

SMALL MESH TRAWLING IN PAPUA

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RESULTS from forty hauls with small mesh trawl nets are described. The sea bottom of the Gulf of Papua is remarkably free of logs and debris. Records of nine different penaeid species of prawns are given of which five have commercial possibilities. Three species of carid shrimps which are not of commercial value by Australian standards were also obtained.

Greatest quantity of prawns was taken off the Fly River Mouth while largest were from Caution Bay and off Jokea. Small fish 6-8 inches long were most abundant off Kerema Bay while the largest fish were found off the Fly River. Salinity and quantity of phytoplankton of the area are described briefly.

1.—Introduction.

The Gulf of Papua comprises an area of more than 6,000 square miles under 100 fathoms deep, a large part of which is muddy or sandy bottom under 70 fathoms. To the south-east, extending from the vicinity of Caution Bay, the areas of mud bottom are much less because of the smaller rainfall and drainage area, with consequent smaller quantity of silt brought down by the rivers. Only in a few places such as Hood Lagoon and Milne Bay are there areas of soft bottom on which it is safe to haul a trawl net. The following account gives the result of forty small mesh trawl net hauls in shallow water in Papua. Details of the hauls are given in Appendix 1 and Chart 1 shows the positions in which the trawls were made.

II.—Species of Prawns and their Size.

The following species† were obtained at representative localities where collections were made. Common names refer to field identifications used in Table 1 :—

1. Off the Fly River Mouth.—

Metapenaeus demani (Roux)—Rainbow prawn.

Parapenaeopsis sculptilis male—Long spined prawn, female—Short spined prawn.

Atyopenaeus formosus—Spiny backed prawn.

Palaemon (nematopalaemon) sp.—White or pink shrimp.

Leander sp.—Hunchback prawn.

2. Eastern Gulf (principally off Jokea).—

Penaeus merguensis (de Man)—Rainbow prawn or greasy-back of Australia.

Metapenaeus monoceros (Fabricius)—Speckled prawn.

Trachypenaeus fulvus Dall—Rough skin prawn.

3. Caution Bay.—

Penaeus merguensis (de Man)—Rainbow prawn.

Metapenaeus endeavouri (Schmitt)—Banana prawn.

Trachypenaeus anchoralis (Bate)—Rough skin prawn.

4. Milne Bay.—

Penaeus semisulcatus (de Haan)—Rainbow prawn.

Metapenaeus monoceros (Fabricius).

Following are the Papuan species of penaeid prawns of possible commercial value, based on Australian standards. Sizes given are the largest recorded in the survey :—

Metapenaeus demani 5½ inches.

Penaeus merguensis 8¾ inches.

Penaeus semi sulcatus 7¼ inches.

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† For common and scientific names of Australian Prawns, see W. Dall, 1956, Fisheries Newsletter, Vol. 15, No. 2, p. 5, in which there are differences from the names given for Papuan species.

Parapenaeopsis sculptilis 4 inches.

Metapenaeus endeavouri 6½ inches.

Over 90 per cent. of these species exceeded 3 inches in length and more than 40 per cent. were over 4 inches (Table 1).

The spinyback prawn, *Atyopenaeus formosus*, although fairly plentiful at times, is usually too small to be considered of commercial value.

The two carid species, *Paleomon* and *Leander* which were taken in the trawl and a third form *Heterocarpus*, taken from a tuna stomach to the south of the Gulf may be of use as a meal. *Leander* was taken in the greatest numbers but was also of smallest size; a considerable proportion being under 2 inches long.

The river prawns from Port Moresby to the Eastern Gulf which sometimes occur at a small size, in the sea, are *Macrobrachium* lar (Fabr) and belong to the palaemonid group.

Twenty per cent. of the prawns and shrimps measured were under 3 inches long. This, however, by weight is less than eight per cent.

III.—Quantity of Prawns.

Results from the Gulf of Papua showed that this area has commercial possibilities, and should be further tested. The best haul off the Fly River Mouth (south entrance) produced twenty-two pounds of medium sized prawns and shrimps of five species, and in the eastern Gulf off Jokea four pounds were taken, mostly of large prawns. Prawns were taken in all localities fished and, while shallow waters may not have been the best fishing grounds, the series of hauls made give comparable results throughout the area fished.

Caution Bay to Yule Island.—

First tests made here with a small net produced a few prawns, however, when a larger net was tested only a slight increase in quantity was taken with also increased quantities of fish. Although bottom and conditions generally appeared better in the vicinity of Yule Island and considerable numbers of flatfish were taken, results were not so good as in Caution Bay.

Jokea to Kerema.—

In a depth of 7-9 fathoms the best haul in the Eastern Gulf was made in a small channel off Jokea. The mud was found to be very soft and the trawl net dug deeply. Four pounds of prawns were taken in a haul of 30 minutes. Other hauls in the vicinity did not produce such satisfactory results. The next best results off Jokea being one pound in 5-6 fathoms, while in deeper water only several large prawns were taken. One hundred pounds of fish were taken off Jokea; they were mostly small *Gerres* and *Leiognathus* neither of which kept in the freezer. The greatest haul was obtained off Kerema Bay where 150 lb. of fish were taken including 60 lb. of small jew fish, several species of anchovy, including *Thrissocles* and *Engraulis*. The common sprat (patu) *Dactylolepis* is also found and blind sole—3½ lb. of prawns were taken.

Keakea Creek to Port Romilly.—

Off Keakea the hauling was heavy inside reef; the net with a large quantity of mud, brought up only about two pounds of prawns.

Off the Purari River was the only place where difficulty was experienced in hauling the net aboard the ship, a large quantity of small pieces of wood and palm seeds which was taken contained mixed with it, four pounds of prawns. Three "Bombay duck" (*Harpodon*) were taken here, the furthest east they were met in this region and with anchovy (*Thrissocles*) identify the head and western Gulf waters. Goat fish *Upeneus* were also taken in this haul and it is evidently near the limit of their distribution into the influence of fresh waters.

In the Panaroa River trawling in 1½-5 fathoms was unproductive, although Natives—by blocking backwaters of the river with woven cane barriers—get considerable quantities of prawns. It seems that in the region of the head of the Gulf there is an extensive area of mixing of salt and fresh water where conditions, particularly with reference to catches of fish and prawns, are very variable.

South of Port Romilly the greatest quantity of heavy mud was found and difficulty was experienced in freeing the net in this locality where it was found to have become buried to a depth of more than a foot (haul 22).

Off the Fly River.—

An almost entirely different fish population was found off the Fly River, and the principal prawn was also different. The variety of prawns and shrimps also was greater with, at least in shallow water, small prawns being more abundant in numbers. The area fished was confined to water 4-8 fathoms deep, and was over a region traversed by channels in which the bottom was of fine silt with shallow parts between the channels of sand and mud. The strong currents carried considerable quantities of this sandy mud which does not make ideal conditions for fish or prawns and water deeper than 10 fathoms may be more productive. Mixing effects of the tidal current is so strong that in no position fished off the Fly River Mouth was the net on the bottom, outside the limit of range of fresh water, and a depth of 10-15 fathoms may be more productive of greater quantities and larger prawns. It is significant that prawns do occur in the shallow water. Hauling in the gutters as off Jokea, produced no large catch and no big prawns, and the principal catch made was probably of small travelling shoals moving over the sand-banks where the trawl did not dig.

Hood Lagoon and Milne Bay.—

There are extensive areas of mud bottom inside the Barrier Reef to the east of Port Moresby but trawling tests were made in only two localities, Hood Lagoon and at the head of Milne Bay. Although prawns were found in these places results were poor and it is probable that on this type of coast, Native methods will prove more satisfactory than trawling. Small waterways draining swamps produce many prawns in some localities, and at Mogubu (north of Anioro or Lupon Island) scoop nets are used to catch prawns during minor floods, when at high tides sand-bars are broken down and the swamps then empty into the sea carrying good quantities of prawns; these are a penaeid species and although *Macrobrachium* is the common river prawn attaining a weight of 12 oz. it is not taken under these circumstances.

IV.—Water Analyses and Prawn Distribution.

Chart 1 shows the positions in which the inshore trawlings were made and in addition, gives the positions in which water

samples and phytoplankton hauls were made with a 7-inch diameter net of 200 mesh per inch bolting silk. It was thought that the quantity of phytoplankton recorded over large areas would give some guide to productivity and consequently to the best areas to search for fish or prawns and while further work may show the soundness of this hypothesis, the results from the Gulf of Papua and the Coral Sea, with reference to prawns are inconclusive, they are briefly summarized below.

Quantity of phytoplankton is given as c.c. settled volume per 5 minute haul which is equivalent to a column of water 7 inch diameter representing 135 cubic feet of water through which the net was towed. Number of hauls is given in parentheses.

Head of Gulf, Kerema Bay to Kiwai Island, Fly River—0.5 (10).

North of Australian Barrier Reef, Daru to East Cay—1.5 (8).

Portlock Reef to Yule Island—1.7 (9).

Eastern Fields to Port Moresby—3.7 (2).

Yule Island to Hood Lagoon (60 miles south-east of Port Moresby)—10.5 (6).

Yule Island to Hood Lagoon (excluding two lagoons)—2.5 (4).

In the enclosed lagoon with small water drainage phytoplankton production was high but inshore in the Gulf where there is much fresh water phytoplankton production is low. It is considered, however, that the increasing phytoplankton in the regions—

- (1) Daru to East Cay;
- (2) Portlock Reef to Yule Island;
- (3) Eastern Fields to Yule Island;

is attributable to the effects of land drainage. There is, however, after the North-West season a possibility that upwelling of deep water will have had some effect.

There are indications that to the east of Port Moresby, although there is a high phytoplankton concentration inshore in low drainage areas outside the reefs, phytoplankton production is comparable to that at the head of the Gulf of Papua.

Salinities in the Gulf of Papua and Coral Sea can be related to the prawn collection only to the extent that in the low saline area, off the Fly River Mouth, greater quantities of small prawns and shrimps were taken than in other localities. At a distance

of 10 miles east of Kiwai Island the waters from surface to bottom are completely mixed when the tide flows strongly. Fine sand is found in the surface water and the influence of the river is felt at least 35 miles to the east of Kiwai. The following resume of the Western and Central Gulf gives average salinity in parts NaCl per thousand, number of analyses in parentheses:—

4½ to 10 miles off Kiwai Island—29.8 (3).
35 miles off Kiwai Island—35.2 (1).

Eastern Fields and Portlock Reefs—36.9 (8),

to 100 fathom line off Papuan Coast.

In the latter area salinity varies from 35.8‰ at 25 miles west of Yule Island where there is influence of fresh water from the head of the Gulf to 37.3‰ at a position 20 miles east-south-east of East Cay.

Ten miles to the south-east of Daru on 23rd August, 1955, fresh water was present in considerable proportion and the salinity was 30.7‰ while a few miles further to the east a definite area of mixing was found in which to the west the salinity was 32.1‰ and a quarter mile to the east 34.9‰. At Bramble Cay 25 miles further east salinity was found to be 36.1‰.

V.—Trawling Possibilities.

Although quantities of prawns taken were small, the results show that the bottom is suitable for trawling in depths from 3 fathoms or more, over many hundreds of square miles. The small mesh trawl was used as it was expected that prawns would be found in quantity; it is possible that at a different season better results may be obtained. Although the greatest quantity was obtained off the Fly River the best class of prawns was found near Port Moresby from Caution Bay to Jokea. A large mesh commercial fish trawl may prove a more efficient method of taking fish than the various Native methods used in inshore waters in the Gulf of Papua where Native sea fishing techniques are poor.

Conditions change suddenly about 20 miles south of the southern entrance of the Fly where bottom fauna is typical of the open sea and comparable to that found off Jokea or in Caution Bay in the eastern Gulf. The specific differences in the area are shown by the results obtained in hauls 24-26 where over a short distance the population

of prawns and *Harpodon*, *Engraulis* and *Polypenus* changed to *Upeneus* and *Platax*. The changing conditions off the Fly River Mouth, however, are shown in hauls 27 to 33 made eighteen days after the first series. The area bearing prawns was not rediscovered although the net fished part of the area on the second series of hauls. It is probable that in some hauls of 40 minutes towing with the tide, the net covered a distance of 7 miles.

Apart from the *Harpodon*, *Engraulis* and small *Polynemus*, the most striking catch in the net was two specimens of the Queensland King Salmon *Polynemus sheridani* Macleay (related to *P. indicus*?). These two fish weighed 20 and 22 pounds and their occurrence in the area of mixed salt and fresh water off the Fly River suggests the possibility of large commercial shoals either in the river itself or in deeper water in the sea.

VI.—Conclusions.

- (1) Logs are not a serious problem for the trawl in the areas fished although for steaming at night they are a navigational hazard even far out in the Coral Sea.
- (2) In shallow water fish were plentiful in several places including Kerema Bay and off Jokea where *Gerres* and *Leiognathus* predominated and off the Fly River Mouth where many *Polynemus* were caught.
- (3) In the ten weeks of the survey prawns were not taken in commercial quantities but with a ship equipped with a special trawling winch and capable of hauling to 50 fathoms, better results may be obtained. At other seasons also different results could be expected.
- (4) Largest quantity off the Fly River Mouth was obtained in 4½ fathoms in a strong current. The biggest prawns were taken on the eastern side of the Gulf off Jokea in a channel 12-15 fathoms deep.
- (5) In the Panaroa River although few prawns were obtained in daylight trawling, some shrimps were taken; Natives fishing with woven nets blocking tidal arms of the river take good quantities of prawns and this is typical of prawn

fishing of the rivers of the Gulf area. Woven cane basket traps such as are used in the Sepik River are not seen in Papua.

(6) Natural runs of prawns in small rivers which are closed by sand-bars in the South-East season are effectively fished by Natives in a number of places.

VII.—Acknowledgments.

Mr. F. McNeill, Curator of Invertebrates of the Australian Museum, kindly identified the carid species and Mr. W. Dall of the C.S.I.R.O., Division of Fisheries, Cronulla, the penaeid prawns. Mr. P. Southern carried out the chemical analyses of the water.

List of Tables.

1. Appendix 1 Trawling Record.
 2. Table 1 .. Length of Prawns and Shrimps, Trawling Survey, Papua.
 3. Chart giving route taken in survey.
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APPENDIX 1

TRAWLING RECORD

23rd March to 12th May, 1955

Station No.	Date	Locality	Depth fathoms	Bottom	TIME			Tide	Catch	Remarks
					Shot	Finish	Total Trawl. time			
1	23.3	Caution Bay	6½ to 10	Soft mud	5.15 p.m.	6.59 p.m.	60 min.	½ F.	3 only prawns, 1 mantis prawn, 2 red mullet, 1 swimming crab, 2 silver bellies and 1 jew fish	Net appears to be digging but quantity of catch small, and believe net is not fishing correctly. Trawl 14 fathoms.
2	24.3	Caution Bay	6½ to 9	Soft mud	8.30 a.m.	9.40 a.m.	60 min.	H.W.	2 flathead, 1 starfish, 1 beche-de-mer	Water possibly too deep for part of haul only 40 fathoms warp (coir). Trawl 14 fathoms.
3	26.3	Red Scar Bay	7½	Soft mud	3 p.m.	3.40 p.m.	50 min.	½ E.	10 small prawns, ½ bucket of sweep, 2 mantis prawns, 10 silver bream, 3 tongue soles, 5 whittings, 5 patu	Prawns milk white (banana) and reddish. Net hauled early as 1 board riding high. Trawl 14 fathoms.
4	26.3	Red Scar Bay	6 to 8	Soft mud	4.15 p.m.	5.40 p.m.	50 min.	½ E.	1 <i>Trichurus</i> , 10 sweep, 2 flounder, 1 round nosed sole, 3 Milky white prawns 3½ to 4 in., 9 red prawns 2½ to 3 in.	Net shot on return course but in shallower water. Trawl 14 fathoms.
5	27.3	Off Isiu	6 to 8	Soft mud	9.15 a.m.	10.25 a.m.	60 min.	½ F.	1 large red prawn 7½ in., 1 pale blue green and red tail 7½ in., 10 white 5 in. and 6½ in. 4½ to 2½ in., 11 mantis prawns	Only fish 15 sweep and 1 red mullet. The small quantity of prawns here suggests that the ground though poor is the best so far. Trawl 14 fathoms.
6	28.3	West side of Caution Bay	5 to 7	Sand to mud	9 a.m.	9.55 a.m.	55 min.	½ F.	Catch only fish. 15 <i>Gerys oblongus</i> and 2 <i>G. argyreus</i>	Net towed at 4 knots at same engine speed as previously. The hard sand is not productive. Trawl 14 fathoms.
7	31.3	Caution Bay	7 to 9	Soft mud	1.55 p.m.	3 p.m.	50 min.	½ F.	1 prawn 3 in., 36 lb. small fish 2½ to 4 in. long including 1 <i>Lutjanus sebae</i>	20 fathoms net.
8	31.3	Caution Bay	7 to 7½	Soft mud	3.40 p.m.	4.45 p.m.	60 min.	½ F.	6 prawns, soft corals and sponges. 65 lb. small fish as previously. 18 large sea urchins 5 in. diameter	Net towing easily and fishing well. 20 fathoms net.
9	1.4	North of Yule Island	9½ to 9	Hard mud	3.10 p.m.	3.40 p.m.	30 min.	½ F.	1 small prawn, 45 small flatfish 3 to 5 in. long. Miscellaneous other fish and crabs, total 10 lb.	Several short lengths of chain used in front of trawl to disturb mud. Appears to move flatfish out. 20 fathoms net.

10	1.4	North of Yule Island	6	Hard mud	4.20 p.m.	5.5 p.m.	45 min.	‡ F.	1 large red prawn, 120 small flatfish—4 different species; few other species	The quantity of small flatfish suggests that there may be commercial grounds. 1 flatfish 10 in. long. 20 fathoms net.
11	2.4	Off Jokea	7 to 9	Very soft mud	11.50 a.m.	12.20 p.m.	30 min.	‡ E.	About 4 lb. of prawns, 4 kinds. 263.55 Red Scar Bay. 30 lb. fish	Very soft mud. The net digging deeply came up muddy. Prawns also muddy. Lead on sounding sunk its full depth of 8 in. 20 fathoms net.
12	2.4	Off Jokea	5 to 6	Mud	2.10 p.m.	2.40 p.m.	30 min.	‡ F.	About 1 lb. prawns. As previous haul. 100 lb. fish	Mud harder and lead did not sink in it. Some of bottom fish (6 in. long) nearly large enough to eat. 20 fathoms net.
13	3.4	Off Jokea	14 to 15	Fine silty grey mud	8.45 a.m.	9.30 a.m.	45 min.	‡ E.	6 prawns, 5 lb. fish	Foul haul. 20 fathoms net.
14	3.4	7 miles N.W. of Jokea	15 to 12	Grey silty mud	12.20 p.m.	1.5 p.m.	45 min.	L.W.	30 lb. fish, 1 lb. prawns	Very strong tide rip although low water by tables and net at one time almost stopped. 20 fathoms net.
15	4.4	Kerema Bay	5‡	Fine black mud	9.5 a.m.	10.10 a.m.	45 min.	‡ E.	About 300 lb., about ‡ leaves and logs, 60 lb. jewfish, catfish, anchovies, sprats, soles, 2 lb. prawns	Bay flat even bottom but much rubbish, leaves and logs caused difficulty in lifting aboard. 20 fathoms net.
16	4.4	2½ miles off Kea-kea Creek	6‡	Fine black mud	12.49 p.m.	1.50 p.m.	59 min.	L.W.	8 lb. fish, 1½ lb. prawns	Very heavy hauling inside bank on which sea was breaking. 20 fathoms net.
17	4.4	2½ miles off east head Purari River	4‡	Fine black mud	4.10 p.m.	4.40 p.m.	30 min.	‡ F.	Many small logs and seed heads of nipa palm, 20 lb. fish and 2 lb. prawns	Unsatisfactory haul; the large quantity of rubbish damaged fish and prawns.
18	5.4	Panarua River tributary on west bank near mouth	1‡	Grey fine silt	2 p.m.	2.30 p.m.	30 min.	L.W.	Many leaves about 2 buckets. 1 lb. prawns, few catfish and anchovies and jewfish (5 lb.)	The large quantity of leaves in the bottom of river had prevented prawns living here. They could be seen near surface close inshore. 20 fathoms net.
19	5.4	Panarua River main channel near mouth	5	Grey fine silt	3.55 p.m.	4.20 p.m.	25 min.	L.W.	Little rubbish, 10 lb. fish, 1 lb. prawns	The strong tide clears the main river channel of rubbish and fish and prawns live in holes in the river bed which are difficult to fish and locate. 14 fathoms net.
20	6.4	5 miles off Urika River	6‡ to 8	Grey silt	8.50 a.m.	9.30 a.m.	40 min.	‡ E.	No catch	Towing warp set for 6 fathoms and dropped into gutter at 8. Not able to bring vessel into 6 fathoms again. 14 fathoms net.

APPENDIX 1—continued.

Station No.	Date	Locality	Depth fathoms	Bottom	TIME			Tide	Catch	Remarks
					Shot	Finish	Total Trawl. time			
21	6.4	Off Port Romilly 7° 55'S 144° 48'E	7	Hard grey mud	11.45 a.m.	12.25 p.m.	40 min.	½ E.	19 prawns, 3 lb. anchovy	Clean haul. 14 fathoms net.
22	6.4	8° 7'S 144° 35'E	11½ to 12	Fine grey silt	4.30 p.m.	5.10 p.m.	40 min.	½ F.	17 prawns, 8 small fish	Heavy mud; hauling difficult, possibly too much warp (60 fathoms). 20 fathoms net.
23	6.4	8° 16'S 144° 12'E	6 to 6½	Fine grey silt	8.5 p.m.	8.45 p.m.	40 min.	¾ F.	2½ lb. prawns of 6 varieties, 12 lb. fish mostly <i>Polynemus</i>	Net hauled easily with 27 fathoms of warp. Tide running at about 5 knots to W. 20 fathoms net.
24	7.4	8° 40'S 144° 17'E	7½	Fine mud	8.55 a.m.	9.35 a.m.	40 min.	¾ F.	2 lb. prawns as previous haul, 4 lb. <i>Harpodon</i> , few <i>Polynemus</i>	Tide strong, estimated at 5 knots. Net towed covered about 7 miles. Good bottom. 20 fathoms net.
25	7.4	8° 42'S 144° 5'E	4½	Fine silty mud	10.35 a.m.	11.10 a.m.	40 min.	H.W.	22 lb. prawns, 6 lb. <i>Harpodon</i> and few <i>Engraulids</i>	Water discoloured and certainly from tide strength is mixed to bottom. 20 fathoms net.
26	7.4	8° 50'S 143° 45'E	6½	Hard mud	12.20 p.m.	1.5 p.m.	45 min.	½ E.	2 only prawns, <i>Upeneus</i> , <i>Batfish</i> no <i>Harpodon</i> or <i>Engraulids</i>	Water nearly clear but still same evidence of Fly River at least on surface. 20 fathoms net.
27	25.4	Off south entrance of Fly 8° 59'S 143° 38'E	4½	Fine hard mud	1.5 p.m.	1.45 p.m.	40 min.	¾ E.	5 lb. prawns, 10 lb. anchovy, <i>Thrissocles</i> 14 large <i>Scyphozoa</i> , 1 king salmon, <i>Polynemus</i> 22 lb.	The bell-shaped <i>Scyphozoa</i> have tentacles with severe stinging cells. Bag rolled tightly. 20 fathoms.
28	25.4	8° 53'S 143° 42'S	5	Fine hard mud	2.25 p.m.	3.5 p.m.	40 min.	½ E.	3 lb. prawns, anchovies	Heavy swell shooting difficult. Turned into wind to haul, star-board wing of net twisted. 20 fathoms net.
29	25.4	8° 45'S 143° 47'E	6	Fine hard mud	4.20 p.m.	5 p.m.	40 min.	¾ E.	½ lb. prawns and anchovies	Heavy swell. The port warp had two twists in it and net had not been fishing. 20 fathoms.
30	26.4	8° 38'S 143° 54'E	6	Fine hard mud	8.15 a.m.	9 a.m.	50 min.	¾ F.	3½ lb. prawns, <i>Harpodon</i> 5 lb. and anchovies 6 lb.	Sea calm, 20 fathoms net.
31	26.4	8° 40'S 143° 51'E	6 to 4½	Fine hard mud	9.30 a.m.	10.10 a.m.	40 min.	½ F.	3½ lb. prawns, 1 whiptail ray 3 ft. <i>Harpodon</i> and <i>Thrissocles</i>	Depth changed suddenly but maintained depth after change. 20 fathoms net.

32	25.4	8° 44'S 45'E	143°	5	Heavy silty mud	11.5 a.m.	11.45 a.m.	40 min.	‡ F.	3 lb. prawns, <i>Harpodon</i> and <i>Thrissoles</i>	Hauling in a gutter the net left a trail of mud on surface distinct. 20 fathoms net.
33	26.4	8° 47'S 47'E	143°	5 to 4	Heavy silty mud	12.10 p.m.	1.5 p.m.	55 min.	H.W.	1½ lb. prawns <i>Harpodon</i> , <i>Thrissoles</i> and 1 king salmon <i>Polynemus</i> 20 lb.	Footline of net torn for 3 fathoms. In gutter as before. 20 fathoms net.
34	3.5	Hood Lagoon		8 to 1½	Soft mud	11.40 a.m.	11.48 a.m.	8 min.	‡ E.	1 <i>Gerres</i> 4 in., 2 <i>Pecten</i> , 1 swimming crab, Crinoids about 30 small fish 1½ to 2½ in. long <i>Gerres</i>	Depth shelved sharply on to bank north-east of village. 14 fathoms net.
35	3.5	Hood Lagoon		9 to 2½	Soft mud	12.20 p.m.	12.40 p.m.	20 min.	L.W.	1 tiger prawn, 1 <i>Trachino-</i> <i>cephalus</i> about 3 <i>Leignathus</i> ; 4 <i>Upeneus</i> , <i>Aprion</i> ; <i>Sillago</i> 10 lb. <i>Gerres</i>	Bottom of sticky mud but with some patches with shell. Free of snags, water with thick plank- ton. 14 fathoms net.
36	3.5	Hood Lagoon		8 to 1½	Soft mud	2.5 p.m.	2.30 p.m.	25 min.	‡ F.	Catch as above and 1 sprat about 10 lb. small fish, mostly <i>Gerres</i>	In hauling, net digging deeply and in 4 fathoms and less made a brown silt come to the surface. 14 fathoms net.
37	11.5	Milne Bay Gamadodo	off	8 to 6	Fine silt	10.10 a.m.	10.49 a.m.	30 min.	H.W.	No prawns, 29 <i>Trachinocephalus</i> 13 <i>Therapons</i> 7 to 9 in., 40 anchovy flatfish including <i>Psettodes</i> and 60 edible scallops 2½ to 3 in. diameter	Although no prawns taken and few fish this area appears to be good trawling ground. 20 fathoms net.
38	11.5	Milne Bay Gamadodo	off	7	Fine silt	5.35 p.m.	6.5 p.m.	30 min.	L.W.	2 prawns 2 in. and 2½ in., 2 scallops, 1 Goby	Net fishing correctly, bottom poor. 20 fathoms net.
39	12.5	Milne Bay Gamadodo	off	7	Fine silt	8.40 a.m.	9.12 a.m.	32 min.	H.W.	7 prawns 5 to 6½ in., 2 flatfish <i>Platycephalus</i> , 1 <i>Therapon</i> , 1 anchovy	3 other species of prawns 9 specimens. Pistol prawn, spider crabs, scallops. 20 fathoms net.
40	12.5	North-west Howell Is.	of	8 to 9	Fine silt	10.01 a.m.	10.31 a.m.	30 min.	3 E.	1 pistol prawn. Very small catch of bottom organisms, few <i>Gerres</i>	Scallops and sea urchins. 20 fathoms net.

TABLE I
LENGTH OF PRAWNS AND SHRIMPS—TRAWLING SURVEY, PAPUA
26th March, 1955, to 12th May, 1955

Length	Off South Entrance Fly River				Off North Entrance Fly River				Kerema to Port Romilly				Caution Bay to Jokea				Hood Lagoon	Milne Bay							
in.	Rainbow	Long Spined	Short Spined	White or Pink Shrimp	Hunchback Shrimp	Spiny Back	Rainbow	Long Spined	Short Spined	Banana	Speckled	White	Rainbow	Banana	Speckled	Short Spined	Rough Skin	Rainbow	Rough Skin	Straight Spined					
1½	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
2	...	1	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...					
2½	...	...	...	7	...	...	...	...	...	...	...	4	...	...	...	...	...	...	2	...					
2¾	...	...	...	4	...	...	...	...	...	...	...	7	...	...	...	...	...	...	3	...					
3	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...					
3½	...	...	...	2	...	...	...	...	...	...	...	6	...	...	...	...	...	...	1	...					
3¾	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
4	6	...	...	3	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...					
4½	12	...	...	3	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...					
4¾	2	...	...	1	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...					
5	3	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	1	...					
5½	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
5¾	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
6½	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
6¾	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
7½	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
7¾	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
8½	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
8¾	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
Total	60	1	18	16	49	31	35	10	4	19	6	43	43	24	...	42	29	46	61	16	7	1	3	9	2

