

X.—EXTRACTS FROM THE FIRST ANNUAL REPORT OF THE FISHERY BOARD OF SCOTLAND FOR THE YEAR ENDING DECEMBER 31, 1882.

A.—SCIENTIFIC INVESTIGATIONS PROPOSED BY THE FISHERY BOARD OF SCOTLAND, AS NECESSARY FOR THE IMPROVEMENT OF THE FISHERIES.

Taking into consideration that the Board is not only required to make suggestions for the improvement of the fisheries, but is empowered to "take such measures for their improvement as the funds under their administration, and not otherwise appropriated, may admit of," and taking into consideration also the important practical results obtained by the United States Commission of Fish and Fisheries, we decided, as soon as provided with the necessary appliances, to institute investigations into the habits and life history of some of our more important food-fishes, such as the herring, cod, ling, haddock, mackerel, sole, plaice, and flounder.

The following questions we consider as deserving of careful investigations :

1. The food, life history, distribution, and migration of useful fishes.
2. The nature of the feeding and spawning grounds of food-fishes.
3. The period of spawning, nature of the ova, and the time required for and the conditions favorable to hatching.
4. What means can be adopted for the protection of fish during their early stages of growth, and what can be done to prevent the destruction of immature fish.
5. What new useful fishes (such as the American shad and the land-locked salmon) can be introduced, and how far the supply of our present forms can be increased by artificial cultivation or protection during the spawning period.
6. The influence of atmospheric variations and of the changes of the temperature of the water and of currents on the presence and migrations of fish, and the nature and depth of the water where fish commonly abound.
7. The special enemies of useful fishes, and the causes of the disappearance of fish from certain districts.

We further believe that it is desirable to make a collection of useful fishes and their food.

Recent investigations indicate that out of every million of ova of cod

and other sea fish only very few undergo development, and that only a very small number of those developed ever reach maturity. This being the case, it will be evident that if the eggs are placed in circumstances favorable to development, and if the young are protected for some time after hatching, the number of any given fish might be increased to an almost indefinite extent. Hence it might have been expected that we would first have directed our attention to the artificial cultivation of the cod or some other fish that appears rather to be diminishing than increasing in numbers along our shores. This, however, necessitates more appliances than we can at present command, and we have therefore determined to begin our inquiries by endeavoring to increase our limited knowledge of the herring, especially of its food and early life-history. That this is not only an important question to take up, but one of the first questions which deserves attention, will be evident when the part the herring plays as food, not only for man, but also for the cod and salmon, is taken into consideration.

In order to carry on investigations as to the food, habits, and early life-history of the herring, it was necessary to have at our disposal a steam-vessel, dredging apparatus, &c. Accordingly we applied to you to move the Lords of the Admiralty to grant the use of a steam-pinnace. This application has for the present been declined, for reasons stated; but, as you are aware, we are still in communication on the subject, and it is to be hoped that the Lords of the Admiralty will yet see their way to grant our request; for, if the investigations could be set on foot at once, we are confident that important results could be obtained during the remaining part of the present year.

In reference to the above proposed scientific investigations, we are impressed with the importance of testing new and more skillful methods of fishing, as, for instance, the successful working of the seine purse-net upon the American coast, which might probably be well adapted to the herring fishery on our own coasts; also the cod gill-net, likewise used with much success on the American coast; and there is no doubt that, with increased Government assistance, much might be done in this direction for the development and improvement of our fisheries.

B.—THE EFFECT OF FIXED ENGINES ON THE SALMON FISHERIES—A PRIZE ESSAY ON “SALMON LEGISLATION IN SCOTLAND,” BY J. M. LEITH.

We now come to “fixed engines,” which, together with pollutions, share the unenviable distinction of being the most destructive agency affecting the salmon-fishings of the whole kingdom. It was very early discovered that the use of fixed nets and engines in rivers exercised an injurious effect upon the development of the fisheries, and in fact that it promised, if unrestricted, to exterminate salmon altogether. Therefore, as we see by the old statutes before referred to, fixed engines were

sternly and forcibly prohibited both in rivers and estuaries, and this prohibition has been confirmed by modern judicial decision, and also by statute, except with regard to a certain limited number of cruives and yairs, which exist by virtue of special grant from the Crown, and cannot be abolished without compensation. About sixty years ago, however, it was discovered that nets fixed on sea-shore were quite as productive as they had been in the rivers, and accordingly in a comparatively short period the whole coast bristled with them, altogether irrespective of right to fish for salmon. They have somewhat decreased since then, because in many cases it was found unprofitable to work them; but they still exist in large numbers, and, judging from the weight of evidence and authority which is accessible on the point, they are prejudicial to the increase and preservation of salmon, and, if they cannot be altogether abolished, they should be placed under much more stringent regulations. It is urged on their behalf (1) that they are established by prescription, and cannot, therefore, be abolished without compensation; (2) that to abolish them would seriously affect the food supply of the country from this source; (3) that though they may diminish the number of fish which reach the rivers, they cause no decline in the total number of fish caught annually; and further, that the fish which they catch are in better condition than those in the rivers; and (4) that no other method of fishing with profit is available in the sea. The first of these pleas is a very plausible one, and no doubt will be very difficult to get over. Prescription, however, cannot run against statute; and though fixed nets on the shore are not specifically mentioned in the old statutes, we ought to hold them included, because the spirit of the whole legislation is so clearly and forcibly directed against that mode of fishing as being unfair and destructive that we cannot doubt that the prohibitions would have been extended to the sea had fixed nets been in existence there at the time. Remedial statutes must receive a liberal interpretation. These old acts prohibit all fixed engines in the "run of the fish." The natural history and habits of the salmon were not then well known, and the legislators were totally ignorant of the fact that the sea-shore was as much the "run of the fish" as the river. In no charter granted is any such mode of fishing authorized or contemplated, and the proprietors of fixed nets have simply erected them without any right to do so and on chance of no one interfering. It was in the rivers that salmon fishing was originally recognized as property, long before even a coast charter was granted (in 1603), and no person had at any subsequent time a right to encroach on this private property. That is exactly what the fixed-net fishers on the coast have done, however, with the result that what was once a valuable possession has in many cases become useless, and no compensation has ever been paid to those deprived of a considerable portion of their income, in securing which often a large amount of capital had been sunk. It is difficult to see what better claims to compensation those persons would have for

the abolition of a practice which was really illegal at first, and which has only acquired a semblance of right because, owing to the uncertainty of the law and the want of proper opposition, it has been allowed to exist beyond the prescriptive period. The appropriation of the waters of rivers and streams by manufacturers, without any title, and totally oblivious of the rights of others, is a case on all-fours with that under discussion. Their doing so destroyed in many cases the fishings enjoyed by riparian proprietors, and deteriorated in all cases the value of the land through which the streams passed; but for want of proper challenge, and a notion that it would not do to interfere with industry, the illegal encroachments were allowed to go on till they obtained a hold which it is difficult now to shake off. The dispossessed proprietors had no compensation here either. No doubt many of the present proprietors of coast fisheries have paid large sums for their fishings in the belief that they were legal, and it might be hard to punish them for the fault of their predecessors. These cases might, perhaps, receive extra consideration, but they do not affect the public question of the legality or illegality of the fixed nets; and if that question were decided against the legality, there can be no doubt that there would be no right to compensation. On the contrary, there would arise claims of damages on the part of those who had suffered from the usurpation.

There is a strong preponderance of evidence and presumption that these nets were unlawfully erected at first against the spirit, if not the letter, of the statutes, and that therefore prescription should not be held to legalize them. Besides, prescription properly only applies to private rights, and has never been, and is not now, admitted where it is "hurtful to the common weill."

The argument that the abolition of fixed nets would seriously reduce the food supply of the country, supported, as it is, by the high authority of the commissioners of 1870, is, of course, entitled to greater consideration. But it is fair to state that there is a good deal of evidence on the other side, and it is backed up in many cases by actual proof. A useful pamphlet, published by Mr. Alexander Jopp, in 1860, contains a large quantity of valuable statistics relating to the Aberdeenshire fishings bearing upon this point. It is shown conclusively that salmon had greatly decreased, both in number and weight, since the introduction of stake-nets, though of course his results referred more particularly to the rivers and not to the sea. But the number of boxes of salmon exported tells the same tale, and a stronger proof still that the total number of fish is diminished by stake-nets is derived from the fact that several proprietors of fixed nets on the coast obtained a large increase of the rentals of their whole fisheries by giving up these fixed nets. The Duke of Richmond, for example, increased his rental from £6,000 to £13,000 in eight years by removing his fixtures at the mouth of the Spey, and the Duke of Sutherland and Earl of Fife, by adopting a similar policy, attained similar results. There are proofs of the same kind

in connection with the fishings on the Solway and elsewhere. Not only, therefore, do fixed engines diminish the number of fish which reach the rivers, but they diminish the total annual number of fish caught, and the statistics of the present day bear out, on the average, those just referred to in this conclusion, though of course there are also other causes at work, and considerable fluctuations. It is undoubtedly the case that fish taken in the sea are in superior condition to those caught in fresh water, but of what avail is that if we take them in such numbers that there will soon be no more left to be caught? In some places on the coast no other mode of fishing is properly available except fixed nets, but the same may be said of the rivers, and yet fixed engines have been abolished there without compensation. The assertion that no other mode can be followed with profit is subject to qualification—it should be with so much profit—seeing that the capital is also encroached upon to a greater or less degree. Besides, from the point of view of the public interest, these stake and bag nets are objectionable on account of the expense involved in working them, which considerably increases the price of the fish to the buyers. I have seen various estimates of the difference of cost of working stake-nets and net and coble, and it is in all cases very marked.

Many exhaustive inquiries have been instituted by Parliament on this subject, and the almost invariable result has been that commissions and committees have recommended that fixed engines should be entirely suppressed, and accordingly suppressed they have been in England, and in Ireland at least checked and strictly regulated. But if it should be deemed inadvisable to put them down altogether in Scotland, they can and ought at least to be placed under strict regulations, and adequate measures taken to insure that these regulations are carried out to the letter, and in this view the suggestions contained in the Special Commissioners' Report of 1871 are admirable and should be adopted. The distance from the mouths of rivers, however, recommended by the commissioners, might, with advantage, be extended in most cases to from 1 mile to 3 miles, according to the configuration of the coast; stake-nets should in no case be allowed to extend further than from high to low water mark, and bag-nets, in addition to being restricted to steep, rocky coasts, and not allowed to be joined to stake-nets, should not be permitted within 3 miles of the mouth of any river. This is the law in Ireland as to stake and bag nets. Very severe penalties should be enacted for breach of weekly or annual close-time, as there is reason to believe that in many cases at present the law is simply ignored, and if any complaint is made, stress of weather or absence of employés is pleaded. It has been suggested that in any case where stress of weather prevents the due observance of the weekly close-time, the owners or tacksmen of the nets should be bound to report the matter to the chief constable of the county, or other official, and satisfy him that the nets were closed for fishing for an equal period when the weather allowed it;

also that the close-time should be by tides, and not by hours, as is already the case in the Tweed.

With regard to reducing the number of fixed engines now plying, a great deal of power rests with the Crown as owner of all the fishings on the sea-shore ungranted, and surely the public are entitled to look to the Crown to exercise that power. (1) If the Crown were to carry to its legitimate issue the inquiry set on foot in 1859 as to the titles of all persons exercising fishing on the sea-shore, a large number of persons now fishing without a title would be turned off. (2) Every proprietor whose title had been examined and found satisfactory should be entered on a register (a copy of which should be supplied to district boards), and a certificate to that effect should be granted him by the Commissioners of Woods and Forests, which he should be bound to exhibit at all times when asked by proper authority, care being taken, of course, to provide that this was only a certificate of title, and not of legality of any mode of fishing. (3) After a reasonable interval to allow proprietors to send in their titles for examination, it should be declared that all persons not in this register, and not provided with certificates of title, should be liable to prosecution and penalties for illegal fishing, which should be rigorously enforced. Any proprietor producing a good title after prosecution instituted to be liable in all expenses. (4) In all the fishings which would thus lapse to the Crown, and all those presently in its possession, let or unlet, the Crown might be expected to forego making profit at the expense of the public good, and prohibit the use of fixed nets to all its lessees. If these suggestions were carried out, the number of fixed nets would be greatly reduced, and it would then become much easier to make regulations regarding the number of nets to be allowed on a certain expanse of shore, distance from rivers, &c.

C.—THE HERRING, COD, AND LING FISHERIES OF 1882.

1. THE HERRING FISHERY.

The herring fishery of 1882 was, with the single exception of that of 1880, the largest upon record. In 1882 the total number of barrels cured was 1,282,973½, while the number cured in 1880 amounted to 1,473,600½.

The particulars of the results of the fishing of last year, when compared with those of 1881, show a considerable increase in the herrings cured and exported, but a decrease in those branded and in the amount received for brand fees. The returns are :

Years.	Barrels cured.	Barrels ex-ported.	Barrels branded.
1881	1, 111, 155½	745, 879½	404, 182½
1882	1, 282, 973½	825, 982½	462, 612½
Increase in 1882	171, 818½	80, 103
Decrease in 1882	31, 570

If the results of 1882 are compared with the average of those of the ten previous years it will be seen that they show a large increase in all the items. The particulars are as follows :

Years.	Barrels cured.	Barrels exported.	Barrels branded.
Average of ten years, 1872-'81.....	943, 487	650, 895	453, 282
1882	1, 282, 973½	825, 982½	462, 612½
Increase in 1882	339, 486½	175, 087½	9, 350½

2. THE COD AND LING FISHERY.

The cod and ling fishery of 1882 yielded an increase of 5,823½ cwts., cured dried, and 3,661½ barrels cured in pickle, over the fishing of 1881. There was an increase in the quantity cured on shore, amounting to 19,200½ cwts., and to it nearly all the districts contributed; but this was so largely counterbalanced by a decrease in the quantity cured on board of vessels that the net increase only amounted to what is stated above.

In Orkney district, at the end of January, when herring bait could be got, the cod and ling fishing was very successful, and the small native boats were frequently loaded. In Stornoway district the weather was unfavorable till the end of March, but it moderated in April and May, when excellent fishing was had. In Shetland district strong winds retarded the spring cod-fishing till May. Thereafter the weather became more settled, and the boats succeeded in making fair average catches. Two hundred and twenty-seven decked boats were engaged in the fishing, of which 150 belonged to Shetland, and the remaining 77 to other districts on the east coast. The quantity of ling caught in Shetland during the season was fully equal to the average of recent years; and in the cod and ling fishing, as in the herring fishing, the six-oared open boats, which were formerly so much in use, are gradually being superseded by large decked boats.

A result of the success of the spring cod and summer herring fishing in Shetland has been that the fishermen there now prefer to purchase shares in decked boats and fish at home instead of manning vessels for cod-fishing on the coast and at Faroe and Iceland. In consequence of this only 19 vessels were fitted out in 1882 for Faroe and Iceland, and there was difficulty in getting fishermen to man even this small number, whereas a few years ago 38 vessels were sent to fish at these places. The vessels got a fair amount of success at Faroe, but on afterwards proceeding to Iceland in August they were met by large quantities of floating ice, so that their fishing was much obstructed and proved a poor one. The decrease in the quantity of fish cured on board of vessels in 1882, as compared with 1881, was 13,437 cwts.

The total quantities of cod, ling, and hake cured and exported in 1881 and 1882, respectively, are :

Total quantities of cod, ling, and hake.

Years.	Cured.		Exported all-cured dried.			
	Dried.	In pickle.	To Ireland.	To the continent.	To places out of Europe.	Total.
1881.....	<i>Cwts.</i> 115,513½	<i>Barrels.</i> 4,075½	<i>Cwts.</i> 27,809	<i>Cwts.</i> 26,870	<i>Cwts.</i> 6,747	<i>Cwts.</i> 61,426
1882.....	121,837	7,737	23,846	23,328	9,325	56,497
Increase in 1882.....	5,823½	3,661½			2,578	
Decrease in 1882.....			3,963	3,544		4,929

3. FISHING BOATS.

The following table shows the number of boats, decked or undecked, employed in the shore-curing herring and cod and ling fisheries, Scotland; the number of fishermen and boys by whom they are manned; the number of fish-curers, coopers, and other persons employed in the years 1881 and 1882 :

Years.	Fishing boats.	Fishermen and boys.	Fish-curers.	Coopers.	Other persons (estimated.)
1881.....	14,809	48,121	1,063	2,398	45,291
1882.....	14,978	48,296	1,072	2,564	47,454
Increase in 1882.....	169	175	9	166	2,173