TUNA BAIT RESOURCES AT SAIPAN

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Oscar L. Chapman, Secretary
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Albert M. Day, Director

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Translated from the Japanese language by

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Pacific Oceanic Fishery Investigations

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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 1,923,000 kilograms and valued at 456,000 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 Palao 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 watch 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 the 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.)

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

This is the most important skipjack bait fish at Saipan. It reaches a length of about 1.2 to 2.4 inches. It occurs on the west side of the island everywhere outside the reef from Garapan to Charankanoa, on the north side from the harbor works to Gunkan [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 [?mojiami] 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 Trachurops crumenopthalma]. 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 p[illegible]. The season is the 4 months from June to September. They are taken during the day using surround-nets and set nets [? mawashi hateami]. 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 8 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.

At this season in 1935 and 1936 large schools of tarekuchi were seen at sea, but this year none were seen, it is said.

At Saipan the skipjack are fattest in June, July, and August, while in December, January, and February when there is no food offshore the fish are at their leanest.

3 Particulars of the Investigation

Research vessels — Nankō Fishing Company's No. 1 Ebisu Maru (10.6 tons, 30 HP) and Sakigake Maru (20 tons, 30 HP)
Area investigated - waters under the jurisdiction of the Saipan District
Time of the investigation - October 28 to December 7, 1937
Personnel - Technician in charge 1 Assistant 1
Crew of the Hakuō Maru 12
Gear used - 1 stick-held bait net
1 Hachida [?] net
1 hōmuraito [Home Light ?] (600 watt)
1 Hayashi type electric fishing light (160 watt)

Outline of the Investigation

The plan was to make oceanographical observations in the waters off Saipan and also to attempt to attract bait fish with lights at night, to take the fish which might assemble by means of a stick-held dipnet or a Hachida net, and to investigate their distribution, time of appearance, and periods of abundance and scarcity.

The places to be investigated and the daily schedule of operations were, after consultation with the skipjack fishermen's association, settled as follows. One fisherman from each of the skipjack boats was carried aboard the vessels making the investigation.

Places Investigated and Number of Days Spent at Each

a when the sea was calm

1	3 to 5 miles west of Gunkan [Maniagasha] island	3 days
2	Mozone	3 days
3	4 miles east of Nafutan Point	3 days
4	1 mile off Donnay	3 days
5	Marpi bank	3 days
6	Shija bank	3 days
7	Magicienne Bay	3 days

b in rough weather

1	off the new harbor at Tinian
1	coast at Kāhī on Tinian
1	Tinian Harbor near South Sea Development Company's plant

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 28. 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), aoesa [probably Harengula schrammi] (.8 to .9 inch long), and ojisan (.8 to .9 inch long) were attracted. At a deeper level there were some gatsun (hiraaji) [carangids] and mizun (urumeiwashi) [perhaps Harengula ovalis (Bennett)] (both about .8 inches long) but not enough to net. On the 16th off Mutcho 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 caesionids], 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 (1.8 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 18

Depth	Station	nu(J)	ru(K)	wo(L)	wa(M)	ka(N)	yo(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 W½N 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	i(A)	ro(B)	ha(C)	ni(D)	ho(E)	he(F)	to(G)	chi(H)
Surface	Temp.	28.0	28.0	28.0	27.9	27.8	27.5	27.8	
	Salinity	34.66	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	27.8	
	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		1.5 miles W of gov't 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.			28.0	28.2	
Sea Temp.			28.4	28.2	28.3
Current direction			W	WSW	
Current velocity			1.0	1.0	
Time light used	hōmuraito	4 hrs.	7 hrs.	6hr.30min.	4 hrs.
	elec. light	4 hrs.	7 hrs.	11 hrs.	11hrs.50min.
	Fishing gear				
	Species	flying fish(2.4")	toberō	toberō	shiira
	Quantity			1 scoop	
Remarks		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.	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 toberō, not enough to net. Returned to moorings at Saipan at 7:40 A.M. on the 8th.	Left government pier for Tinian at 3:00 P.M. aboard Sakigake Maru. After 7:00 P.M. a few toberō 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 toberō. Returned to Saipan at 8:30 A.M.	Left government pier for Magicienne Bay at 3:35 P.M. Arrived at 5:50 p.m. Water depth 47 meters. Only a few shiira 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.

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 light used	homuraito		7 hrs.	3hr.30min.	2 hr. 45 min.
	elec. light	7 hrs.	7 hrs.	3 hr.	3 hr.
	Fishing gear				
	Species		tobero	gatsun	tobero
	Quantity				1 scoop
Remarks		Left government pier at 3:40 P.M. for the new harbor at Tinian. The homuraito 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.	Left government pier at 4:40 P.M. Moored to buoy at Tanapag Harbor. Water depth 16 meters. Tobero 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 aoesa, tobero, oilsan, aii, and urume came in. Returned to Saipan at 7:50 A.M.	Left government pier at 3:50 P.M. and 4:20 were off the harbor works in 10 meters of water over a coral sand bottom. Very few fish came in. A few gatsun (4.8 inches long) were attracted. Returned to moorings at 6:50 A.M. on the 17th.	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.

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 light used	hōmuraito	2hr. 40 min.	1hr. 15min.	1hr. 40 min.	4hr.30min.
	Elec. light				4hr.30min.
	Fishing gear	stick-held net		stick-held net	
	Species	tobero	urume	urume	urume
	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 tobero but mixed with a few akaesa 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
Sept.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 mizun (urume iwashi) and gatsun (meaji) mixed. Made second haul at 11:30 P.M., took 4 small scoops of gatsun.
9-27	same				Made third haul at 12:30 A.M. taking some gatsun.
9-27	same				Turned on light at 7:20 P.M., made first haul at 11:00 taking 4 small scoops of mixed mizun and gatsun. Second haul at 3:20 A.M. Netted 5 scoops of gatsun. A third haul at 4:40 A.M. took 2 scoops of gatsun.
9-28	at the regular steamer anchorage off Garapan	26 m			Turned on light at 7:20 P.M. and made first haul at 11:30 taking 2 scoops of mizun with some gatsun Made second haul at 2:00 A.M. but caught no bait because the Palao Maru 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 gatsun and some barracuda. Second haul at 4:00 A.M. took 10 scoops of gatsun. Third haul at 5:00 A.M. took 2 scoops of gatsun.
9-30	inside harbor [Tanapag]	14 m	27.9	1.0216	At 12:30 P.M. first haul took 10 scoops of gatsun. Second haul at 3:30 took 2 scoops of gatsun. Third haul at 5:20 took 3 scoops of gatsun with some muroaji [probably Decapterus sp.] mixed in. One scoop of gatsun 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	First haul at 2:00 A.M. netted 33 lbs. of barracuda. There were some tarekuchi 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 tarekuchi in the net but they escaped in the same way.
Oct. 2	Magicienne Bay	35 m	28.9	1.02280	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 tarekuchi 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 ronpa (mangrove iwashi) [probably Sardinella leiogaster].
Oct. 4	inside harbor [Tanapag]				Using a small stick-held dipnet with chumming bait during the daytime took 16½ lbs. of muroaji each weighing about 6½ ounces.
Oct. 5	"				Using a small stick-held dipnet during the daytime with chumming bait took 26½ lbs. of muroaji each weighing 6½ ounces.
Oct. 6	"				Using a small stick-held dipnet with chumming bait during the forenoon took 22 lbs. of 6½ oz. muroaji.
Oct. 6	off Charankanoa				300 muroaji weighing 2½ oz. each.
Oct. 7	inside harbor [Tanapag]				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 Charankanoa				in afternoon 265 muroaji weighing 53 lbs.
Oct. 8	Off Charankanoa				four hauls with small stick-held dipnet took 149 muroaji 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 akamuro. 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 hatambo/?7 and mangrove iwashi. On the second haul a small school of akamuro appeared; the net went on the reef and was damaged but we made emergency repairs and completed the haul taking 2 scoops of akamuro. The third haul took 3 scoops of akamuro.
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 akamuro 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 schoc of akamuro 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 akamuro. 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 Charankanoa and by 1:00 P.M. took 3 baskets of bait.
Nov. 27	off Charankanoa				Started out at 6:30 A.M. and took day bait off the sugar company's pier at Charankanoa. 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 sone (6) Shija sone. 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.