fertilized by the male, and of course, under the circumstances, there are many chances of not complete fertilization.

The eggs are then left to hatch which takes from 40 to 60 days during which time the eggs are considered rightful prey by many enemies, the rain and storms may cover the eggs with mud which smothers them, the result being, it is estimated, that only a small percentage of the eggs deposited are hatched. Science gathers the fish and artificially takes from the female the roe, and from the male the milt which are then carefully mixed until almost every egg is sure to be fertilized. The eggs are then placed in the troughs, on

screens where the water keeps them in motion, the real secret of the successful hatching of the eggs.

There are no enemies that can possibly reach the eggs, and storms have no chance to exercise their devastating effects. The careful fish culturist picks out the fungused or other bad eggs and prevents the spread of any contagion among the rest. At the end of the hatching season, from 40 to 60 days, depending on the temperature of the water, the little fish come forth from their eggs and there no enemy meets them. For several days they are supported by their sacs and then begin to feed. Every precaution is taken to prevent disease and as the fish grow they are sorted out in the ponds where each size is kept together, because the trout, like nearly every other fish, are essentially cannibals, and the bigger fish will devour the smaller ones.

Under this method it is estimated that the scientific fish culturist brings to maturity from 60 to 90 per cent. of his fish against five or 10 per cent. of the fish hatched from the eggs left to the care of nature alone. Here then is the reason for the hatchery, and this is the reason you can urge upon your legislators as to the importance of establishing a hatchery which will fulfill the requirements of your State.

People prate much about the man who makes two blades of grass grow where only one grew before, but his work is no greater, if as great, as the man who makes 90 fish grow where only five grew before. It is difficult for the man who has never studied the subject to appreciate the value of scientific fish culture, and therefore it is not surprising that the average legislator cannot be brought at once to see the economic value to the State of spending the State's money for fish hatcheries.

To tell that legislator that if a fish's eggs get wet after spawning, from 40 to 60 per cent. of them will be barren, will cause him at first to raise his hands and exclaim against such outrageous fish story. Yet such is a fact, and this is one of the secrets of success on the part of the fish culturist, for knowing this about the trouble of the eggs getting wet, he carefully places the eggs in a dry pan and fertilizes them, after which they can be placed in the water to hatch.

That artificial propagation of fish will do the work, and that it is absolutely necessary to keep the streams stocked, is shown in a number of cases. Thus, in Lake Erie, some time ago, destructive and wasteful fishing had so much depleted the white fish, the most delicious fish of the lake, that it was no longer profitable to fish for them. The Commonwealth of Pennsylvania and the Bureau of Fisheries of the United States took up the artificial propagation of the white fish, and today Lake Erie once more abounds with white fish and in spite of the heavy fishing, the number of fish is increasing yearly.

In the Connecticut River, the natural spawning ground of the fish no longer sufficed to keep up the supply of shad and the stream became barren as to that fish. The United States authorities took up the matter and imported some shad spawn to the river, which was hatched and released, and has since kept up the artificial propagation of the shad, with the result that shad are once more taken in the Connecticut River.

From Presque Isle Bay, an arm of Lake Erie, the Department of Fisheries has for several years been taking yellow perch breeders and hatching out the eggs at the hatchery and then planting the small fish in the Bay. While the fish were left to spawn naturally, the catch of yellow perch was very small, but since the artificial propagation has been taken up the Bay seems to swarm with these fish, and hundreds of anglers may be seen daily fishing from the breakwater, every one getting a fine string of delicious food.

The large breeders of ducks and chickens for city markets, like those in New York, no longer depend upon the hen to hatch out the chickens, but leave to her only the work of producing the eggs from which the ducks or chickens are to come. These eggs are hatched in incubators in large numbers, and more successfully than when the work was left to the mother fowl.

This most of your legislators will admit, because this practice is widespread, and, so to speak, more visible to the naked eye, the fish being an inhabitant of the water, and its habits little known to the public, who do not seem to think they come under the same rules in regard to artificial propagation as ducks and chickens, but such is a fact. You can confidently appeal to your legislature for the establishment of a hatchery, because artificial propagation, as shown above, is no longer an experiment but an established fact, the United States and nearly every State in the Union having established hatcheries upon which they depend for the restocking of their waters with fish. Therefore you do not ask for the investment of money in a doubtful scheme, but the investment of money in something that will bring a return many times to the State, in that the waters will then furnish a food supply available to the poorest inhabitant, while the allurements of angling will bring to West Virginia hundreds and thousands of visitors whose money will add to the resources of its people.

REMARKS.

Upon the Department of Fisheries devolves the important duty of the conservation of a most valuable food supply, and, in addition, the promotion of the popular recreation of angling, by providing fish.

The position of the Commissioner is much like that of the preacher who was called by a congregation famous for its dissensions. There had been a period of drought, and the congregation was unanimous in desiring the preacher whose prayers would bring rain. The candidate announced his willingness to accept a call coupled with this demand, but with the reservation that no prayers would be forthcoming unless the congregation should be unanimous as to the day and hour of the rain. When it came to fixing the time for the rain, some rejected Monday because it was washday, while others did not want it on Tuesday because they had arranged for a picnic. And so on for all the days of the week. The result, of course, being that the preacher was not called upon for his prayers.

The Commissioner stands ready to accede to the popular demands, but he cannot entirely satisfy these demands on account of the division of sentiment, so he is trying to do the best he can, according to his own judgment and experience. Fishculture, like any other business, demands suitable plants and tools to accomplish results, so at present the Department is at work completing the present hatcheries with permanent structures, and giving to each hatchery the breeding of the fish to which it seems particularly adapted. When the plans upon which the Department is now working are carried out to completion, it is hoped that Pennsylvania will have the best equipped hatcheries of any State in the Union, and equal to all the demands that may be made upon them for fish.

The form of application adopted by the Department requires the applicant to fill out the full description of the stream of water it is proposed to stock, and thus enable the Commissioner to judge the suitability of the water for the fish applied for. Experience shows that in too many instances the wrong fish are planted, or too many fish are planted in the same water, and none thrive. It is proposed in the future to plant trout in the yearling stage, and all other fish when from two to four inches long, excepting, of course, the pike perch and shad, which must be planted as soon as hatched, as they are obtained from what otherwise would be waste products, and they emerge from the eggs in such enormous quantities that it would be impossible to retain them. Of course, you will understand that the breeding of fish in large numbers will require liberal appropriations of money, and it is hoped that public sentiment will assist the Department in procuring from the Legislature such appropriations as will be commensurate with the great work of restocking and keeping stocked the waters of Pennsylvania with fish.

One of the requirements of successful stocking with fish is the prevention of the pollution of the waters of the State. For years, with an utter disregard of the rights of the people below them on the same stream, manufacturing establishments have been pouring all their refuse matter into the streams, because it was the easiest and cheapest way of disposing of their refuse. As manufactories have become more abundant and population increased, the pollution of the streams has grown into a menace to public health, besides

destroying the fish, and there is growing every day a stronger and stronger demand for the prevention of the use of the streams as sewers. This prevention is at first a matter of cost to the manufacturers, but experience has shown that most instances the waste matter can be so treated as to become sources of income. That the purification of the waters can be secured is proven by the result in Germany, where a paternal government ordered the manufacturers to stop pollution, and they did.

The Department of Fisheries is doing its best to put a stop to the pollution, but the number of manufactories in Pennsylvania runs into thousands, while the Department, owing to the small appropriation made by the Legislature, has only eight wardens to cover the State to prevent violations of the fish laws and to try to induce violators running refuse into streams to stop the practice. How incommensurate the money appropriated by the Legislature is to the work of stopping pollution will be readily understood when I state that the amount of money for attorney fees and court expenses is the altogether inadequate sum of One Thousand Dollars a year. Any one who has had experience in court proceedings knows what an insufficient sum this is with which to fight large corporations, which have to be coerced.

The Department is glad to say that in a large number of cases it has found the manufacturers ready and anxious to co-operate with it in bringing about the desired results, but where a corporation wishes to make a fight, it is an expensive proceeding and long drawn out. Complaint constantly comes to the Department that the little offender who catches an undersized fish is promptly fined, while the big offender, who destroys fish by the thousands by running his pollution into the streams, escapes, so the Department in its effort to stop pollution brought suit against one of the largest corporations in the State. By the various devices, which lawyers are able to devise, this case has now been pending for two years and a half, and the solution is not yet in sight. Every year public sentiment is growing stronger in demanding the clearing up of the streams, and it is hoped that the next Legislature will vote enough money for the Department to be able to do much more efficient work. The present program is to take one water shed and require the entire stoppage of pollution by every manufacturer on the streams in that water shed. This will give tangible results and do much better work than sporadic cases here and there.

With the purification of the waters, with the employment of sufficient wardens to prevent the violation of the fish laws, and with the completion of the hatcheries, the Department of Fisheries hopes that it will not be long before Pennsylvania will become the Angler's Paradise and at the same time so restock the waters with food fish that this important item of diet will be placed within reach of all.

The real purpose of the Department of Fisheries is to propagate fish and plant them in the streams so that the supply of fish in the waters of the Commonwealth be kept equal to the demand upon them. The propagation of fish demands skilled and trained men in their line and to secure the best results all the energies of the head of the Department should be devoted to that end.

To the duties of propagation of fish, the Legislature in its wisdom, has added the charge of enforcing the laws in regard to fish by

means of fish wardens, A fish warden, to be thoroughly competent, should be a man in the best physical condition, capable of withstanding the hardships of storm and the wear and tear of sleepless hours, because most of the violators of the fish laws, or rather the real violators of the fish laws, work like thieves, in the darkness of the night. To catch these violators it is necessary to patrol the streams where progress is difficult and tiresome, and hours cannot be counted as they are counted by the ordinary laborer.

To this physical ability must be added a mental training which will enable the warden to grasp the meaning of the laws, to know what their enforcement means, and to be able to take a case before a Justice of the Peace, see that the law in regard to such trials is fully carried out, and that the Justice's docket will stand the scrutiny of a higher court. This requires higher mentality than is usually possessed by the ordinary Justice of the Peace, for in 99 cases out of 100 the docket of an ordinary Justice falls completely when taken before a Court of Record on a certiorari. In the enforcement of the law there arises constantly cases which awaken the hostility of the neighborhood, no matter what the merit of the case is in the eyes of the laws, and this disfavor is visited upon the Department of Fisheries.

Pennsylvania at this time possesses a body of men known as the State Police whose duty is to enforce the laws, and from every point of view it seems that the proper thing to be done would be to divorce the Department of Fisheries from the enforcement of the laws and turn its warden service over to the Superintendent of the State Police.

The care of the warden service necessarily devolves a lot of work upon the Department of Fisheries that is entirely foreign and apart from the propagation of fish. It is work that should be done by such trained men as sit in the office of the Superintendent of Police. If the Department should be relieved of its warden service it could then devote all its time and energy to the main purpose of its existence.

There is no question that if the warden service were detached from the Department of Fisheries that there would be much less friction between the Department and the public and a better feeling could be created. The Department could then devote all its energies, as I remarked before, to the propagation of fish and to the dissemination of knowledge of fish and their habits among the people. If this knowledge could be universally disseminated there is no question that it would greatly aid the Department in its work of re-stocking the streams. A mistake of one warden, no matter how trivial, will often excite the animosity of a whole community, and it will take a long time to overcome this animosity.

I am glad to say that the present force of wardens have made very few errors of judgment, but it is not always from an error of judgment that the animosity is created. The Department believes that the enforcement of the laws should be placed in such a body as the State Police whose duty and training fits them pre-eminently for the purpose, and the Department of Fisheries only has to exercise its training and supervision over the men who will raise the fish and supervise the planting.



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