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PELAGIC FISHING EXPERIMENTS IN AUSTRALIAN WATERS

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Summary

Further progress made during the years 1947-49 in catching commercially important pelagic fish in southern Australian waters is briefly described. These commercial scale experiments have been made by C.S.I.R.O. Fisheries Division alone or in collaboration with professional fishermen, or by fishermen themselves. In this way methods of taking six species of pelagic fish in commercial quantities have been demonstrated.

I. INTRODUCTION

Earlier fishing experiments carried out upon unexploited Australian pelagic species, by the Organization's Division of Fisheries and its collaborators, have been reported in papers by Blackburn (1941, 1943), Blackburn and Olsen (1947), Blackburn and Tubb (1950), Thompson (1943), Flett (1944), and Serventy (1947). The present paper deals briefly with work done between 1947 and 1949.

II. JACK-MACKEREL (*TRACHURUS NOVAE-ZELANDIAE*)

This species was called horse-mackerel, scad-mackerel, and cowan-young in earlier papers, which described attempts at capture by purse-seine net, culminating in one haul of 15 tons and a second of 16 tons within one week. These hauls were made in south-eastern Tasmanian waters in April 1947 by the 61-ft. vessel "*Eden Star*" under Mr. W. Warn, using a 2-in. mesh Californian purse-seine, 170 x 23 fathoms, imported by the Division of Fisheries. Several subsequent hauls in Tasmanian and southern New South Wales waters were failures because the net was too short. Mr. Warn then lengthened it to about 240 fathoms, and eventually approximately 70 tons were taken in five hauls (four of which caught fish, the catches ranging from 15 to 22 tons) from October 4 to November 14, 1947, in the Eden-Narooma district of New South Wales. In July 1948 three hauls were made in the same area from the 8th to the 15th, for a total catch of 35 tons; one haul yielded nothing because seals tore the net and liberated the fish. Between March 24 and the end of April 1949, again in south-eastern Tasmanian waters, approximately 60 tons were taken in an undisclosed number of hauls, some of which were unsuccessful.

There can be no further doubt that the purse-seine, in the hands of skilled Australian fishermen, is suitable for taking this species. The foregoing record might suggest that opportunities for such fishing occur only spasmodically, but this would not be a fair deduction because effort

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was not sustained over the whole period. The original net was too short, and many weeks were spent in fruitless attempts with it and in its reconstruction. Difficulties with mechanical equipment and with seals caused losses of time and fish. Some time was also devoted to beach fishing for salmon. A second vessel was procured, converted, and equipped for pelagic net fishing. The vessels reached Tasmania in 1949, some weeks after the normal commencement of the shoaling season, and the weather in May was unusually bad. Such difficulties are understandable in the experimental phase of a fishing enterprise, and in view of them it is felt that the record of captures is creditable, and promises well for future sustained purse-seining.

A very satisfactory feature of this work is the evidence of a surface shoaling season for jack-mackerel in southern New South Wales waters from July to November (and, from other evidence, possibly even later). It was observed in earlier papers that the best season in east Tasmanian waters is from February to June. If shoals appear under fine weather conditions in the New South Wales season as regularly as they usually do in the Tasmanian season, it would be possible for boats to fish over almost the whole year by exploiting both areas. Past experience in the Division of Fisheries' surveys suggests that weather conditions might not be as favourable in New South Wales as in Tasmania, but Mr. Warn's performances show that very considerable tonnages could be taken when conditions were suitable.

At present date the demand for jack-mackerel is better in New South Wales than in Tasmania. This is largely due to the continuing pre-occupation of Tasmanian canners with barracouta. There are more skilled net fishermen in New South Wales. The leading New South Wales fish-canning firm is now conducting its own tests in the Eden area with purse-seine gear. The net being used is larger than the Division's, being approximately 300 x 27 fathoms. During one week in late October and early November 1949, a total of 45½ tons was taken in three hauls. The best haul was 28 tons, the other two being spoilt by the net tearing, and by the depredations of sharks.

III. PILCHARDS (*SARDINOPS NEOPILCHARDUS*) AND ANCHOVIES (*ENGRAULIS AUSTRALIS*)

Fishing trials, mostly for pilchards, were made in 1940, 1941, and 1946 by the Division of Fisheries, by fishermen collaborating with it, and by private enterprise. Lamparas and small purse-lamparas were used, principally in Jervis Bay (New South Wales) and Coffin Bay (South Australia). Catches were infrequent and only one was as high as 2 tons. The first promising advances in this field are described below.

Western Australia.—Pilchards occur in considerable quantities over a vast stretch of the south-western and southern coasts of Western Australia

and their presence in surface shoals has been amply established by the Fisheries Division's aerial and surface observations. The Division's vessel, the F.R.V. "Warreen", has used drift nets along a considerable stretch of the coast to obtain samples large enough for identification and scientific purposes, but no commercial-sized catches have yet been made by this method. In April, May, and June of 1948, this vessel turned attention to the use of the lampara net for the catching of this fish. The experiment centred on King George Sound, where sheltered waters and plentiful fish combined with a potential local market in the Albany Cannery offered encouraging conditions. From May 9 to June 4, 28 hauls were made for an average catch of 3 cwt. Several methods, some unorthodox, of shooting this net were tried, that giving the best results requiring a motor dinghy and two pulling dinghies. When used in this manner half the net was stowed in each dinghy and, approaching the shoal from windward, one dinghy was towed and the other pulled to encircle the fish. Five men, sometimes six, including the driver of the motor dinghy, composed the team. The net was also shot from local boats, with varying success, to give those interested some idea of the net's potentialities. The net was only used during daylight hours, as insufficient luminescence was present in these waters to locate fish shoals at night and, although appreciable catches were eventually taken, this form of net was not considered to be the most suitable for this fishing.

The Western Australian pilchard shoals are not usually dense, nor do they appear to have any great solid depth. Their surface display is often misleading, giving an appearance of more fish than are actually present. The fish may escape the net, either sounding before the floor is closed or passing out through the large meshes of the wings.

The catches obtained, however, stimulated considerable local interest, and development of this form of fishing is being pursued. A form of net more suitable than the lampara employed in this experiment will doubtless shortly be evolved by local endeavour, and it is anticipated that considerable and regular catches of pilchards will be made.

Victoria.—In April 1949, some fishermen in Port Phillip Bay began to catch pilchards at night, using electric lights and a floating seine. The group consisted of Messrs. A. Defina and W. Hughes and three other men.

A 32-ft. half-decked boat of 21 h.p., and two 14-ft. dinghies are used. The net measures 110 x 17 fathoms, the depth being practically the same throughout, and is in $\frac{1}{2}$ -in. mesh except for $\frac{3}{4}$ -in. mesh in the wings, which are about 10 fathoms long. The purse-rings hang on bridles from the footrope except on the wings, where there are no rings. The footrope is lightly leaded and the purse-rings are very small. The landing bag is in the centre of the net, which is thus a purse-lampara. The lighting system consists of a 300-volt generator which is belt-driven from the engine of the main boat, a cable with floats, and a wooden stand with a reflector and two 1000-watt electric lamps.

A fine, dark night is required. The vessel anchors, the lighting equipment is assembled in the stern of one of the dinghies, and the lights are put on. After an hour or two the fish may be seen in the illuminated patch of water. The net is piled in the spare dinghy in the usual manner of a seine. This dinghy is then rowed round the shoal and back to the main boat, where the net is pursed and hauled by hand. Quick hand pursing would be impossible but for the lightness of the foot-rope and purse-rings. Such light equipment would probably not sink fast enough to trap pilchards in the daytime, but speed is not so important when the fish are attracted to the light.

During five weeks in April and May the net was shot eight times to yield about 8 tons of fish, mostly pilchards, although some anchovies were also taken. The individual catches ranged from about $\frac{1}{2}$ to $2\frac{1}{2}$ tons. Later, when the fishermen found they could not sell the pilchards, they turned their attention to anchovies, for which they had limited orders. Anchovies are caught in exactly the same way, and $6\frac{1}{2}$ tons were taken in a single haul in August 1949.

These are modest catches, but they have been made very regularly. Only twice have the lights failed to attract fish, once because of full moon and once because of extreme turbidity following bad weather. The fish have been caught on every occasion on which they appeared. The method could probably be developed further, but the fishermen have no incentive to do this. More than one haul could be made on some nights, and there have been suitable nights on which the boats have not gone out.

This work is the result of an earlier interest in beach seine fishing for anchovies in Port Phillip, which the Division of Fisheries was able to stimulate by finding buyers. These buyers use the anchovies for flavouring fish paste, but do not need large quantities. Attempts to interest canners in these fish for packing whole were unsuccessful, but it is thought that pilchards, which cannot be caught regularly in beach seines, might be acceptable for this purpose. However, there are yet no signs of interest even in pilchards by any fish processors in eastern Australia.

A purse-lampara of about the same length, but differing in some other details, has been used by Messrs. Mitchelson Bros. for taking anchovies and pilchards at Lakes Entrance. Several day-time catches of up to 12 tons, mostly made in shallow waters with the net touching bottom, have been reported.

IV. SPRATS (*CLUPEA BASSENSIS*)

It was shown in an earlier paper that sprats could be taken intermittently in the D'Entrecasteaux Channel, Tasmania, with a 150-fathom Californian lampara operated by two or three men. This followed experiments with various nets by the Division of Fisheries and collaborators. Over about six weeks in February and March 1949, Messrs. T. and R. Sward shot such a net eleven times for nine catches, the largest of which

was 1 ton. Barracouta (*Thyrsites atun*) were also taken without damaging the net. The sprat may not have the commercial possibilities of the other species, but operations such as these, involving no serious interference with the routine of ordinary fishing (e.g. for barracouta), obviously could prove a profitable part-time occupation.

V. TUNA

In his paper on tuna trolling tests carried out by the Division in 1941, Serventy (1947) concluded that the results showed that, with the methods used, trolling for southern bluefin tuna on the New South Wales south coast could only be regarded as a borderline fishery and that further development was entirely bound up with the ruling scale of prices. He pointed out that if the Californian scale of prices ruled in New South Wales there would be a much brighter prospect for the fishery. In the spring of 1949 a New South Wales cannery offered 6d. per lb. for tuna and the total catch taken on the south coast during the season was approximately 1000 tons. Most of this was taken by trolling. This bears out Serventy's conclusion that "the matter is entirely one of economics", and while the prices remain at or above the present level there is a chance that, given reasonable runs of tuna, the industry will develop into a full-time seasonal fishery.

The operations upon pilchards and anchovies have a highly significant bearing on the prospects for large-scale tuna fishing. It was shown in 1940 that the North Pacific live-bait method was quite suitable for catching tuna in Australian waters. Pilchards and anchovies were carried successfully in a bait tank aboard the Division's M.V. "Warreen", and southern bluefin tuna (*Thunnus maccoyii*) and striped tuna (*Katsuwonus pelamis*) were freely caught. However, these results had no great significance until recently, because no method of taking bait regularly in significant quantities had been demonstrated. Now that two methods are available, there should be nothing to hinder the development of a tuna fishery in Australian waters. The Victorian bait fishing experiments appear particularly significant, because the adjacent area of continental shelf waters from southern New South Wales to north-eastern Tasmania is a good tuna area. A study of overseas publications suggests that individual catches of bait fish for this purpose need not be large, but that it must be possible to obtain them regularly.

In the closing months of 1950 the 75-ft. tuna clipper "Senibua", owned by South Seas Marine Products Ltd. of Suva, Fiji, made some good catches of tuna by the live-bait method in southern New South Wales waters. The best catch was 33 tons in one day. Yellowtail (*Trachurus declivis*) and pilchards were used as bait.

In the spring of 1949, fishermen at Eden caught 14 tons of southern bluefin in eight hauls of a lampara net lent to them by the Division of Fisheries, a token auguring well for further efforts to catch the fish by means of nets.

VI. CONCLUSION

It will be realized that at least one method has now been demonstrated as successful for catching each of the principal species of pelagic fish — jack-mackerel, pilchard, anchovy, sprat, southern bluefin tuna, and striped tuna—at present almost unexploited in southern Australian waters. These results have been achieved partly by the Division of Fisheries, partly by fishermen collaborating with the Division, and partly by fishermen alone.

A recent development has been the growing interest displayed by the fishermen, and this has greatly assisted and encouraged the general effort. This rising interest is due to the fishermen's improved economic condition, the apprehension of some of them about the prospects for the established fisheries, and the recent development of the fish-canning industry which represents a potential market. At present, however, the demand for pelagic fish by some of the canners is not encouraging, and the actual possibilities for commercial exploitation can only be established as a result of cooperation between canners and fishermen. This in turn should lead to improvements in fishing methods.

It is considered that with the results set out in this paper, the immediate objectives of the Division of Fisheries in this field have largely been achieved. Further development of the exploitation of our pelagic fish resources in southern waters depends now upon the use made of these results by the trade.

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