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1888. PARLIAMENT OF TASMANIA.

INSPECTOR OF FISHERIES:

REPORT FOR **1887-8.**

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



FISHERIES DEPARTMENT.

REPORT for the Year terminating 31st May, 1888.

Fisheries Office, Custom House, Melbourne, 1st June, 1888.

I HAVE the honor to submit to you my Report upon that section of the Fisheries Department with which I have been associated for the year terminating 31st May, 1888.

In accordance with the new arrangement concluded with the Tasmanian Government following upon the termination of my original three years' contract in May, 1887, I now devote two months of the year to a personal supervision of operations connected with the Fisheries of Tasmania, and give advice and directions by correspondence as required throughout the remainder of the year towards their efficient maintenance. The residue of my time is now placed at the disposal of such other of the Australian Colonies as may desire my services, and has, since the inauguration of the new arrangements, been chiefly retained by the Government of Victoria.

In conformity with the terms of the new agreement, my attention has been mainly directed to the further development of the Oyster Fisheries of the Colony in connection with the Model Government Reserves and associated private Fisheries established on suitable portions of the coast line. In this direction I am pleased to be in a position to report to you a satisfactory amount of progress. At Spring Bay, which represents the first established and most important oyster breeding station, there has been a very remarkable increase. Not only has the brood or spat settled abundantly on the various descriptions of artificial collectors placed in the beds for its retention, but scarcely a stone or shell can now be taken up in the bay that has not oyster brood adhering to it, and which brood, undoubtedly, is derived from the extensive stock of breeding oysters now under cultivation in the adjacent Government and private beds. As a result of the substantial success of the operations initiated in the Government Reserves at Spring Bay, there has been a largely increased demand for areas of foreshore in this district for the purpose of forming private oyster fisheries, insomuch so that nearly the whole of the ground available for this purpose in this locality has been either taken up or applied for. The object primarily aimed at being thus practically accomplished in this particular district,—*i.e.*, the resuscitation of the natural beds, and the extensive establishment of scientifically cultivated private fisheries,—I propose, during the ensuing year, to utilise the stock and appliances from one of the Government Reserves at Spring Bay towards the formation and equipment of similar Reserves on other suitable stations on the coast line.

At the two new Government Reserves which have been experimentally established at Little Swanport Lagoon and at the mouth of Swanwick River respectively, the increase has been even more remarkable. The split-paling collectors, weighted at each end with a brick, are in many instances encrusted throughout with oyster brood. On one collector raised by me from the Swanwick River Reserve last March no less than three hundred young oysters could be counted on the brick attached to one end, while the entire surface of the collector carried upwards of one thousand. The quantity of brood developed from the original stock laid down in these Reserves, taken collectively with that in Spring Bay, may be correctly estimated at millions. In a Supplementary Report I propose, a little later on, to incorporate illustrations of the more remarkable growths of the oysters on the different descriptions of collectors in the several Reserves enumerated.

Sir,

The three districts now referred to undoubtedly represent the most prolific oyster breeding grounds that have been so far cultivated. At the other Government Reserves considerable, though relatively less substantial, results have been obtained. Continued experiments at Little Oyster Cove have tended to demonstrate that this locality is more suited for fattening than for breeding purposes. The oysters grown there increase in size at a great rate, but a comparatively small quantity of spat adheres to the collectors. The large amount of sedimentary matter in suspension in the waters in this bay, while it provides an abundant food supply for the oysters, coats the collectors and parent oyster-shells with slime to such an extent as to interfere with the ready adhesion of the spat. It is at the same time worthy of note that this year the production of spat on this reserve has been very late, oysters opened by me in the month of March last being then on the point of liberating their brood. The oysters laid down on the newly established Reserve at Shipwrights' Point, in the Huon estuary, are doing well, but have not yet been established sufficiently long to propagate. This same remark applies also to a small experimental reserve established at George's Bay.

In association with the Government Reserves in the neighbourhood of George Town, on the Tamar estuary, I have availed myself of the opportunity of my connection with other of the Australian Colonies of importing and laying down here a selected assortment of the New South Wales rock oyster, Ostrea glomerata. Through experiments conducted at the Fisheries establishment formerly stationed at Battery Point, and as recorded in my last year's report, I had demonstrated that the species would live in the relatively colder Tasmanian climate. The several thousands that are now under cultivation in the Tamar Reserve have increased remarkably in size since their importation last November, but it yet remains to be seen whether they will reproduce their kind in these waters. Should they do so there is a very extensive area between George Town and the Tamar Heads that will be eminently suited for the artificial culture of this species.

The localities in which I propose to establish new Government Oyster Reserves and new centres for the development of private oyster fisheries during the ensuing year, are Port Sorell on the north coast, and Carlton River and Southport in the south. At the instance of the Member for East Devon, Dr. Young, and with the personal assistance of Major Dumbleton, I have surveyed Port Sorell, and selected a suitable area, on which there are a few oysters growing naturally. As soon as oyster culture in this district has been proved through the Government Reserve to be a success, several private fisheries are likely to be started in the immediate neighbourhood.

The establishment of a model Government Reserve at the Carlton River is also calculated to be productive of good results, and to impart a stimulus to private oyster culture, extending from thence to Pittwater. One private fishery had been leased here for some years past, but on recently visiting it I ascertained that the lessee was ignorant of the true nature of an oyster, and had been collecting by the bushel, as oyster brood, and assiduously cultivating on his ground, an allied but utterly worthless bivalve mollusk, known technically by the name of *Avicula pulcherimma*.

The larger the number of model Government Reserves, with their associated private oyster fisheries, that are established upon the coast, the sooner necessarily will it be that a remunerative oyster trade can be re-established in the colony. With the reduced funds that are now at the disposal of the Department—£200 representing the sum total available for the maintenance of the existing Reserves, and the preparation, stocking, and equipment of new ones—the progress towards the accomplishment of this end must consequently be a slow one, inasmuch so that I would strongly recommend that an extra £100 might be placed on the Estimates for the forthcoming year for the purpose indicated. The most expensive item connected with the establishment of these Reserves is represented by the purchase of stocks of breeding oysters for further propagation; the price paid for these, taking large and small oysters together, being at the rate of thirty shillings per thousand, the cost of stocking a Reserve with forty or fifty thousand oysters amounts to from £60 to £75. To this has to be added the requisite additional expenditure incurred in staking off and preparing the area selected, in supplying the frames and apparatus used in the culture and collection of the spat, and for the services of a caretaker who shall take charge of the Reserve, and carry out as directed the necessary operations thereon throughout the year.

The oysters hitherto obtained for stocking the Government Reserves have been collected chiefly from the natural beds in Cole's Bay and adjacent inlets of Oyster Bay, in the neighbourhood of Swansea, and it is satisfactory to report that there has been a very abundant increase in these beds within the past year. Sufficient care being taken not to over-exhaust these beds, supplies will be available from this same source for the establishment of a large number of additional Reserves and private fisheries. In order to protect these natural beds from such over-exhaustion, it is desirable, I consider, that a regulation should be passed restricting the taking of oysters off the entire area of Oyster Bay and its connecting inlets to the purpose only of supplying breeding stock for the Government Reserves and private fisheries.

Various new appliances have been introduced by me within the past year for the purpose of securing the largest possible amount of spat on the Reserves. Chief among these have been collectors formed of cemented slates attached ridgewise in rows to triangular wooden frames, and which can be cheaply constructed out of native pine or tea-tree poles. Through the courtesy of the Manager of the Bangor Slate Quarry I have obtained the concession of an unlimited quantity of small slates, unsuited for the market but admirably adapted for the construction of spat-collectors, free of charge, from the Bangor Wharf in the River Tamar, the only expense connected with them being their transport to the Reserves wherein they are utilised. Notwithstanding the short trial that has as yet been made of these collectors, they have been found to act very efficiently, the cemented slates being already on several of the Reserves thickly coated with spat. The prolonged trial that has now been given to the system of growing the oysters upon frames has further demonstrated the advantages that are to be derived from this method of culture. That the oysters grow much more rapidly under such conditions, and will thrive on areas otherwise unsuitable through the accumulation of sedimentary deposits, has been pointed out in my last year's report. Within the past twelve months they have been found to fulfil a useful function in another direction. During the past summer both the Government and private beds at Spring Bay have been invaded by an oyster-eating species of shark—*Cestracion Philipi*. In the case of certain private beds where no frames had been used, the fish literally destroyed the whole stock of several thousand oysters laid loosely on the bed, leaving nothing but the empty shells, which presented the appearance of having been smashed up with a hammer. Where the oysters were left unprotected in the Government beds similar, though a less amount of damage was effected, while the bulk of the oysters which

were lodged on the frames and covered in by the paling collectors altogether escaped. Where frames are not employed it is essential, in districts frequented by this shark, that the fence enclosing the area cultivated should be wattled round with branches or otherwise made impervious to its incursions. In recognition of the efficiency of the system of oyster culture associated with the provision of frames for the reception of the adult stock and cemented paling and slate collectors for the attachment of the brood, 1 may here mention that the Victorian Government has decided upon adopting the same system on the Victorian coast-line, and that one such fully equipped model Government Reserve has been already established under my supervision at Port Albert, in Gippsland. Arrangements have been made for the display at the forthcoming Melbourne Centennial Exhibition of a series of the spat collectors, covered with oyster brood, and other apparatus successfully employed on the Tasmanian and Victorian Oyster Reserves here referred to.

Now that the problem of cultivating oysters in favourable localities in Tasmanian waters in such manner as to secure a large amount of the spat, and to obtain an abundant increase in the stock originally laid down, may be said to be fairly solved, attention may be directed to the special preparation of the mollusk for consumption. From the millions of young oysters now collectively existing on the Government Reserves, the natural beds, and the private fisheries on the eastern coast line, it may be anticipated that in from between two and three years' time there will be a sufficient supply to allow of a certain quantity being placed on the market, and thenceforward in increasing ratio. The oyster, however, in its crude state, as taken off the beds, is not in a condition to compete favourably with the imported varieties. As is the case with the English representative of the same species, it requires special manipulation and culture to develop it into that deep, smoothshelled, and finely flavoured type known as the English "native," and which at the present date commands so high a price as from 3s. 6d. to 4s. per dozen. There is every reason to believe that the Tasmanian variety might be "artificially developed" to the same standard of excellence, and, as such, would occupy a first rank in the oyster markets of the antipodes. Towards the accomplishment of this object, I propose to initiate some special operations during the forthcoming year, and the results of which I shall hope to embody in my next Report. With reference to the observations made by me during the last three years relative to a large quantity of spat being produced by the Tasmanian oysters in the month of March, and to the oysters then being unfit for food, a regulation by the Governor in Council has, on my recommendation, been passed within the past twelve months, extending the close season for oyster fishing from the first day of November to

Regarding the few matters, separate from the oyster fisheries, pertaining to the Fisheries Department that have fallen under my notice or within my scope of action during the past twelve months, I may enumerate the following:—The collection of plaster casts of Tasmanian fish, modelled and painted from life, mentioned as commenced in my last year's Report, and as completed by me up to the date of the new arrangements, has been deposited in the Tasmanian Museum. The Aquarium, built to my designs, and formerly associated with the fish and oyster ponds at the Fisheries Establishment, Battery Point, has been likewise transported to and re-erected on the Museum premises, where it is calculated to prove a source of great attraction to the public. The apparatus at the same establishment, improvised by me for the special culture of the ova and fry of the Cucumber Mullet or Grayling (*Prototroctes marena*) I caused to be transported to the Fish Hatchery at the Salmon Ponds, and I have communicated to the recently appointed Fisheries Board detailed particulars, with accompanying diagrams, descriptive of its practical working. Young Grayling, developed from the fry liberated by me in the Derwent, to the number of several millions, within the past two or three years, have been reported to me as having been seen and taken recently in that river by several anglers. To ensure the permanent and abundant re-establishment of this desirable species in the Derwent, I have to recommend that the process of turning the artificially cultivated fry into it in large quantities, as heretofore, be continued for several more consecutive years. One or two of the Blackfish, *Gadopsis marmoratus*, conveyed by me from the Mersey to the Derwent, have likewise been taken by anglers, and I would advise that further supplies of this species be transported to this last-named river.

Within the past twelve months, September, 1887, I contributed a paper to the Royal Society of Tasmania^{*}, wherein I dealt more at length than in my last year's Report on the prospects of acclimatising the Atlantic Salmon, *Salmo salar*, in Tasmanian waters. After a prolonged and careful study of the subject, I therein further emphasised my opinion that the higher temperature of the Tasmanian, as compared with the British seas, represented the most important factor that had to be taken into consideration with regard to the negative results that had hitherto been obtained after so many years of strenuous and praiseworthy efforts to acclimatise the species on the part of the late Salmon Commissioners. This interpretation still appears to me to be not only the most, but the only logical explanation of the phenomenon. A personal record of the litoral temperature of the sea water on the Tasmanian coast demonstrated that it was nine on ten degrees (Fabr.) higher than that under parallel conditions in the British seas. The surface temperature on the Tasmanian coast was shown by this record to correspond with that on the coast of Spain and in the Mediterranean, and in the rivers of France, flowing into which last-named sea the acclimatisation of the Salmon, *Salmo salar*, has been attempted with precisely similar negative results.

The question as to what becomes of the young Salmon on descending the Tasmanian rivers to the ocean is a difficult one to answer. It is most reasonable, nevertheless, to conjecture that they follow a southerly course in the direction of the Antarctic Circle, and are there lost to human ken. The matter, as a mere incident, was referred to in my paper quoted, that a quantity of Atlantic Salmon had been reported a few years since as having mysteriously appeared on the coast of Japan. No authentic evidence has been since produced to substantiate that report, and to which I consequently attach no importance. If, however, such report had been verified, it would have been difficult to account for their presence otherwise than by the inference that they had migrated thither by a cool submarine current from the coasts of Tasmania or New Zealand, and which represented at that time the only stations in the Indo-Pacific Ocean basins where the Atlantic Salmon had been liberated.

My attention has been recently directed to the circumstance that it is maintained by some authorities that Salmon, or a fish that would be sent as Salmon to the English market, is already acclimatised in Tasmania. The magnificent fish, weighing $28\frac{1}{2}$ lbs., caught by His Excellency Sir Robert Hamilton last November in the Huon River is, I am informed, included in this category, and it has been suggested to me that I should record my official opinion both as to the specific identity of this particular specimen, and with reference to the asserted existence of Salmon in the rivers and seas of Tasmania. As a matter of fact, this last-quoted assertion is substantially correct. The term "Salmon," in its strictest legal sense, includes any species or variety of the genus Salmo that migrates from fresh to salt water, or vice versá, and any person caught taking such migratory fish, of whatever species or variety, by illegal means, or during the close season, would be liable to conviction for infringing the Salmon laws. Moreover, the Salmon trout, Salmo trutta, with its several varieties technically distinguished by the titles of S. trutta, var. albus, cambricus, eriox and brachypoma, and bearing the corresponding popular names of White Salmon, Sewin, Salmon Peal, Whitling, Hirling, and Blue Poll, &c., is constantly sent to the English market and classified as "Salmon." This species, with its parallel varieties, has undoubtedly also been permanently established in Tasmania, and which Colony may therefore be consistently congratulated upon possessing Salmon in both the legal and the general sense of the term. In an equivalent sense Salmon has also been established in the Colony of Victoria, numerous examples of both the seagoing or estuarine variety of the Brown Trout, Salmo fario, and of the Salmon Trout, S. trutta, taken from Victorian waters, having been submitted for my identification within the past few months.

Concerning the specific identity of the large Huon fish, there can be no doubt whatever in the mind of any expert practically acquainted with the more prominent varieties of the British-bred Salmonidæ. Every essential diagnostic feature, including the dentition, relative coarse unsymmetrical contour of the body, profusely and conspicuously spotted dorsal fin, and comparatively minute and more numerous lines of scales, precludes its identification with Salmo salar, and collectively stamp it to be a Brown Trout, Salmo fario. As a representative of this species it most closely coincides with the modification of this species distinguished in England by the title of the Great Lake Trout, and which, prior to its being demonstrated to be only a modified variety, was classified as a separate species under the name of Salmo ferox. Salmo fario, var. ferox, is the title now assigned to this form in the most modern works on icthyology.

To refer the Huon fish to the true or Atlantic salmon, salmo salar, or to classify it as a local variety of that species—and which, it must be borne in mind, is not, like S. fario and S. trutta, subject to wide variation—woold undoubtedly be a grave mistake. In adjudging the identity and affinities

^{*} Observations on the acclimatisation of the true Salmon, Salmo salar, in Tasmanian waters, and upon the reported Salmon disease at the breeding establishment on the River Plenty, by the Superintendent and Inspector of Fisheries, W. Saville-Kent, F.L.S., F.Z.S.

of this fish, undue weight is doubtless liable to be attached to its abnormal size. In this respect it may certainly be pronounced to be the finest representative of the Salmonidæ that has yet been taken in Tasmanian waters, or I believe at the Artipodes. In the various standard works on British fishes, however, including Francis Day's "Fishes of Great Britain and Ireland," and his "Monograph of the British and Irish Salmonidæ," the record will be found of a yet larger race of the same Brown Trout, that closely resembles the variety *ferox*, and is designated *Salmo fario*, var. orcadensis. This trout inhabits the Loch of Stenness, in the Orkney Islands, and attains to a weight of 36 lbs. and

upwards. The loch where these large fish occur is about nine miles long and one and a-half broad, and while fresh in its upper portion, is brackish, or even salt, in its lower one. The conditions of the locality where the large Huon fish was taken, within easy access of brackish or saltwater, closely approximate those productive of the gigantic Orkney fish.

Brown Trout weighing over 20 lbs. have, I am informed, been taken in New Zealand, and were bred from ova of the Great Lake variety, specially imported from England. A similar large growing fish, familiar to Home anglers, is locally distinguished by the title of the "Thames Trout." It has also to be remembered here that the trout ova originally imported to Tasmania belonged to the fine racial variety known as "Wycomb Trout," and whose tendency to increase yet further in size would accompany their introduction into waters yielding such an abundant food supply, and possessing other conditions so favourable to their growth, as are found in the Huon River. By way of further illustration, a large local variety of the English brown trout has been named, with reference to its salt and brackish-water propensities, Salmo jario, var. estuarius. An identical or parallel estuarine race has already well established itself in the bays and estuaries of both the Tasmanian and Victorian coast line.

It has been recently asserted that no unanimity of opinion can be obtained regarding the specific identity of the Tasmanian bred Salmonidæ, and that six diverse ones would probably be expressed by as many separate authorities concerning the same fish. This assertion may possibly hold good with respect to the numerous interblending racial variations of the Brown Trout and Salmon Trout, Salmo fario and S. trutta, and which have been variously named by different authors. A similar amount of indecision may also be experienced in discriminating between the young and immature phases of the Salmon Trout, S. trutta, and the true Salmon, S. salar, which at such period of their life very closely resemble one another. No such doubt, however, would perplex the minds of a company of experts called upon for a decision as to the specific identity of an adult and well-matured fish weighing 20 or 30 lbs. belonging to the last named species, Salmo salar, and which typical matured fish has yet to be produced from Tasmanian waters for experts to pronounce their verdict on.

Through the munificent liberality of Dr. J. W. Agnew, the Chairman of the late Salmon Commission, and under the supervision of so experienced an expert as Sir Thomas Brady, Inspector of Irish Fisheries, yet another and crucial experiment is now being made to acclimatise the Atlantic Salmon in Tasmania. With these unprecedented advantages in its favour, the accomplishment of the end aimed at will, it is to be hoped, be assured. Should, however, as in the former experiments, negative results only be achieved, I would strongly recommend that some attention should be paid to the attempted establishment in Tasmania of the Pacific Salmon, Salmo quinnat. This species, from a commercial point of view, would yield a hardly, if any, less productive revenue to the colony: while the fact that it inhabits waters of a considerably higher temperature than those affected by Salmo salar, represents an important element in favour of its successful acclimatisation.

Trusting that the information and suggestions submitted in this Report may meet with your approval,

I have the honor to be, Sir,

Your very obedient Servant,

The Hon. the Chief Secretary, Tasmania.

W. SAVILLE-KENT, F.L.S., F.Z.S., Inspector of Fisheries, Tasmania.

WILLIAM THOMAS STRUTT, GOVERNMENT PRINTER, TASMANIA.