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Government of Bombay

Department of Industries

Report on the Work of the Steam Trawler *"William Carrick"*

May 1921 to February 1922

By

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Bombay

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INTRODUCTION

In considering the commercial results of the trawling experiment, of which Mr. Hefford has given a full and interesting account, it must be recollected that the scheme was first investigated immediately after the Armistice, when the world was enjoying a boom, and was approved by a strong committee of business men. The conditions of the boom period delayed the beginning of actual operations and made the purchase of the vessel and equipment and the engagement of the European staff unusually expensive. By the time actual trawling began, coal had also increased enormously in price. Almost immediately the financial circumstances of Government made retrenchment a necessity. Once the experiment had been launched at considerable expense, the logical and scientific course was to carry it on for a full calendar year, so that a complete season's data should be available for the promoters of such ventures in the future when market and other conditions had improved. Logic and science were, however, too expensive for the time being, and the experiment had to be wound up before a new financial year began.

One important change in conditions has since occurred—the installation of cold storage at the local market. This has encouraged private enterprise to make another effort. It is hoped that the information carefully collected and analysed by Mr. Hefford will be of real value to such pioneers of improved fishing methods.

Old Custom House,
Bombay, 27th March 1923.

R. D. BELL,
Director of Industries.

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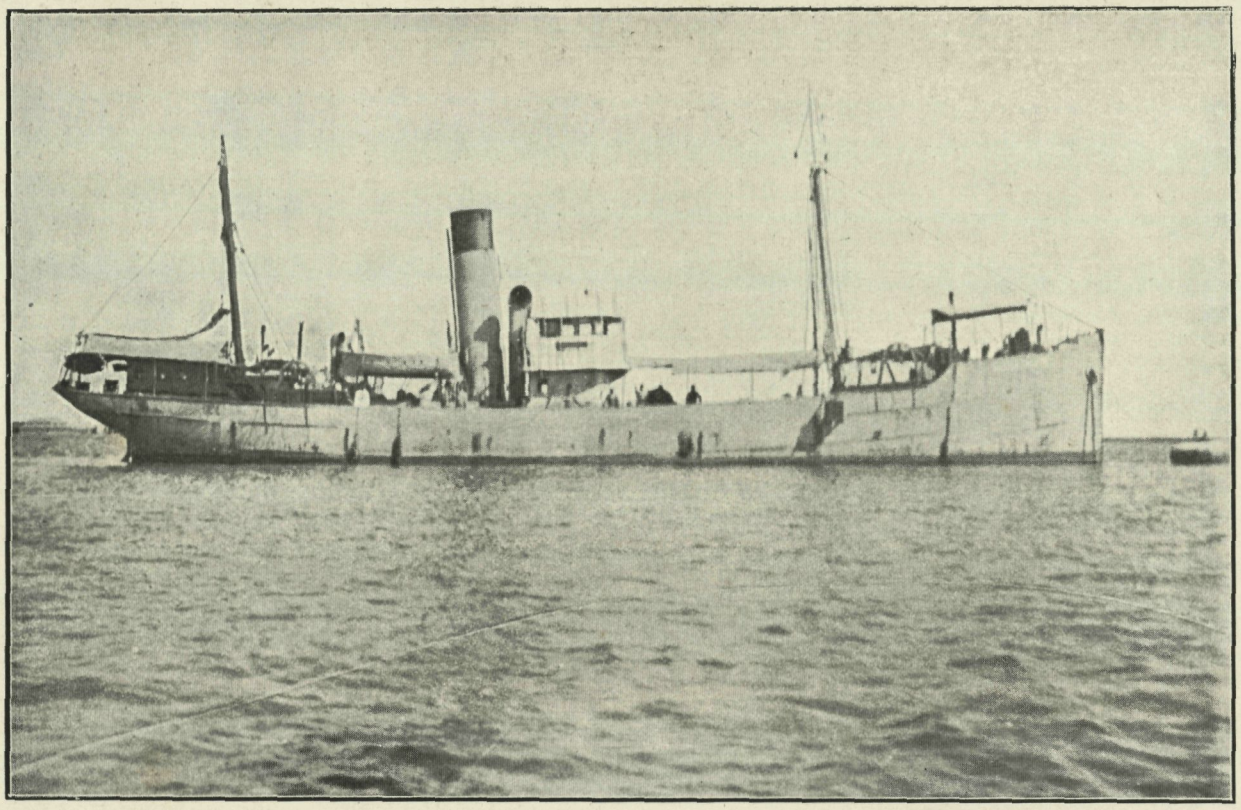
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Frontispiece.—The Bombay Government Steam Trawler "William Carrick" in Karachi Harbour.

I. The Trawler

The Steam Trawler "*William Carrick*" was purchased from the British Admiralty in May 1920. She was one of the many vessels built during the war of the type known as the 'Castle' class of steam trawler, in the design of which consideration was given not only to the requirements of the war, but also to the question of subsequent utility for fishing purposes.

Immediately after the purchase of the vessel steps were taken by the Stores Department of the India Office under the joint advice of the India Office Shipping Department and the present writer to fit her out for the trawling work in Bombay waters for which she was required. This involved in the first place the provision of the special accessories for trawling which were lacking in the war craft. More than the ordinary reconditioning was necessary in order to meet special requirements for fishing in tropical seas. The most important matter in this connection was the provision of a refrigerating plant to produce a low temperature in the fish-hold, and the addition of a special wall of insulating material around the fish-hold so as to conserve the low temperature of this compartment. It was also necessary to make alterations to afford accommodation for the larger complement of men that would be required at Bombay than is the case with a trawler working in European waters.

The "*William Carrick*," built at Paisley in 1917, is a screw steamer of 125′-6″ length and 23′-4″ mean breadth. Her tonnage is 276 (gross) and 113 (registered). She has a draught of about 8′-6″ forward and 15′-8″ aft. Her engines are triple of indicated Horse Power 480. The bunker capacity is nominally 180 tons.*

A detailed statement of structural particulars is given in Appendix I. A photograph of the trawler is shown in Fig. 1.

The steam trawler is of course a specialised craft whose design and structure are adapted for the particular work to be done. At this point a brief description of the fishing methods known as trawling becomes necessary.

The trawl is a large net made in the form of a conical bag with projecting wings on each side which serve to increase the width of its mouth. It catches fish by being dragged along the bottom of the sea from a moving ship. Like all fishing gear—or for that matter any other implement designed and utilized by man—it has been subject to a process of evolution in the course of its history and has become a progressively more efficient instrument for reaping the harvest of the sea. It has a general resemblance to the Dol and Bokshi which are used by the fishermen of Bombay Presidency.

* The "*William Carrick's*" engineer stated that for practical purposes the trawler's bunker capacity might be regarded as 160 tons for Welsh Coal and 140 tons for Indian Coal (which is of less density than Welsh).

But the fundamental difference is that these are stationary nets which are fixed to stakes or to some other sort of mooring and are set so as to capture fish which swim into them—a method which may be compared with the setting of the spider's web for the capture of insects. The trawl on the other hand is an *actively moving* instrument. It goes after its prey blindly in a sense but guided by the intelligence of the skipper who directs the movements of the vessel from which it is towed. The advantages of the mobile method over passive and stationary tactics are obvious ; but of course they are only obtained at a cost. Trawling calls for the exertion of power. The earliest types of trawler were sailing vessels which derived their power from the wind, the help of the tides also being utilized to some extent. With the utilization of the greater and more uniformly acting power afforded by the adoption of steam there was acquired not only a greater degree of mobility but also the ability to work bigger and more efficient trawlers. An early, but by no means an obsolete type of trawl has its mouth kept open by a beam of wood to which are fixed—one at each end—a pair D shaped iron runners which act as "skids." This sort of gear is known as the *beam trawl.* Such a net is limited in size by the fact that it is impracticable to work with a beam longer than about 50 feet.

A stage of very marked improvement was achieved by the invention of what is known as the *otter trawl.* In this form of gear the cumbersome beam is done away with and the mouth of the net is kept open by the " sheering" action of a pair of strong wooden rectangular boards. These *otter boards,* as they are called, are fixed one on each side of the mouth of the net and to each is attached a rope by which they are connected to the ship (the trawler) by which they are towed in fishing. On a commercial trawler these ropes are of steel wire $2\frac{3}{4}$" in circumferences and necessarily of great strength to withstand the immense strain to which they are subjected. They are known as the *trawl warps.* The attachment of net and of warp to each board of the pair is so arranged that the board acts as a sort of kite. As it is pulled at a slight angle through the water, the reaction of the board to the pressure produces a steady pull on the mouth of the net which keeps it open. The advantages of the otter over the beam method are that it enables a bigger net to be used, thus increasing the catching power. Besides allowing the use of a more widely spreading net the upper edge of the mouth of the net is also lifted into a wider gape.

The size of a trawl is given by the length of head-rope or head-line which forms, so to speak, the upper lip of the mouth of the net. The largest modern steam trawlers use a trawl with a head line of about 130 feet in length. When the net is fishing the head line assumes the shape of a low backwardly directed arch.

The actual width of the mouth of the net when fishing is estimated at about $\frac{2}{3}$ the length of the head line. The lower lip of the trawl mouth consists of the ground rope which is heavier and thicker than the head line because of the greater wear to which it is subjected in being dragged along the sea bottom. It is also made longer

than the head line and therefore when fishing it trails along with the greater part of its curve below and in rear of the head line. This arrangement makes more certain the capture of fish which would have a good opportunity of eluding the mouth of the net if the bottom-disturbing ground rope were not preceded by the head line and the over-spreading " square"* of the trawl.

The deck equipment of the trawler is adapted for the rapid and convenient lowering and raising of the net to the required depth and for the safe towing of the gear. Chief among these deck fittings is the winch (see Fig. 2) on the twin drums of which the two steel wire warps are wound as on a huge reel. The power for the winch is provided by steam from the ship's boiler as in the case of an ordinary windlass. Each drum can be put in or out of gear separately and powerful brakes are provided for checking the warps when sufficient length of wire has been paid out. Other essential accessories are the sheaves or large steel pulleys which provide convenient leads for the warps from the winch to the ship's side when towing or hauling the net. These are so arranged that the warps can be led to either side of the vessel. Two nets are always provided, each attached to its pair of otter boards, so that when one is damaged or otherwise put out of action the warps can be quickly connected up with the reserve trawl ready on the other side. In order that the nets may be raised well clear out of the water each warp is led through a sheave (a large pulley wheel) which is fixed at a height of 7 or 8 feet above the deck level on a structure known as a ' gallows ' (see Fig. 4). There is a forward and an after gallows on each side of the vessel.

When a trawler is about to engage in fishing operations the winch brakes are released and the net lowered away until a suitable length of warp has been paid out (which varies according to the depth of water) while the vessel is manœuvred so that the net will sink clear of the ship and its propellor. This is effected by steering so that the wind will blow the vessel in the direction away from the side from which the net is lowered. Failing the assistance of the wind it is necessary to take advantage of the tide so that the net may drift clear with the current. This operation, usually termed ' shooting' the trawl, calls for skill and judgment on the part of the skipper and smart handling on the part of the men at their several stations where each has his special job *to be done at the right moment.*

After the trawl has been towed for a suitable time, which in commercial practice usually varies from 4 to 6 hours, the word is given for hauling. The first operation is the release of the "towing block" by means of which the two warps are drawn together on the outside of the bulwark on the ship's quarter. The winch is then set in motion and the otter boards are hauled up to the gallows. The wings are then drawn in by means of "quarter ropes" the power for this also being provided by the steam winch. The front part of the net is hauled in by hand, the whole

* The foremost and widest part of the top side of the trawl.

of the deck crew being assembled for this purpose, till the narrow hinder part of the net known as the "cod end," in which most of the captured fish are collected, is reached when a rope sling (called a "becket") is passed around it and the "bag" is lifted up overside and led in board by a steel wire rope which passes round a sheave attached to the mast head. As the bag is suspended over that part of the deck separated off for the purpose, the rope by which the extremity of the net was securely closed while fishing is unfastened and the catch falls into the "fish pound" which is a rectangular area of deck space separated off by strong wooden planks fixed into short upright iron brackets (see Figs. 3 and 4).

The above brief outline of the way of working a trawl is intended to give the inexperienced reader some idea of the method. For a more detailed description of this and other fishing methods reference may be made to the article on Fishing Nets in the Encyclopædia Britannica or to Dr. J. T. Jenkins' "The Sea Fisheries" (Constable, 1920).

Fitting out of trawler.—The reconditioning and fitting out of the "*William Carrick*" in England were carried out by the firm Messrs. Brand and Curzon of Milford Haven at which port the trawler was lying when taken over from the Admiralty after purchase. The work to be done fell under two heads (1) requirements for the catching and keeping of fish, (2) requirements for the accommodation of personnel. For the ordinary requirements of trawling the overhauling and repairs of existing accessories and the provision of others which had been omitted from the naval equipment were necessary. In addition the trawler was provided with refrigerating plant in order that the catches might be preserved in good condition under the tropical temperatures in which the work at Bombay was to take place. The problem of where to house the refrigerating machine could only be solved satisfactorily by sacrificing the chart room below the wheel house which is normally kept for the skipper's accommodation.

Power for working the compressor was provided by means of a steam pipe connection with the ship's boiler. From the compressor the refrigerating pipes were led through the deck to the fish-hold to the ceiling and sides of which they were attached in narrow U shaped coils. The fish-hold was surrounded by an insulating wall consisting of a double partition of one inch match boarding enclosing a layer of granulated cork and lined with water-proof material. This insulation was taken all round the compartment, above, below and on each side, to a thickness of 10 to 12 inches. The original fish-hold was divided into two compartments by a transverse wall of insulation, the forward one measuring $12\frac{1}{2} \times 19\frac{1}{4}$* ft. and the after one $9\frac{1}{4} \times 21$* ft. Communicating between the two is a door also provided with a layer of insulating material eight inches thick. The forward compartment is fitted for the storage of fish with the usual partitions forming four pounds on each side into which

* These are the mean widths, the compartments not being rectangular owing to the curve of the ship's sides.

the fish are packed. They are kept in place and prevented from being crushed by the pressure of weight from above by a system of " pound " boards which fit into slots in the partitions forming a series of movable shelves.

A deck house 12 ft. × 9 ft. × 7½ ft. high of steel plate lined with match boards enclosing a 2 inch layer of cork dust was built on the deck abaft the cook's galley which is adjacent to the after end of the engine room casing. An electric lighting installation was provided for the whole ship, for navigation and deck lights as well as for the interior illumination. Electric fans were fitted in deck house and after cabin and in the two officers' berths.

Taken in hand immediately after the purchase of the trawler in May, the fitting out was seriously impeded by delay in the installation of the refrigerating plant with which disturbances in the engineering trade at that time had a great deal to do. Completion was promised for the end of August but the firm did not succeed in getting the plant installed on the ship till January 1921. The Marine Biologist arrived in Bombay on the 25th December 1920, but the trawler did not get here till 13th of March 1921.

Before trawling could be commenced it was necessary to make alterations for the accommodation of a lascar crew, to provide deck awnings and to drydock the vessel for cleaning and painting the bottom, etc., besides remedying certain minor defects which revealed themselves on the outward voyage. It was anticipated that the R.I.M. Dockyard would be able to do this but they had too much other work in hand to deal with the trawler without considerable delay. The work was therefore given to the Mazagaon Dock Co. only to be held up by the strike which paralysed activity in their yard from the 26th March to the 23rd June. On the 12th April the work was undertaken by the Porcupine Foundry Co., and at last on the 17th May 1921 the trawler was ready for sea and sailed for the first fishing voyage.

The crew of the trawler.—A skipper, mate and boatswain were engaged under an agreement with the Secretary of State in Council as officers for the navigation and as trawler experts for the fishing operations. These formed part of the crew of the trawler which brought her out from England. The European engineer was originally engaged only for the voyage out but was retained particularly on account of his ability to deal with the refrigerating plant.

The lascar crew engaged in Bombay consisted of the following :—

Deck crew—

Syrang, tindal, 4 sukanis, 6 khalassis, 1 bhandari.

Engine room crew—

1 driver, 2 greasers*, 6 firemen, 1 bhandari.

Menials for European officers' quarters.

1 Butler, 1 Cook, 1 Scullion, 1 Topas.

* Before the end of their engagements both greasers passed the examination qualifying them to act as drivers.

The ship thus carried a total crew of 31 men. With the Marine Biologist, the Assistant Marine Biologist and a personal servant, the total number on board the trawler was 34—a somewhat large crowd to be carried by a vessel the sister ships of which working from British fishing ports normally carry a crew not exceeding 10 or 11 in number.

Additional sleeping accommodation for the lascar crew was obtained by bunking them in the forward hold usually used for the storage of gear which was converted for the purpose by being fitted with wooden bunks which accommodated 18 men while the rest were housed in the forecastle. Only the practice of taking meals on deck and the possibility of sleeping on deck for the greater part of the time enabled so large a number to be carried without considerable difficulty and discomfort.

The crew which is carried on the similar class of trawlers working from the British fishing port numbers not more than eleven men consisting of

> Skipper, mate or second hand, bosun or third hand, 2 deck hands, engineer, Second engineer, 1 or 2 firemen and a cook; and usually a " spare hand " is also shipped who works on deck while fishing is going on and acts as trimmer while the vessel is steaming.

The necessity of carrying so large a crew for trawling from the port of Bombay constitutes the first handicap that may be noted in connection with the question of industrial trawling in these parts, but the precise bearing of this and other commercial aspects of the method must be postponed for subsequent discussion. A statement of the different ratings on the trawler with their pay is given on page 56.

II.—Objects of the Work

Before describing the fishing operations of the " *William Carrick* " it is necessary to make some reference to the aim and policy which it was decided should be followed in conducting the work.

In the Annual Report of the Department of Industries for 1918-19 (when the acquisition of a trawler was originally decided upon), Mr. Bell, the Director of Industries, wrote as follows :—

" This is a field for Government endeavour analogous to the exploration of the country's mineral resources by the Geological Survey of India. In the case of fisheries, however, I consider that mere exploration work should, at the outset, be subordinated to the policy of ascertaining definitely whether trawling will or will not pay in Bombay waters ". It was not without careful re-consideration after the arrival of the trawler that this policy, under which our primary object was to catch and market as much fish as possible, was embarked upon. All that was involved by this will become more apparent at a later stage in this report when the details and results of the work have been described. That a steam trawler, albeit an " experimental trawler ", which is a practical industrial machine should be used in a practical industrial way and the results of its operations judged in the inequivocal commercial units of rupees expended

and realised appears on the face of it to be the right way of regarding such an undertaking. That there is another point of view will, possibly, be made clear later on (see p. 9). Otherwise this report might be closed here and now with the statement that our balance sheet shows a very considerable excess of expenditure over income ; in a word, that the working of the steam trawler did *not* pay.

Fishing has a unique character which separates it from all other industrial pursuits. Manufactures depend principally for success upon the efficient and economical working of processes for rendering raw materials into goods which can be marketed at a profit. Agriculture involves the possession of land, the utilization of seeds, manures and implements and the expenditure of labour over a shorter or longer period before crops can be harvested. Mining operations are dependent first upon the acquisition of that part of the earth's crust that is to be opened for the extraction of its subterranean mineral wealth. The deep sea fishermen, on the other hand, pay no rent or royalty ; and, except those imposed by Nature, there are no boundaries to the fields open to their exploitation. Nature looks after the propagation of their stock and all they have to provide are the craft to go out in and the fishing gear to work with. Their harvest time is, or could be, an all-the-year-round one. With so much to the good there are nevertheless plenty of difficulties. The scope of their harvesting is limited by the power and sea-worthiness of the craft in which they go out on the great waters and by their skill and hardihood as sea-farers, and, most important point of all, the fish which are the objects of their search are not definite and stationary objects. They may be here to-day and gone to-morrow. However, though there may be some scope for guess work on the part of even the most experienced in fishing lore, the fact is that deep-sea fishing is by no means the blind and chancy pursuit that it would appear to the inexperienced landsman. Just as certain crops naturally flourish on certain soils, and just as certain strata below the earth's surface are known by the geologist to contain particular minerals or to yield supplies of water, so the fish life which moves and has its being in mysterious obscurity in the depths of the sea necessarily bears a natural relationship to its environment. This presence or absence of fishes is determined by perfectly definite natural conditions. The depth, temperature or salinity of the water, the nature of the bottom, the weather conditions, the state of tide, the time of day (light or darkness) and the season of the year, associated with the specific habits of the fish relative to their search for food or their reproductive instinct—some or all of these conditions may operate as factors in determining the movements of fishes which are subject to natural laws like every other organism.

In European seas the researches of marine biologists have gone very far towards the elucidation of the operation of these laws so that the life history of some of the important food fishes is comprehended from the stage of the passively drifting embryo in its floating egg to the stage at which in due course the mature adult finds its way to the area marked out by natural law as the spawning ground of the species.

Naturally the fisherman is fundamentally interested only in that part of fish lore that will enable him to know when and where he can go with a reasonable prospect of making good catches of fish. He thus becomes a keen investigator of fish migrations, though his methods are empirical and he does not bother his head about causal factors, or if he does he is apt to make rather unscientific assumptions about them.

The point to which all the foregoing is intended to lead is that while the fisherman is occupied in catching fish for the market he is also occupied in accumulating knowledge about the movements and distribution of fishes. In an area which has been fished for many years and possibly for many generations the fishermen of to-day has the benefit of the discoveries and experience of his elders to guide him in his quest, but after a certain point it is the use he makes of his own experience and observations which most of all places him—or unplaces him—in the competition against other fishermen. Luck or chance certainly comes into the case, but as in games of cards it is the skilful player who makes use of previous experience and whose memory, observations and reasoning powers are most acute who wins through in the long run. This rule applies to all kinds of fishing but probably to trawling most of all, because it is essentially a *mobile* and therefore initiative-demanding method. It is clear then that while the trawler skipper is capturing fish which have a present market value he is also making, and, with more or less accuracy and rationality storing in his memory, observations which have a potential value leading to subsequent profit or guarding against future loss. These are the skipper's " trade secrets " and very exceptionally are they shared with competing brethren in the trade ; for knowledge in the trawling industry has an extraordinarily high value in proportion to other capital requirements of the trade.

The trawler " *William Carrick* " was a pioneer with a virgin field for exploration before her. When we started we had no experience and no information to go upon except such as could be gathered or inferred from the observed results of the operations of local inshore fishermen ; and it was not in our programme to intrude upon their grounds. It is obvious that such circumstances involve the smallest chances for the best market results in the early stages of the enterprise. On the other hand, starting as one did with a *zero* fund of information, the exploration aspect of the work possessed a high degree of value and of interest. There was indeed a good deal to be said for concentrating on the exploratory side of the undertaking, spending as much time as possible at sea, traversing as much ground as possible, making a large number of hauls — " sample " hauls of short duration—and leaving market considerations in the back-ground. This course would have yielded more *information* about the distribution of the various kinds of fish, and if it had been followed there would have been more *body—i.e.*, more and better systematised facts about the distribution of fishes and its local and seasonal variation in these waters—in the present report. However the market for trawled fish was also an important matter for exploration. And there

was also the consideration that results expressed in terms of rupees would carry more significance and convey more meaning than results expressed in terms of fish*. Moreover the Monsoon season was at hand—we commenced our first voyage on the 17th of May—when there would be a great lack of fish from other sources, since the local machliwallas cannot put to sea in very stormy weather, and when it was also considered not desirable for the " *William Carrick* " to wander too far from port.

After the first three trips (17th May to 1st June 1921) during which the gear and crew became adjusted to working conditions and a tentative trial of various grounds was made, the policy of working on commercial lines was given the fullest scope, Skipper Reeve being left in sole control of the working movements of the ship to decide when and where and how long to trawl exactly as if he were following his calling as master of a commercial trawler working for the fish market of Grimsby or Fleetwood. The Marine Biologist (the present writer) or (in the earlier voyages) the Superintendent of Fisheries (Mr. T. J. Walke), or both, went out on the trawler for the purpose of recording the kinds, quantities and circumstances of capture of the fish taken in the trawl.

On the 10th of October 1921 the Director of Industries placed the control of the trawling in the hands of the Marine Biologist.

On the 25th November orders were received which implied a change of policy. Up to this date the primary consideration had been to get fish for the market, cruises of a mere exploratory nature had been debarred, and mere recording, not researching, had been the main occupation of the Marine Biologist at sea. Orders were now received to the effect that the trawler should be worked so as to obtain as much information as possible, the supply of fish to the market becoming a secondary consideration. The primary object was to get in as many working days at sea as possible. It may be mentioned that Bombay market was at this time being well supplied with fish so that the proceeds of our sales were more than ever disproportionate to the working expenses. No change was made in the fishing procedure, as by this time the practice of making three hauls each of 3½ hours duration during daylight and two 5½ hours hauls during the night (see p. 18) had become established as a routine which, while it afforded the practicable maximum of time for the trawl to be in the water (fishing), also fitted in with the requirements of the crew, both officers and men, as regards the changing of watches and the times for food and sleep. For the purpose of obtaining the most in the way of information-yielding records a system of seven or even six 3-hour hauls each day would have been better than the other, but the human element had to be considered.

The new dispensation however permitted us to go off and explore the distant grounds to the North-West, and especially the reputedly very rich fishing grounds off the Sind coast, which we visited in December 1921, January 1922 and for our final voyage

* This was *not* the writer's opinion.

before laying up at the end of February 1922. Previous to this, with the exception of a visit to the neighbourhood of Karwar in October 1921 (voyage XIX), we had confined our fishing for the most part to grounds within a few hours steaming from Bombay. In spite of the time expended in steaming to and from Karachi on three occasions, the market figures for the three months when exploration took precedence of sales compared quite favourably with the earlier months. As a matter of fact the figures of sales proceeds, whether good or bad, do not correctly reflect the quantity or quality of the catches for the reason that considerable variation was shown in the market prices from time to time according as supplies from other sources were abundant or otherwise. That however is a question that will arise for discussion at a later stage. This report must now concern itself with the fruits of the secondary object of the trawler's activities, namely, the information about the fishing grounds and fishes gathered from her operations.

III.—Area of Operations

The evolution of the steam trawling fleets of Europe was very largely brought about by the need for voyaging to distant fishing grounds to satisfy the demand for fish which the (relatively speaking) home-keeping fishermen could not meet. Thus was brought into being the staunch and powerful type of British steam trawler of which the "*William Carrick*" is an example. With available power sufficient for crossing the oceans it is frequently rather problematic as to what is the most economical working range for a trawler. Steaming a long distance means not only time lost from fishing but also extra consumption of fuel which, especially nowadays, represents the most considerable item on the side of working expenses. It is only justified by an increased yield of fish on the distant grounds. As might be expected, such considerations have resulted in a greater or less degree of specialisation in the modern trawler types, so that there are—broadly speaking—two classes of boats, differing as to size, bunker capacity and power : the one adapted to long voyages and an absence from port for 2, 3 and 4 weeks or sometimes more ; the other designed for fishing voyages of not longer than 6 to 10 days duration.

The 'range' of the "*William Carrick*" was sufficient to enable her if necessary to visit the Persian Gulf or the coast of Arabia, and the possession of a refrigerated fish-hold ensured the preservation of the catch in good condition for several days.

The limits of the areas over which fish catchable by the trawl are distributed and the abundance in which they occur in different parts of such areas were at the outset of our undertaking circumstances about which our information was very limited. The discovering of the limits of distribution of trawl fish and its relative abundance in different localities was in fact an important—though secondary—object of the enterprise.

In the fisheries of the North Atlantic and its associated seas the trawling method is practised from shallow inshore areas of a few fathoms depth up to, and even occasionally beyond, the 300 fathom line. Large steam trawlers using the otter trawl as a rule are rarely to be found working in less than about 15 fathoms, such inshore shallows being mostly fished by sailing craft of comparatively small tonnage using the beam trawl which is a more manageable form of gear for shoal water than the commercial otter trawl. Trawling in the great depths of 100 fathoms or more is practically limited to the steam trawlers from the large fishing ports on the West Coast of England which go in pursuit of the hake (*Merluccius vulgaris*) on the edge of the ocean depths on the east side of the Atlantic. Probably over 75 per cent. of the fish caught by all the trawlers in the world is caught between the depths of 15 and 80 fathoms.

If one looks at a chart of the Arabian Sea off the Bombay Presidency it will be evident that the virgin field awaiting exploration, and possibly exploitation, consisted of the zone bounded on its landward side by the narrow coastal strip which is already more or less exploited by the long established fishermen of the coastal communities by methods which have been practised for many generations, and the fish stocks of which are thereby already known—at least to the fishermen themselves. On its seaward side it is bounded by the contour of depth up to which a trawl can be conveniently operated. This outer boundary may be considered to be the 100 fathom line; for although, as has been mentioned above, trawling is carried on at over twice this depth in the Atlantic Ocean, the part of the sea bottom lying beyond the 100 fathom line off the West Coast of India slopes so steeply down to the great ocean depths of 1,000 fathoms or more where, even if the fish occurred, trawling would be quite impracticable, that there is so little distance between the 100 fathoms and the 200 fathom lines that if the latter contour were taken as the limit it would make no appreciable difference to the area enclosed.

A glance at the chart will show that the zone between the coast and the 100 fathom line is a relatively narrow strip on this side of the Arabian Sea. Off the coast between Karwar and Vengurla this line lies only about 45 to 55 miles from the coast. Coming northward one finds the area of comparatively shallow water extending progressively further out to sea. Off Ratnagiri the 100 fathom line is 65 miles from land and off Bombay the distance is rather more than 120 miles. This depth contour continues in a generally northwesterly direction which brings it furthest from land abreast of the Gulf of Cambay and it again converges into nearer proximity off the west coast of Kathiawar. Off Navibunder its distance is only about 45 miles and off Dwarka about 60 miles. Thence this contour line proceeds roughly parallel to the Kutch and Sind coast at a distance of 60 to 80 miles. Along the Baluchistan coast, the shallow water zone is very narrow, the average distance of the 100 fathom line being about 14 miles; and at only twice that distance from the coast the ocean depth of 1,000 fathoms can be reached.

The total area of the sea lying between the coast of the Bombay Presidency* from Bhatkal at the southernmost limit to Cape Monze (Ras Muari), a few miles west of Karachi, and the 100 fathom line is approximately 60,000 square miles.†

Considering the different sections of this area we have—

	Approximate area.
Between 14° N to 16° N Latitude (from Bhatkal to Malvan) ..	6,700 sq. miles.
Between 16° to 18° N Latitude (Malvan to Bankot) ..	9,600 ,, ,,
Between 18° to 20° N Latitude (Bankot to Dahanu) ..	18,000 ,, ,,
Between 20° to 22° N Latitude (including Gulf of Cambay outside of Malacca Banks and off the Kathiawar coast) ..	13,180 ,, ,,
Between 22° N Latitude and the Swatch‡ ..	8,800 ,, ,,
Between the Swatch and Cape Monze (Western boundary of Sind) ..	4,800 ,, ,,

It will be clear from the above that the greatest expanse of *possible* fishing grounds, so far as considerations of depth are concerned, lies off the coast in the neighbourhood of the port of Bombay and between here and the Gulf of Cambay.

The Fishing Grounds

The nature of the bottom below the sea is of fundamental importance in determining the occurrence of fish life. Excepting the cases where fish migrate for spawning purposes to particular areas which are specially adapted for this in virtue of physical conditions of water or bottom or in relation to the localities where the young fry can find a living, the distribution of fishes depends directly upon the occurrence of suitable food supplies. Without going into detailed consideration of the biological points involved, it may be said here that the kinds and quantities of marine animals which constitute the bottom fauna depend very largely upon the physical character of the bottom. It would be more accurate to say that their occurrence is naturally correlated with the character of the sea bottom ; because certain conditions which determine the nature of the bottom also determine the conditions of life of the fauna. It thus comes about that mud, fine sand, coarse sand, shelly ground, stony or rocky ground each has its characteristic fauna for the reason that different types of animals have their own characteristic structure and

* For this purpose one includes Kathiawar, etc.

† The miles are sea-miles (2,026 yards).

‡ A narrow tongue of deep water (over 100 fathoms) 50 miles long projecting from the ocean depths and pointing towards the Sind coast opposite the Baghiar Mouth of the Indus from which its extremity is distant only 15 miles.

habits by which they are adapted to the physical environment in which they are found. It is obvious that the presence or absence of the fishes which feed upon these animals which dwell on or near the sea bottom will be profoundly affected by the abundance of such prey and will thus indirectly be correlated with the nature of the bottom.

The sea bottom of the Bombay Presidency from close proximity to the shore out to and beyond the 100 fathom line consists almost entirely of dark grey clayey mud. This layer of mud, which is probably of considerable depth* is the accumulated sediment of land-derived material which has been washed from the land surface by the rains and carried away by rivers and streams for countless ages. This vast expanse of submarine mud by virtue of its characteristic fauna dominates the whole region in a fishery sense. Here and there among the almost universal expanse of mud are to be found patches of sand, frequently associated with broken shells but very rarely free from a greater or less admixture of mud. They are of relatively insignificant extent and occur for the most part between 30 and 100 fathoms. Of more frequent occurrence are patches of coral which probably in most cases mark the places where a mass of rock protruding through the layer of mud affords a lodgement for the colonies of organisms which build up these particular organic reefs. It was our experience that patches of sandy ground were also associated with coral formations. It goes without saying that a trawl towed over a mass of coral comes to grief. Coral is not as a rule met with in this neighbourhood at depths of less than 40 fathoms but there is a possibility of meeting it anywhere over 30 fathoms ; and in the neighbourhood of Okhamandal and Kutch it occurs at depths between 20 and 30 fathoms.

There are patches of rocky ground at various places not all of which are charted. These are obviously spots to be avoided by a trawler.

As might be expected, the extent of the purely muddy grounds is greatest off that part of the coast where rainfall is heaviest and the torrents therefore wash down from the Ghats the greatest amount of *detritus*. Off the Sind coast in spite of the vast quantities of mud which must be carried down by the river Indus† there is a greater extent of hard ground, a relatively large proportion of the soundings showing sand or mud with sand.

It follows from the above that most of our trawling was done over a bottom of mud and the great majority of the fish we caught were typical of—or at least tolerant to—a muddy bottom environment.

On the harder grounds which occur in isolated patches among the mud there appears to be a definite lack of fish—at least so far as the marketable species are concerned. A somewhat surprising dearth of fish life was also found wherever we left comparatively shallow water. The distribution of fish (as indicated by our trawl catches) at different

* An idea of the depth and consistency of the mud may be obtained from the fact that the " stakes " (which are really very large poles of teak) to which fishing nets are attached and which are fixed off the coast in the neighbourhood of Bombay up to the 10 fathom line, are driven into the mud to a depth of 30 feet or more.

† The greater part of this is trapped by the Delta to the formation of which it contributes.

depths will be dealt with in a later section but it may be mentioned at once that only a very small proportion of the 60,000 square sea-miles lying between the coast and the 100 fathom line appears to carry an appreciable stock of trawlable fish. The area to be regarded as suitable for practical trawling must in fact be limited to within the 40 fathom line. Judging from our results it would rarely be worth while working the trawl in the neighbourhood of Bombay in depths greater than 30 fathoms. Our best catches were almost invariably made between 15 to 25 fathoms. In less than 15 fathoms or at least 10 fathoms there is some difficulty in shooting a large commercial otter trawl because of the risk of the net being over-run by the otter boards owing to there being insufficient water for it to trail off and open properly before it reaches the bottom. For practical purposes therefore the area available for trawling off this part of the West Coast may be regarded as limited to the zone bounded on the land side by the 10 fathom line and to seaward by the 30 fathom line. This cuts off a very large proportion of the strip between the coast and the 100 fathom line which before being tested appeared, by considerations of depth, to be available for trawling. For example, the area lying between latitude 18° N. and 20° N. which by its proximity to Bombay would doubtless be subject to most fishing in the event of commercial trawling being carried on from the port, becomes reduced by these limitations to an area of approximately 5,000 square sea-miles. The greater part of the "*William Carrick's*" work was done in this area. Its nearest part lies within one hour's steam from the Harbour, within 20 miles of which some of our biggest hauls were made. Its furthest northern limit is about 110 miles from Bombay Light Vessel* and its furthest southern limit lies about 55 miles from the same point. It is an area of almost uniformly muddy bottom with the exception of Direction Bank (about 30 to 35 miles roughly SW from Kundari or Kenri Island) where one finds sand with shells and coralline masses which make it a dubious locality for trawling. Moreover, on the occasion when we tried we found its fish fauna to be of very little commercial worth.

The grounds fished by the "William Carrick"

A synoptic view of the chief areas sampled by our operations can be obtained from the charts at the end of this report on which are shown the positions of every haul. It will of course be borne in mind that although the position of *hauling* may be indicated as a point on the chart, the part of the sea bottom swept over by the trawl is a track the width of which corresponds with the width of the mouth of the net and the length of the track is the distance steamed by the trawler while the net is on the bottom. The average speed of the trawler while towing her gear was about 2½ sea-miles per hour ; so that in a haul or tow† of 3½ hours duration (the normal length of a daytime

* This lies four miles South-West (approximately) from the Prongs Light-House.

† 'Haul' is the term usually used with reference to the dragging of the net along the bottom but as this is also—and more correctly—applied to the process of *lifting* the net inboard it is better to speak of the former operation as the '*tow.*'

tow) the net swept over about 9 sea-miles of ground : while in 5½ hours (the normal duration of a night-time tow) something like 13 to 14 miles was traversed. There is of course some variation in the speed of the towing according as it is affected favourably or unfavourably by the tide or wind, by the condition of the ships' bottom or by the efficiency of the stoking.

The Location of Trawl Hauls

As will be seen from the chart the majority of our hauls were made within a radius of 30 miles from Bombay Light-ship. Our essays to the southward were few and their ill success discouraged repetition. The course between Bombay Harbour and Div Head, which follows fairly closely the 20 fathom depth contour line in a north-westerly direction, is moderately well sprinkled with trawling " stations ". A few hauls were made on the route to the Sind Coast where there is again a certain concentration of hauls on the grounds lying between south by east and south-east from Cape Monze.

A local grouping of our operations may therefore conveniently be made as follows :—

Bombay Grounds (Latitude 18° N to Latitude 20° N), 278 hauls.

South of Kathiawar Grounds. (Between South Kathiawar coast and Latitude 20° N), 30 hauls, *viz.*, Nos. 13-21, 201-212, 230, 283, 290-293, 304, 308 and 366.

Sind Grounds. (Off Karachi). 58 hauls, *viz.*, Nos. 232-257, 313-325, 367-385.

The above three areas are the only ones which under the conditions imposed could be sampled with any approach to adequacy even in a local sense. Outside of these areas there was a very limited degree of sampling represented by 14 hauls (Nos. 80-84, 160-167 and 358) made South of Latitude 20° N ; 3 hauls (Nos. 294-296) off Daman (east side of Gulf of Cambay) ; 4 hauls (231, 258, 386 and 387) off the west coast of Kathiawar, made on the run to the Sind Grounds ; and 4 hauls (Nos. 309-312) off the Gulf of Kutch.

Depths

Our scheme of work being arranged with regard to the catching of fish as its primary object, our hauls, instead of being distributed with a certain amount of system over various depths, were made for the most part in those places where according to the skipper's judgment there was the best prospect of getting fish. The chief drawback arising from these circumstances which hampers one in the study of results is the considerable lack of homogeneity in the data. There are for instance a considerable number of hauls in which there was such a great difference between the depths at which the tow was begun and ended that it is impossible to tell within several fathoms where the majority of the fish were caught. And there is no doubt but that

a very few fathoms usually made all the difference to the character of the catch. A second drawback is that our records contain little or no data from certain localities which it would have been desirable to sample in order to obtain a rational conception of the distribution of the fishes.

Some idea of the distribution of our hauls according to depth may be obtained from the following table which shows the number of hauls the mean depth of which falls within 10 fathoms, 10-20 fathoms, 20-30 fathoms, 30-40 fathoms and over 40 fathoms respectively.

	Under 10 fathoms.	10—20 fathoms.	20—30 fathoms.	30—40 fathoms.	Over 40 fathoms.
Bombay Grounds ..	3 hauls	99 hauls	151 hauls	21 hauls	4 hauls
South Kathiawar Grounds ..	....	8 hauls	18 hauls	3 hauls	1 haul
Sind Grounds ..	....	31 hauls	19 hauls	5 hauls	3 hauls
Southern Grounds ..	2 hauls	4 hauls	4 hauls	2 hauls	....
Off Daman ..	....	2 hauls	1 haul	....	....
Off west coast of Kathiawar	....	1 haul	2 hauls	....	1 haul
Off Gulf of Kutch ..	....	2 hauls	2 hauls	....	....

The mean depths of 346 hauls out of the total of 391 thus fall between the limits of 10 and 30 fathoms. And, so far as our observations go, these are the limits within which trawling would yield the best results. The point will be taken up in more detail when we come to deal with the question of the catches.

IV.—The Work at Sea

Period

The trawler left harbour for her first fishing voyage in the evening of the 17th May 1921 and her last voyage finished on the 27th February 1922. In this period 36 voyages were made in which fishing was carried on. The shortest voyage (XII) lasted only 19 hours, on which occasion the trawler returned to port owing to stress of weather preventing work. On two other occasions the trawler left harbour but, finding the sea too rough for working the fishing gear, returned to port without trawling.

Except in cases where a relatively large proportion of the time was spent in steaming as in visits to the Canarese Coast (XIX,) and the Sind Coast (XXIV—XXVI, XXX, XXXI, XXXV and XXXVI), the duration of a voyage depended on the amount of fish caught, having regard to marketing conditions. The times of the several voyages are given in the general table in Appendix II. But it may be convenient to note at this stage the amount of time spent at sea, the number of hauls made and the number of hours occupied in trawling in each month of the year.

		Number of days on which the trawler was at sea.	Total number of hours of absence from Port.	Total number of hours of trawling.*	Number of hauls made.
May	1921	10	185	84·5	21
June	,, ...	6	114	90	18
July	,, ...	12	226	167·5	32
August	,, ...	13	191	126	28
September	,, ...	19	335	216	50
October	,, ...	18	340	144·5	37
November	,, ...	19	359	225	54
December	,, ...	18	334	194	48
January	1922	21	390	204	51
February	,, ...	20	377	221	52
	Totals ..	156	2,851	1,678	391

Having regard to the extent of possible trawling ground available it is obvious that the time during which trawling was carried on was extremely limited. Owing to the decision (through budget difficulties) to discontinue the work after February 1922 there is a complete lack of data for that part of the year covered by the months of March, April and the first half of May. The aspect of the work as a survey is appreciably blemished by this *hiatus* since seasonal migrations are of profound interest in the study of fish life and obviously of considerable importance to those who pursue commercial fisheries. The catches made in a certain locality in January are by no means a criterion as to what might be caught there a month or two later.

Working Method

Passing reference has already been made to the general manner of working of the trawl gear. It will be understood that the net is working (that is, sweeping up any fish which may come within its mouth) while it is being towed. It may further be added that according to the usual present day practice the towing of the trawl calls for the exertion of the trawler's full steaming power. In the case of the "*William Carrick*" the same amount of steam (or coal consumption) which when normally under way would give her her full speed of 9 or 10 sea-miles an hour was required to tow the trawl over the sea bottom at a speed of 2 to 3 sea-miles per hour (see also p. 14). Thus the stoke-hold watches were kept working at equal pressure whether we were trawling or steaming. Similarly it was necessary that there should always be a navigating officer—either the mate or the boatswain who worked alternate watches in this capacity—on the bridge, with a sukani at the wheel and a look-out at the forecastle head.

When the trawl is hauled the whole of the deck crew are mustered, the skipper handling the ship and directing operations from the bridge, and each officer and man has his station and his job.

* *i.e.*, the time the net was actually being towed,

When the cod-end has been heaved in and the catch of fish shot out on deck, the net, if uninjured, is lowered away again for the next haul. Frequently there are rents and holes in the net of greater or less extent which must first be repaired. This work was done by skipper, mate and bo'sun, as to join up a trawl properly calls for some skill and considerable experience; but some of the lascar crew, who were mostly of the fishing community of Ratnagiri, after a time were able to lend a hand with the simpler mends. There was normally an interval of about half an hour from the time when the heaving of the gear was commenced and the time when the net was completely 'shot' (to use the trawler-man's term) for the next tow. On the fishing grounds a uniform daily system was followed by which three hauls of 3½ hours each were made during daylight and two hauls of 5½ hours' duration during the night. Thus, except when damage to the net occupied some considerable time in mending, the trawl was fishing for 21½ hours out of the 24.

As soon as the trawl is down again the catch of fish from the previous haul receives attention. The different kinds are sorted out and cleaned. The large fish such as Goal, Ravas, Tambusa, Karel, Wam, Shingala and Rays are gutted, and all are given a thorough washing with sea-water from a hose. The swim-bladders ("poks" or "maws") of Goal, Ravas, Wam and Shingala are removed and cleaned and subsequently hung up to dry since these have their own market value as a source of isinglass. The fish are then put in baskets and weighed before being lowered into the fish room where they are packed in the "pounds".

The fish-hold is maintained at a low temperature by means of the refrigerating plant. In practice it was found necessary to run the refrigrator only for an hour or so every morning and evening in order to keep the fish room at a temperature a little above freezing point, which was the most suitable for our purposes. A temperature so low as actually to freeze the fish hard is *not* desirable. Apart from the fact that the temperature of the "*William Carrick's*" fish room was artificially lowered, the treatment of the fish in storing was practically exactly the same as that followed on British steam trawlers. One or two tons of ice was carried and broken fragments of this ice were scattered over the layers of fish as they were packed in the pound in the fish-hold. The moisture from this slowly melting ice serves to keep the fish moist and fresh-looking.

The Marine Biologist's observations and records are made while the fish is on deck. The nature and bearing of these will be detailed in a later chapter. The only operations calling for present notice are the identification of the species and the weighing of the different kinds. The weighing was done on a spring balance. When the motion of the ship was lively, as it frequently was, it was impossible to get a reading that was accurate to a few pounds. However both in the readings of the scale and also in the allowance that was made for the weight of the basket the principle was adopted of recording a figure that would be well *below* rather than a little above the real weight.

In calm weather a closer approximation to accuracy was possible ; but in all cases the figures referring to the weights of each haul of fish may be regarded as minimal. The weights of all except the smallest fish were taken after the fish had been cleaned and the entrails removed.

V.—The Catches

Chief kinds of fish caught

The information about the quantities of fish caught will have more significance if an idea is first conveyed as to the nature and relative commercial value at least of those kinds which were of most frequent occurrence and of most market value. There is no intention at this stage of dealing with biological characters except those of commercial interest such as the prevailing and limiting sizes of the different species. It is necessary to introduce some scientific names, for without them there can be no precision as to which species are concerned. In the market or fishermen's vernacular one name is frequently applied to fishes which are of different species from the ichthyologist's point of view. The larger classes which the scientist calls *genera*, the members of which possess in common more—or more conspicuous—similarities than differences, are usually patent to the eye of the fisherman and it is thus found that vernacular names usually coincide with generic names while specific differences among the members of a genus are often ignored.

As our interest, like the fishermen's, is at present not so much concerned with what the fish exactly are as with what they are worth, the different kinds will be introduced under their most general market or vernacular name and in the order of their value and abundance as indicated by the total sum realised by the sales.

Goal.—This fish comes first in point of total value (Rs. 6,556) and second as regards total quantity landed (24,298 lbs.) among all the kinds caught by the trawler. It is a fish well known in Bombay markets, where it fetches a good price on account of its firm white flesh and good size. Its commercial position here may perhaps be compared with that of the cod in the fish markets of Europe or northern America. It belongs to the genus *Sciæna* of the family *Sciænidæ* to which belong numerous species distributed throughout the warmer seas of the world. Sixteen different species of *Sciæna* are recorded by Day* as occurring in India. Many of these are too small when full grown to possess appreciable commercial value. The large goal which were commonly taken in the trawl off Bombay appear almost without exception to belong to the species *Sciæna diacanthus*. The weights of individual fish lay for the most part between 10 and 25 lbs., the average being about 15 lbs. Our best catch of goal was made on 21st February 1922 off Karachi in 14 fathoms of water when 75 fish having a total weight of 1,149 lbs. (after being gutted) were taken in a haul of

* See " The Fauna of British India, *Fishes* " by Francis Day (2 vols.), published by Taylor and Francis, London, 1889.

5½ hours duration. The species is known to occur in great abundance near the coast in the neighbourhood of Karachi in the months of April and May when it is the object of a great local fishery. We had no opportunity of sampling these waters at this season, but in May 1921 the steam trawler " *Calcutta* ", chartered for a few weeks by Captain J. McLeod from the R. I. M. for private fishing trials, caught about 10 tons or more in 26 hours near the coast in the neighbourhood of Karachi.

Large goal are of value not only for the sake of the fish itself but also on account of the swim bladder (the "maw", "pok" or "sound") from which isinglass is obtained.

The highest price per lb. realised from our sales was 11 annas. The lowest was 11 pies. The average for all sales was 4 annas 2·5 pies per lb.

An idea of the appearance of the fish may be obtained from the photograph, Figure 7.

The Pomfret.—This is the best known and the most popular fish in Bombay, though possibly its relative abundance in the cold weather season to some extent detracts from its esteem. Europeans commonly refer to it as a "flat fish " and erroneously class it with the plaice and dab of British waters but it is not a flat fish in the same sense as these (which have both their eyes and all their colouring on one side of the body only and have the habit of lying on the sand at the bottom of the sea where they find their food, and very rarely if ever leave the lowermost layers of the water). The pomfret is indeed flattened in shape but it has an eye on each side of its head and is coloured similarly in both sides of its body. It does not appear habitually to swim near the bottom or our trawl hauls would have contained more pomfret than they did. Occasionally small shoals of pomfret were observed from the trawler swimming quite close to the surface of the sea.

The pomfret is scientifically known as *Stromateus cinereus.** It is also commonly called the white pomfret to distinguish it from the black pomfret (*Stromateus niger*) which is quite common in these waters but is apparently very much less abundant than the former. In the " Fishes " volume of the " Fauna of India " series referred to above, a third species (*Stromateus sinensis*) is given the English name of " white pomfret ", and the common pomfret is termed *silver pomfret* when immature and *grey pomfret* when adult. *Stromateus sinensis* however is so relatively little met with among the Bombay market fish that it calls for no further remark here, while *S. cinereus* (Marathi, *Saranga*) is so universally known as *the* pomfret or—when necessary to distinguish it from Day's *S. niger* (Marathi *halwa*†)—the *white* pomfret, that it seems

* These are the scientific names given in Day's work on Indian Fishes which are the ichthological books of reference most likely to be easily accessible to the reader. It may, however, be mentioned that the present day authorities do not recognize these *generic* names. Nor is the black pomfret regarded as a true pomfret at all. The similarity between the two species is as a matter of fact quite superficial.

† From Vengurla southward the name *Saranga* is applied to this species and the white pomfret which is the *Saranga* of the north Konkanese fisher folk is called " pamphlet ".

preferable to adopt this nomenclature here. It may be mentioned that this fish in the fresh condition is characterised by the silvery lustre of the scales on the sides of its body which while more conspicuous on the young is by no means lacking in the big fish.

The total quantity of pomfrets caught by the trawler was 6,876 lbs., of which 5,939 lbs. sold in Bombay Market realised a total sum of Rs. 2,618. Our biggest single haul was 490 lbs. in a 3½ hours' tow made on the 6th October 1921 off Bombay in 24 to 25 fathoms (Voyage XVIII, Haul 3). The prices realised by our sales ranged from Rs. 1-3-7 per lb. in July (during the monsoon when local boats are not at sea) to 2 annas per lb. in November and December, a time when there is a plentiful supply available in Bombay. The average for all pomfret marketed was 6 annas 11·9 pies.

Karel.—This fish is not very well known in Bombay, but it may undoubtedly be classed among the "prime" qualities. It is a perch-like fish corresponding with the species described and figured by Day‡ as *Pristipoma maculatum.* The name karel is that used by the Ratnagiri deck hands of the trawler, but it appears to be similarly used in Bombay also, though at least some people apply the name Karkara to the same fish. Day (Fauna of India—Fishes I, p. 510) gives *Karkutla* as the Marathi name of the species. Dr. Jenkins in his report on the working of the Steam Trawler "*Golden Crown*"§ includes it with one or more other perch-like forms under the name Bekti (used as a class name—the bekti of Bengal being strictly applicable to the species *Lates calcarifer* which is the *Khajura* of Bombay). The Karel is a bright handsome fish with a dark greenish purple back and silvery sides. On those caught near Bombay the silvery lustre is associated with yellow pigment which gives the fish a pale golden appearance, but on the Sind grounds the fish are more purely silvery. The younger fish are characterised by the presence of dark bars on the sides which disappear with age. Its flesh is firm and flaky and of good flavour. It soon became the favourite fish of the Europeans on the trawler and was eaten in preference to any other. If it became better known it would certainly find favour among the consumers of the best kinds of fish in Bombay and would command better prices than we made.

The total weight of Karel caught by the trawler was 15,190 lbs. The total weight of large Karel marketed as such in Bombay was 8,411 lbs. which realised a total sum of Rs. 1,209. The price per lb. varied from 7 pies in November to 4 annas in August. The average was 2 annas 3·6 pies per lb.

The largest Karel taken in the trawl was 25 inches long. The usual range of size of the fish marketed as Karel was from about 15 to about 22 inches. The corresponding range in weight is 2 lbs. to 6 lbs. Our largest take in a single haul was

‡ *Fishes of India*, p. 74, Plate XIX, fig. 5, and *Fauna of India—Fishes*, Vol. I, p. 510. Day's figure is of a *young* form apparently.

§ *Fishery Survey of the Bay of Bengal.* Bengal Secretariat Book Depot, Calcutta, 1911, p. 28.

807 lbs. (about 250 fish) in a haul of 3¾ hours duration made on the 29th August 9 miles east by south from Kundari in 15 to 16 fathoms.

Rávas or Indian Salmon.—This kind of fish comes fourth in order of value among the fish landed by the trawler. The total landings of 3,254 lbs. realised altogether Rs. 1,215.

Three distinct species of the genus *Polynemus* (*viz.*, *P. indicus*, *P. plebeius* and *P. tetradactylus*) are included in this class to all of which in the market and in *menus* the English name of Salmon or Indian salmon is applied. While possessing absolutely no resemblance to the salmon of northern waters, these fish have excellent eating qualities which are reflected in their market prices. I give the Marathi name *rávas* as a sort of class name for market purposes following in this respect the practice of the members of the Ratnagiri fishing community who were on the "*William Carrick*". The name *ravas* is also applied generally to all Polynemus species on the market. The most abundant species in our catches, *P. indicus*, which is also the most frequently seen in Bombay fish markets, is however commonly known in Bombay as *dára*. The same name is often applied to the larger specimens of *P. tetradactylus*. There are several records from our earlier voyages in which the particular species is not shown, but from the records where the specific identity is clear we obtain for *P. indicus* (dara) a total of 88 large fish of a total weight of 1,135 lbs. (average 13 lbs.). The heaviest individual fish recorded was 34 lbs. (total length 3 ft. 8 ins.). The largest catch in a single haul was one of 17 fish weighing altogether 435 lbs. made in 3½ hours on 30th January 1922, 23 miles WNW from Kundari in 22 fathoms. There are records of 48 small-sized fish of this species with a total weight of 58½ lbs. and of 35 specimens of small size the weight of which was not separately taken.

Polynemus plebeius, which resembles *P. indicus* in having five of the free filament-like rays at the base of the breast fin which are characteristic of the family, but may be fairly readily distinguished from the latter species by the relatively greater thickness of the root of the tail (called by zoologists the caudal peduncle) and by the proportionately larger eye, was of less common occurrence in our catches and never of sufficiently large size to be of commercial importance. Day's works give no record of sizes for this species. Fifty-five specimens altogether were recorded, the largest being 11½ inches in length.

The third species, *Polynemus tetradactylus*, differs from the above two in having only 4 free rays to the pectoral fin. It is a more shapely fish than the others and has the silvery sheen and the graceful body contour which call to mind comparison with the true salmon of the north. Our records of fish weighed contain altogether 83 of this species with a total weight of 331 lbs. 9 others are recorded but no weights given. Only one specimen of large size is definitely included among these records and that is one of 15¼ lbs. The best catch recorded is one of 40 fish weighing

altogether 220 lbs. made on 12th July 1921 in 22-25 fathoms, 21 miles ENE from Kundari, but there is some doubt as to whether the whole of this catch actually consisted of this one species of *Polynemus*.

The prices realised varied from 13 annas 9 pies per lb. in December to 3 annas 6·3 pies in February. The average is 5 annas 11·9 pies per lb. The "pok", "maw", or swim bladder of the ravas is thick walled and rich in gelatine like that of the goal and is similarly of commercial value as a source of isinglass.

Wám.—This is the Marathi name for fish belonging to the genus *Muraenesox*, of which there are three species known in Indian seas. Our catches consisted almost entirely of *M. talabonoides*. An occasional *M. cinereus* was observed, but we have no definite record of the third species, *M. talabon*. One distinguishes between them by the arrangement of their teeth; but observations of the dental characteristics of a live wam are very apt to be attended by a sudden and vicious display of their utility as a weapon of offence. In its tendency to snap like an angry dog the wam resembles the European conger to which it is also very similar in body form and in its edible qualities. The jaws of the wam, however, are longer and more slender than those of the conger. It appears to be associated with an entirely muddy bottom habitat, while on the other hand the European conger is a frequenter of rocky ground. The flesh of the wam is somewhat tough when fresh, but it has better keeping qualities than the more tender fish. Its scales are so small and so embedded in the skin that they appear to be absent, which may detract from its marketable value. An idea of the appearance and size of the wam taken in the trawl may be obtained from the photograph in Fig. 9.

All our wam were of large size varying in weight between 7 and 17 lbs., the majority being about 9 or 10 lbs. weight and about 5 ft. long. The smaller sizes obviously escape through the meshes of the net. Altogether 16,337 lbs. of wam were landed for market, of which 14,703 lbs. were sold as such * and realised Rs. 1,103. The highest price realised was 2 annas 5 pies per lb. in June; the lowest 5 pies per lb. at the end of September and middle of November. The average price was 1 anna 2·4 pies per lb. The 'pok' of the wam is marketable as a source of isinglass.

Tambusa.—The fish marketable under this name belong to the genus *Lutianus* of which there are many different species in Indian seas. In our hauls the species *Lutianus johnii* was predominant. It is a particularly handsome fish, rather like a robust-looking Karel in general shape and even more beautifully marked than that brilliant fish. The Marathi names, *Tambusa, tambus or Tambre,* † were obviously suggested by its shiny and ruddy appearance. Its sides have a pale golden sheen and the upper half of the body is speckled with a rich brown colouring associated with red. The smaller fish are less richly coloured. The flesh is firm and of good flavour, not unlike that of Karel but perhaps still more like that of the big ravas (dara) or Indian

* The rest sold in mixed lots. † Tambe (Marathi) means copper.

Salmon. If properly known it would certainly be regarded as one of the " prime " fishes of Bombay. The range of size usually lay between about 24 inches (8 lbs.) and 30 inches (12 lbs.). The largest observed was 33 inches long and weighed 17½ lbs.

The only other *Lutianus* species of which we caught any appreciable quantity was *L. annularis* which is entirely bright red in external colouring,‡ but as regards edible qualities not unlike the other. The usual sizes met with lay between 16 and 24 inches. The greatest length recorded was 26 inches. The Ratnagiri men on the trawler called it Lalgon (*i.e.*, Red One), but I do not know how far this may be regarded as the distinctive name for the species. It was called tambusa for market purposes and in the trawling records " Red Tambusa " to distinguish it from the other which we called " Speckled Tambusa ". In the sales records (see appendix) the two sorts are combined. Altogether 6,065 lbs. of tambusa were sold as such in Bombay and realised a total sum of Rs. 801. The trawler records show a total catch of 5,181 lbs. of the speckled and 1,840 lbs. of the red sort. The best single haul of the former was made on 20th February 1922 off Karachi in 14 to 7 fathoms (hauling 31 miles SE¾E from Cape Monze) when 70 fish weighing 719 lbs. were caught in 3½ hours. In the case of the red tambusa a haul of 3½ hours on the 11th November 1921 in 23 fathoms off Div Head (124 miles NW½W from Bombay) produced a catch of 179 fish weighing 992 lbs. It would thus appear that both species are more abundant to the northwest than in the vicinity of Bombay. The speckled species was found to be the more general in its distribution both as regards locality and season. Practically all our red tambusa were taken in the months of October and November.

The best price realised for speckled tambusa was 6 annas 3 pies per lb. (in October), the lowest was 11 pies (in November). On the 15th November when 1,491 lbs.—practically all Red tambusa—were marketed, an average of only 8 pies per lb. was realised. The average price from all sales of tambusa was 2 annas 0·6 pies per lb.

Shingala.—In order of abundance in the trawler catches this fish holds third place, being exceeded only by wagli (rays) and goal. It appears to be very abundant and very generally distributed over the muddy grounds in the neighbourhood of Bombay and is well known, though not very highly esteemed, in the Bombay fish markets. They appear to be as abundant in the Bay of Bengal as they are this side. In the " *Golden Crown* " reports they are termed " gurnards ", a name given by the British crew of the Bengal Government trawler on account of their resemblance to the European fish of that name in having broad bony heads and a liberal armament of spikes. The British on the " *William Carrick* " called them " cat fish§ ", a name almost universally applied to the *Siluridæ*, the family to which these fish belong and which is represented by numerous species in the fresh waters and seas of the tropics

‡ The dark markings on the head and nape and at the base of the tail are inconspicuous on the freshly caught fish.

§ From the whisker-like appearance of the feelers or barbels arranged round the mouth.

in both hemispheres. Many different genera and species of cat fish are known in the larger rivers and lakes of India, the purely marine species being relatively few. From the commercial point of view the marine genus *Arius* is the only one of appreciable importance and to this genus belong practically all the Shingala landed by the "*William Carrick*". As to the species, there were two or three and possibly as many as half a dozen different ones among our catches but their precise differentiation was a tedious and difficult matter to which sufficient attention could not be paid on the trawler and therefore specific names cannot here be given with confidence.

Our total catch of Shingala was over 16,000 lbs.—an average of almost 9½ lbs. for every hour of trawling. Our biggest catch in a single haul was 1,010 lbs. taken on the 24th August 1921, 22 miles SW½W from Janjira in 23 to 11 fathoms in a 3½-hour haul.

The largest sized individual noted was 35 inches long and weighed 14 lbs. The usual range of size was from about 15 to about 24 inches (2 to 6 lbs).

The total sum realised by the sale of 12,321 lbs.* of Shingala was Rs. 568, averaging 8·8 pies per lb. The highest price realised was 2·1 annas per lb. in August and September, the lowest was 2 pies in November.

This fish only appears to be eaten by the lower classes. Its scaleless skin, which rather easily rubs off, and its colour which is usually leaden grey and sometimes of a livid blue, are points which go against it as a market fish. The flesh too is somewhat soft though of perfectly good flavour when fresh. The swim-bladders or "poks" yield isinglass.

Dori.—This fish is known on the Ratnagiri and Canara side as Wánwás. Its scientific name is *Sciaenoides brunneus* and, as that name suggests, it has a close relationship to the Sciaenas to the same family as which in fact it belongs. It has the appearance of a very slender goal, which fish it also resembles in taste.

Out total landings of dori were 4,060 lbs. of which 3,292 lbs. were marketed as such (the rest in mixed lots) and fetched altogether Rs. 550. Average price, 2 annas 8 pies per lb. The highest price realised was 3 annas 6·5 pies per lb. in December; the lowest 1 anna 6 pies in February. Day (Fauna of India. Fishes, Vol. II, p. 127) says it is common at Bombay in October but from the beginning of September to the middle of December this fish was almost entirely absent from the trawler catches. Possibly they migrate inshore at this season. They were not found at all off the Sind coast.

This species showed more variety in size than most of the sorts taken in the trawl. The longest individual recorded measured 43 inches.

Chánd.—The fish known to science as *Drepane punctata* is from its shape and gleaming silvery colour very appropriately named chand, chandva or moon-fish.†

* The rest were sold in mixed lots.

† The same species occurs off the Australian coasts where it is also known as Moon-fish.

It is one of the most commonly occurring species in the Bombay neighbourhood and very few catches were made which did not contain chand in greater or less numbers. The size of these fish was as a rule very small, from 5 to 8 inches long being the usual range. Small chand were frequently not weighed separately but were included in the class called " small mixed " in both trawler and market records. Chand were included in the records of catches from 195 hauls. In 108 of these they were separately weighed and in 5 cases together with a second species also loosely called " chand " by the crew but which was as a matter of fact the Karawada (*Ephippus orbis*). The weighings at sea totalled 3, 435 lbs. from which (it is estimated) 135 lbs. may be substracted as representing approximately the weight of the *Ephippus orbis* included, thus leaving 3,300 lbs. as the total weight of the chand weighed on the trawler. Out of this total the quantity of large chand (*i.e.*, exceeding 12 inches in length) which were caught amounted to only 257 fish, the estimated weight of which would be about 1,200 lbs. The total weight of chand as weighed separately when landed for market was 2,594 lbs. out of which 110 lbs. were sold in mixed lots. The 2,484 lbs. of chand marketed as such realised a total of Rs. 465, an average of 2 annas 11·2 pies per lb. The highest price realised was 3 annas 5·5 pies per lb. in October ; the lowest was 4·8 pies in November.

A remarkable feature about our catches of chand was the absence of fish which might be termed *medium* sized. The small rarely exceeded 8 inches in length and their individual weight would not as a rule exceed 3 or 4 ounces. Of the large fish however the smallest was usually not less than 12 inches long and not less than 3 lbs. in weight. Only 6 medium sized fish were recorded, their lengths lying between 8 and 11 inches. The largest recorded was a little over 18 inches long. Day says chand are " in most places esteemed as food ". They ought to be esteemed everywhere for the larger ones at least are of excellent edible quality. If properly known, they would, I am convinced, command a good price in Bombay.

Wágli (*Skates or Rays*).—For total weight caught by the trawler the fish classed under this name come easily first compared with any other kind taken, constituting 24 per cent. of our total catches (by weight). There are several different genera and species known under the same general vernacular name of *wagli* and called rays or skates by English-speaking people all over the world. They all belong to the group of cartilaginous skeletoned fish known to science as the *Batoidei* and all are characterised by a flattened body with a rhomoboidal or kite-shaped outline, sometimes more or less rounded, and a slender elongated tail. Fig. 10 shows a photograph of a large specimen of *Trygon microps*, a rather rare species, though the family Trygonidae is very abundantly represented by several different species in Bombay waters. This is the family of *Sting-rays* or *Whip-rays* so called because of the slender whip-like tail armed with one or more long saw-edged spines with which the fish is able to

inflict painful inflammatory wounds. The flesh of these fish is practically indistinguishable in flavour from that of the European *Raidae* (skates and rays) which fish, though formerly not much esteemed in England, nowadays commands a good market and is recognized as an excellent food. It is as a matter of fact much more nutritious and digestible than many other sorts of fish which command higher prices. The same may be said with greater emphasis about the Bombay *wagli* in comparison with other sorts of fish obtainable here. Apparently its somewhat grotesque appearance and its apparently scaleless skin are drawbacks which at present limit its consumption to the poorer and lower classes of the fish-eating people of Bombay.

Besides the abovementioned family of Trygonidae, represented in our catches by *Trygon walga*, *T. uarnak*, *T. zugei*, *T. sephen*, *Pteroplatea micrura*, and possibly others, other fishes of the *wagli* kind which were commonly taken were *Aetobatis narinari*, and species (undetermined) of *Myliobatis*, *Dicerobatis*, and *Rhinoptera*.

The estimated total catch of *wagli* was about 50,000 lbs. averaging approximately 30 lbs. for every hour of trawling. 21,724 lbs. of *wagli* were separately marketed as such and realised altogether Rs. 311, an average price of 2·7 pies per lb. The highest price per lb. was 8 pies (in January) and the lowest half a pie per lb. (in November).

9,946 lbs. of these fish were supplied *gratis* to the British military forces in Bombay and it is understood were a very much appreciated ration.

The abovementioned ten sorts or market classes of fish—Goal (large-sized *Sciaena* species), Pomfret (*Stromateus*), Karel (*Pristipoma*), Ravas or Dara (*Polynemus*), Wam (*Muraenesox*), Tambusa (*Lutianus*), Shingala (*Arius*), Dori (*Sciaenoides*), Chand (*Drepane*) and, last of the ten in present-day value but first in quantity and possibly greatest in the potentiality of enhanced value in the future, *Wagli* (the various Ray species)—these then appear to constitute the fish stocks of chief commercial importance available in the vicinity of Bombay for exploitation by trawling or any other bottom fishing method. There are however other fishes which among our landings were of relatively minor importance but which require brief notice in order that a proper idea may be presented of the kinds of fish catchable by the trawl in this neighbourhood.

The most important of these is the Palu (*Chrysophrys berda*) of which altogether 887 lbs. were marketed and realised Rs. 139, an average price of 2 annas 6 pies per lb. This fish is highly esteemed by all who know its edible qualities. In the Madras Presidency it has received the English name of " Black Rock Cod, " though its resemblance to the well-known cod of northern seas is difficult to trace. The name " Black Sea Bream " would better describe its appearance and systematic position in the families of fishes. Our best catch was one of 115 fish weighing altogether 95 lbs. made in 4½ hours in 16 to 19 fathoms, hauling 15 miles W½S from Kundari, on 17th December 1921. The individual sizes usually ranged from 8 to 12 inches (½ lb. to 1½ lbs. weight). Our largest recorded was 14 inches long.

There is another fish with the scientific name of *Pagrus spinifer* that figures among our catches which bears a close resemblance to the Palu and in fact both belong to the same family (*Sparidae*). In colouring they are very different, the Palu being silvery grey with the edges of the scales outlined in black and a good deal of black about the fins. *Pagrus spinifer* is predominantly pinkish in colouring which renders it very attractive to the eye. As an edible fish it is as excellent as the more sober-coloured Palu. Though quite common off the Sind coast we found very few of this species in the neighbourhood of Bombay and I have not yet succeeded in finding a Marathi name for it. Our Ratnagiri crew called it Palu and then, when its distinction from *Chrysophrys berda* was pointed out, qualified it as *Lal Palu* which, failing an original, might be adopted as its local name. In our trawling records it is termed Red Palu. This is the species which in the " *Golden Crown* " reports goes by the name of " Red Flats " which was obviously a rough and ready improvisation by the English crew of that trawler. Our European fishermen on the " *William Carrick* " called it the " Carrick Bream " from the close resemblance that it bears to the British Sea-Bream which belongs to the allied genus Pagellus. An English-speaking fisherman of Karachi referred to it as " Red Snapper " and it is as a matter of fact closely related to that important Australian food fish as well as to another Pacific species (*Pagrus major*) which, as the Red *Tai* or *Akadai* figures so largely in the *menus*, the art and the mythology of Japan. *Pagrus spinifer* is a familiar and highly esteemed food fish in Karachi where it is called Dánt by the local fisher people.

Our biggest catch of Red Palu was one of 625 lbs. numbering approximately 900 fishes of sizes ranging from 6½ to 16 inches. This was from a tow of 5¼ hours duration made on 6th December 1921 hauling 52 miles SE from Cape Monze in 17 fathoms depth. This fish was landed for Bombay Market on only two occasions. On 13th December 1921 45 lbs. realised Rs. 9 (average 3 annas 2 pies per lb). On 1st March 975 lbs. sold for Rs. 50, an average of only 9·8 pies per lb., which low price was doubtless due to the fish being practically unknown in Bombay.

The Surmai or Seer-fish, * belonging to the genus *Cybium*, is fairly well known and esteemed in the Bombay fish markets. They do not figure very abundantly in the trawler catches and those we secured were all of comparatively small size. Our best haul was made on 11th February 51 miles S¼E from Kundari Island in 14 to 12 fathoms depth when 49 fish having an aggregate weight of 116 lbs. were taken in a 3½ hours tow. The sizes ranged from 14½ to 26 inches. It will be noted that this haul was made in comparatively shallow water. It is probable that these fish do not habitually swim so near the bottom as to come within the reach of the trawl. Of the five known Indian species, *Cybium lineolatum* and *C. Commersonii* appear to be the most commonly occurring in Bombay waters.

* In Karachi, however, the ravas (*Polynemus*) is called Seer.

The 477 lbs. of Surmai sold as such in Bombay market realised an average price of 3 annas 5 pies per lb. The highest was 3 annas 10·5 pies per lb. and the lowest 1 anna 2 pies.

The Dagola or Dagol, known by the scientific name *Chorinemus*, is another sort of fish with which the fishermen of these coasts are well acquainted but which came but rarely to our net. Like the Surmai this is a swift-swimming fish and probably moves about in higher levels in the water than are fished by the trawl. About 500 lbs. of Dagola were caught altogether. 406 lbs. marketed in Bombay realised Rs. 67; an average price of 2 annas 7·6 pies per lb.

Bhakas (*Psettodes erumei*). This fish was called "turbot", and sometimes "halibut" by the Europeans on the "*William Carrick*". It bears some resemblance to each of these northern species of flat-fish and is the only representative of the great family of *Pleuronectidae** found in the neighbourhood of Bombay that has any commercial importance or that was commonly taken in the trawl. 551 lbs. is the sum total of our takings of this fish, though it should be noted that there is a liability for the weights of fish taken in small numbers to escape being separately recorded; which depresses the total weight given for the catch of this and other species of minor importance to something below their true amount. Our biggest catches of Bhakas were made in voyage XX when one haul produced 55 lbs. in 4½ hours. This was on 25th October 1921 hauling 25 miles NW½W from Kundari Island in 23 to 20 fathoms. On this occasion the larger fish were observed to be sexually ripe and the increased catch was doubtless due to an aggregation for spawning purposes. These mature fish were from 12 to 18 inches in length. The only other species of flat-fish which were of frequent occurrence in our hauls were the fish known to the Ratnagiri fishermen as Lép which belong to the genus *Pseudorhombus*. These were too small and too few to have any commercial significance. The "Soles" † which are said to be quite common in the shallow inshore waters in the neighbourhood of Karachi were never taken in our trawl except in ones and twos. In the neighbourhood of Bombay very small sized specimens were occasionally met with.

Sharks and similar fishes.—For the purposes of this section of the report and without going into the question of their precise positions in scientific classification it will suffice to refer the class of fish which is given in the summary tables of the trawler catches as "Sharks, etc." to the four main kinds contained in it.

Most numerous were the ordinary forms of sharks known by the vernacular name of *Mushi* which belonged for the most part to the genus *Carcharias* of which there are many species in Indian waters. Some of these attain a very large size but it was remarkable that of all those taken in the "*William Carrick's*" trawl none was ever obtained over five feet in length. The largest recorded individual weight is 65 lbs.

* This is according to Day's classification. Present day authorities exclude *Psettodes* from the *Pleuronectidae*.

† *Cynoglossus*, *Plagusia* and *Synaptura*.

(length not recorded). Being relatively unimportant commercially in comparison with other kinds caught in the trawl, the catches of these fishes were not always recorded with complete precision as to quantity. They were sometimes weighed but not counted, sometimes counted but not weighed, and frequently recorded indefinitely as " a few " or " several ". And only rarely were they measured. The total of all weighings which were taken amounts to 4,050 lbs. The average weight of all fish weighed and counted is 5·2 lbs.

Of Hammer-headed Sharks (*Zygaena*) there are records of 90 individuals caught, of which 55 were weighed. These show an average weight of 9·2 lbs. The heaviest individual weight recorded is 34 lbs. The vernacular name for these fish is *Kanere* (*i.e.*, having big ears). The name is suggested by the projecting flaps on each side of the head which bear the eyes of the fish at their extremities.

The remaining shark-like fish which call for notice belong really to the same zoological Sub-order as the wagli (rays), *viz.*, the *Batoidei*. These are the *Kandere* or Saw-fishes (*Pristidae*), characterised by a bayonet-like prolongation of the snout armed on each edge with a series of sharp teeth, and the family known to science as *Rhinobatidae* which in general shape rather resemble the *Pristidae* but their pointed snout has no offensive armament. These fishes are named in the local vernacular Lánj and in Canara are called *Fadka*. Somewhat similar species in England are called Fiddle-fish and in America Guitar-fish.

The largest and heaviest individuals of all the fish taken in the trawl were *Kandere* (Saw-fish). These occasionally exceeded 8 feet in total length and were much too big to weigh. There is one record of a saw-fish with a total length of 12½ feet the tail fin and breast fins of which alone weighed 46 lbs. Altogether 49 Saw-fishes were caught and those which were weighed—15 individuals—give an average weight of 60 lbs.

A total of 49 lánj also is recorded. The largest individual record was entered as " about 100 lbs. weight, probably more ". Twenty-five fish which were weighed show an average weight of 23 lbs.

As a rule only the fins of large shark-like fish were kept. The smaller fish were usually regarded as " stocker bait " for the crew. 894 lbs. landed for market and sold separately realised Rs. 46 (an average of 9·8 pies per lb.). The highest price realised was 1 anna 9 pies, and the lowest 3 pies per lb. 216 lbs. of shark fins were sold for Rs. 40—an average price of 3 annas per lb. On one occasion 8 annas 7 pies per lb. was realised.

It will be noticed in the lists found in the market statements (see appendix) that there is a class termed " Small Mixed " which comes third in point of quantity landed and sixth in point of value among our market classes of fish. This—at any rate for the fishing grounds in the vicinity of Bombay—consisted very largely of small sized species belonging to the Goal family or Sciaenidae : The most abundant species were *Otolithus*

ruber and a small sized species of Sciaena at present unidentified which at times were numerically very abundant, usually the former but sometimes the latter being the more numerous. In three hauls made in September 1921 (Voyage XVII, hauls 3, 4 and 5) in 15 to 25 fathoms about 20 miles from Bombay Harbour our catches of these two species amounted to 570, 540 and 830 lbs. respectively. In haul 4 the species *Otolithus ruber* outnumbered the other by about 10 to 1 and in haul 5 by about 15 to 1. Both sorts are excellent eating when fresh and there is nothing to be said against them except on the score of size which in our catches rarely exceeded 10 inches (about 4 to 5 fishes to the lb.). The English name " whiting " is applied to these fish, as well as to other sciaenid fishes, in the reports on the Fishery Survey of the Bay of Bengal.

Other frequent constituents of the class " Small Mixed" were *Polynemus sextarius* (a small species of *ravas* which matures at a length of a few inches and rarely exceeds 8 or 9 inches in length) ; Saundala (*Lactarius delicatulus*) an excellent fish to eat, but rarely greater than a foot in length) ; and various species of *Caranx* (Horse Mackerel), which were sometimes fairly abundant. The commonest were Lalbi (*Caranx Malabaricus*). Less abundant were *C. atropus*, *C. rottleri*, *C. kurra* and *C. gallus*. *Scomber microlepidotus*, the true mackerel, occasionally occurred. In the deeper water the very handsome red and yellow *Synagris japonica* and *Synagris bleekeri* were occasionally met with in abundance. Less frequent but by no means uncommon were *Upenoides vittatus* and *Upenoides sulphureus*, both very pleasing to the eye and closely related in a zoological sense to the much esteemed Red Mullet of Southern European seas. The Chorbombil (*Saurida tumbil*) was frequently taken but never in great abundance. Bummaloes, Bombils, or Bombay ducks (*Harpodon nehereus*) were sometimes taken in fair quantities, especially in the shallower water, but these easily damaged fish suffered a good deal of crushing in the trawl and after a trial it was deemed profitless to keep them for market. A good proportion were thrown overboard unweighed. The herring family (*Clupeidae*) was most abundantly represented by the genus *Pellona*. Many other small forms were met with but as their commercial value is quite insignificant they do not call for enumeration here. The young stages of goal, karel, dori and chand occasionally formed an appreciable proportion of the class sold as " small mixed ".

Quantities of fish caught

Having formed some idea as to the different sorts and relative values of marketable fish caught by the trawler one may now consider the results of the trawling with regard to the quantities obtained. It must be remembered that the tows or hauls were not of equal duration and in considering the quantity of the catch regard must be given to the time the trawl was down. The detailed results from each haul for the commercially important fishes for which the voyage totals are given in Appendix III have been recorded and the figures showing the catch per hour of each have been

worked out but on account of their bulk it has been deemed undesirable to include them in this report.*

It may also be mentioned that the weights† of fish for the individual hauls are from weighings made at the sea when owing to the motion of the ship accuracy could not be secured and a definite policy of recording rather less than the probable actual weight was followed. The weights of the fish taken on landing for market are more accurate. Where these are shown to be less than the sum total of the weights at sea it is due to the amount of fish consumed by the thirty odd men of the crew or to cases where such sorts as mushi (sharks), wagli (rays), ribbon fish and bummaloes were not landed for market.

By totalling the whole figures for all the fish caught for the whole time and dividing by the number of hours trawling we get an average catch per hour's fishing of 116 lbs.‡ Excluding sharks and rays the general average catch per hour's trawling is 80 lbs.

The general average catch for every hour's absence from port is estimated at 66 lbs. (all kinds combined), and 47 lbs. exclusive of rays and sharks or shark-like fishes.

Variations in catches according to Locality, Depth and Season

The area for fishing was too vast and our working period too short, and moreover our policy of working primarily for the market was not favourable for obtaining data upon which to make reliable correlations such as would be aimed at in an ideally systematic survey. Certain generalisations may however be made from the data available which show features to which some degree of significance may be attached and which at least have a practical interest. To this end the hauls have been grouped according to the area and depth and season in which they were made and from the totals of the combined catches the average catch per hour's fishing has been estimated. The catch per hour so obtained gives an indication of the productivity in fish for different localities, depths and seasons. Besides the rate of catch for all fish combined, the catch per hour rates have been summarised for the six more important marketable species separately, *viz.*, goal, pomfret, karel, ravas, wam, shingala ; as well as for wagli (rays) and the shark-like fish.

The catch per hour figures given in the table below afford a comparison between the different grounds or fishing areas sampled in the trawling operations as enumerated above (p. 15).

* These figures are available for reference at the office of the Department of Industries where to anyone who is interested facilities will be afforded for their inspection or for taking copies of them.

† Goal, ravas, dori, wam, shingala, wagli and all others except the smallest fish were gutted before being weighed, as the weighing was done just before the fish was put below.

‡ The general catch per hour figure of 107 lbs. given in Table I below is calculated from the weighings at sea which in most cases were found to be considerably below the more accurate weights taken when the fish were landed for market. The total from which the present figure of 116 lbs. is calculated consists of the weights observed on landing *plus* the weights of such fish as were recorded at sea but not landed.

Table I showing the CATCH PER HOUR in lbs. (to the nearest whole number) of certain of the more important kinds of fish and of total fish in the different areas or fishing grounds (see p. 15) and for all grounds combined.

	Goal.	Pomfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks.	All fish together.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Bombay Grounds.									
(from 270 hauls combined).	16	3	8	2	11	10	31	4	109
Sind Grounds.									
(from 58 hauls combined) .	19	2	20	0·3	0·2	9	3	11	114
South Kathiawar Grounds.									
(from 30 hauls combined).	17	9	2	2	6	10	33	8	120
Kathiawar West Coast.									
(3 hauls combined) * ..	6	12	30	0·5	1	5	4	34	132
Gulf of Kutch.									
(2 hauls combined)† ..	19	6	22	1	2	22	24	21	145
Gulf of Cambay (off Daman).									
(3 hauls combined)‡ ..	3	2	..	5	..	1	11	4	30
Southern Grounds.									
(14 hauls combined) ..	2	0·3	0·2	..	1	5	1	2	21
All Grounds (392 hauls) combined ..	16	3	9	2	9	10	25	6	107

Bearing in mind that these figures cannot represent absolutely average conditions for the several areas but will be more or less affected by the inadequate and irregular sampling which was inevitable under the practical and commercial limitations of our work we may nevertheless glean certain significant facts from the above figures.

It will be noted that the two hauls which were made without mishap in the Gulf of Kutch show the highest catch per hour of all fish together (145 lbs.) ; and the conclusion may be drawn that this area, at least in the season when our samples were taken,

* Haul No. 386, an experimental haul in unusually deep water (70—95 fathoms) is omitted.

† Two hauls omitted as the catches were lost through the net being very badly torn on coral.

‡ Net badly torn in one of these hauls.

holds a good stock of trawl fish. But the position of undesirable snags in the form of coral reefs requires investigation to ensure against the possibility of the losses outweighing the gains.

All the grounds except the inadequately sampled Southern Grounds and the Gulf of Cambay (off Daman) show a catch per hour of over 100 lbs. The general mean may be taken as not less than 1 cwt. of fish per hour as it should be borne in mind that the data from which the figures are calculated are the weights of the several sorts of fish as observed at sea which were in general below and in some cases considerably below the actual weight of the total fish caught.

The Southern Grounds make a poor showing. Our work here was very limited and it is likely that the figures are in deficit of average conditions for we know from the coastal fishings that fish are to be found in abundance on these coasts at certain times of year. The probability is that they move in shoals and shift their grounds suddenly. Further trawling trials might throw sufficient light on their movements to enable one to pursue the fishing with successful results.

The figures for *all grounds* are of course very largely biassed by the excess of data from the Bombay Grounds comprised in the combined totals from which the catch per hour figures are estimated.

Considering the more important individual species, it will be seen that the Sind and Gulf of Kutch grounds give the highest figures for Goal. The Kathiawar Grounds and the Gulf of Kutch show the best average yield of Pomfret. The West Coast of Kathiawar, Gulf of Kutch and Sind Grounds show a marked predominance of karel and there seems no doubt but that this species has its maximum density of distribution to the northward. Wam are clearly most abundant on the muddy grounds adjacent to Bombay while Shingala are shewn to be of general distribution though the highest rate of catch is given by the four hauls in the Gulf of Kutch. Rays (wagli) appear to be most abundant on the Bombay Grounds and off South Kathiawar and are conspicuously less in evidence on the cleaner grounds off Sind where also the wam, which is a characteristic inhabitant of muddy grounds, is similarly lacking. The shark-like species are shown in greatest abundance off Kathiawar (West) and Kutch.

We may now consider the average catch per hour figures shown by the hauls on the several grounds when grouped according to the depth and season at which they were taken.

In dealing with seasonal considerations it must be remembered that that part of the year represented by the months of March, April and the first half of May is unfortunately blank as the trawler was not used in that period. For purposes of comparison the total period of the trawling operations has been divided into *three* " Seasons " as follows ;—*Pre-Monsoon, viz.*, the months of February

voyages 33, 34, 35 and 36), March (blank), April (blank), May and the early part of June (voyages 1 to 4, commencing 18th May and extending to the 5th June): *Monsoon*, comprising the rest of June and the months of July, August and September: *Post-Monsoon*, comprising the months of October, November, December and January.

For the purpose of generalising the results according to the depths at which fishing was carried on, the five successive zones mentioned above (p. 16) have been distinguished, *viz.*, (1) under 10 fathoms; (2) between 10 and 20 fathoms; (3) between 20 and 30 fathoms; (4) between 30 and 40 fathoms and (5) over 40 fathoms.

Table II showing the AVERAGE CATCH PER HOUR at different seasons and depths on the BOMBAY GROUNDS.

Season.	Depth Zone.	Catch per Hour (in lbs. to nearest whole number)*.									Remarks.
		Goal.	Pomfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks	Total fish.	
Pre-Monsoon.	Under 10 fathoms.	25	11	1	9	..	+	4	+	66	2 hauls, June and February. Average depth 9 fathoms.
	10—20 fathoms.	19	2	4	9	23	11	30	7+	133+	13 hauls, February and May. Average depth 18 fathoms.
	20—30 fathoms.	6	0·1+	11 0	·4+	4	7	32	3	110+	8 hauls, in May and June. Average depth 26 fathoms.
	20—30 fathoms.	16	12	5	2	34	9	18	11	136	18 hauls in February. Average depth 26 fathoms.
	30—40 fathoms.	3	1	39	+	..	2	6	6	79+	4 hauls, May-June. Average depth 31 fathoms.

* Where the quantity is less than 1 it is given to the first decimal figure.

A + sign indicates the occurrence of fish of which there is no record of weight—usually because the individual weights were comparatively inconsiderable.

Season.	Depth Zone.	Catch per hour (in lbs. to nearest whole number).									Remarks.
		Goal.	Pom-fret.	Karel.	Ravas.	Wam.	Shin-gala.	Rays.	Sharks	Total Fish.	
	Over 40 fathoms.	..	..	..	..	..	..	..	2+	7+	3 hauls, May. Average depth 50 fathoms.
Monsoon ..	10—20 fathoms.	24	3	14	1	15	6	38	2+	133+	No data for under 10 fathoms. 44 hauls. Average depth 14 fathoms.
	20—30 fathoms.	18	3	12	2+	6	21	52	5+	155+	41 hauls. Average depth 24 fathoms.
	30—40 fathoms.	1	0·1+	+	0·1	..	1+	4	5	33	4 hauls. Average depth 32 fathoms.
	Over 40 fathoms.	..	..	..	..	..	..	..	..	1	1 haul in 43 fathoms.
Post-Monsoon	Under 10 fathoms.	36	..	8	..	18	5	36	..	135	1 haul in 9 fathoms.
	10—20 fathoms.	15	2	4	3	6	11	23	2	80	39 hauls. Average depth 17 fathoms.
	20—30 fathoms.	10	3	3	4	11	3	18	4	69	62 hauls. Average depth 24 fathoms.
	30—40 fathoms.	17	7	2	..	19	1	13	2	71	10 hauls. Average depth 33 fathoms.
											No data for over 40 fathoms.

The outstanding fact brought out by these tables is the distinct drop in the quantities of fish caught when the 30 fathom line is crossed, except in the case of the Post-Monsoon fishing when the catch of goal slightly exceeded and the catch of pomfret and wam in the 30-40 fathom zone—the average depth was however only 33 fathoms—approximately doubled the normal (*cf.* figures for Bombay Grounds given in the preceding table). It may be noted however that these catches were derived from only

10 hauls which were almost all made near the northern limit of the Bombay Grounds. There are not sufficient data for this locality in other seasons for comparison to enable one to judge whether this is a purely seasonal feature or not. There are indications however that as one leaves the latitude of Bombay and proceeds towards the Kathiawar coast there is a tendency for the fish to be found extending further seaward than is the case further south. How far this is connected with the effect of the large rivers Narbudda and Tapti or whether it has to do with the strongly moving tides of the Gulf of Cambay are interesting questions which need not be further pursued here. All that can be concluded from the data we have been able to gather is that in general the heaviest catches of fish made by the trawler were made in the neighbourhood of the 20 fathoms line. Occasionally, as will be seen by reference to the particulars regarding the individual hauls in Appendix II, unusually good catches were made near or below 10 fathoms on the one hand and in the neighbourhood of 30 fathoms on the other hand. But for all round fishing the middle depth of 20 fathoms seems preferable. It may be mentioned too that near this contour the grounds appear to be most free from obstructions liable to cause damage to the trawl. Near 10 fathoms there is more liability to meet with rocks, wreckage or such snags as old fishing stakes and moreover foul hauls through the otter boards overriding the wings of the trawl in shooting are especially liable to occur in shallow water. Beyond 30 fathoms depth the risk of encountering coral is considerably increased.

One may now consider to what extent features indicative of the distribution of the more important sorts of fish are shown in the table.

In the case of goal it would appear that their maximum density of distribution lies inside the 20 fathom line, though as an exception to the general rule, we have the results of Hauls Nos. 288 and 289 (see Appendix II) to show that in that particular locality at the end of December at least they are to be found in some abundance up to 36 fathoms. In the same neighbourhood and at about the same time pomfrets also appeared in more than normal abundance, in contrast with their tendency during the Pre-Monsoon and Monsoon seasons to show in greater abundance on the landward side of the 20th fathoms line. The results indicate for karel an off-shore tendency during the Pre-Monsoon months and an inshore concentration in the Monsoon and after. Ravas are clearly revealed as shore-hugging fish except in the Post-Monsoon when *Polynemus indicus* no less than goal and pomfret were found in the northern half of the stretch between Bombay and Diu to be distributed in depths which were greater than those which afford their normal habitat elsewhere. The same applies to wam which, however, show a very distinct aggregation in the vicinity of the 20 fathom line—more above than below that depth—in the Pre-Monsoon month of February (see Hauls Nos. 345, 350, 359, 360, 364 and 365 more especially). The maximum figure for shingala is shown for the 20-30 fathom zone in the Monsoon Season. In other seasons they appear to be more abundant at less than 20 fathoms depth.

Table III showing catch per hour for different depths and seasons on the Sind Grounds.

Season.	Depth.	Catch per hour in lbs. (to nearest whole number).								Remarks.
		Goal.	Pomfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks	All kinds.	
Pre-Monsoon, February.	10—20 fathoms.	23	0·2	24	+	..	9	5	11	125	14 hauls. Average depth 14 fathoms.
	20—30 fathoms.	12	4	13	..	..	13	19	22	120	4 hauls. Average depth 22 fathoms. No hauls were made between 30 and 40 fathoms. A fruitless haul was made in 38 to over 50 fathoms where the trawl was badly torn by coral.
Post-Monsoon, December and January.	10—20 fathoms.	12	3	14	1	0·2	8	1	10	93	17 hauls. Average depth 16 fathoms.
,,	20—30 fathoms.	4	3	24	0·1	0·3	10	0·6	7	105	15 hauls. Average depth 24·5 fathoms.
,,	30—40 fathoms.	74	8	32	..	1	8	..	17	195	3 hauls. Average depth 32 fathoms.
29th November.	Over 40 fathoms.	3	..	+	..	..	..	..	..	18	One haul in 47—48 fathoms.
All ..	All	19	2	20	0·3	0·2	9	3	11	114	58 hauls.

The data from the distant Sind grounds are comparatively scanty and practically limited to the months of December, January and February, but so far as they go they indicate for goal an inshore concentration in the Pre-Monsoon month of February. In April and May one knows from the big local fishery that then takes place, there is a remarkable immigration of goal to the coast in the neighbourhood of Karachi. The figures for karel also appear to indicate a movement to the shallower waters in February.

It is a noteworthy fact, though based on only 3 hauls the average depth of which was 32 fathoms, that the highest catch per hour figures are shown for the 30 to 40 fathom zone in the Post-Monsoon fishing, the data for which are provided by hauls Nos. 253, 323 and 324. The predominant species are goal, pomfret and karel. A comparison is suggested with the similar conditions noted above for the northern Bombay Grounds. In each case it seems probable that the neighbourhood of large rivers tends to push out the seaward limits of fish distribution.

Table IV.—Catch per hour for different depths and seasons on the South Kathiawar Grounds.

Season.	Depth.	Catch per hour in lbs. (to nearest whole number).									Remarks.
		Goal.	Pomfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks	All kinds.	
Pre-Monsoon.	20—30 fathoms.	18	5	2	0·3	14	3	56	5	108	6 hauls, May; (1 haul) February. Average depth 25 fathoms.
,,	30—40 fathoms.	25	0·5	..	..	2	3	22	0·5	71	2 hauls, May. Average depth 37 fathoms.
Pre-Monsoon.	Over 40 fathoms.	12·5	..	..	..	4·5	3	25	25	100	1 haul, May, in 45 fathoms.
Post-Monsoon.	10—20 fathoms.	28	4	3	4	2	30	27	4	127	3 hauls, November; 5 hauls, January. Average depth 17 fathoms.
,,	20—30 fathoms.	8	15	3	2	3	3	21	14	136	9 hauls, November; 1 haul, December; 1 haul, January. Average depth 23 fathoms.
,,	30—40 fathoms.	..	44	..	..	6	..	37	18	120	1 haul, January, in 33 fathoms.
All ..	All	17	9	2	2	6	10	33	8	120	30 hauls. Average depth 24 fathoms.

The data from the South Kathiawar Grounds are perhaps too scanty to allow of any very precise conclusions as to variations in bathymetrical or seasonal distribution. It is significant however that fairly good catches are shown here for the deeper zones just as was shown by the hauls made in the adjacent grounds of the Bombay area to which reference has been made above. Probably no significance can be attached to the figures for the separate species for comparative purposes, but the indication of a post-monsoon concentration towards shallower water in the case of goal and the relatively high catches of pomfret in the deeper zones at this season may be noted, as well as the increased shingala catches from the 10-20 fathoms zone in the Post-Monsoon data (derived from the January hauls).

The material from other grounds (see p. 15) is too meagre to generalise about. The reader may study the results of individual hauls by reference to the detailed figures given in Appendix II.

The above given figures represent *average* conditions as indicated by the unsystematically collected data provided by our practical trawling. It will be more to the point for purposes of practical fishing guidance to pick out the individual hauls which yielded the highest catches.

Out of the entire 391 hauls which were made, 185 yielded a catch of over 100 lbs. of fish for each hour's trawling. Of these there were 56 hauls which yielded a catch per hour exceeding 200 lbs. of fish, *viz.*, Hauls Nos. 41, 44, 45, 46, 47, 48, 50, 52, 57, 58, 62, 66, 70, 71, 76, 79, 85, 89, 90, 94, 95, 105, 134, 142, 146, 147, 151, 152, 158, 172, 201, 202, 230, 250, 253, 254, 257, 263, 265, 291, 310, 316, 324, 325 ,335, 336, 338, 346, 360, 365, 370, 372, 376, 382, 389 and 390. For particulars regarding the date, locality, depth and details of the catches reference may be made to Appendix II. It may be noted that 40 of these hauls were made on the Bombay Grounds out of a total of 278 hauls in that region, *i.e.*, 14 per cent. of the hauls yielded catches exceeding 200 lbs. per hour. Eleven were made on the Sind Grounds, out of a total of 58 hauls in that region (= 19 per cent.). Four were made on the South Kathiawar Grounds out of a total of 30 in that region (= 13 per cent.); and 1 was made off the Gulf of Kutch out of a total of 4 in that locality.

As to the depths at which they were made the following table summarises the bathymetrical distribution of these biggest hauls.

Bombay Grounds.

Mean depth.	Number of hauls.	Catch per hour.
13 fathoms	1	277 lbs.
14 ,, ...	1	269 lbs.
15 ,, ...	2	257 and 204 lbs.
16 ,, ...	1	801 lbs.
17 ,, ...	2	243 and 206 lbs.
18 ,, ...	1	310 lbs.
19 ,, ...	3	267, 254 and 204 lbs.
20 ,, ...	2	226 and 221 lbs.
21 ,, ...	4	225, 277, 395 and 266 lbs.
22 ,, ...	4	200, 478, 270 and 478 lbs.
23 ,, ...	5	348, 426, 281, 280 and 225 lbs.
24 ,, ...	4	283, 222, 284 and 213 lbs.
25 ,, ...	5	384, 221, 207, 244, 207 lbs.
26 ,, ...	1	211 lbs.
27 ,, ...	4	389, 204, 290 and 295 lbs.
28 ,, ...	1	283 lbs.

Sind Grounds.

Mean depth* (with actual depths of shooting and hauling positions).	Number of hauls.	Catch per hour.
10 (14 to 7 fathoms)	1	299 lbs.
13 (16 to 10 and 13 to 13 fathoms)	2	206 and 227 lbs.

* Half fathoms are omitted, the mean being given to the nearest whole number on the side of the depth at which the trawl was *hauled*.

Mean depth (with actual depth at shooting and hauling positions).	Number of hauls.	Catch per hour.
14 (13 to 14 fathoms)	1	270 lbs.
15 (16 to 15 ,,)	1	347 ,,
21 (20 to 22 ,,)	1	263 ,,
27 (30 to 24 ,,)	1	315 ,,
28 (31 to 26 ,,)	1	209 ,,
31 (31 to 31 ,,)	1	317 ,,
35 (40 to 30 ,,)	1	252 ,,
Ca. 36 (>50 to 17 ,,)	1	403 ,,

South Kathiawar Grounds.

19 (21 to 17 and 18 to 19) fathoms	2	242 and 307 lbs.
23 (23 to 23) fathoms	1	476 lbs.
24 (25 to 23) ,, ...	1	226 lbs.

Gulf of Kutch Grounds.

	Number of hauls.	Catch per hour.
20 to 24 fathoms	1	204 lbs.

The haul which yielded the highest catch per hour of all (of 801 lbs. per hour) was Haul No. 90, the first haul of voyage XI, made on the 19th August 1921 at a depth of 15 to 16 fathoms 9 miles west by north from Kundari (Kenri) Island. It is of interest to note the very close proximity of this spot to Bombay. The catch per hour of the different sorts of fish taken in that haul was as follows (expressed in lbs. to the nearest decimal figure):—

Goal	384	lbs.	per hour.
Karel	213·8	,,	,,
Dori	101·3	,,	,,
Rays	42·6	,,	,,
Wam	24·0	,,	,,
Sharks	13·3	,,	,,
Shingala	6·6	,,	,,
Ravas	4·8	,,	,,
Palu	4·8	,,	,,
Tambusa	2·1	,,	,,
Pomfret (white)	1·3	,,	,,
Chand	0·8	,,	,,

The next best productivity was shown by Haul No. 336 (Voyage XXXII, Haul 11) made on the 30th January 1922 at a distance of 23 miles WNW from Kundari in 22 fathoms when a catch per hour of 478 lbs., constituted as follows, was obtained:—

Ravas (124·0), Goal (116·0), Rays (65·6), Sharks (51·1), Wam (42·8), Tambusa (29·9), Karel (22·8), Pomfret (13·4), Dori (10·21), Shingala (1·1), Mixed (1·4). The figures in brackets give the catch per hour in lbs. of each sort.

A catch per hour of 476 lbs. is shown for Haul No. 202 (Voyage XXII, Haul 3) which was made on the South Kathiawar Grounds on the 11th November 1921 at a depth of 23 fathoms about 124 miles NW ½ W from the Prongs Light. This consisted of Tambusa (337), Shark (35), Rays (33·3), Pomfret (29·3), "Small Mixed" (19·0), Karel (14·3), Shingala (7·0) and Black Pomfret (1·6).

The next highest catch per hour (426 lbs.) was yielded by Haul No. 66 (Voyage VI, Haul 13) made on the 14th July 1921 about 22 miles W × S ½ S from Kundari in 22½ to 24 fathoms. The chief sorts of fish taken were :—Rays (196·3 lbs. per hour), Goal (157·2), Shingala (32·7), Mixed (9·1), Pomfret (7·2), Chand (7·2), Karel (7·2), Tambusa (6·3), Dori (2·7).

Considering individual sorts of fish, the best catch per hour of GOAL was 280 lbs. in Haul No. 250 (Voyage XXV, Haul 6) made on the Sind Grounds on the 6th December 1921 on the northern edge of the Swatch, shooting in more than 50 fathoms and hauling in 17 fathoms at a distance of 52 miles SSE from Cape Monze. The elusive movements or the local concentration of the off-shore shoals of goal—a condition which is well described by the trawler man's term "spotty"—is exemplified by the fact that a second haul, for which the trawl was towed as nearly as possible over the same ground, produced not a single Goal. The haul which produced the second highest catch per hour (209 lbs.) of Goal was also made on the Sind Ground, *viz.*, Haul 376 which has been referred to above (see p. 19) as yielding the highest total catch of this species. It should be noted that the depth here was 13 to 14 fathoms only. The third highest catch per hour of Goal was 142·9 lbs. made on the 26th February 1922, sixty-seven miles SE ½ S from Diu Head (or about 100 miles roughly NW from Bombay) in 20 fathoms. Four other hauls made on the Bombay Grounds yielded a catch per hour of over 100 lbs. of Goal, *viz.*, Hauls Nos. 89, 95, 290 and 336. The catch per hour figures were 141, 114, 103 and 124 lbs. and the depths 16-15, 15-19, 21-17 and 22 fathoms respectively. The practical conclusion to be drawn from these data is that the best catches of Goal are generally to be made inside the 20 fathom line.

With regard to the seasonal abundance of Goal on the Bombay Grounds as shown by the catches of different voyages as a whole, the voyages which show the best results are the Monsoon Voyages V, VI and VII (July 1921), X and XI (August 1921) with catch per hour averages of 19, 36, 21, 31 and 53 lbs. respectively ; but it should be noted that only in the first of these voyages were the fish of large size throughout. In the other voyages there was a considerable proportion of medium and small sized fish.* Voyages XXVII and XXVIII made in the last half of December also show a fair yield of this species with catch per hour figures for the voyages of 27 lbs. and 24 lbs.

* Details as to size will be given in a later report on the biological character of the catches.

of goal respectively. These catches were made on the north side of the latitude of Bombay while the monsoon catches were practically all on the South side.

With regard to the catches of POMFRET, only 10 hauls show catch per hour figures which exceed 20 lbs.

The particulars are as follows :—

Serial Haul No.	Voyage No.	Haul No.	Depth.	Total catch of Pomfret.	Catch per hour of Pomfret.
			Fathoms.	Lbs.	Lbs.
152	XVIII	3	24—25	490	140·0
346	XXXIII	7	22—24	335	93·5
201	XXII	2	25—23	276	73·6
151	XVIII	2	25—24	197	56·3
304	XXIX	15	40—27	75	44·2
257	XXVI	2	16—15	146	38·9
343	XXXII	4	31—22	109	31·1
154	XVIII	5	24—27	125	22·7
140	XVII	3	21—14	120	21·8
303	XXIX	14	24—40	115	20·9

Two of the above hauls were made on the South Kathiawar Grounds (*viz.*, Nos. 201 and 304) and one (No. 303) in close proximity to this region. No. 257 was made on the Sind Grounds in comparatively shallow water (16-15 fathoms). The optimum depth for the Bombay Grounds appears to be a little below 25 fathoms though some good catches were made from tows which were taken at greater depths. Where the depths at the beginning and ending of the tow vary so much as from 24 or 27 fathoms to 40 fathoms it is of course impossible to say from what part of the line the fish were mostly derived and such hauls are, therefore, of little value as survey data.

The voyages which yielded the best catches of Pomfret were Voyage XVIII made in October on the grounds abreast of Bombay Harbour, with an average catch per hour for the whole fishing time of 20 lbs. of Pomfret, Voyage XXII made in November to the grounds in the vicinity of Diu Head (114 to 130 miles NW½ W from the Prongs Light covering the best of the fishing) with a catch per hour of 12 lbs. of pomfret, and Voyage XXXIII made in February on the Bombay Grounds when the best catches were made in the area lying between 20 and 25 miles roughly NW by W from Kundari (catch per hour of pomfret for whole voyage, 15 lbs.).

Regarding the catches of KAREL, to sum up the indications as concisely as the data will allow, it may be said that the best average catches were made on the Sind Grounds, where the depths above 20 fathoms showed a greater abundance of these

fish in the months of December and January whereas in February the more shallow water inside the 20 fathom gave the better results. On the Bombay Grounds there are indications of a concentration of this species for the monsoon months which seems to be associated with the incidence of spawning. The best individual hauls of Karel were as follows :—

Month.	Serial No. of haul.	Depth of water.	Quantity of karel caught.	Catch per hour.
Bombay Grounds.		Fathoms.	Lbs.	Lbs.
June	29	29—32	480	87·2
,, ...	47	24—25	500	90·9
July	57	22—25	250	45·5
,, ...	58	25—24	220	40·0
,, ...	60	24—26	345	62·7
,, ...	62	26—24	470	85·4
August	90	15—16	807	213·8
September	105	13—14	240	64·0
Sind Grounds.				
November	231	32—17	230	61·3
December	242	25—21	256	71·3
,, ...	254	30—24	606	173·1
,, ...	257	16—15	389	103·7

The best Karel Voyages were as follows :—

Month.	Voyage.	Total catch of karel.	Catch per hour of karel.
Bombay Grounds.		Lbs.	Lbs.
June	IV	909	18
,, ...	V	1,314	12
July	VI	1,824	24
August	XI	1,427	33
Sind Grounds.			
November-December	XXIV	953	16
December	XXV	1,182	26
,, ...	XXVI	448	39
January	XXX	467	14
February	XXXV	1,187	23

The marketable kinds of RAVAS (which for practical purposes may be considered as limited to the species *Polynemus indicus* with a relatively small proportion of *Poly-*

nemus tetradactylus) are shown for the Bombay Grounds to be in greatest abundance for the months of February, June, July and August and, though not entirely absent, are much less frequently taken in the latter part of the monsoon season. The post-monsoon hauls made in December and January indicate their occurrence somewhat further out to sea. The distribution of these fish however seems to be so "spotty" (to use the trawler man's expression once more) that the average figures of catch do not perhaps carry much significance and it may be of more practical utility to indicate the best hauls. These were as follows :—

Date.	Serial No. of haul.	Voyage No.	Haul No.	Depth.	Quantity of ravas caught.	Catch per hour.	Species.
				Fathoms.	Lbs.	Lbs.	
2nd July 1921 ..	46	V	13	22—24	60	10·9	Not distinguished.
3rd „ 1921 ..	49	V	16	23—18	70	12·7	„ „
12th „ 1921 ..	57	VI	4	22—25	220	40·0	Polynemus tetradactylus.
14th „ 1921 ..	65	VI	12	24—22	120	21·8	Polynemus indicus and Polynemus tetradactylus.
30th August 1921 ..	96	XI	7	19—12	90	16·4	Not distinguished.
10th December 1921 ..	257	XXVI	2	16—15	67	17·8	Polynemus tetradactylus.
20th „ 1921 ..	275	XXVII	17	20—17	60	10·9	Polynemus indicus.
21st „ 1921 ..	276	XXVII	18	17—18	59	10·7	„ „
21st „ 1921 ..	277	XXVII	19	18—17	78	22·3	„ „
30th „ 1921 ..	283	XXVIII	3	20—26	96	17·5	„ „
6th January 1922 ..	291	XXIX	2	17—15	58	16·8	„ „
30th „ 1922 ..	334	XXXII	9	23—20	98	28·0	6 large Polynemus indicus and 3 small Polynemus tetradactylus.
30th „ 1922 ..	335	XXXII	10	20—22	116	33.1	Polynemus indicus.
30th „ 1922 ..	336	XXXII	11	22—22	435	124·3	„ „
31st „ 1922 ..	338	XXXII	13	30—20	116	21·1	„ „
12th February 1922 ..	360	XXXIV	8	20—18	100	28·6	„ „
12th „ 1922 ..	361	XXXIV	9	18—16	68	19·4	„ „
12th „ 1922 ..	362	XXXIV	10	16—18	95	27·1	„ „
26th „ 1922 ..	389	XXXVI	12	21—20	56	16·0	„ „
26th „ 1922 ..	390	XXXVI	13	20—19	88	25·1	„ „
26th „ 1922 ..	391	XXXVI	14	19—18	87	15·8	„ „

The above hauls were taken between the limits of depth of 12 to 30 fathoms, the average for all being 20 fathoms. With the exception of Haul No. 257 made on the Sind Grounds (which yielded the species *Polynemus tetradactylus* only) and Hauls No. 283 and No. 291 made on the South Kathiawar Grounds, all these catches were made on the Bombay Grounds.

The trawling results indicate that WAM are a predominant and regularly occur-

ring species over the Bombay Grounds between the 10 and 30 fathom lines, but as in the case of Goal and Pomfret to which reference has already been made, there are distinct indications that on the grounds to the north-west from Bombay these fish occur at greater depths. This accounts for the average catch per hour of 19 lbs. shown for the hauls made in the 30 to 40 fathom zone in the post-monsoon season (December and January).*

Particulars relating to the hauls in which the best catches of wam were made are given below :—

Date.	Serial No. of haul.	Voyage No.	Haul No.	Depths.	Quantity of wam caught.		Catch per hour.
					No. of fish.	Weight.	
				Fathoms.		Lbs.	Lbs.
3rd July 1921 ..	49	V	16	28—18	..	190	34·6
13th ,, 1921 ..	62	VI	9	26—24	25	190	34·6
30th August 1921 ..	93	XI	4	14—14	..	207	59·0
30th ,, 1921 ..	94	XI	5	14—15	21	270	77·1
23rd September 1921 ..	124	XVI	1	19—18	..	180	40·0
26th October 1921 ..	179	XX	7	21—20	37	330	60·0
1st January 1922 ..	289	XXVIII	9	36—32	25	223	40·5
28th ,, 1922 ..	327	XXXII	2	23—20	25	303	71·3
29th ,, 1922 ..	328	XXXII	3	20—21	20	255	46·4
29th ,, 1922 ..	332	XXXII	7	26—26	24	245	44·5
30th ,, 1922 ..	333	XXXII	8	26—23	38	380	69·1
30th ,, 1922 ..	336	XXXII	12	22—22	20	195	40·0
30th ,, 1922 ..	338	XXXII	13	22—30	51	495	90·0
4th February 1922 ..	340	XXXIII	1	16—26	22	210	32·3
5th ,, 1922 ..	341	XXXIII	2	21—20	16	190	47·5
6th ,, 1922 ..	345	XXXIII	6	24—22	22	240	43·6
7th ,, 1922 ..	350	XXXIII	11	17—19	21	240	43·7
12th ,, 1922 ..	359	XXXIV	7	16—20	21	219	39·8
12th ,, 1922 ..	360	XXXIV	8	20—18	25	244	69·7
13th ,, 1922 ..	364	XXXIV	12	22—26	23	266	48·4
13th ,, 1922 ..	365	XXXIV	13	26—28	92	914	261·1

The depths in which these hauls were made lay between 14 and 36 fathoms. The average was 22 fathoms. They were all made on the Bombay Grounds, and almost all in the months of January and February when these fish appear to congregate for spawning. The individuals comprising the big catch of 914 lbs. in Haul No. 365 were all observed to be sexually ripe.

The figures for SHINGALA indicate a tendency on the part of this fish to concentrate more on the shallow grounds of the Bombay region during the fine weather and to move into deeper water for the monsoon season.

* Hauls made in November and December at over 30 fathoms depth in the more southern parts of the Bombay Grounds produced no wam at all. Otherwise the average catch would have reached a much higher figure.

The data from the hauls made on the South Kathiawar Grounds in the post-monsoon season (November, December and January) show a very marked concentration of Shingala towards the grounds inside 20 fathoms depth at this time.

The voyages which yielded the biggest catches of Shingala were Voyage X (August 1921) with an average catch per hour of 37 lbs. and Voyage XXVII (December 1921) with an average catch per hour of 18 lbs. The former was made on the grounds abreast of and somewhat to the south of the latitude of Bombay Harbour and the latter between Kendari and Bassein.

The individual hauls which produced the biggest catches of Shingala were as follows :—

Date.	Serial No. of haul.	Voyage No.	Haul No.	Depth.	Quantity of Shingala caught.	Catch per hour.
					Lbs.	Lbs.
1st July 1921 ..	41	V	8	32—22	250	50·0
2nd „ 1921 ..	45	V	12	29—22	410	74·6
12th „ 1921 ..	57	VI	4	22—25	320	58·2
12th „ 1921 ..	58	VI	5	25—24	335	61·0
21st „ 1921 ..	70	VII	2	21—25	400	88·9
21st „ 1921 ..	71	VII	3	25—21	595	119·0
24th August 1921 ..	79	X	4	23—21	1,010	288·0
24th „ 1921 ..	80	X	5	21—24	200	57·0
25th „ 1921 ..	85	X	10	20—19	400	114·1
27th November 1921 ..	230	XXIV	1	18—19	230	65·7
18th December 1921 ..	265	XXVII	7	29—24	255	60·0
6th January 1922 ..	291	XXIX	2	17—15	287	82·0
11th February 1922 ..	355	XXXIV	3	24—24	300	54·6
11th „ 1922 ..	357	XXXV	5	20—14	262	58·2

Two of the above hauls (*viz.*, Nos. 230 and 291) were on the South Kathiawar Grounds : the others on the Bombay Grounds. It will be noted that the depths of the former fall below 20 fathoms (average 17 fathoms). The hauls on the Bombay Grounds were between the limits of 14 and 32 fathoms (average depth, 23 fathoms).

It will be seen from the particulars of the catches of individual voyages given in Appendix III that TAMBUSA were but sparsely met with, at least on the Bombay Grounds. Only two voyages (*viz.*, Voyage XXII made in November and Voyage XXXII made in February) produced anything like substantial catches of these fish. As already mentioned (p. 24) the November catches which were made on the Kathiawar Grounds were predominantly of the species L. *annularis* which we called the " Red Tambusa. "

Particulars of the ten best hauls of "Speckled Tambusa" are given below :—

Date.	Serial No. of haul.	Voyage No.	Haul No.	Depths.	Catch of Tambusa.		Catch per hour.
					Weight.	No. of fish.	
				Fathoms.	Lbs.		Lbs.
10th December 1921 ..	257	XXVI	2	16—15	219	25	58·4
30th January 1922 ..	335	XXXII	10	20—22	110	10	31·4
30th ,, 1922 ..	336	XXXII	11	22—22	105	9	30·0
5th February 1922 ..	342	XXXIII	3	20—31	151	16	43·1
5th ,, 1922 ..	343	XXXIII	4	31—22	125	14	35·7
5th ,, 1922 ..	344	XXXIII	5	22—24	355	39	64·5
6th ,, 1922 ..	346	XXXIII	7	22—24	370	41	105·7
6th ,, 1922 ..	348	XXXIII	9	24—17	108	9	30·8
19th ,, 1922 ..	370	XXXV	5	13—13	165	19	36·6
20th ,, 1922 ..	372	XXXV	7	14— 7	719	70	205·4

It will be noticed that three out of the ten (*viz.*, Nos. 257, 370 and 372, the last of which yielded the record catch of speckled tambusa), were made on the Sind Grounds.

The average depth of these three hauls was 13 fathoms. The other hauls, made on the Bombay Grounds, were all located on the north side of the latitude of the home port. Their depths varied between 17 and 31 fathoms, the average being 23 fathoms.

The three best hauls of Red Tambusa were as follows :—

Date.	Serial No. of haul.	Voyage No.	Haul No.	Depths.	Quantity of Tambusa.		Catch per hour.
					Weight.	No. of fish.	
				Fathoms.	Lbs.		Lbs.
11th November 1921 ..	201	XXII	2	25—23	241	43	64·2
11th ,, 1921 ..	202	XXII	3	23—23	992	179	330·7
13th ,, 1921 ..	210	XXII	11	22—21	114	..	32·6

The best catches of DORI or WANWAS were produced by the hauls enumerated below :—

Date.	Serial No. of haul.	Voyage No.	Haul No.	Depths.	Quantity of Dori caught.		Catch per hour.
					Weight.	No. of fish.	
				Fathoms.	Lbs.		Lbs.
3rd July 1921 ..	49	V	16	23—18	125	52	22·7
3rd ,, 1921 ..	50	V	17	18—26	150	67	27·3
21st ,, 1921 ..	70	VII	2	21—25	90	54	20·0
29th August 1921 ..	90	XI	1	15—16	380	Ca. 150	101·3
21st December 1921 ..	280	XXVII	22	21—20	105	38	19·1
31st ,, 1921 ..	287	XXVIII	7	35—36	123	90	35·1

These were all made on the Bombay Grounds. July appears to be the month when these fish are most in evidence.

CHAND of small size are fairly abundant throughout the Bombay Grounds in the neighbourhood of the 20 fathom line. The large individuals were much more rarely met with and their occurrence appears to be subject to seasonal migrations.

The particulars of hauls in which large chand were obtained in greatest abundance may therefore be of practical interest.

Date.	Serial No. of haul.	Voyage No.	Haul No.	Depths.	No. of chand caught.		Weight of chand caught.
					Large fish.	Small fish.	
				Fathoms.			Lbs.
3rd June 1921	25	IV	2	22—31	35	184	170
4th ,, 1921	29	IV	6	29—32	16	1 basket-ful. (Ca.85 lbs.)	150
5th ,, 1921	31	IV	8	24—27	14	90	80
2nd July 1921	45	V	12	29—22	10	46	55
2nd ,, 1921	47	V	14	24—25	35	?	135
11th ,, 1921	55	VI	2	26—30	11	?	125
12th ,, 1921	59	VI	6	24—24	16	?	100
12th February 1922 ..	359	XXXIV	7	16—20	15	2	65

PALU (*i.e.*, "Black Palu") appeared in 105 hauls out of the 391 hauls made altogether but they were never found in very great abundance.

The following shows the hauls in which the weight of PALU taken exceeded 50 lbs.

Date.	Serial No. of haul.	Voyage No	Haul No.	Depths.	Quantity of palu caught.		Catch per hour.
					Weight.	No. of fish.	
				Fathoms.	Lbs.		Lbs.
10th September 1921 ..	105	XIV	1	13—14	70	107	18·7
7th October 1921 ..	158	XVIII	9	17	95	?	15·8
12th November 1921 ..	208	XXII	9	20—23	75	50	12·5
17th December 1921 ..	260	XXVII	2	16—19	95	115	21·1
29th January 1922 ..	332	XXXII	7	26—26	50	70	9·1
12th February 1922 ..	359	XXXIV	7	16—20	57	71	10·4

The above were all on the Bombay Grounds with the exception of No. 208 which was on the South Kathiawar Grounds. Our trawling off the Sind Coast yielded but few fish of this species.

RED PALU have a very different distribution, appearing as a regular and characteristic species among the catches made on the Sind Grounds and only occasionally occurring as odd specimens in the neighbourhood of Bombay.

The largest catches of Red Palu (all made on the Sind Grounds) were as follows :—

Date.	Serial No. of haul.	Voyage No.	Haul No.	Depths.	Quantity of Red Palu caught.		Catch per hour.
					Weight.	No. of fish.	
				Fathoms.	Lbs.		Lbs.
6th December 1921 ..	251	XXV	7	17—17	625	900	123·8
7th ,, 1921 ..	252	XXV	8	17—40	115	?	20·9
19th ,, 1921 ..	314	XXX	7	17—17	138	116	23·0
19th February 1922 ..	370	XXXV	5	13—14	310	Ca. 250	68·8
20th ,, 1922 ..	375	XXXV	10	13—14	144	156	26·2
23rd ,, 1922 ..	383	XXXVI	6	22—18	101	209	18·4

RAYS (WAGLI) are recorded as occurring in 280 of our hauls. They may be said to be perennially abundant on the muddy grounds off Bombay inside the 30 fathom line but were most in evidence at the beginning of the Monsoon as is indicated by the following statement showing those hauls which yielded 500 lbs. or more of this kind of fish :—

Date.	Serial No. of haul.	Voyage No.	Haul No.	Depth.	Quantity of Rays caught.	Catch per hour.
				Fathoms.	Lbs.	Lbs.
1st July 1921	43	V	10	21—25	500	91·0
2nd „ 1921	44	V	11	25—29	530	96·5
2nd „ 1921	45	V	12	29—22	1,112	202·4
2nd „ 1921	46	V	13	22—24	1,175	213·8
3rd „ 1921	48	V	15	25—28	1,075	195·6
3rd „ 1921	50	V	17	18—26	510	92·3
4th „ 1921	52	V	19	22—20	777	141·4
12th „ 1921	59	VI	6	24—24	500	91·0
14th „ 1921	66	VI	13	22—24	1,080	196·6
19th October 1921	172	XIX	13	21—21	1,200	218·2
18th December 1921	261	XXVII	3	19—21	534	97·1
30th January 1922	335	XXXII	10	20—22	505	144·3

VI. The Marketing of the Fish.

In commercial fishing the ensuring of supplies by the successful carrying on of fishing is an all important but by no means the only important aspect of the business. It is also essential that they should be sold to the best advantage, and since the quality of freshness is the chief criterion of value the preservation of the fish in as fresh condition as possible till the time it reaches the purchaser is a matter of extreme importance and in the climate of Bombay is one moreover that is attended with no small difficulty especially in the case of a deep-sea fishing enterprise where fish are caught at some distance from the port of landing and may have to be kept several days before reaching the market *en route* to the consumer.

The "*William Carrick*" with its refrigeration plant was equipped so as to be able if necessary to carry a catch of fish for several days. The method of cleaning and storing the fish at sea has been described (p. 18). The arrangements for landing and marketing the catches were as follows. The departure from the fishing ground was timed so as to allow of the trawler reaching port at such a time that word could be sent to the salesman who then arranged for the necessary number of bullock-waggons to be sent to the quay for the transport of the fish to Crawford Market early the following morning. The trawler used to lie alongside the quay at Modi Bunder* which was the only place outside a Dock where there was sufficient depth of water for a vessel of her draught. Landing began at about 4 a.m. The different sorts of fish were hauled up from below in baskets and weighed on deck before being hoisted into the waggon ashore. It usually arrived at Crawford Market by 7 a.m. where it was sold by auction in the usual way to the wholesale fish dealers. The firm of Messrs. Todywalla (the City Ice Supplying Co.) was commissioned to deal with the transport to market and the auctioning of

* Between Carnac Bunder and the Bombay Steam Navigation Company's Ferry Steamer Wharf.

the fish for which they received a commission of 5 per cent. of the net sales receipts together with transport expenses.*

A statement of the quantities of different kinds of fish sold, the prices obtained, and showing the average price per lb. realised for the different sorts at each sale is given in Appendix VI.

Reference has already been made to the minimum, maximum and average prices obtained for the various kinds of fish in dealing with the several varieties caught by the trawler (see pp. 19-31). A considerable degree of variability in market value is a practically inevitable feature in all fresh fish wholesale operations. It arises out of the fact that although demand may be fairly constant and at any rate possible of anticipation, the supplies are not constant and can never be anticipated with any certainty. And the article is essentially perishable and cannot be held over without loss, even in these days of artificial ice and refrigeration, for more than a very short time. Our best prices were made in the Monsoon season when the open sea fishing of the local boats was at a standstill and the market was therefore inadequately supplied.

With the resumption of fishing by the local boats after the Monsoon, our prices showed a marked decline which reached a minimum in the month of November when the market was glutted with the pomfret which are caught in abundance at this time by the fishermen of Bombay and neighbouring villages. When the popular pomfret is available nearly every other kind of fish meets with a cold reception from the buyers, and the excellent qualities of unknown or slightly known sorts like tambusa, karel, red palu or chand are left ignored.

It is a noteworthy fact that, kind for kind, our steam trawler fish was preferred and sought after by the buyers in precedence of that brought to market from the *machwas* or tonis of the established *machliwalas*. The indubitable reason for this was that our fish was always firm and in good condition because it had been chilled almost to freezing point immediately after being caught and had been carefully handled and packed. Other fish, and especially supplies from villages outside Bombay, was already soft and sometimes tainted on reaching the market. The trawler fish also had a cleaner appearance and this may have helped it to find favour, though it must be admitted that this matter of cleanliness is not regarded in Bombay fish markets as of so much importance as it might be.

The details of the market expenses are given in Appendix VII. The total gross receipts from the sales of fish in Bombay Market were Rs. 18,698-14-0 and the expenses of sale Rs. 2,059-7-0 (approximately 11 per cent.). The totals of the various items of expenses were as follows :—

* I would here like to acknowledge my appreciation of the efficiency with which, sometimes under circumstances of some difficulty, this work was conducted by the members of Messrs. Toddywalla's firm. Hitches would have been serious. But they never occurred.

	Rs. a. p.						
Cart Hire ..	482	0	0 = 2·58	per	cent.	of	gross receipts.
Cooly Charges ..	237	12	0 = 1·27	,,	,,	,,	,, ,,
Market Tax ..	243	4	0 = 1·30	,,	,,	,,	,, ,,
Dalal's Charges..	220	12	0 = 1·18	,,	,,	,,	,, ,,
Commission ..	875	11	0 = 4·68	,,	,,	,,	,, ,,
Total ..	2,059	7	0 = 11·01	,,	,,	,,	,, ,,

The net receipts from Bombay sales were thus Rs. 16,639-7-0.

The catches from three voyages, *viz.*, XXIV, XXV and XXX were landed at Karachi where, the fish supplies being better and the demand much smaller than at Bombay, inferior prices were obtained and some of the fish, including rays, sharks, and several of the mixed kind, found no sale at all. Here fish are bought by number so that no weights were recorded. A little over 4,000 lbs. of fish were sold for Rs. 143. As the fish merchant brought his own boat alongside the trawler anchored out in the harbour there were no expenses for transport or commission. The catch from voyage XXV, sold in part direct from the trawler to the same fish-merchant and the rest consigned to Karachi Market on commission, realised altogether Rs. 282-14-5 of which Rs. 57-3-8 was expended in transport and cold storage charges, and auctioneer's commission.

The catch from voyage XXX, with the exception of four goals sold from the trawler for Rs. 4, was landed and sent to Karachi where it was sold from cold storage in successive lots. The whole lot, amounting to approximately 2,400 lbs. of fish, realised Rs. 199-12-6. Sales expenses (boat hire, cooly hire, motor lorry hire and cold storage charges) amounted to Rs. 57-0-3, leaving the nett proceeds Rs. 142-12-3.

From voyage XXXV 30 goal and 10 tambusa were sold at Karachi for Rs. 26-4-0. The rest of the catch was kept for sale at Bombay.

Fish poks (or " maws ") realised Rs. 744, less Rs. 46-3-5 for market expenses. Nett proceeds Rs. 697-12-7.

The total quantity of fish marketed was 1,66,440 lbs. It realised Rs. 20,094 (gross). It took 1,679 hours or 78* days actual fishing and 2,851 hours (118·8 days) absence at sea to obtain this produce.

The average catch† per day's fishing is thus: 19·04 cwts., equivalent to a value of Rs. 258.

The average catch† per day's absence at sea works out at 12·5 cwts., with a value of Rs. 169.

* 21½ hours out of each 24 hours being taken as the average time the trawl was down.

† Estimated from the weights of fish marketed.

A comparison of these figures with other steam trawling results may be of interest.

The average catch per day's fishing of the Bengal Government's steam trawler "*Golden Crown*" for the whole year 1909 was 26·6 cwts., which is 52 per cent. more than the "*William Carrick's*" results. In the case of the Bengal trawler however the first seven voyages which showed much smaller catches, ascribed to the more exploratory nature of the fishing and the bad weather of the Monsoon have been omitted. Moreover the weights of bummaloes, prawns and in some cases turtles appear to have been included. The "*William Carrick*" figures include only the fish marketed as shown in Appendix IV.

The English fishery statistics published in the Annual Fishery Reports of the Board of Agriculture and Fisheries give the average catch per day's absence of steam trawlers working in various regions as in the following statement. The year 1913 is taken as being the latest before the abnormal conditions produced by the War:—

Fishing Region.	Average Steam Trawler Catch per day's absence.
	Cwts.
North Sea	14·0
Iceland	46·1
Faroe	28·1
South Ireland	23·7
West of Scotland	28·1
Bay of Biscay	13·2
Portugal and Morcco	13·8
Irish Sea	11·9
Bristol Channel	13·9
English Channel	8·9

The "*William Carrick's*" rate of catch therefore exceeds that of trawlers fishing in the Irish Sea and in the English Channel but is smaller than that of British trawlers fishing in all the other regions.

Such comparisons do not however really help our problem very much since the fishing grounds and the fish are entirely different and still more so are the working and marketing conditions.

VII. Capital and Working Expenses.

Detailed statements of receipts and disbursements are given in Appendix XI from which it will be seen that a loss of Rs. 3,18,318 was incurred.

The capital expenditure for the purchase and equipment of the trawler represents a very substantial proportion of the disbursements. This, it should be pointed out, was due to the fact that the trawler was obtained and fitted out at the very worst

possible time in the history of the economics of steam trawling. It was a time when the accepted fact of a world shortage of food and the high prices, consequent upon high freights of food stuffs imported from foreign countries, led to the focussing of the attention of various publicists upon the possibilities of "the harvests of the seas." In 1919-1920 there was a boom in the British fishing industry. The immense profits which had been made by the trawlers left working during the war and which were maintained for the year following the war owing to the continued high prices and plentiful supplies of fish stimulated an unusual amount of interest and optimism which led to a rush to invest in trawlers. The pre-war fleets of British trawlers had been decimated by war-losses, many while engaged in mine-sweeping, submarine hunting or other auxiliary naval duties, many also while still employed in fishing. The effect of all this was that those who wanted trawlers—and they were many—had to pay competitive prices for them. Similarly under the industrial conditions then prevailing the expenses of re-conditioning were at a maximum and the possibilities of getting expeditious work out of ship-yards and engineering firms were at a minimum. The Bombay Government trawling enterprise thus came into being at an unpropitious time.

In the equipment of the Bombay trawler there were expensive items to which reference has been made in the description of the trawler given on pages 4 and 5 which would have been unnecessary for a vessel intended for commercial fishing in European waters. The question as to how far these are to be considered essential for a trawler fishing from Bombay on purely commercial lines, will be considered in the analysis of the circumstances of expenditure and receipts which follows.

A considerable quantity of spare parts for the trawler and trawling accessories* were also provided in order to insure against inordinate loss of time in case of breakages since such accessories would not be obtainable and could not be provided without great expense and delay in Bombay. Fortunately we had no accidents which necessitated resort to these reserves, and moreover the period of trawling operations was curtailed to one-quarter of what it was expected to be. These materials, obtained at a time of very high prices, were therefore virtually wasted when the straitness of the financial situation led to the abandonment of the trawling operations at the end of February 1922.

In order that information of utility for purposes of practical guidance may be obtained from the results of the "*William Carrick's*" work it is necessary to analyse the circumstances with special regard to expenses incurred and income derived, and to examine the possibilities of reducing the one and increasing the other.

We will deal first with the working expenses, considered on a monthly basis. The average monthly expenses were as follows :—

* *E.g.*, Refrigerator spares, sheaves for trawl gallows and bollards, otter-boards, trawl warps, etc.

		Rs.
Wages—		Rs. 4,413
Skipper	1,000	
1st Officer *	800	
2nd Officer *	500	
Chief Engineer	660	
Crew †	1,453	
Stores—		1,196
Consumable	733	
Non-consumable	463	
Coal (average monthly consumption, 124·95 tons)		4,742
Ice		294
Port dues		283
Miscellaneous (water, godown rent, etc.)		247
Total ..		11,175

Items of expenditure as percentages of expenditure for whole period.

	Per cent.
Wages—	
Officers, 23 per cent.	33·0
Crew, 10 per cent.	
Coal	29·1
Repairs and Renewals	25·1
Stores	7·3
Ice	1·9
Water	0·3
Port Dues	2·0
Miscellaneous	1·3
Total ..	100·0

Wages.—Commercial people have said that our wages bill was too high. As to that it should be remembered that trawling is not and cannot be a "soft job". Energetic and reliable hands on good pay are much cheaper in the long run than

* These European officers would, if working under British conditions, have been rated as " mate " or " second hand " and " boatswain " or " third hand ". The conditions on the " *William Carrick* " working as on exploratory vessel involved more responsibility and therefore it seems more appropriate to term them first and second officers. The first officer held a trawler skipper's certificate and the second officer a mate's certificate. The latter is also now qualified as a trawler skipper.

†Two Engine Drivers (Rs. 140 and Rs. 100), 1 Greaser (Rs. 60), 6 Firemen (Rs. 45), 1 Serang (Rs. 80), 1 Tindal (Rs. 60), 4 Sukanis (Rs. 71), 6 Khalasis (Lascars) (Rs. 45), 2 Bhandaris (Rs. 45). Butler (Rs. 50), Cook (Rs. 50), Scullon (Rs. 30), Topass (Rs. 30). The figures in brackets show the monthly pay of each rating. The crew had to provide their own food, except that fish was allowed them out of the trawler catches.

indifferent workers at a lower rate. To make the best use of every minute of time is all important. To prevent mishaps which involve loss of time, loss of fish and loss of gear, all of which mean loss of money, is all important. The best plan is to put the whole crew on a profit-sharing basis which is the general rule in British fishing vessels so that while the owners are earning, the hands are earning also. Compared with the working of a British trawler, the fact that almost three times as large a crew, from whom moreover much less intensive and continuous work can be obtained, is a practical consideration which cannot be overlooked.

Coal.—It so happened that our trawler's working period coincided with a time of world-wide high prices for bunker coal. The kinds used and prices paid were as follows :—

Bengal coal (most of which was obtained from His Majesty's Mint), at Rs. 35-11-0 per ton, of which we consumed 917 tons ; English Coal (Cardiff Ocean Merthyr and Davison's West Hartley), at Rs. 42 and Rs. 43 per ton, of which we consumed 220 tons * ; Natal Coal at Rs. 42 per ton, of which we used 50 tons ; and Admiralty List Standard Indian Coal at Rs. 53 per ton of which we consumed 60 tons. This last was obtained in April 1921 when prices were very high.

The price of coal is a vital factor in the economy of steam trawling. The coal famine during the colliers' strike in England in 1921 brought about a crisis in the great fishing industries and disaster to several steam trawling firms. Incidentally it greatly stimulated enterprises which aimed at developing fishery methods involving less expenditure of mechanical power or in other words less fuel consumption. The "*William Carrick*" consumed 9 tons of Bengal coal or 7 tons of Welsh Coal per 24 hours when steaming or trawling. This includes steam required for the dynamo (working for about 20 hours out of the 24) and the refrigerator (working 2 or 3 hours out of the 24). Lying in harbour with fish on board, which necessitated the occasional working of the refrigerator and the pump for the deck hose besides the dynamo for lights and fans, the daily consumption was about $2\frac{1}{4}$ tons. When no power was required for the refrigerator it was only necessary to keep one fire going and the consumption then fell to between 1 and $1\frac{1}{2}$ tons per 24 hours.

Could the fishing have been carried on with a trawler consuming less fuel than did the "*William Carrick*"? This question was frequently discussed with the trawler officers and there was a concensus of opinion it *could*, and that the most practically suitable vessel for fishing out of Bombay would be one of the type known as a drifter-trawler, *i.e.*, a vessel of the class originally designed for the herring or mackerel fisheries (in which a long series of drift nets is paid out into the sea, the fishing being of the same nature as the *Jal* net operations carried on by some of the Bombay fishermen) but with winch, gallows and other deck fittings added so that trawling may also be

* In the last two months of our period when prices of imported coal had dropped.

carried on. This type of vessel is suitable for trawling when the distances to be steamed are not too great and the water to be trawled is not too deep.

Such a vessel could work in any part of the Bombay Grounds. Her coal consumption would be one-third that of the "*William Carrick's*". As to her fishing efficiency the "*William Carrick's*" officers affirm that in British waters these boats use exactly the same sized trawl as we used here. A possible drawback to which I may draw attention—it is a point which I did not discuss with our practical trawler experts who are not now in Bombay—is that there might be some difficulty on the soft muddy grounds which occur here to keep the trawl going at a sufficient pace to avoid picking up mud. I think that such a difficulty could be got over by adjustments of weights of the otter board and the length of warp. It is of importance in trawling, especially for swiftly swimming mobile fish as distinguished from those which have the habit of loitering and lying on the bottom—the Bombay fishes appear to belong mostly to the former category—to keep the engines going at their best speed. Slack firing means as a rule a diminished catch of fish. For the last few years many minds in Britain, France and Germany have been bent upon the problem of how to modify trawling gear so that it could be worked with less expenditure of power or less consumption of fuel. A German has recently patented a design for otter boards which appears to have given satisfactory results in practical tests but it is not possible to say what is exactly the degree of fuel economy effected by this improvement. The trend of developments in England has recently been in the direction if displacing the trawl net by the Danish seine or *snurre-vaad*. This is a form of fishing gear which has been gradually improved in the course of many years of usage by the Danish fishermen and to-day is considered to be capable of catching as many, if not more, fish than the trawl and with much less expenditure of power. If the Bombay Government had seen its way to continue the experimental fishery work I should certainly have recommended a trial of this gear. For a detailed description of the method of working see Appendix XII. The reader may also refer to Mr. Hornell's paper on "The Fisheries of Norway and Denmark" published in the Madras Fisheries Bulletin, Volume XIV, Report No. 4 (1921), p. 33.*

It has been claimed that the method possesses the following advantages over steam trawling. The actual fishing operation is carried on while the vessel remains at anchor, fuel being required only for steaming to and from the grounds. As much fish can be caught in the same time as with the otter trawl. Owing to the lightness of the gear and the slow speed of hauling it in the fish are not bruised or otherwise damaged as is sometimes the case with steam trawler fish. Fewer undersized fish are caught. It is adaptable to all kinds of fish, either those which lie near the bottom or those which swim in the higher levels of the water. A steam vessel is not essential. In

* While this is in the press I hear that the Madras Fishery Department intends to make experiments with the Danish seine in 1923. These will be of interest to Bombay ; but it must not be assumed that similar results would be obtained under the different conditions that prevail here.

Denmark motor boats are universally employed in this fishing. In England besides motor boats, steam drifters as well as steam trawlers have been equipped with the gear and have worked it profitably. The initial cost of equipping a vessel with the Danish seine is only one-fourth the cost of fitting out a steam trawler, and a vessel capable working this gear can be built and completely equipped at about one-tenth the cost of a steam trawler, and only about half the number of men, or less, are required as are necessary for the crew of a trawler. So much for the advantages. There are some drawbacks and limitations which need to be examined especially on the light of conditions at Bombay.

The Danish seine being of light cotton twine and having a light ground-rope is more susceptible to damage than the trawl which, as used in European steam trawlers, is made of stout manilla twine. Large saw-fish and sharks would probably go through the Danish seine and it is not suitable for working on a rough bottom nor in very deep water. However rents caused by big fish are only occasional and not irreparable and the use of stouter material is not impossible. With the adjustments of the weights on the ground-rope which might possibly be necessary there appears to be no reason why this gear should not be successfully worked on the muddy Bombay grounds. It is also said to be inferior to the trawl for bad weather fishing. In view of this, it has become a common practice for English steam trawlers working in the North Sea to fit out with both seining gear and trawling gear, the former being utilised in fine or moderate weather and the latter when stormy conditions prevail. A similar arrangement is, I believe, the one most likely to be satisfactory for Bombay where September to May might be the seining season, and the more expensive pursuit of trawling might be limited to the monsoon months.

Could a vessel of the type recommended, *viz.*, a drifter of about 90 feet length—the "*William Carrick*" is 126 feet long—keep at sea and carry on fishing in the bad weather of the monsoon? The trawler-men, with experience of Bombay weather and knowledge of the qualities of the steam drifter, with whom I have discussed this question are of the opinion that for the greater part of the monsoon such a vessel would be able to work. The steam drifters fish in the stormiest of winter weather off the British coasts and when they are stopped by gales, it is due to the fact that their nets, which extend for 1, 2 and sometimes as much as 3 miles while fishing and which are of considerable value, are jeopardised by heavy storms.

How did the "*William Carrick*" fare during the monsoon of 1921? On 5th June when we terminated voyage IV the weather was squally and looked very threatening but it was quite possible to work the trawl, though examination of catches and recording of weights, etc., were difficult matters. It was decided to utilize the period of the "break" of the monsoon, which is expected to be rather violent, in getting done such jobs as boiler scaling and sundry repairs. As events turned out we found that this was exercising undue caution. From commercial considerations the trawler would

have been better employed fishing and taking advantage of the good markets caused by the absence of landings from the local Machliwalas' sailing boats. The extended delay in harbour till the 29th June was due to a mishap which involved further repair work, and when the trawler commenced voyage V on that date the sea was only moderate and the wind a steady westerly one. Up to 20th July the time lost was due to such matters as changes of crew, re-ballasting of the ship, etc. Voyage VII (July 20th to 21st) was however handicapped and curtailed owing to the effects of weather, the heavy swell causing much splitting of the net. In spite of the splits, however, excellent catches, averaging over 2 cwt. of fish per hour were made, and if the fishing had been taking place under ordinary commercial conditions where damage to gear is of small regard when fishing is good and markets lucrative and where the skipper's earnings depend entirely upon the proceeds from the fish sold, there is no doubt but that we should have hung on to it a little longer. The following day however there occurred the heaviest gale of the season up to that date and the weather continued to be severe up to the latter part of August. On 1st August an attempt at a fishing voyage was made but on encountering heavy seas outside the harbour the skipper turned back. Again on 4th August we left harbour and made a five hour haul which damaged the net badly and produced only a few fish. We " dodged " during the night and tried again the following morning. In six hours 655 lbs. of fish were caught, but further damage to the gear was sustained, both the wings and the square of the trawl being " split beyond repair " (to quote the skipper's log entry). The voyage was then abandoned. Another attempt was made on the 11th and 12th August (Voyage IX) in which the first haul resulted in splits in both wings and the breaking of the headline and no catch of fish ; the second haul produced a good catch (934 lbs.), but stress of weather led to the curtailment of the voyage. We went out again on the 16th, but returned without venturing to shoot the gear.

It should be made clear that all this time there was no question as to the perfect safety of the ship. It was simply a matter of the practicability of carrying on fishing operations. I am of opinion that with experience and persistent trials one could have devised means of minimising the risk of damage to gear. The damage was caused by the resistance of the trawl to the jerky stresses set up by the plunging movements of the vessel towing it. These stresses would have been less intense if the trawler had been of smaller tonnage. Therefore it appears probable that a smaller vessel of the drifter type would have been less liable to this particular difficulty. A further point is that our skipper had a particular *penchant* for letting out far more than the usual amount of warp, and although the trawl might " hold the ground " better with say 100 fathoms of warp out instead of the regulation 60 fathoms, it is certain that the greater tendency to inertia on the part of the trawl thus produced would increase the amount of the strain put upon it, and especially* upon the upper part of it (the square

* From the horizontal pull of the unduly long warps.

and head-line) which was always the part which was torn under these conditions. Moreover our nets were not so strong as they might have been (see below p. 64).

On voyage X, begun on 23rd August, light S. W. winds were in evidence and on that and the following voyage, terminated on 31st August, no weather trouble was encountered. Rough seas and strong winds were again met with on the 2nd September and voyage XII was abandoned through stress of weather, the one haul which was made producing only 287 lbs. of fish.

On voyage XIII the weather was bad and the fishing bad. This voyage was curtailed after four very poor hauls had been made, the return to port being made on account of the illness of the Second Officer, though, had the weather been fine, it would have been possible to carry on without him. No other time was lost owing to the adverse weather, although the wind and swell became heavy again about the middle of September and the splitting of the net to a greater or less extent was of frequent occurrence.

Consideration of the problem of fuel consumption has led us to pick up various threads which, gathered together and summarised, come to this. The "*William Carrick*" was unnecessarily extravagant in fuel consumption for working the fishing grounds which are available for exploitation from Bombay. A vessel of the drifter type burning about two tons of coal (English quality) per day would serve equally well. If such a vessel were equipped with the Danish seine, still further fuel and other economies would be effected and it seems probable, though unfortunately we have no experimental results to go upon, that the catching power would be increased rather than diminished. Trawling gear would be necessary however for use in rough weather. The "*William Carrick*" as a boat had no trouble from the Monsoon storms, and the steam drifter type of boat could safely, though perhaps not comfortably, work under the same conditions. Our chief difficulty arose from the strain imposed upon the trawl when towed in a heavy swell. This however should not prove a crippling factor and would be eased by the employment of a trawler of smaller tonnage. Moreover the nets we used were sometimes not as strong as they might have been, for reasons that will presently appear.

The trawl employed was of the type used by the smaller class of trawlers (including the drifters converted into trawlers mentioned above) which fish the North Sea. It has a 90 feet long headline, which dimension is always taken as indicative of the relative size of the net. The largest steam trawlers use a trawl of 130 feet head line, and this sized net could have been used by the "*William Carrick*" and would naturally have caught more fish under ordinary circumstances. The smaller sized net however was deliberately chosen as being the more suitable for use in a pioneering survey of strange fishing grounds and with a crew unfamiliar with the handling of trawl gear. The trawls are made of stout Manila twine which is doubled for the cod-end (the narrow extreme end of the bag) which undergoes most strain and friction. The trawler brought out

six of these nets " fixed and complete " and sufficient spare parts for the making up of six others. In practice the renewal of a trawl—unless a net meets with complete destruction—takes place in piece-meal fashion, the various parts being replaced by new pieces as required and minor casualties being repaired by the use of the " needle " between hauls. In established trawling ports in Britain the major operations of fixing new trawls are carried out by a special shore staff, which was one of the many normal conveniences which the " *William Carrick* " had to dispense with in Bombay. Our trawls as " fixed complete " were purchased at a cost of £56-17-6 each from the Great Grimsby Coal Salt and Tanning Company's Milford Haven Branch. The whole supply of fishing gear brought out on the " *William Carrick* " was as follows :—

	Cost. £	s.	d.
6 trawls fixed complete at £56-17-6	341	5	0
Spare parts (10 belly tops, 6 baitings, 6 squares, and upper wings, 6 pairs lower wings, 6 cod-ends).	213	5	0
100 dozen lbs. trawl twine at £1-0-6 per dozen lbs. ..	102	10	0
Total ..	657	0	0

This very heavy item of expenditure reflects the inflated condition of the post-war market of 1920. The trawls which cost us £ 56-17-6 each in 1920 would have been obtained for £12 or £13 at the most in 1914 and for about £38 at the beginning of 1922. Although prices are still falling in England it would probably be advisable for any established trawling firm in Bombay to explore the possibilities of obtaining net materials here at least for purposes of repair, but the making of entire nets calls for special experience and skill which would not be available for some years. In England the making of the various parts of trawls affords employment for girls and women in net factories while the fixing and bigger repairing jobs are carried on by elderly fishermen who have left the sea. Locally made hemp twine would probably be quite suitable and for the upper part of the trawl net cotton twine might be used. With regard to the rate of consumption of trawls and trawl repairing materials, the average life of a trawl on the " *William Carrick* " was about one month. Net casualties of the major kind are rather fortuitous occurrences which often come unexpectedly and must be prepared for. If one trawls in the neighbourhood of coral or rock without having a very accurate knowledge of the ground and of one's position one is inviting trouble. The best of the Bombay Grounds from abreast of Kundari to the neighbourhood of Kathiawar in the 17 to 30 fathom zone are apparently very clear of obstructions and being of soft mud do not subject a trawl to the amount of scraping and rending on its lower part that is experienced on most of the British trawling grounds. The chief cause of splits has already been mentioned, but it should here be added that the nets brought out on the " *William Carrick*" had not been treated with any preservative or tanning preparation,

the reason being that the coal tar which is universally used for otter trawls in England was objected to by the skipper owing to its irritant effect on the eyes when tarred nets are being mended in hot weather. It was considered that it would be easily possible to get the nets " barked " or tanned with " cutch " out here, but that idea was entertained in ignorance of the total lack of facilities available for such work in Bombay, at least on the temporary basis such as we had to work upon. An attempt to get a trawl tanned at one of the local tanneries resulted in the utter spoiling of the net. Being neither tanned nor tarred, the twine of our nets deteriorated and weakened very rapidly not only in the course of usage at sea but still more seriously owing to the effects of monsoon atmospheric conditions in the unsuitable godown in which they were stored. A proper trawling concern should of course be provided with handy storage facilities and with means of tanning or tarring its nets. Trawls tanned with ' Ain, ' ' Chilahar ' or ' Amba ' bark as the local fishermen tan their nets and lines would probably be quite satisfactory. So would tarred nets, provided that sufficient time elapses before using them to allow the irritant vapours to dry off.

With regard to the provision made on the " *William Carrick* " for the preservation of the fish in as fresh a condition as possible, it may be claimed that whatever else about the trawler might have failed in practice to come up to expectations, this part at least proved very satisfactory in working. The assistance of artificial cold either stored up in the form of ice or directly produced by mechanical power by means of refrigeration plant is a *sine quâ non* for fishery operations on a big and modern scale even in temperate latitudes. In a tropical climate its indispensability is still greater. The point of present interest is as to the cost of it. The " *William Carrick's* " refrigeration installation with spare parts represented a capital expenditure of £2,902-2-4, * but this included a special brine refrigeration tank which was provided in order that experiments might be made in the brine freezing of fish for long distance transport, but which was not made use of under our policy of concentrating on catching fish for the Bombay market.

Our refrigerator was used merely to keep the fish storage hold at a low temperature. With slight modification, it could also have been used for making our own ice, but this is an unnecessary undertaking where ice can be obtained so readily and comparatively cheaply as in Bombay. A compressor of half the capacity would have met our requirements and for the type of smaller vessel above recommended would be preferable. A practical point of the utmost importance is that the fish-room must be well insulated (above, below and at the sides) in a vessel which in these seas is floating in water of a temperature which is usually above 80° F. besides being heated from above by the rays of a tropical sun.

In our use of ice for packing with the fish in the fish-hold we may perhaps have been unnecessarily extravagant ; though this item of expenditure represented but a

* For items see Appendix.

small fraction of the whole. Occasionally very little ice was used and the market results were apparently not affected. The water from slowly melting ice trickling down through layers of fish not only keeps the fish uniformly cooled but also serves to keep it moist and therefore of *fresher* appearance and saves loss of weight by drying. But these two factors have not at present the same importance in the Bombay Market as in those of Europe. In fact, it is not affirming too much to say that the Bombay consumers of fish have become so used to buying* and eating fish of soft condition and indifferent quality that they have not been able to develop an appreciation for really well conditioned fish. In a refrigerated fish-room it is possible to reduce the use of ice to a minimum and perhaps to dispense with it altogether, but in a fishing vessel that has no refrigerator a liberal admixture of ice will be necessary for any fish that is not to be landed within a few hours, and the wastage of ice would be very rapid in the Bombay climate. The possession of a refrigerating plant is certainly to be recommended but it must be remembered that it necessitates the employment of an engineer sufficiently competent and also sufficiently conscientious to keep it in proper working order. The engineer on the "*William Carrick*" was experienced in the working of refrigerating machinery and we had no hitches, but it should be mentioned here that there have been cases in the past of trawlers equipped with plant for their own ice-making which have proved unsuccessful because of the failure of the men in charge to keep the plant in proper working order. Since that time however there have been improvements in the construction of refrigerating machinery and such plants made by reputable firms should be at least as easy to run and keep in order as, say, motor cars. In Bombay where the water available for cooling purposes is of high temperature the carbonic acid-using plant is not likely to be successful, though this is the system that is largely favoured—on account of the less obnoxious character of the gas as compared with ammonia—for marine installation for temperate regions. The ammonia system can be much more efficiently and easily worked here but it possesses the drawback that the compressor must be installed above deck and not down below to avoid unpleasant consequences from an escape of the gas. On the "*William Carrick*" the refrigerator was housed on deck at the expense of the living accommodation. On a smaller vessel the difficulty would be more acute but not, I think, insuperable.

The item for *stores* in our expenses is heavier under the non-consumable category than need be the case with a commercial trawler. The consumable stores required *e. g.*, oils, paints, cleaning materials, etc., will of course vary according to the tonnage of the vessel and the intensity with which she is worked. A permanent fishing company

* The great obstacle to the improvement of the trade in fish of prime quality in Bombay is that the consumers—or would-be consumers—of such fish never see it until it is on the table, the purchasing being done by the cook who is as a general rule more interested in obtaining fish as cheaply as possible and of *passable* quality than in getting the *best* fish.

would require to make wholesale arrangements for these things and would doubtless be able to effect economies which were not possible in our case.

Repairs and renewals, dry docking and painting the bottom of the "*William Carrick*" involved a large item of expenditure. The greater part of this was of a non-recurrent nature however, consisting as it did of work involved in fitting out for the new and experimental conditions.

It is necessary to emphasize the fact, not merely as an explanation of the heaviness of our working expenses, but because it is one with which any private firm going in for deep sea fishing would have to cope, that Bombay is a port where at present accommodation for a steam trawler is a matter of no little difficulty. The fishing ports of Europe have special fish docks where trawlers can conveniently come alongside the quay, land their fish which is marketed on the spot, take aboard coal, ice and other stores and get away with the minimum expenditure of time and labour ; where also there are handy repair facilities specialising in the supply of trawler accessories ; where, if a trawler's hull requires examination or bottom cleaning, there are patent slipways immediately available. In such ports the owner's office is immediately on the fish quay or very near it and everything, including the sale of the fish—the trawler owner is almost invariably the auctioneer of the fish—goes on, so to speak, under his eye. Nothing remotely resembling these conditions was possible for the "*William Carrick*" in Bombay. The only possible landing place* without coming into a dock was at Modi Bunder from which the fish had to be carted in bullock waggons to Crawford Market one mile away. By the same means of transport ice was brought to the trawler from the Lightfoot factory at Byculla Bridge about three miles distant. Coaling again involved a tedious *bandobast* and was sometimes subject to a delay of a day or more. Repairs even of the most minor sort involved inordinate loss of time. The only available godown for stores such as nets, etc., was at least a mile from the landing place. The office † where the trawler's business was conducted was nearly a mile in the opposite direction. All this dispersion of facilities and forces was a heavy handicap to productive work which had to be put up with under the temporary and experimental conditions of our undertaking. To run a fishery enterprise efficiently and economically there must be local concentration of facilities, and while the means of providing them remain lacking—in other words while Bombay has no proper fish market—so long will the development of a fishing industry along modern lines be seriously impeded if not impossible.

* It should be remembered that in comparison with her tonnage a trawler's draught is very great. The "*William Carrick's*" is 16 feet 8 inches. This embarrassed and restricted her movements in regard to dry-docking as well as in coming along side for landing.

† A telephone would have helped considerably but the rate at which such conveniences are provided at the present day in Bombay is such that the order for a telephone showed no signs of materialising until long after the trawler ceased working.

The outstanding points which so far emerge from this review of the circumstances under which the " *William Carrick* " was obtained, fitted out and worked as a trawler are, first, that our capital expenditure was very heavy. From the point of view of the question as to whether trawling *can* be made to pay in Bombay, too much importance need not be attached to that, for if a trawler were being equipped for Bombay to-day instead of two years ago, the cost would certainly be less than half what it was. For instance, the type of trawler for which £17,000 was paid in 1920 would now be obtained for £7,000 and other expenses would be more or less proportionately lower to-day.

The second important fact, and one that is for practical purposes much more to the point, is that the working expenses of the trawler averaged Rs. 11,175 per month of which 33 per cent. represents wages* and 29 per cent. coal consumption. Any further analytical examination of the trawler expenses, though the items are given as necessary for the purpose of this report, would not prove very useful as guidance to the prosecution of a commercial concern. It is primarily of more importance to examine what was achieved by way of fish production and information relative to fish production. It is clear at the outset that the " *William Carrick's* " record of time spent at sea does not come anywhere near what would be required of a commercial trawler, and for this reason our monthly receipts for fish sold, which averaged a little over Rs. 2,025 per month, ought not to be taken as an indication of commercial possibilities. The factor upon which attention must be concentrated as the main criterion of possible production is the *rate* of catch of fish (both the average figures and the figures for special times and places) rather than the *total* catches landed by the " *William Carrick* ". From what has already been said it will be understood that the catch of a trawler depends upon several factors—the efficiency of the net, its size, condition and manner of working, and upon the time spent in fishing. Time with the gear idle, whether at sea or in port, is all so much to the *debit* side. In Britain the trawling industry is a veritable race between competing rivals in which the slack or incompetent very soon go under ; but there are always plenty of others to take their place.

If the " *William Carrick's* " receipts for the different months† are examined, it will be seen that June, February, January and July were the best while November and October were the worst months. The results and circumstances may be summarised as follows :—

* The rates of pay for the European officers were fixed at a time when the British trawling industry was booming. For present-day commercial purposes a considerable reduction in this item could be effected.

† These periods do not exactly coincide with the calendar months named because sometimes a voyage overlapped from one calendar month to the next. The point of the analysis is not however affected by this.

Month.	Number of hours spent at sea.	Number of hours fishing, and (in brackets) percentage of time at sea.	Total fish landed.	Value of fish landed.	Remarks.
			Lbs.	Rs.	
Best months.					
June .. .. (Voy. IV & V)	191	160·5 (84 %)	26,227	3,074	The equivalent of 8 whole days only spent at sea. Trawler laid up for repairs, etc., while market was at its best.
February .. (Voy. XXXIII—XXXVI)	377·5	221 (59 %)	28,562	2,793	Voyage to Sind Grounds took 60 per cent. of whole time spent at sea but yielded only 38 per cent. of the month's revenues.
January .. .. (Voy. XXIX—XXXII)	376	199 (53 %)	21,482	2,530	Sind voyage occupied 50 per cent. of whole time at sea but yielded only 16 per cent. of receipts for the month.
July .. .. (Voy. VI & VII)	127	91 (72 %)	18,950	2,470	Much time lost through bad weather. Also damage to gear and loss of fish through same cause. Markets very good however.
Worst months.					
November .. (Voy. XXI—XXIV)	391·5	242 (62 %)	19,603	665	Markets bad. One landing made at Karachi. Some time lost through visit of His Royal Highness the Prince of Wales.
October .. .. (Voy. XVIII—XX)	335	142·5 (43 %)	10,593	865	Markets not good. Much time lost on unproductive voyage to Canara coast.

Our best month (June) was thus at the very beginning while the work of fitting out and repairing defects was still occupying a considerable proportion of our time and when also the break of the monsoon occurred. The next best result was for February, our last month of working, which may be ascribed chiefly to our increased experience and knowledge of the fishing grounds. However we were not then fishing primarily for the market but to obtain fishing *data*, or the large proportion of time spent voyaging to the Sind Grounds would not have been justifiable. The same remark applies to the January results which come next in order of value.

As to the bad months, the November voyages figure moderately well in point of fish caught, but the markets were well supplied from other sources, this being the height

of the local inshore fishing season, and prices were very low. The October receipts were also depressed, though to a less degree, by the same factor and by the very unsuccessful trip to the neighbourhood of Karwar.

It is a well-known fact that the abundance of fish in the sea varies from year to year owing to natural causes which are nowhere very perfectly understood, and certainly not yet at all understood for these seas. Whether the fish stocks were above or below the normal for the time the "*William Carrick's*" operations were taking place it is of course impossible to tell. Considering the pioneering conditions under which we worked, it is at least reasonable to assume that our average catch per hour throughout of 116 lbs. could at least be equalled and ought to be exceeded by a properly established commercial concern with a trawler using similar gear and having the fruits of our initial exploration available for guidance. Rounding off our average catch per hour as 1 cwt. and the number of hours trawling each day while on the fishing grounds as 20—it ought to be possible to have the fishing gear down for 21½ hours out of the 24—we may safely reckon upon an *average* daily catch of 1 ton.

The next question which arises is, how many fishing days ought a commercial trawler to be able to put in each month? This turns upon the energy and competence of the skipper and crew and—still more—upon the perfection of the shore organisation for landing, coaling, etc. It is obvious that although there are, at least for certain times of the year, fishing grounds within 3 or 4 hours steaming from Bombay Harbour as productive as any that we have explored, a trawler cannot be frequently running into port to land her catch without losing a considerable amount of time for fishing. Nevertheless, the market would be more favourable for frequent landings of moderate supplies than for large quantities brought in at longer intervals.*

About 20 fishing days per month is as much as can be safely reckoned upon for a single trawler. The "*William Carrick*" approximated this only in three out of her 9½ months, *viz.*, November, January and February (with 242, 199 and 221 hours fishing respectively) but the landings only numbered four each month, whereas a single vessel working commercially should aim at making say ten landings per month, thus bringing in supplies every third day. Daily landings would be a better business, but this would involve the running of 3 or 4 vessels, the latter number being necessary to keep supplies constant as one or other would have periodically to lay up for such matters as boiler scaling, hull cleaning and repairs. For reasons which may be enlarged upon later I think that the working of such a number of vessels as would ensure regular daily supplies would stand a much better chance of commercial success than a single vessel.

* A possible solution to this difficulty would be to put the surplus fish into cold storage for marketing on a subsequent occasion. With proper care this can be done without serious deterioration but it is not a policy that I would recommend if it can be avoided. It means extra expense; and moreover cold-stored fish soon loses its prime quality and, if the buyers have any appreciation for quality—but it must be admitted there does not appear to be much evidence of this in Bombay markets—it will thereby depreciate in value.

To return to our individual trawler marketing 20 tons (or 44,800 lbs.) per month. Assuming for the moment that her monthly working expenses equalled those of the "*William Carrick*" and averaged Rs. 11,175 per month* she would have to sell this fish at the *net* price of $11,175 \times 16/44,800 = 3 \cdot 99$ annas per lb. in order to clear her working expenses. And that is leaving out of account the question of interest on capital, provision for depreciation and the expenses of management ashore. The average price that was realised for our fish was 1 anna 11·5 pies per lb. I have already assumed that the commercial trawler would land 20 tons of fish per month which, I think, is not an excessive assumption in spite of the fact that the "*William Carrick*" did not achieve so much. Is it also safe to assume that the commercial trawlers catches could be sold at something like 300 per cent. better price than our fish were? *Either much better prices or else much cheaper production is necessary before the fishery could be a paying concern.*

I have already indicated how trawling might be pursued with much less working expenses by diminishing coal consumption and other outgoings in utilizing a smaller vessel, and have also referred to the Danish seining method as one which in the North Sea, that has for years been the happy hunting ground of the trawler, has already now asserted its superiority over trawling, bringing profits to its adherents while trawler owners were losing money. However, so far as Bombay is concerned both these possibilities or any other developmental projects such as drift net fishing must remain matters of opinion until they have been the subject of practical demonstration under the conditions that prevail here.

I may however state here that it is the opinion of the most experienced of the English fishermen who served on the "*William Carrick*" that a vessel of the steam drifter type equipped with trawl, Danish seine and drift nets for pomfret fishing would be a commercial success in Bombay. I am inclined to agree with that opinion provided that he with his practical experience of all three methods of fishing and his acquaintance with Bombay conditions could be induced to skipper the vessel and that the shore organisation of the business possessed in similar degree the attributes of efficiency.

Meanwhile the general complaint about the shortage and high price of fish in this sea-girt city of a million inhabitants is still real and well-founded and awaiting the only remedy—increased supplies. But the increased supplies must be obtainable at less cost than the "*William Carrick*" method. In practically all industries it is the fact that large scale production is the cheapest method—that the big firm can underseli the small one—which makes possible increased consumption and lower prices with benefit to the consuming public. Only by obtaining sufficiently large quantities can a fishery which utilizes power and fuel in the modern manner hope to survive

* But this figure does not represent as many days steaming as the commercial trawler would have to do.

in competition with the local machliwala with his cheap and primitive methods of fishing. The real competition however would not be with the fisherman but with the merchant and vendor in the market. A power-using fishery concern cannot carry on a modern method of production if it is left at the mercy of the fish merchants of of Crawford Market to fix the prices it will get for its fish. It must be in a position at least with a considerable proportion of its supplies, to side-track the middle-man and supply direct to the consumer. To do this *it must be in a position to guarantee regular supplies.* This is most important ; and this is where a firm working three or four vessels would have a much better chance than a single boat concern. The wholesale disposal of fishmaws, shark's fins, shark oil, and possibly sharks' skins from which excellent leather can be made, would also be possible to an undertaking of sufficient magnitude. There is also the possibility of developments in the production of first class smoked fish and in the inland despatch of fresh fish in ice or possibly treated by the up-to-date method of brine-freezing by which the preservation of the original qualities of flavour and freshness for purposes of long storage or long-distance transport is marvellously secured. There is also the utilization of fish waste—heads, fins, entrails and unsaleable varieties—by conversion into fish meal for cattle and poultry food or into fertilisers for the land. All these developments, possible and profitable by-industries in a modernised fishing port, await the provision of the means of obtaining regular supplies on a sufficiently big scale and at a sufficiently low cost of production. Further fishery exploration and experiments and further trials of methods hitherto untried here, are necessary however before adequate data for the basis of such developments can be available.

APPENDICES.

I. Steam Trawler "*William Carrick*"; *particulars of construction.*

II. Particulars of individual hauls of the trawl, with quantities in lbs. of the six chief kinds of fish caught and the catch of rays, sharks and total fish, as weighed at sea.

III. Quantities of different kinds of fish caught in each voyage, as weighed at sea.

IV. Quantities of fish from each voyage landed for sale in Bombay Market.

V. Prices realised for each kind of fish by sales in Bombay Market.

VI. Quantities of different kinds of fish landed for market in Bombay, with amounts of sales proceeds and average price per lb. (gross).

VII. Particulars of marketing expenses.

VIII. Fish sold at Karachi, ' prices realised '.

IX. Average catch (in lbs.) per hour's trawling and per hour's absence from port for each voyage.

X. Rate of gross earnings per hour's fishing and per hour's absence.

XI. Financial Statement :—
(*a*) Capital Expenditure.
(*b*) Working Expense.
(*c*) Revenue Statement.
(*d*) Balance Sheet.

XII. Note on the Danish Seine Net.

APPENDIX I.

Particulars of Steam Trawler "William Carrick."

When Built—1917.
Where Built—Paisley.
Builder's name—Bow, McLachlan & Co.
Material—Steel (Ketch).
Class—British Corporation.
Tonnage Gross Register—276.
Tonnage Nett Register—125.
Engines—Triple.
Maker's Name—Bow, McLachlan & Co.
When made—1917.
Horse Power indicated—480.
Dia. of Cylinders—12½"×21"×35".
Length of stroke—26".
Boiler—One S/B 13′ 6"×10′ 6".
Age—1917, by David Rowan & Co.
Working pressure—180 lbs.
Number of Furnaces—3 plain.
Heating surface—1,619 sq. ft.
Consumption for 24 hours—*About* 9 tons.
Speed per hour—*About* 9 knots.

Dimensions—
Length between perpendiculars—125′ 6".
Breadth—23′ 4".
Depth—In hold 12′ 8"; 13′ 6" moulded; aft 15′ 5".
Draft of water, laden, 8′ 6".
Bunker capacity—180 tons.
Deck Plan—One deck, wood, usual arrangements.
Position of wheel house—Foreside funnel.
Holds—Usual.
Hatches—Usual.
Fresh water tanks.
Electric light.
Fish hold—Fully insulated, with cork, one half fitted as cold storage chamber and the other equipped for brine freezing plant.
Refrigerating plant, by Lightfoot; capacity two tons ice per 24 hours—full supply of spares.
Hold in foc'sle—Fitted to provide extra accommodation for crew.
Deck cabin—A 3-berth deck cabin has been specially added aft. Spare propeller available.

The "*William Carrick*" is a Castle type trawler, of which the following are further details:—

Castle Type Trawler.

Engines—Dia. of Cylinders 12¼"×21"×35".
Strokes—26".
Press.—180 lbs.
Lloyds N. H. P.—87·5.
Crank Shaft—7⅞ dia.
Thrust—6¾ dia.
Tail Shaft—7⅝ dia.
Continuous Liner.
H. P. Piston Valve.
M. P. Slide.

Lock Wood Carlisles Springs.
Piston Rods—3⅝ dia.
Valve Rods—2½. „
Designed for 10 knots on 480 I. H. P. at 130 Rev.
Cutting off 66 per cent. H. P.
Length—125′.
Beam—23′ 6″.
Depth moulded—13′ 6″.
Draught aft—15′ 8″.
Draught forward—8′ 7″.
Main Draught—12′ 1½″.
Bar Keel—7½″.
Draught marks taken from bottom of keel.
Air pump—12″×12″.
Feed Pump Main—2½×12″.
Two Bilge Pumps—2½×12″.
Feed Donkey—Fly wheel type 6″×3″×6″.
Single Cyl. D Acting.
Service Donkey—Horizontal Duplex, 6″×4″×6″.
Propeller—Cast iron, four blades 9′ 6″ dia. 11′ 1½″ mean pitch.
Devd. surface—35·5 sq. ft.
Boilers— 13′ 6″ internal dia.
10′ 6″ mean length.
180 lbs. press.
3 primary Furnaces 3′ 6″ out dia.
Heating surface—1,619 sq. ft.
Grate Heating surface—50 sq. ft.
Firebars—5 ft. in two lengths.
3½″ dia. Smoke Tubes.
Between Tube Plates 6′ 10½″.
Coal consumption—About 9 tons per day.

APPENDIX

Particulars of individual hauls of the trawl, with quantities in lbs. of the six chief

Serial No.	Voyage No.	Haul No.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1921.						
1	I	1	18th May.	7·30	8·30	1	30 miles W½S from Bombay L. V.	30-33	f.s.,m.,sh.
2	,,	2	,, ..	9·15	10·30	1¼	32 ,, W ,, ,,	33-34	m.
3	,,	3	,, ..	11·30	15·00	3½	35 ,, W½N ,, ,,	34-40	m.
4	,,	4	,, ..	17·15	20·15	3	19 ,, ,, ,, ,,	32-26	m.
5	,,	5	18th/19th May.	21·15	1·15	4	5 ,, W × S½S ,, ,,	26-11	m.
6	,,	6	19th May.	2·00	6·00	4	15 ,, W × N ,, ,,	11-22	m.
7	,,	7	,, ..	6·30	10·30	4	20 ,, NW × W¼W ,, ,,	22-23	m.
8	,,	8	,, ..	11·00	14·00	3	13 ,, NW × W ,, ,,	23-17	m.
9	II	1	22nd May	15·40	18·40	3	38 miles SW × W ,, ,,	36-28-40	s. & sh.
10	,,	2	23rd May.	2·00	6·30	4½	85 ,, W × S¼S ,, ,,	50-51	s.m.,dec. crl.
11	,,	3	,, ..	8·15	12·30	4¼	81 ,, W¾S ,, ,,	51-50	m. & s.
12	,,	4	,, ..	14·30	19·00	4½	78 ,, W½S ,, ,,	50-49	dk. s.
13	,,	5	24th May.	6·00	10·00	4	28 ,, S from Diu Head.	45-45	m.
14	,,	6	,, ..	10·40	15·30	4¾	20 ,, ,, ,, ,,	45-30	m.
15	,,	7	,, ..	16·10	22·00	5¾	11 ,, S.SW ,,	30-23	m.
16	III	1	30th May.	6·30	11·00	4½	15 miles SW from Diu Head.	>40-28	m.
17	,,	2	,, ..	12·30	18·00	4½	9 ,, ,, ,, ,,	28-26	m.
18	,,	3	,, ..	18·20	23·30	5¼	9 ,, WSW ,,	26-18	m.
19	,,	4	31st May.	0·00	5·30	5½	16 ,, S ,, ,,	18-29	m.
20	,,	5	,, ..	6·00	11·30	5½	25 ,, S × E½E ,,	29-27	m.
21	,,	6	,, ..	12·15	16·00	3¾	31½ ,, SE × S¾S ,,	27-22	m.
22	,,	7	1st June.	3·00	7·00	4	11 ,, SW × W from Prongs.	17-11	m.
23	,,	8	,, ..	7·30	9·30	2	2½ ,, S × W ,,	11- 7	m.
24	IV	1	3rd June.	10·10	12·40	2½	12 miles W from Bombay L. V.	16-22	m.
25	,,	2	,, ..	13·10	18·00	4¾	16½ ,, SW × W¾W ,, ,,	22-31	m.
26	,,	3	,, ..	18·30	24·00	5½	25 ,, SW × S from Kendari.	31-27	m.
27	,,	4	4th June.	0·30	6·00	5½	10 ,, SW ,, ,,	27-22(?)	m.
28	,,	5	,, ..	6·30	12·00	5½	12 ,, W × S from Bombay L. V.	22(?)-29	m.

II.

kinds of fish caught and the catch of rays, sharks, and total fish as weighed at sea.

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Coal.	Pomfret.	Karel.	Ravas.	Wam.	Shingala.	Rays,	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
..	(10)	..	..	..	(5)	+	+	(70)	Nil.	Calm.	About 1 basket of fish (ca, 70 lbs.).
..	..	..	..	..	+	..	+	109	,,	,,	
..	..	..	..	..	..	+	+	..	,,	,,	
(26)	(2)	+	(30)	..	..	+	36	..	,,	,,	
..	..	..	..	..	..	..	..	..	,,	,,	1 basket of fish only.
..	..	..	..	(9)	..	..	(100)	(150)	,,	,,	
64	(4)	48	..	88	(10)	(20)	(10)	491	,,	,,	
(35)	(8)	..	..	..	..	..	..	46	,,	,,	
..	..	..	..	..	..	(30)	(20)	..	W, light.	Smooth.	Across N end of Direction Bank. Very poor catch.
..	..	..	..	..	..	..	(15)	(60)	,,	,,	Wing of trawl split.
..	..	..	..	..	..	..	(15)	(35)	,,	,,	,, ,,
..	..	..	..	..	..	..	+	+	,,	,,	Very poor catch.
50	..	..	..	(18)	(12)	(100)	(100)	400	W NW.	,,	The first decent haul.
230	1	..	..	110	(30)	201	..	620	,,	,,	
(90)	(30)	..	..	+	+	(250)	+	400	W	,,	
..	(4)	..	..	(11)	..	..	(5)	(35)	SW	Smooth to moderate	A very poor haul.
98	25	5	..	140	65	118	50	509	SW, fresh	Moderate.	
130	35	10	..	45	+	305	+	525	W, fresh	,,	
162	37	6	..	131	20	376	24	756	W NW, Steady	,,	
80	5	12	..	104	13	193	19	476	SW, steady	Smooth.	
50	25	8	10	..	20	208	64	397	,,	,,	
30	2	15	..	115	75	30	+	393	S, light	,,	
40	8	..	..	..	+	..	+	48	SSW, ,,	,,	
35	3	7	..	6	65	50	10+	213+	SSW, Light	,,	
65	..	140	10	..	..	80	5	595+	Nil.	Swell making.	Several big moonfish.
..	..	..	..	..	50	300	20	620	,,	,,	
15	..	..	..	..	65	290	+	682+	S.W.	Swell increasing.	
60	+	72	..	6	40	220	..	616	WSW.	,,	

Serial No.	Voyage No.	Haul No.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1921.						
29	IV	6	4th June .	12·40	18·00	5½	18 miles W SW from Bombay L. V.	29-32	m.
30	,,	7	,, ..	18·30	24·00	5½	20 ,, SW × W from Kendari.	32-24	m.
31	,,	8	5th June.	0·30	6·00	5½	20 ,, W × S ,, ,,	24-27	m.
32	,,	9	,, ..	6·30	12·00	5½	23 ,, W½S ,, ,,	27-33	m.
33	,,	10	,, ..	12·30	17·00	4½	14 ,, W ,, ,,	33-24	m.
34	V	1	29th June.	11·30	18·00	6½	20 miles W × N from Kendari.	11-33	m.
35	,,	2	,, ..	18·30	24·00	5½	22 ,, ,, ,, ,,	33-33	m.
36	,,	3	30th June.	0·30	6·00	5½	22 ,, ,, ,, ,,	33-34	m.
37	,,	4	,, ..	6·30	12·00	5½	25 ,, W × N½N ,, ,,	34-30	m.
38	,,	5	,, ..	12·30	18·00	5½	12 ,, W × S ,, ,,	30-21	m.
39	,,	6	,, ..	18·30	24·00	5½	23 ,, ,, ,,	21-28	m.
40	,,	7	1st July ..	0·30	6·00	5½	25 ,, W" ,, ,,	28-32	m.
41	,,	8	,, ..	7·00	12·00	5	18 ,, W × N ,, ,,	32-22	m.
42	,,	9	,, ..	12·30	18·00	5½	18 ,, W ,, ,,	22-21	m.
43	,,	10	,, ..	18·30	24·00	5½	22 ,, W × N ,, ,,	21-25	m.
44	,,	11	2nd July.	0·30	6·00	5½	20 ,, W ,, ,,	25-29	m.
45	,,	12	,, ..	6·30	12·00	5½	20 ,, W × N ,, ,,	29-22	m.
46	,,	13	,, ..	12·30	18·00	5½	21 ,, W × S ,, ,,	22-24	m.
47	,,	14	,, ..	18·30	24·00	5½	24 ,, W × S ,, ,,	24-25	m.
48	,,	15	3rd July.	0·30	6·00	5½	25 ,, W × S½S ,, ,,	25-28	m.
49	,,	16	,, ..	6·30	12·00	5½	19 ,, W ,, ,,	28-18	m.
50	,,	17	,, ..	12·30	18·00	5½	24 ,, W × S ,, ,,	18-26	m.
51	,,	18	,, ..	18·30	24·00	5½	24 ,, ,, ,, ,,	26-22	m.
52	,,	19	4th July.	0·30	6·00	5½	19 ,, W½S ,, ,,	22-20	m.
53	,,	20	,, ..	6·30	12·00	5½	13 ,, W ,, ,,	20-17	m.
54	VI	1	11th July.	15·00	19·00	4	17 miles W from Kendari.	15-26	m.
55	,,	2	,, ..	19·30	24·00	4½	25 ,, ,, ,, ,,	26-30	m.
56	,,	3	12th July.	00·30	06·00	5½	20 ,, WSW ,, ,,	30-22	m.
57	,,	4	,, ..	06·30	12·00	5½	21 ,, ,, ,, ,,	22-25	m.
58	,,	5	,, ..	12·30	18·00	5½	20 ,, SW × W½W ,, ,,	25-24	m.
59	,,	6	,, ..	18·30	24·00	5½	25 ,, SW × W ,, ,,	24-24	m.

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Goal.	Pomfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
25	..	480	+	..	5	..	30	725+	SW, squally	Heavy WS swell.	
15	..	105	..	..	45	75	80	525	SW	Deep swell.	
6	..	55	..	..	30	100	10	471+	SW, squalls with rain	Heavy SW swell.	
12	8	35	..	..	28	80	55	318+	Nil	,,	
28	(2)	15	7	75	50	220	..	493+	Very strong in squalls.	Very deep swell.	
90	15	65	10	33	70	200	30	647	W, steady	Moderate.	
..	(1)	+	..	..	..	..	..	16	W, light.	,,	Net not fishing properly.
..	..	+	1	..	9	50	3	160		,,	
14	+	..	1	..	13	37	100	486		,,	
110	15	20	..	95	110	290	10	705	SW	,,	
90	(1)	25	..	..	85	445	2	831	,,	,,	
..	(2)	..	..	..	+	..	..	73	,,	,,	Cod-end of trawl torn and baitings split.
258	+	175	10	8	250	343	175	1,949	,,		Fresh net for this haul.
230	(8)	25	(6)	50	135	475	7	1,002	S, light	,,	
80	4	15	3	30	75	500	..	859	SW	,,	
170	(11)	10	..	..	75	530	27	1,124	,,	,,	
162	(24)	185	20	..	410	1,112	..	2,109	,,	,,	
125	7	10	60	2(?)	155	1,175	155	1,915	,,	,,	
102	10	500	..	6	60	303	..	1,213	,,	,,	
90	10	10	2	..	30	1,075	25	1,594	,,	,,	
35	10	155	70	190	175	210	45	1,083	,,	,,	
140	(6)	20	25	3(?)	90	510	30	1,098	,,	,,	
110	..	9	..	..	60	435	3	684	,,	,,	
135	..	+	..	9	70	777	175	1,239	,,	,,	
80	5	+	..	20	35	60	..	273	,,	SW swell.	
75	+	90	2	50	..	250	40	647	SW, fresh	Moderate. SW swell.	
150	10	140	+	..	45	120	..	725	SW, light	Moderate.	
70	+	10	+	10	80	440	250	920	SW, steady	,,	
310	10	250	220	6	320	255	+	1,558	,,	,,	
235	+	220	..	10	335	225	..	1,220	,,	Steady. SW swell.	
70	+	65	+	8	70	500	..	953	,,	Moderate.	

Serial No.	Voyage No.	Haul No.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of haul. Hours.	Position.	Depth. Fathom.	Bottom.
			1921.						
60	VI	7	13th July.	00·30	06·00	5½	22 miles W¾N from Kendari.	24-26	m.
61	,,	8	,, ..	06·30	12·00	5½	22 ,, W¾N ,, ,,	26-26	m.
62	,,	9	,, ..	12·30	18·00	5½	20 ,, W½N ,, ,,	26-24	m.
63	,,	10	,, ..	18·30	24·00	5½	26 ,, W½S ,, ,,	24-28	m.
64	,,	11	14th July.	00·30	06·00	5½	23 ,, SW×W½W ,, ,,	28-24	m.
65	,,	12	,, ..	06·30	12·00	5½	21 ,, W×S ,, ,,	24-22½	m.
66	,,	13	,, ..	12·30	18·00	5½	22 ,, W×S½S ,, ,,	22½-24	m.
67	,,	14	,, ..	18·30	24·00	5½	23 ,, W×S ,, ,,	24-25	m.
68	,,	15	15th July.	00·30	02·30	2	23 ,, W×S ,, ,,	25-25	m.
69	VII	1	20th July.	13·45	19·00	5¼	18 ,, W×S½S ,, ,,	17-23	m.
70	,,	2	21st July.	07·30	12·00	4½	25 ,, SW×W ,, ,,	21-25	m.
71	,,	3	,, ..	13·00	18·00	5	19 ,, W×S ,, ,,	25-21	m.
72	VIII	1	4th Aug.	12·45	18·00	5¼	18 ,, WSW ,, ,,	15-23	m.
73	,,	2	5th Aug.	06·00	12·00	6	23 ,, SW×W ,, ,,	17-25	m.
74	IX	1	11th Aug.	15·45	19·00	3¼	23 ,, W×N ,, ,,	16-24	m.
75	,,	2	12th Aug.	06·15	12·00	5¾	28 ,, SW×W ,, ,,	24-26	m.
76	X	1	23rd Aug.	15·00	19·00	4	23 ,, SW×W ,, ,,	20-27	m.
77	,,	2	,, ..	19·30	24·00	4½	31 ,, SW ,, ,,	27-25½	m.
78	,,	3	24th Aug.	00·30	06·00	5½	21 ,, SW½W ,, Janjira.	25½-23	m.
79	,,	4	,, ..	06·30	10·00	3½	22 ,, ,, ,, ,,	23-21	m.
80	,,	5	,, ..	10·30	14·00	3½	25 ,, SW ,, ,,	21-24	m.
81	,,	6	,, ..	14·30	18·00	3½	30 ,, SW×S ,, ,,	24-29	m.
82	,,	7	,, ..	18·30	24·00	5½	40 ,, SSW ,, ,,	29-40	m.
83	,,	8	25th Aug.	00·30	06·00	5½	32 ,, SW×S½S ,, ,,	40-37	m.
84	,,	9	,, ..	06·30	10·00	3½	25 ,, SW×S ,, ,,	37-20	m.
85	,,	10	,, ..	10·30	14·00	3½	18 ,, SW ,, ,,	20-19	m.
86	,,	11	,, ..	14·30	18·00	3½	18 ,, SSW ,, ,,	19-14	m.
87	,,	12	,, ..	18·30	24·00	5½	22 ,, SW×S ,, Kendari.	14-13	m.
88	,,	13	26th Aug.	00·30	06·00	5½	10 ,, WSW ,, ,,	13-16	m.
89	,,	14	,, ..	06·30	12·00	5½	8 ,, W ,, Prongs.	16-15	m.

Quantity of Fish caught, in lbs.								Total.	Weather Conditions.		Remarks.
Goal.	Pomfret.	Karee.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.				
+	+	345	+	8	35	40	110	578	SW, steady	SW swell	Ship lagging. Trawl picking up mud.
170	(14)	85	+	95	120	60	14	622	,,	,,	
140	+	470	..	190	80	200	..	1,140	SW, showery	,,	
65	10	15	..	7	25	155	+	330	SW, steady	,,	
72	(13)	14	+	50	40	330	75	701	,,	,,	
145	(13)	60	120	..	170	150	+	810	SW, light	,,	
865	40	40	..	..	180	1080	..	2,345	SW, steady	Moderate SW. swell	
10	10	20	..	..	55	200	300	765	SW, fresh	SW deep swell.	
15	2	..	..	..	4	250	..	274	SW, strong	,,	
55	20	(79)	5	75	140	405	+	1,040	SW, fresh	SW swell	
110	5	(70)	5	100	400	200	20	1,265	SW.strong	Heavy swell	Net split.
160	(30)	(9)	(1)	40	595	360	+	1,400	SW. very strong.	Very heavy swell	,, ,,
..	(1)	..	..	..	..	+	..	+	WSW	Rough	Net very badly torn.
80	2	35	2	10	30	340	30	655	,,	,,	Net badly torn.
..	..	..	..	..	+	+	..	+	WSW, strong	Very rough	Fore & after wing split and headline parted. Net not fishing properly.
142	20	+	..	97	77	448	60	934	WSW	,,	
170	5	95	+	70	142	398	..	1,146	SW, light	Smooth.	
..	..	..	..	..	..	..	..	..			
52	15	30	..	..	150	30	..	438	,,	,,	
110	50	40	25	..	1,010	220	+	1,675	,,	,,	
75	(5)	5	..	10	200	20	..	360	,,	,,	
..	..	..	..	8	22	..	+	30	,,	,,	
..	..	..	..	..	..	..	..	33	,,	,,	
..	..	..	..	..	..	..	..	65	,,	,,	
..	..	..	..	20	..	..	..	20	,,	,,	
90	4	17	..	25	400	325	+	938	,,	,,	
185	(15)	40	..	..	40	..	..	312		,,	
150	2	45	..	100	5	150	+	462		,,	
110	3	15	..	170	4	350	+	712		,,	
778	4	24	30	145	110	250	+	1,411		,,	

Serial No.	Voyage No.	Haul No.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of haul. Hours.	Position.	Depth.	Bottom.
			1921.					Fathom.	
90	XI	1	29th Aug.	14·15	18·00	3¾	9 miles W×N from Kendari.	15-16	m.
91	,,	2	,, ..	18·30	24·00	5½	10 ,, SW×W ,, Bombay L. V.	16-17	m.
92	,,	3	30th Aug.	00·30	06·00	5½	10 ,, WSW ,, Prongs.	17-14½	m.
93	,,	4	,, ..	06·30	10·00	3½	12 ,, W×N ,, ,,	14½-14	m.
94	,,	5	,, ..	10·30	14·00	3½	15 ,, W×N½N ,, ,,	14-15½	m.
95	,,	6	,, ..	14·30	18·00	3½	21 ,, NW×W ,, ,,	15½-19	m.
96	,,	7	,, ..	18·30	24·00	5½	30 ,, NW ,, ,,	19-12½	m.
97	,,	8	31st Aug.	00·30	06·00	5½	28 ,, NW×W ,, ,,	12½-23	m.
98	,,	9	,, ..	06·30	10·00	3½	18 ,, NW½W ,, ,,	23-27	m.
99	,,	10	,, ..	10·30	14·00	3½	21 ,, WSW ,, ,,	27-25	m.
100	XII	1	2nd Sep.	14·00	18·00	4	15 miles NW ,, ,,	15-20	m.
101	XIII	1	5th Sep.	18·45	24·00	5¼	25 miles W×S from Kendari.	24-27	m.
102	,,	2	6th Sep.	00·30	06·00	5½	30 ,, WSW ,, ,,	27-22	m.
103	,,	3	,, ..	06·30	10·00	3½	26 ,, SW×S ,, ,,	22-23	m.
104	,,	4	,, ..	10·30	12·30	2	23 ,, SSW ,, ,,	23-15	m.
105	XIV	1	10th Sep.	14·15	18.00	3¾	10 miles NW×W from Prongs.	13-13½	m.
106	,,	2	,, ,,	19·00	24·00	5	10 ,, W×S ,, ,,	13½-14½	m.
107	,,	3	11th Sep.	00·30	06·00	5½	11 ,, SW×W ,, ,,	14½-14	m.
108	,,	4	,, ,,	06·30	10·00	3½	8 ,, NW×W ,, ,,	14-13	m.
109	,,	5	,, ,,	10·30	14·00	3½	15 ,, NW ,, ,,	13-14½	m.
110	,,	6	,, ,,	14·30	18·00	3½	21 ,, NW½N ,, ,,	14½-15	m.
111	,,	7	,, ,,	18·30	24·00	5½	28 ,, NW¾N ,, ,,	15-22	m.
112	,,	8	12th Sep.	00·30	06·00	5½	20 ,, W×S ,, ,,	22-25	m.
113	,,	9	,, ,,	07·00	12·00	5	4 ,, SW½S ,, ,,	25- 8	m.
114	XV	1	15th Sep,	13.00	18.30	5½	25 miles WSW from Kendari.	25-31	m.
115	,,	2	16th Sep.	06·30	10·00	3½	40 ,, WSW ,, ,,	36-50	m.
116	,,	3	,, ,,	14·00	18·30	4½	21 ,, W×N ,, ,,	30-25	m.
117	,,	4	17th Sep.	07·00	10·00	3	65 ,, NW ,, Prongs.	32-25	m.
118	,,	5	,, ,,	10·30	14·00	3½	8 ,, NW½N ,, ,,	25-17	m.
119	,,	6	,, ,,	14·30	18·30	4	66 ,, NW×N½N ,, ,,	17-14	m.
120	,,	7	18th Sep.	06·30	12·00	5½	45 ,, NW ,, ,,	25-25	m.
121	,,	8	,, ,,	12·30	18·00	5½	33 ,, NW ,, ,,	25-20	m.

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Coal.	Pomfret.	Karee.	Ravas.	Wam.	Shingla.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
1,440	5	807	18	90	25	160	50	3,004	SW, light	Moderate.	
76	18	150	..	145	18	70	+	533	SW	Fine.	
..	4	150	2	45	+	100	+	331	SW, light		
120	(10)	62	(1)	207	..	100	..	500	,,	Smooth.	
120	7	55	3	270	..	250	+	715	,,	,,	
398	6	188	..	60	42	150	..	851	,,	,,	
40	..	10	90	80	35	200	..	455	,,	Moderate.	
50	..	+	30	45	30	125	+	280	SW, light	Smooth.	
..	5	5	..	35	5	50	+	150	,,	,,	
15	(3)	+	..	..	16	(25)	(25)	221	,,	,,	
25	..	70	..	10	10	140	8	287	WSW, strong	Rough.	
..	..	+	..	..	+	+	+	80	WSW, very strong	Rough.	
..	+	..	..	..	+	+	+	65	,,	,,	
..	..	..	..	..	..	..	..	..	,, strong	,,	
..	..	..	..	..	..	..	..	..	,,	,,	
120	15	240	+	100	15	420	+	1,010	WSW	W swell.	
50	10	35	..	30	20	210	+	405	,,	,,	
+	..	15	..	..	15	45	..	127	,,	,,	
55	+	55	+	..	75	50	350	652	,,	,,	
40	10	160	..	135	+	165	..	525	,,	,,	
50	8	62	..	75	..	350	+	553	,,	,,	
10	+ (1)	25	..	40	15	225	+	315	,,	,,	
..	..	..	+	8	+	+	..	38	,,	,,	
+	..	+	..	..	..	+	..	40	,,	,,	Fore wing badly torn due to shoal water.
..	..	..	..	..	..	140	..	150	SW, steady	,,	Net torn (square split.)
..	..	..	..	..	..	..	..	5	WSW, strong.	Rough.	
..	..	..	..	..	+	+	..	40	,,	,,	Headline parted.
..	17	55	+	10	5	125	+	288	,,	,,	
25	35	+	..	45	45	130	+	315	,,	,,	
150	2	..	30	..	30	80	+	297	NW, light	Moderate.	
27	50	..	..	40	17	+	+	226	WNW,	Heavy swell	
5	30	..	..	..	..	+	+	766	,, strong	Rough	

Serial No.	Voyage No.	Haul No.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of haul. Hours.	Position.	Depth. Fathom.	Bottom.
			1921.						
122	XV	9	19th Sep.	06.30	10.00	3½	from 15 miles SW½S from Kendari.	15-14	m.
123	,,	10	,, ,,	10·30	14·00	3½	to 10 ,, SW ,, ,, 4 ,, WNW ,, ,,	14- 8	m.
124	XVI	1	23rd Sep.	13·30	18·00	4½	(Shot) (Hauled.) 16-24 miles NW×W from Prongs.	19-18	m.
125	,,	2	,, ,,	18·30	24·00	5½	31 ,, NW¾W ,, ,,	18-27	m.
126	,,	3	24th Sep.	00·30	06·00	5½	42 ,, NW¾W ,, ,,	27-18	m.
127	,,	4	,, ,,	07·00	10·00	3	48 ,, NW¾W ,, ,,	18-18	m.
128	,,	5	,, ,,	10·30	14·00	3½	54 ,, ,, ,, ,,	18-20	m.
129	,,	6	,, ,,	14·30	18·00	3½	45 ,, ,, ,, ,,	20-18	m.
130	,,	7	,, ,,	18·30	24·00	5½	33 ,, NW½W ,, ,,	18-18	m.
131	,,	8	25th Sep.	00·30	06·00	5½	21 ,, ,, ,, ,,	18-18	m.
132	,,	9	,, ,,	06.30	10.00	3½	14 ,, ,, ,, ,,	18-19	m.
133	,,	10	,, ,,	11·00	14·00	3	20 ,, SW ,, ,,	19-17	m.
134	,,	11	,, ,,	14·45	18·00	3¼	22 ,, WSW ,, ,,	19	m.
135	,,	12	,, ,,	18·30	24·00	5½	30 ,, NNW ,, Kendari.	19-15	m.
136	,,	13	26th Sep.	00·30	06·00	5½	16 ,, NW½W from Prongs.	15-15	m.
137	,,	14	,, ,,	06·30	12·00	5½	5 ,, W ,, ,,	15-11	m.
138	XVII	1	28th Sep.	13·15	18·00	4¾	30 ,, NNW from Kendari.	19-21	m.
139	,,	2	,, ,,	19·00	24·00	5	22 ,, NW×N ,, ,,	21-22	m.
140	,,	3	29th Sep.	00·30	06·00	5½	26 ,, NW×N ,, ,,	21-14½	m.
141	,,	4	,, ,,	06·30	10·00	3½	21 ,, NW½W ,, ,,	14½-18	m.
142	,,	5	,, ,,	10·30	14·00	3½	23 ,, NW×W½W ,,	19-25	m.
143	,,	6	,, ,,	16·00	19·00	3	22 ,, NW½W ,, ,,	25-23	m.
144	,,	7	29/30th ,,	19·30	00·30	5	28 ,, NW ,, ,,	23-18-16½	m.
145	,,	8	30th ,,	01·00	06·00	5	23 ,, W½N ,, ,,	25	m.

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Coal.	Pomfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
11	..	..	..	..	+	55	..	78	WNW, strong.	Rough.	
13	+	20	..	..	30	180	..	308	WNW	,,	
*130	85	140	..	180	25	240	..	845	W, light.	Fine.	*These figures are taken from the record maintained by the ship's officers. There was no naturalist on this voyage.
..	105	10	..	55	140	220	..	582	,, ,,		
..	..	..	..	..	..	..	..	..	*Nil.*	,,	
..	5	..	..	20	5	200	..	230	*Nil.*	..	
25	27	..	..	10	10	200	..	272	,,	..	
40	4	..	..	55	15	300	..	414	,,	..	
45	50	..	..	50	10	500	..	675	,,	..	
45	35	25	..	55	10	320	..	535	,,	..	
10	..	..	..	..	..	..	..	10	,,	..	Net split.
..	..	..	..	..	..	..	..	..	,,	..	Net split.
										..	Head line gone.
10	15	55	..	25	60	140	..	1,005	WSW, light	..	
35	15	..	..	155	27	200	..	492	,, ,,	..	
105	80	80	..	80	30	50	..	510	*Nil.*	..	
..	10	..	..	30	..	40	..	355	,,	..	
										..	
..	15	..	..	..	..	+	..	26	W, light.	..	Net badly torn away from head line.
..	87	4	..	138	37	110	+	774	,,	..	
..	120	..	..	95	15	..	..	877	,,	..	
..	+	..	..	25	..	80	..	655	,,	..	
15	7	..	..	47	7	20	..	941	,,	..	Cod end burst with weight of fish.
..	50	..	..	40	10	..	..	335	,,	..	
..	(2)	45	..	80	25	290	..	663	,,	..	
..	..	..	..	..	..	..	..	..	,,	..	Foul haul, after wing folded under board.

Serial No.	Voyage No.	Haul.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1921.						
146	XVII	9	30th Sept.	07·00	10·00	3	From 21 miles W½N from Kendari. to 20 ,, NW×W ,, ,,	23-23	m.
147	,,	10	,, ,,	10·35	14·00	3½	25 ,, NW×N ,, ,,	23-17	m.
148	,,	11	,, ,,	14·45	18·00	3¼	31 ,, NW×N ,, ,,	17-25	m.
149	,,	12	,, ,,	18·30	24·00	5½	41 ,, NW×N ,, ,,	25-21	m.
150	XVIII	1	5th Oct.	14·40	17·00	2¼	From 22 miles WSW from Prongs. to 23 ,, W×S ,, ,,	19-25	m.
151	,,	2	6th ,,	06·30	10·00	3½	29 ,, NW ,, Kendari.	25-24	m.
152	,,	3	,, ,,	10·30	14·00	3½	23 ,, WNW ,, ,,	24-25	m.
153	,,	4	,, ,,	14·30	18·00	3½	26 ,, NW×W ,, ,,	25-24	m.
154	,,	5	,, ,,	18·30	24·00	5½	26 ,, W×S ,, ,,	24-27	m.
155	,,	6	7th ,,	00·30	06·00	5½	25 ,, NW ,, ,,	27-26	m.
156	,,	7	,, ,,	06·30	10·00	3½	24 ,, WNW ,, ,,	26-25	m.
157	,,	8	,, ,,	10·25	14·00	3½	21 ,, WSW ,, ,,	25-25	m.
158	,,	9	,, ,,	18·00	24·00	6	16 ,, W×S ,, ,,	25-17	m.
159	,,	10	8th ,,	00·30	06·00	5½	14 ,, W½N ,, ,,	17-16½	m.
160	XIX	1	13th ,,	13·50	15·00	1¼	From 4 miles WNW from Oyster Rock to 2 ,, W ,, ,, ,,	11-11½	m.
161	,,	2	,, ,,	15·35	17·40	2	4 ,, SSW ,, ,, ,,	11½-8½	m.
162	,,	3	14th ,,	08·30	11·00	2½	From 4 ,, W×½N ,, ,, ,, to 10 ,, WNW ,, ,, ,,	15-16	m.
163	,,	4	,, ,,	14·00	16·20	2¼	From 26 ,, SW×S ,, ,, ,, to 24 ,, SW×S ,, , ,,	27-28	Hard.
164	,,	5	,, ,,	18·50	20·30	1¾	From 1¼ ,, NW ,, ,, ,, to 1¼ ,, E×N ,, ,, ,,	8- 5½	m.
165	XIX	6	16th ,,	11·30	14·45	3¼	From 5 miles W from Oyster Rock to ½ ,, SSW ,, Anjeva Rock	15- 8½	m.
166	,,	7	17th ,,	06·00	10·00	4	From 10 ,, W×N ,, Deogad harbour. to 7 ,, W×S ,, Rajapur (off Viziadrug).	19-17	m.

Quantity of Fish caught, in lbs.								Total	Weather conditions.		Remarks.
Coal.	Pomfret.	Kare.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
..	6	..	..	30	6	150	+	674	N, light.		
..	18	23	..	130	48	450	..	794	,, ,,	..	
..	27	47	+	28	7	470	10	602		..	Net all split.
..	..	+	..	+	..	+	..	+		..	Net all to pieces.
..	..	..	..	..	..	8	..	38	*Nil.*	Smooth	Head line parted (new net) fore-wing split and square split.
117	197	..	..	165	11	20	..	747	,,	,,	
..	490	..	..	125	15	..	..	855	,,	,,	
40	27	..	..	40	10	50	45	320	,,	,,	Picking up mud. Ship lagging.
35	125	..	..	80	..	..	..	555	,,	,,	
..	20	..	..	..	..	35	..	251	,,	,,	
..	5	..	..	..	..	..	..	172	,,	,,	
..	2	..	..	..	..	..	..	74	,,	,,	
247	..	12	..	..	30	480	200	1239	N. light.	,,	
..	..	..	..	..	20	..	30	180	,, ,,	,,	
(5)	+	..	..	..	(2)	+	..	(43)	NW, light.	Smooth.	
..	(1)	..	..	..	..	..	..	(20)	,, ,,	,,	Square and baitings split.
..	..	..	..	..	..	..	..	..	*Nil.*	,,	
..	..	..	..	..	..	..	..	(20)	NW, fresh	,,	
..	..	..	..	..	+	+	..	(6)	NW, steady.	,,	Net split from cod end to wing
..	..	..	..	..	..	(3)	..	(13)	*Nil.*	..	
..	..	..	..	..	..	..	..	(18)	NNW, steady.	Smooth.	

Serial No.	Voyage No.	Haul No.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of Haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1921.						
167	XIX	8	17th October.	14·00	20·00	6	From 6 miles WNW from Ratnagiri to 17 ,, SW½W ,, Warori Bluff.	17-18½	m.
168	,,	9	18th ,,	06·00	10·00	4	From 17 ,, W×S ,, Kendari to 16 ,, W×N ,, ,,	18	m.
169	,,	10	,, ,,	10·30	14·00	3½	10 ,, WNW ,, Prongs	18-17	m.
170	,,	11	,, ,,	14·45	18·00	3¼	From 12 ,, W×N ,, ,, to 18 ,, WNW ,, ,,	21-26	m.
171	,,	12	,, ,,	18·30	24·00	5½	28 ,, NW×W½W ,, Kendari.	21	m.
172	,,	13	19th ,,	00·30	06·00	5½	20 ,, NW ,, ,,	21-21	m.
173	XX	1	25th October.	16·00	19·00	3	From 15 miles NW×W from Kendari to 20 ,, NW¾W ,, ,,	18-23	m.
174	,,	2	,, ,,	19·30	24·00	4½	25 ,, NW½W ,, ,,	23-20	m.
175	,,	3	26th ,,	00·30	06·00	5½	26 ,, NW½W ,, ,,	20-23	m.
176	,,	4	,, ,,	07·30	10·00	2½	31 ,, NW½W ,, ,,	23	m.
177	,,	5	,, ,,	10·30	14·00	3½	33 ,, NW¾W ,, ,,	23-30	m.
178	,,	6	,, ,,	14·30	18·00	3½	37 ,, NW½W ,, ,,	30-21½	m.
179	,,	7	,, ,,	18·30	24·00	5½	45 ,, NW ,, ,,	21½-20	m.
180	,,	8	27th ,,	00·30	06·00	5½	53 ,, NW ,, ,,	20-22	m.
181	,,	9	,, ,,	06·45	10·00	3¼	48 ,, NW½W ,, ,,	22-25	m.
182	,,	10	,, ,,	10·35	14·00	3½	42 ,, NW¼W ,, ,,	25-24	m.
183	,,	11	,, ,,	14·25	18·00	3½	37 ,, NW ,, ,,	24-21	m.
184	,,	12	,, ,,	18·40	24·00	5¼	25 ,, NW ,, ,,	21-18	m.
185	,,	13	28th ,,	00·55	06·00	5	20 ,, NW½W ,, ,,	18-15	m.
186	,,	14	,, ,,	06·40	10·00	3¼	18 ,, NW ,, ,,	15-17	m.
187	XXI	1	2nd November.	16·15	19·15	3	From 12 miles W×S from Kendari to 16 ,, WSW ,, ,,	17-21	m.
188	,,	2	2nd-3rd ,,	19·40	00·30	4¾	24 ,, SW ,, ,,	21-30	Sharp sand and shells.
189	,,	3	3rd ,,	00·55	06·00	5	14 ,, WSW ,, ,,	30-18	m.
190	,,	4	,, ,,	06·30	10·00	3½	8 ,, W ,, ,,	18-11	m.
191	,,	5	,, ,,	11·00	13·00	2	6 ,, WSW ,, ,,	9	m.
192	,,	6	,, ,,	13·45	18·00	4¼	From 10 ,, WSW ,, ,, to 12 ,, WNW ,, ,,	13-14	m.

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Goal.	Pomfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
..	..	..	..	..	..	..	..	(8)	NNW, steady.	Smooth.	
..	..	..	..	..	..	..	..	(40)	NE, light	,,	
..	..	..	..	..	..	..	..	(5)	*Nil.*	,,	
..	..	..	..	..	..	..	..	..	..	..	
16	13	25	..	..	20	290	+	898	..	..	
15	+	12	..	75	3	1,200	..	1,522	..	..	
..	..	..	..	..	..	..	..	79	NE, light	Smooth.	
1	..	..	..	..	4	..	..	233	,, ,,	,,	
5	15	35	..	85	..	13	+	244	,, ,,	,,	Net badly split.
..	20	45	..	40	16	10	20	215	,, ,,	,,	
2	48	..	..	50	12	5	4	232	,, steady	,,	
..	66	10	..	42	9	30	22	377	,, light	,,	
34	27	15	..	330	37	180	10	725	,, ,,	,,	
..	4	..	..	115	..	40	..	284	,, ,,	,,	
..	..	..	..	..	..	..	..	42	,, ,,	,,	
..	..	..	..	125	..	27	..	265	,, ,,	,,	
22	22	..	..	110	+	120	..	341	,, ,,	,,	
55	2	15	..	103	10	55	+	382	,, ,,	,,	
15	..	..	..	14	2	..	..	31	,, ,,	,,	
..	..	..	..	..	..	..	..	+	,, steady	,,	Square all split.
..	..	..	..	..	..	87	..	91	..	Smooth.	
..	..	..	..	..	..	..	..	..	NE, light.	,,	
..	..	..	..	..	..	..	..	..	,, ,,	,,	
132	1	30	..	..	100	120	+	568	,, ,,	,,	Square split.
100	..	23	..	50	15	100	..	370	,, ,,	,,	Came fast. After wing split and head line parted.
25	..	..	..	..	35	..	..	132	,, ,,	,,	

Serial No.	Voyage No.	Haul No.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of Haul.	Position.	Depth.	Bottom.
			1921.			Hours.		Fathoms.	
193	XXI	7	3rd Nov.	18·30	24·00	5½	20 miles NW from Kendari.	14-18	m.
194	,,	8	4th ,,	01·00	06·00	5	30 ,, NNW ,, ,,	18-10	m.
195	,,	9	,, ,,	06·30	09·00	2½	32 ,, NNW ,, ,,	10-10½	m.
196	,,	10	,, ,,	09·45	13·30	3¾	From 32 ,, NW×N½N ,, ,,	13-16	m.
							to 24 ,, NW½N ,, ,,		
197	,,	11	,, ,,	14·00	18·00	4	26 ,, NW½N ,, ,,	16-13	m.
198	,,	12	,, ,,	18·30	24·00	5½	22 ,, NW×W ,, ,,	13-17	m.
199	,,	13	5th	01·40	06·00	4¼	12 ,, NW×W ,, ,,	17-16	m.
200	XXII	1	10th November.	16·30	19·00	2½	From 12 miles WNW from Prongs	15-20	m.
							to 16 ,, NW×W ,, ,,		
201	,,	2	11th ,,	06·15	10·00	3¾	From 114 ,, NW½W ,, ,,	25-23	m.
							to 119 ,, NW½W ,, ,,		
202	,,	3	,, ,,	11·00	14·00	3	124 ,, NW½W ,, ,,	23-23	m.
203	,,	4	,, ,,	14·30	18·00	3½	130 ,, NW½W ,, ,,	23-20	m.
204	,,	5	,, ,,	18·35	24·00	5½	7 ,, SSE ,, Diu Hd. Light.	20-17	m.
205	,,	6	12th	00·25	06·00	5½	14 ,, W ,, Diu Head	17-12-16½	m.
206	,,	7	,, ,,	06·30	10·00	3½	13 ,, S×E ,, Veraval	16½-20	m.
207	,,	8	,, ,,	10·30	14·00	3½	20 ,, S¼W ,, ,,	20-25	m.
208	,,	9	,, ,,	18·00	24·00	6	From 8 ,, SW×S ,, Diu Head.	20-23½	m.
							to 12 ,, SSE ,, ,, ,,		
209	,,	10	13th ,,	00·30	06·00	5½	23 ,, SE×S½S ,, ,, ,,	23-22	m.
210	,,	11	,, ,,	06·30	10·00	3½	30 ,, SE×S ,, ,, ,,	22-21	m.
211	,,	12	,, ,,	10·45	14·00	3¼	36 ,, SE½S ,, ,, ,,	21-23	m.
212	,,	13	,, ,,	14·30	18·00	3½	42 ,, SE ,, ,, ,,	23-23	m.
213	XXIII	1	16th Nov.	17·15	24·00	6¾	From 12 miles NW from Kendari	17-16	m.
							to 22 ,, NW ,, ,,		
214	,,	2	17th ,,	00·30	06·00	5½	24 ,, NW×W ,, ,,	16-25	m.
215	,,	3	,, ,,	06·30	10·00	3½	20 ,, NW×W½W ,,	25-26	m.
216	,,	4	,, ,,	10·20	14·00	3¾	22 ,, NW ,, ,,	26-15	m.
217	,,	5	,, ,,	14·30	18·00	3½	26 ,, NW ,, ,,	15-17	m.

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Coal.	Promfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
15	20	70	..	..	20	10	..	225	NE, light	Smooth.	
170	..	57	..	117	66	354	..	882	,, ,,	,,	
130	5	..	..	12	60	225	..	465	,, ,,	,,	Premature haul to clear drift nets.
22	80	45	..	174	66	48	..	512	,, ,,	,,	
8	27	172	..	117	40	70	..	658	WNW, steady	,,	Fore quarter split.
..	..	..	..	..	40	25	..	115	,, ,,	,,	Fore quarter split.
..	..	..	..	..	14	34	..	105	NE, light	,,	
93	16	62	..	..	10	17	27	284	NNE, light.	Smooth.	
..	276	6	..	..	..	..	35	849	NE, light.	,,	
..	88	43	..	..	21	100	105	1,429	E, light	,,	
23	70	..	..	..	66	..	139	574	,, ,,	,,	
..	59	16	..	..	88	100	26	549	,, ,,	,,	
18	1	..	..	..	70	10	..	104	..	..	
..	..	..	..	..	..	26	..	26	..	Smooth.	
..	1	..	..	..	..	..	..	1	..	,,	Changed grounds.
..	20	..	..	88	..	20	35	443	..	,,	
15	25	10	..	24	15	250	..	536	SE, light	,,	
95	40	55	..	..	16	228	37	667	,, steady	,,	
17	61	10	..	..	..	..	137	360	,, ,,	,,	
..	..	..	..	9	..	118	..	160	,, ,,	,,	
180	15	20	..	160	35	60	..	570	E, light	Smooth.	
45	17	30	..	..	187	167	..	486	,, steady	,,	
..	..	..	..	..	15	20	..	35	,, ,,	,,	Ground rope parted and net split.
76	72	38	23	36	58	81	..	406	..	..	
120	70	65	..	35	45	35	..	395	NE, light	. Smooth.	

Serial No.	Voyage No.	Haul.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of Haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1921.						
218	XXIII	6	17th Nov.	18·30	24·00	5½	35 miles NW from Kendari.	17-20	m.
219	,,	7	18th ,,	00·30	06·00	5½	45 ,, NW ,, ,,	20-19	m.
220	,,	8	,, ,,	06·30	10·00	3½	52 ,, NW ,, ,,	19-18	m.
221	,,	9	,, ,,	10·30	14·00	3½	52 ,, NW×W ,, ,,	18-20½	m.
222	,,	10	,, ,,	14·50	18·00	3¼	54 ,, NW×W½W ,,	25½-22	m.
223	,,	11	,, ,,	18·30	24·00	5½	58 ,, NW×W½W ,,	22-25	m.
224	,,	12	19th ,,	00·30	06·00	5½	47 ,, NW×W½W ,,	25-25	m.
225	,,	13	,, ,,	06·25	10·00	3¾	32 ,, NW×W ,, ,,	25-35	m.
226	,,	14	,, ,,	10·22	14·00	3¾	35 ,, NW¾W ,, ,,	35-32	m.
227	,,	15	,, ,,	14·30	18·00	3½	32 ,, NW½W ,, ,,	32-20	m.
228	,,	16	,, ,,	18·35	24·00	5½	22 ,, NW×W ,, ,,	20-25	m.
229	,,	17	20th ,,	00·30	06·00	5½	20 ,, NW ,, ,,	25-21	m.
230	XXIV	1	27th Nov.	06·30	10·00	3½	From 104 miles NW from Kendari	18-19	m.
							to 110 ,, NW ,, ,,		
231	,,	2	28th ,,	06·15	10·00	3¾	From 25 ,, SSW ,, Dwarka Pt.	32-17	Sand mud.
							to 20 ,, WSW ,, ,, ,,		
232	,,	3	29th ,,	06·00	10·00	4	From 25 ,, S×W½W ,, Monze Head	48-47	Coral.
							to 18 ,, SSW ,, ,, ,,		
233	,,	4	,, ,,	11·30	14·00	2½	From 10 ,, SSW ,, ,, ,,	27-27	m.
							to 8 ,, SSE ,, ,, ,,		
234	,,	5	,, ,,	14·35	18·00	3½	10 ,, SE½E ,, ,, ,,	27-14	m.
235	,,	6	,, ,,	18·27	24·00	5½	23 ,, SE½S ,, ,, ,,	14-24	m.
236	,,	7	30th ,,	00·30	06·00	5½	11 ,, SSW ,, ,, ,,	24-30	m.
237	,,	8	,, ,,	06·37	10·00	3½	12 ,, SE×S ,, ,, ,,	30-25	m.
238	,,	9	,, ,,	11·35	14·00	2½	14 ,, SE×E ,, ,, ,,	25-16	m.
239	,,	10	,, ,,	14·25	18·00	3½	21 ,, SE½E ,, ,, ,,	16-14	m.
240	XXIV	11	30th Nov.	18·35	24·00	5½	18 miles SE from Monze Head	14-15	m.
241	,,	12	1st Dec.	00·30	06·00	5½	12 ,, S×E ,, ,, ,,	15-25	m.
242	,,	13	,, ,,	06·35	10·00	3½	10 ,, SE×S ,, ,, ,,	25-21	m.
243	,,	14	,, ,,	10·30	14·00	3½	8 ,, SE×S ,, ,, ,,	21-21	m.
244	,,	15	,, ,,	14·30	18·00	3½	3 ,, SW×W ,, ,, ,,	21-17	m.
245	XXV	1	5th Dec.	14·45	18·00	3¼	From 14 miles SE×S from Monze Head	20-17	m.
							to 20 ,, SE½S ,, ,, ,,		

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Goal.	Promfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
..	..	..	..	..	147	10	..	172	N, light.	Smooth.	
10	..	..	..	..	30	30	..	70	,, ,,	,,	
..	..	..	..	..	..	..	..	..	,, ,,	,,	
..	..	..	..	..	..	..	..	..	Nil.	,,	
19	42	5	..	52	15	37	..	257	..	,,	
4	4	5	..	10	..	..	..	123	..	,,	
57	2	40	..	12	26	22	..	209	..	,,	
..	3	..	..	..	10	5	..	33	..	,,	
..	..	..	..	..	..	..	..	..	..	,,	
..	..	..	..	..	7	6	..	54	..	,,	Trawl split in fore and after wing, belly and square.
155	..	9	..	..	21	105	..	387	..	,,	
210	50	40	..	70	35	150	..	595	ENE, light		
335	7	64	..	45	230	180	20	1,075	NW×N, light	Smooth. ,,	
42	62	230	..	7	14	14	90	640	NW	,,	
13	..	+	..	..	..	..	..	73	NNE, light	,,	Ground rope parted, net split. fore wing and after wing.
..	7	53	+	..	12	..	26	282	..	,,	
..	10	65	..	..	25	..	50	350	Nil.	,,	
..	..	50	..	..	45	..	70	474	N. light	,,	
23	..	55	..	..	45	..	..	523	,,	,,	
..	+	..	..	..	3	..	3	43	Nil.	,,	
..	5	112	..	..	10	..	23	323	,,	,,	
..	..	14	..	..	21	..	55	110	NW, light	,,	
14	..	..	..	..	..	..	..	14	W, light	Smooth.	
..	..	46	..	2	110	..	..	453	,, fresh	,,	
..	(2)	250	+	..	75	..	55	540	,, ,,	,,	
..	3	7	4	..	4	..	..	185	,, steady	,,	
..	13	7	..	..	10	..	90	352	,, ,,	,,	
..	13	32	..	..	7	..	14	263	ESE, light	Smooth.	

Serial No.	Voyage No.	Haul.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of Haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1921.						
246	XXV	2	5th Dec.	18.25	24·00	5¼	31 miles SE×S½S from Monze Head	17-28	m.
247	,,	3	6th ,,	00.30	06·00	5½	42 ,, SE×S¼S ,, ,, ,,	28-24	m.
248	,,	4	,, ,,	06.35	10·00	3½	51 ,, SSE ,, ,, ,,	24-30	m.
249	,,	5	,, ,,	10.35	14·00	3½	56 ,, SSE ,, ,, ,,	30->50	No bottom.
250	,,	6	,, ,,	14·30	18·00	3½	52 ,, SSE ,, ,, ,,	>50-17	m.
251	,,	7	,, ,,	18·45	24·00	5¼	52 ,, SSE ,, ,, ,,	17-17	m.
252	,,	8	7th ,,	00·25	06·00	5½	43 ,, SSE ,, ,, ,,	71-40	m.
253	,,	9	,, ,,	06·35	10·00	3½	40 ,, SSE ,, ,, ,,	40-30	m.
254	,,	10	,, ,,	10·35	14·00	3½	37 ,, SSE ,, ,, ,,	30-24	m.
255	,,	11	,, ,,	14·35	18·00	3½	30 ,, SE×S ,, ,, ,,	24-16	m.
256	XXVI	1	9th Dec.	19·50	24·00	4¼	From 14 miles SE from Monze Head	15-16	Mud, sand and shells.
							to 21 ,, SE ,, ,, ,,		
257	,,	2	10th ,,	10·15	14·00	3¾	From 109 ,, SE×S¼S ,, ,, ,,	16-15	m.
							to 116 ,, SE×S¼S ,, ,, ,,		
258	,,	3	11th ,,	06·25	10·00	3½	From 15 ,, SW×S Porbander	20	m.
							to 18 ,, SSW ,, ,,		
259	XXVII	1	17th Dec.	15·25	19·00	3½	From 13 miles W×N from Kendari	17-16	m.
							to 11 ,, W½N ,, ,,		
260	,,	2	,, ,,	19·30	24·00	4½	15 ,, W½S ,, ,,	16-19	m.
261	,,	3	18th ,,	00·30	06·00	5½	19 ,, W ,, ,,	19-21	m.
262	,,	4	,, ,,	06·35	10·00	3½	20 ,, W½S ,, ,,	21-23	m.
263	,,	5	,, ,,	11·00	14·00	3	26 ,, WSW ,, ,,	23-32	m.
264	,,	6	,, ,,	14·35	18·00	3½	31 ,, SW×W ,, ,,	32-35	m. End Hard Coral.
265	,,	7	,, ,,	19·45	24·00	4¼	From 23 ,, SW×W ,, ,,	29-24	m.
							to 19 ,, WSW ,, ,,		
266	,,	8	19th ,,	00·30	06·00	5½	12 ,, W×S ,, ,,	24-22	m.
267	,,	9	,, ,,	06·35	10·00	3½	5 ,, W×N ,, ,,	22-12	m.
268	,,	10	,, ,,	10·25	11·15	1¼	3 ,, WSW ,, ,,	12- 7	m.

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Coal.	Promfret.	Karel.	Ravas.	Warn.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
47	2	100	+	..	55	..	28	665	NE, strong	Smooth.	
45	..	45	..	..	85	5	45	545	,, fresh	,,	
..	..	..	+	..	5	30	25	188	,, strong	,,	
..	12	64	6	..	2	..	30	574	,,	Choppy.	
980	14	95	..	..	..	..	60	1,412	Nil,	Smooth.	
..	4	15	2	..	86	..	..	801	NE, light	,,	
..	20	20	..	..	135	..	34	504	,, ,,	,,	
438	35	175	..	..	..	..	35	886	ENE, fresh	,,	
105	56	606	..	..	..	..	61	1,108	,, steady	,,	
2	..	30	..	..	20	..	40	132	,, light	,,	
4	3	36	..	..	27	41	..	263	Nil.	..	
48	146	389	67	..	8	37	172	1,302	NE, fresh	Smooth.	
..	11	23	..	..	28	17	155	317	,, light	,,	
210	6	8	35	18	25	180	..	567	NE, light	Smooth.	
254	7	47	..	..	47	175	..	798	,, ,,	,,	
288	31	16	..	38	38	534	..	1,029	NNE, fresh	,,	
200	6	34	..	17	14	225	..	512	NE, light	,,	Back piece renewed.
77	19	17	18	22	122	220	39	698	,, ,,	,,	
..	..	..	..	..	26	..	25	90	..	..	Baitings split.
130	11	75	12	50	255	88	..	897	N, light	Smooth.	
205	20	35	..	17	55	297	..	767	ENE ,,	,,	
185	4	(4)	..	+	..	(140)	12	410	,, ,,	,,	
..	..	..	..	..	..	+	..	+	,, ,,	,,	Came fast, head line and foot rope parted, net badly damaged.

Serial No.	Voyage No.	Haul.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of Haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1921.						
269	XXVII	11	19th Dec.	15.50	19.00	3¼	From 29 miles NW×N from Kendari	17-15½	m.
							to 34 ,, NW×N ,, ,,		
270	,,	12	,, ,,	19·25	24·00	4½	43 ,, NW×N ,, ,,	15½-19	m.
271	,,	13	20th ,,	01·00	06·00	5	54 ,, NW×N¼N ,, ,,	19-18	m.
272	,,	14	,, ,,	06·25	10·00	3½	54 ,, NW×N¾N ,, ,,	18-14	m.
273	,,	15	,, ,,	10·30	14·00	3½	57 ,, NW×N¾N ,, ,,	14-15	m.
274	,,	16	,, ,,	14·25	18·00	3½	62 ,, NW×N½N ,, ,,	15-20	m.
275	,,	17	,, ,,	18·30	24·00	5½	71 ,, NW×N¼N ,, ,,	20-17½	m.
276	,,	18	21st ,,	00·30	06·00	5½	80 ,, NW×N¼N ,, ,,	17½-18	m.
277	,,	19	,, ,,	06·30	10·00	3½	87 ,, NW×N¼N ,, ,,	18-17	m.
278	,,	20	,, ,,	12·00	14·00	2	From 84 ,, NW½N ,, ,,	20-26	m.
							to 83 ,, NW ,, ,,		
279	,,	21	,, ,,	14·30	18·00	3½	76 ,, NW ,, ,,	26-21	m.
280	,,	22	,, ,,	18·30	24·00	5½	65 ,, NW ,, ,,	21-20½	m.
281	XXVIII	1	30th December.	10·00	14·00	4	From 85 miles NW from Kendari	20-20	m.
							to 91 ,, NW ,, ,,		
282	,,	2	,, ,,	14·30	18·00	3½	98 ,, NW ,, ,,	20½	m.
283	,,	3	,, ,,	18·30	24·00	5½	109 ,, NW ,, ,,	20½-26	m.
284	,,	4	31st ,,	00·30	06·00	5½	107 ,, NW¼W ,, ,,	26-31	m.
285	,,	5	,, ,,	06·30	10·00	3½	99 ,, NW¼W ,, ,,	31-26	m.
286	,,	6	,, ,,	10·30	14·00	3½	90 ,, NW¼W ,, ,,	26-25½	m.
287	,,	7	,, ,,	14·35	18·00	3½	80 ,, NW½W ,, ,,	25-35	m.
288	,,	8	,, ,,	18·30	24·00	5½	67 ,, NW½W ,, ,,	35-36	m.
			1922.						
289	,,	9	1st January.	00·30	06·00	5½	59 ,, NW¾W ,, ,,	36-32	m.
290	XXIX	1	6th January.	06·30	10·00	3½	From 128 miles NW from Kendari	21-17½	m.
							to 128 ,, NW¼N ,, ,,		
291	,,	2	,, ,,	10·25	14·00	3½	128 ,, NW½N ,, ,,	17½-15	m.
292	,,	3	,, ,,	14·30	18·00	3½	120 ,, NW½N ,, ,,	15-16	m.
293	,,	4	,, ,,	19·10	24·00	4¾	110 ,, NW×N ,, ,,	16-16½	m.
294	,,	5	7th ,,	08·00	10·00	2	From 11 miles W ,, Daman	13-20	Clay, Shells & Coral.
							to 14 ,, W¼S ,, ,,		
295	,,	6	,, ,,	11·35	14·00	2½	20 miles W×S½S ,, ,,	20-20	Coral.
296	,,	7	,, ,,	15·30	18·00	2½	From 95 miles N×W½W ,, Kendari	19-18	m.
							to 93 ,, N×W½W wly. ,, ,,		

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks
Coal.	Promfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
142	11	..	37	24	75	26	..	335	W, light	Smooth.	
35	8	..	..	..	40	159	25	303	ENE, light	,,	
65	5	..	47	..	58	65	10	252	..	,,	
23	+	..	38	15	130	105	..	341	..	,,	
104	(2)	..	35	26	26	100	44	340	W, light	,,	
28	+	..	..	25	75	164	22	357	WNW ,,	,,	
20	..	..	60	10	175	490	70	830	,, ,,	,,	
149	+	..	59	..	162	301	56	856	NNW, ,,	,,	
90	1	..	78	..	150	195	17	630	,, ,,	,,	
40	26	..	..	8	2	155	..	310	Nil.	,,	
215	36	2	36	36	2	66	7	450	,,	,,	
30	5	..	25	35	17	214	10	563	,,	,,	
13	1	..	..	13	70	348	+	486	NE, steady	Smooth.	
75	2	..	27	..	125	102	32	443	N, light ,,	,,	
141	48	6	96	21	3	185	(112)	741	NNW, steady	,,	
61	94	..	38	90	9	459	15	825	,, fresh	Choppy.	
13	36	11	..	50	+	202	..	341	,, steady	Moderate.	
53	37	6	..	30	..	141	50	478	N, ,,	,,	
60	20	..	..	25	3	115	2	380	,, light	Smooth.	
314	30	31	..	183	..	207	3	826	,, steady	,,	
202	28	11	..	223	..	170	2	674	N, strong	Rough.	
361	36	12	23	..	..	123	3	637	NW, fresh	Smooth.	
130	36	..	58	..	287	170	54	849	N, light	,,	
55	1	..	38	..	180	175	15	529	,, ,,	,,	
36	..	..	..	25	142	113	13	439	Nil.	,,	
..	..	..	35	..	..	..	..	35	,,	,,	Coral tore hole in cod end.
22	6	..	..	..	7	75	2	122	,,	,,	
..	6	..	..	..	..	..	24	54	..	..	

Serial No.	Voyage No.	Haul.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of Haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1922.						
297	XXIX	8	7th Jany.	18·30	24·00	5½	83 miles NW×N from Kendari	18-18½	m.
298	,,	9	8th ,,	00·30	06·00	5½	82 ,, NW¼W ,, ,,	18½-37	m.
299	,,	10	,, ,,	06·30	10·00	3½	87 ,, NW¼W ,, ,,	37-34	m.
300	,,	11	,, ,,	10·30	14·00	3½	95 ,, NW½W ,, ,,	34-37	m.
301	,,	12	,, ,,	14·30	18·00	3½	95 ,, NW¼W ,, ,,	37-25	m.
302	,,	13	,, ,,	18·30	24·00	5½	107 ,, NW¼W ,, ,,	25-24	m.
303	,,	14	9th ,,	00·30	06·00	5½	117 ,, NW½W ,, ,,	24-40	m.
304	,,	15	,, ,,	06·30	10·00	3½	116 ,, NW¼W wly. ,, ,,	40-27	m.
305	,,	16	,, ,,	10·30	14·00	3½	108 ,, NW¼W ,, ,,	27-23	m.
306	,,	17	,, ,,	14·30	18·00	3½	100 ,, NW¼W ,, ,,	23-20	m.
307	,,	18	,, ,,	18·30	24·00	5½	90 ,, NW ,, ,,	20-18½	m.
308	XXX	1	16th January.	06·00	08·30	2½	From 132 miles NW¼W from Bombay L.V.	30-28	m.
							to 136 ,, NW¼W ,, ,, ,,		
309	,,	2	17th ,,	05·00	10·00	5	From 15 ,, WNW ,, Dwarka Head	17-20	m.
							to 24 ,, NW × W½W ,, ,, ,,		
310	,,	3	,, ,,	10·30	14·00	3½	30½ ,, NW×W ,, ,, ,,	20-24½	m.
311	,,	4	,, ,,	14·30	17·00	2½	35 ,, NW¾W wly. ,, ,, ,,	24½-26	Coral.
312	,,	5	,, ,,	19·00	24·00	5	From 35 ,, NW¼W ,, ,, ,,	17-17	Rough Coral.
							to 46 ,, NW¾W ,, ,, ,,		
313	,,	6	18th ,,	10·15	14·00	3¾	From 86 ,, NW¾W ,, ,, ,,	17-50	
							to 93 ,, NW¾W ,, ,, ,,		
314	,,	7	19th ,,	24·00	06·00	6	From 53 ,, SE×S½S ,, Monze Head	17-17½	m.
							to 42 ,, SE×S ,, ,, ,,		
315	,,	8	,, ,,	06·30	10·00	3½	43 ,, SE×S ,, ,, ,,	17½-16	m.
316	,,	9	,, ,,	10·45	13·30	2¾	41 ,, SE½S,sly ,, ,, ,,	16-10	m.
317	XXXI	1	20th January.	19·25	24·00	4½	From 12 miles SE½S from Monze Head	20-17½	m.
							to 25 ,, SE×S¼S ,, ,, ,,		
318	,,	2	21st ,,	00·30	06·00	5½	40 ,, SE×S¼S ,, ,, ,,	17½-18½	m.
319	,,	3	,, ,,	06·30	10·00	3½	48 ,, SE×S ,, ,, ,,	18½-14	m.
320	,,	4	,, ,,	10·50	14·00	3¼	53 ,, SE¾S ,, ,, ,,	14- 9	m.
321	,,	5	,, ,,	15·30	18·00	2½	From 52 ,, SE×S½S ,, ,, ,,	17-16	m.
							to 61 ,, SE×S½S ,, ,, ,,		

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Goal.	Promfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
80	2	..	..	50	2	182	..	416	Nil.	Smooth.	
15	15	8	..	70	..	10	..	172	N, steady		
35	1	12	..	135	2	40	12	263	NNE, ,,	,,	
14	13	8	..	75	..	12	25	182	,, ,,	,,	
36	75	4	..	..	..	..	23	195	,, ,,	,,	
75	37	24	..	13	2	52	6	227	,, ,,	,,	
26	115	6	..	140	..	10	..	297	,, fresh	Choppy.	
..	155	..	..	20	..	130	62	421	,, ,,	,,	
..	65	..	..	..	14	..	40	154	NE, ,,	,,	
90	40	22	..	..	..	9	50	308	,, strong	,,	
112	5	..	..	..	55	26	20	259	,, ,,	,,	
72	23	..	..	6	3	18	..	170	N, steady	Smooth.	
147	15	52	1	..	184	+	..	518	N, light	,,	
13	33	137	8	13	7	(200)	178	(714)	,, ,,	,,	
..	+	+	..	..	..	..	..	+	,, ,,	,,	Came fast with coral, net destroyed, ground rope parted.
..	..	..	..	..	..	+	..	+	N, steady	,,	Net came up all torn to pieces.
..	..	..	..	..	..	+	..	+	N, light	,,	Net all to pieces.
485	1	88	..	15	50	..	56	1,047	Nil.	,,	
..	..	48	..	..	2	..	5	106	NE, light	,,	
123	23	142	..	..	135	..	52	567	,, ,,	,,	
147	..	70	..	..	7	..	39	357	ENE, light	Smooth	
35	..	3	..	..	10	..	12	100	NE, steady	,,	
..	..	33	..	..	21	..	32	182	,, ,,	,,	
..	1	23	..	..	67	..	53	258	,, light	,,	
..	..	22	..	..	29	..	18	134	Nil.	,,	

Serial No.	Voyage No.	Haul.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of Haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1922.						
322	XXXI	6	21st Jany.	18·30	24·00	5½	67 miles SE×S½S from Monze Head	16-31	m.
323	,,	7	22nd ,,	00·35	06·00	5½	56 ,, SE×S½S ,, ,, ,,	31-31	m.
324	,,	8	,, ,,	06·35	10·00	3½	48 ,, SE×S½S ,, ,, ,,	31-31	m.
325		9	,, ,,	10·35	12·00	1½	42 ,, SE×S¾S ,, ,, ,,	31-26	Coral.
326	XXXII	1	28th January.	16·10	18·30	2¼	From 13 miles W¾N from Kendari to 19 ,, W½S ,, ,,	15-23½	m.
327	,,	2	,, ,,	19·45	24·00	4¼	14 ,, W½S ,, ,,	23½-20	m.
328	,,	3	29th ,,	00·35	06·00	5½	19 ,, WSW ,, ,,	20-21	m.
329	,,	4	,, ,,	06·25	10·00	3½	18½ ,, W½S ,, ,,	21-22	m.
330	,,	5	,, ,,	10·25	14·00	3½	27 ,, W×S½S ,, ,,	22-34	m.
331	,,	6	,, ,,	14·30	18·00	3½	21 ,, W½S ,, ,,	34-26	m.
332	,,	7	,, ,,	18·30	24·00	5½	21 ,, W×N¼N ,, ,,	26-26	m.
333	,,	8	30th ,,	00·30	06·00	5½	22 ,, W×N½N ,, ,,	26-23	m.
334	,,	9	,, ,,	06·30	10·00	3½	29 ,, NW¼W ,, ,,	23-20	m.
335	,,	10	,, ,,	10·30	14·00	3½	25 ,, NW×W ,, ,,	20-22	m.
336	,,	11	,, ,,	14·30	18·00	3½	23 ,, WNW ,, ,,	22-22	m.
337	,,	12	,, ,,	18·30	24·00	5½	34 ,, NW×W ,, ,,	22-30	m.
338	,,	13	31st ,,	00·30	06·00	5½	24 ,, NW×W ,, ,,	30-20	m.
339	,,	14	,, ,,	06·30	10·00	3½	21 ,, NW½N ,, ,,	20-16½	m. (nets).
340	XXXIII	1	4th February.	17·30	24·00	6½	From 24 miles NW¼N from Kendari to 32 ,, NW¼W ,, ,,	16-26	m.
341	,,	2	5th ,,	06·00	10·00	4	From 24 ,, NW ,, ,, to 26 NW ,, ,,	21-20	m.
342	,,	3	,, ,,	10·30	14·00	3½	24 ,, NW½W ,, ,,	20-31	m.
343	,,	4	,, ,,	14·30	18·00	3½	21 ,, NW×W½W ,, ,,	31-22	m.
344	,,	5	,, ,,	18·30	24·00	5½	23 ,, NW×W¼W ,, ,,	22-24	m.
345	,,	6	6th ,,	00·30	06·00	5½	21 ,, NW×W¾W ,, ,,	24-22	m.
346	,,	7	,, ,,	06·30	10·00	3½	26 ,, NW½W ,, ,,	22-24	m.
347	,,	8	,, ,,	10·30	14·00	3½	22 ,, NW¾W ,, ,,	24-24	m.
348	,,	9	,, ,,	14·30	18·00	3½	25 ,, NW ,, ,,	24-17	m.
349	,,	10	,, ,,	18·30	24·00	5½	27 ,, NW ,, ,,	17-15-19	m.
350	,,	11	7th ,,	00·30	06·00	5½	38 ,, NW ,, ,,	19-19	m.

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Goal.	Promfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
15	..	41	..	17	53	..	6	347	*Nil.*	Smooth.	
222	4	103	..	17	70	..	15	446	ENE, light	,,	
459	56	118	..	..	24	..	191	1,110	ESE, ,,	,,	
20	50	27	..	..	+	..	72	314	,, ,,	,,	Came fast in coral. Trawl hopelessly damaged.
..	11	18	..	..	+	22	6	151	NW, fresh	Smooth.	
..	..	13	..	303	26	130	..	.. 553	NW, steady	,,	
24	1	28	..	255	14	..	..	383	N ,,	,,	
19	7	22	5	35	5	36	(172)	547	,, fresh	Choppy.	
..	5	16	..	8	36	86	60	455	,, ,,	,,	
..	..	115	..	..	..	100	55	412	,, ,,	,,	
..	10	..	..	245	130	..	..	864	N, strong	Rough.	
..	8	7	..	380	2	105	..	541	,, ,,	,,	
140	10	23	98	115	..	130	37	631	,, ,,	,,	
160	35	175	116	150	..	505	75	1,384	N, steady	Choppy.	
407	47	80	435	150	4	230	179	1,678	,, ,,	,,	
38	11	8	..	195	5	180	82	546	,, light	,,	
190	15	73	116	495	5	175	36	1,137	NNE, light	Calm.	
..	21	47	31	45	..	235	..	476	,, ,,	Smooth.	
16	14	100	9	210	..	100	35	578	NW	Choppy.	
63	11	40	1	190	..	160	7	510	NNE	Smooth.	
..	30	..	..	150	..	34	20	449	Nil	,,	
..	109	9	..	85	24	9	135	569	,,	,,	
17	38	52	..	157	..	11	14	660	,,	,,	
..	105	18	..	240	14	17	36	467	N, light	,,	
..	335	12	..	28	35	23	78	932	NNE, ,,	,,	
..	30	5	..	18	24	..	115	218	Light	,,	
..	98	20	..	10	28	82	46	465	Light, changeable	,,	
41	9	34	..	162	..	262	..	549	NNW, light	,,	
55	20	47	..	240	..	425	7	826	N, light	,,	

Serial No.	Voyage No.	Haul.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of Haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1922.						
351	XXXIII	12	7th Feb.	06·30	10·00	3½	30 miles NW from Kendari	19-21	m.
352	,,	13	,, ,,	13·00	15·00	2	From 9 ,, NW¾W ,, ,,		
							to 9 ,, N×W ,, ,, and SW×S½S ,, Prongs.	11-8	m.
353	XXXIV	1	10th February.	16.30	19.00	2½	From 11 miles W×N from Kendari		
							to 17 ,, W ,, ,,	15½-21	m.
354	,,	2	,, ,,	19·30	24·00	4½	22 ,, SW¾W ,, ,,	21-24	m.
355	,,	3	11th ,,	00·30	06·00	5½	31 ,, SW×S½S ,, ,,	24-24	m.
356	,,	4	,, ,,	06·30	10·00	3½	37 ,, S¾W ,, ,,	24-20½	m.
357	,,	5	,, ,,	10·25	14·00	3½	42 ,, S ,, ,,	20½-14	m.
358	,,	6	,, ,,	14·30	18·00	3½	51 ,, S¼E ,, ,,	14-12	m.
359	,,	7	12th ,,	00·30	06·00	5½	From 12 ,, W¾S ,, ,,		
							to 20 ,, NW×W¼W ,, ,,	16-20	m.
360	,,	8	,, ,,	06·30	10·00	3½	26 ,, NW¼W ,, ,,	20-18	m.
361	,,	9	,, ,,	10·30	14·00	3½	33 ,, NW ,, ,,	18-16	m.
362	,,	10	,, ,,	14·30	18·00	3½	40 ,, NW ,, ,,	16-18	m.
363	,,	11	,, ,,	18·30	24·00	5½	48 ,, NW¼W ,, ,,	18-22	m.
364	,,	12	13th ,,	00·30	06·00	5½	35 ,, NW½W ,, ,,	22-26	m.
365	,,	13	,, ,,	06·30	10·00	3½	28 ,, NW×W ,, ,,	26-28	m.
366	XXXV	1	17th February.	10·00	14·00	4	116 ,, NW¼W from Bombay Light V.	24-27	m.
367	,,	2	19th ,,	00·30	06·00	5½	99 ,, NW×W wly. ,, Dwarka	14½-31	m.
368	,,	3	,, ,,	06·30	10·00	3½	112 ,, NW¼N ,, ,,	31-15	m.
369	,,	4	,, ,,	15·30	19·00	3½	From 55 ,, SE×S¼S ,, Monze Head		
							to 48 ,, SE×S¼S, sly ,, ,,	14-13	m.
370	,,	5	,, ,,	19·30	24·00	4½	36 ,, SE¾S ,, ,, ,,	13-13½	m.
371	,,	6	20th ,,	00·30	06·00	5½	28 ,, SE¾S ,, ,, ,,	13½-14	m.
372	,,	7	,, ,,	06·30	10·00	3½	31 ,, SE¾E ,, ,, ,,	14- 7	m.
373	,,	8	,, ,,	11·00	14·00	3	From 32 ,, SE½S ,, ,, ,,		
							to 32 ,, SE¼S ,, ,, ,,	13½- 9½	m.
374	,,	9	,, ,,	15·00	18·00	3	30 ,, SE¾S ,, ,, ,,	14-13½	m.
375	,,	10	,, ,,	18·30	24·00	5½	21 ,, SE¾S ,, ,, ,,	9-13½	m.
376	,,	11	21st ,,	00·30	06·00	5½	23 ,, SE¾S ,, ,, ,,	13½-14	m.

Quantity of Fish caught in, lbs.								Total.	Weather conditions.		Remarks.
Goal.	Pomfret.	Karel.	Ravas.	Wam.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
46	50	26	..	144	16	85	25	590	NNW, light	Smooth.	
60	35	5	35	..	..	15	..	215	West	,,	
..	23	5	..	..	..	..	35	193	WNW	Calm.	
4	4	11	..	..	73	..	13	179	Nil	Smooth.	
3	8	108	..	..	300	..	48	662	NNW, light	,,	
..	18	..	..	..	108	8	221	521	Nil	,,	
..	+	..	..	14	57	45	210	446	,,	,,	
..	(10)	7	..	13	48	25	87	430	,,	,,	
88	2	50	8	219	..	60	2	664	,,	,,	
146	..	43	100	244	10	308	2	892	NNW, light	,,	
115	4	16	68	73	74	172	78	632	NNE, ,,	,,	
125	2	..	95	47	79	225	9	624	Nil	,,	Net clogged with mud.
118	2	..	..	144	26	352	22	693	NNW, light	,,	
262	4	..	44	266	34	330	..	950	WNW, ,,	,,	
62	1	17	30	914	8	..	4	1,036	NNE, ,,	,,	
16	10	16	..	55	..	485	30	641	NE, light	Smooth.	
25	..	72	..	..	131	..	57	520	,, ,,	,,	
..	..	22	..	..	30	..	53	168	,, ,,	..	Net clogged with mud.
..	..	194	..	..	45	..	99	476	,, ,,	,,	
15	5	105	..	..	262	..	55	1,023	Nil	,,	
..	..	95	..	..	12	..	25	244	,,	,,	
..	..	199	..	..	..	..	..	1,048	,,	,,	
..	..	111	..	..	12	..	65	219	,,	,,	
15	..	..	..	..	10	..	18	64	,,	,,	
..	..	85	..	..	..	..	..	538	NW, light	,,	
1,149	..	128	..	..	15	..	..	1,486	,, ,,	,,	

Serial No.	Voyage No.	Haul No.	Date.	Hour. Haul began.	Hour. Haul ended.	Duration of Haul. Hours.	Position.	Depth. Fathoms.	Bottom.
			1922.						
377	XXXV	12	21st Feb.	06·20	10·00	3½	From 25 miles SE×S from Monge Head	14-15	m.
378	XXXVI	1	22nd February.	16·30	24·00	7½	From 12 miles SE¾E from Monze Head	14-15	m.
							to 23 ,, SE×S ,, ,, ,,		
379	,,	2	23rd ,,	00·30	06·00	5½	25 ,, SE×S ,, ,, ,,	15-15½	m.
380	,,	3	,, ,,	06·20	10·00	3½	25 ,, SW¾S ,, ,, ,,	14-10 and out again.	m.
381	,,	4	,, ,,	10·20	14·00	3½	32 ,, SE×S ,, ,, ,,	14-20	m.
382	,,	5	,, ,,	14·20	18·00	3½	43 ,, SE×S½S ,, ,, ,,	20-22	m.
383	,,	6	,, ,,	18·20	24·00	5½	59 ,, SE×S¾S ,, ,, ,,	22-18	m.
384	,,	7	24th ,,	00·30	06·00	5½	75 ,, SSE ,, ,, ,,	18-38	m.
385	,,	8	,, ,,	06·30	09·00	2½	82 ,, SSE ,, ,, ,,	38-50	Coral.
386	,,	9	24th/25th February.	24·00	06·00	6	From 60 ,, SW from Dwarka	95-70	m.
							to 54 ,, SW ,, ,,		
387	,,	10	25th ,,	16·00	18·00	2	From 13 ,, WNW from Mangrol	14-14	m.
							to 11 ,, ,, ,, ,,		
388	,,	11	26th ,,	06·00	10.00	4	From 44 ,, SE×S from Diu Head	20-21	m.
							to 59 ,, SE¾S ,, ,,		
389	,,	12	,, ,,	10·20	14·00	3½	67 ,, SE¼S from Diu Head	21-20	m.
390	,,	13	,, ,,	14·30	18·00	3½	75 ,, SE¼S ,, ,, ,,	20-19½	m.
391	,,	14	,, ,,	18·30	24·00	5½	89 ,, SE ,, ,, ,,	19½-18	m.

Quantity of Fish caught, in lbs.								Total.	Weather conditions.		Remarks.
Coal.	Pomfret.	Karel.	Ravas.	Warn.	Shingala.	Rays.	Sharks.		Wind.	Sea.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			
..	..	160	..	..	30	..	20	291	NNW, light	Smooth.	
..	4	51	+	..	42	110	252	654	SW, ,,	,,	
..	..	55	..	..	10	15	20	262	S, strong	Choppy.	
..	..	80	..	..	17	20	13	180	SSW, ,,	,,	
105	6	185	..	..	21	7	115	607	WNW, light	,,	
93	70	65	..	..	..	(289)	(270)	923	SW, strong with rain	,,	
157	..	68	..	..	95	187	30	804	SW, light	Smooth.	
105	..	75	..	..	65	60	23	545	W, strong	Choppy.	
..	..	..	..	..	..	..	..	..	WSW, light	Moderate	Trawl gone to pieces except a small portion of forewing.
..	..	..	..	10	..	+	(156)	227	Nil	Smooth.	
14	4(	22	4	..	1	2	69	266	N, light	,,	
186	24	..	40	..	..	75	8	351	NW, light	Moderate.	
501	21	..	56	76	13	84	7	774	NNW, ,,	Smooth.	
192	5	..	88	30	105	262	13	715	,, ,,	,,	
114	3	..	87	64	142	179	8	636	,, ,,	,,	

APPENDIX

Statement showing the quantities of different kinds of fish caught

17th May 1921—

Name of fish.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Ravas ..	+	..	10	17	208	342	11	2	..	55	144	..	..	+	30	..	+	..
Goal ..	64+	280	590	261	2,021	2,392	325	80	142	1,720	2,259	25	..	325	231	445	15	439
Surmai ..	+	..	..	..	21	..	..	..	..	..	..	..	..	..	..	..	..	..
Pomfret W. .	+	30	141	7	181	126	55	3	20	103	55	..	+	44	134	431	332	866
Black Pomfret ..	+	..	3	6	19	1	..	..	..	5	3	..	+	2	..	..	+	..
Chand ..	+	+	+	760	640	469	39	20	12	85	34	4	+	50	45	..	146	50
Tambusa ..	48+	5	47	182	115	112	19	..	..	89	58	10	..	+	78	32	..	56
Karel ..	48+	..	51	909	1,314	1,824	158	35	+	311	1,427	70	+	592	75	310	119	12
Palu ..	..	6	..	73	92	222	3	..	+	37	31	..	..	97	10	..	..	115
Dagola ..	+	+	..	+	275	..	..	..	..	..	..	..	..	..	..	..	..	..
Dori ..	..	..	+	440	887	503	265	55	18	173	390	4	..	15	5	..	..	..
Shingala ..	+	+	201	378	1,907	1,559	1,135	30	77	2,083	171	10	+	140	127	332	155	86
Wam ..	88+	110	546	87	446	434	215	10	97	548	977	10	..	388	95	715	613	410
Rays ..	+	201	1,230	1,415	8,527	4,255	965	340	448	1,743	1,230	140	+	1,465	710	2,410	1,570	593
Sharks ..	36+	15	158	210	787	789	20	30	60	+	75	8	+	350	+	..	10	275
Mixed ..	176+	78	26	508	1,542	550	495	50	60	630	189	6	+	153	882	1,250	3,333	1,468
Bombay Ducks	..	..	125	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ribbons ..	..	..	..	..	..	..	..	..	..	..	+	..	..	..	..	..	..	..
Bhakas ..	+	2	4	7	9	10	..	..	..	..	+	..	..	..	11	..	50	61
Gobra ..	..	29	..	..	..	..	..	..	..	+	..	..	..	7	..	..	..	..
Dandosa ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Karli ..	..	..	..	..	2	..	..	..	..	20	..	..	..	..	..	..	..	..
Bangra ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sole ..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Palu (Red) ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Herring ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Not recorded separately ..	868	751	..	..	76	..	..	..	..	..	..	..	145	40	40	* ..	..	..
Total ..	1,328	1,507	3,132	5,260	19,069	13,588	3,705	656	934	7,602	7,043	287	145	3,668	2,473	5,925	6,343	4,431

Note.— + indicates the presence of fish
* This total includes the weight

III.

each Voyage by the S. T. 'William Carrick'. As weighed at sea.

27th February 1922.

XIX	XX	XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXVIII	XXIX	XXX	XXXI	XXXII	XXXIII	XXXIV	XXXV	XXXVI	Total.
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
..	..	..	..	23	4	8	67	480	161	154	9	..	801	45	345	..	275	3,191
36	134	602	261	876	447	1,617	52	2,490	932	1,087	840	698	978	298	923	1,220	1,467	26,572
5	..	..	+	..	55	45	35	25	..	2	17	25	66	36	223	45	105	705
14	204	133	657	275	109	156	160	198	296	608	95	111	181	884	78	15	173	6,875
6	..	..	8	..	40	30	..	6	..	..	..	..	..	+	28	+	16	173
47	30	88	88	..	147	46	..	56	..	..	30	48	101	5	79	4	..	3,123
..	163	62	1,663	20	108	132	271	79	73	220	96	175	467	1,345	78	1,055	218	7,076
37	120	397	202	252	953	1,182	448	238	65	96	467	440	625	368	257	1,187	601	15,190
+	..	+	133	..	38	33	..	136	+	..	5	183	54	11	57	3	29	1,368
15	..	..	7	..	21	84	102	4	..	5	23	3	10	..	20	5	7	581
..	..	5	..	..	..	..	..	369	351	105	32	..	167	61	148	..	40	4,033
25	90	456	286	631	604	395	63	1,494	210	691	381	281	227	141	817	547	511	16,241
75	1,014	470	121	375	54	..	..	341	635	528	34	34	2,376	1,634	1,934	55	180	15,649
1,493	480	1,073	869	728	194	35	95	3,899	1,929	1,127	218	..	1,934	1,221	1,525	485	1,290	45,837
+	56	+	541	..	482	372	327	337	216	349	291	438	702	518	731	422	984	9,589
762	776	788	1,105	591	1,751	1,815	214	846	217	155	355	740	930	200	545	424	734	24,344
..	..	..	..	..	120	..	..	320	109	455	..	..	..	..	..	..	..	1,129
..	..	..	..	..	..	..	..	..	..	..	..	..	+	..	..	..	..	+
54	160	49	33	21	..	..	..	6	..	..	3	1	20	2	19	..	..	522
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	61	4	109
10	..	..	8	..	..	..	..	..	..	..	..	9	7	..	..	345	..	379
..	..	..	+	..	11	..	29	11	..	9	40	63	90	259	105	23	10	672
..	67	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	67
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	274	836	19	..	..	..	186	..	22	..	10	822	300	2,469
..	..	..	..	..	25	292	..	..	..	..	..	..	..	..	..	..	..	317
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,926
2,593	3,294	4,123	5,982	3,792	5,437	7,078	1,882	11,335	5,194	5,591	3,122	3,249	9,758	7,028	7,922	6,718	6,944	1,88,138*

but weight not recorded separately.
of fish not recorded separately.

APPENDIX

Statement showing the quantities of fish

Voyages.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XIV	XV	XVI	XVII
Kind of fish.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Ravas ..		..	12	11	216	320	(5)	(2)	..	63	148	..	28	..	..
Goal ..		478	642	277	2,051	2,782	311	(70)	142	1,923	2,311	398	241	459	24
Surmai ..		..	..	7	18	..	..	..	..	..	..	..	..	..	..
Pomfret W. ..		11	155	7	204	170	45	(3)	20	117	53	30	135	482	368
,, B. ..		..	..	..	..	..	..	..	..	..	..	..	..	..	5
Chand ..		..	..	765	565	532	44	15	(15)	68	36	61	39	..	137
Tambusa ..		..	43	180	130	118	(19)	..	..	87	58	..	71	54	..
Karel ..		..	..	899	1,475	1,610	96	..	..	184	1,267	506	..	273	..
Palu ..	Fish	..	..	69	..	195	..	..	..	31	28	106	..	..	..
Dagola ..	not	..	..	9	297	..	..	..	..	..	..	..	..	..	..
Dori ..	wei-	..	..	437	1,029	538	278	55	(15)	232	347	..	..	18	..
Shingala ..	ghed	..	231	410	1,926	1,743	1,275	20	77	2,311	189	140	114	219	133
Wam ..	sepa-	172	594	92	489	486	205	26	97	641	972	429	112	800	666
Rays ..	rate-	850	1,684	1,863	9,517	4,985	462	299	448	154	..	1,027	62	3,047	..
Sharks, etc. ..	ly.	..	241	435	1,177	1,619	..	..	60	..	..	..	..	460	27
Mixed ..		313	22	552	1,875	594	508	32	60	687	142	186	796	1,418	3,553
Bhakas ..		..	..	19	24	10	..	..	..	..	..	..	23	..	57
Karli ..		..	..	..	..	..	..	..	..	21	..	..	..	..	..
Dandosa ..		..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bangra ..		..	..	..	..	..	..	..	..	..	..	..	..	96	..
Shark's fins ..		..	..	..	..	..	..	..	..	..	..	..	28	..	..
Bombay Ducks ..		..	163	..	..	..	..	..	..	..	..	..	..	..	..
Mixed lots ..	1,300	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total ..	1,300	1,824	3,787	6,032	20,993	15,702	3,248	522	934	6,519	5,551	2,883	1,649	7,326	4,970

Note.—Voys. XII and XIII. No fish
Voys. XXIV, XXV and XXX
Figures in brackets denote

IV.

landed for sale in the Bombay Market.

XVIII	XIX	XX	XXI	XXII	XXIII	XXVI	XXVII	XXVIII	XXIX	XXXI	XXXII	XXXIII	XXXIV	XXXV-VI	Total.
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
..	..	..	..	..	25	58	510	157	160	..	813	50	381	295	3,254
459	45	135	608	268	977	52	2,310	971	1,120	761	994	315	957	2,217	24,298
..	..	..	..	..	..	..	33	..	..	..	54	51	218	103	484
859	15	181	126	610	245	124	126	202	480	..	152	837	63	133	5,953
3	..	..	..	..	..	..	..	..	..	..	..	..	39	..	47
37	40	..	66	60	..	..	..	..	..	..	55	..	59	..	2,594
51	..	139	72	1,491	35	254	55	76	228	222	454	1,315	80	1,115	6,347
..	28	94	349	65	105	384	80	..	..	298	385	248	99	1,360	9,805
117	..	..	..	118	..	45	75	..	..	81	71	7	48	975	1,966
..	..	..	..	..	..	94	..	..	..	..	..	..	15	..	415
..	..	..	..	..	..	..	325	273	86	..	165	71	156	35	4,060
96	27	112	436	271	724	71	1,540	197	704	270	299	137	828	1,122	15,622
399	75	1,045	502	119	388	..	377	599	562	36	2,479	1,676	1,984	315	16,337
..	836	..	394	..	..	..	705	1,808	275	..	1,575	1,231	1,700	826	33,748
240	..	107	..	..	..	..	..	..	..	..	..	..	..	..	4,366
1,535	657	813	749	902	665	173	868	197	88	690	856	150	409	1,041	20,531
84	48	139	42	29	48	..	..	..	..	..	..	..	4	..	527
..	..	..	..	28	..	55	..	..	..	40	64	203	..	12	423
..	..	..	..	..	..	..	..	..	..	..	..	..	..	358	358
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	96
..	..	153	..	..	..	..	..	..	..	..	..	..	..	..	181
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	163
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,300
3,880	1,771	2,918	3,344	3,961	3,212	1,310	7,004	4,480	3,703	2,398	8,416	6,291	7,040	9,907	1,52,875

was landed for sale.
Fish was sold at Karachi.
estimated weights.

APPENDIX

Statement showing the amounts realised

Voyages.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XIV	XV	XVI	XVII
Kind of fish.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Ravas ..		..	10	5½	106	185	..	..	..	40	48	..	12	..	..
Goal ..		181	361	40	950	1012	140	..	98	749	291	180	80	124	6
Surmai ..		..	..	..	4	..	..	..	..	..	..	..	..	..	..
Pomfret W. ..		..	70	7	104	150	55	..	18	68	32	22	105	216	172
,, B. ..		..	..	..	..	..	..	..	..	..	..	..	..	..	1
Chand ..		..	..	190	93	105	..	..	..	20	..	7	6	..	17
Tambusa ..		..	7	..	25½	8	..	..	..	21	14	..	15	15	..
Karel ..	Fish	..	..	87	84	300	..	..	..	46	171	101	..	53	..
Palu ..	sold	..	..	17	..	40	..	..	..	..	..	25	..	..	..
Dagola ..	in	..	..	..	52	..	..	..	..	..	..	..	..	..	..
Dori ..	mix-	..	..	5	200	80	..	..	..	29	47	..	..	3	..
Shingala ..	ed	..	20	..	145	25	..	..	10	45	.	14	15	8	5
Wam ..	lots.	16	50	14	..	32	8	..	12	40	..	38	..	60	59
Rays ..		25	..	51	..	35	..	..	4	5	..	22	..	30	..
Sharks etc. ..		..	..	..	..	..	..	..	6	..	..	..	..	20	3
Mixed ..		51	10	..	146	78	..	..	9	43	13	20	70	100	210
Bhakas ..		..	..	..	..	..	..	..	..	..	..	..	4	..	7
Karli ..		..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dandosa ..		..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bangra ..		..	..	..	..	..	..	..	..	..	..	..	..	12	..
Shark's fins ..		..	..	..	..	..	..	..	..	..	..	..	15	..	..
Bombay Ducks ..		..	..	..	..	..	..	..	..	..	..	..	..	..	..
Value of mixed lots	230⅛	..	53	397½	351	70	147	75	8	29¾	40	..	18	..	..
Total ..	230⅛	273	581	814	2,260½	2,120	350	75	165	1135¾	656	429	340	641	480

Note.—Voys. XII and XIII. No
Voys. XXIV, XXV and

V.

for each species sold in Bombay Market.

XVIII	XIX	XX	XXI	XXII	XXIII	XXVI	XXVII	XXVIII	XXIX	XXXI	XXXII	XXXIII	XXXIV	XXXV-VI	Total.
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
..	..	..	..	..	7	50	160	65	99	..	254	14	84	76	1,215½
124	5	10	35	15	84	6	405	210	530	74	177	34	220	415	6,556
..	..	..	..	..	..	..	8	..	..	..	4	12	54	20	102
350	6	30	21	85	59	65	45	80	244	..	73	455¾	25	60	2,617¾
1	..	..	..	..	..	..	..	..	..	..	..	..	6	..	8
8	2	..	2	1½	..	..	..	..	..	..	6	..	8	..	465½
20	..	13	5	65	2	36	8	12	68	19	112	208	15	113	801½
..	3	6	16	2½	5	53	10	..	..	27	58	33	16	138	1,209½
12	..	..	..	4	..	9	9	..	..	12	8	2	10	50	198
..	..	..	..	..	..	12	..	..	..	..	..	..	3	..	67
..	..	..	..	..	..	..	72	42	18	..	16	15	16	7	550
6½	2	3	6	3	12	3	64	8	60	13	8	9½	40	43	568
38½	4	30	16	3	15	..	36	60	60	2½	160¼	169⅞	156	23	1,103⅛
..	3	..	1	..	..	..	13	28	12	..	23½	18⅞	30	10	311⅜
15	..	2	..	..	..	..	..	..	..	..	..	..	..	..	46
80½	29	16	10	15	20	17	33	12	15	63	100¼	10	48	55	1,273¾
15½	5	5	2	1	3	..	..	..	..	..	..	..	1	..	43½
..	..	..	..	1½	..	9	..	..	..	4	8	19	..	..	41½
..	..	..	..	..	..	..	..	..	..	..	..	..	..	37	37
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12
..	..	20	..	..	..	..	..	..	..	..	..	..	..	..	35
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	1½	3	..	..	..	..	..	..	..	..	13	1,436⅞
671	59	135	114	198	210	260	863	517	1,106	214½	1,008	1,001	732	1,060	18,698⅞

fish was landed for sale.
XXX. Fish was sold at Karachi.

APPENDIX VI.

Statement showing quantities of different kinds of fish landed for market in Bombay, with the amounts of sale-proceeds and average price per lb. (gross).

Voyage and dates of landing.	Goal.			Pomfret (White).			Ravas.			Karel.			Wam.			Tambusa.		
	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.
	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.
I 20-5-21																		
II 27-5-21	478	181	6 0·7	(11)									172	16	1 5·8			
III 2-6-21	642	361	8 11·9	155	70	7 2·7	12	10	13 4				594	50	1 4·1	43	7	2 7·2
IV 7-6-21	65 (212)	40	9 10·1	7	7	16 0	11	5½	8 0	706 (193)	87	1 11·6	92	14	2 4·5			
8-6-21																(180)		
V 5-7-21	2,051	950	7 4·9	204	104	8 1·8	216	106	7 10·2	430 (1,045)	84	3 1·5	(489)			130	25½	3 1·6
6-7-21																		
7-7-21 VI 16-7-21	2,782	1,012	5 9·7	170	150	14 1·4	320	185	9 3	1,550 (60)	300	3 1·1	486	32	1 0·6	35 (83)	8	3 7·9
17-7-21 VII 23-7-21	311	140	7 2·4	45	55	19 6·6	(5)			(96)			205	8	0 7·5	(19)		
VIII 6-8-21	(70)			(3)			(2)						(26)					
IX 13-8-21	142	98	11 0·5	20	18	14 4·8							97	12	1 11·7			
X 27-8-21	1,923	749	6 2·7	117	68	9 3·6	63	40	10 1·9	184	46	4 0	641	40	1 0	87	21	3 10·3
XI 1-9-21	2,311	291	2 0·1	53	32	9 8·0	148	48	5 2·2	1,267	171	2 1·9	(972)			58	14	3 10·3
XII							No fish was landed for market.											
XIII							"	"										
XIV 13-9-21	398	180	7 5·8	30	22	11 8·8				506	" 101	3 2·3	429	38	1 5·0			

XV	241	80	5	3·7	135	105	12	5·3	28	12	6	10·2					(112)			71	15	3	4·5
20-9-21 XVI	459	124	4	3·8	482	216	7	2·0					273	53	3	1·2	800	60	1	2·4	54	15	4	5·3
27-9-21 XVII	24	6	4	0	368	172	8	4·6									666	59	1	5·0				
2-10-21 XVIII	459	124	4	3·8	859	350	6	6·2									399	38½	1	6·5	51	20	6	3·3
9-10-21 XIX	35	5	2	3·4	15	6	6	4·8					28	3	1	8·5	75	4	0	10·2				
20-10-21 XX	(10) 135	10	1	2·2	181	30	2	7·8					94	6	1	0·2	1,045	30	0	5·5	139	13	1	5·9
29-10-21 XXI	608	35	0	11·0	126	21	2	8·0					349	16	0	8·8	502	16	0	6·1	72	5	1	1·3
6-11-21 XXII	268	15	0	10·7	610	85	2	2·7					65	2½	0	7·3	119	3	0	4·8	1,491	65	0	8·3
15-11-21 XXIII	977	84	1	4·5	245	59	3	10·2	25	7	4	5·7	105	5	0	9·1	388	15	0	7·7	35	2	0	10·9
22-11-21 XXIV									See Karachi sale statement.														
XXV																							
XXVI	52	6	1	10·1	124	65	8	4·6	58	" 50	13	" 9·5	" 384	53	2	2·5					254	36	2	3·2
13-12-21 XXVII	2,310	405	2	9·6	126	45	5	8·5	510	160	5	0	80	10	2	0	377	36	1	6·3	55	8	2	4·0
23-12-21																								
24-12-21 XXVIII	971	210	3	5·5	202	80	6	4·0	157	65	6	7·4					599	60	1	7·2	76	12	2	6·3
2-1-22 XXIX	1,120	530	7	6·8	480	244	8	1·6	160	99	9	10·8					562	60	1	8·5	228	68	4	9·2
11-1-22 XXX									See Karachi sale statement.														
XXXI	761	74	1	6·6									298	27	1	5·4	36	2½	1	1·3	222	19	1	4·4
26-1-22 XXXII	994	177	2	10·1	152	73	7	8·2	813	254	4	11·9	385	58	2	3·1	2,479	160¼	1	0·4	454	112	3	11·3
1-2-22																								
2-2-22 XXXIII	315	34	1	8·7	837	455¾	8	8·2	50	14	4	5·7	248	33	2	1·5	1,676	169⅞	1	7·4	1,315	208	2	6·3
8-2-22 XXXIV	957	220	3	6·8	63	25	6	4·1	381	84	3	6·3	99	16	2	7·0	1,984	156	1	3·1	80	15	3	0
14-2-22 XXXV-XXXVI	2,217	415	2	11·8	133	60	7	2·6	295	76	4	1·4	1,360	138	1	7·4	280 (35)	23	1	3·7	1,115	113	1	7·4
28-2-22, 1-3-22																								
Total ..	24,006 24,298	6,556	4	5·4	5,939 5,953	2,617¾	7	0·6	3,247 3,254	1,215½	5	11·9	3,411 3,805	1,209½	2	3·6	14,703 16,337	1,103 1/8	1	2·4	6,065 6,347	801½	2	1·3

APPENDIX VI—*contd.*

Voyage and dates of landing.	Shingala.			Dori.			Chand.			Rays.			Palu. ("Black and Red.")			Surmai.		
	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.
	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.
I 20-5-21																		
II 27-5-21										850	25	0 5·6						
III 2-6-21	231	20	1 4·6							(1684)								
IV				17	5	4 8·4	765	190	3 11·6	1,863	51	0 5·2	69	17	4 0			
7-6-21 8-6-21	(410)			(420)												(7)		
V	1,654	145	1 4·8	1,029	200	3 1·6	565	93	2 7·6							18	4	3 6·6
5-7-21 6-7-21	(272)									(9517)								
7-7-21 VI	608	25	0 7·8	538	80	2 4·5	532	105	3 1·9	4,985	35	0 1·3	195	40	3 3·3			
16-7-21 17-7-21	(1135)																	
VII 23-7-21	(1275)			(278)			(44)			(462)								
VIII 6-8-21	(20)			(55)			(15)			(299)								
IX	77	10	2 0·9							448	4	0 1·7						
13-8-21 X	2,311	45	0 3·7	(15) 232	29	2 0	(15) 68	20	2 4·2	154	5	0 6·2	(31)					
27-8-21 XI				347	47	2 2·0												
1-9-21 XII	(189)				No	fish was	(36) landed	for	market.				(28)					
XIII					"	"	"	"	"									
XIV 13-9-21	140	14	1 7·2				61	7	1 10	1,027	22	0 4·1	106	25	3 9·0			
XV 20-9-21	114	15	2 1·2				39	6	2 5·5	(62)								

XVI 27-9-21	219	8	0	7·0	18	3	2	8·0				3,047	30	0	1·8								
XVII 2-10-21	133	5	0	7·2					137	17	1 11·8												
XVIII 9-10-21	96	6½	1	0·2					37	8	3 5·5					117	12	1	7·7				
XIX 20-10-21	27	2	1	2·2					40	2	0 9·6	836	3	0	0·7								
XX 29-10-21	112	3	0	5·1																			
XXI 6-11-21	436	6	0	2·6					66	2	0 5·8	394	1	0	0·5								
XXII 15-11-21	271	3	0	2·1					60	1½	0 4·8					118	4	0	6·5				
XXIII 22-11-21	724	12	0	3·1																			
XXIV					See	Karachi		sale	state	ment.													
XXV						"		"		"													
XXVI 13-12-21	71	3	0	8·1												45	9	3	2·4				
XXVII 23-12-21	1,540	64	0	8·0	325	72	3	6·5				705	13	0	3·5	75	9	1	11·4	33	8	3	10·5
24-12-21																							
XXVIII 2-1-22	197	8	0	7·8	273	42	2	5·5				1,808	28	0	3·0								
XXIX 11-1-22	704	60	1	4·3	86	18	3	4·1				275	12	0	8·4								
XXX					See	Karachi		sale	state	ment.													
XXXI 26-1-22	270	13	0	9·2												81	12	2	4·4				
XXXII 1-2-22	299	8	0	5·1	165	16	1	6·6	55	6	1 9·0	1,575	23½	0	2·8	71	8	1	9·6	54	4	1	2·2
2-2-22																							
XXXIII 8-2-22	137	9½	1	1·3	71	15	3	4·5				1,231	$18\frac{7}{8}$	0	3·0	7	2	4	7·0	51	12	3	9·1
XXXIV 14-2-22	828	40	0	9·2	156	16	1	7·7	59	8	2 2·0	1,700	30	0	3·3	48	10	3	4·0	218	54	4	0
XXXV-XXXVI 28-2-22-1-3-22	1,122	43	0	7·4	35	7	3	2·4				826	10	0	2·3	975	50	0	9·8	103	20	3	1·2
Total .. {	12,321 15,622	568	0	8·8	3,292 4,060	550	2	8·0	2,484 2,594	465½	3 0	21,724 33,748	$311\frac{3}{8}$	0	2·7	1,907 1,966	198	1	7·9	477 484	102	3	5·0

APPENDIX VI—*contd.*

Voyage and dates of landing.	Dagola.			Sharks.			Bhakas.			Karli.			Dandosa.			Sharks' fins.		
	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.
	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.
I 20-5-21																		
II 27-5-21																		
III 2-6-21				(241)														
IV 7-6-21	(9)			(435)			(19)											
8-6-21 V	297	52	2 9·6															
5-7-21				(1177)			(24)											
6-7-21 7-7-21 VI																		
16-7-21				(1619)			(10)											
17-7-21 VII 23-7-21 VIII																		
6-8-21 IX				60	6	1 7·2												
13-8-21 X																		
27-8-21 XI										(21)								
1-9-21 XII							No fish was landed for market.											
XIII							"	"	"	"	"							
XIV 13-9-21																		
XV 20-9-21							23	4	2 9·3							28	15	8 7·0

XVI				460	20	0	8·3														
27-9-21																					
XVII				27	3	1	9·3	57	7	1	11·6										
2-10-21																					
XVIII				240	15	1	0	84	15½	2	11·4										
9-10-21																					
XIX								48	5	1	8·0										
20-10-21																					
XX				107	2	0	3·6	139	5	0	6·9								153	20	2 1·1
29-10-21																					
XXI								42	2	0	9·1										
6-11-21																					
XXII								29	1	0	6·6	28	1½	0	10·2						
15-11-21																					
XXIII								48	3	1	0										
22-11-21																					
XXIV				See Karachi sale statement.																	
XXV					,,	,,		,,													
XXVI	94	12	2	0·5								55	9	2	7·4						
13-12-21																					
XXVII																					
23-12-21																					
24-12-21																					
XXVIII																					
2-1-22																					
XXIX																					
11-1-22																					
XXX				See Karachi sale statement.																	
XXXI												40	4	1	7·2						
26-1-22																					
XXXII												64	8	2	0						
2-2-22																					
1-2-22																					
XXXIII												203	19	1	6·0						
8-2-22																					
XXXIV	15	3	3	2·4				4	1	4	0										
14-2-22																					
XXXV-XXXVI																358	37	1	7·8		
28-2-22, 1-3-22												(12)									
Total .. {	406	67	2	7·6	894	46	0	9·8	474	43½	1	5·6	390	41½	1	8·4	358	37	1	7·8	216*	40	2 11
	415				4,366				527				423								

* Including 33 lbs. sold after trawler had ceased working.

APPENDIX VI—*contd.*

Voyage and dates of landing.	Bangara.			Pomfret (Black).			Bombay Ducks.			Mixed.			Fish sold in Mixed lots.		Total quantity landed for each Voyage.	Total sum realized for each Voyage.	Average price per lb. for the Voyage.
	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.	Price per lb.	Quantity.	Value.			
	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	A. p.	Lbs.	Rs.	Lbs.	Rs.	A. p.
I													1,300	230 1/8	1,300	230 1/8	2 10·0
20-5-21																	
II										324	51	2 6·2	11	0	1,824	273	2 4·7
27-5-21																	
III							163			22	10	7 3·2	1,925	53	3,787	581	2 5·5
2-6-21																	
IV													2,437	397 1/2	6,032	814	2 1·9
7-6-21										(552)							
8-6-21																	
V										1,851	146	1 3·1	12,548	351	20,993	2,260 1/2	1 8·7
5-7-21										(24)							
6-7-21																	
7-7-21																	
VI										594	78	2 1·2	2,907	70	15,702	2,120	2 1·9
16-7-21																	
17-7-21																	
VII													2,687	147	3,248	350	1 8·7
23-7-21										(508)							
VIII													522	75	522	75	2 3·6
6-8-21										(32)							
IX										60	9	2 4·8	30	8	934	165	2 9·9
13-8-21																	
X										587	43	1 2·0	152	29 3/4	6,519	1,135 3/4	2 9·5
27-8-21										(100)							
XI										142	13	1 5·5	1,225	40	5,551	656	1 10·6
1-9-21																	
XII						No fish was landed for market.											
XIII						,,	,,	,,	,,								
XIV										186	20	1 8·6			2,883	429	2 4·7
13-9-21																	
XV										796	70	1 4·8	174	18	1,649	340	3 3·6
20-9-21																	

XVI 27-9-21	96	12	2	0							1,418	100	1	1·5			7,326	641	1	4·8
XVII 2-10-21					5	1	3	2·4			3,553	210	0	11·3			4,970	480	1	6·5
XVIII 9-10-21					3	1	5	4			1,535	80½	0	10·0			3,880	671	2	9·2
XIX 20-10-21											657	29	0	8·4	10	0	1,771	59	0	6·4
XX 29-10-21											813	16	0	3·8			2,918	135	0	9·5
XXI 6-11-21											749	10	0	2·5			3,344	114	0	6·5
XXII 15-11-21											870 (32)	15	0	3·3	32	1½	3,961	198	0	9·5
XXIII 22-11-21											650 (15)	20	0	5·9	15	3	3,212	210	1	5·5
XXIV							See	Karachi sale		statement.										
XXV																				
XXVI 13-12-21							"	"	"	"	173	17	1	6·8			1,310	260	3	2·1
XXVII 23-12-21											868	33	0	7·3			7,004	863	1	11·7
24-12-21 XXVIII 2-1-22											197	12	0	11·7			4,480	517	1	10·2
XXIX 11-1-22											88	15	2	8·7			3,703	1,106	4	9·3
XXX							See	Karachi sa'e		statement.										
XXXI 26-1-22											690	63	1	5·5			2,398	214½	1	5·2
XXXII 1-2-22											856	100¼	1	10·4			8,416	1,008	1	11·0
2-2-22 XXXIII 8-2-22											150	10	1	0·8			6,219	1,001	2	6·9
XXXIV 14-2-22					39	6	2	5·5			409	48	1	10·5			7,040	732	1	7·9
XXXV-XXXVI 28-2-22, 1-3-22											958 (83)	55	0	11·0	130	13	9,907	1,060	1	8·5
Total ..	96	12	2	0	47	8	2	8·7	163		19,185 20,531	1,273¾	1	0·7	26,105	1,436⅞	152,875*	18,698⅞ 16,639·7/8	1 1	11·5† 8·9‡

* Excluding the 35 lbs. fns sold after trawler had ceased working. † Gross. ‡ Net.

APPENDIX VII.

Particulars of Marketing Expenses.

(a) Detailed statement of the expenses incurred in the disposal of fish.

Voyage.	Fish landed for Market.	Cart hire.	Cooly charges.	Market tax.	Dalal's charges.	Commission.	Total.
	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ..	1,300	5 14 0	7 0 0	2 6 0	5 0 0	10 7 11	30 11 11
II ..	1,824	8 0 0	4 0 0	5 8 0	5 0 0	12 8 5	35 0 5
III ..	3,787	11 4 0	6 12 0	13 0 0	5 0 0	27 4 0	63 4 0
IV ..	6,032	15 4 0	8 6 0	16 12 0	11 4 0	38 1 11	89 11 11
V ..	20,993	71 12 0	21 12 0	30 0 0	25 0 0	105 9 4	254 1 4
VI ..	15,702	44 0 0	26 8 0	21 0 0	20 0 0	100 6 9	211 14 9
VII ..	3,248	11 0 0	7 0 0	4 0 0	5 0 0	16 2 4	43 2 4
VIII ..	522	5 0 0	3 0 0	0 12 0	2 0 0	3 3 4	13 15 4
IX ..	934	4 8 0	3 0 0	1 8 0	5 0 0	7 8 9	21 8 9
X ..	6,519	15 8 0	9 4 0	10 0 0	10 0 0	54 8 9	99 4 9
XI ..	5,551	16 8 0	9 8 0	8 0 0	5 0 0	30 13 7	69 13 7
XII ..	....	....	....	....	....	....	....
XIII ..	....	....	....	....	....	....	....
XIV ..	2,883	12 0 0	4 8 0	5 8 0	5 0 0	20 1 7	47 1 7
XV ..	1,649	8 8 0	4 0 0	4 8 0	5 0 0	15 14 5	37 14 5
XVI ..	7,326	22 0 0	12 0 0	13 0 0	7 0 0	29 5 7	83 5 7
XVII ..	4,970	16 0 0	8 0 0	9 0 0	5 0 0	22 1 7	60 1 7
XVIII ..	3,880	12 0 0	6 0 0	7 8 0	7 8 0	31 14 4	64 14 4
XIX ..	1,771	5 0 0	2 8 0	3 4 0	3 0 0	2 4 2	16 0 2
XX ..	2,918	8 6 0	5 0 0	4 10 0	5 0 0	5 9 7	28 9 7
XXI ..	3,344	12 0 0	6 4 0	4 12 0	5 0 0	4 4 9	32 4 9
XXII ..	3,961	12 0 0	6 0 0	6 4 0	5 0 0	8 7 0	37 11 0
XXIII ..	3,212	12 0 0	6 0 0	5 4 0	5 0 0	9 1 4	37 5 4
XXIV ..	....	....	....	....	....	....	....
XXV ..	....	....	....	....	....	....	....
XXVI ..	1,310	4 0 0	2 0 0	2 0 0	5 0 0	12 5 7	25 5 7
XXVII ..	7,004	20 8 0	11 6 0	11 2 0	10 0 0	40 7 11	93 7 11
XXVIII ..	4,480	12 0 0	6 6 0	6 10 0	5 0 0	24 5 7	54 5 7
XXIX ..	3,703	14 0 0	6 0 0	6 0 0	10 0 0	53 8 0	89 8 0
XXX ..	....	....	....	....	....	....	..
XXXI ..	2,398	8 0 0	3 14 0	3 10 0	5 0 0	9 11 2	30 3 2
XXXII ..	8,416	31 0 0	13 0 0	12 2 0	10 0 0	47 1 5	113 3 5
XXXIII ..	6,291	16 0 0	7 0 0	8 0 0	10 0 0	48 0 0	89 0 0
XXXIV ..	7,040	20 0 0	8 12 0	5 4 0	5 0 0	34 10 4	73 10 4
XXXV and XXXVI	9,907	28 0 0	13 0 0	12 0 0	10 0 0	49 13 7	112 13 7
Total ..	152,875	482 0 0	237 12 0	243 4 0	220 12 0	875 11 0	2,059 7 0

Voyage.	Fish landed for Market.	Cart hire.	Cooly charges.	Market tax.	Dalal's charges.	Commission.	Total.
	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Fish.			*Karachi Market Account.*				
XXIV ..	4,818	....	....	....	....	....	....
XXV ..	6,260	27 0 0	0 0 0	20 0 0	0 0 0	10 3 8	57 3 8
XXX ..	2,387	25 0 0	0 0 0	20 0 0	0 0 0	12 0 3	57 0 3
XXV ..	100	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
	13,565	52 0 0	0 0 0	40 0 0	0 0 0	22 3 11	114 3 11
Grand Total ..	166,440	534 0 0	237 12 0	283 4 0	220 12 0	897 14 11	2,173 10 11
Date.			*Fish Poks.*				
2-8-21 ..	65	1 0 0	0 8 0	0 0 0	0 0 0	3 10 9	5 2 9
14 9-1921 & 11-12-21	172½	3 0 0	0 0 0	0 0 0	0 0 0	13 2 4	16 2 4
11-2-22 ..	96	0 0 0	2 0 0	0 0 0	0 0 0	8 15 2	10 15 2
11-3-22 ..	120	0 0 0	3 0 0	0 0 0	0 0 0	10 15 2	13 15 2
Total ..	453½	4 0 0	5 8 0	0 0 0	0 0 0	36 11 5	46 3 5
			Summary.				
Fish ..	166,440	534 0 0	237 12 0	283 4 0	220 12 0	897 14 11	2,173 10 11
Poks ..	453½	4 0 0	5 8 0	0 0 0	0 0 0	36 11 5	46 3 5
Grand Total ..	....	538 0 0	243 4 0	283 4 0	220 12 0	934 10 4	2,219 14 4

(*b*) SALES ACCOUNT.

Bombay Market Account.

Voyage.	Gross sale proceeds.	Expenses of sale.	Net sale proceeds.
	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ..	230 2 0	30 11 11	199 6 1
II ..	273 0 0	35 0 5	237 15 7
III ..	581 0 0	63 4 0	517 12 0
IV ..	814 0 0	89 11 11	724 4 1
V ..	2,260 8 0	254 1 4	2,006 6 8
VI ..	2,120 0 0	211 14 9	1,908 1 3
VII ..	350 0 0	43 2 4	306 13 8
VIII ..	75 0 0	13 15 4	61 0 8
IX ..	165 0 0	21 8 9	143 7 3
X ..	1,135 12 0	99 4 9	1,036 7 3
XI ..	656 0 0	69 13 7	586 2 5
XII ..	....	....	....
	No fish was sold.		
XIII ..	....	....	....
XIV ..	429 0 0	47 1 7	381 14 5
XV ..	340 0 0	37 14 5	302 1 7
XVI ..	641 0 0	83 5 7	557 10 5
XVII ..	480 0 0	60 1 7	419 14 5
XVIII ..	671 0 0	64 14 4	606 1 8
XIX ..	59 0 0	16 0 2	42 15 10
XX ..	135 0 0	28 9 7	106 6 5
XXI ..	114 0 0	32 4 9	81 11 3
XXII ..	198 0 0	37 11 0	160 5 0
XXIII ..	210 0 0	37 5 4	172 10 8
XXIV ..	....	....	....
	Sold at Karachi, *vide* Karachi account.		
XXV ..	....	....	....
XXVI ..	260 0 0	25 5 7	234 10 5
XXVII ..	863 0 0	93 7 11	769 8 1
XXVIII ..	517 0 0	54 7 7	462 10 5
XXIX ..	1,106 0 0	89 8 0	1,016 8 0
XXX ..	....	....	....
	Vide Karachi account.		
XXXI ..	214 8 0	30 3 2	184 4 10
XXXII ..	1,008 0 0	113 3 5	894 12 7
XXXIII ..	1,001 0 0	89 0 0	912 0 0
XXXIV ..	732 0 0	73 10 4	658 5 9

Voyage.	Gross sale proceeds.	Expenses of sale.	Net sale proceeds.
	Rs. a. p.	Rs. a. p.	Rs. a. p.
XXXV } XXXVI }	1,060 0 0	112 13 7	947 2 5
Total ..	18,698 14 0	2,059 7 0	16,639 7 0
	Karachi Market account.		
XXIV ..	143 0 0	0 0 0	143 0 0
XXV ..	282 14 5	57 3 8	225 10 9
XXX ..	199 12 6	57 0 3	142 12 3
XXXV ..	26 4 0	0 0 0	26 4 0
	651 14 11	114 3 11	537 11 0
Grand total for fish.	19,350 12 11	2,173 10 11	17,177 2 0
Date.		POKS.	
2-8-21 ..	75 0 0	5 2 9	69 13 3
14-9-21 & 1-12-21 ..	266 0 0	16 2 4	249 13 8
11-2-22 ..	181 0 0	10 15 2	170 0 0
11-3-22 ..	222 0 0	13 15 2	208 0 10
	744 0 0	46 3 5	697 11 9
	SUMMARY.		
Fish ..	19,350 12 11	2,173 10 11	17,177 2 0
Poks ..	744 0 0	46 3 5	697 12 7
	20,094 12 11	2,219 14 4	17,874 13 9
		Actually received.	

APPENDIX VIII.

Statement showing quantities of fish marketed at Karachi, and prices realised.

Voyage.	XXIV 2-12-21 3-12-21		XXV 8-12-21 9-12-21		XXX 20-1-22		XXXV 22-2-22	
	Quantity.	Price.	Quantity.	Price.	Quantity.	Price.	Quantity.	Price.
		Rs. a. p.		Rs. a. p.	Lbs.	Rs. a. p.	Lbs.	Rs. a. p.
Goal ..	(27) fish	20 4 0	(150) fish		743		100	26 4 0
Pomfret, White ..	(50) fish	6 4 0	(203) fish		40			
Karel ..	(210) fish	52 8 0	(361) fish		398			
Wam ..	..	..			38			The rest of the catch was sold in the Bombay Market.
Tambusa ..	(9) fish	2 13 0	(15) fish		84			
Shingala ..	(160) fish	10 0 0	(5¼) basket	Fish sold at Karachi in mixed lots.	391	Fish sold at Karachi in mixed lots.		
Chand ..	..	..			24			
Palu ..	(125) fish	18 6 0	(10) basket		194			
Surmai ..	..	..	(20) fish		15			
Dagola ..	..	..	(33) fish		25			
Karli ..	..	..	..		30			
Pomfret Black ..	(15) fish	2 13 0	(16) fish					
Mixed ..	(20) basket*	30 0 0	(22½) basket.		325			
Estimated Total weight ..	4,818 lbs.	143 0 0	6,260 lbs.	282 14 5	2,387	199 12 6	100	26 4 0

Total lbs.	Total Rs. a. p.	Price per lb. Pies.
13,565	651 14 11	9·2 gross
	537 11 0	7·9 net.

* Each basket weighing about 90 to 100 lbs.

APPENDIX IX.

Average catch per hour's trawling and per hour's absence from port.

Voyage.	Absence from port.	Period of actual trawling.	A. Catch per hour's trawling.				B. Catch per hour's absence from port.			
			Rays.	Dogfish Shark Saw fish.	All others.	Total.	Rays.	Dogfish Shark Saw fish.	All others.	Total.
	Hours.	Hours.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
I ..	50	24	10	4	42	56	5	2	20	27
II ..	83	31	27	4	27	59	10	2	10	22
III ..	73	36	47	6	53	105	23	3	26	52
IV ..	63	50	27	4	73	105	22	3	58	83
V ..	128	110½	86	11	93	190	74	9	80	164
VI ..	92	76½	65	21	119	205	54	18	99	171
VII ..	35	14¾	67	1·4	189	257	28	1	80	106
VIII ..	32	11¼	30	3	25	58	11	1	9	20
IX ..	30	9	50	7	47	104	15	2	14	31
X ..	75½	62½	25	..	102	127	20	..	84	104
XI ..	54	43¼	29	1	133	163	23	1	106	130
XII ..	19	4	35	2	35	72	7	·4	7	15
XIII ..	26½	16¼	..	..	..	9	..	..	..	6
XIV ..	49	40¾	36	9	45	90	30	7	38	75
XV ..	104	42	17	..	42	59	7	..	17	24
XVI ..	75	65	55	7	59	121	48	6	51	105
XVII ..	70½	52½	30	..	91	121	22	..	68	90
XVIII ..	74	42¼	18	7	86	111	10	4	49	63
XIX ..	188	44¾	33	..	25	58	8	..	6	14
XX ..	73	57¾	8	4	48	60	7	3	38	47
XXI ..	68	53¼	20	+	57	77	16	+	45	61
XXII ..	89	52½	21	10	83	114	12	6	49	67
XXIII ..	99	77	12	..	42	54	10	..	32	42
XXIV ..	135½	59¼	3	8	80	92	1·4	3·5	35	40
XXV ..	56½	46	.8	8	145	154	·6	6	118	124
XXVI ..	71	11½	8	28	127	164	1	5	20	26
XXVII ..	120	86	45	4	83	132	32	3	59	94
XXVIII ..	64	40	48	5	76	130	30	3	48	81
XXIX ..	118	70¾	16	5	58	79	9	3	35	47
XXX ..	88	34½	6	8	76	90	2	3	26	31
XXXI ..	98	35	..	13	80	93	..	4	29	33
XXXII ..	72	58½	33	12	121	167	27	10	99	136
XXXIII ..	75	55½	22	9	95	127	16	7	70	94
XXXIV ..	74½	53½	29	14	106	148	20	10	76	106
XXXV ..	114¾	50½	10	8	115	133	4	4	51	59
XXXVI ..	113¼	61½	20	16	76	112	11	9	41	61
Total ..	2,851	1,679¼								
Average ..	....	..	30	7	80	117	18	4	47	69

APPENDIX X.

Rate of gross earnings per hour's fishing and per hour's absence.

Voyage.	Absence from port.	Duration of trawling.	Sum realised.			Remarks.
			For whole catch.	Per hour's fishing.	Per hour's absence from port.	
	Hours.	Hours.	Rs.	Rs.	Rs.	
I ..	50	24	230·125	9·6	4·6	
II ..	83	31	273	8·8	3·3	
III ..	73	36	581	16·1	8·0	
IV ..	63	50	814	16·3	12·9	
V ..	128	110½	2,260·5	20·5	17·7	
VI ..	92	76½	2,120	27·7	23·0	
VII ..	35	14¾	350	23·7	10·0	
VIII ..	32	11¼	75	6·7	2·3	
IX ..	30	9	165	18·3	5·5	
X ..	75½	62½	1,135·75	18·1	15·0	
XI ..	54	43¼	656	15·1	12·1	
XII ..	19	4	....	....	....	No fish was landed for market.
XIII ..	26½	16¼	....	....	....	Do.
XIV ..	49	40¾	429	10·5	8·8	
XV ..	104	42	340	8·1	3·3	
XVI ..	75	65	641	9·9	8·5	
XVII ..	70½	52½	480	9·1	6·8	
XVIII ..	74	42¼	671	15·9	9·1	
XIX ..	188	44¾	59	1·3	0·31	
XX ..	73	57¾	135	2·3	1·8	
XXI ..	68	53¼	114	2·1	1·7	
XXII ..	89	52½	198	3·8	2·2	
XXIII ..	99	77	210	2·7	2·1	
XXIV ..	135½	59¼	143	2·4	1·05	
XXV ..	56½	46	282·9010	6·2	5·0	
XXVI ..	71	11½	260	22·6	3·7	
XXVII ..	120	86	863	10·03	7·2	
XXVIII ..	64	40	517	12·9	8·0	
XXIX ..	118	70¾	1,106	15·6	9·4	
XXX ..	88	34½	199·7812	5·8	2·3	
XXXI ..	98	35	214·5	6·1	2·2	
XXXII ..	72	58½	1,008	17·2	14·0	
XXXIII ..	75	55½	1,001	18·0	13·3	
XXXIV ..	74½	53½	732	13·7	9·8	
XXXV ..	114¾	50½	1,086·25	9·7	4·8	
XXXVI ..	113¼	61½				
Total ..	2,851	1,679¼	19,350·8072	11·5	6·8	

APPENDIX XI (*a*).

Statement of capital cost.

		£ s. d.	Rs. a. p.
Cost of Trawler ..		17,000 0 0	1,70,000 0 0
Expenses incurred in England ..		15,336 0 0	1,53,360 0 0
Details.	£ s. d.		
1 Reconditioning and Repairs (Brand and Curzon A-c.)	7,677 16 5		
2 Electrical Installation .. (Humber Electric Engineering Co., A-c.)	600 8 5		
3 Fishing gear and spare accessories .. (Grimsby Coal, Salt and Tanning Co., A-c., Garnick Bilby & Co., A-c., Tyne Metal Co., A-c., and Bedford Steer End & Co., A-c.)	1,852 9 0		
4 Refrigerating plant, installation and spares. (Lightfoot Refrigeration Co., A-c.)	2,902 2 4		
5 Navigation equipment ..	217 16 0		
6 Supervision and Travelling, etc. ..	1,191 15 11		
7 Expenses of bringing out to Bombay .. (G. Welford & Son, A-c., J. C. Strick & Co., A-c., and Anchor Line, A-c.)	752 14 7		
8 Ship's accessories ..	145 8 4		
	15,340 11 0		
Deduct rebate ..	4 11 0		
	£15,336 0 0		
Expenses incurred in India for final fitting out, such as awning, galley, bunks for Indian Crew and other additions and alterations.			29,584 3 0
		Total Rs.	3,52,944 3 0

APPENDIX XI (*b*).

Statement showing the amounts spent under different headings for running the steam trawler "William Carrick".

	Rs. a. p.	Rs. a. p.	Rs. a. p.
Wages to Officers ..	....	....	30,157 7 9
Wages to Chief Engineer ..	....	....	7,276 0 0
Wages to Crew ..	....	....	16,387 13 0
Stores ..	....	....	11,965 3 5
Consumable ..	....	7,334 2 4	....
Paints ..	815 1 2	....	....
Oils ..	2,734 1 3	....	....
Soap ..	316 15 8	....	....
Soda ..	82 5 10	....	....
Sponge cloth and cotton waste ..	198 14 0	....	....
Ropes ..	1,454 5 5	....	....
Miscellaneous :			
Matches, medicines, brushes, brooms, packing, emery, scrapers, twine, etc. ..	1,732 7 0	....	....
	7,334 2 4	....	....
Coal ..	....	....	47,418 4 6
Water ..	....	....	427 11 4
Ice ..	....	....	2,944 0 0
Non-consumable ..	....	4,631 1 1	....
Tools ..	200 0 0	....	....
Cooking utensils for Indian Crew ..	155 0 0	....	....
Crockery and cutlery ..	793 14 0	....	....
Linen ..	1,145 2 7	....	....
Anchor ..	925 0 0	....	....
Life rafts ..	500 0 0	....	....
Miscellaneous :			
Cane-baskets, buckets, tins, charts, boxes, wires, S. Balances, torches, etc.	912 0 6	....	....
	4,631 1 1	....	....
Godown ..	....	....	500 0 0
Basin rent ..	....	....	1,963 5 4
Wharfage ..	....	....	557 8 0
Towing, etc. ..	....	....	334 0 0
Pilotage ..	....	....	355 0 0
Coal ashes removing charges ..	....	....	475 0 0
Miscellaneous charges ..	....	....	1,115 7 9
Repairs and renewals ..	....	....	41,039 5 4
Capital cost for general fitting out ..	....	29,584 3 0	....
Repairs ..	....	5,621 2 4	....
Dry docking and painting ..	....	5,834 0 0	....
			1,62,916 2 5

APPENDIX XI (c).

Revenue statement.

Receipts.			Expenses.		
	Rs. a. p.			Rs. a. p.	
Sale-proceeds of fish ..	19,350 12 11		Marketing expenses of fish ..	2,173 10 11	
,, ,, poks ..	744 0 0				
Miscellaneous receipts ..	72 4 3		Marketing expenses of poks ..	46 3 5	
Food store account ..	6 0 0			2,219 14 4	
Fins account ..	5 0 0		Dicsount ..	0 0 10	
			Net ..	17,958 2 0	
	20,178 1 2			20,178 1 2	

APPENDIX XI (*d*).

Balance sheet.

Receipts.	Rs.	a.	p.	Expenses.	Rs.	a.	p.
Sale-proceeds of fish as per Revenue account ..	20,178	1	2	Cost of Trawler ..	1,70,000	0	0
Sale-proceeds of Trawler ..	1,50,000	0	0	Capital expenses for fitting out.	1,82,944	3	0
Loss ..	3,18,318	0	5	Working expenses ..	1,33,331	15	5
				Sale expenses as per Revenue account ..	2,219	14	4
				Discount ..	0	0	10
	4,88,496	1	7		4,88,496	1	7

APPENDIX XII.

Note on the use of the Danish Seine or Snurrevaad.

This net is essentially an improved seine or drag net which in its general character is akin to nets which have been used for ages all over the world. For many years it has been used by Danish fishermen, at first mainly for the capture of plaice which were brought alive in well-boats to market, but more recently it has been modified so as to catch practically any kind of fish, there being three different patterns in use in Europe designed to catch principally plaice, haddock and cod. The secret of its efficiency is that in its mode of working it combines the wide *spread* of the seine net proper with the *mobile* method whereby it sweeps a path over the sea bottom in the same way that a trawl does.

On the Danish fishing grounds this gear is used from motor cutters of between 40 and 50 feet length. The net somewhat resembles a trawl in shape but has the long wings of a seine. To each wing is attached a long hauling rope. For many years the method of working was to anchor the motor cutter at a suitable spot and to shoot the net from a small motor boat, one of the hauling ropes being fixed to the cutter and paid out by the small boat as it moves away. When all this line is paid out the net is cast into the water and the small boat returns with the other hauling rope to the cutter. Both ropes are then hauled in together by a motor winch in connection with which an automatic rope-coiler is used.

As soon as it has brought back the end of the second hauling line the small boat goes off with another net and repeats the process and thus in the course of a day a large area of ground may be swept without the employment of the great power and fuel consumption that is necessitated by the working of a trawler.

By a comparatively recent modification the employment of the small boat is dispensed with and the work is thus enabled to be carried on under conditions of rough weather and further out to sea. The present day plan is to make use of a large buoy which is anchored in the position where the cutter itself formerly remained and to which one hauling rope is attached. The cutter then performs the same operations of paying out the ropes and "shooting" the net, returning to the buoy with the end of the second hauling rope. Both ends are then taken aboard and the hauling is commenced. A circular area of ground of a mile radius from the buoy may thus be swept in successive hauls.

The dimensions of the net usually used for plaice or other flat fish are as follows :—Each wing is 80 to 90 feet long ; the length of the central bag, 30 to 40 feet ; depth of wings 50 meshes at near end ; depth of mouth of central bag 10 feet ; mesh of wings 2½ inches, of bag 2 inches and of tail-end of same 1¾ inches. The net used for haddocks has a longer bag and a mouth about twice as deep. The ground rope is weighted with lead sinkers and the head-line buoyed with corks.

The special feature of the gear is the length of the hauling ropes. When fishing in water of 10 to 15 fathoms the usual length is about 600 fathoms (1,200 yards) but in deeper water longer ropes are used, 900 fathoms being let out in depths of about 25 fathoms. With still longer ropes the net has been successfully used in the Skagerack up to depths of 100 fathoms.

The accessory gear consists of a small steam or motor winch with which to haul in the net, a rope-coiling machine which works in conjunction with the winch and automatically forms two coils of rope on the deck at the same time, and rollers to guide the hauling ropes over the boat's side to the winch drums. The entire outfit with six nets and two warps (hauling ropes) of 1,000 fathoms each can be installed for very little more than a quarter the cost of fitting out a vessel for trawling*.

Although this form of fishing gear has been very largely installed on steam trawlers and steam drifters in Britain in the last year or so, by which it has been used with equal or greater success and with marked saving of expense as an alternative to trawling, the most suitable and economical vessel for its employment is a motor vessel.

The modern motor-cutters of Denmark are usually about 48 feet long, 13½ feet beam and about 6 feet draught, with a gross registered tonnage of 16 to 28 tons or more. They are installed with motor engines of 30 to 45 horse-power which with a consumption of 320 to 400 lbs. of Kerosene per day give speeds of 6 to 8 knots.

The cost of a completely equipped seining cutter is said to be about one-tenth of the cost of a steam trawler. The cutter requires only four hands, one of whom looks after the motor but also helps with the fishing as is the case in British motor fishing boats. While being able to catch as much fish, and not infrequently more, the working expenses are only about one-third those of a steam-trawler.

For the Bombay fisheries there is every reason to suppose that a seining vessel of the Danish type would be quite as productive as steam trawler and possibly much more so.

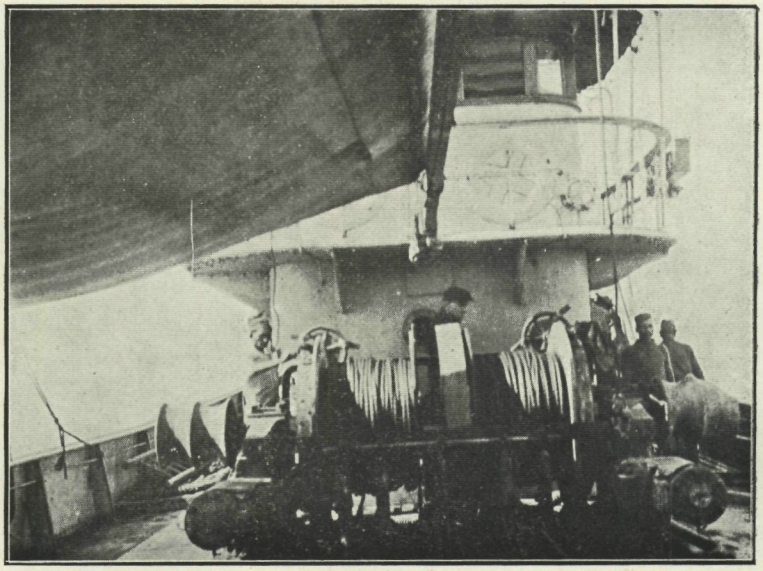
However, in view of the fact that the bad weather season is the most lucrative for fishing it would probably be the most advantageous arrangement to work a small steam trawler with seining gear in the fine weather and as a trawler proper during the Monsoon.

* The following F.O.B. prices were quoted by a firm at Great Yarmouth, England, in 1922 :—Double cylinder winch, £106-10-0 to £115 ; Double pattern rope coiling machine, £24-5-0. Two rope Rollers, £7-5-0 to £7-15-0 ; 20 coils yacht manila (2") hauling rope, each 120 fathoms £5-10-0 per cwt. Thirty fathom Tarred Seine (trawl-fitted complete), £20-5-0. Twenty-four fathom Tarred Seine (trawl-fitted complete), £13-12-6.

Installation charges for winch, etc., were quoted at £50.

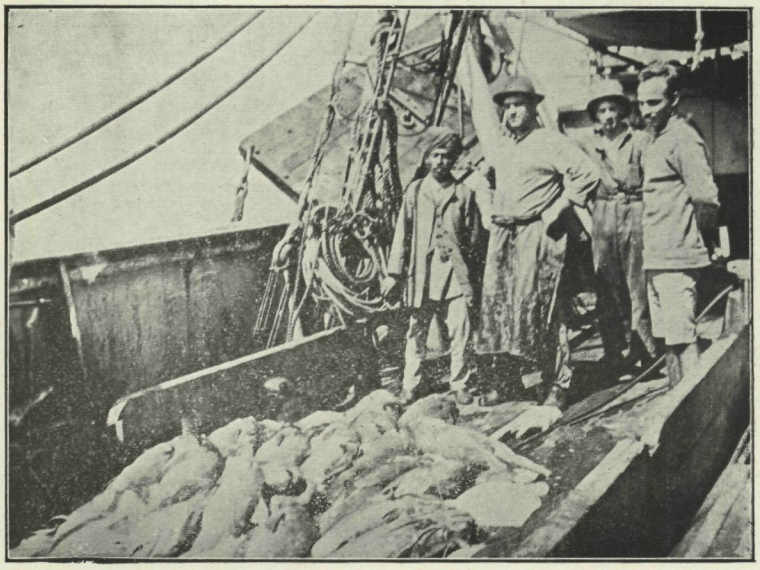
BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS.

Fig. 1.



The trawl winch. The deck-house behind the winch contains the compressor of the refrigerating plant.

Fig. 2.



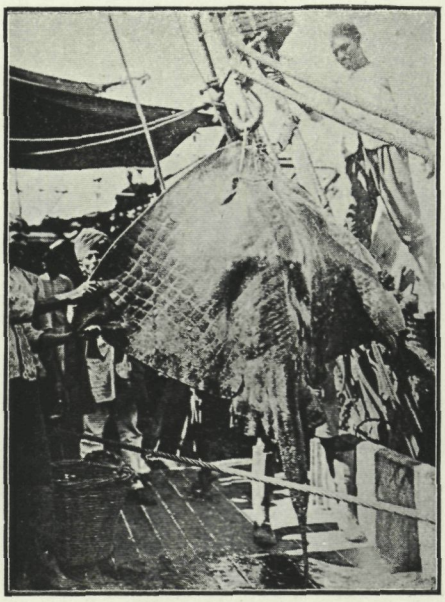
A catch of goal and ravas. One of the otter-boards is shown drawn up and suspended from its "gallows".

Fig. 3.



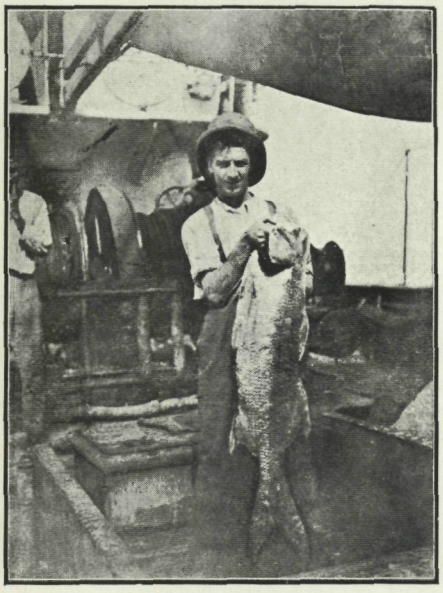
Goal *(Sciaena diacanthus)*.

Fig. 4.



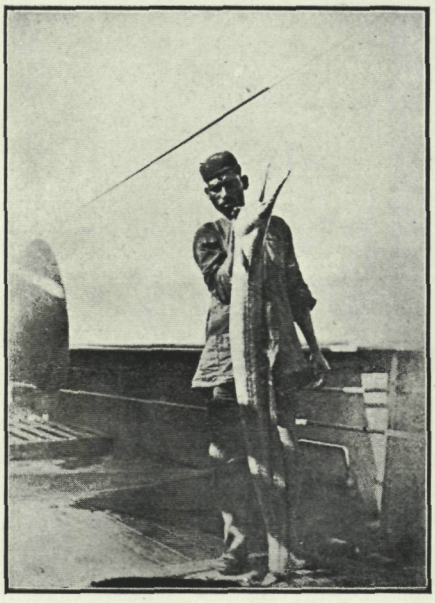
Wagli *(Trygon microps)*.

Fig. 5.



Ravas *(Polynemus indicus)*.

Fig. 6.



Wam *(Muraenesox talabonoides)*.

Fig. 7.



The "cod end" of the trawl hauled inboard. It is about to be untied to let out the catch of fish into the deck pound.

Fig. 8.



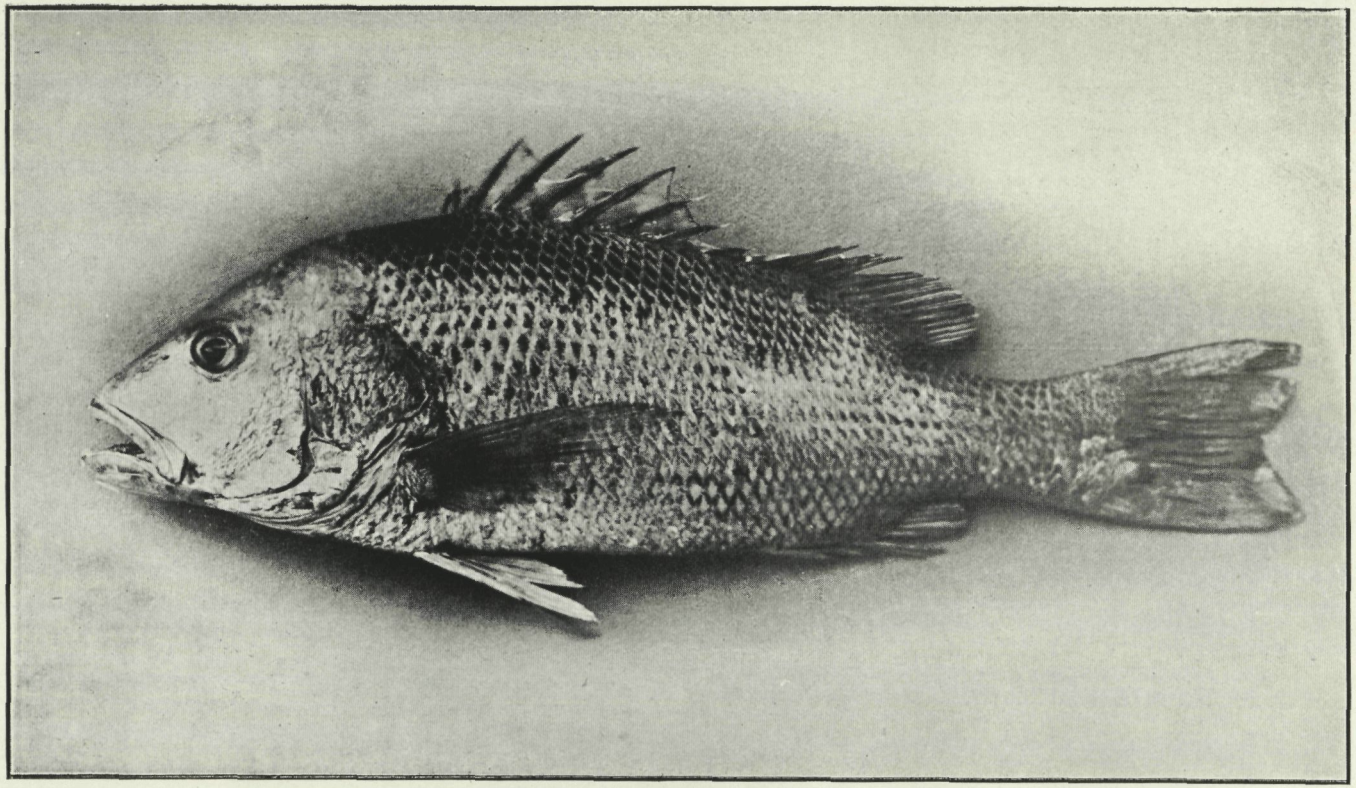
A mixed catch. The fish being held up are (from front to rear) goal, hammer-headed shark and ravas.

Fig. 9.



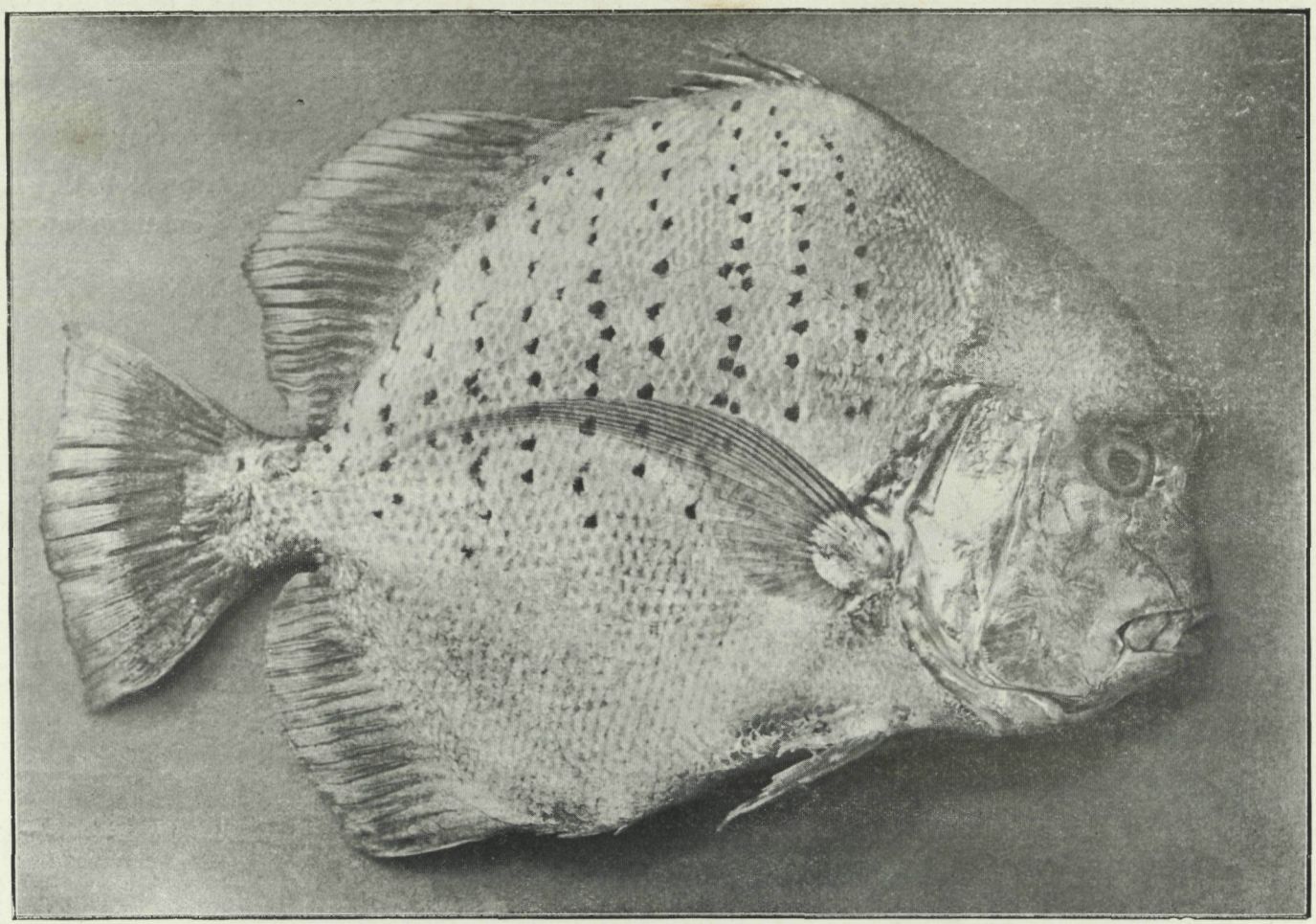
Mending the trawl net.

Fig. 10.

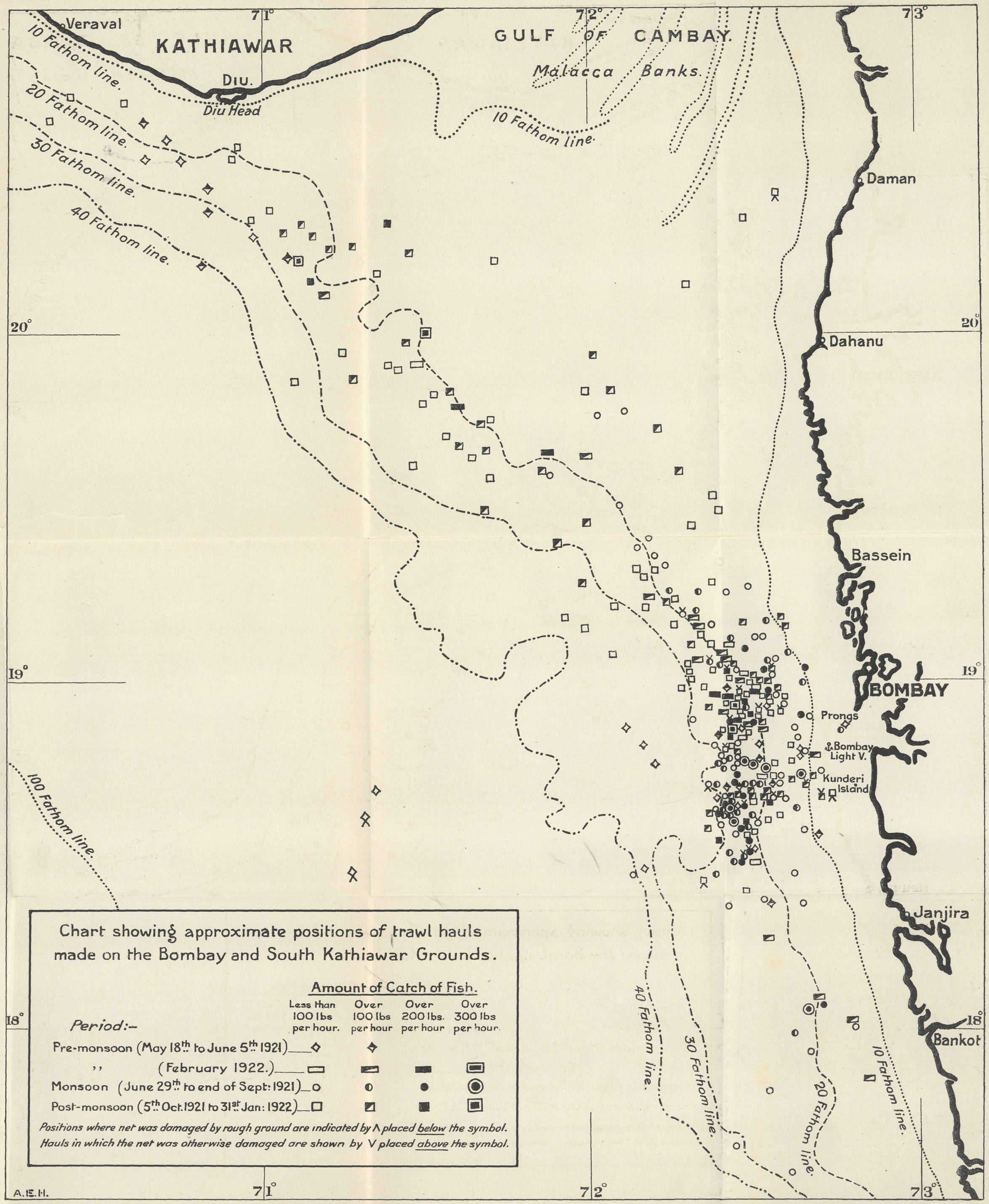


Tambusa *(Lutianus johnii)*.

Fig. 11.



Chand *(Drepane punctata)*.



L/332. Govt Photozinco: Office, Poona.

45′

67° E

15′

KARACHI

Cape Monze

Kiamari

Manora

45′

Gisri Mouth

DELTA OF THE INDUS

45′

Piri Mouth

Kudi Mouth

Khai Mouth

30′

30′

Pitiana Mouth

Dubba Mouth

15′

15′

Sisa Mouth

Hajamro Mouth

Kedwari Mouth

24° N

24°

CHART SHOWING POSITIONS OF HAULS

Made by the Steam Trawler "William Carrick" on the Sind Grounds.

The centre of the rectangle marks the approximate position of hauling.

Hauls made in December and January ("Post-monsoon season") are represented by oblongs and hauls made in February ("Pre-monsoon") by squares.

Quantities of fish caught are indicated as follows:-

A catch per hour of under 100 lbs. by □ or ▭ ,

" " " " " *over* 100 lbs. " ◪ " ◪ .

" " " " " " 200 lbs. " ■ " ■ ,

" " " " " " 300 lbs. " ■ " ■ .

A haul in which the net was damaged is indicated thus:- ▭

The dotted line (·····) indicates the 10 fathom limit.

The broken line (- - -) shows the 20 fathom limit.

45′

67° E

15′