

## SECTION XI.

## FISHERIES AND PISCICULTURE.

## § I. Commercial Fisheries.

1. **Fish Stocks.**—Australasia possesses an abundant and varied fish fauna, which embraces both tropical and temperate varieties and includes destructive as well as edible species. In rivers and lakes both indigenous and imported varieties thrive. The latter have been introduced and acclimatised for industrial and sporting purposes by Governments and angling societies. Exploitation of the fishing areas—for some classes of fish for the whole year, for others during the breeding season only, or until a certain size is attained—is, where necessary, expressly forbidden; proclaimed localities are closed against net-fishing, and a minimum size of mesh for nets is sometimes fixed. The sea-fishermen in some districts have made regulations in their own interests for the purpose of controlling the market supply, and these they rigorously observe.

2. **Economic Fisheries.**—Although Australia's food fishes are abundant, the development of the industry has been slow. It has been authoritatively stated that the marine fisheries, properly fostered, will develop into an industry of national importance. Local catches of lake and river fishes furnish, in the aggregate, a not inconsiderable amount of food supply.

3. **Distribution of Supplies.**—Present methods of distribution impose serious difficulties on the development of fishing generally, since there is a wide divergence between the price paid by the consumer and the return received by the producer. States and municipalities are interesting themselves in the direction of more economic distribution. Good markets are assured in the chief cities for regular deliveries of fresh fish.

4. **Oyster Fisheries.**—Natural oyster beds, whose ample product is of excellent quality, exist on the foreshores in the shallow waters of inlets and estuaries in several parts of Australia. By husbanding the natural crop, and by judicious transplanting, the oyster output has been very materially augmented, and it is believed that there is a great future for the industry. The areas are leased by the Government to private persons, lengths of foreshore being taken up and profitably exploited. In New South Wales and Queensland particularly, the industry has developed; and small yields have been obtained in South Australia and Victoria.

5. **Pearl-shelling.**—Pearl-shelling is carried on in the tropical districts of Queensland, the Northern Territory, and Western Australia. The pearl oyster inhabits the northern and western coasts from Cape York to Shark Bay, a length of shore of over 2000 miles. The shells are marketed in considerable quantities, and pearls are also obtained in Queensland and Western Australia. The fishing is generally conducted with the aid of diving apparatus, in water varying from four to twenty fathoms in depth.

In Queensland and Northern Territory the béche-de-mer industry is carried on, and tortoiseshell is obtained on the coasts. Experiments have been made in cultivating the pearl oyster on suitable banks. In October, 1911, a pearl weighing 178 grains, and valued at £3000, was obtained at Broome. Further details regarding pearl-shelling are given in *Official Year Book*, No. 6, p. 463.

The system of licensing boats and men engaged in the pearling industry restricts, in the States where it is in force, indiscriminate exploiting of the areas, and returns a small revenue.

Poaching in Australian territorial waters has long been rife, particularly on the north-west coast, and measures have recently been taken to check it.

In accordance with the "White Australia" policy, it has been determined that the employment of coloured labour in the pearl-shelling industry shall be restricted, and ultimately cease altogether. After 31st December, 1913, permits to indent Asiatics for the pearling fleet cease, and all divers and tenders employed upon the luggers must be white men. Experienced divers from England have been engaged. It is believed that practical difficulties which may arise in the transition period will be overcome. In March, 1912, the Commonwealth Government appointed a Royal Commission to inquire into the pearling industry generally, and particularly as regards its labour problems. The Commission commenced its work at Cairns, Queensland, on 30th April, 1912. Evidence of a valuable nature has been taken in various centres; a progress report was presented in October, 1913; and minutes of evidence, appendices, etc., were published in December, 1913.

## § 2. Fisheries Statistics.

1. *Estimates for the Commonwealth.*—The returns given below have been furnished by the State departments. Estimates and approximations, where shewn, are official. The data do not generally lend themselves to presentation on a uniform scheme, but the principal facts have been compiled as far as possible for the Commonwealth.

### GENERAL FISHERIES (EXCLUDING EDIBLE OYSTERS, PEARLSHELL AND BÉCHE-DE-MER), COMMONWEALTH, 1912.

State.	No. of Boats Engaged.	Value of Boats and Equip-ment.	No. of Men Em-ployed.	Total Take of		Value of Take.	
				Fish.	Lobsters.	Fish.	Lobsters.
	No.	£	No.	cwt.	doz.	£	£
New South Wales ...	615	26,047	2,405	134,182	11,325	144,319	5,096
Victoria ...	721	46,034	1,138	88,850	39,460	77,899	11,749
Queensland...	311	11,106	574	37,570	...	36,628	...
South Australia ...	881	30,500	1,194	98,000	11,750	165,000	5,500
Western Australia ...	271	19,794	569	32,000	15,000	60,000	4,260
Tasmania† ...	†95	*	†220	†	8,233	12,817	1,235
Northern Territory ...	4	600	14	566	...	682	...
Commonwealth ...	2,898	134,081§	6,114	391,168§	85,768	497,345	27,840

\* Figures not available. † Estimated. ‡ 73,869 dozen. § Exclusive of Tasmania.

## EDIBLE OYSTER-FISHERIES, COMMONWEALTH, 1912.

State.	Number of Boats Engaged.	Value of Boats and Equipment.	Number of Men Employed.	Number of Leases.	Length of Foreshore in Leases.	Oysters Taken.	
						Quantity.	Value.
	No.	£	No.	No.	Miles.	cwt.	£
New South Wales ...	364	10,776	348	2,010	339	25,955	45,108
Victoria ...	...	...	...	...	...	...	...
Queensland... ..	115	12,760	161	769	*	28,935	32,371
South Australia ...	6	640	9	*	...	3,223	2,454
Western Australia ...	...	...	...	...	...	...	...
Tasmania ...	...	...	...	...	...	...	...
Northern Territory ...	...	...	...	...	...	...	...
Commonwealth ...	485	24,176	518	2,779†	*	58,113	79,933

\* Figures not available.

† Exclusive of figures for South Australia.

## PEARL, PEARLSHELL, AND BÊCHE-DE-MER FISHERIES, COMMONWEALTH, 1912.

State.	Number of Boats Engaged.	Value of Boats and Equipment.	Number of Men Employed.	Quantity of Pearls obtained.	Value of Pearls obtained.	Value of Pearls obtained.	Value of Bêche-de-mer obtained.	Quantity of Tor-toiseshell obtained.	Value of Tor-toiseshell obtained.
N.S.W. ...	...	...	...	...	...	...	...	...	...
Victoria ...	...	...	...	...	...	...	...	...	...
Q'island ...	170	55,000	1,357	462	92,576	*6,333	23,385	1,302	785
S. Aust. ...	...	...	...	...	...	...	...	...	...
W. Aust. ...	401	186,924	2,718	1,596	421,609	100,000	...	...	...
Tas. ...	...	...	...	...	...	...	...	...	...
N. Terr. ...	36	8,650	216	45	16,113	40	1,757	...	...
C'wlth.	607	250,574	4,291	2,103	530,298	106,373*	25,142	1,302	785

\* Exclusive of pearls obtained by Japanese divers, for which no record is obtained; estimated at about £25,000.

## PUBLIC REVENUE FROM FISHERIES, COMMONWEALTH, 1912.

State.	Licenses.	Leases.	Fines and Forfeitures.	Other Sources.	Total.
	£	£	£	£	£
New South Wales ...	1,116	5,766	320	604	7,806
Victoria ...	...	...	...	...	...
Queensland... ..	2,320	4,752	6	10	7,088
South Australia ...	412	...	7	...	419
Western Australia ...	1,126	1,150	152	11	2,439
Tasmania* ...	556	...	10	...	566
Northern Territory ...	46	...	...	...	46
Commonwealth ...	5,576	11,668	495	625	18,364

\* Returns incomplete; refer mainly to Fisheries Board of Hobart.

## GENERAL AND OYSTER FISHERIES, COMMONWEALTH, 1908 to 1912.

Particulars.	1908.	1909.	1910.	1911.	1912.
General Fisheries—					
No. of boats engaged ...	3,063	3,101	3,088	2,593	2,898
„ men employed ...	5,107	5,492	5,515	4,405	6,114
Fish obtained—					
Quantity ... cwt.	289,820	298,351	341,659†	350,828§	391,168
Value... .. £	259,392	276,672	381,182	474,027	497,345
Lobsters obtained—Value, £	16,163	16,078	22,172	27,718	27,840
Edible Oyster Fisheries—					
No. of boats engaged* ...	139	139	113	482	485
„ men employed* ...	196	175	174	589	518
Oysters obtained—					
Quantity ... cwt.	57,590	59,109†	59,854	64,397	58,113
Value ... .. £	61,900	63,192†	60,769	77,080	79,933
Public Revenue from Fisheries					
Licenses ... .. £	8,891	8,812	5,496	4,833	5,576
Leases ... .. £	7,001	7,446	9,842	11,583	11,668
Fines and forfeitures	£ 168	142	180	345	495
Other sources ... .. £	885	649	742	386	625
Total revenue ... .. £	16,945	17,049	16,260	17,147	18,364

\* Queensland and South Australia only for years 1907 to 1910. There are practically no oyster fisheries in Victoria, Western Australia, and Tasmania. † New South Wales and Queensland only. ‡ Exclusive of Tasmania. § Exclusive of Western Australia and Tasmania. || Exclusive of Tasmania.

## PEARL, PEARL-SHELL AND BÈCHE-DE-MER FISHERIES, COMMONWEALTH,\*

1908 to 1912.

Particulars.	1908.	1909.	1910.	1911.	1912.
No. of boats engaged ...	604	567	586	578	607
No. of men employed ...	3,852	3,883	4,038	4,052	4,291
Pearlshell obtained—					
Quantity ... .. tons	1,768	1,770	1,853	1,717	2,103
Value ... .. £	219,098	270,256	299,143	327,444	530,298
Pearls obtained †—					
Value ... .. £	49,225	77,788	94,768	87,713	106,373‡
Bêche-de-mer obtained—					
Quantity ... .. tons	346	352	251	323	450
Value ... .. £	22,903	16,410	14,088	17,712	25,142
Tortoiseshell obtained—					
Quantity ... .. lbs.	5,056	3,532	2,070	1,056	1,302
Value ... .. £	2,776	1,739	998	572	785

\* Queensland, Northern Territory and Western Australia only. There is no production in the other States. † As returned. ‡ Exclusive of pearls obtained by Japanese divers, estimated at £25,000.

## § 3. Oversea Trade in Fish.

That the development of the fishing industry in Australia leaves much to be desired is evident from the fact that the import of preserved fish into the Commonwealth is very large. The figures for the trade are as follows:—

## IMPORTS OF FISH, COMMONWEALTH, 1908 to 1912.

Classification.		1908.	1909.	1910.	1911.	1912.
Fresh (oysters) ...	{ cwt.}	9,702	10,580	9,640	7,152	8,765
	{ £}	4,381	4,989	4,805	3,462	5,279
Fresh, or preserved by cold process... ..	{ cwt.}	19,311	11,355	11,248	20,455	25,673
	{ £}	48,072	20,785	23,001	44,536	56,396
Potted ... ..	{ cwt.}	*	*	*	*	*
	{ £}	20,874	22,082	25,408	26,024	35,506
Preserved in tins ... ..	{ cwt.}	144,750	137,860	154,547	148,846	194,092
	{ £}	400,981	371,620	466,381	443,049	606,969
Smoked, dried and n.e.i.	{ cwt.}	19,349	21,667	19,448	21,605	26,472
	{ £}	34,780	47,096	42,918	52,289	76,327
Total ... ..	{ cwt.†}	193,112	181,462	194,883	198,058	255,002
	{ £}	509,088	466,572	562,513	569,360	780,477

\* Not available. † Exclusive of potted fish.

## EXPORTS OF FISH (AUSTRALIAN PRODUCE), 1908 to 1912.

## COMMONWEALTH.

Classification.		1908.	1909.	1910.	1911.	1912.
Fish, fresh, smoked, or preserved by cold process	{ cwt.}	394	994	912	248	137
	{ £}	1,230	2,896	1,963	1,026	436
Preserved in tins, dried, salted, etc.	{ cwt.}	7,006	6,746	5,346	6,891	38,268
	{ £}	23,299	15,556	17,532	23,185	35,827
Total ... ..	{ cwt.}	7,400	7,740	6,258	7,139	38,405
	{ £}	24,529	18,452	19,495	24,211	36,263

Although a considerable development has taken place lately in the fish preserving industry, there is for the Commonwealth an excess of imports over exports amounting approximately to £485,000 in 1908, £450,000 in 1909, £540,000 in 1910, £545,000 in 1911, and £745,000 in 1912.

The exports of pearlshell and tortoiseshell are given hereunder for the five years 1908-12:—

## EXPORTS OF PEARLSHELL AND TORTOISESHELL, 1908 to 1912.

## COMMONWEALTH.

Article.		1908.	1909.	1910.	1911.	1912.
Pearlshell ... ..	{ cwt.}	40,748	34,585	40,307	39,126	64,976
	{ £}	250,904	250,291	322,184	330,003	524,281
Tortoiseshell ... ..	{ lbs.}	5,310	3,207	1,742	1,693	5,170
	{ £}	2,783	1,557	823	964	3,454

## § 4. Development of the Fishing Industry.

1. **Transport and Marketing.**—For many years the question of securing to the consumer a regular supply of wholesome fish at a moderate price has been under consideration. Where quick transport by rail or steamer is not provided, the catch of fish in tropical or sub-tropical waters can only be locally consumed, since speedy marketing is essential. Adequate refrigerating apparatus on railway waggons and coasting steamers and quick transport to centres of population might, however, alter the economic condition in a satisfactory direction. In the temperate regions there are adequate supplies close to the principal ports—a fact which is of considerable advantage, since short trips mean marketing of the produce in good condition, and less sea risks are incurred. At the present time the natural wealth of Australia in fish is exploited only to a very slight extent.

2. **Experiment and Culture.**—*The Existing Fisheries.* In many respects the fishing industry is capable of modification and development. A good deal has been effected by the State Governments in the way of experiment and culture. A uniform policy of development for Australia is desirable, and recommendations have been made that the Fisheries Departments of the various States should co-operate with the Federal Government with a view to increasing the productiveness of the Commonwealth waters; and that uniform fisheries laws should be adopted by adjacent States.

All live fish arriving in Australia are examined on shipboard in order to prevent the importation of undesirable fish.

With the object of ascertaining something of the movements of oceanic fishes, as well as of those estuarine fishes which make periodical oceanic migrations, reports are furnished regarding the various kinds of fishes, etc., observed travelling along the coast, as well as the quantity and size of fish seen. Some very useful information has in this way been obtained.

Fuller details regarding the activities of the States in fish-culture are given in Official Year Book No. 6, pp. 471-2.

By arrangement with the Commonwealth Fisheries Department, members of the staff of the Australian Museum, Sydney, accompany the F.I.S. "*Endeavour*" on various cruises. Specimens are collected, mounted for scientific purposes, and distributed to other Australian Museums, a considerable number being put aside for the Commonwealth Fishery Museum.

## § 5. The Commonwealth Department of Fisheries.

1. **The Federal Council of Australasia.**—The Federal Council had power to legislate with regard to fisheries in Australasian waters beyond territorial limits. In its second session (opened 16th January, 1888), an Act was passed to regulate pearlshell and bêche-de-mer fisheries in Australasian waters adjacent to Queensland; and in the third session, opened shortly afterwards, the Act was made applicable to Western Australia. Upon the passing of the Commonwealth Constitution Act of 1900, however, the Federal Council ceased to exist.

2. **Commonwealth Investigations.**—In 1907 the Commonwealth Government decided to demonstrate what might be attained commercially by the application of modern methods and experiences. A Federal Investigation Ship, the *Endeavour*, was constructed specially for the work, and a Director of Fisheries was appointed. Cruises and experiments were immediately instituted. These shew that the Commonwealth possesses an asset of considerable value in her sea fisheries. The scope and results of the inquiries are set out in the Director's reports, and are summarised below.

3. **Scope of the Inquiry.**—The immediate scope laid down for the investigation was, shortly, as follows:—

- (i.) By various means of capture to ascertain what marketable food-fishes may be found in ocean waters adjacent to Australia.
- (ii.) In what quantity they may be taken.
- (iii.) To what extent they migrate, and where.
- (iv.) How they may be conveniently and economically captured.
- (v.) By systematic survey to find out and chart suitable fishing grounds.

In addition to the work which is being thus carried on in the various recognised methods of capture (including long-line and drift-net fishing, etc.), survey, hydrographic work, etc., is conducted, for the purpose of ascertaining the nature of the bottom, depth of water, currents, and sea temperature.

4. **The F.I.S. "Endeavour."**—The construction of the investigation vessel was undertaken in the Commonwealth, and was upon the lines shown by the most recent European experience to be of greatest advantage, with necessary modifications to suit the Australian climate. A description of the vessel, which was the first Commonwealth owned sea-going ship, is given in Official Year Book No. 6, p. 473. Up to the end of 1913, 85 cruises had been made in eastern and southern waters.

5. **Results.**—The object of the investigations is to shew how and where food-fish may be obtained in quantity, rather than to bring large catches into port. Moreover, in untested areas, sounding and survey work generally become a main feature. Experiments with drift nets and long lines have given promising results. Trawling has been the principal method tried. By this means the fish are disturbed by a large bag-shaped net drawn along the sea bottom, and they are caught and retained in a trap arrangement at the tail-end of the net. Prior to 1912 the trials were limited to waters of not more than 100 fathoms in depth. During 1912 and 1913 the work was, in several localities, extended to a depth of 250 fathoms, and shewed that excellent catches could be obtained. In many cases, the greater size and superior quality of the catches obtained in deep waters made the freights, commercially, much more valuable than those obtained in shallow areas. A typical instance is the rockling, which in coastal waters is uncommon and small, but abundant at depths between 150 and 200 fathoms, and with an average weight of nearly ten pounds. The cruises have shewn that both suitable and unsuitable trawling grounds were met with in all parts, and that not all suitable grounds are rich in fish life. The richest grounds were found in localities where a reversal of currents or eddies facilitates the accumulation of fish food. Good catches are nearly always obtained along the "edge of the bank" at a depth varying from 50 to 120 fathoms. The "Endeavour" has so far located approximately 10,000 square miles of trawlable ground carrying fish in paying quantities, and within reasonable distance of the principal cities. The results have attracted a considerable amount of attention, particularly in Great Britain.

In conjunction with the survey work, investigations were undertaken regarding the deep water currents and their relation to the abundance of fish food and migrations. Bottom samples have been obtained from various depths down to 1200 fathoms, and water samples and temperatures from intermediate depths. Plankton collections from the surface have also been obtained, particularly to ascertain the distribution of pelagic fish eggs.

A varied and scientifically interesting collection of rare fishes, invertebrates, etc., has also been obtained. The specimens have been classified and mounted by naturalists in various parts of the Commonwealth.

Reports on the hydrographic, survey, and scientific departments of the vessel's activity are being prepared. At the end of 1911, part I. of the zoological results of the fishing experiments of the *Endeavour* was published; parts II. and III. followed in 1912. In 1914, a second volume was begun. These embody reports on the fishes, mollusca, sponges and hydroids obtained during the cruises. A number of new species has been discovered, and scientifically examined.

6. **Treatment and Disposal of the Catch.**—It was decided that the wisest method of disposing of the fish was to distribute them to recognised charitable institutions. Clashing with the established industry was thus avoided, and upwards of one hundred charities have benefited.

Upon capture, the prompt gutting and washing of the fish is performed. The necessary records are taken regarding the number, size, food, etc. They are then dried, and stowed in the cool chamber.

Unmarketable fish constitute a considerable proportion of the catch. Experience elsewhere has shewn that fish for which there is no sale for consumption, have a considerable value as material for rich fertilisers, and for the extraction of oil. For both these by-products there is a good oversea market.

The inadequacy of the present supply of fish in Australia is universally admitted, yet all reports agree that there is, on the coast, a bountiful supply of fish. It is not, as in Great Britain and the northern countries of Europe, a popular article of diet, but is rather in the nature of a luxury. While the value of fish consumed in Norway is nearly 20s., and in Holland, Denmark, and the United Kingdom 5s. per head of population, in Australia it is little over 1s. 6d. Moreover, in the European countries named, notwithstanding the fact that the trawlers have generally to go much further afield for their catches, a shilling's worth of fish represents a much larger quantity than could be obtained for the same amount in the Commonwealth, where the wealth of the coastal waters indicates that, with satisfactory handling, the product of the sea would become an article of food for the poorest classes, and a valuable industry would be developed. The uncertainties and limitations of the market, caused by the irregularity of the supply, will be overcome when the fact is recognised that the ocean product, properly exploited, is adequate to supply the demand, however strong. Under present conditions, it is not surprising that Australians are not great fish-eaters. The quantity of fish consumed annually per head in Great Britain is 42 lbs.; in Australia it is only 9 lbs. As a result of the *Endeavour's* experiments, definite steps are being taken to carry out well-considered schemes, which it is hoped will awaken enterprise, and revolutionise the unsatisfactory conditions of the Australian fish trade.

### § 6. Fish Preserving.

Bounties have been provided by the Federal Government for fish preserving, the rate payable being  $\frac{1}{4}$ d. per lb. The amounts paid were £27 in 1907-8; £1727 in 1908-9; £311 in 1909-10; £115 in 1910-11; £168 in 1911-12; and £103 in 1912-13. An amount is available for 1913-14. It is anticipated that the bounties, together with the increased yield that may be expected to result from the fisheries investigations now being conducted, will lead to a considerable output and consumption of locally preserved fish. The abundance of fish in Australian waters offers excellent opportunities for the institution of preserving establishments, particularly in those coastal districts which enjoy a temperate climate. Up to the present but little development has taken place, and the establishments for fish preserving at the present time are very few.

NUMBER OF FISH-PRESERVING ESTABLISHMENTS IN COMMONWEALTH,  
1908 to 1912.

State.	1908.	1909.	1910.	1911.	1912.
New South Wales	1	1	...	1	1
Victoria	...	...	1	1	1
Queensland	3	2	...	3	1
South Australia	...	...	...	...	...
Western Australia	3	3	3	...	...
Tasmania	...	...	...	...	...
Northern Territory	2	2	2	2	2
Commonwealth	9	8	6	7	5