(No. 31.)



1887.

PARLIAMENT OF TASMANIA.

SUPERINTENDENT AND INSPECTOR OF FISHERIES :

REPORT FOR **1886-7.**

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



FISHERIES DEPARTMENT.

REPORT for the Year terminating 31st May, 1887.

SIR,

Fisheries Department, 28th June, 1887.

I HAVE the honor to lay before you my Report summarising the more important operations that have been conducted, and the results derived therefrom, in connection with my Department during the year terminating 31st May, 1887.

A.-MARINE SECTION.

1. The Oyster Fisheries.

Steady progress has been made with the further development of the series of Government oyster reserves established in accordance with my recommendations on various suitable portions of the Tasmanian coast-line. The results obtained during the past year from those reserves that are already in working order justifies my expression of the opinion that, with an extension of the same system, conducted on scientific principles, the produce of these reserves, combined with that raised on the private beds, will be sufficient within the course of a few more years to once more establish a lucrative oyster trade in this Colony. At all of the several reserves there has been an abundant fall of spat, but more especially in those of the Spring Bay district, and which locality I anticipate will, as in former years, become the chief station of the Tasmanian oyster fishery. A list indicating the number and localities of the Government reserves and private oyster beds already in working order, together with those for which preliminary surveys or applications have been made or received, is appended to this Report.

The number of breeding oysters at present laid down upon the various Government reserves may be reckoned at about 150,000; to these may be added, as the produce of the past year's spatting season, at least an equal number of young brood. From the natural beds it will, I anticipate, be possible during the current year to obtain a further supply of 100,000 adult stock for placing on the additional reserves projected or in course of construction. Among the localities that I have surveyed within the past year, and selected as eminently suited for the establishment of these additional reserves, are the Carlton River; Shipwrights' Point, in the Huon estuary; the estuary of Swanwick River, near Swansea; St. Helen's, George's Bay, and two new stations in the Tamar estuary. Southport, Falmouth, and the neighbourhoods of Port Arthur and Port Sorell are additional localities where the establishment of similar breeding stations is under consideration. It is proposed likewise to lay down a small experimental bed in the vicinity of Cornelian Bay in the River Derwent, though there are some doubts as to whether, as in the case of the River Tamar, the higher reaches where oysters used to grow are not now so much more extensively affected by flood water as to be unsuitable for the culture of this mollusk. Should, however, experiment prove the contrary, it may be anticipated that a large number of private beds will be immediately taken up in this district.

The stock at present cultivated on the Government reserves consists chiefly of the indigenous variety of Ostrea edulis collected on the East Coast, D'Entrecasteaux Channel, and the Tamar estuary. A small stock of the New Zealand variety of the same species has been laid down at Battery Point and Little Oyster Cove. Through the influence of and kind interest taken in the matter by the Hon. Wm. Crosby, M.L.C., special facilities have been placed at my disposal for obtaining this variety, if so desired, in large quantities on very advantageous terms. Before, however, recommending the extensive introduction of this oyster, it will be desirable to arrange for the stock to be obtained from waters corresponding more closely in character with that in which it is proposed to place them, and to make special provision for their conservation during transit.

Out of the stock of this New Zealand variety ordinarily imported, it has been found possible to preserve but a very small percentage on the reserves. This circumstance is probably due partly to a difference in the depth, density, and temperature of the waters in which they are placed as compared with those from which they are originally imported, and partly to the long period for which they are kept out of water during the voyage. This last-named difficulty might probably be overcome by recourse to the system adopted in France of gradually subjecting the stock for exportation to extended periods of isolation from their native element, and by which means they become, as it were, educated to surviving long intervals of exposure to such conditions. Special care should likewise be exercised in packing the oysters for so long a voyage with their convex shell underneath, in order that the least possible quantity of their natural juices should escape.

Experiments have likewise been made during the past year with the Sydney Rock Oyster (Ostrea glomerata.) The doubts previously entertained as to whether this species would withstand the more severe Tasmanian winter have been satisfactorily disposed of, several hundred examples cultivated in the tanks of the Fisheries Establishment at Battery Point having survived the low temperature of 40° Fahr., or one of from eight to ten degrees lower than that registered throughout the winter in the adjacent sea. I accordingly propose to place a considerable number of this oyster in one or more of the reserves this year in order to ascertain whether the species will also propagate in Tasmanian waters, and in which case it will prove a valuable addition to the native type. Having recently paid a visit to Sydney in order to make myself personally familiar with the conditions most favourable to its growth, an area has been selected in the estuary of the River Tamar for the first essay towards the experimental culture of this species.

My acknowledgments may be recorded here of my indebtedness to Dr. James Cox, the President of the New South Wales Fisheries Commission, and to Mr. Henry Woodward, one of the largest oyster growers in that colony, for the opportunities placed at my disposal for obtaining the information I desired concerning this oyster, also for facilities promised relative to the importation of the most suitable stock for culture in Tasmanian waters on the most advantageous terms.

The scheme introduced last year of growing oysters upon frames, in such a manner that they are raised from six to nine inches above the bottom of the water, has proved eminently successful. A full description, with illustrations of these frames, appears in my last year's report. The most A full description, with illustrations of these frames, appears in my last year's report. prominent feature connected with this system of cultivation is the remarkable rapidity and evenness of growth of the oysters thus treated. This is probably due to the facilities for obtaining food on all sides, from beneath as well as from above, afforded to the oysters in connection with their raised position, the open wire netting alone separating them from a lower stratum of water. As an illustration of the abnormally rapid growth of oysters placed on these frames, it may be mentioned that samples thus cultivated in one of the reserves, and on private beds at Oyster Cove, were found to have made a symmetrical growth of three quarters of an inch all round their shells, or a total increase in diameter of one and a half inches, within the short space of six weeks after their removal from the ground to the frames With this augmented rate of growth the simple culture of young brood stock, independent of its increase by propagation, becomes a remunerative industry, such stock increasing in value at least one hundred fold within the course of a single twelvemonth. Adopting the frame system of cultivation, it has been found possible and profitable to grow oysters on oozy bottoms where under ordinary conditions they would inevitably perish. As a case in point, oysters laid down in a reserve on the West Arm, River Tamar, made no growth, and were slowly dying off in consequence of the accumulation upon them of sedimentary deposits. So soon as they were placed upon frames the mortality ceased, and they commenced to increase in size at a rapid rate. In addition to collectors composed of split palings plastered with cement, roofing slates similarly coated have been found to form very effectual spat collectors. It may be here mentioned that the collectors of either description are found to fulfil their purpose far more effectively when placed obliquely instead of horizontally over the breeding oysters. A collector for spat that has been recently introduced with much success in America consists of frames laden with empty oyster shells or cultch that are kept floating at the surface of the water. I purpose initiating experiments next summer with the view of ascertaining whether this system may be profitably applied to the culture of the Tasmanian species.

The most remarkable growth of oyster-brood during the past year is, perhaps, associated with the pine branches and stakes laid down on one of the Spring Bay reserves. Many of these are so thickly covered with young oysters that the wood is completely concealed. A sample of these pine branches, and also of oyster and mussel shells covered with brood oysters, have been photolithographed for the accompanying illustrations. In recognition of the effectiveness of these branches as spat collectors, arrangements have been made to lay large quantities of them in the form of faggots or fascines upon the reserves during the coming summer. The branches of other trees, to which the young oysters do not naturally adhere, will, I anticipate, prove equally efficient collectors if previously brushed over with or dipped in Portland cement. An interesting and instructive collection of living oyster-brood from the various reserves on slates, shells, wood, and other collectors, yielded during the past year is now on view at the Fisheries Establishment, Battery Point. Concerning the duration of the spatting season of the Tasmanian oyster, I have obtained abundant evidence to show that while the hotter summer months—November to February—are most conspicuously associated with the phenomena of propagation, spat may be abundantly produced in the months of March and April, and more sparingly during every other month. Young spat, not more than a few weeks old, has fallen under my observation in association with either the natural or cultivated oyster-beds at all seasons of the year.

For the information of the increasing number of persons who may desire to lease portions of the foreshore for the purpose of oyster culture, a brief summary is herewith appended indicating the conditions and facilities under which such leases are now granted. Any person holding property abutting on the foreshore may apply for a lease of that foreshore for the purpose of oyster culture, providing its occupation for that purpose will not interfere with the ordinary water traffic nor prejudice any vested interests. Should a person desire to take up an area fronting another person's property, the written consent of the owner must accompany the application. Leases are granted for a term of 14 years. For the first three years the nominal rental of one shilling per annum per acre is charged to the lessee; thenceforward to the termination of the lease a rental of $\pounds 1$ per acre per annum is chargeable upon the area leased. Should, however, the Governor in Council be satisfied, on the report of the Superintendent and Inspector of Fisheries, that the lessee has faithfully complied with the conditions of his lease, he is empowered to remit the rent for a second period of three years. By the terms of the lease granted it is made incumbent upon the lessee to permanently maintain on the area taken up, a stock of not less than 4000 breeding oysters to the acre. This clause has been introduced to rectify an abuse associated with former oyster leases, and whereby the areas were occupied simply as store-grounds for the accumulation of oysters collected during the close season ostensibly for breeding purposes, but which were, as a matter of practice, all sent to market so soon as they were legally saleable. Through the introduction and practical enforcement of this regulation each private bed constitutes a breeding centre that assists towards the restocking of the surrounding waters, independently of the brood secured in the area held by the lessee.

Applications by those who desire to take up portions of the foreshore should be made to the Chief Secretary, and must be accompanied by a tracing indicating the extent and precise locality of the area applied for. Assistance in the selection of suitable areas, and advice as to the best methods of cultivating oysters on it—diverse localities requiring different treatment—is accorded on applying for it to the Superintendent and Inspector of Fisheries.

2.—Fisheries Establishment, Battery Point.

Among the operations conducted at the Fisheries Establishment, Battery Point, during the past year, in addition to those connected with oyster culture, may be mentioned the commencement of the preparation by me of a collection of casts or models of Tasmanian fish, moulded in plaster of Paris and painted in oil colours, from specimens preserved alive in the tanks for this special purpose. Should the opportunity be afforded, it is proposed to prepare in this manner representative collections of the entire fish fauna of this Colony. One such collection, it is suggested, should be remitted to England as a contribution to the Imperial Institute, such portion of it as is completed being first displayed at the forthcoming Melbourne Centennial Exhibition. A second collection might be advantageously deposited in the Tasmanian Museum. Such an extensive undertaking as the preparation of more or less complete collections would necessarily be a work of time, as, in addition to the considerable amount of mechanical labour involved, many of the species are captured only at rare intervals. It is, furthermore, only in conjunction with such facilities as are afforded in connection with the tanks and ponds of the Fisheries Establishment, and where the fish are maintained in a living state, that such a task could be successfully carried out, it being possible under no other conditions to carefully study and faithfully reproduce the natural attitudes and colours of the varieties modelled. While similar models of their respective fish species have been undertaken in England-the famous Buckland Museum at South Kensington being pre-eminently celebrated for its collection of casts of British fish, executed by the late Frank Buckland-and by the Fisheries Departments of Canada and the United States, nothing of the sort has been hitherto attempted in the Australian colonies, which, as compared with the Northern hemisphere, possess a unique and wonderfully diversified fish fauna. I need scarcely point out to you the hudos that will accrue to this Colony to diversined hish fauna. I need scarcely point out to you the *hudos* that will accrue to this Colony to be represented at the Imperial Institute in the direction indicated, nor the utility of such a series of models for public instruction if prepared as proposed for the Museum. In this connection I may remark that artistically executed and faithfully coloured casts convey a more accurate idea of the general aspect and natural colours of living fish than is presented by stuffed or spirit-preserved examples, and in either of which conditions the shape is almost unavoidably more or less distorted and the natural colours altogether obliterated. A first series of models, representing about twenty distinct mainting area completed and end whilted her are at the Art Enhibition held in the Darliement distinct varieties, was completed and exhibited by me at the Art Exhibition held in the Parliament Buildings at the beginning of the year. Duplicate moulds for the reproduction of the majority of these models, as proposed for the Museum, have been taken, and casts from them are in course of execution. Assistance in obtaining fine and perfect examples of any of the rarer species of Tasmanian fish not yet yet modelled, for the purpose of rendering the collections as complete as possible, will be gratefully acknowledged.

As mentioned in my last year's report, arrangements had been made in connection with the Fisheries Establishment for the experimental introduction to this Colony of the Europeau Lobster, large edible Crab, and other valuable commercial species. Plans and directions for the construction and management of the apparatus required for the successful realisation of this proposed undertaking were drawn out by me and remitted to England, and from whence abundant assistance in procuring and despatching the first cargo of the crustacea named was willingly promised. Through an unfortunate misunderstanding, however, of the instructions remitted to the Crown Agents of this Colony in London, the sum of $\pounds 200$ voted for this special purpose was not utilised in sufficient time, and lapsed to the Treasury. If thought desirable a vote might be again placed on the Estimates for the

carrying out of this experimental acclimatisation scheme, and which there is every reason to believe would prove successful, and lay the foundation of new and highly profitable fishing industries. In connection with the modified auspices under which it is proposed that I shall hereafter be associated with the Fisheries Departments of this and, probably, certain of the adjacent colonies, it might be advantageously arranged for these colonies collectively to join in the cost and to share the results of the proposed experiments. Pending the further development of this project, I have initiated steps with the view of acclimatising in Tasmanian waters the magnificent Prawn (*Peneus esculentus*) of New South Wales. This species attains to a length of eight or nine inches, and is, to my personal knowledge, most excellent eating. The large marine Crawfish (*Palinurus Hugellii*), of the same colony is not unfrequently taken on the Tasmanian coast, and many other species are common to the waters of Tasmania and New South Wales; so that there can be but little doubt that the species might be established here with comparative facility. If so acclimatised it would prove a valuable addition to the exceedingly limited list of marine edible crustacea at present at the disposal of the Tasmanian public, and which is practically represented only by the common Crawfish (*Palinurus Edwardsi*), and a small Prawn or so-called Shrimp (*Palemon sp.*), which scarcely repays the trouble of unshelling. The large Prawns in question not being procurable in a living state, in consequence of rough weather and the bad condition of the harbour water, during a recent visit to Sydney, I have arranged to bring over personally or otherwise import an experimental cargo by the T.S.N. Co.'s s.s. *Flora* on the first fitting opportunity. On their arrival it is proposed to first acclimatise the Prawns in the tanks of the Fisheries Establishment, and, when a sufficient number has been accumulated, to release them in one or more of the Government oyst

Further progress has been made at the Fisheries Establishment during the past year towards collecting accurate information concerning the habits, natural food, spawning seasons, and other data of importance concerning the more valuable marine fish of this Colony, the new information gained being incorporated in the Schedule (see Appendix B.), which is an amplification of that contained in my last year's report. Among the observations recorded concerning the breeding habits of certain of these species, it has been ascertained that the Rock Gurnet (Sebastes percoides) is a viviparous fish. a specimen in November last having given birth to many thousands of young fry, the majority of which were liberated in the adjacent sea. Among the twenty-five known species of Sebastes distributed throughout the world, another form, inhabiting the Norwegian coast and Arctic seas (S. viviparus), is evidently distinguished for the same abnormal method of reproduction. The large Blenoid fish, new to science, and described in my last report under the title of Clinus Johnstoni, has likewise been proved to reproduce its kind in a similar manner. A remarkable circumstance con-nected with the propagation of this species is that two broods of many thousand fry were produced by the same fish within an interval of about two months, the contents of one ovary, consequently, either ripening or having been fertilised previously to that of the other. Concerning the reproduc-tion of the Rock Cod (*Pseudophycis barbatus*), it has been observed that there is a distinct pairing of the sexes, the male and female fish swimming in close contiguity, and the ova being fertilised as expelled by the milt of the male. As recorded in an earlier report, 1884, the ova of this fish when extruded float on the surface of the water. It is anticipated that the shoal of Real Trumpeter (Latris hecateia) cultivated for over a year in one of the ponds, will breed this season.

The series of diurnal observations concerning the temperature of the sea water in the tanks and tidal ponds of the Fisheries Establishment, recorded for only a few weeks in my last year's report, has been carefully continued, with the result that a table of maximum and minimum temperature can now be constructed for a complete twelvemonth, and is herewith subjoined :--

1887.	Maximum.	Minimum.
	. o	 0
January	80	61 Fahr.
February	74	54
March	68	50
April	64	48
May	56	45
June	53	43
1886.		
July	52	40

52

59

56

66

44

44

44

48

52

October.....

November

December

TABLE of Maximum and Minimum Temperatures of Sea Water at Fisheries Establishment, Battery Point, Years 1886-7.



Pine Branches with attached Oysters bred at the Government Reserve, Spring Bay, 1886-7. Onc-half the natural size.



The temperatures recorded in the foregoing table, as registered in isolated ponds and tanks, necessarily indicates a both higher and lower range of variation than obtains in the sea itself: the extreme limits of from 40 deg. Fahr. in winter to 80 deg. in summer, representing, in fact, as nearly as possible a range of 10 deg. lower and 10 deg. higher than were recorded simultaneously in the open sea. This open sea temperature was found to oscillate between that of 50 deg. Fahr. in winter to 70 deg. in summer, the mean isotherm being, consequently, as also in the tanks, that of 60 deg. As indicated in correlation with the temperature record in my last year's report, the abnormal range registered in connection with the isolated tanks and ponds of the Fisheries Establishment yields valuable information concerning the direct or indirect influence of temperature upon the vitality, general habits, and distribution of the species cultivated. Among the important data thus collected during the past year, it has been practically demonstrated that the New South Wales Rock Oyster (Ostrea glomerata) may be successfully cultivated in water having so excessive a thermic variation as from 40 deg. to 80 deg. Fahr., and pari passú, much more so in the open sea waters of this Colony, having a mean variation of from 50 deg. to 70 deg. only. The temperature table of last year, dating from the erection of the Fisheries Establishment in its present position, related only to the autumn and winter months—March till August—leaving for this year's report the record of my special observations concerning the exposure of the varieties cultivated to the extremes of summer heat. In this direction it is interesting to observe that the only form fatally affected by the highest water temperature registered,—that of 78 deg. to 80 deg. Fahr. —was the Rock Cod (*Pseudophycis barbatus*), and which species again, as shown in my last year's report, is the first to succumb to an abnormally low temperature or to extensive dilution of the water during flo

I may suitably acknowledge under this sectional heading my indebtedness to Mr. Henry Grant, one of our most persevering and enthusiastic amateur sea fishermen, for observations upon the temperature of the water at different stations in the Derwent estuary supplied to me during the past year, together with material assistance in the collection of various species of fish for modelling or experimental culture. I propose, during the ensuing year, to inaugurate observations concerning the temperature and density of the water and its influence on the migrations and distribution of the commercial fishes of Tasmania on a more extensive scale. The co-operation of the adjacent colonies in obtaining data of a like description with reference to their respective fish faunæ will also be invited, and may prove of value in connection with acclimatising operations that may be hereafter inaugurated to the mutual advantage of the colonies collectively. It is a matter of regret that up to the present time no steps have been taken to systematically record the varying range of temperature and salinity that obtains on the British coast-line. Such information would be a valuable guide in association with the attempted establishment of British fish in the waters of this and the neighbouring colonies, and will be reverted to again in the section devoted to the *Salmonidæ*.

Among other functions that have been fulfilled by the Fisheries Establishment during the past year, I may direct attention to the extent to which the public have availed themselves of the opportunity of there making themselves acquainted with the natural living aspects and habits of the fishes and other marine denizens of the seas of this Colony. Schools and other bodies have visited it extensively, and it has proved an especial source of interest and attraction to our numerous summer visitors. Though not formally advertised as a public exhibition, since that announcement would probably attract such a number as to interfere with the ordinary work in progress, no applicant since the date of its establishment has been refused admission. In recognition of its increasing popularity as an educational institution, I have to suggest that certain days or times might be set apart when it should be thrown open unreservedly to the public.

3. New or rare Fish taken in Tasmanian Waters.

The list of new or rare fish that have been taken in Tasmanian waters during the past year is somewhat extensive. Among those that have been received at the Fisheries Establishment the following may be most prominently mentioned. The specimens, excepting such as have been preserved alive at the Fisheries Establishment, have, in most instances, been contributed to the Museum :—

1. A. Tunny, or so-called Albicore, indistinguishable from the Tunny (*Thynnus thynnus*) of the European seas, eight feet long, and weighing four and a half hundredweight, captured in shoal water in Taylor's Bay. 2. Hoplognathus Conwayi, a large transversely-banded percoid fish, rare in Australian and new to Tasmanian waters, two allied species inhabiting the Japanese and Chinese seas, taken in a graball net in the Derwent estuary. 3. Percis Allporti, a rare fish, having somewhat the aspect of a Flathead (*Platycephalus*), but with a thicker head; colour, when living, body pale pink superiorly, shading off through lemon yellow to white on the ventral surface; the dorsal region diversified with from seven to nine dark brown or blackish transverse bars; fins yellow; captured in graball, Derwent estuary. 4. Frost-fish or Scabbard-fish (Lepidopus caudatus), a specimen three feet long, captured struggling on the surface of the water in the Fishermen's Dock, Hobart, June, 1887. 5. New Zealand Trumpeter, or "Moki" of the aboriginals, (Latris ciliaris), East Coast, October, 1886, now living in the tanks of the Fisheries Establishment. 6. Butterfish of the Hobart fishermen (Chilodactylus Mulhalli), apparently identical with the Psilocranium Coxii of Mackay, and the Chilodactylus speciabilis of Huttor. Notes on this species were contributed by me to the Proceedings of the Royal Society of Tasmania, May, 1887. 7. The Magpie Perch of the Tasmanian fishermen, referred in Mr. Johnston's Catalogue to Chilodactylus gibbosus (Richardson), has been found by me, on reference to the original figures and description of that species, (Proc. & Trans. Zool. Soc., 1850), to be a species new to science, and upon which (Proc. Roy. Soc. Tasmania, June, 1887) I have conferred the title of Chilodactylus bizonarius, in allusion to the two broad black bands by which its body is encircled. The Chilodactylus vittatus of Gunther is, apparently, a local or, possibly, the sexual variety only of the typical C. gibbosus. 8. A Rock Gurnet (Sebastes sp.), new to Tasmanian waters, from the East Coast. 9. Large Blennoid fish or Bully (Clinus Johnstoni), described for the first time in my last year's report; two more specimens received, now living at the Fisheries Establishment. 10. A Dragonette (Callionymus sp.), probably C. lunatus, new to Tasmania. 11. The large Parrot-fish or "Blue-head" of the Tasmanian fishermen, apparently referred by Allport and Johnston to Cossyphus Gouldii (Rich.), has proved to be a new species of Labricthys, recently described by Mr. D. Ogilby (Proc. Lin. Soc. N.S.W., 1887), under the title of L. cyaneus. 12. A Leather Jacket, allied to Monocanthus Ayraudi (Quoy and Grimard) new to Tasmanian waters. 13. Frog-fish (Antennarius sp.), new to Tasmania, taken with dredge in the Tamar estuary, June, 1886. 14. Seven-gilled Shark (Notitanus indicus), rare in Tasmanian waters; two specimens taken with graball in Norfolk Bay, January, 1887.

Two specimens of the large Deep-sea Crab (*Pseudocarcinus gigas*), the one taken in a graball near Port Arthur, and the other foul-hooked with a handline off South Bruni, have been received at the Fisheries Establishment during the past year. The specimens fed for the first few days, but soon sickened and died, owing, probably, to the much lower temperature of the water in the tanks at the time of their arrival—May and August respectively—as compared with that of their native habitat. By setting ordinary crab-traps in the neighbourhood of the localities where these specimens were captured, they might probably be taken in sufficient abundance for commercial purposes. Several more examples of the New South Wales Crawfish (*Palinurus Hugellii*), recorded for the first time from Tasmanian waters in my last year's report, have been captured on the East Coast within the past twelvemonth.

The following list of new and rare species of fish, other than above mentioned, received or recorded at the Tasmanian Museum during the past year, has been supplied to me by the Curator, Mr. Morton:—1. Pempheris macrolepis. 2. Gobius Castlenaui. 3. Salarias sp., new to science. 4. Sucking-fish (Crepidogaster Tasmaniensis), from George's Bay. 5. Silver Eel (Congromurena habeneta. 6. Blue or Porbeagle Shark (Lamna cornubiensis.) 7. Black Bream (Girella tricuspidata). The occurrence of an example of the Sword-fish (Histiophorus gladius), found stranded on the North-West Coast, has been reported by Mr. Johnston in the Proceedings of the Royal Society of Tasmania for June, 1887.

SECTION B.—FRESHWATER FISHBRIES.

1. Salmonidæ.

There is but little to report this year concerning the establishment of the true salmon (Salmo salar) in Tasmania, attention being engrossed chiefly by the speculation as to whether the many thousands of fry reared from the Yeoman importation of ova, 1885, and liberated the same year in numerous rivers throughout the Colony, will re-ascend these rivers from the sea this coming spring in the form of grilse or more or less matured fish. Should they fail to do so, it will be difficult to avoid the conclusion that upon descending to the ocean the young salmon find the surrounding conditions so unsuited to their natural requirements that they migrate further afield and do not return to Tasmanian waters. I am inclined to anticipate, in this event, that the conditions of temperature represent the most important disturbing factor. As indicated in a previous page of my Report (p. 7) no systematic record is accessible concerning the seasonal range of temperature of the British seas. It may be at the same time observed that the aerial mean isotherm of Tasmania, about 50° Fahr., corresponds most closely with that of the south of France; that the true salmon is confined to the rivers of Europe that debouch upon its northern coast line, and that the attempts made, notably by Prof. Paul Gervais, to acclimatise it in various rivers of Languedoc flowing into the Mediterranean, have not been attended with success. As here, the young fish of from one to two years old throve in the rivers, but failed to reappear after making their customary migration to the secibed under the title of the Slender Salmon (Salmo attenuatus.) It has, in fact, in that district approached its southern isothermal limit, and assumed an attenuate and depauperated character prior to disappearing altogether. Should the inference be correct,—viz., that the young salmon finding the waters of the Tasmanian coast too warm, migrate to more distant and colder climes,—tit will, I consider, be a waste of expenditure to import the oreal an attenuate and depauperated

the return to our rivers this coming spring of genuine Tasmanian born and bred Salmo salar will, I am hoping, form not the least important item of my next Report.

2. Cucumber Mullet or Grayling.

Good progress has been made during the past autumn with the operations inaugurated by me the year previously in the direction of restocking the River Derwent with the much esteemed so-called Cucumber Mullet, Freshwater Herring or Grayling, *Prototroctes marena*. As proposed in my last Report, I established during the past spawning season a small hatching station on the banks of the Mersey near Latrobe, and here collected and stored the artificially tertilised ova until they had arrived at the "eyed" condition, and were better fitted for railway transit. Supplies of ova were thus obtained and brought to the station from the Mersey and the Forth, and thence drafted on to Hobart. Here they were retained in the especial boxes prepared for them at the Fisheries Establishment, Battery Point, until the fry had hatched out or were on the point of doing so, and were then conveyed to suitable places in the Derwent above New Norfolk, where the species was formerly known to breed. So many as between five and six millions of young and healthy fry were there liberated, and a few more years of perseverance with these operations can scarcely fail to accomplish the object of once more restoring this valuable species in abundance to the waters of the above-named river. Already gratifying reports have been received of a number of the young fish having been seen, and others taken that have evidently developed from the ova and fry similarly placed in the Derwent last year.

For the safe transport and development of the Grayling ova I have invented special apparatus, which I find to fulfil its purpose very economically and efficiently. This consists, for transport purposes, of an ordinary 7lb biscuit-tin fitted with shallow trays one quarter of an inch deep, and which are composed of a light wooden outer frame, upon which coarse flannel is tightly strained and secured; each tray accommodating 60,000 of the minute Grayling ova in a single layer, and, twenty of these trays fitting into a single box, upwards of one million ova can be stored and transported in each box. To keep the ova moist and at a low temperature during transport for long distances, cloths saturated with water are wrapped round the boxes. For the further development of the ova, two trays with their contents are transferred to and tightly fitted side by side as a false bottom into larger bottomless frames or boxes about six inches deep. These are fixed or allowed to float in a stream or trough with two or three inches of their sides above the surface of the water. In the latter case it is so arranged that water drips through a tap into each box. The ova and fry when hatched thus get a constantly circulating stream, and are at the same time, nothwithstanding their minute size, unable to escape from the boxes. Acknowledgments must be made under this heading to Mr. Bonney, of Latrobe, for kindly permitting the erection of the hatching-shed on his private grounds, and for the use of a portion of his mill-stream for the accommodation of the floating boxes; thanks are also due to Mr. S. Ready, of the same township, for valuable assistance in collecting and artificially fertilising the Grayling ova in accordance with my directions, and for taking general charge of the station during spawning operations. Provision has been made for dealing next year with further supplies of the ova of this fish, and in response to applications received for stocking rivers other than the Derwent with this species.

3. Blackfish.

During the past year I have also directed my attention, as proposed in last year's Report, to acclimatising the Blackfish (Gadopsis marmoratus) of Northern Tasmania in the Derwent and other Southern rivers. Previously to this I had on one or two occasions brought a few examples from the Mersey to Hobart. The skin of this species is, however, so exceeding soft and susceptible of abrasion against the side and bottom of an ordinary fish-tin, that they were usually so much injured in transit as to outlive the journey for but a few days only. To overcome this obstacle to their safe transport, I this year adopted a plan which has proved eminently successful, not a single fish having been lost out of the whole number transported. Into the sides of an ordinary circular tin fish carrier, measuring eighteen inches in diameter with about the same depth, I had affixed two parallel series of metal hooks that received and held in position two hoops of cane. A square of coarse canvas or cheese-cloth being thrust bagwise into the tin, is fastened down and strained tight by means of the cane hoops at some little distance from the bottom and sides, and on water being filled in forms a sort of padded chamber or swing hammock within which the fish travel without ever coming in contact with the carrier. Between seventy and eighty fine fish, some ten inches long and which should breed this coming summer, have by these means been transported from the Mersey to the Derwent in first-class condition. Next season it is proposed to prosecute these operations on a more extensive scale, and to supply stock for the Huon and other rivers, where the species is regarded as a desideratum.

4. Proposed Local Board of Conservators.

With reference to the better conservation and further development of the fresh-water fisheries of this Colony, I would re-direct your attention on this occasion to the recommendations made in my two previous Reports concerning the appointment, as in England and elsewhere, of Local Boards of Conservators, who shall act in concert with the Superintendent and Inspector of Fisheries in exercising a general control over the fresh-water fisheries of their respective districts. Such Boards would be self-supporting, deriving the funds for the discharge of their functions from the sale of fishing licences. In my former Reports I have suggested the appointment of two such Boards, the one to be associated with the northern and the other with the southern rivers of Tasmania. Having during the past year made myself more fully acquainted with the resources and requirements of the Colony, I have now to recommend the formation of at least four such Boards, that shall be associated respectively with the following riverine districts :-

1. The Derwent and its affluents.

3. The Tamar and the two Esks combined.

2. The Huon and neighbouring streams.

4. The Mersey, Forth, and neighbouring rivers.

In a separate communication I have furnished you with full details as to the composition and functions of the proposed Boards of Conservators, as also, in the event of your approving of the scheme, with the rough draft of a suggested Bill that it will be necessary to introduce to Parliament to authorise their appointment. The names of gentlemen willing and qualified to act upon the several Boards will be submitted to you so soon as you are prepared to receive them. I may point out that the present time is a particularly opportune one for the inauguration of the proposed scheme; also, that under no other auspices than through the appointment of the suggested Boards, composed chiefly of landed proprietors having a direct interest in the conservation and development of the fisheries of their respective neighbourhoods, do I anticipate any practical check can be brought to bear upon the illegal and indiscriminate fishing so extensively practical check can be blodght and which is already seriously impoverishing the supplies of indigenous and acclimatised fish throughout the rivers of this Co ony. I may further state that I anticipate deriving very material assistance from the co-operation of such judiciously selected Boards in carrying out the operations I have initiated, and have hitherto had to accomplish single-handed, in the direction of establishing the Cucumber Mullet and Blackfish in the many rivers of this Colony where they have been previously exterminated or unrepresented, and will be regarded as a welcome accession.

While intimating that the proposed Boards would be self-supporting, I have to recommend that the Government, for the present at least, continue its annual contribution of £100 towards the conservancy of the lower reaches of the Derwent estuary, and where it is desirable that a skilled boatman should be constantly on guard. The Salmon Ponds Establishment on the River Plenty, while always available for propagating operations in connection with the proposed Derwent Board of Conservancy, should remain in the hands of the Government for utilisation under the direction of the Superintendent and Inspector of Fisheries, for the benefit of the fresh-water fisheries of the entire Colony.

In concluding my Report, I would crave leave to draw your attention to the circumstance that the conduct of the financial affairs of my department would be greatly facilitated if reasonable and definite notice was communicated from the Treasury concerning the dates at which all the accounts should be submitted. The absence of such notice in connection with the termination of the past financial year has caused very serious inconvenience, involving the necessity for applying for a Supplementary Vote, as though the departmental expenditure had been exceeded, which is not the case.

Trusting that the subject-matter of my Report may meet with your approbation,

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.

The Hon. the Chief Secretary.

APPENDIX A.

LIST of Government Oyster Reserves and Private Oyster Fisheries established and projected in the Colony of Tasmania.

Battery Point. 1 Government Reserve	Stocked.
Oyster Cove. 2 Government Reserves 2 Private beds	Stocked. Stocked.
Barnes' Bay. 1 Private bed	Bespoken.
Carlton River. 1 Government Reserve 1 Private bed	Surveyed. Partly stocked.
Shipwrights' Point. 1 Government Reserve 3 Private beds	Surveyed. Bespoken.
Norfolh Bay. 1 Government Reserve 2 or more Private beds	Projected. Bespoken.
Southport. 1 Government Reserve ,	Projected.
Prosser's River. 2 Private beds	Stocked.
Spring Bay. 3 Government Reserves 7 Private beds	Stocked. Partly stocked.
Maria Island. 1 Private bed	Partly stocked.
Little Snanport Lagoon. 1 Government Reserve 2 Private beds	Stocked. Partly stocked.
Swansea. 1 Government Reserve 2 Private beds	Stocked. Bespoken.
Falmouth. 1 Government Reserve	Projected.
George's Bay. 1 Government Reserve 1 Private bed	Stocked. Partly stocked.
River Tamar. 2 Government Reserves 2 Private beds	Stocked. Applied for.
Port Sorell. 1 Government Reserve 1 Private bed	Projected. Bespoken.

A stock of native oysters is at the present time being collected for laying down on those Reserves against which are affixed the terms of "surveyed" or "projected."

While printing this Report, and as the result of the past year's successful operations in Oyster culture on the Government Reserves, two public associations are in course of formation for cultivating Oysters on an extensive scale in the neighbourhoods of George's Bay and Spring Bay.

APPENDIX B.

SCHEDULE of Tasmanian Marine Market Fish.

	Name.	Adult Size or Weight.	In Season.	Mode of Capture.	Natural Food.	Habitat or where caught.	When spawns or found with Roe.	Remarks.
1.	Red Perch	1 to 2 lbs.	All the year	Graball; hook and line	Shellfish; Brit *	Among kelp	June and July	Not common. *"Brit" is the popular name given by the local fishermen to a floating gregarious species of crustacea closely allied to or identical with
2.	Native Salmon	1 to 7 or 20 lbs.	All the year	Graball; seine; hook & line or	Small fish ; Brit	Open water	February	Grimmothea gregarea. Gregarious, the young having spots and bars, is known locally as Native Salmon Trout (Arripis truttaceus,
3.	Black Bream (Girella tricuspidata.)	1 to 3 lbs.	Oct. to March	Jig Graball	Seaweed	Shoal water; North Coast	· . — .	Cuv. & Val.) This and the following type are considered to possibly represent stages of the same species.
4.	Sweep	2 to 3 lbs.	Autumn	Graball	Seaweed	Among seaweed in shallows	Autumn?	Not common.
5.	Silver Bream	1 to 4 or 5 lbs.	Oct. to March	Graball ; hook & line	Crustacea	Estuaries ; enter- ing fresh water	Nov. and Dec.?	Affords excellent sport with rod and line in the brackish waters of river estuaries, which it enters
6.	Sea Carp	5 to 6 lbs.	All the year	Graball	Crustacea; Brit	With Bastard Trumpeter	July and August	Caught most abundantly before westerly gales.
7.	Black and Silver Perch (Chilodactylus macropterus.)	1 to 6 lbs.	All the year	Graball; hook & line	Crustacea ; small fish	among kelp Adult, reefs and among kelp; young, entering	With roe & milt, Aug to Oct.	Common.
8.	Magpie Perch	1 to 2 lbs.	All the year	Graball	Crustacea	bays & estuaries Among kelp	July and August	Not common.
9.	Real Trumpeter (Latris hecateia.)	5 to 40 or 60 lbs.	All year through : largest fish, May to September	Hook and line; bait, Crayfish	Crustacea ; Shrimps, Crabs, &c.	Reefs, 10 to 70 fathoms	Ova and milt ripe, July and August	Two varieties: 1, "Deep Reef" variety, weighing 15 to 60 lbs., with ova and milt matured, from deep water; and 2, "Pair" or "School Fish," not exceed-
10.	Red and Silver Bastard Trumpeter	5 to 6 or 7 lbs.	Adult, Jan. to Mar.; young, all the year	Graball	Brit	Kelp banks and in estuaries 3 to	March & April? June & July	ing 6 or 7 lbs. weight, with immature reproductive organs, from shallower water & ascending estuaries. The fry of this species, known as "Paper Fish," enter the upper waters of the larger estuaries in large
11.	Real Bastard Trumpeter (Mendosoma Allporti.)	5 to 6 lbs.	Winter	Graball		Reefs, among kelp	··	shoals. Not common ; gregarious.
12.	Rock Gurnet	1 to 2 lbs.	All the year	Hook and line		Trumpeter ground	Viviparous ; Spring months	
13.	Flathead	2 to 3 lbs.	All the year	Hook and line	Young fish, espe- cially flounders	Abundant every- where; the finest on exten-	Nov. & Dec. ? throughout the year?	The commonest of Tasmanian edible fish. Have taken male with ripe milt end of July.
14.	Tasmanian Whiting	≵ lb. '	Nov. to Mar.	Scine; hook and line		sive sandy flats Offsandy beaches	Spawns bien- nially, Mar. &	
15.	Barracouta	6 to 8 lbs.	Nov. to Aug.	Maori jig; cloth bait	Shoal fish, espe- cially sprats	Surface of open sea entering	Sept. With roe in Dec., also in July	Gregarious.
16.	Kingfish	12 or 14 to 20 lbs.	Dec. to Oct.; most abundant May & June	Hook and line with chain and swivel, fish bait	Shoal fish	Surface of open sea	-	Gregarious. Occurs in vast numbers at fluctuating intervals. In the year 1875 it was so abundant as to be used extensively for manure.

12

17.	Bustard Dorey (Cyttus australis.)	⅓ to 1 lb.	April	Graball	Sprats and small shoal fish	In deep water and about harbours	Spring? young fish in summer	Gregarious; appearing in large shoals at uncertain intervals.
18.	Horse Mackerel	½ to 3 lbs.	All the year	Seine; hook and line	Small fish; Brit	Open sea, enter- ing estuaries	July and Aug.? young in	Gregarious; a cosmopolitan type, plentiful also in European seas.
19.	White or Silver Trevally (Caranx Georgianus.)	10 to 12 lbs.	Midwinter	Graball, seine, hook & line	Small shoal fish	Open waters	autumn r	Gregarious.
20	Yellowtail	50 lbs. or up- wards	Autumn	Hook and line	Small fish	North Coast only	_	Gregarious.
21.	Snotgall Trevally (Neptonemus brama.)	12 to 14 lbs.	March to May	Hook and line	Brit and small fish	Adult, deep water, mouths of estuaries ;	May to July	
22.	Mackerel Trevally (Neptonemus do ula.)	2 lbs.	March to April	Graball; hook & line	Small shoal fish	young, shallow Entering estuaries		Gregarious.
23.	Pike	2 to 4 lbs.	Summer	Hook and line		—	. —	
24.	Sand Mullet	4 to 6 lbs.	Summer	Seine ; hook and line	Mostly vegetable	Estuaries of northern rivers	·	Abundant, George's Bay.
25.	Sea Mullet	ᢤ to 1ᢤ lbs.	All the year	Hook and line; seine	Animal matter generally	Bays & estuaries all round the	All the year through?	Fry abounds at all seasons, so probably breeds all the year through.
26.	Stranger	1 lb.	Autumn	Seine; hook and line	Crustacea	River mouths	November	
27.	Rock Cod (Pseudophycis barbatus.)	At $2\frac{1}{2}$ lbs.; deep water 8 or 9 lbs.	All the year	Hook and line	Crustacea, Pea Crab, Brit	Everywhere on rocky bottom	June to Aug.? [•] September.	
28.	Tasmanian Ling (Genypterus blacodes.)	7 to 15 lbs.	All year; chiefly in summer	Hook and line	Small fish	Rock or weed bottom, 3 to 8	Winter	Two distinct varieties—dark on rocky, and light- coloured on sandy ground.
29.	Tasmanian Sole	1 to 2 lbs.	All the year	Seine	·	On sandy bottom	<u> </u>	Most plentiful on North Coast, there called "Brill."
30.	Tasmanian Flounder (Rhombsolea monopus.)	$\frac{1}{2}$ to 2 lbs.	All the year	Seine	Marine worms	Sandy bottom	June to Sept.; also Dec.	Apparently breeds nearly all the year through.
31. (Garfish Hemirhamphus intermedius.)	¼ to ⅔ lbs.	April to October	Seine, ¹ / ₄ -in. mesh	Small Crustacea and Molluscs	Among sea grass (Zostera)	Young fish, taken in autumn	Also affords good sport with rod and line.
32.	Tasmanian Sand Eel	1/2 to 1 lb.	Winter? sum- mer?		_			
33.	Anchovy or Prettyfish (Engraulis encrasicholus.)	5 inches	November to March		Minute Crustacea	River estuaries entering brack-		Very abundant in autumn in George's Bay.
34.	Sprat	4 inches	Winter		. —	Bays and estuaries	_	
35.	Conger Eel	7 to 50 lbs.	All the year	Hook and line	Small fish	On rocky bottom	. —	
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