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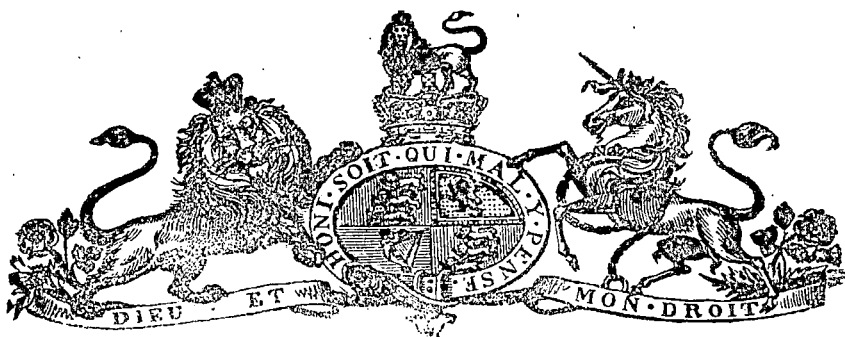
1884.

PARLIAMENT OF TASMANIA.

FISHERIES OF TASMANIA :

REPORT BY W. SAVILLE KENT, F.L.S., F.Z.S.

Presented to both Houses of Parliament by His Excellency's Command.



84, Davey-street, Hobart, 9th September, 1884.

SIR,

IN compliance with your request, I have the honor to lay before you a brief statement indicating the more important directions in which I am of the opinion that certain of the Sea and Fresh Water Fishing Industries of Tasmania might be developed or re-established, as also the means I would suggest for the accomplishment of so desirable a result.

MARINE DEPARTMENT.

1. *The Oyster Fisheries.*

With reference to this once highly important fishery, undoubtedly reduced to its present impoverished state mainly through overfishing, I would earnestly recommend that steps be taken for the formation of efficiently protected Government reserves, in which breeding stocks of oysters of the best quality might be laid down for the replenishment of the surrounding waters. As evidence of the important practical results that have been accomplished by the adoption of such a precaution in other countries, I may refer to the successes achieved in this direction on various portions of the French coast, but more especially to those connected with the Netherlands oyster fisheries, recorded by Professor Hubrecht in a paper communicated to the Conferences of the London International Fisheries Exhibition, 1883. It was therein shown that the famous oyster beds now established for many years at the mouth of the Schelde owe their continued productiveness to the fact that a very considerable oyster-producing area has from the commencement been left totally undisturbed, and has thus annually furnished an abundant supply of "spat" or brood to the adjacent cultivated beds.

This reserve area, it is worthy of remark, was not in the first instance purposely or even knowingly established, but owed its origin to the following circumstances:—The coast line throughout the Schelde district is protected from the incursions of the sea by specially constructed stone defences, and to guard against their injury a law was enacted prohibiting the use of the dredge anywhere within a distance of 500 metres from their outer boundary. For a long time the proprietors of the neighbouring oyster beds were at a loss to account for the constant and abundant supply of brood that annually settled upon their ground. A diver was at length employed to examine the submerged bases of the stone defences above referred to, and it was then discovered that wherever these stood out on the sea bottom a more or less profuse crop of oysters of all ages was developed. The problem as to the source from whence the yearly supply of spat was chiefly derived was thenceforward solved, and, with the unanimous approval of the oyster proprietors themselves, the preservation of this productive nursery ground has ever since been strictly enforced with the most gratifying results.

Working upon the same natural principle, I would advise that certain duly approved areas formerly noted for their productiveness, and still retaining a natural adaptation to the growth of the oyster, should be restocked and protected by the Government as breeding grounds for this mollusk. An abundant supply of stock being laid down and maintained on these beds could not but result sooner or later in the replenishment of the adjacent districts. The most suitable localities for the formation of such reserves as are here recommended I am not yet in a position to precisely determine, but upon this point I shall hope shortly to be able to report to you more fully.

A second method of procedure by which I am of the opinion that the oyster fisheries of Tasmania might be resuscitated is through the establishment and maintenance, either by the Government itself or with Government aid, of one or more model farms for the culture of oysters on the most approved principles. Among the localities that appear to offer peculiar advantages for the establishment of such oyster farms I am inclined to indicate such areas as Cloudy Bay Lagoon in South Bruny, and also probably Pipe-clay Lagoon and the Pittwater. Such lagoons which abound on the Tasmanian coast, possessing as their natural features a considerable expanse of salt water which communicates with the sea by a narrow inlet, correspond in a remarkable manner with the famous oyster lagoon near Baia on the coast of Italy, known as Lake Fusaro, and which has been celebrated from the times of the ancient Romans to the present day for its cultivated oysters. It was, in fact, the system of oyster culture in operation at Lake Fusaro that supplied M. Coste, the well-

known French ostraculturist, with the idea so successfully carried out of establishing oyster parks at Arcachon, Cancale, and other points on the French coast. The lagoons of Tasmania possess greater natural advantages for successful oyster culture than the best grounds in French waters, and more nearly resemble the famous station oyster lagoon of Lake Fusaro, in that their communication with the ocean might be entirely controlled by artificially erected guards or sluices, and the "spat" produced by the parent oysters prevented from being carried out to sea and lost, as so frequently happens where beds are formed in open bays or channels.

The accompanying diagrammatic outline, Fig. 1, roughly illustrates the general form and relationship to the sea of Lake Fusaro in Italy; Figs. 2 and 3 indicating the systems there employed for forming the artificial oyster banks and for collecting the spat. While it would be desirable, I think, for the Government to establish and maintain one or more oyster farms on the basis here suggested, encouragement should be given to private individuals or companies to undertake a like cultivation of some of the many suitable lagoons that abound on this coastline, and which, if skilfully conducted, could scarcely fail to yield a profitable return.

2. *Salt and Brackish-water Fish Preserves.*

There are other important fishing industries to which the lagoons of Tasmania, so suitable for oyster culture, might be made subservient. Certain of these lagoons are fed by fresh-water streams and there would be but little difficulty in converting these into salt or brackish-water lakes for the cultivation of the more valuable food fishes. I would especially recommend the adaptation of one such lagoon for the reception of a number of the young salmon reared at the breeding-ponds at New Norfolk. If placed therein so soon as they had assumed the "smolt" condition and were ready to migrate to the sea, they would grow rapidly throughout the summer months in the salt water of the lagoon and repair in autumn and winter to the connecting stream to deposit their spawn. They would thus be under control and safeguarded from the enemies which would prey upon them in the open sea, and would constitute a permanent breeding stock from whence might be derived a sufficient quantity of ova for stocking Tasmanian and other colonial waters, and thus save the expensive and precarious process of repeatedly importing supplies from England or elsewhere. This suggested method of cultivating salmonidæ in salt-water ponds has been practically carried out on the Norwegian Coast.

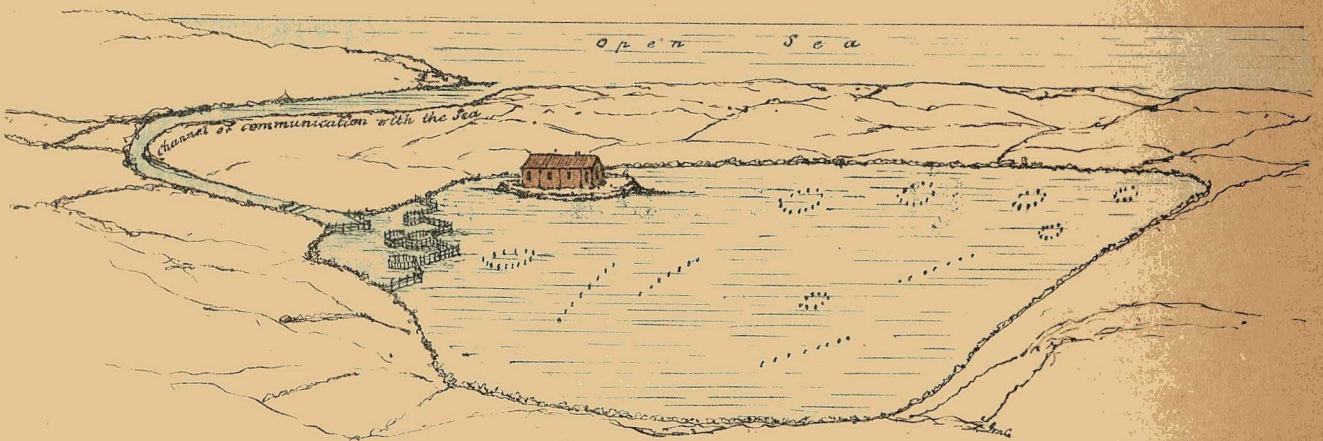
The establishment of salt-water ponds, as above suggested, would again be of the utmost service in connection with the attempt I propose making to introduce such valuable European food fishes as cod, herring, soles, turbot, and lobsters into Tasmanian waters. As stated in a memorandum recently addressed to the Chairman of the Salmon Commission, I am of the opinion that the ova of these marine fishes might be successfully imported to this Colony by the adoption of a modification of that system which has already succeeded in the transport of the ova of salmonidæ. Valuable native fish, such as the real trumpeter (*Lates hecateia*) might likewise be profitably cultivated in these lagoons. In the Commissioners' Report for 1883 the supplies of this last-named species are stated to be diminishing through overfishing. By the culture of its ova and fry in salt-water ponds its former abundance might be restored, and it would not improbably be found possible to acclimatize it in waters nearer home than those it now chiefly frequents, in the same manner that the codfish has been induced to take up its residence in warmer and shallower waters on the American Coast than it previously inhabited through the adoption of the simple plan of annually turning into such waters vast numbers of artificially cultivated fry.

3. *A Salt-water Hatchery and Laboratory.*

An indispensable adjunct to the Sea Fisheries Department will be a small hatchery, containing tanks, pumping apparatus, and other appliances for the experimental culture of marine forms of economic value. Such a marine hatchery I propose to erect on the premises adjacent to my residence when determined, and therein to conduct more especially investigations concerning the natural history and developmental phenomena of the oyster peculiar to these waters, and which in many respects appears to differ materially from those of the European varieties. It is only by such a close and careful study of the specific peculiarities of a given type that the data can be arrived at upon which its artificial culture on a large and profitable scale can be safely conducted. In such a hatchery I would likewise initiate those experiments concerning the artificial development of the ova of valuable British and other exotic marine fish that might be advantageously introduced into this Colony. The cost of the erection of this proposed marine hatchery, including a wooden shed, breeding-tanks, cistern, reservoir, and pump for circulating the water, would at the lowest estimate amount to about £200, and I would petition that such a sum, at least, should be placed at my disposal for this purpose at so early a date that I may be in a position to commence my experimental investigations this coming Spring.

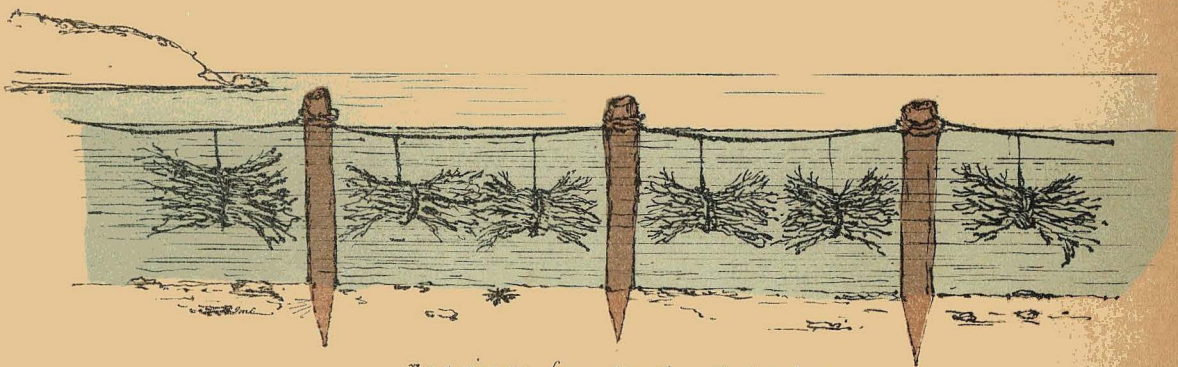
The cost of establishing a model oyster farm in one of the lagoons would probably involve an expenditure of about £500, and one or more keepers or assistants would be required to take charge of and systematically work it. Whether or not the Government would be disposed to incur such an outlay immediately, or would rather defer it for another year, I must leave for you to determine.

FIG 1



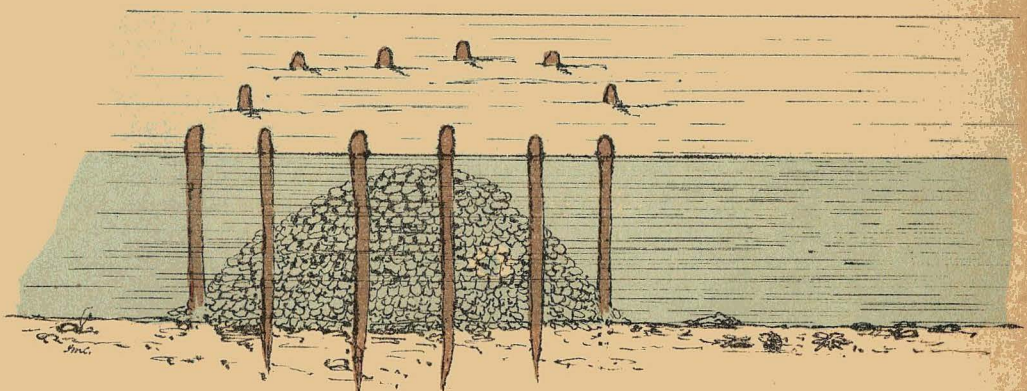
*Lake Fusaro with oyster banks and stakes
for suspending the fascines.*

FIG 2



Fascines for collecting Oyster Spat.

FIG 3



Oyster bank with surrounding stakes.

4. Anchovy and Sardine Fishery.

From the accounts I have received of the numbers of anchovies (*Engraulis encrasicolus*) that are taken at certain seasons in Tasmanian waters, but which hitherto have been entirely neglected, I am of the opinion that their capture and preservation might be developed into a highly important industry. In order to facilitate any practical measures that might be undertaken in this direction I am taking steps to obtain full particulars of the methods employed in those countries, such as France and Italy, which have hitherto been the head-quarters of this fishery. A second small and exceedingly abundant member of the herring tribe, closely allied to the English sprat (*Clupea sprattus*) might furnish the material for a profitable sardine industry. For the extensive capture of both this and the preceding species the introduction of specially constructed nets would be required.

5. The Crayfish Fishery.

It is, I think, highly desirable that a law should be passed, as recommended by the late Fisheries Commission (Report, p. xxiv., 1883), prohibiting the capture and sale of crayfish measuring less than 10 inches, or of, say, 1 lb. weight, and also altogether of female fish bearing spawn. A continuance of the present unchecked destruction of small-sized fish and of females laden with eggs cannot but result sooner or later in a marked deterioration of the crayfish fisheries. Such a deterioration has in fact, I understand, already begun to make itself felt, the fish now captured being less in both numbers and dimensions as compared with former years. The use of lobster, crab, and prawn traps and pots, and also shrimp nets, as utilized in almost every other country on the face of the globe, might be advantageously recommended to the fishermen of Tasmania. This recommendation, if adopted, would probably result in the market being supplied with a much greater variety of edible crustacea than has hitherto been offered to the public.

FRESH-WATER FISHERIES.

1. Salmonidae.

I have already recommended to the Salmon Commissioners various steps for securing the more certain establishment of the true salmon (*Salmo salar*) in this colony. No fish that I have so far seen possesses the full characteristics of that species, and after a careful consideration of all the evidence that has been submitted to me, I can arrive at no other logical inference but that by some accident the eggs of the salmon trout (*Salmo trutta*), instead of those of the salmon, were in the first place imported from England. It is scarcely possible that the young salmon only should have fallen a prey to other predatory fish on their arrival at the river estuaries. And yet, had they safely run the gauntlet of their enemies, as the salmon trout have unquestionably done, there should by this time—after a lapse of 18 to 20 years—have been salmon taken in Tasmanian waters weighing as much as 40, 50, or even 60 pounds.

The salmon-trout, or sea-trout, (*Salmo trutta*)*, including various well-marked local varieties, is, undoubtedly, firmly established here, several typical freshly-caught examples having been submitted to my inspection within the past few days. The fine spotted salmonoid,—now also taken commonly in the Derwent and its estuary,—I must pronounce to be a variety only of the brown trout (*Salmo fario*), grown to a large size by reason of the superabundant food supply. It is closely approached in England by the variety known as the "Great Lake Trout," and distinguished by the sub-specific title of *Salmo fario*, variety *ferox*. Another allied British variety of the ordinary brown trout, inhabiting salt and brackish water in the lochs of the Orkney Islands, has been known to attain to a weight of as much as 36 pounds. It has been technically described by the name of *Salmo fario*, variety *Orcadensis*.

Among the steps I have suggested for the permanent establishment of the true salmon (*Salmo salar*) in this Colony, is a proposition that well authenticated fry of this form should be turned into rivers that have, so far, been uninvaded by the brown-trout and salmon-trout, and where, in returning from the sea, they would hold undisturbed possession of the spawning-beds. It is a well attested fact that many English rivers have been entirely abandoned by the salmon in consequence of trout and sea-trout driving them off the spawning grounds and multiplying at their expense.

* Adopting the views of many modern ichthyologists, such as Huxley, Day, Widegren, Mallngren, Agassiz, and others, the writer includes, under the title of the salmon-trout (*Salmo trutta*), as here quoted, all of the several varieties referred to distinct species by earlier and some recent writers under the respective names of *Salmo trutta*, *S. cambricus*, *S. albus*, and *S. brachypoma*, the two last names being again synonyms of the same short-headed variety adopted respectively by Artidi and Lacipede and Dr. Günther. Not only do all these varieties pass by almost imperceptible gradations into one another, but evidence has been rapidly accumulating of late years to show that the common brown trout (*S. fario*) and the migratory salmon-trout are also extreme racial variations only of the same species. The brown trout may adapt itself to a marine or brackish water habitat, and the salmon-trout may, in like manner, reconcile itself to a purely fresh-water existence, while the species will freely interbreed and produce fertile progeny. The more remarkable local variations of *S. trutta* and *S. fario*, as produced by the novel environments to which they have been exposed in Tasmanian waters, as also the question of their relationship to one another and to *S. salar*, have been described and discussed in a masterly manner in a paper entitled "General and Critical Observations on the Fishes of Tasmania," contributed by Mr. R. M. Johnston, F.L.S., to the Proceedings of the Royal Society of Tasmania, and embodied in the Report of the Royal Commission on the Fisheries of Tasmania published in the year 1883.

The much greater value of the true salmon, compared with the species so far introduced, to Tasmania, and the greater benefit that would accrue to a larger section of the community if this species was established in such a manner as to form a large and important fishery, should justify further efforts being made towards its acclimatization. With the 1400 or 1500 fry only that have survived the last consignment of ova but little can probably be done, unless they could be cultivated in an enclosed salt-water lagoon, as suggested by me at page 4 of this report. Towards the more successful transport of the proposed next year's considerably larger consignment of salmon ova from England, I have already contributed some practical suggestions to the Salmon Commissioners, and have likewise submitted to them plans, which they have decided upon adopting, for the extension and improvement of the existing hatchery. Should the importation of further consignments of salmon ova prove desirable, I should be inclined to recommend an application for supplies from the Fisheries Department of the United States, the Superintendent of which,—Professor Spencer Baird,—with whom I have been long acquainted by correspondence, has already promised me the advantage of his assistance in any matters connected with the fishing industries.

2. *Fresh-water Herring, Grayling, or Cucumber Fish (Prototroctes maræna).*

This species is spoken of as affording such good sport and as being such an excellent table fish that I consider it would well repay the trouble of artificially cultivating the ova and fry and turning the latter in large quantities into the Derwent and other accessible waters, from which for some unknown cause they have of late years disappeared. Nothing definite being at present known concerning the reproductive and developmental histories of this fish, I purpose investigating this subject with the view of dealing with the ova and fry in the manner above suggested.

3. *The Fresh-water Lobster (Astacopsis Franklinii).*

This fine species of crustacean, confined chiefly to the northern rivers of Tasmania, might, I think, be cultivated with great facility, and such cultivation could doubtless be developed, as is the case with the comparatively diminutive European forms, into an important and profitable industry. In the Ringarooma and other rivers this lobster is reported to be taken weighing as much as 8 or 10 lbs., though their number are said to be fast decreasing, owing partly to the facility with which they are captured, and partly to their destruction through the silt discharged into the river from the neighbouring tin mines. It would, I consider, be a great misfortune to allow this magnificent crustacean—actually the finest known fresh-water form in the world—to become exterminated, when with comparative ease it might be profitably cultivated. The fact that I have personally succeeded in rearing the marine European lobster from the egg to the adult form (Conference Paper on the Artificial Culture of Lobster, by W. Saville Kent, F.L.S., International Fisheries Exhibition, London, 1883,) may be cited as evidence in favour of the possibility of dealing with the Tasmanian species in the manner suggested. The most practical method of securing the extensive preservation and propagation of this fresh-water lobster would be to offer approved prices for all females in spawn or with young in a healthy condition, and to cultivate the fry in suitable ponds or tanks. On account of its large size and high reputation for the table, many other countries would doubtless be glad to introduce this species as a valuable addition to their esculent varieties.

4. *American Whitefish (Corregonus albus).*

Among the exotic species of fish that I consider might be advantageously introduced into Tasmania I would make a special reference to the "Whitefish" of North America (*Corregonus albus*). This species, which belongs to the salmon tribe, and averages a weight of from 5 to 7 lbs., frequents the lakes and rivers of Canada and the United States in vast shoals. It is now artificially cultivated in immense quantities, and being delicious eating, constitutes one of the most important American fisheries. I anticipate that the ova of this fish might be transported with little difficulty to this colony, and that the large lakes and rivers situated in the interior of the Island would prove peculiarly adapted to its growth and propagation.

Trusting that this preliminary Report will recommend itself to your notice as containing some suggestions capable of development to the advantage of the fishing industries of Tasmania,

I have the honor to be,
Sir,

Your very obedient Servant,

W. SAVILLE KENT, F.L.S., F.Z.S., Superintendent
and Inspector of Fisheries.

To the Honorable the Chief Secretary.