

TUNA BAIT RESOURCES AT SAIPAN



SPECIAL SCIENTIFIC REPORT: FISHERIES No. 44

**UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE**

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Washington, D. C.
January 1951

United States Department of the Interior
Oscar L. Chapman, Secretary
Fish and Wildlife Service
Albert M. Day, Director

Special Scientific Report - Fisheries
No. 44

TUNA BAIT RESOURCES AT SAIPAN

Translated from the Japanese language by

W. G. Van Campen

Pacific Oceanic Fishery Investigations

CONTENTS

| | Page |
|---|------|
| 1. Report of a skipjack bait investigation in Saipan waters, By Technician Kenzō Ikebe and Assistant Takeshi Matsumoto <u>1</u> / | 1 |

1/ From South Sea Fishery News [Nanyō Suisan Jōhō], No. 6, pp. 2-12. Jan. 1938.

Report of a Skipjack Bait Investigation in Saipan Waters

1. Purpose and Scope of the Investigation

According to the 1935 report of the Saipan District of the South Seas Government-General, the tuna fishery in that district in 1935 employed 19 skipjack boats and 9 tuna boats, which produced a catch weighing 1,925,000 kilograms and valued at 450,000 yen. This is the most important fishery of the area, and there is much room for its future development. Almost all of the catch is made into dried fish-sticks, and at present the product of the Nankō Fishing Company enjoys a very high reputation in Japan. The value of the fish-stick produced is 400,000 yen, and plans are being made for the further expansion of this industry.

Since this island is not blessed with an abundant natural supply of the bait fish which are so essential to the skipjack fishery, unlike Palau where fishing can be carried on all year round, during roughly half of the year from September to February the fishermen are forced by the scarcity of bait to sit idly by and wait for large schools of skipjack offshore. During recent years there has been a tendency in this slack period for the fishermen to go to work as laborers on the sugar plantation of the South Sea Development Company or to go away to other islands. If fishing could be carried on all year round, the present production could probably be doubled and the fishermen could be rescued from their difficult circumstances.

For several years persons in the fishing business at Saipan have been wanting the research station to undertake an investigation which might produce some solution to this annoying problem of bait scarcity. It happened that in the period from October to December of this year we were to have engaged in a fisheries investigation in foreign waters, but this operation was called off because of the effects of the China Incident, and the time was devoted instead to a bait survey at Saipan. Consequently, the period of this survey was not originally selected as the time for such a study, and as it coincided with the trade wind season at Saipan the constantly rough seas made it impossible to carry out a thorough investigation, a circumstance which is indeed regrettable.

2. Present Situation

The following is a description of the bait fish situation at Saipan with regard to each of the species used. (The common names of the fish are those used by Okinawan fishermen.)

(*) baka (common name) [Stolephorus delicatulus (Bennett)]

This is the most important skipjack bait fish at Saipan. It reaches a length of about 1.5 to 2.4 inches. It occurs on the west side of the island everywhere outside the reef from Garapan to Claranhanoa, on the north side from the harbor works to Gunran [Maniagasha] Island, on the east side in the vicinity of Magicienne Bay, and also at Tinian and Rota. It is found throughout the year, but it is least abundant in November and December. This fish spawns each year beginning in January and at this time is worthless as bait, so for this reason and in order

to preserve the stock the skipjack fishermen's association prohibits the taking of the fish during January and February.

These fish are taken by going to the grounds before dawn and driving the fish into a fine-meshed net [?nojiame?] just as day breaks. The fishermen then set off for the skipjack grounds at about 7:00 a.m. These fish are weak and those taken on one day cannot be held over until the next day. At the peak of the season one haul with the bait net usually provides enough bait for one fishing trip.

(2) shiira (common name) [may be Sardinia immaculata]

Resembles the young of the hiraiwashi [Ilisha elongata ?] of Japan. Somewhat slenderer than the baka. At Saipan it occurs in greatest numbers inside the harbor [Tanapag ?], and is also abundant inside the reef off Garapan. Being a species which comes into the lagoon from the open sea, it schools abundantly in season at the entrance to the boat channel off Garapan. The season is the five months from May to September. In December and January only a few are seen and they are grown too large to be suitable for skipjack bait.

Like the baka this fish is taken with a driving-in net, but whereas in taking the baka the fishermen dive and chase the fish, the shiira are driven in with a surround net. This species will collect around a fishing light.

(3) hiraaji or gatsun [carangids]

These fish are the young of the meaji [probably Trachurons crumenophthalma]. They are much larger than the species described above, being usually about 7 fish to 100 momme [13.25 ounces], and are thus most suitable as bait for medium and large skipjack. They occur inside the reef on the west side of Saipan. They come in through the channels from the open sea on stormy days and are generally taken at the entrance to a pass. The season is the 4 months from June to September. They are taken during the day using surround-nets and set nets [? mawashi tateami]. This species also is attracted by light.

(4) muro [probably Decapterus sp.]

These fish are about the same size as the hiraaji, usually running about 3 fish to 100 momme [13.25 ounces], but smaller ones run about 10 per 100 momme. They are found outside the reef at Saipan and do not come inside the lagoon. The season is roughly the same as that for the hiraaji, four months from June to September, but it is often irregular. This year they did not show up at all.

This species is taken during the day with a stick-held dipnet using shrimp for bait. They sometimes school around naval vessels and steamers anchored off Garapan, and they will collect around a fishing light.

(5) akamuro or sanera [probably Caesio chrysozonus]

In general appearance this species resembles the "ojisan" [a goatfish?], but it is smaller, being about 3 inches long. They sometimes come in large schools. This fish is most suitable for skipjack bait, but it only comes into the waters near the reef at certain times and for short periods. It is taken around the entrance to the Garapan channel, off Charankanoa, and in the vicinity of the harbor works [Tanapag Harbor?]. The season lasts from 5 days to a week and during this time enough fish can be taken in one haul of the net to provide bait for four or five trips, that is to say, a month's supply of bait can be taken in one day. They withstand captivity well and when large quantities are taken they are kept in hastily constructed pounds. These fish do not, however, come every year. They appeared in October of 1933 and on November 23, 1935, from which it is thought that they generally migrate into these waters every two years at this season. They are driven into bag-nets during the day, and they will also collect around a fishing light. It is said that when the akamuro appear, the Nankō Fishing Company hurriedly rounds up fishermen and pays them 3 yen per day to do nothing but catch bait for several days.

(6) ojisan [a goatfish?]

This fish is about 3.6 inches long, roughly the same size as the muro. They occur inside the reef on the sandy beach from the harbor works to Charankanoa. They are generally found the year round, but the season of greatest abundance is during June, July, and August, and they are seen only rarely at other times of the year. They are taken both day and night with beach seines. These bait fish are not attracted by a light. In recent years the skipjack have not responded well to this bait and this year almost no one used it.

(7) aobike (common name) [may be Abudefduf sexfasciatus]

This is a small fish about .7 to .8 inch long, and deep green in color. It is found inside the reef on the west side of Saipan. The fishermen take it by setting a net inside the reef and then diving and poking sticks into the crevices in the coral to drive the fish out and into the net. The season is pretty much all year round, but the larger specimens are unsuitable for skipjack bait.

The ojisan, aobike, and so forth are used as a last resort when the baka and shiira cannot be obtained in sufficient quantities.

In addition to the above, there are a number of other bait fish such as the tobero or harara and the tarekuchi [probably Engraulis heterolobus Rüppell], but none of them are taken in useful quantities. When the stomachs of skipjack are studied they are all found to be stuffed full of various kinds of small fish, from which it is deduced that there must be many small fishes offshore which could serve as skipjack bait. Skipjack taken off Saipan feed on "young ojisan" or "deepsea ojisan", squid, and shrimp all year round, and on tarekuchi from May to September.

4 Progress of the Investigations

The technician in charge, his assistant, and 12 crew members left Palao aboard the Zuihō Maru at 9:00 A.M. on October 29. The party stopped at Yap en route to pick up four bait live-boxes which had been left in the care of the Yap District government office. Leaving Yap at 8:00 A.M. on October 30, the party made oceanographical observations en route to Saipan and released 120 drift bottles. At 4:00 P.M. on November 2 the vessel arrived at Tinian where it remained at anchor over night, leaving the following morning at five o'clock for Saipan where it moored at Tanapag Harbor at 8:00 A.M. On the following day, the 4th, the members of the skipjack fishermen's association gathered at the government offices to hold a conference on the bait problem. We heard the opinions of the fishermen and made arrangements concerning the investigation. On the 5th we negotiated with the Nankō Fishing Company for the use of the No. 1 Ebisu Maru and the Sakigake Maru to carry on the investigation and made preparations for our operations. As shown in the accompanying table of the progress of the investigation, we began our work on November 6 and ended it on November 28. During this time we spent 14 days in actual operations, of which 2 days were devoted to oceanographical observations.

After the completion of the investigation we were scheduled to return to headquarters aboard the Zuihō Maru, but that vessel proceeded to Japan for repairs and inspection and the members of the expedition left Saipan for Palao aboard the Yamashiro Maru on December 3.

The results of this investigation (see the accompanying table) may be summarized as follows. On November 6 at a station 1-1/2 miles west of the Saipan government pier the light brought in only a few flyingfish (2.4 inches long) and no other bait fish. On the 7th in front of the sugar mill at Tinian a few toberō (1.2 inches long) came in, but not enough to justify using the stick-held dipnet. On the 9th in front of the government pier at Tinian the light brought in about one scoop of toberō (1.2 inches long), but we did not use the net. On the 10th at Magicienne Bay only a few shiira (.8 to .9 inch long) came in, not enough to net. On the 11th at the new harbor on Tinian only a few small shrimp (komase) were attracted. On the 15th at Tanapag Harbor at Saipan a few toberō (1.2 inches long), aeosa [probably Harengula schranzi] (.8 to .9 inch long), and ojisan (.8 to .9 inch long) were attracted. At deeper level there were some gatsun (hiraaji) [carangids] and uzun (urumeiwashi) [perhaps Harengula ovalis (Pennett)] (both about .8 inches long) but not enough to net. On the 16th off Lutchō Point a small number of gatsun (hiraaji) [carangids] were attracted. On the 21st at the sugar mill at Tinian about one scoop of toberō (1.2 inches long) came in, and the next day we operated the stick-held bait net there, taking only one small scoop of mixed toberō (1.2 inches long), baka (.7 to .8 inch long), and akaesa (.7 to .8 inch long) [probably apogonids or crenonids], not enough to use as bait. On the 25th the fishermen, who had been awaiting the arrival of the akamuro [probably Caesio chrysozonus], announced that these fish had come into the vicinity of the Garapan channel. All of the skipjack boats immediately went out and took the fish with bag-nets. On the 26th we made a trial with the light near the Garapan channel and attracted a

large school of mizun (urumeiwashi) [Harengula ovalis?] (7.2 inches long), but no akamuro. It appears that the akamuro come into the vicinity of the channel from the offshore waters at dawn and go out to sea again during the day. On the 27th at the same location we took about 300 mizun (urumeiwashi) (7.2 inches long) with the stick-held dipnet. On the 28th we continued operations at the same place and again attracted a large school of mizun. Since the akamuro came in at dawn we tried to find out whether the light would attract them by conducting a trial from 3:00 to 6:00 a.m. on the 29th but only a few of them (1.3 inch long) came in. Just as they did at night, the mizun assembled in a large school and the akamuro dispersed. As indicated, the appearance of the akamuro this year took place during 4 days beginning November 25. Since the fish dispersed to the offshore waters during the day, the fishermen all went out at dawn and took them in bag-nets and held them in live-bait pounds, but the amount taken was only enough for four or five trips and that was the end of the akamuro for this year.

6 Results of Oceanographical Observations

Results of observations made between Maniagasha I. and a point north of Ushi Point on Tinian and inside the harbor and lagoon at Saipan were as follows: (see chart for locations) [This chart has been omitted from the translation.]

Offshore Observations November 13

| Depth | Station | <u>nu</u> (J) | <u>ru</u> (K) | <u>wo</u> (L) | <u>wa</u> (M) | <u>ka</u> (N) | <u>yo</u> (O) |
|---------|----------|---------------|---------------|---------------|---------------|---------------|---------------|
| Surface | Temp. | 28.2 | 28.0 | 28.0 | 28.0 | 28.1 | 28.2 |
| | Salinity | 34.45 | 34.52 | 34.65 | 34.61 | 34.65 | 34.54 |
| 50 m | Temp. | 28.0 | 28.0 | 27.9 | 27.7 | 27.8 | 28.0 |
| | Salinity | 34.49 | 34.60 | 34.69 | 34.67 | 34.69 | 34.63 |

Positions:

nu(J) 3 miles W $\frac{1}{2}$ N of Maniagasha I.
ru(K) 2 miles S of nu(J)
wo(L) 2 miles S of ru(K)
wa(M) 2 miles S of wo(L)
ka(N) 2 miles SW of wa(M)
yo(O) 2 miles SW of ka(N)

Harbor Observations November 24

| Depth | Position | <u>i</u> (A) | <u>ro</u> (B) | <u>na</u> (C) | <u>ni</u> (D) | <u>ho</u> (E) | <u>he</u> (F) | <u>tc</u> (G) | <u>chi</u> (H) |
|---------|----------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|
| Surface | Temp. | 28.0 | 28.0 | 28.0 | 27.9 | 27.8 | 27.5 | 27.8 | |
| | Salinity | 34.60 | 34.32 | 34.65 | 34.66 | 34.68 | 34.62 | 34.68 | |
| Bottom | Temp. | 28.0 | 28.0 | 28.0 | 27.9 | 27.8 | 27.5 | 27.3 | |
| | Salinity | 34.68 | 34.67 | 34.64 | 34.65 | 34.67 | 34.63 | | |

Table Showing Progress of Saipan Skipjack Bait Investigation

| Date | 11-6 | 11-7 | 11-9 | 11-10 |
|-------------------|---|-------------------------------------|-------------------------------------|-------------------|
| Station | A | B | C | D |
| Position | 2.5 miles W of govt pier | in front of Tinian sugar mill | in front of Tinian gov't pier | Magicienne Bay |
| Weather | B | BC | B | BC |
| Wind | NE 3 | NE 1 | NE 1 | NE 1 |
| Air Temp. | | 23.0 | 23.2 | |
| Sea Temp. | | 23.4 | 23.2 | 23.3 |
| Current direction | | W | WSW | |
| Current velocity | | 1.0 | 1.0 | |
| Time | <u>hōmuraito</u> 4 hrs. | 7 hrs. | 4 hr. 30 min. | 4 hrs. |
| light used | elec. light 4 hrs. | 7 hrs. | 11 hrs. | 11 hrs. 50 min. |
| Fishing gear | | | | |
| Species | flying fish(2.4") | <u>toberō</u> | <u>toberō</u> | <u>shiira</u> |
| Quantity | | | 1 scoop | |
| Remarks | <p>Left government pier at 5:30 P.M. for first bait trial. Could not go out to scheduled station 3-5 miles off Maniagasha I. because of rough weather. Water depth 30 meters. No skipjack bait came in. Squalls and rough sea made operation difficult so the experiment was halted at 10:30 and we returned at 11:00.</p> <p>Left Saipan government pier at 5:05 P.M. At front of sugar mill on Tinian the lights brought in a very small quantity of <u>toberō</u>, not enough to net. Returned to moorings at Saipan at 7:40 A.M. on the 8th.</p> <p>Left government pier for Tinian at 3:00 P.M. aboard Sakigake Maru. After 7:00 P.M. a few <u>toberō</u> came in. Fish were about 1 inch long. After 10:00 we used only the electric light. Kept light on until 5:30 A.M. on the 10th and brought in only 1 scoop of <u>toberō</u>. Returned to Saipan at 8:30 A.M.</p> <p>Left government pier for Magicienne Bay at 3:35 P.M. Arrived at 5:50 p.m. Water depth 47 meters. Only a few <u>shiira</u> came in. Returned to moorings at 7:40 A.M. on the 11th. Rough seas off Nafutan Pt. made the trip difficult both going and returning.</p> | | | |

Table Showing Progress of Saipan Skipjack Bait Investigation

| Date | 11-11 | 11-15 | 11-16 | 11-21 |
|-----------------------|--|---------------------|----------------|----------------------------|
| Station | E | F | G | H |
| Position | Tinian new harbor | Saipan harbor works | off Mutcho Pt. | in front of mill at Tinian |
| Weather | B | BC | BC | BC |
| Wind | NE 4 | E 2 | ENE 3 | NNE 1 |
| Air Temp. | 27.0 | | 29.5 | 28.0 |
| Sea Temp. | 28.4 | 28.0 | 28.1 | 28.0 |
| Current direction | W | W | S | W |
| Current velocity | 1.5 | 1.5 | 2.0 | 1.0 |
| Time <u>homuraito</u> | | 7 hrs. | 3hr. 30min. | 2 hr. 45 min. |
| light elec. light | 7 hrs. | 7 hrs. | 3 hr. | 3 hr. |
| used Fishing gear | | <u>tobero</u> | <u>gatsun</u> | <u>tobero</u> |
| Species | | | | |
| Quantity | | | | 1 60000 |
| Remarks | <p>Left government pier at 3:40 P.M. for the new harbor at Tinian. The <u>homuraito</u> was undergoing repairs and we used only the electric light. Anchored in Tinian new harbor at 5:25. Water depth 35 meters. Only some shrimp came in. Weighed anchor at 6:00 A.M. on the 12th, returned to Saipan at 8:00.</p> <p>Left government pier at 4:40 P.M. Moored to buoy at Tanapag Harbor. Water depth 16 meters. <u>Tobero</u> came in, but not enough to net. At 4:00 A.M. on the 16th the moon went down and the light became more effective. Some <u>aoesa</u>, <u>tobero</u>, <u>oilsen</u>, <u>ail</u>, and <u>urume</u> came in. Returned to Saipan at 7:50 A.M.</p> <p>Left government pier at 3:50 P.M. and 4:00 were off the harbor works in 10 meters of water over a coral sand bottom. Very few fish came in. A few <u>gatsun</u> (4.8 inches long) were attracted. Returned to moorings at 6:50 A.M. on the 17th.</p> <p>Left government pier at 3:00 P.M., arrived off Tinian sugar mill at 5:30. Water depth 33 meters, bottom sand. The moon was bright so very few fish came in. Weighed anchor at 6:00 A.M. on the 22nd. Returned to Saipan at 8:20.</p> | | | |

Table Showing Progress of Saipan Skipjack Bait Investigation

| Date | 11-22 | 11-26 | 11-27 | 11-28 |
|-------------------|----------------------------------|------------------------|----------------|--------------|
| Station | I | J | K | L |
| Position | in front of mill at Tinian | off Garapan Channel | same | same |
| Weather | B | B | B | B |
| Wind | E 2 | NE 3 | ENE 2 | NE 2 |
| Air Temp. | 28.5 | 28.0 | 28.7 | 28.2 |
| Sea Temp. | 28.0 | 28.2 | 28.3 | 28.4 |
| Current direction | S | S | E | S |
| Current velocity | 2.0 | 2.0 | 2.0 | 1.0 |
| Time | <u>hōmuraito</u> 2hr. 40 min. | 1hr. 15min. | 1hr. 40 min. | 4hr. 30min. |
| light | Elec. light | | | 4hr. 30min. |
| used | Fishing gear | | stick-held net | |
| Species | <u>tobefiō</u> | <u>urume</u> | <u>urume</u> | <u>urume</u> |
| Quantity | 1 scoop | | 300 fish | |

Remarks

Left government pier at 3:15 P.M., arrived off Tinian mill at 3:40. Anchored in 31 meters on a sandy bottom. Made a haul at 9:00 P.M. with the stick-held dipnet, taking only about 1/2 scoop, mostly tobefiō but mixed with a few akaessa and baka. Returned to Saipan at 7:00 A.M. on the 23rd.

Left government pier at 5:20 P.M., anchored near buoy at entrance to Channel. Depth 17 meters. A large school of urume came in, but no akamuro. Stopped fishing at 7:00 P.M., returned to pier at 7:30.

Left at 5:00 P.M., anchored at same place as the preceding night. Took about 300 urume with the stick-held bait net. Returned at 8:00 P.M.

Left, at 5:30 P.M. for same anchorage. 14 meters depth. As on preceding night, a large school of urume came in. Turned on the light at 4:00 A.M. on the 29th to catch the dawn migration of the akamuro but only a few were attracted. The large urume school came in again and the akamuro dispersed.

Survey Made by the Nankō Fishing Company September 26 to November 29, 1935

| Date | Location | Depth | Water Temp. | Density | Bait Fishing Conditions |
|---------|--|-------|-------------|---------|---|
| Sep. 26 | Inside harbor Tanapag | 14 m | 29.2 | 1.02282 | Turned on light at 7:00 P.M., made first haul at 9:00. Took 3 small scoops of <u>mizun</u> (crème lwashi) and <u>gatsun</u> (<u>meali</u>) mixed. Made second haul at 11:30 P.M., took 4 small scoops of <u>gatsun</u> . Made third haul at 12:30 A.M. taking some <u>gatsun</u> . |
| 27 | same | | | | Turned on light at 7:20 P.M., made first haul at 11:00 taking 4 small scoops of mixed <u>mizun</u> and <u>gatsun</u> . Second haul at 3:20 A.M. Netted 4 scoops of <u>gatsun</u> . A third haul at 4:40 A.M. took 2 scoops of <u>gatsun</u> . |
| 28 | at the regular steamer anchorage off Garapan | 20 m | | | Turned on light at 7:20 P.M. and made first haul at 11:30 taking 2 scoops of <u>mizun</u> with some <u>gatsun</u> . Made second haul at 2:00 A.M. but caught no bait because the <u>Falao Maru</u> had changed its position in the anchorage. |
| 9-29 | inside harbor Tanapag | 14 m | | | Turned on light at 7:20 P.M. and made first haul at 11:30 taking 2 scoops of <u>gatsun</u> and some <u>barracuda</u> . Second haul at 4:00 A.M. took 10 scoops of <u>gatsun</u> . Third haul at 5:00 A.M. took 2 scoops of <u>gatsun</u> . |
| 9-30 | inside harbor Tanapag | 14 m | 27.9 | 1.0216 | At 12:30 P.M. first haul took 10 scoops of <u>gatsun</u> . Second haul at 3:30 took 2 scoops of <u>gatsun</u> . Third haul at 5:20 took 3 scoops of <u>gatsun</u> with some <u>murcaji</u> probably <u>Decapterus</u> sp. mixed in. One scoop of <u>gatsun</u> contains about 150 fish. |

Survey Made by the Nankō Fishing Company September 26 to November 29, 1935

| Date | Location | Depth | Water Temp. | Density | Bait Fishing Conditions |
|--------|------------------------------|-------|-------------|---------|---|
| Oct. 1 | Magicienne Bay | 24 m | 28.8 | 1.02279 | <p>First haul at 2:00 A.M. netted 33 lbs. of barracuda. There were some <u>tarekuchi</u> in the net but they were so small that they slipped through the meshes. In the second haul at 4:00 A.M. there were also some <u>tarekuchi</u> in the net but they escaped in the same way.</p> |
| Oct. 2 | Magicienne Bay | 35 m | 28.9 | 1.02280 | <p>Moved a little SW of the position of the preceding day. At 2:00 A.M. on the 3rd hauled the net but the small school of <u>tarekuchi</u> which the light had brought in almost all escaped through the meshes. In the second haul at 5:00 A.M. the light brought in a small number of <u>ronpa</u> (mangrove <u>iwashi</u>) /probably <u>Sardinella leiogaster</u>/. Using a small stick-held dipnet with chumming bait during the daytime took 16½ lbs. of <u>muroaji</u> each weighing about 6½ ounces.</p> |
| Oct. 4 | inside harbor / Tanapag / | | | | |
| Oct. 5 | " | | | | |
| Oct. 6 | " | | | | |
| Oct. 6 | off Charankanoa | | | | |
| Oct. 7 | inside harbor / Tanapag / | | | | |

300 muroaji weighing 2½ oz. each.

in the forenoon 76 muroaji weighing 29 lbs.

Survey Made by the Nankō Fishing Company September 26 to November 29, 1935

| Date | Location | Depth | Water Temp. | Density | Bait Fishing Conditions |
|--------------------|--|-------|-------------|---------|--|
| Oct. 7 | Off Charankanooa | | | | in afternoon 265 <u>mucoaji</u> weighing 53 lbs. |
| Oct. 8 | Off Charankanooa | | | | four hauls with small stick-held dipnet took 149 <u>mucoaji</u> weighing 29 lbs. |
| Oct. 8 to Nov. 19, | a tuna longline test was made at Saipan and Pagan. | | | | |
| Nov. 19 | entrance to pass off Garapan | | | | Took one small scoop of <u>akamuro</u> . Notified other skipjack boats in the anchorage, all made large catches with bag-nets. |
| Nov. 20 | 200 meters inshore from Palao Maru's anchorage | | | | First haul took two scoops of mixed <u>hatambo</u> ? and mangrove <u>iwashi</u> . On the second haul a small school of <u>akamuro</u> appeared; the net went on the reef and was damaged but we made emergency repairs and completed the haul taking 2 scoops of <u>akamuro</u> . The third haul took 3 scoops of <u>akamuro</u> . |
| Nov. 21 | entrance to pass off Garapan | | | | All the skipjack boats had been searching the vicinity of the reef since the day before but the <u>akamuro</u> schools were not large and none of the boats shot their nets. |
| Nov. 23 | same | | | | Early in the morning skipjack fishermen on watch at the Garapan pass announced that a large school of <u>akamuro</u> had come in. The No. 3 Nankō Maru went out and anchored at the reef where the fish were. The light was turned on at the anchorage at 6:00 p.m., but by 3:00 am. it had not brought in any <u>akamuro</u> . At 3:30 a small school came up. The first haul filled a bamboo basket (8 feet in diameter by 5 feet deep). The second haul |

Survey Made by the Nanko Fishing Company September 26 to November 29, 1935

| Date | Location | Depth | Water Temp. | Density | Bait Fishing Conditions |
|---------|------------------------------|-------|-------------|---------|--|
| Nov. 23 | entrance to pass off Garapan | | | | filled a live pound made of net (3 yards square). The third haul was halted because dawn broke and the fish went down. |
| Nov. 24 | same | | | | Operated in same place as the previous day. Fish did not come up until 4:00 A.M. First haul at 4:20 took one basket. School went down while second haul was being made at 5:30. |
| Nov. 26 | same | | | | Started out at midnight for same location as previous day. Turned on light. Made one haul at dawn and took enough fish to half fill the net pound. At 8:00 A.M. used the daytime net off the sugar pier at Charankanoo and by 1:00 P.M. took 3 baskets of bait. |
| Nov. 27 | off Charankanoo | | | | Started out at 6:30 A.M. and took day bait off the sugar company's pier at Charankanoo. Took about enough for three fishing trips. |
| Nov. 28 | same | | | | Since the net which was used the previous day was too small, we used the Hachida net. A good deal of bait came over the net, but because of swift current and insufficient men the operation did not go as expected, the net went on the reef and was damaged, and we did not catch a single fish. |

The above material has been extracted from a skipjack fishing log kept by Mr. Zenkurō Kawakami of the Nankō Fishing Company from September to November, 1935.

9 Conclusions

The period covered by this investigation coincided with the trade wind season at Saipan, and winds of forces ranging from gentle to violent blew constantly. The sea was rough and we could not carry out experiments on the use of a light to attract bait fish in the offshore waters. Consequently, we were unfortunately unable to survey the following six areas which had been scheduled after consultation with the skipjack fishermen at the beginning of operations: (1) 3 - 5 miles off Maniagasha I. (2) Mozone (3) 4 miles E of Nafutan Pt. (4) off Donnay (5) Marpi sonē (6) Shija sonē. We were forced to restrict our survey to places which were sheltered from the northeast winds such as the Saipan harbor works, the Garapan channel, off the Tinian sugar mill, and Magicienne Bay. The progress of the investigation is shown in the foregoing table. Adverse weather and other causes limited our days of operation to twelve, however, our results, combined with those of a survey made by the Nankō Fishing Company in 1935, indicate the following facts:

1. In the waters around Saipan (excepting the offshore waters) from September to November there are no bait fish suitable for use as skipjack bait except urume iwashi [may be Harengula ovalis ?] and hiraaji [carangids].
2. The urume iwashi and hiraaji which occur during these three months are too large to be suitable for skipjack bait, but would be good for tuna bait.
3. During these three months the tarekuchi [probably Engraulis heterolobus], shiira [probably Stolephorus delicatulus], toberō [?], and baka [?] are seen, but not in quantities adequate for use as bait.

According to the local skipjack fishermen, last year in June, July, and August schools of tarekuchi were seen in the offshore waters on the skipjack grounds, but this year they did not appear at all. This indicates perhaps that the tarekuchi, like the akamuro, does not come into Saipan waters every year but irregularly. In these three months the sea is calm and it is thought that it would perhaps be possible to experiment with attracting these fish with a light and taking them with a stick-held dipnet or a Hachida net, however, during this period the baka and shiira provide sufficient bait and it is thought that there is no necessity for such an experiment.

On the basis of the above facts it is thought that the best solution to the problem of the enforced idleness of the skipjack fishermen caused by the lack of bait during the half of the year from September to February would be for the boats to switch over to tuna fishing using for bait the urume iwashi and hiraaji, which can be taken during this period and which appear to occur in a fair abundance. It is, however, necessary to study further the possible methods of putting this proposal into execution.

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