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REPORTS

OF

COMMITTEES OF THE HOUSE OF ASSEMBLY

OF

NOVA-SCOTIA,

ON THE SUBJECT OF

THE DEEP SEA AND RIVER

FISHERIES

OF THE PROVINCE.

PUBLISHED BY AUTHORITY.

HALIFAX, N. S.
WILLIAM ANNAND, QUEEN'S PRINTER.
1854.

DEEP SEA FISHERIES.

The Committee appointed to consider the various documents on the subject of the Fisheries referred to them, after mature consideration, have agreed to report as follows:—

The Committee observe with pleasure that considerable improvement has taken place in the Provincial Fishery during the last year, and that, if effectual protection be continued, this important branch of industry will, ere long, furnish a very valuable export; and while the Fisheries are annually improving as a nursery for British Seamen, they will, at the same time, constitute an improving source of wealth to the Province. The Committee earnestly recommend that the rights of the Province, in reference to the Fisheries, should be strictly and rigidly enforced, and that no participation in them should be conceded to any foreign power, but that the Colonial Fishermen should be invested with the exclusive rights to fish in the waters adjacent and belonging to the Province; and they recommend that such steps should be taken to impose a tax on foreign fishing vessels passing through the Strait of Canso to and from the fishing grounds, as will counter-balance, in some degree, the bounties and protection by which the Fisheries of foreign nations are fostered and encouraged. The Committee observe that the legal right of the Provincial Legislature to enact laws for the protection and regulation of the Fisheries has been fully recognized by the Crown Officers of England in a case recently submitted to them, to which they beg to refer, and from which they make the following extract:—

"Even if the Imperial Act 59, Geo. III, Chapter 38, should be insufficient to give Her Majesty power to impose all or any of the rules and regulations in question, (a question which we need not now consider,) the authority of the Local Legislature appears to us to be sufficient to make them valid in effect by its express Legislative Enactment of them. The authority of the Local Legislature extends, like that of the Imperial Parliament, over the space of three miles of the high seas next to the coast which is, by the comity of nations, part of the Country to which it is adjacent; and we are of opinion, that upon this general principle, and irrespective of the Convention, the Imperial Statute or the regulations of the Sovereign in Council, the Colonial Legislature was legally entitled to legislate as it has done, relative to the Fisheries, and its enactments are valid and binding. We are of opinion that such a vessel

is, under the circumstances stated, liable to forfeiture under the express provisions of the Colonial Statute already referred to."

Such being the unquestionable right of the Legislature, your Committee earnestly recommend the House to enact a law by which foreign fishing vessels will either be compelled to pay for the use of the Strait of Canso or to find their way into the Gulf around the Island of Cape Breton.

The Committee have attentively perused the reports of the several Officers of the Royal Navy engaged during the last year in the protection of the Fisheries, from which it appears that the fishermen of the United States are not at all scrupulous about trespassing when out of view of the British Cruizers. That great numbers of their vessels, probably about 280, were in the neighbourhood of Cape Breton in the fall, and that the number of these fishing vessels exceeded 600, and are by some stated to number as many as 2000. That great benefits have resulted from the protection afforded the Fisheries, and that considerable improvement has been observed in the build and equipment of our fishing vessels, and particularly those belonging to the port of Lunenburg. It seems to be the opinion of the Officers referred to, that small Steamers with Schooner Tenders, should be employed in protecting the Fisheries. They all complain, and with much reason, that English fishing vessels almost uniformly neglect to show their colors to the cruizers, thereby occasioning much additional trouble, and frequently leading the cruizers out of their course. The Committee are of opinion that the protection afforded to the Fisheries has already been productive of much benefit—that, in consequence, the American fishermen have been unsuccessful, while increased vigour has been infused into those of the Province, and that few of the former made a third voyage during the last season. In view of the signal benefit of protection, the Committee recommend the House to grant for that purpose the sum of £3000 in addition to any sum remaining undrawn. The Committee recommend that all vessels should be compelled to take out a fishing license at their own Ports for the season, and that every vessel should be provided with an English Merchant's Union, to be shewn to the British Cruizers when they are in sight under a certain penalty, and that the Lieutenant-Governor should request the Commanders of the cruizers to note on the registers of fishing vessels each case of disobedience of the law in this particular.

It appears that Wears in St.Mary's Bay are found to be destructive of the Fishery. The Committee therefore recommend that the use of them should be prohibited or regulated.

The Committee are of opinion that valuable Oyster Fisheries might be established by transplanting this valuable shell fish in

suitable localities; and they recommend that some encouragement should be held out with a view to the attainment of this object.

The Committee beg leave to express their sense of the valuable and important services of Admiral Sir George Seymour, whose judicious measures for the protection of the Fisheries have effected a considerable saving of expense to the Province, and have been attended with signal success.

The Committee call the attention of the House to the annexed Report on the subject of the breeding of fish. The Committee conclude by directing the attention of the House to the very important legal opinion before referred to, in which the right of the Colony to legislate, in respect of the waters adjacent to the Province, is fully asserted. It is evident that the eminent lawyers from whom it proceeded concur in the view entertained by your Committee of the exclusive rights of the Colony to the Fisheries within three miles of the coasts, being a part and portion of the property of the Province—a property of such inestimable value and consequence that the Legislature should at all times, in the most energetic manner, deny the right of any other authority whatever to interfere with the fisheries, or to pretend to transfer them or any participation in them to a foreign power.

JAMES B. UNIACKE,
Chairman.

JOHN RYDER,
MARTIN J. WILKINS,
B. WIER,
JOHN J. MARSHALL,
HENRY S. JOST,
HENRY MARTELL,
THOMAS COFFIN.

Subject to the reference to foreign powers participating in the Fisheries, believing that equivalents can be given to make that object desirable. Also, to putting a tax on foreign vessels passing through the Strait of Canso.

B. WIER,
THOMAS COFFIN.

Excepting the recommendation of a tax on foreign vessels passing through the Gut of Canso.

H. S. JOST.

Halifax, 12th March, 1854.

HALIFAX, NOVA-SCOTIA,
NOVEMBER 1, 1853.

An Account of the number of Vessels cleared on a Fishing Voyage at the Port of Halifax and other Ports in this Province, during the year 1853,—*together with the total amount of Tonnage of the said Vessels, and the number of Men employed in the said Fisheries:*

Port.	Vessels.	Tonnage.	Men.
Halifax,	149	5816	1240
Yarmouth,	54	1982	400
Lunenburg,	23	1130	244
Windsor,	1	14	4
Liverpool,	13	585	106
Pictou,	6	316	63
Guysborough,	11	382	76
Digby,	4	97	23
Sydney,	8	204	53
Arichat,	44	1155	152
Annapolis,	1	16	4
Clements Port,	2	23	8
Port Medway,	5	152	33
Pugwash,	5	380	60
New Edinburg,	6	282	30
Cape Canso,	24	861	174
Argyle,	7	193	49
Sheet Harbor,	2	57	7
Pubnico,	7	206	55
Canada Creek,	1	26	5
Gates Breakwater,	3	43	15
Westport,	16	422	94
Ragged Islands,	27	952	218
Ship Harbor,	10	283	52
St. Mary's,	3	75	19
Port Hood,	3	139	36
Barrington,	17	413	116
Church Point,	3	72	19
	455	16,276	3,355

HENRY TREW,
Controller of Customs and Navigation Laws.

ARTIFICIAL PRODUCTION OF FISH.

The object of this Pamphlet is to make known the means by which fish of all descriptions may be multiplied in rivers to an almost incalculable extent. The principle employed is not new in theory; but it is only within the last few years that any practical application of it on an extensive scale has taken place. This application has been made in France, and with success so complete and extraordinary as to be almost incredible. Our hope is, that it will be adopted on a grand scale in this country also. In Great Britain and Ireland there are rivers and streams, lakes and canals, innumerable; and they may be made to yield annually millions on millions of fish: we say millions, and say it on good authority.

It has been remarked, that the man who makes two blades of corn grow where only one grew before is a benefactor of humanity. If this be true, and true it is, we respectfully submit that our tiny volume is worthy of the attention of the legislator, the country gentlemen, and the clergyman,—for it shows how an immense addition may be made to the people's food with scacely any expese. To persons engaged in the fishing trade in rivers, and to professed anglers, it will, we conceive, recommend itself.

I.

The manner in which most fish propagate their species is of course well known to all readers.

"No sooner," in the words of a most distinguished naturalist, "does the sun of spring begin to spread its vivifying warmth, and no sooner does its renovating and irresistible influence penetrate to the depths of the waters," that a peculiar organ developes and increases in male fish. This organ, which is double, and which extends itself in the superior part of the abdomen, almost equalling it in length, has received the name of *milt*. The milt is the seminal or fecundating liquor. It grows gradually during several months; and then softens, or so to speak, melts or ripens, as spawning time approaches. When discharged from the fish it is of a milky colour.

When the milt begins to form in the male, the ovaries of the female begin to fill with eggs, which however are almost imperceptible. These organs are two in number in the greater part of fish, but only one in the others. Confined in a membrane, they occupy in the abdomen a place analogous to that which the milt occupies in males, and are nearly equal to it in length. The eggs they contain increase in proportion as the milt becomes tumified.

As the eggs grow they cause pain and become very burdensome to the female; until at length she is obliged to relieve herself of their weight and volume. This she does by pressing her belly against pebbles, or any other hard substance at the bottom of the water. The eggs flow from her by the anus. She previously prepares a sort of hole to receive them.

Then comes the male, and by a like pressure he relieves himself of the milt, which flows also from the anus on to the eggs, and fecundates

them. The fish afterwards cover up the eggs with sand or pebbles, or leave them, and in due time the eggs become transformed into fish.

II.

The quantity of eggs which the female fish of all sorts deposit is very considerable; of some it is truly prodigious. The carp, for example, produces about a quarter of a million at a time; the perch a great many more; the trout seven or eight hundred; the salmon several hundred; the sturgeon between six or seven millions; and the pike a vast number. A very small portion of milt suffices to give life to a large quantity of eggs. It would therefore appear that nothing in the world ought to be more abundant than fish of all descriptions.

But only a very small portion indeed of the eggs come to maturity; some naturalists calculate that not one in a hundred do so. Of the rest no inconsiderable portion are devoured by other fish. The males of some species, and indeed the females too, also eat their own eggs; and a great quantity are destroyed by getting mixed with mud and dirt.

III.

It certainly seems strange that man, who has done so many wonderful things,—who has, so to speak, scaled the heavens, to learn the movements of suns and planets,—who has plunged deep into the earth for mineral treasures,—who has turned many a mornful morass, and dreary forest, a barren waste, into fruitful corn-fields or abundant pasturages, who has made the tremendous agent, electricity itself, docile to his will, it is strange that he, with his vast ingenuity, should never have bethought him of taking measures for preserving the eggs of fish, and thereby secure to himself, in all climates and at all seasons, an abundant supply of wholesome food.

Still stranger perhaps is it to find, that though he has taken immense pains to discover the secrets of nature, even in matters of mere scientific, or, if we may so say, idle curiosity, centuries passed away before it occurred to him that he might do with fish what he has done for animals, and birds, and plants,—assist and control, and improve, the operations of nature; that is to say, instead of leaving the female to deposit her eggs and the male his milt, and then abandon them, he might cause the female to discharge her burden, and the male his fecundating liquor, where pleased; that he might assist them in the operation; and that for so doing he might obtain a living fish from almost every egg.

But the strangest thing of all undoubtedly is, that when he *did* learn that he could produce fish as well as the fish themselves—when scientific naturalists discovered that by casting some of the male's milt on the female's eggs fish would be brought forth, as surely as if the operation had been done by the parents in the bed of a river—it never struck him that herein was the means of increasing, a million and a million fold, the production of his lakes and rivers and streams, and reservoirs and ponds—of making in a word, the waters as fruitful, in their way, as the land is of corn and grain.

The ancient Greeks and Romans, who paid extraordinary attention to the breeding of fish, may, to be sure, have known something of all his; but if they did, there knowledge did not descend to us, and is therefore to us as though it had never existed.

As to the means of protecting the eggs of fish from the accidents of the waters, or the voracity of its occupants, none of incontestable efficiency are described in books or known in practice; and the proof of this is, that in France aud Germany, England and Scotland, and indeed in every part of Europe, there have of late years been general complaints of the gradual yet rapid decline in the supply of various sorts of fish, not only in rivers, but on the coasts.*

With respect to what we will call the artificial production of fish—*i. e.* the taking by man of the female's eggs, and the fucundation of them by means of the male's milt, applied by him—the first idea of it was conceived no further back than in 1758. It was, we believe, the Count Von Golstein, a German naturalist, that the scientific world is indebted for this grand conception; as also for the first experiments which proved its truth. Having taken a female trout about to spawn, he pressed out her eggs, and then pressed on to them the milt of a male. After a certain number of days, he had the satisfaction of seeing young fish produced, which grew and flourished. Another German naturalist, Jacobi by name, made, a few years later, a similar experiment, with a like result; and, going a step further, he actually caused the milt to breed fish from the eggs of a *dead* female. In Italy, Spallanzani successfully experimented in a similar manner on the spawn of toads, and of certain descriptions of fish. At a later period, experiments were made with success on the eggs of salmon in Scotland by Dr. Knox, Mr. Shaw, and one or two others. And here in England the same sort of thing has been done.

But as we have already intimated, it never entered the mind of any of these great *savans*—nor of their successors—nor of the tens of thousands of persons who, in different countries, have made the natural history of fish a subject of study—that this way of breeding fish was something more than a simple scientific experiment, curious but useless,—that it was of practical and commercial, political and social importance, inasmuch as it might be made a new branch of commerce, which would add greatly to the national wealth, give employment to thousands, create an inexhaustible supply of cheap, nourishing, and wholesome provisions for all classes of the people—and be, in short, to rivers and waters what agriculture is to land.

For this glorious but singularly simple idea, the world is indebted to two humble fishermen, named Gehin and Remy, of an obscure village called La Bresse, in the department of the Vosges, in France.

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* Macculloch mentions that in France the annual supply of fresh-water fish before 1789 was 1,200,000. It fell some years back to 700,000, and has diminished since. The decline in our own rivers is well known: and this very year we have had alarming accounts from Scotland of the falling off in salmon. The yield of salt-water fish on the English, Scotch, Dutch, and French coasts, is also far from what it was.

IV.

The department of the Vosges is traversed by the Moselle, possesses many of the tributaries of that beautiful river, together with several streams and some lakes. The fine clear waters of all these, made them the most famous resort of trout in all France; and the production of that fish was so considerable that it formed a large portion of the food of the population.

Several years ago, however, the yield was observed to decline, and it continued year after year to diminish. Messrs. Gehin and Remy made it their business to attempt to discover if any, and if so, what means could be devised for checking the evil. After studying night and day for a long time the habits of the trout, they came to the conclusion that it would be easy to preserve the eggs and to fecundate them by the aid of the milt of the male. Having watched the proceedings of the male and female at spawning time (it is in the month of November in the Vosges,) they soon saw how they were to act. Their first experiment was crowned with extraordinary success; this was in 1841. In 1842, 1843, and 1844, they again repeated their experiments, and in each case in the most triumphant manner. In the latter year, to encourage them, the Societe d'Emulation des Vosges gave them a bronze medal, and granted them a sum of money. They were subsequently employed to exercise their system in the different rivers and streams of the department, and in those of the adjacent departments. In the course of a short time, they succeeded in stocking these waters with *millions* of trout.

It is to be observed, that although the fecundation of the eggs of fish by the means employed by Gehin and Remy was, as we have seen, known to scientific ichthyologists, it was perfectly unknown to them. These poor men had never heard of Golstein or Jacobi, of Lacepede or Sannoni; they had probably never in their lives opened a book on the natural history of fish; consequently it was by their own unaided intelligence and patient investigation that they arrived at the discovery of the "great fact;" and surely the same credit is due to them for it as if it had been quite original. Though they came after Golstein, they rank as high—nay higher, for they had none of his instruction or means of observation.

Though bad news proverbially flies fast, information really useful to the public not unfrequently travels very slowly. It was so in this case. Until the beginning of 1849, nothing was heard of the discovery and its great results beyond the department of the Vosges and its immediate vicinity; and perhaps nothing would have been heard of it until this day, if an eminent and learned physician residing in the department, who had taken much interest in the matter, had not called attention to it. For thus taking the light from under the bushel, a very deep debt of gratitude is due to him, not only from his own countrymen, but from foreign nations.

This gentleman, Dr. Haxo of Epinal, perpetual Secretary of the Societe d'Emulation, and member of the Counseil Academique of the Department of the Vosges, addressed in the month of March, 1849, an admirably written communication to the Academy of Sciences at Paris,

describing Gehin and Remy's *modus operandi* and its astonishing results. The sensation which this paper created was extraordinary, amongst the public as well as in the Academy; and surprise was generally expressed at the singular fact that it should have fallen to two uneducated fishermen to show the practical value of a discovery known to the learned for nearly a century.

The Academy, seeing at once the immense national importance of the two fishermen's proceedings, hastened to call the attention of the Government to it. The Government, on its part, after making proper inquiries and finding all that was said was true, resolved, as was plainly its duty to do, to have the system applied to all the rivers in France, and especially to those in the poorer provinces, Gehin and Remy were accordingly summoned to Paris, and taken at once into the employment of the Government at good salaries; their duties being first to stock with fish, by their system, such rivers as should be pointed out to them, and next to teach that system to the peasantry. They were treated, too, as men who have made a great scientific discovery, and secured an immense benefit to their country. Many *savans* vied with each other in doing them honour; and the President of the Republic and his ministers made them dine at their tables and figure at their receptions. A Commission, consisting of distinguished scientific men, was appointed to superintend their operations.

V.

We now proceed to describe Gehin and Remy's plan as applied to trout. No great space will be required to do so, for, like most things that are really useful, it is of remarkable simplicity.

For the sake of convenience we put it into the shape of rules:—

1. Prepare a vessel containing about a quart of pure fresh water.

2. Take the female at the moment at which she is about to spawn. Hold her by the back with the left hand, with her head and body near you. If she tries to escape, pass the hand gently to and fro on her belly: this soothes her; if, however, she continues restless, get some one to hold her by the tail.

3. When she is tranquil, place her over the vessel containing the water, and with the thumb and finger of the right hand press gently on her belly downwards towards the tail. This pressure should be done in the same way as one would draw one's thumb and finger down a finger, or it may be compared to the milking of a cow; but care must be taken that it be not too heavy.

4. The eggs under the pressure will immediately spurt forth into the water. If they do not come easily, it is a proof that they are not sufficiently matured, and that they cannot consequently be fecundated. The fish should therefore be restored to the water for a few days.

5. Take a male and hold him in the same way; press with the thumb and finger gently down his belly, and cause the milt to spurt into the water. This milt will give the water a whitish colour. It spurts forth readily when perfectly butteraceous.

6. Both for male and female, the pressing operation must be re-

peated several times, until the fish be completely relieved of their respective burdens.

7. When these operation are terminated, stir up the water and its contents with the hand, or, which is better, with the tail of a male fish still bearing traces of the milt.

8. After a few moments repose, pour off the water slowly and put in more.

9. Before the mixing, the eggs will be observed to be of a pale orange-colour and very transparent; after it they become brownish, and a small black spot is perceived in the middle.

10. Change the water once or twice.

11. The fecundation being now complete, some of the eggs will be perceived to be white. These are the sterile ones, and must be picked out, otherwise they will corrupt the rest.

Having proceeded so far, the next operation is to provide for the preservation of the eggs.

12. Take a round box in the form of a warming-pan, with the centre of the bottom pressed in, so as to cause it to stand firmly. Let the box be made of zinc, to prevent rust. Let it be eight inches in diameter, with a lid one-and-a-half high, opening with a hinge. Riddle it completely with small holes in all directions, and let the edges of the holes be quite smooth.

13. Place in the box a layer of fine gravel.

14. Then take about one fish's spawn of the fecundated eggs.

15. Close the box, place it in the bed of a current of pure water, cover it with shingle and pebbles, and leave it; but see that the water passes freely through it, as it is necessary for the eggs to be slightly agitated.

This done, the operator must wait until the time shall arrive at which the exclusion, or hatching of the eggs, will take place. The period varies from two to four months. It cannot, however, be fixed with any precision, as it depends on the nature and quality of the water, the soil over which it flows, and other local circumstances. But there can be no difficulty on the point, as the box may be taken out and examined from time to time.

Instead of a box the eggs may be placed in a hole in the bed of the stream, and covered with pebbles. But in that case the progress of the transformation of the eggs cannot be followed. Besides, the box covered with pebbles is a better preservative against the admission of mud and dirt, which is injurious to the eggs.

When the time of exclusion has arrived, the tail is first formed, and the little rents in the egg which its formation causes become the lower fins. The head afterwards appears at the other extremity, and the rents on either side form the upper fins. The lower part of the egg composes the belly; the upper, which consequently breaks, the back. The pellicle which covers the embryon does not fall, but becomes developed with it.

16. Keep the little fish in the box from eight to fifteen days, accor

ding as they are more or less numerous. Then set them at liberty. But

17. Take care not to let them go into water different to that in which they were born; as more or less freshness or limpidity may be injurious to them. The water should, too, be tranquil.

18. If the young fish be confined to a particular part of the stream, or if they be in reservoirs, it will of course be necessary to supply them with food. At first the spawn of frogs will suit them very well. When they get stronger the more substantial food of chopped meat, or the intestines of sheep and oxen torn into very narrow shreds, should be supplied. It is preferable, however, to procure an abundance of small fish, especially of those which derive their principal sustenance from aquatic plants.

The average weight of the trout produced by the above means, is about four and a half ounces at the end of the second year, and nine at the end of the third.

Modifications of the rules here given may be attempted. Thus, the holes in the box may be made so large as to enable the fish to escape when so disposed, which would do away with the trouble of watching them; secondly, they may be placed and brought up in large boxes containing coagulated blood, or other descriptions of food, so as to make a comparison between their growth and those left at large. In fact, innumerable experiments may be attempted; but they will suggest themselves to the mind of the operator practically acquainted with fish.

When the trout are destined to stock a river, it is advisable to produce them in one of its tributaries, where they will remain until they are active or strong enough to escape or resist the enemies which they find in the deeper waters of rivers.

If they be destined for reservoirs or ponds, care must be taken not only not to place voracious fish with them, but to separate them according to their ages,—those of three years from those of two, and those of two from those of one. The reason for this is, that the larger trout devour the smaller ones.

VI.

It has been already stated, that in the course of a very short time Messrs. Gehin and Remy, by the application of their system, succeeded in introducing several millions trout into the rivers and streams of the Vosges. In a report of the Academy of Sciences at Paris, by Dr. Haxo, in 1849, we read that, in addition to this, "they had formed a piece of water belonging exclusively to them, in which they now have between *five and six million trout*, aged from one to three years; and the production of this year will increase that vast number by several hundred thousand." Since then, of course, the quantity has immensely increased: we scarcely like to express the estimate in figures, lest, from its enormity, it should appear exaggerated.

Shortly after Dr. Haxo had, by his communication to the Academy, called public attention to the discovery, very liberal offers were made to Gehin and Remy, by the Governments of Spain and Holland, to in-

troduce their system into those countries, but they declined to quit France.

Since they have been taken into the service of the French Government, they have stocked streams and rivers at Allevard, Pontcharra, Sassenage, Veury, Vizille, Bourg d'Oisans, Rives, Pont-en-Royans, Paladru, Lemps, St. Geoire, Arandon, La Buisse, and Grenoble, in the department of the Isere; in numerous places in the department of the Haute Loire; also in the departments of the Allier, the Lozere, the Meuse, the Meurthe, the Haute Saone, and several others.

M. de Caumont, a gentleman of property, has experimented on their system in Normandy with great success; as have also the director of the canal from the Rhone to the Rhine, in the vast reservoirs of Huninguen, and different noblemen and gentlemen in Burgundy, in Brie, in the neighbourhood of Dijon, and in numerous other parts of the country.

VII.

Important as is the system described, Messieurs Gehin and Remy have invented another which will produce even more extraordinary results.

It is well known that it is difficult to naturalize fish peculiar to one country into another country: nor is it easy even to remove with success fish from one river to another in the same country. The introduction of carp into England in the year 1514 was considered, it will be remembered, a very marvellous operation, and it is spoken of as such in every Natural History of Fish; and though it has long been known that fecundated eggs might be removed from place to place, it does not appear that in any country any great progress has been made in the stocking of rivers by that system.

But Remy and Gehin have got over all difficulty by their new fashion of removing, not the fish, *but the eggs*. To do this, these are the directions:—

1. Take a box similar to that already described.
2. Place it in a layer of fine sand; on that layer place one of pebbles of about the size of a nut; on the pebbles put a layer of fecundated eggs. Then begin again with a layer of pebbles and of eggs, and continue until the box be full.
3. Plunge the box into water to cause its contents to be consolidated, and send it off.
4. Take care during the journey to keep it in the open air.
5. On arriving at its destination, divide its contents into other boxes, in the proportion of one female's spawn for each.
6. Place the boxes in the bed of a stream, cover them up, and leave them, as already described.
7. The sand and pebbles placed in the boxes must be perfectly clear of earthy substances and dirt; and if, on opening them, there be any spoiled—that is, white—eggs, they must be removed.

VIII.

Although in the operation described trout only has been mentioned, the plan of the two fishermen is *applicable to every other description of*

fresh-water fish, as well as *to those which, though living partly in fresh-water and partly in the sea, spawn in rivers.*

It has been TRIED in France on salmon, crap, pike, tench, perch, and on other descriptions. And each experiment has been perfectly satisfactory.

IX.

To make experiments on the different sorts of English fish, it will only be necessary to follow the very simple directions already given; or if in one or two sorts any slight modification should happen to be required; they will be so self-evident as not to need description. As for the *time* of operating, that, of course, varies according to the species of the fish, and still more as to the temperature of the water. On this point, local knowledge can be the only guide.

Care must, of course, be taken to provide, in streams or reservoirs, a sufficient supply of fish for the fish to feed on. Thus, when the system of artificial production is employed on an extensive scale, it will be necessary, to breed some of the smaller descriptions of fish as food for the larger. In reservoirs, however, different sorts of food may be offered by way of experiment.

X.

Although it has been stated that it is necessary to place the fecundated eggs in the bed of a stream, it may be mentioned that an eminent French naturalist. M. Coste, professor at the College de France at Paris, has discovered that the stream may be done without; *he has produced salmon in a tub.*

He caused a large tub to be constructed, with conduits or canals placed one beneath the other, in such a way that the water, on entering by the upper part of one canal, flowed to the lower part, and then descended into the canal beneath; and after flowing along it, descended into the one below, and so on until at last it escaped from the vessel. In each canal he placed a layer of gravel and pebbles, and on these a quantity of salmon's eggs, fecundated by Remy and Gehin's system, and sent up from the reservoirs of Huninguen, a distance of several hundred miles. The water flowed from a cistern, through an ordinary cock; and the only precaution taken was to keep the stream constantly going.

In due time the exclusion or hatching of the eggs took place, and the salmon are now alive and well.

By M. Coste's system several different descriptions of fish can be produced at the same time. But it may, perhaps, be doubted whether the fish will possess the same vigour or qualities as if produced in a natural stream; and, at all events, M. Coste's plan is more curious than practically useful.

XI.

And now to conclude. It would be idle to dwell on the immense importance of stocking our waters with millions of fish,—*that* will be apparent to every one; and we shall be much disappointed if the system

described be not taken up as warmly, and practised as extensively, in this country as it has been in France.

But in addition to its commercial importance as a new branch of industry, and its social value as affording a vast addition to the people's food, this system possesses the advantages of opening a boundless field to scientific curiosity. In the Danube and the Rhine, the Elba and the Spree, and almost every other river in Germany; in the rivers and lakes of Russia and northern Europe; in the lakes of Switzerland; in the rivers of France; there exist either species of fish which we do not possess, or peculiar varieties of species which we do not possess; and there is every reason to believe that very many of them, if not all, might be naturalized in our waters. The same remark will apply to some of the fish in the rivers and lakes of America, and even of the rivers of Asia and Africa. Nor is this all. Why should not the different races of fish be crossed, as well as those of animals and plants? Who can tell what the ingenuity of man may not produce by the happy adaptation of the milt of one description of male to the eggs of another description of female?

Appendix.

As almost always happens with the discoverers of curious and useful things, Messrs. Gehin and Remy have excited the jealousy of several influential parties, and amongst them some learned ichthyologists. These gentlemen could not bear the idea of seeing two humble and uneducated fishermen carry off the "glory" of a great discovery which *they* might have made but did not; and they have employed strenuous and perhaps somewhat unworthy efforts to strip the two poor men of their well-earned distinction. For ourselves, after a patient investigation of the facts of the case, we have no hesitation in repeating what we have said at page 10; namely, that although the learned world knew theoretically the principle of artificial production, Gehin and Remy discovered it, not from the teaching of books, but from patient observation; and that therefore the same credit is due to them for it as to their distinguished predecessors Golstein and Jacobi. And we add, that to them alone is owing the grand idea of turning the discovery to *practical* account in the stocking of rivers with fish.

To Dr. Haxo, of Epinal, also, we must repeat, that the world is under great obligation, for having taken the two fishermen under his protection, and made their process known. We, personally, are peculiarly indebted to him for the valuable information he has courteously placed at our disposal for the compilation of this little work.

The Doctor is particularly anxious that the honor of the discovery should not be wrested from his two *proteges;* and he has written to us on the subject as follows:—

"As you intend to make known to the English the process employed for the artificial fecundation of the eggs of fish, do not fear, sir, to show yourself more equitable than certain French *savans* who have occupied themselves with this subject have hitherto been:—do not fear to proclaim aloud that it was in a village of the department of the Vosges

that the promblem of the artificial production of the eggs of fish was solved. In so doing you will be the organ of the truth; and the members of the Institute of France may do what they please; but they will not be able to deceive any except the superficial men who do not go to the bottom of things.

"I repeat what I have so often said—the problem of the artificial fecundation of the eggs of fish was only seen, and very imperfectly solved, by all the *savans* who have occupied themselves with it up to the present time. Spallanzani's experiments on this subject were not at all conclusive; and they were more connected with his experiments on electricity than with solution of a problem of which he thought only as accessory to a more important matter. The researches of Rusconi and Jacobi are nearly in the same case; and though Golstein, towards the middle of the last century, obtained results more satisfactory, it is certain that he deduced no practical consequences from them, and that since then the question has remained in the same state.

"What proves this, is a paper read to the Institute in 1848 by M. de Quatrefages. If at that period the solution of the problem had been found, that *savant* would not have failed to have said it; whilst, on the contrary, he proves at every line that he considered the solution as still to be found, and he even indicated the means by which it might be arrived at.

"Well, Sir, equity requires that it should be known that at that period two simple Vosgien fishermen, Remy and Gehin, of La Bresse, by means of care, practical observation, patience, and perseverance, succeeded in finding what had long been vainly desired, that is to say, the means of artificially fecundating the eggs of trout, and of procuring the exclusion of them. The *savans* may rise in revolt against the fact, that two simple observers of nature, without any science, without even knowing how to read or write, have found alone what they, the *savans*, vainly sought for in their ponderous books; but truth will triumph over their ill-will, and it will remain acquired to the history of the natural sciences that our two fishermen are really the inventors of the process now generally adopted of the artificial fecundation of the eggs of fish.

"What I say to you, Sir, of the ill-will of the French *savans* who have occupied themselves with the subject in question is so true, that not only does M. Milne-Edwards, in a report to the Minister of Commerce, tend to give to others than our two fishermen the merit of the priority of the invention, but in a recent sitting of the Institute, in which the question was discusssed by the same gentleman, and M. Coste (*a propos* of the experiments made by the Commission de Pisciculture,) no mention whatever was made of the operations of the two fishermen, nor were their names ever pronounced. This is grossly iniquitous; and on that account I express to you an ardent desire that a work, destined to make known the process in England, shall not commit a like injustice to my two countrymen.

"I beg of you to excuse me, Sir, for insisting so much on this point. But you will understand as well as I do, how important it is to leave

to our two fishermen the honor which belongs to them. They are not *savans*, it is true; they have not the advantage of being members of the Academy of Sciences: but what is theirs is theirs; and they cannot, without crying injustice, be deprived of the merit of an invention destined, as I believe, to obtain the most useful development, and a brilliant renown."

RIVER FISHERIES.

The Committee to whom were referred the Bill on the River Fisheries, together with the Report of the Fishery Wardens, and the Petitions on the subject of the River Fishery, beg leave to report as follows:—

They are impressed with a deep sense of the importance of the matter referred to them, and have entered on its consideration with an anxious desire, that any recommendation they might feel it their duty to make to the House, should be based on sound views of the policy which ought to prevail in reference to a matter so closely connected with the best interests of the Province,

They are inclined to believe that this subject has hitherto occupied too small a share of public attention; that its importance has been undervalued, and that the policy of the legislature in the laws it has passed on the subject, has been little understood or appreciated.

The Committee felt satisfied that they could not do a better service, than to gather from any sources open to them, such information as would have a tendency to dispel misapprehensions, and place before the country the true reasons and grounds on which the policy of the legislature is based.

They have therefore endeavoured to procure as much practical information as they could, bearing on the subject of the habits of fish resorting to our rivers; and have great pleasure in referring to the answers of Captain Chearnley, hereto annexed, given to questions submitted to him by the Committee, in which is comprised some information on the subject of our own fisheries not hitherto submitted to the public in any authentic form.

It is obvious that the policy of a law relating to the fisheries in our rivers, must be based upon a proper understanding of the habits of the fish resorting in those rivers.

As regards those kinds of fish which, in the propagation of their species, do not resort to fresh water, there is little need for any legislation, with a view to preserve them from destruction or diminution. The limitless ocean which forms their habitation, is also their protection and the hand of man is powerless to diminish the vast masses which is diffused over a space so enormous. But those fish whose instincts compel them to seek fresh waters for the propogation of their species, are for a certain period of each year, confined within narrow limits, are at the mercy of man, and may be diminished or exterminated at his will.

For such fish it may be necessary to interpose a legislature's protection, and preserve the true interests of a country by restraining its inhabitants from pursuing an immediate and direct good, at the expense of future and immeasureably greater loss.

The fish which resort to our rivers are principally the salmon, the gaspereaux, and the trout.

The first two are the greatest in importance.

The salmon enters the rivers of Nova Scotia from the middle of March to the middle of September. They swim along our coast from the southward and westward, entering first the rivers of Shelburne, Queens and Lunenburg, later the rivers of Halifax and Guysboro, and still later the rivers and streams of the Gulf of St. Lawrence. But besides these differences in the times of their entering our rivers there are others for which it is more difficult to account. In two rivers in the county of Queens, which empty into the sea within ten miles of each other, salmon appear in the one ten days earlier than in the other, reversing too, in this instance, the usual order by appearing first in the eastern river. The female salmon first enters, the male follows about a month after: and lastly come the grilse, or young salmon.

The salmon ascend the streams to the shallow waters, and select as their spawning grounds gravelly beds, prefering places in the neighbourhood of springs, where the water is the coolest, or bubbling runs over pebbly ground, where it is acrated by movement and agitation over a rough surface.

They deposit their spawn in the months of September and October, when the first frost comes, and in November or December return to the sea.

In about 3 months after the deposit of the spawn, the eggs are hatched. In two months more the young Fish attains the length of $1\frac{1}{4}$ inch, and at the age of 6 months it has grown to the length of $3\frac{1}{4}$ inches.

In this state the young salmon are called Parr. They do not go down to the sea till they are a year old. When the fry has obtained this age, it is about 7 inches long and 6 or 7 ounces in weight; but after remaining two or three months absent in the sea, it returns a grilse of four or five pounds weight, and when returning a second year, is sometimes found to have grown to 12 or 15 pounds.

The instinctive propensity of the full-grown salmon to resort to the fresh water to spawn, and then return to the sea, and the instinctive propensity of the young fry, after spending a year in the river nurseries, to resort to the ocean, cannot be counteracted by physical obstacles without destruction to the fish. It seems generally admitted that full grown salmon resort to the same rivers in which they were spawned; and therefore any continuous obstructions in violation of the instincts of the fish in any one river, will soon banish them entirely from the river.

The Gaspereaux appear also to come from the south and west; they arrive in some rivers earlier, and in others later, than the salmon.

They do not generally remain longer than thirty days, having in the mean time deposited their spawn.

The general policy to be applied to the preservation of salmon and gaspereaux is sufficiently indicated by the forgoing account of their habits and instincts.

It should be the duty of the Legislature to make such provision for their protection, as will ensure the yearly deposit of sufficient spawn to keep up the supply of fish within the river, and to afford an adequate nursery for the fish on the coast.

It would appear by the evidence of Captain Chearnley, that two thirds of the salmon resorting to a river, may be taken without unduly interfering with these objects. If this be correct it is obvious, that in streams much resorted to by these fish, a large amount of valuable food may be obtained by the inhabitants living on their banks without material prejudice to the fishery itself, and that sound policy requires that the natural right of the inhabitants to participate in this privilege, should be no further restrained than may be necessary to obtain the objects for which Legislative interference is justifiable.

By the law as it now stands the close season is uniform, being from the 30th June to the 1st of March. In many of our rivers in the Gulf and in the Bay of Fundy, the fish do not arrive till after the close season commences, and in consequence the law works most unequally, depriving of any participation in the Fishery, some portions of our people, while it allows it to others for a period above 3 months.

The law ought therefore to be allowed in this respect, and it should be left to the session of each county to determine at what period the close season shall commence in each particular river, or at all events in each particular county.

In reference to the physical obstructions which have been thrown across our rivers, your Committee need hardly observe that any dam or other obstacle which prevents the passage of fish to its natural spawning ground, will effectually destroy the fishery of the river.

In the early history of this country our rivers teemed with fish. The narratives of the first adventurers to Nova Scotia respecting the abundance of fish are almost incredible. The fish had then no enemy but the spear of the native hunter, who killed only what he wanted for his own use, and who raised no physical obstacle to the return of the fish every year to the spot dictated by instinct for the preservation and propagation of its kind. To a much later period the salmon and gaspereaux abounded in, and gave name to many of our rivers, where they are now almost unknown, but the great decrease has taken place since the growth of our lumber trade, which has blocked our rivers with numerous dams, that have been erected in reference only to the immediate interest of the proprietors.

The Law which prescribe a fish-way in each dam, has been most extensively, and, in many cases, most unnecessarily evaded. Until the passage of the Act of last Session no systematic effort has been made to carry out a policy absolutely necessary to the preservation of this most important interest

Your Committee have enquired in the operation of the new Law, and are glad to find that it has in general worked well. They discover, however, that in some of the Northern and Central Counties it has been found objectionable in some particulars, and in a few localities a strong and universal resistance is made to its enforcement.

Your Committee have enquired into the reasons of results so different.

The County of Queens is largely interested in the Lumber Trade. Last year its exports in connection with this trade exceeded and almost doubled that of any other County. Yet in this County the law has been found quite practicable, and has been carried out, so as to afford adequate protection to the Fishery, without working injury to any other important interest. On the other hand in some parts of Pictou, Colchester, and Cumberland, it was found impossible to carry out the Law without outraging the feelings, and incurring the opposition of the great bulk of the people.

On enqiring into the facts from which these differences arise, your Committe discover that the Rivers of Queens County have their sources in immense lakes situated in the far interior, and pour into the sea an immense volume of water. The quantity therefore of water which escapes through fish ways made at the bottom of the dams, is a matter of small consequence, and diminishes to no serious extent the water power which is required to work the machinery.

On the other hand the rivers which flow into the Gulf of St. Lawrence, particularly those which have their outlet in the harbour of the northern shore, are short and rapid, and will not bear the loss of the same volume of water which can be allowed to pass away without injury in rivers differently situated.

An aperture such as is applied to the Queen's County rivers would carry off the whole of the waters of those streams, and would render the machinery on their banks, to a large extent, useless.

On one small river in Tatamagouche, and its tributary brooks are erected no less than 20 mills which directly and indirectly afford a livelihood for some hundreds of families, and an article of export of the value of many thousands of pounds. The stream itself is insignificant in size, and though like all other rivers on our coast the resort of some few fish, never yielded a quantity sufficient to make it an object of consideration either to the inhabitants, or as a nursery for the sea.

If the law cannot be applied to the dams across this river without involving the destruction of all this valuable property, thereby depriving a large body of people of their livelihood, and the province of a valuable article of export, it is obvious that the true policy of the Legislature must arise from a comparison of inconveniences, and would dictate some modification of the provisions of the law to meet the exigency of the case.

Your Committee would therefore recommend that power should be given to the Sessions to relax the law in cases where it can be made clearly apparent that a particular river or stream should be exempted from its operation.

Your Committee have had their attention called to the propriety of making several important alterations in the act of last year, particularly in reference to the recommending for the district of St. Mary's, and the township of Maxwelton, the appointment of additional Wardens; but they are of opinion it would be better, before extensively interfering with the act, to have another year's experience of its operation.

They hope, too, before another session of the Legislature, to have more accurate information in respect of several of our more important rivers. They have derived much benefit from the information afforded to them by Captain Chearnley, but that gentleman's experience extends principally to the rivers westward of Halifax. They would hope that his services could be procured to carry out, during the ensuing season, an examination of the other rivers in the Province, and would consider it wise in the Legislature to appropriate a sum of £100, to enable the Government to procure through him a reliable report on the position and demands of the fisheries of all our principal rivers.

All of which is respectfully submitted.

March 27, 1854.

(Signed) A. G. ARCHIBALD,
JOHN J. MARSHALL,
STEPHEN FULTON,
BENJAMIN SMITH,
MARTIN I. WILKINS.*

* I sign the foregoing report protesting against allowing the court of sessions in the several counties to exempt any rivers from the operation of the law, or to modify the law to suit the supposed interests of individuals, on the ground that all dams heretofore erected on rivers resorted to by fishes from the sea were illegal, and ought to be removed or so constructed as to admit a free passage to the fish.

(Signed) MARTIN I. WILKINS.

QUESTIONS PUT TO CAPTAIN CHEARNLEY AND PATRICK GOUGH.

1. Have you made the habits and natural history of fish the subject of study and observation for some time, and how long?

2. Are you acquainted with many, and how many of the rivers and bays of Nova Scotia and Cape Breton, and over what period does your experience run?

3. Are the salmon caught in streams emptying into the Gulf of St. Lawrence the same kind of fish as those of the streams emptying into the Bay of Fundy? Is there any difference, and what is their average weight?

4. What kinds of fish resort from the sea to our rivers to spawn, and name the rivers most resorted to.

5. At what period of the year does the salmon begin to resort to our rivers, and when does the ascent cease? Is the time the same in all the

rivers, and if not state to the best of your knowledge the difference between our different principal rivers.

6. At what time does the deposit of spawn commence? Is it the same in each river; and if not state the difference?

7. How long before the spawning season do the fish begin to deteriorate, and when do they become unwholesome or unfit for human food?

8. Is there any difference in the habits of the salmon in this country, and in Ireland or England.

9. What is the close season in England, in Scotland, and in Ireland? and what laws exist relative to obstruction of rivers by dams or otherwise?

10. What parts of rivers do salmon select as their spawning grounds? What circumstances in the situation or materials of the bed of a stream supposed to make it a favorite resort for such purpose?

11. Does the deposite of saw-dust in the bed of a stream injure the spawning ground in the stream?

12. Do salmon resort invariably, when there is nothing to prevent them, to the streams in which they were spawned.

13. Have the mill-dams or other obstructions in our rivers interfered to any serious extent with the quantity of salmon resorting to our rivers, or caught in our bays or harbours? State any facts you may be acquainted with, in corroboration of your opinion on this subject.

14. What is the nature—and describe the plan of the fish-ways best fitted for insertion in a mill-dam.

15. What ascent is found not to interfere with the run of salmon up a river.

16. Do you consider the run of fish, and the quantity in a river, to be more obstructed by the nets and wears at the mouth of the rivers, or by dams in the upper parts?

17. What ought to be considered the fair annual produce of salmon in some of the principal rivers of the Province? Of the whole quantity resorting to a river, what proportion may be taken before the spawning season, without injury to the fishery?

18. Does the provision of the present law—making the close season from the 1st August to the 1st March, practically deprive the inhabitants of many of our rivers of any privilege connected with the taking of fish; and if so, what remedy would you suggest?

19. What do you consider the main defects of the act as it now exists? What alteration would you suggest, and state the grounds on which such suggestions are made?

20. State your views of the general policy which should be pursued.

21. Would there be any impropriety in giving the Sessions the power of exempting any river which is spanned by a number of dams in which fish-ways could not be made without great damage to the mill property situate thereon being subject to the law?

22. What is the distinction between salmon and grisle? and should any provision be made for the preservation of the latter? What length of time elapses from the deposit of spawn till the young fish becomes full

grown, and what are its habits and places of resort in the intermediate periods?

23. Do you see any objections to the practice of spearing as a mode of taking fish?

24. What is the food of salmon in salt water? What in fresh?

25. Do salmon under any circumstances remain in the river all winter; and if so in what condition are they in the spring?

ANSWERS OF CAPTAIN CHEARNLEY.

1. I have made this my study theoretically and practically for more than 30 years.

2. Since the year 1831 I have visited all the principal rivers from Clyde River, Shelburne County, to White Haven, to the eastward, as also many in and about Cape Breton.

3. I have not seen salmon taken in the Bay of Funday, but from my reading and experience I know of but one species.

4. Salmon, gaspereaux, trout, shad, bass, grayling and some others. The three first named resort to nearly all the rivers in the Province, the others to some particular streams.

5. They commence running in our rivers to the westward in March, and continue till the end of July. The time is not the same in all rivers, instance in Gold River, Lunenburg, the salmon commence running in March; and at the Musquodoboit, to the eastward of Halifax, about the first of June, and in the Shubenacadie, River Philip, and perhaps some others, at a later period.

6. In the month of September and October, or at the early frost in all our rivers.

7. Salmon deteriorate from the time of their entrance in the fresh water, and are unwholesome during procreation.

8. To my knowledge there is no difference in the habits of salmon.

9. In Ireland the close season commences 20th August, and ceases 12th February; Commissioners however are empowered to alter the close season in any river or district, upon proof that such alteration is necessary. In Scotland from 1st September to 31st January. Commissioners are appointed by the Government to keep open a free and uninterrupted passage for the fish at all seasons, and during a dry season the waste gates or over-falls are directed to be closed so as to direct and force the surplus water through the passage prepared for the migration of fish. In New Brunswick, 31st August to 1st April.

10. Salmon select the shallow waters at the heads of rivers to deposit their spawn, and are found breeding in tributary streams. This fish generally deposits its spawn in gravelly and sandy beds.

11. Saw-dust is believed to be injurious to salmon, and in spawning they invariably avoid it. It is considered so destructive, that in Scotland millers are, by law, compelled to carry it off by shoots, so that no saw-dust is allowed to enter a river where fish resort; all writers agree on this point.

12. It is generally believed so, and my experience confirms such belief.

13. The mill dams and other obstructions on the rivers of Nova Scotia have seriously interfered with the quantity of salmon resorting to our rivers.

Facts. At Preston River, last year, an abandoned dam was levelled which had obstructed the passage of fish for many years. Immediately after a free passage was made, salmon and gaspereaux were seen many miles up the stream, where they had not been seen since the erection of the dam; and it was in the recollection of inhabitants that fish formerly were very abundant in that river.

The same occurred at Chezetcook River. In Sackville River a fish-way was made, and fish was seen in numbers entering the passage, migrating, which, before the passage was made, had been driven back.

At Port Medway Mr. Gough reports that he cleared an obstruction in that river, and in twenty-five minutes from the time of its being cleared he counted forty-three salmon passing up. In Gaspereaux or Salmon River, Horton, and indeed in all the rivers in this country where obstructions exist, the fish of all sorts are nearly extinct.

14. It is essential that a free passage in ascending and descending the rivers, should be afforded to the fish, and any plan which will allow such uninterrupted passage will be sufficient to be inserted in a mill-dam. Among others the following plans have been found effectual. viz., No. 1.—A double inclined plane, at an obtuse angle, with about one foot of water running over it, with proper breaks to produce a serpertine course. No. 2.—A sufficient opening or aperture, made in the bottom of the dam with a breakwater situated about ten feet above the sluice, with side pieces to prevent the aperture being closed. This latter has been found to serve the purpose at Liverpool. Another plan has been adopted at Sackville river, and has been found to answer well.

15. An obstruction of 2 or 3 feet may not interfere with the ascent of salmon, provided there is a sufficient volume of water, and if there is a sufficiency of water, or a gradually inclined plane with convenient resting places, salmon may ascend to a still greater height.

16. I consider that nets and wears at the mouth of our rivers and dams, in the upper parts, are obstructions, and destructive to the run, and consequently diminish the quantity of the fish.

17. It is impossible to state with accurracy what the annual produce of salmon now is in the principal rivers of the Province; various obstructions in the rivers preventing the fish migrating to their spawning grounds, and the destructive means (nets, spears, &c.,) used in capturing them, have so diminished the quantity during the last 30 years as to nearly extirpate the fish. An instance may he given where at Liverpool, within the recollection of the inhabitants, 500 barrrels have been taken in the season, now perhaps not as many pounds. About two thirds of the salmon may be taken after having entered a river without diminishing the usual number in the subsequent season.

18. It may interfere with some of the rivers to the eastward, and I

would suggest that the Sessions should regulate the close seasons for the rivers in their respective counties.

19 & 20. A revised act has been prepared and forwarded by me to your Honorable House, in which has been embodied my views, relative to the alterations required in the existing law, and also my views of the general policy, which should be pursued; to which document I refer you in answer to the 19 & 20 question.

21. If any river spanned by a number of dams, in which fish-ways could not be made without great damage to mill property, be exempt from the existing law, the fishery of that river will be totally destroyed. It is for your Honorable House to consider the propriety or impropriety of such exemption.

22. A grilse is a young salmon, and the same provision should be made as for old salmon. Salmon are supposed to be at their full growth in 5 or six years, and they alternately resort in the intermediate period to the salt and fresh water. The grilse may be preserved by the use of nets with meshes not smaller than 5 inches.

23. Spearing is decidedly injurious and destructive, and I beg again to refer you to the revised act previously referred to.

24. The food of salmon in the salt water is the sand eel, and caplin, and in fresh water they feed on flies, worms, grubs, &c.

25. Occasionally salmon remain in the rivers all winter. This is caused by debility, and in the spring they are found in an exhausted state.

ANSWERS OF PATRICK GOUGH.

1. Not till within the last twelve months.

2. I am acquainted with the rivers of Queens County, principally.

4. Alewives and salmon, principally.

5. They begin to resort to the Rivers in Queens County the last week in April, and continue to the last of July. Port Medway River is only 10 miles from Liverpool River, but the Salmon resort to the former river a fortnight earlier than to the latter.

After the Salmon, comes the Grilse; they begin about the 20th July, and cease about September. About 38 years ago, a gentleman of Queens County caught a Grilse and marked it, and returned it to the water. It then weighed 4½ lbs. The next year it was caught again ascending the same river, and then weighed 12 lbs.

6. Salmon begin to spawn in October.

7. When the fish come first from the sea, they are fat and in their prime. They begin to deteriorate at once, and become worse and worse till the actual deposit of the spawn.

They are wholesome till within 5 or 6 weeks of spawning.

10. Salmon select the shoal water near the heads of rivers for spawning. I have seen them in water scarce deep enough to cover their backs. Gravelly bottoms are most resorted to. The Salmon when ready to spawn make holes in the gravelly bed of the river, where they remain in

pairs, the male and female. They remain in their spawning holes for a week at least, leaving them during the day, and returning at night.

11. I dont think the saw-dust does harm. The Salmon spawn higher up the streams than where saw-dust is found.

13. The mill-dams have seriously injured the fishing.

When I came to Queens County, a Mr. Dunn of Mill Village used to take 1,000 barrels of Gaspereaux in a season, and the other inhabitants 2,000 more. Such is the difference in the run of the fish that last year not more than 300 barrels could have been taken by the utmost diligence. In point of fact there were none taken. They are always caught below mill-dams, and the law prohibits taking them within a quarter of a mile; and was this year in force. Four mill-dams were built across Liverpool River. The first is near 100 years old but always had a fish way. The other dams have been built of late date, and had all fish-ways when first constructed, but their fishways have become closed by drift-wood, and at the time the new law came into operation the fishways were completely obstructed. I attribute the falling off of the fishery entirely to these obstacles.

14. The plan I propose for a fish-way is this: Cut a hole in the bottom of the dam on a level with the lowest part of the water in the Pond, 2, 4, or 6 feet square, according to the size of the river. At a distance of 10 feet from the inner or pond end of this hole build a pier, 12 feet square, connect the two ends of this pier with the dam by stringers, one connecting the top of the pier with the top of the dam, the other the bottom of the pier with the bottom of the dam. Attach upright pickets to these stringers at a distance of 14 inches apart. The pier stops the rush of the water into the hole and the pickets prevent the way being stopped up with rubbish.

From the pier to the shore there should be a bridge, so as to make the pier easily accessible for the removal of rubbish. That part of the dam which is over the hole should be raised so far above the general level of the dam as to prevent any water passing over and falling upon that which passes through the fishway.

This plan is applicable to all dams. If the dam be not made of timber, a square box can be inserted instead of cutting the timber for the hole. The cost of inserting one of these fishways in an ordinary dam would range from £5 to £12, according to the size.

15. This depends on the quantity of water. When the water is high and running over a dam, a salmon will sometimes force his way up; salmon never leap over an obstruction unless there is a sheet of water covering it.

THE HON. ALEXANDER CAMPBELL.

I have been long acquainted with the northern parts of the Counties of Pictou, Colchester and Cumberland. All the rivers that have their outlet in the Gulf, west of Pictou, are short, and most of them rapid, varying in length from 3 to 5 miles, from the head of the tide to the base of the mountains, from which they spring. After a rain the moun-

tain torrents descend with great rapidity. The streams swell sometimes rising from 2 to 5 feet, and after the rain ceases, subsiding rapidly. There is no steady current of water supplied from distant lakes. It becomes necessary, therefore, to preserve with great care all the water after the first rush of a freshet is past. If a fish-way were made at the bottom of one of our mill-dams, 3 feet square, it would practically destroy our mills. They could not work, except during the height of the spring and fall freshets. On the French River, and the small streams emptying into it, there are 20 mills. The average produce of these mills is probably from £150 to £200 a year; directly and indirectly they form a source of support to a large body of people. To apply the law to the dams on this river, by putting in such fish-ways as Mr. Gough describes, would be to confiscate property worth many thousands of pounds, and reduce to indigence a large portion of the most industrious and useful classes in the county.

The fish-ways to which Mr. Gough refers, and the pier which he recommends, are not applicable to our northern rivers They may suit the western rivers where the waters are warmer and deeper, and the climate less severe, but will not suit us. The piers could not stand. In winter they would be surrounded and contracted by solid ice, and in the spring would be lifted and removed. The ice is immensely powerful in this way. I have seen it operate to extract trees firmly fixed in the ground by long and spreading roots. I have known cases where the ponds have been made by putting a dam in a suitable place across a hollow ground which has been previously wooded, and the wood chopped down, leaving stumps standing. The ice surrounding these stumps, and embracing them, has lifted them up in the spring, and I have known dams destroyed by the holes made in this way, by drawing up the roots of trees which extended under the dams.

The salmon come into the rivers that empty into Tatamagouche harbour, with the first freshet after the middle of September, and leave in the early part of November.