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MICRONESIAN FISHERY DEVELOPMENT PROJECT:

Manual for Skipjack Pole and Line Fishing and Conditioning of Talai

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Japan International Cooperation Agency
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Fishing Operations with Lejabil

An interim report has already been prepared on the fishing operations with the Lejabil. The following is a summary.

1. Comparison of Skipjack Fishing Operations at Palau between 1978 and 1979.

We did not have a chance to have access to information on skipjack fishing operations in 1978, but a comparison was made between 1978 and 1979 on the basis of skipjack hauls and live bait for them in June, July and August, which are considered the busiest fishing season for Palau.

As for live bait, it is essential that a comparison should be made in terms of catches, but no documentations are available on the catches or the quantities of live bait caught in stick-held dip nets.

Month	1978				1979			
	Ships operated	Ships in the aggregate	Total catch of skipjacks	Total consumption of live	Ships operated	Ships in the aggregate	Total catch of skipjacks	Total consumption of live
	(ships)	(ships)	(S/T)	bait (Bucket)	(ships)	(ships)	(S/T)	bait (Bucket)
June	13	352	2,018	27,698	14	299	658	13,554
July	13	371	2,451	33,729	14	284	1,243	17,436
Aug.	14	343	2,416		14	336	1,388	22,966

The catch of skipjacks and the consumption of live bait are based on the calendar year.

The above table indicates that the number of boats operated in 1979 was greater than in 1978 but that the aggregate number was smaller. The consumption of live bait in 1979 was less than half that of 1978.

This signifies the fact that there were a greater number of days in 1979 when plans for fishing operations had to be suspended due to a lack of live bait. Even if fishing operations had been carried out, it would have been impossible to have access to adequate supplies of live bait.

In fact, the crewmen of fishing boats operated in 1978 say that skipjack fishing grounds were close to Palau and that enough live bait was captured by a single operation of stick-held dip net (Bouke ami).

In 1979, on the other hand, the situation was such that the skippers of fishing boats went as far as to grumble that they were forced to sail out as far as 50 to 70 miles every day just to look for schools of skipjacks. In fact, each fishing boat operated at places so far away that it was almost impossible for them to make a day's trip.

The resources of live bait are so scarce that the catch would be consumed in one day unless live bait is caught in stick-held dip nets three or four times a night. In other words, every effort had to be made to assure the minimum quantity of live bait which would allow fishing boats to venture on a worthwhile operation.

In spite of the unprecedentedly great efforts made by each fishing vessel, the total catch of skipjacks in 1979 was half as big as in 1978. The reason is ascribable in large measure to a shortage of live bait, to be sure, but it is conceivable that the absolute quantity of migrating skipjacks was small.

If the fishing operations in 1979 had been as big in dimension as in the earlier years, the total catch in Palau in 1979 would presumably been consistently as small as that of a lean year.

When it is taken into account that no skipjack fish-grounds whatever were formed in the Palau waters from the end of October to December, it might be reasonable to assume that the year 1979 happened to be a lean year.

The fact that fishing vessels designed for a day's trip to fishing grounds 50 to 70 miles away every day must be described as the greatest effort which goes beyond their capacity.

II. Reasons for Annual Changes in Palau's Skipjack Fishing (Personal View)

It is known that the fishing of skipjacks is subject to annual and seasonal changes. Above all, Palau is known for big fluctuations in catch partly because the regions in which skipjack fishing vessels may be operated on a day's trip from Palau are extremely confined. Moreover, the hauls vary to a great extent, depending on the year.

The fishing conditions of skipjacks in Palau are such that there appears a sudden rise in the number of schools of floating skipjacks in or around May, but the skipjacks caught in pole-and-line fishing remain different in size. From the end of May to the beginning of June, the sizes become roughly identical.

1. In this period, the "baiting" of schools of skipjacks become explosively favorable for the rich year. Big hauls are registered every day, and this situation remains till July and August. (The year 1978 happened to be rich, big hauls were started on June 8, or May 3 according to the lunar calendar.)

2. For the lean year, the sizes of skipjacks caught in pole-and-line fishing are not uniform even with the start of June. Even they have become uniform, they do not remain so over a long span of time. The availability of live bait is limited at bait nurseries and difficulties are encountered in assuring daily uses. This situation drags on till July and August.

   Be it a rich or lean year, there appears a sudden drop in haul with the start of September. Depending on the

weather, the fishing conditions in the period of October and November are such that:

1) The weather in the rich year is relatively favorable, and the hauls of skipjacks remain somewhat even throughout the year, if not as good as in June, July and August.

2) The weather in the lean year is unfavorable, and large schools of skipjacks are seldom seen throughout the year.

The fishing of Skipjacks at Palau seem to be placed in such conditions as have been elucidated in the foregoing.

In the year which is described as rich at Palau, it is surmisable from the above-enumerated cases and also from the comparison made between 1978 and 1979 in I, above, the schools of skipjacks which make their appearance are great, and bait resources are available in large quantities.

The big fluctuations in the catch of skipjacks, as is discernible from a great difference between the rich and the lean year, are presumably attributable to the direct influences of the north-border whirlpool area of counter-currents north to the equator, when the geographical conditions in which Palau is placed are taken into account.

In this area, it is reported that there are many schools of "skipjacks with floating logs". A ship skipper who has had long years of experience in fishing operations near Palau says that the schools of skipjacks appear in great numbers determines whether the year is rich or lean.

It has been established that there exist counter-currents north to the equator, but little is known about their viability and other factors. However, the following matters may be pointed out.

1) The countercurrents between lat, 5 - 1°, N. are east-bound and tend to move toward the north or south, depending on the year.

2) In the north-border whirlpool area of the counter-currents, there are many schools of "skipjacks with floating logs!".

The schools of skipjacks which are concentrated in this area increase in number in proportion to the development of this area. It is conceivable that they come down to the Palau region along with the whirlpools, activating their fishing.

In the year which is described as rich, therefore, a well developed whirlpool area remains in the Palau region for a long time, inducing schools of skipjacks one after another and enabling fishing vessels operating near Palau to catch skipjacks in great quantities.

As stated above, direct influences are produced by the north-border whirlpool area of countercurrents north to the equator. It is therefore surmisable that the fishing of skipjacks near Palau are subject to a yearly change to a great extent.

III. Actual Fishing Operations with Lejabil throughout the Year

1. Actual Fishing Operations

The actual fishing operations with the Lejabil from April 1979 to February 1980 are shown in the following table. Incidentally, a table of actual operations by month is given as Appendix 1.

Gross Haul (S/T)	Total number of days (days)	Number of days operated (days)	Number of days off (days)	Reasons for suspension of fishing operations (in days)						
				No bait caught	Foul weather	Engine out of order	Docked for maintenance	Lack of crewmen	Holiday	Others
298,404	325	183 (41)	142	8	51	10	19	25	28	1

The figures in brackets represent the numbers of days when fishing boats sailed out but there were no hauls.

The breakdown of engines for which fishing operations were suspended in broken down as follows:

Repair of radar	1 day
Repair of the Lejabil's pumps	1 day
Repair of generator at Lejabil	1 day
Repair of the Lejabil's wheel	1 day
Repair of lighting ship	3 days
Total	10 days

2. Breakdown by Fish Species and Size

(A table of actual hauls by month, fish species and size is given as Appendix 2.)

Unit: S/T

	GR-I	GR-II	GR-III	SCRAP	Others	Total
Yellowfin tuna	0,618					0,618
Skipjack	239,942	30,370	16,299	1,321		287,932
SODA					4,418	4,418
MAHIMAHI					1,608	1,608
DESUI					3,828	3,828
Total	240,560	30,370	16,299	1,321	9,854	298,404

3. Breakdown by Consignee, Fish Species and Size

(A table of actual hauls by month, consignee, fish species and size is given as Appendix 3.)

Unit: S/T

		VAN CANP	PFFA	Total
Yellowfin tuna	GR-I	0,220	0,398	0,618
Skipjack	GR-I	214,933	25,009	239,943
	GR-II	18,733	11,637	30,370
	GR-III	4,293	12,006	16,299
	SCRAP		1,321	1,321
SODA			4,418	4,418
MAHIMAHI			1,608	1,608
DESUI			3,828	3,828
Total		238,179	60,225	298,404

4. Daily haul reports are attached to this paper.

Maintenance of FRP 26 S/T Skipjack Fishing Boats

I. Preface

In 1979, a total of four FRP 26 S/T Skipjack fishing boats --- Mokorokor, Lejabil, Garangap and Angarap --- were put into order, and all ships other than the Anagarap have been smoothly operated.

The Angarap has been put into perfect order with the exception of the generator, and a trial run has been completed.

As regards the generator, rewinding of the coil remains to be carried out and so is an inspection of the electrical system. It will therefore be some time before the work is completed.

1. When the Mokorokor was checked, it was pointed out that the bridge was extraordinarly vibrated with the engine set at 700 - 900 rpm.

   Other mechanisms were not responsible for this vibration. But when the engine is set at 700 - 900 rpm, the various devices equipped to the bridge are vibrated and placed in a condition where they are most likely to resonate. This vibration is also common to other FRP ships.

   To avoid this vibration it is advisable to refrain as much as possible from setting the engine at 700 - 900 rpm (or to use this speed over as short a time as possible) and operate the engine at less than 700 rpm or more than 900 rpm.

2. The generator of the Angarap was disassembled due to its faulty generation, and there was clear evidence that the generator had been inundation was responsible for the faulty insulation or burning of coils. We understand that the coil had to be rewound similarly on the Lejabil in April, 1978. It is anticipated that faulty generation will occur as in the case of the generator on the Angarap after a long period of suspension even on other FRP vessels performing satisfactorily. The breakdown of the generator both on the

Lejabil and on the Angarap was clearly caused by inundation. Judging from the evidence of this inundation, it is surmisable that the bilge of the engine was higher than the position where the generator was installed and, therefore, that the water had not been pumped out before the generator was inundated. Maintenance and control of this sort cannot be considered exceptional to the Lejabil and Angarap and has presumably been conducted for the other vessels, with the consequence that the generator caused concern.

The Lejabil was excluded from the above, because she has been maintained and controlled by Japanese experts and there have been no inundation whatever since her generator's coils were rewound in 1978.

3. Insofar as the engine is concerned, no common deficiencies have been detected. Conspicuous is the faulty handling of the engine for which a lack or shortage of basic knowledge about the handling is responsible. For example, the parts which should have been oiled are not done so at all; the parts the movement of which is completely free do not move as they gather rust and are stuck; no inspections are conducted on leaks; and no interest is shown in the vibration of the engine. Particularly, the anti-erosion and protective zinc built in the engine is not changed at all, nor are lubricants given to the main and auxiliary engines.

   It is a general practice to replace with a new one the anti-erosion and protective zinc built in the engine roughly every six months, but those built in the oil cooler and other components should be replaced every three months or so.

   It is a general practice to replace the lubricant after about 1,000 hours of operation. It should be replaced every four months or so, even if the ship is not put into operation. This is because the lubricant gets oxidized.

4. The thing to which particular attention ought to be paid during the course of maintenance of the main and auxiliary engines is the position where the auxiliary engine is installed. As there is no room for a man

to go behind the auxiliary engine, it is exceedingly difficult to take out pistons and other types of maintenance work.

II. Maintenance and Repair of Hulls and Outside Planks

The hull and planks, which are made of FRP, are not subject to erosion as those of steel and wooden vessels. So, no special maintenance is required. It has been pointed out, however, that the steel pipes and other parts which installed in the ship are extraordinarily more apt to suffer erosion than those of steel and wooden ships. Up to now, the reason has been ascribed to electric corrosion, but there is a need to pay special heed to the earth and other components of the electric source installed in the ship.

In a tropical sea, oysters and other creatures are quite easy to stick to the bottom, so that care must be exercised about the painting of the bottom and a quality paint the effects of which will last should be selected. The foreign objects stuck to the bottom produces a grave impact on the ship speed.

1. If the kingston valve is blocked up by oysters and other foreign objects, there will be a drop in the quantity of water.

2. The earth plate will be useless, if it gets dirty.

Although it might be said that there are no reasons for corrosion in terms of materials, it is necessary to put the ship on the slipways at least once a year and clean the bottom to prevent the aforementioned accidents. There is also a need to replace zinc plates on the bottom, check the outside planks of the bottom and inspect the propeller and its spindle.

Every effort must be made to clean the inside of the ship. Not only are things put into order but the inside of the ship must be carefully checked to detect leaks and corroded pipes at an early stage and, if necessary, to repair them.

It is equally necessary to check and maintain navigation and other instruments and devices to the full extent at all times.

III. Maintenance of Engines

1. Maintenance (with Special Reference to Overhaul Check)

In Micronesia, few people are able to maintain the engines of FRP ships. There is a need to train maintenance men. Another thing is that it is quite difficult to get necessary parts.

To conduct an overhaul check on the main and auxiliary engines of an FRP ship, the parts necessary for repair must be available in advance.

When an engine is reassembled after an overhaul, there are cases where somewhat inferior parts have to be used due to the difficulty of immediately getting their supply. Frequently, this will result in the outbreak of a major accident. Therefore, overhauling should be avoided unless a minimum number of parts required for the check are available.

In case an engine has been inadvertently disassembled and overhauled without setting aside parts necessary for its reassembly (it is difficult to obtain parts in Micronesia at once), the engine will remain overhauled over a long span of time. When necessary parts are finally secured, other parts will possibly be dispersed, thus making it impossible to reassemble the engine.

When maintenance work of the kind which has been done for the Mokorokor, Garangap and Angarap is to be conducted, it will require four weeks for one ship.

Moreover, it would be difficult for one and the same group of technicians to do maintenance work on ships one by one for health reasons, because it is hot at the work place and the inside of the ship is not spacious.

In respect to the maintenance of the engines of FRP ships, the necessity of carrying out maintenance must be confirmed to prevent a malfunction.

1) Practically every piece of equipment fitted to the seven FRP ships identical both in kind and type. Therefore, it might be said that the parts all common to all the ships.

2) The conditions of each ship are different, so that unless the engine is overhauled, there are many cases in which whether a given part is good or not cannot be determined.

3) There are parts which must be replaced, depending on the length of hours operated (e.g., piston rings). Then there are parts that must be replaced, depending on the service period (e.g., the anti-corrosion and protective zinc plates built in the engine).

On the basis of a full awareness of the above matters, it is conceivable that whether a system or method for the purchase, storage and supply of parts will be established will determine the way the maintenance of FRP ships will be in future.

Disassembling and inspection after a break-down is repair work, but not maintenance. Therefore, regular maintenance should be conducted, regardless whether the engine is out of order.

2. Preventive Maintenance

We have already touched upon a lack or shortage of the basic knowledge about the handling of the engine. Here, we will talk of the basic matters.

A) Preparations for Starting

a) Check the quantity of the lubricant inside the engine bed. Check the grease pot of the shaft bearing. If the lubricant is short, supply it.

b) Switch the lubricant cock and start the manual pump and supply the lubricant until it starts flowing out from the main shaft bearing and the piston shaft bearing.

c) Manually turn the engine more than two times to have the lubricant penetrate each part and check and see if there is any abnormality in each moving part.

d) The auxiliary engine is driven a cell motor. In case the engine has not been used over a long period, cut the fuel and drive only the cell motor for 20 seconds (this is known as 'racing') and make sure that the lubricant spread all over the moving parts. (There have been many accidents because this work was not done.)

e) Prime the fuel pump and valves.

B) Immediately after Starting

a) Check and see if there is a rise in the pressure of the lubricant.

b) Check the scuppers and see if cooling water has been supplied.

c) Check and see if each moving part works fine.

d) Check the condition of ventilation and the functioning of the fuel valves.

e) Gradually increase the load, if no abnormalities are detected.

C) During Operation

a) Note the readings of the pressure gauge and thermometer. Occasionally, touch each part to check the vibration and temperature in an attempt to detect an abnormality, if any, at an early stage.

b) Every two hours, oil the outside parts that require oiling. Open the exhaust cocks at time and check the conbustion.

c) Check drainage by taking a loot at the scuppers to ascertain that cooling water is being supplied to the full extent.

d) Keep each part of the engine clean and make sure that there is no leakage of water or oil.

e) When an abnormality has been detected in the engine, immediately stop the engine and determine what is responsible for it. In this situation, immediately report to the skipper without fail if you have time to spare.

D) Stopping of the Engine

a) Supply small quantities of light oil to the exhaust and air suction valves to prevent a possible sticking of valve rods after the engine is brought to a stop.

b) Open the indicator cock of the cylinder cover, turn the flywheel and chase all the combustion out of the cylinder.

c) Open the door to the crank chamber, touch the main crankshaft bearing, crank pin shaft bearing and piston pin shaft bearing and check the temperature.

d) Check and see if the bolts and nuts of each part are loose.

e) Wherever necessary, replace the lubricant and the anti-corrosion and protective zinc plates and clean the strainers and other devices of the fuel and lubricant.

E) Out of Operation (Not in Use for Long Period)

a) When the engine is to remain out of operation for a long span of time, take out all cooling water.

b) Carefully clean each component and grease each movable part to prevent it from gathering rust.

c) Set the engine at work one or two times a week and put each movable part of the ship into trial operation. Operate the navigation instruments and other devices to make sure that no malfunctions are produced by humidity and no rust is gathered.

Make sure that the engine is turned at several runs at least once every week to change the coupling of each part, supply oil and prevent rust.

Management of FRP 26 S/T Skipjack Fishing Boat

I. Basics for Management of Skipjack Pole-and-Line Fishing Boats.

The shipowners and land supervisors who intended to manage skipjack pole-and-line fishing vessels would be unable to do so, unless they were fully acquainted with the following essentials, in whatever region the ships were to be operated.

1. Points of difference between the pole-and-line fishing of skipjacks and other types of fishing operation. (The points might perhaps be described as features of the pole-and-line fishing of skipjacks).

2. Actual conditions for operation in a given region.

   a. The actual conditions of the port which serves as the base and of the land facilities.

   b. Forms of operation in the region.

   c. Trend of fish prices.

3. Features of the fishing boats used and the break-even point for the operation of fishing boats.

In the following, we will dwell mostly on the management of skipjack pole-and-line fishing boats of the FRP 26 S/T.

1. Points of Difference between Pole-and-Line Fishing of Skipjacks and other Types of Fishing

   As we explained whenever the opportunity presented itself, fishing boats other than skipjack pole-and-line fishing boats use such fishing gear as longlines and baskets, catch fish and accommodate them inboard. It is not an exaggeration to say that the primary mission of the crewmen of these vessels is to accommodate fishing gear inboard and dispose of fish caught. Consequently, whether fishing gear is good in quality is the main determinant for a fish haul.

b. Form of pole-and-line fishing of skipjacks at Palau

The skipjack pole-and-line fishing conducted at Palau is such that fishing vessels gather live bait by themselves to engage in a day's operation. Therefore, their operation area is extremely confined.

It has been pointed out for many years that the skipjacks which migrate to the Palau region fluctuate in number, depending on the year. Therefore, it is said that some years are rich and others lean. It is also known that the annual fluctuations are greater than in any other region of the West Pacific, and the fluctuations are amplified by the fact that the operation of skipjack fishing boats is confined to areas where they can get and return in a day.

In spite of the fact that Palau is situated in the tropical zone, there is a relatively clear difference between the busy fishing season and the slack fishing season.

So exceedingly fast are fluctuations and changes in the schools of skipjacks migrating near Palau that it is necessary to go out to sea and watch their movement. There is a need to realize that it would otherwise be impossible to continue catching big hauls of skipjacks.

A check of the fishing boats which landed their hauls at Van Canp in 1979 suggests that none of them were able to catch skipjacks in large quantities on the day following a day off in any favorable fishing season.

c. Skipjack prices at Palau

The meat of frozen skipjacks is consumed for canning resources. The tone of business is influenced by the tendency of the world markets. In Japan, too, the sales of frozen skipjacks are affected by the tone of business on the world markets. Van Canp in Palau can in no way be an exception.

In the case of skipjack pole-and-line fishing boats, the crewmen themselves play the role of fishing gear used by other fishing boats. In this context, the former are greatly different from the latter. Unless fishing gear is well balanced, high hopes may not be pinned on a big fish haul. In the same vein, the fish haul of a skipjack fishing boat will be determined by the voluntary teamwork of its crew.

It is a common practice in Japan for the shipowners and land supervisors to concentrate a maximum degree of effot on the formation of a crew with competent crewmen. It is sometimes said that a well organized crew will make it possible to provide a 90% assurance for a good haul before an operation.

2. Actual Conditions of Pole-and-Line Fishing of Skipjacks at Palau

a. Actual conditions of land facilities at Palau

In order to enable FRP 26 S/T Skipjack fishing boats to operate on a paying basis at Palau, there is no choice but to rely entirely on the facilities available at Van Canp. The use of other land facilities would reduce the working ratio for the following reasons, making it impossible to operate fishing boats on a paying basis at this juncture.

1) Facilities for the loading of large quantities of fish at one time and their inspection, disposal and storage are not available at places other than Van Canp.

2) Merchants capable of buying fresh skipjacks in great quantities are available only at Van Canp.

3) Fishing gear, engine parts, fuel, fresh water, ice for fishing operations and other things may be quickly supplied only at Van Canp at all times.

The future prospects for the international marketing of frozen skipjacks depend on the future tendency of consumption of canned fish and the future prospects for the supply of fish as resources. Therefore, it is hard to make a forecast, but the following matters may at least be pointed out in respect to the international marketing of skipjacks in future.

1. Consumption of canned skipjack is likely to continue expanding.

2. The supply of fish is likely to become increasingly difficult due to the establishment of an economic zone for each country of the world and to rises in fuel price.

From the foregoing, it is summarisable that the price level would be pushed up in respect to the international marketing of frozen skipjacks with small fluctuation as have been experienced in the past.

From April 1979 to March 1980, the price of skipjacks Van Camp was raised from $470 to $520 and further to $570 in terms of GR-I.

It is generally believed that the basic tone for the international marketing of frozen skipjacks is determined by the price specified in a fish purchase contract between netters and canners (we call this price a union price in a broad term).

In regard to FRP ships operating at Palau, whatever has been caught is landed as fresh fish but Palau does not have any marketing functions. Nor is PFFA capable of marketing the fish caught by FRP ships.

Even FRP ships, therefore, have to land their catches at Van Camp, to whose prices the catches are subject.

3. Features of FRP Ship and Break-Even Point

1) Features of FRP ship

a. The FRP ships stand comparison with other ships based at Van Camp in terms of speed. However, they are inferior in speed, being small and light,

when they chase schools of skipjacks toward the wind with a velocity of more than 4.

b. The width looks small as against the length. When more than five tons of skipjacks are caught from a school of skipjacks, the ship lists, so that the pole-and-line fishing operation has to be temporarily suspended to move skipjacks into the fish hold.

c. The ship is capable of accommodating about 70 buckets of live bait, The accommodation of a greater quantity will raise the mortality of live bait to an extraordinarily great extent.

As the service pump for the bilge is concurrently used to change the water of the live bait hold, there is a need to pay full heed to the capacity of the pump.

d. Deck gear may be procured at Van Camp with the exception of fishing gear. It is necessary to take note of the fact that it is impossible to have immediate access to parts, of the navigation instruments and engines.

e. The latitude of the inboard electric source is roughly 10 kW when the fish lamps are not in use.

f. The slipways available at Palau are usable for the cleaning of the bottom.

2) Break-Even point for pole-and-line fishing of skipjacks with FRP ships

See Appendix No. 4.

II. Actual Management of Pole-and-Line Fishing of Skipjacks with FRP Ships

In order to put the pole-and-line fishing of skipjacks with FRP ships on a profitable basis, there is no choice but to follow the following principles, which have been widely pointed out in the past, on the basis of what has been mentioned in I.

1. Try to catch as many skipjacks as possible in order to increase the proceeds.

2. Try to reduce the cost as much as possible.

Palau does not have such marketing functions as in Japan, and catches are acceptable at Van Canp and PFFA. The Acceptance at PFFA is limited, because only local marketing is conducted there, and therefore the major consignee is Van Canp.

Given this situation, the prices of skipjacks are changed to some extent during the fishing season, but the changes are not so big as to fluctuate the prices every day as in Japan.

For the fishing boats engaged in the pole-and-line fishing of skipjacks near Palau, therefore, it follows that any increase in catch will directly raise the proceeds as long as care is exercised about inboard control of the quality of the skipjacks caught.

On the other hand, fishing operations are done on the basis of a day's trip and this pattern of operation is repeated day after day, so that each item of the cost may readily be checked and reduced.

For a raise in catch (or a raise in proceeds), there is no choice but to use the fishing boats and fishing gear to the maximum extent to increase opportunities for the catching of skipjacks. As far as skipjack fishing boats are concerned, whether a haul is favorable is determined by the voluntary teamwork of their crewmen, who in fact serve as fishing gear, as has been elucidated in I.

Personally, Takahashi is of the view that in order to accomplish the above-mentioned two objectives, it is a wisdom of the management to determine how the customs and practices of Palau may be put to use or eliminated with the full understanding of the matters enumerated in I.

In Palau where it might be said that there are virtually no practices for the pole-and-line fishing of skipjacks, rather than that such practices have not taken root, judging at least from the experience we had with crewmen of the Lejabil, it would seem exceedingly difficult for people of Palau to organize, manage and control skipjack fishing boats, but it would not be totally impossible, as long as appropriate measures were available.

For this purpose, it is necessary for entrepreneurs in fisheries and land supervisors to give full consideration to the following matters.

a. It is absolutely necessary to win the faith of crewmen.

   They must discipline themselves so as not to postpone payment of wages and commission fees for their own reasons and to appropriate fish catches and ship equipment for other purposes. This is indispensable for entrepreneurs in fisheries and land supervisors as the pole-and-line fishing of skipjacks is placed on a commission basis.

b. There is a need to come to a full understanding of the meaning of the break-even point, and to realize that priority should be given to the work ratio to raise catches as much as possible and consider what should be done to increase the work ratio. In the case of operation of the Lejabil, for example, its direct landing at PFFA will exceedingly hamper the work ratio, so that it is necessary to eliminate, or strive to eliminate, every factor which will hamper the work ratio, as is discernible from the case in which landing was done only at Van Camp from April when the fishing operations were started to mid-July.

There is also a need to give full thought to the maintenance and preventive maintenance of fishing boats and to study at all times measures for the supply of provisions and materials and for the unforeseen repair of fishing boats.

c. In the commission system it is a basic rule to have crewmen informed of the proceeds and the cost. For this reason, it is necessary to document daily payments and proceeds and immediately show the records to crewmen upon request. The same thing also holds true in the calculation of commission fees.

If possible, it is desirable that daily outlays be itemized at the end of each month for use as references in the suceeding month. By so doing, efforts must be made to raise and maintain crewmen's volition for production.

III. Appropriate Measures

1. Organization of Crewmen for Better Teamwork

When the fishing operation of the Lejabil was to be begun, crewmen were selected from each hamlet for assignment to the ship, but crewmen did not settle down. Before the end of the project, more than 100 embarked and disembarked. The impression is that the crewmen finally settled down toward the end of the project, and all of them are from one and the same community.

As is discernible from this case, the best way in any country to assure better teamwork will be to depend on local ties and blood relationship. In other words, crewmen should be employed from one and the same hamlet and the hamlet familiarized with fishing practices.

If the crewmen are from the same community, they are likely to the same way of thinking and customs. It will then be easy to take various steps; it will also lead to an improvement in the life of the community as a whole. Further, fishing practices will quickly take root and crewmen will settle down.

There should also be an officer responsible for employment in respect to the hamlet and crewmen. One way would be to replace men unqualified as crewmen at an early stage, respond to requests from crewmen's family members for counsel (as almost every crewman is single) and work for better teamwork among the crewmen and for the upgrading and maintenance of the work ratio of fishing boats.

This method is exceedingly dangerous in some aspect. But there is a need to conclude that it would be better to discharge all crewmen not capable of raising fish hauls than to keep them in an undecided manner throughout the fishing season.

2. Settlement of Crewmen

For the employment of crewmen, it is naturally necessary to have the crewmen give their pledge that they will observe the rules of the ship and to conclude a labor contract which specifies the line of duty, methods for payment of the wage and commission fee, etc. Here, the holidays pose a problem. There is a need to have the crewmen fully understand that holidays will be provided on days when the weather is foul or the fishing operation has to be suspended.

Commission fees will be squared up every month. (the minimum indemnity will be paid on a monthly basis every month). The system for the payment of commission fees should be revised so that the total amount may be in a lump at the end of the fishing season, and the payment of commission fees to crewmen who disembarked for reasons other than an injury sustained during the performance of official duty and those who have been ordered to disembark should be cancelled. In respect to the handling of the commission fees which would have been paid to them, the crewmen should work out some standard or the other (e.g., proportional division by the number of days engaged in the fishing operations) for a fair distribution. In terms of labor legislation, there might arise a variety of problems, but it is necessary to have crewmen embark with a full understanding of these matters.

At Palau, practically ever crewman who is assigned to a fishing boat is single. As for the single crewman, one way would be to conclude a contract with him and his family member who may produce the greatest influence on him as his guarantor.

3. Enhancement and Maintenance of Volition for Production

As has been elucidated earlier, practically every crewman assigned to a fishing boat is single, and after a wage is paid, there will often be a long string of days in which the fishing boats are unable to go out to sea because they are indulged in drinking and have quarrels among themselves. (For some fishing boat, there were months in which it could not leave port for more than one week).

Thus, the work ratio decreases and the fish hauls sharply drop. To stop a repetition of this pattern of work, it is natural that a strict ban should be placed on drinking and hemp. It is equally necessary to make a careful study on the payment of wages and other matters.

Now that practically every crewman is single, the efforts of entrepreneurs in fisheries or land supervisors alone would be totally inadequate to enhance and maintain a volition for production.

At any rate, there is a need for encouragement from persons around crewmen. Given this situation, it is necessary to make a review of the wage payment method.

4. Control of Provisions, Materials, Etc.

This is quite an important matter. Reduction of the cost begins with the inboard control of provisions, materials, etc. In reality, however, ship equipment, etc., are missing, unawares.

It is quite difficult to come out with any convencing countermeasures, but with respect to provisions and materials, there is a need to clarify the custody and responsibility with the appointment of a responsible custodian.

At the same time, it is a prerequisite to put a strict ban on the embarkation of a fishing boat at anchor by any persons at their discretion other than the entrepreneur, land supervisor and crewmen.

For example, even family members and friends of crewmen's should not be allowed to come aboard a ship. Ship equipment should be used inboard and full control should be exercised to insure that no equipment should be absolutely be taken out to the land. Efforts should be made to make them a practice.

For the missing of a piece of flatware, a raincoat and other items which were leased to a crewman at his assignment, the crewman should be held liable, even if they are missing for easons ascribable to other persons. He should compensate the loss by buying the same items or the cost should be deducted from his pay. There is a need to arouse the attention of the crewmen to the use of inboard equipment.

5. Thorough Dissemination of Uniform Views on Operation of Pole-and-Line Fishing of Skipjacks

In a skipjack pole-and-line fishing, fishing boats leave and enter port every day, so that it is absolutely necessary for many competent persons to render full cooperation.

There are many cases in which the competent and responsible persons behave themselves at their own discretion, thus hampering the movement of fishing boats.

To continue a fishing operation with their full cooperation and without such incidents, the crewmen and competent persons should be assembled at one place for a briefing on the operation so that the intentions of the entrepreneur and land supervisor may be fully understood and there may emerge uniform views on the criteria of judgment about contingencies and vertical and horizontal liaison in order to assure a smooth fishing operation.

1) Methods for calculation and payment of pays and commission fees.

2) Each crewman's assignment and area of responsibility.

3) Actions to be taken for a violation of ship discipline.

4) Methods for supply of necessary materials and persons to be commissioned for repair and other types of work.

5) Matters of liaison and methods for liaison..

It should be mentioned here that explanation on a group basis should be avoided as much as possible as it may lead to misunderstanding.

IV. Measures for FRP Ships

The estimated incomings and outgoings including the depreciation cost, interest and insurance premium of the FRP ships are given in separate sheets. In respect to the fish prices at Van Camp, including the aforementioned outlays, the catch tonnage at the break-even point is 319 S/T when the commission rate is 60%, as shown by Appendix No. 4.

It would not be so difficult for an FRP ship to catch 319 S/T a year.

In order to encourage the entrepreneur to have a stronger volition for management and crewmen to enhance and maintain a volition for production, there is a need to lower the break-even point as much as possible and stimulate further their volition.

Naturally, there is a need to come out with some measure or the other to lower the break-even point.

1. Raise of Entrepreneur's Share to 50%

The holdings which are prevalent at Palau at present are said to be 40% for the entrepreneur and 60% for

the crew. (However, the commission fees are settled once a year for Taiyo and for the Republic of Korea boats, the commission fees are also settled once a year with the holding of the crew set at 50%). In the past, the sommission fees have been settled on a monthly basis. It was extremely disadvantageous to the enterpreneurs that his holding was set at 40% while he was forced to provide a large amount of money as a minimum guarantee and settle commission fees every month, or do something unbalanced.

It is desirable, therefore, that measures be work out to raise the holding of the enterpreneur to 50%. If so, the break-even point would be 296 S/T in terms of catch tonnage. (See Appendix No. 4)

2. Fixing and Advance Payment of Lease Fee

It is understood that the lease fee of an FRP ship accounted for 10% of the proceeds in 1979. This system is quite unreasonable in that in the eye of the entrepreneur who make serious efforts for management, the higher the proceeds, the greater the lease fee.

If it is assumed that the lease fee is $10,000 when the ship insurance fee which has to be directly paid by the TTPI is included, the break-even point may be indicated in the following manner in terms of catch tonnage. (See Appendix No. 4)

Entrepreneur's share at 40%	243 S/T
Entrepreneur's share at 50%	226 S/T

It seems advisable, therefore, that the lease fee be paid under an advance payment system without fail, the enterpreneurs be obligated to put their ships on the slipways once a year and bottom paints and zinc plates, good in quality and durability, be supplied in the countryside.

3. Negotiations on Fish Prices

In Palau, the catches of FRP ships are accepted only

at Van Camp. For this reason, Van Camp should be urged to distinguish FRP ships from other commercial vessels for the purchase of catches and to accept them at prices equivalent to PFFA (in reality, GRII is equivalent) or at expected prices enumerated in Appendix No. 4.

Incidentally, when the share of the entrepreneur is 50% of the PFFA and expected prices, the break-even point is 218 S/T and 211 S/T, respectively, in terms of catch tonnage. (See Appendix No. 4)

In the trial computation of the break-even point in Appendix No. 4, the use of foreigners is included for reference purposes.

Commission System for Fishing of Skipjack and Tuna

The commission system is incorporated as one of the basic ways of labor renumeration for persons who are engaged not only in the fishing of tuna and skipjacks but in all other fisheries as well. It is not an exaggeration to say that there are no fishing operations which do not incorporate any commission system.

Of all fishing operations, the fishing of skipjack and tuna is such that the commission system is taken into serious account as in the past in spite of the fact that the fishing vessels engaged in this operation are greater in size than ever. The reasons are given below.

1. The resources for the work remuneration of crewmen infallibly come from the proceeds gained from the sale of catches of their ships. Therefore, the principle is "no fish, no pay".

2. Whether there is a catch is exceedingly influenced by the weather, sea and other natural conditions which are beyond human power.

3. Whether there is a catch depends to a great extent on the hauling efforts of crewmen.

4. The fish prices fluctuate, depending on the day's marketing.

The commission system for skipjack and tuna fishing operations in Japan has been developed in an extremely ingenous form, as the operations are managed in a form similar to a common investment on the basis of blood and local relationships and people offer their labor by themselves to increase production.

From the outset of this system, therefore, it has been a basic practice to stick to the principles of "no fish, no pay" and settle accounts at one time for an entire fishing season. As a matter of course, there have never been cases where workers migrate to other sectors.

Thus, it has become a practice for skipjack and tuna fishermen that no remunerations are made to them when there have been no catches in a fishing operation and that they will not migrate until the end of the fishing season.

This deep-rooted practice might be described as having sustained a commission system for the fishing of skipjack and tuna.

From the start of a commission system to 1950 or so, workers made it a practice to let some other persons work in their place at their own responsibility, when they were unable to work for some reason or the other in a fishing season. Naturally, the replacements were paid for their work by the persons who had asked to take their place. There is a need to note that the commission system has been in existence in Japan on this serious, common awareness.

I. Classification of Commission Systems for Fishing of Tuna and Skipjack

The commission systems which are now in force at present may roughly be classified as follows:

1. Classification by Cost Handling Method

   a) System to incorporate costs in the calculation of commission fees (generally, this is known as an "Onaka" system).

   b) System not to incorporate costs in the calculation of commission fees (generally, this is known as a system of costs shared by shipowners).

2. Classification by Commission Settlement Term

   The general practice is to settle accounts for a fishing season or the year.

   a) Accounts are normally settled for a fishing season or the year.

   b) Accounts are settled for a month or each navigation.

The "Onaka" system is a normal account settlement method

for skipjack fishing operations in Japan at present, and accounts are settled for each fishing season (one year practically in every case). In other words, the methods 1. a) and 2. a) are used at the same time.

It is understood that the "Onaka" system of Van Camp is such that accounts are settled on a monthly basis. In other words, the methods 1. a) and 2. b) are used at the same time. This kind of account settlement method may be described as unusual.

For the settlement of accounts for the long-lining of tuna, the "Onaka" expenses are normally settled for each navigation. In other words, the most common practice is to use 1. a) and 2. b) at the same time.

Here is some example in Japan. At a time when the fishing boats were small in size and their management also small in scale and ample labor was available for their operations, the most common commission system was for the shipowner to bear the cost and settle commission accounts for the year.

In this situation, the shipowner and the crewmen were related to each other in blood and local ties and took on the markedly evident character of a group whose members cast their lot with one another. This system had been in common practice till 1955 or so and there had been neither excesses nor deficiencies.

However, as fishing boats became larger in size and their management greater in scale, there inevitably arose the necessity of people of other areas as crewmen. And when fishing operations were to be started newly as a business undertaking, it became impossible to employ crewmen in the locality of the shipowner. Growingly large numbers of communities came to adopt the "Onaka" system for fishing operations, and this system is employed practically in every case at present.

As for the background for a prompt shift to the "Onaka" system, it might be pointed out that when the costs are shared by shipowners, they complain that the costs tend to go up and that crewmen complain that restrictions are

imposed on ship equipment and materials, provisions, etc., both qualitatively and quantitatively.

II. Prerequisites for Commission System

For the implementation of a commission system, be it the "Onaka" expense system or a system in which the costs are shared by the shipowner, it is indispensable to nourish the following fishing practices.

1. When a new labor contract has been signed, no absence is authorized unless there is some unavoidable reason. In case a crewman is absent without any convincing reasons, a strict assessment will be made, such as a cut in share. For disembakation during the course of a fishing season, the share of the crewman will be cut and he will not be eligible for receiving a commission.

2. Under the principles of "no fish, no pay", neither shipowners nor crewmen shall appropriate landed catches for private use, and common efforts will be made to deliver the total catches to the landing institution (landing market). It is only natural to prevent the theft or missing of the catches.

3. The landing institution (landing market) will exercise care so that the catches landed from fishing boats will not be stolen or lost.

4. Inboard equipment should be inboard-use only. Anyone who use them for his own private purposes is held responsible for sharing the cost, which will be deducted from his commission fee.

5. The shares of the crewmen must be well balanced, depending on their title in the ship and their work.

6. In regard to the "Onaka" expenses, there is a need to attach an itemized statement, which has to be confirmed by representatives of the crew (fishing master, chief engineer and chief deck officer in practically every case).

These fishing practices are indispensable for a stabilization of the management of fisheries.

III. Outline of "Onaka" Expense System

The "Onaka" expense system is similar to a system of joint management by the shipowner and crewmen, as all costs from the departure of a fishing boat to her port return and the landing of her catches are deducted from the proceeds of the catches, and the balance is distributed between the shipowner and the crewmen at a reasonable rate. In other words, the ship is operated with the shipowner offering his ship and the crewmen assuring catches.

For this reason, the crewmen must do the utmost for the assurance of catches and for the reduction of all costs required for the operation of the ship and the fish operations, whereas the shipowner must make efforts to keep the ship in good condition. Otherwise, both parties must know that there will a cut in their shares.

As for the management of fishing operations under the "Onaka" system, the following basic matters tend to be misunderstood at times.

1. Minimum Guarantee for Crewmen

The minimum guarantee is something prepared to stabilize the lives of the crewmen on the basis of the principles of "no fish, no pay". In no way is it a pay but it takes on the character of a partial advance of the pay.

Therefore, the minimum guarantee may be considered an assurance of the payment of a commission fee. When this payment exceeds the commission fee at the time when commission accounts are settled, the advance must be deducted from the commission.

2. Substance of "Onaka" Expenses

In many cases, the substance of the "Onaka" expenses is confused in the light of the characters of various

expenses. There is a need to itemize the "Onaka" expenses with consideration given to various cases.

3. Persons Liable for "Onaka" Expenses

It often happens that the "Onaka" expenses are erroneously considered something that should be jointly shared by the shipowner and the crewmen. It should be noted that as long as the crewmen are concerned, the "Onaka" expense are nothing but a rule in terms of calculation of commissions and all costs for the fishing boat should be paid by the shipowner.

A. Substance of "Onaka" Expense

The "Onaka" expenses are the expenses which are required for a given navigation and from which the shipowner's expenses are deducted.

B. Substance of Shipowner's Expenses

The shipowner's expenses include the expenses for the maintenance of his ship before a fishing operation, expenses for the preservation of the ship (including the repair cost which should be appropriated in the ship cost in accounting terms), authorized numbers of furnishings, authorized numbers of fishing and ship gear, engine parts durable for more than one year, etc.

C. Individual Expenses

The individual expenses are very important. The basic rule is for the crewmen to pay for their daily necessaries and belongings. For skipjack line-and-pole fishing boats based in Japan, it is a normal practice for crewmen to go as far as to supplement poles and other fishing gear.

Therefore, it is only natural that the crewmen should pay for the detergents, soap, tissue paper, etc., they personally consume. For example, some of the medical supplies stored by the ship are used for reasons other than an injury sustained during

the executions of official duty, the users must pay for them, and the expenses are not appropriated in the "Onaka" expenses.

As elucidated above, the rules are quite strict. Rigid restrictions are also imposed on individuals' expenses.

IV. Calculation under "Onaka" Expense System

1. Shares by Shipowners and Crewmen

The "Onaka" expenses are deducted from the total amount of catches (net amount of catches), and the balance is distributed between the shipowner and the crewmen. The apportionment rate is determined on the basis of the past practices.

In case a fishing boat built on a new concept is offered by the shipowner to a crew (or in case a newly built fishing boat is offered), it is a practice to distribute the balance between the shipowner and the crewmen so that there may not be a big difference in commission between those assigned to the new ship and another ship of the same type (i.e., an old ship of the same type) and that the commission rates may not be of such a nature as to hamper the crewmen's volition for production.

As for the apportionment of the balance between the F.R.P. shipowner and the crewmen, it seems reasonable to halve it between them at rates of 50% for the entrepreneur and 50% for the crewmen.

For the operation of skipjack pole-and-line fishing in Palau, it is said that the Van Camp formula of distributing 40% to the shipowner and 60% to the crewmen was initially adopted for the calculation and distribution of commission fees on a monthly basis. No fishing boats use this system as it is, nor is there anybody which is familiar with the situation in those days. It is surmisable that there must have been various circumstances which necessiated the use of this system and the shipowner expense must have been low vis-a-vis the fish prices prevalent in those days. Now that there

have been increases in the shipowner's expenses, the merits of management by the shipowner is extremely small, when the rate is 40% for the shipowner and 60% for the crew and commission accounts are settled on a monthly basis.

2. Method for Calculation of Commission for Crewmen

As stated earlier, the commission fee of each crewman will be computed on condition that the minimum guarantee for the crewman is an advance payment of the commission.

In other words, in case the commission fee is in excess of the minimum guarantee, the balance gained by deducting the minimum guarantee from the total amount will be paid as a commission fee.

The method with which the commission fee is paid by the Lejabil is different from that which is employed for the "Onaka" expense system.

There are a variety of computation methods. Normally, in Japan, the computation of a commission fee is done roughly in the following manner. This method is applicable only to fishing boats with their bases situated in the mainland of Japan.

The conditions are that 50% of the balance goes to the shipowner and 50% to the crew, and that practically no crewmen embark or disembark during the course of an operation of the fishing boat.

1) Computation of Crewmen's Share (Total)
(net value of catches - "Onaka" expenses) x 50% ...A

2) Computation of Share by Crewman
A (total share of crew) .....B

3) Computation of Share for Each Crewman
B x (each crewman's share) C

4) Penalty for Crewmen Absent from Fishing Operations

a. Computation of Commission Fee per Capita

a Day during Fishing Season
B (total number of work days in the period) ..... D

b. Calculation of Penalty for Crewman Absent From Operation
Number of days absent x D x share of crewman absent ..... F

c. Distribution of Penalties (division by number of persons without absence)
$(F + F_1 + F_2 \ldots.)$ (number of crewmen not absent) ..... H

Normally, the following final calculation is made after the above computations.

1) Crewmen without absence

C - (minimum guarantee) + H = Commission fee payable

2) Crewmen with absence

C - (minimum guarantee) - F = Commission fee payable

These methods are examples. The method varies to some extent, depending on the district. So are the penalities.

II. Present Situation of Commission System for Van Canp Ships

There are many unknown points about the commission system of each fishing boat which land their catches at Van Canp, as no elaborate survey has been conducted, but the present situation is generalized for reference purposes below.

Now that Van Canp does not have any fishing boats at present, there are no fishing boats which adopt the so-called Van Canp formula whereby commission accounts are settled on a roughly monthly basis and which adopts

the "Onaka" system (reportedly, 40% for the shipowner and 60% for the crew).

Only the Garangap adopts a similar method (50% for the shipowner and 50% for the crewmen).

The fishing boats from Okinawa which belong to Taiyo adopt a system of "Onaka" expenses which are settled for an entire fishing season (40% for the shipowner and 60% for the crewmen).

For the Republic of Korea ships, an "Onaka" system (50% for the shipowner and 50% for the crewmen) is adopted whereby commission fees are computed for an entire fishing season (reportedly, 30 months).

The computation method for ROK fishing boats is complicated and no details are available. Both Okinawan and ROK ships land their catches at Van Canp and adopt a system whereby commission fees are settled for an entire fishing season.

Preserve of Telai

I. Past Developments in Preserve of Telai

Use of Telai (Stolephorus sp.) in Palau as a main live bait for the pole-and-line fishing of skipjacks started before World War II.

Ever since then, Telai has been used as a main live bait by skipjack pole-and-line fishing boats in Palau.

The pole-and-line fishing of skipjacks began in Papua New Guinea in 1970. Later, it was also started in the Solomon, Fiji and other tropical parts of the Western Pacific.

For a live bait in the skipjack pole-and-line fishing which has been started by a number of nations in the tropical Western Pacific, fish of the same species as Telai, the main live bait for Palau has been used. In regard to the live bait used by skipjack pole-and-line fishing boats, these nations have the same problem as Palau.

In other words, the problem is to supply preserved live bait to skipjack pole-and-line fishing vessels and work for an effective utilization of the live-bait resources.

However, some of the fishing boat crewmen who has used this species of fish as a live bait for many years maintain on the basis of their experience that the fish is too weak to preserve. In the aforementioned nations (including Japan), experiments have been carried out on the governmental and private bases on the possibility of preserving the fish, and its use has not yet gone beyond an experiment.

In the Telai preserve experiment project which was prepared from the end of October 1978, top priority has been given to the ascertainment of whether Telai may be successfully preserved in (congested) crawls on a commercial basis. On the basis of this concept, preparations have been made for the preserve of Telai.

As a result of the preserve experiment conducted in January 1979, it was ascertained and reported that it would be possible to preserve Telai, depending on the treatment.

The points different from the conventional treatment of Telai are given below.

1. Stick-held Net Operations

   a) Small floats are attached for about three meters from the receiving bamboo rods attached to both ends of the stick-held net to prevent a dispersion of Telai.

   b) Only one push bamboo rod was left as it was, and its end was fixed inside the ship and care was exercised so that the receiving bamboo rod would not come too close to the ship's side to "push around" Telai in the net.

   c) When the net was hauled, the hauling of the center was somewhat delayed. Three or four lead weights (1 kg) were tossed into the net so that Telai would not be "pushed around" as the net was "blown" by the current.

2. Crawls

   a) The crawls used were small in size, 4 x 4 x 5 m. From the upper edge of one side of each crawl, the side was cut in for about 1.5 meters and fixed with a zipper.

   b) For the frame of a crawl, bamboo poles were put together in two rows. For the installation of the crawl, the upper edge of the net was so arranged as to come to the upper row of the frame. The crawl fixing rope was tied to the lower row of the frame from outside.

   c) The crawls were made with minnow nets. "Blown" by the current, the netting tended to become inferior. For this reason, a frame, 4 x 4 m,was

prepared with pipes, 1.2" in diameter, was prepared and sunken to the bottom of the crawl as a bottom frame to put the net into proper shape and serve as a weight.

3. Transfer of Telai from Stick-held Net to Crawl

For the transfer of Telai from a stick-held net to a crawl, what was known as a "pour-in" system was used.

a) Telai were gathered in the center of the net with a lamp (about 100 W with a shade) above the water.

b) The zipper of the crawl was opened and part of the stick-held net was put into the crawl. Telai were introduced into the crawl with the lamp. Beind the lamp, the net was slowly hauled to help Telai move into the crawl.

c) When 80 to 90 Buckets of Telai had moved into the crawl, the zipper of the crawl was closed. A floating lamp was placed at the center of the crawl, which was moved to, and moored at, a place where no influences were produced by any fish lamps.

As a bottom frame had been sunken into the crawl, the survival rate of Telai was not markedly affected, when the crawl containing 80 to 90 Buckets of Telai was moved at appropriate speed.

II. Targets for This Year (April 1979 to March 1980)

In the previous year, it was confirmed that the preserve of Telai was possible, depending on the treatment, and that Telai could survive in the live bait hold of a fishing boat. Given these factors, the following targets have been set this year so as not to revert to the conventional assessment of Telai (the assessment that Telai would be unsuitable for preserve).

1. Full familiarization with operations with stick-held nets and other types of work, such as movement of Telai into crawls.

2. Labor-saving for operations with stick-held nets.

3. Efforts will be made to accumulate findings on Telai and research and development work will be conducted on a more effective fishing method in respect to the capture of Telai (testing on Bagan and Ranpara nets).

III. Developments in This Year

The targets for this year, mentioned in II, above, have been set on the basis of the following prerequisites:

1. For operations with stick-held nets, the Emeraech will be used as in the previous year.

2. Two light ships will be used -- In addition to the one assigned to the MMDC, one more ship must be prepared.

3. The two generators (2 KVA) which are landed will be repaired (they will be promptly repaired at the Palau Marine Resources). Another generator, (2 KVA), used in the previous year, and one gasoline generator (3 KVA) will also be used, bringing to four the total of generators.

4. One or two work boats will be employed.

However, the following conditions emerged when the preserve project was to be started in April 1979.

1. The two generators (2 KVA) the repair of which should have been completed were not actually repaired. (inferior insulation of the coils for the two generators). The 2 KVA and 3 KVA generators which were used in the previous year could not be used due to their poor handling. The result is that no generators were usable.

2. Judging from the capture of live bait by the Lejabil and a ship which belonged to Van Canp, it was known that the resources of Telai were limited at the bait grounds. The bait grounds (rock islands) which were used in the previous year were exceedingly devastated by many commercial vessels.

3. The Emeraech sank, and there were no prospects for its replacement.

Due to an unforeseen accident and changes in conditions as stated above, there was no choice but to drastically changed the initial targets and start with an experiment on the capture Telai with a Bagan net and a survey on bait grounds, in spite of the fact that all preparations had been completed with the exception of fishing boats capable of engaging in operations with stick-held nets and generators (three new crawl frames were constructed).

No mention is made of the survey on bait grounds and the Bagan net in that a detailed report has already been filed.

In conjunction with an experiment on the capture of Telai with a Bagan net, a variety of tests were also conducted on the method of using lamps (fish lamps).

In addition to the gathering of Telai, the use of underwater lamp (1,000 W), a lamp above the water (1,000 W) and a Kerosene lamp (about 300 W), posed the following questions:

1. Would it be possible to let schools of Telai come close to the surface? Past experience (under water lamp) shows that it had been considered difficult to let them come to depths of 10 - 15 meters from the water surface.

2. Would it be possible to reduce the lighting hours with a change in the lighting method? It had been said that unless the lamps were turned on for more than four hours, it would not be possible to gather as much fish as to make possible operations with stick-held nets.

3. Would a change in the lighting method produce an obvious difference in the capture of Telai?

On the basis of these basic concepts, tests were carried out on the capture with a Bagan net. As only one ship was engaged in the capture, and the conditions for the capture were different every night, restricting the number of samples, so that no findings suitable for public dissemination have been gathered.

1. Gathering of Fish

At least judging from the findings of a fish finder, it might be said that the underwater lamp is superior to the lamp above the sea. Because the resources of Telai were limited, because the same buoy was used for every test, and because there were differences in fish gathering (findings of the fish finder), it was difficult to make an assessment this year.

A larger kerosene lamp (Coleman 206) was used and no other kerosene lamps were available. This lamp seemed to be equivalent to an electric lamp of about 300 W but could not stand comparison with an 1,000 W lamp. However, fish may be gathered with a kerosene lamp, and there is a need to conduct tests with a large kerosene lamp as are used in the Philippines.

2. Floating of Schools of Telai Close to Sea Surface

Depending on the handling of lamps, it is possible to let schools of Telai come close to the sea surface. The past tests indicate that when they have been driven near the surface, some schools disperse from the lamp with the lapse of time.

3. Shortening of Conventional Lighting Hours

It has been pointed out that there is a need to turn on lamps for more than four hours, and this conventional belief has been disseminated the effects of capture in operations with stick-held nets.

Whether the capture is good or not is determined greatly by the quantity of Telai gathered, to be sure, but another important factor is the quantity of Telai to follow an induction lamp, when this lamp is turned on. In other words, the greater the quantity of Telai accustomed to a lamp, the greater the quantity of Telai which follows an induction lamp. For this reason, there is a need for the lapse of some length of time.

As the findings of tests are limited in number, there is no convincing reason to conclude that the length of lighting hours should be shortened. The length may

be shortened when there are many resources. Or it may be done so, depending on the fishing gear used.

4. Effects of Lighting, Depending on Method of Using Lamps

Judging from the tests that have thus far been conducted on the capture of Telai with a Bagan net,

1) The underwater lamp is more effective in the capture than the lamp above the sea at the time of the new moon.

2) The lamp above the sea is more effective in the capture than the underwater lamp at the time of the full moon.

This is ascribable to the fact that the Bagan net which was used in the tests was too small in size, but with the underwater lamp, there are cases in which no Telai was captured at all. With the lamp above the sea, Telai could certainly be captured, albeit in small quantities.

5. Method of Using Different Lamps

With a stick-held net, an induction lamp is used to induce Telai into a crawl. With a Bagan net, a fish lamp is used for a better concentration of Telai. The shift to one lamp to another has been repeatedly tested in the following manner:

A. By reducing the rotation of the generator (2 KVA), the lamp is set at the appropriate intensity of illumination (one lamp used).

B. Reducing the rotation of the generator (2 KVA), illuminating power is changed to two lamps of about 100 W (two lamps used).

C. Reducing the rotation of the generator (2 KVA), illuminating power is changed to two 1,000 cylindrical lamps (two lamps used).

These tests were conducted with a Bagan net, but the tests were few in number and the conditions were different. Then there were problems about the timing of hauling of the net. It was difficult to make a reasonable assessment. On the basis of the tests that have thus far been conducted, the effects for the capture are in the order of A, C, B. Tests of this kind should also be conducted in future.

IV. Impression on Preserve This Year

It is indeed regrettable that the operations with stick-held nets which were scheduled for the beginning of this year and the saving of labor in the operations could not be conducted due to unforeseen changes. In the tests on the capture of Telai with a Bagan net, it was confirmed that the capture effects with the Bagan net were just as good as those with a stick-held net.

Example: The Komin Maru captured about 300 buckets of Telai with a stick-held net (23 x 25 m in finished form) and captured about 180 buckets with a Bagan net (10 x 10 m in finished form) at the same night.

The Telai which had been captured with a Bagan net were induced into crawls to conduct preserve tests. The survival rate was practically the same as in January 1979, and the possibility of preserving Telai was once again ascertained.

The greatest question posed for the future is the selection of a method which would assure the capture of a maximum quantity of Telai. For the selection of the right fishing method, there is a need for a variety of basic surveys as well as an accumulation of findings on Telai.

Practically every factor concerning Telai has not yet been clarified. As in the past, it is surmisable that the surveys and tests may end up in grouping. There may be mistakes and errors, but surveys and tests should be carried out. We hope that a better fishing method will be developed by coming out with sophisticated findings on Telai.

Telai

No reports are available stating that Telai (Stolephorus heterolobus) inhabits Japan. "Tarekuchi" which belongs to the same family as Telai has been found only in the catches of "Katakuchiiwashi", a species of the anchovies (Engraulis japonicus).

And it is said that "Tarekuchi" has been drifted in by the current as will be elucidated later.

The species which is known as "Tarekuchi" inhabits the seas off the Philippines, Indonesia, Taiwan and other nations and used for food. Little research work has been conducted on this species, which does not seem to be considered much important.

Given this situation, an exceedingly small number of research papers are available on Telai ("Tarekuchi"), and no information whatever is available on Telai's habits the knowledge of which is required for fishing operations.

In Palau, the word "Telai" is used as a general appellation of Stolephorus sp. which inhabits Palau. We wish to call this species "Tarekuchi" to distinguish it from the Japanese anchovy.

In recent years, the pole-and-line fishing of skipjacks has become brisk in the tropical regions, so increasing attention has now been focused on "Tarekuchi" which is used by skipjack pole-and-line fishing boats for a live bait. However, the experience and observation of "Tarekuchi" in terms of fishing operations have been buried in those of individuals, and each person has his own view.

It does not necessary mean that the observation and knowledge (or experience) of "Tarekuchi" are shared by every person who has been engaged in the pole-and-line fishing of skipjacks in the tropical area. Only the persons responsible for lighting ships and those engaged in the capture of "Tarekuchi" have carefully observed this species.

In order that the experience and observation concerning "Tarekuchi" which are placed in such an environment may be used for the development and improvement of methods for the

fishing of "Tarekuchi", there is a need to discuss at an open forum the experience and observation that remain buried.

The observation of "Tarekuchi" which will be introduced now includes the matters which have been secured as pieces of information as well as those which have been experienced. What will be introduced now is none other than the view of the author, who wishes to make a bold attempt with the hope that it will pave the way for an open forum on the habits of "Tarekuchi". Kindly note that there may be some misjudgments in the author's view.

I. Importance of Telai ("Tarekuchi")

Ever since the pole-and-line fishing of skipjacks was begun in the tropical western region of the Pacific, Telai, "Akamuro" (general appellation of the larvae of "Takasago", coral fish, etc.), "Kibinago", etc. have been used as live baits. No other species are easier to capture and available in a more stable manner than Telai.

From before World War II, the pole-and-line fishing of skipjacks has been conducted in Palau. Nevertheless, no species which could take the place of Telai has ever been detected as mentioned above.

Judging from the dietary habit of skipjacks and the availability of Telai as resources, Telai might perhaps be described as the most important species for a live bait not only in the pole-and-line fishing of skipjacks in Palau but in the pole-and-line fishing of skipjacks in the entire tropical western section of the Pacific.

II. Observation of Telai

The observations of Telai may be enumerated as follows without putting into order the pieces of information gathered from persons responsible for lighting shops and individuals who has had many years of experience in the fishing operations of the southern part of the Pacific.

1. The areas where Telai may be gathered by fish lamps, rather than those which are inhabited by Telai, are

such that the bottom consists of mud or sandy mud. Practically no Telai are gathered at places where the bottom is coral.

2. Telai is not so good in phototaxis as Japanese anchovies and "Kibinago". The Telai which are gathered by fish lamps do not seem to be as conspicuously orderly in behavior as Japanese anchovies and "Kibinago".

3. No persons have ever macroscopically observed schools of Telai at places in bays other than bait beds for hardtail, frigate mackerel, etc.

4. No persons have ever witnessed something like schools of Telai both during the daytime and nighttime while being engaged in the search of fish. Perhaps, this stems from deficiency or carelessness in the observation of fish search records, but there have been no reports that something like schools of Telai is encountered.

5. It has been reported by Japanese government agency ships and training ships of fishery high schools that fish of this species are drifting in the tropical western region of the Pacific.

6. Telai have been captured in regions which are not considered their habitat (Miyako in Okinawa Prefecture, Saipan, etc.), but they have been done so sporadically but not continuously.

7. Telai varying in inhabiting generation appear at one and the same place at different times or at one and the same time. Telai in a different generation make their appearance in small numbers when the appearance of Telai in a certain generation comes to a peak.

8. It has been reported that Telai, as gathered by fish lamps, increase in number with the lapse of time, but it appears that there is some limit to the gathering.

9. An observation of the behavior of Telai gathered by fish lamps reveals that they are not so orderly in behavior as anchovies or not conspicuously orderly.

10. When Telai are poured into a crawl with a bucket, practically every Telai will be dead by the following morning. The survival rate will be highest, when they are captured in the twilight and moved into a crawl at daybreak.

11. The larvae of Telai are observed in Palau almost every night from May or so to August. However, there are few nights in a month when only larvae may be caught.

12. Gathered by underwater lamps and lamps above the sea, Telai will not come to the surface or depths of up to 10 meters by themselves (drifting at depths of 10 - 15 meters).

13. The way in which one school of Telai replaces another of a different inhabiting generation in their appearance at bait grounds is such that it looks as though they appeared and disappeard en masse.

14. The pattern of appearance of Telai varying in inhabiting generation is not evident at the bait grounds of Palau, though it is relatively evident at Kabieng district Papua New Guinea. In other words, fecund Telai make their appearance two or three days before the full moon and Telai which look like white-baits appear after the full moon. Twenty days or so later, they will take the place of Telai in their adolescence.

15. Among the ingredients found in the stomachs of skip-jacks captured in Palau, there are an overwhelmingly large number of Telai or small fish of the same species as Telai. There are many cases in which Telai and small fish of the same species as Telai found in the stomachs are different in size from Telai cast by fishing boats, and their clear distinction may be done with ease.

16. An observation of Telai in crawls and the live fish holds of fishing boats reveals that Telai is less orderly in behavior than anchovies.

III. Inferences on Telai

1. Habitation of Telai

Due to the facts that no reactions are observed in the gathering of Telai with fish lamps and in the records on their capture and that nobody has ever macroscopically observed schools of Telai in their natural state (in the oceans, bays, etc.), it is surmisable that Telai extensively and sparsely inhabit near the seabed and that they do not exist in group as anchovies.

A check of Telai in crawls, etc., gives the impression that they stay near the seabed at night and that they come up somewhat more frequently during the daytime than during the nighttime.

2. Spawning

It is conceivable that Telai, like anchovies, will spawn many times as long as they are placed in suitable conditions.

In Palau, the larvae of Telai make their appearance both inside and outside a bait ground (in the inside, they appear in the inner parts of rocks; in the outside, they appear in the inner parts of reefs and outside the rocks) almost every month, giving the impression that spawning is done throughout the year.

When the appearance of Telai's larvae and the skipjack fishing season are taken into account, it is surmisable that there are two peaks -- one in the May - August period and the other in the November - December period -- for spawning, granted that spawning is done throughout the year as mentioned above. The former peak is presumably greater than the latter.

1) The larvae of Telai make their appearance on the bait grounds of Palau almost every night, albeit different in quantity.

2) Judging from the oceanic structure, the correlations between the skipjack fishing season and the fish for use as a live bait are such that the main spawning season seems to fall in the May - August and November - December periods, judging at least from the following points, in that the skipjack fishing season has peaks in the June - August and November - December periods and that spawning is done throughout the year (the larvae of Telai make their appearance every month).

   a. The main spawning season of Japanese anchovies, which are described as being of the Japanese Mainland and Pacific family, falls in the April - May period. On the other hand, the busiest skipjack fishing season for the seas near the Izu Peninsula falls in the May - June period.

   b. The main spawning season for Anchovy sp. in the western Indian Ocean is described as falling in the November - February period, whereas the busiest skipjack fishing season in the Laccadive Islands, India, is said to fall in the December - February period.

   c. Fisherman on the Luzon in the Philippines point out that the appearance of the larvae of Anchovy sp. is most conspicuous when schools of skipjacks come closest to the shore.

   From the foregoing facts, it is surmisable that the oceanic structure which stimulates the appearnce of schools of skipjacks and that which encourages the spawning of anchovies are extremely similar or there are very close relations between them.

   Therefore, it is surmisable that the busiest skipjack fishing season coincides with the main spawning season of anchovies.

3. Places of Spawning

The views on the places of spawning by Telai in Palau are widely varied; some contend that they are found inside the rocks, whereas the others argue that they are detected near the bays. The people who hold that the places of Telai's spawning are near the bays contend that Telai which look like whitebaits will grow into bigger sizes.

A check of the replacement of one school of Telai by another at a bait ground forecloses the possibility of Telai larvae rapidly growing into bigger sizes in a matter of four or five days. Nor is it conceivable that Telai which look like whitebaits migrate at their own will.

In the oceans which surrounds Palau, fish of the same species as Telai are hemmed in and avidly eaten by skipjacks.

Large schools of Telai larvae drift off the shore, giving rise to the formation of surprisingly large numbers of schools of skipjacks with baits, driving fishing boat skippers to complain that skipjacks do not readily fall a prey.

This is related to the movement of Telai, which will be elucidated later, but the place they may drift away into the ocean (the fact that Telai drift in the tropical western part of the Pacific in exceedingly great quantities indicates that exceedingly great quantities of Telai are drifted away) or migrate into the bay must be the place where the oceanic current encounters the coastal current, when the quantity of Telai larvae in movement is taken into account. When the reproduction of Telai is taken into consideration, however, the place must presumably be the side of the coastal current which is directly affected by the tidal current.

In Palau, spawning is done at places outside the reefs which are affected by the tidal current and situated within reach of the coastal current.

4. Migration of Telai

Judging from the experience of fishing operations, the replacement of one school of Telai by another in different inhabiting generations, as repeatedly stated above, gives the impression that they appear, stay and disappear en masse.

a. Even the larvae of Telai the freedom of whose movement seems limited (Telai which look like whitebaits) to appear at a bait ground and disappear from it in an identical pattern.

b. When the Telai resources are not abundantly available at a bait ground, experience shows that even if an attempt is made to gather them with buoys of one and the same time, no fish what so ever will be gathered, depending on a change in the position of the lighting ship due to the wind direction or tidal current, or there will be a sharp drop in the gathering.

c. Even in the research of the brains of anchovies, it is known that the brains of fish of such a species are not of such a structure as will enable them to migrate and extremely primitive in terms of structure.

Judging from the foregoing facts, it is conceivable that Telai are migrated due to the movement of masses of water in a physical manner, instead of migrating by themselves for some specific purpose.

It is surmisable that Telai individually exist in an exceedingly sparse pattern, instead of forming congestions around masses of water.

If it is assumed that Telai will migrate due to the movement of masses of water, it is understandable the movement of masses of water, it is understandable that there are cases in which Telai have been captured in areas which are inhabited by Telai. (Miyakojima, Saipan, etc.)

If it is assumed that Telai sparsely and individually exist in masses of water, it is understandable that no reactions are observed in the records on the capture of fish and that no fishermen have ever macroscopically observed them.

5. Others

1) Annual changes in Telai resources at bait nurseries in Palau

In the Lejabil's operation reports, the consumption of live bait is compared between 1978 and 1979, showing that the consumption in 1979 was half as much as in 1978. This signifies the fact that the resources were extremely scarce in 1979.

The difficulty of capturing live bait in 1979 was nothing to that in 1971.

As stated in the foregoing, there are annual changes in the availability of Telai resources at bait nurseries.

Since Van Camp started operating the pole-and-line fishing of skipjacks in Palau, more than 10 fishing boats have operated, but we have never heard of the depletion of live-bait resources, even though the difficulty of capturing them has varied year by year.

In respect to these Telai resources, as it is conceivable that there should not be a depletion of the resources inhabiting Palau, nor should there be annual changes in the availability of the resources, there might be additional resources coming in from other areas.

In Palau, there are many schools of skipjacks in the year when skipjacks are caught in large quantities. The persons who have engaged in skipjack pole-and-line fishing operations for many years unanimously point out that there also are many Telai resources and bait nurseries and that it is easy to capture and preserve live bait.

When these facts and the movement of Telai are taken into account, it follows that the development of the whirlpools of the countercurrent north to the equator bring about not only skipjack resources but those of Telai as well and that the development also greatly influences not only flows into bait nurseries but also into the reproduction of Telai resources. In other words, Telai which spawn at the place where the oceanic current encounters the coastal current and those roes which are dragged in by the oceanic current drift as they are until they are eaten by big fish or naturally die (Japanese survey ships also report that Telai drift in exceedingly great quantities). They are concentrated bit by bit by whirlpools. With the development of whirlpools, they are carried to the Palau waters as big resources and flowed into Palau's bait nurseries along with Palau's indigenous species. Then they are presumably used as live bait for skipjack fishing vessels and also as reproduction resources.

Development of the whirlpool of the undercurrent north to the equator, it is pointed out, undergoes annual changes. It is conceivable that Palau's Telai resources may be tied in with annual changes in the whirlpool, thus bringing about annual changes in the resources.

2) Conditions for habitation of Telai

In the western Pacific, large quantities of Telai inhabit areas where there are many rivers, whereas they seldom inhabit in the areas where there are few rivers. The reason has been ascribed to the fact that nutrient salt is carried by the river water, making possible the habitation of Telai.

Whether this argument is correct is debatable. It is undeniable that there exist rivers near places where the habitat of Telai has been detected and that nutrient salt on the land is carried by the river water. It is surmisable, however, that these factors alone would not make it possible to assure a viability or reproduction of Telai in a smooth manner.

The bottom of the bait nurseries in Palau is the earth which has been produced as a result of the erosion of rocky islands by the waves and therefore this earth is different from that which has been washed down by the river water.

The primary condition for the habitation of Telai is not the workings of rivers, and their viability seems to be determined by whether the tidal current fitted to the lives of Telai exists in a given area.

3) Precipitation and Telai

In Palau, some people argue that there are many Telai resources in the year when there is much rain. Attempts were made to check Palau's precipitation against the consumption of Telai, as no data were available, however, there was no choice but to check it against the data of Van Camp's precipitation, but a possible correlation between them has yet to be found due partly to deficiencies involved in the comparison method.

If it is assumed that the primary requisite is the existence of rivers as mentioned earlier, there ought to be a significant correlation between the precipitation and the availability of Telai resources, or in the longrun, the haul of skipjacks, but such a correlation has not yet been discovered.

The impression is increasing gaining ground that what has been described as much rain is not numerically demonstrated but something gained out of intuition. If so, it would be exceedingly difficult to demonstrate the existence of a correlation.

Appendix 1. Actual Operations of Lejabil by Month

Month	Fish haul (S/T)	No. of days of the Month (days)	No. of days operated (days)	No. of days fishing operations suspended (days)	Reasons for suspension						
					No bait caught	Foul weather	Engine break-down	Docked for repair	Lack of crewmen	Holidays	Others
Apr.	15,272	20	14 (2)	6		3	2		1		
May	37,164	31	22 (2)	9			2	2	4	1	
June	22,309	30	24 (4)	6			1		5		
July	40,698	31	18 (3)	13	2	6	2		3		
Aug.	64,829	31	26 (3)	5	2	1			1		1
Sept.	36,777	30	19 (4)	11	1	4	2		3	1	
Oct.	0	31	0	31		15		16			
Nov.	10,224	30	16 (8)	14	1			1	7	5	
Dec.	27,915	31	14 (5)	17	2	1				14	
Jan.	12,199	31	17 (6)	14		5	1		1	7	
Feb.	31,017	29	13 (4)	16		16					
Total	298,404	325	183 (41)	142	8	51	10	19	25	28	1

Appendix 2. Fish Hauls by Lejabil by Month, Species and Size

(Unit : S/T)

Month	Yellowfin Tuna			Skipjack				Miscellaneous fishes				Total
	GR-I	GR-II	GR-III	GR-I	GR-II	GR-III	Scrap	Soda	Mahimahi	Desui	Others	
Apr.	0.113			13,686	0.946	0.405	0.122					15,272
May				32,751	4.338	0.075						37,164
June				20,434	1.663	0.078		0.134				22,309
July				39,895	0.153	0.650						40,698
Aug.				62,292	0.695	1.703	0.139					64,829
Sept.				35,923	0.089	0.765						36,777
Oct.												0
Nov.				0.734		4,389		2,706		2,395		10,224
Dec.	0.285			22,695	0.359	1.826		1.476		1.274		27,915
Jan.	0.220			1,562	7.064	2.581	0.150	0.102	0.407	0.113		12,199
Feb.				9,970	15,063	3.827	0.910		1.201	0.046		31,017
Total	0.618			239,942	30,370	16,299	1.321	4.418	1.608	3.828		298,404

Appendix 3. Sales by Month, Consignee, Species and Size

Month	VAN CAMP								PFFA											Total
	Yellowfin tuna			Skipjack				Sub-Total	Yellowfin tuna			Skipjack			Miscellaneous fishes				Sub-Total	
	GR-I	GR-II	GR-III	GR-I	GR-II	GR-III	Scrap		GR-I	GR-II	GR-III	GR-I	GR-II	GR-III	Scrap	Soda	Mahimahi	Desui		
Apr.				10,582	0.693	0.268		11,543	0.113			3.104	0.253	0.137	0.122				3,729	15,272
May				27,406	4,338	0.041		31,785				5.345		0.034					5,379	37,164
June				16,889	0.741	0.078		17,708				3.545	0.922			0.134			4,601	22,309
July				39,127	0.026			39,153				0.768	0.127	0.650					1,545	40,698
Aug.				56,654	0.648			57,302				5.638	0.047	1.703	0.139				7,527	64,829
Sept.				32,112	0.089	0.575		32,776				3.811		0.190					4,001	36,777
Oct.																				0
Nov.				0.734		1.168		1,902						3.221		2.706		2.395	8,322	10,224
Dec.				20,483		1.202		21,685	0.285			2,212	0.359	0.624		1.476		1.274	6,230	27,915
Jan.	0.220			0.976	5.667	0.961		7.824				0.586	1.397	1.620	0.150	0.102	0.407	0.113	4,375	12,199
Feb.				9,970	6.531			16,501					8.532	3.827	0.910		1.201	0.046	14.516	31,017
Total	0.220			214,933	18,733	4,293		238,179	0.398			25,009	11.637	12,006	1.321	4.418	1.608	3.828	60,225	298,409

Appendix 4. Trial Computation on Break-even Point

			Price in Van Camp GR-I $570 GR-II $420	Reference: PFFs Price GR-I $600 GR-II $420	Reference: Expected Price GR-I $630 GR-II $480
A	Proceeds		160,950$	168,780$	178,350$
B	Fixed cost:	Includes depreciation cost, interest and ship insurance fee.	136,534$	136,534$	136,534$
C	Variable cost:	"Onaka" commission - 60% for crewmen	37,110$	41,808$	47,550$
C'	Variable cost :	"Onaka" commission - 50% for crewmen	27,315$	30,430$	35,215$
	Break-even point:	Indicated in terms of haul tonnage with combination of A, B and C	319S/T	312S/T	303S/T
	Break-even point:	Indicated in terms of haul tonnage with combination of A, B and C'	296S/T	286S/T	276S/T
B'	Fixed cost:	The lease fee set at $10,000, not including depreciation cost, etc.	104,034$	104,034$	104,034$
	Break-even point:	Indicated in terms of haul tonnage with combination of A, B' and C	243S/T	237S/T	231S/T
	Break-even point:	Indicated in terms of haul tonnage with combination of A, B' and C'	226S/T	218S/T	211S/T

Haul Tonnage at Break-even Point in Trial Computation for Reference (Unit : S/T, Van Camp Rate)

	Trial calculation for reference No. 1	Trial calculation for reference No. 2	Trial calculation for reference No. 3	Trial computation No. 1 is for all Philippine crewmen (16 men)
With combination of A, B and C	361		391	Trial computation No. 2 is for all South Korean crewmen (16 men)
With combination of A, B and C'	335	341	369	Trial computation No. 3 for two Japanese and 14 Palauan crewmen
With combination of A, B' and C	285		319	
With combination of A, B' and C'	265	281	301	

Appendix 5. Conditions for Table of Trial Computation with All Crewmen Consisting of Palauans

1. Fish hauls (in S/Ts) are hypothesized as indicated in the following table. The fish species is hypothesized as skipjack. As for the size, 90% are hypothesized at GR-I and 10% at GR-II.

Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
20	30	30	40	40	40	30	20	20	20	290

2. The fish price is set at $570 for GR-I and $420 for GR-II in terms of Van Camp prices. The costs of supplies are also shown in terms of Van Camp prices.

3. Commission accounts are settled for each month under the "Onaka" system (with the "Onaka" expenses hypothesized at $5,500 a month). Computation is made with the commission set at 60% for the crewmen and 40% for the shipowner.

4. It is hypothesized that the cost of equipment, such as stick-held nets, fishing poles and generators, which should be purchased for the pole-and-line fishing of skipjacks is set at $10,000 and appropriated as a cost for the inception of this business (to be proportionally depreciated over three years).

5. The depreciation cost, ship insurance premium and interest are appropriated.

Trial Computation

1. There are a wide variety of restrictions on work by foreigners, but the trial computation is made without taking the restrictions into account.

2. In regard to the costs, when a foreigner is to be employed, outlays, such as for his trip in his own country, are required, but these outlays are not appropriated here because an attempt has been made to prepare rough data this time.

3. The fish prices and costs quoted in the Table of Trial Computation Nos. 1, 2, and 3 are calculated in terms of Van Camp prices.

Appendix 6. All Crewmen Consisting of South Koreans (Trial Computation for Reference No. 2)

Item	Amount	Base for Computation
Incoming		
[Fish proceeds]	[160,950]	
Skipjack GR-I	148,770	
Skipjack GR-II	12,180	
Miscellaneous fishes	0	
Outgoings		
[Materials cost]	[38,284]	
Ship gear	5,000	
Fishing gear	5,000	
Fuel	25,900	
Lubricant	1,844	
Ice	540	
Expendables	0	
[Labor cost)	[82,867]	
Crewmen's wage	67,200	20 persons x $280 x 12 months Remittance $240 and local allowance $40 per capita a month.
Commission fee	0	"Onaka" expense 50%; commission fee computed once a year.
Crewmen's health and welfare	1,067	The same amount as in the case of Palauans is appropriated as no data are available. 16 men x $100/18 x 12 months.
Provisions	14,600	$2.50 x 6 persons x 365 days

Item	Amount	Base for Computation
[Expenses]	[45,325]	
Repair	4,300	
Depreciation	19,000	
Insurance	4,500	
Lease	4,125	
Tax and public impost	0	
Communication	0	
Travel allowance	12,800	$800 for return trips between the Republic of Korea and Palau 16 men x $800
Conference	0	
Port and Harbor	0	
Miscellaneous	600	
[Depreciation of cost for business inception]	[3,334]	
[Project cost]	[169,810]	
[Interest]	[19,000]	
[Fishing operation cost]	[188,810]	

Remarks:

1. For fishing operations in the Palau region, there are seamen whose skills are just as good as, or better than Japanese skippers and chief engineers.

2. The practice of pole-and-line fishing of skipjacks has taken root.

Appendix 7. All Crewmen Consisting of Philippians (Trial Computation for Reference No. 1)

Item	Amount	Base for Computation
Incomings		
[Fish proceeds]	[160,950]	
Skipjack GR-I	148,770	
Skipjack GR-II	12,180	
Miscellaneous fishes	0	
Outgoings		
[Materials cost]	[38,284]	
Ship gear	5,000	
Fishing gear	5,000	
Fuel	25,900	
Lubricant	1,844	
Ice	540	
Expendables	0	
[Labor cost]	[85,237]	
Crewmen's wage	36,000	20 men x $150 x 12 months
Commission	33,570	Same as in the case of the Palauans
Health and welfare	1,067	The same amount in the case of the Palauans is appropriated: 16 men x $100/18 x 12 months
Provisions	14,600	$2.50 x 16 men x 365 days
[Expenses]	[45,421]	
Repair	4,300	
Depreciation	19,000	
Insurance	4,500	
Lease	4,125	
Taxes and public imposts	0	

Item	Amount	Base for Computation
Communication	0	
Travel allowance	12,896	$806 x 16 men for return trips between the Philippines and Palau
Conferences	0	
Port and harbor	0	
Miscellaneous	600	
[Depreciation of cost for business inception]	[3,334]	
[Project cost]	[172,276]	
[Interest]	[19,000]	
[Fishing operation cost]	[191,276]	

Remarks:

1. As the pole-and-line fishing of skipjacks is not carried out in the Philippines, no data are available on the skills of skipjack pole-and-line fishing boats' skippers and chief engineers.

2. Though there is no practice of engaging in the pole-and-line fishing of skipjacks in the Philippines, it will be possible to exercise good control, depending on organization. (This is demonstrated by the Bunei Maru in 1979).

Appendix 8. All Crewmen Consisting of Palauans (Trial Computation for Reference No. 1)

Item	Amount	Base for Computation
Incomings		
[Fish proceeds]	[160,950]	
Skipjack GR-I	148,770	(290 S/T - 29 S/T) x $570
Skipjack GR-II	12,180	29 S/T x $420
Miscellaneous fishes	0	
Outgoings		
[Materials cost]	[38,284]	
Ship gear	5,000	$500 x 10 months
Fishing gear	5,000	$500 x 10 months
Fuel	25,900	(136 gallons x 25 days x 6 months) + (136 gallons x 20 days x 4 months) x $0.828
Ice	540	290 S/T x $2.00
Expendables	0	
[Labor cost]	[80,501]	
Crewmen's wage	33,000	(20 men x $150 x 10 months) + (10 men x $150 x 2 months)
Commission	33,570	$63,570 (total commission) - minimum guarantee (20 men x $150 x 10 months)
Health and welfare	956	16 men x $100/18 x 10 months + 6 men x $100/18 x 2 months
Provisions	12,975	$2.50 x 16 persons x 300 days + $2.50 x 6 men x 65 days

Items	Amount	Base for Computation
[Expenses]	[32,525]	
Repair	4,300	Slipway cost $1,000 + engine parts $2,300 + monthly repair $100 x 10 months
Depreciation	19,000	Depreciation in equal installments over 10 years $190,000 x 1/10
Insurance	4,500	Annual amount $4,500
Lease	4,125	Lighting ship (with generator) $13.50 x 300 days
Taxes and public imposts	0	
Communication	0	
Travel allowance	0	
Conference	0	
Port and harbor	0	
Miscellaneous	600	$50 x 12 months
[Depreciation of cost for business inception]	[3,334]	$10,000 x 1/3 (to be depreciated in equal amounts over 3 years)
[Project cost]	[154,644]	
[Interest]	[19,000	Interest for facilities: Ship cost $190,000 x 0.1 without interest for operation
[Fish cost]	[173,644]	

Remarks:

1. No persons in Palau are able to serve as skipper and chief engineer for skipjack pole-and-line fishing boats. (Two Japanese men married to Palauans are said to be able to serve skippers).

2. It is a precondition that a system should be established for the management of Palauan crewmen. Efforts should be made to introduce fishing practices.

Appendix-9. 14 Palauan Crewmen with Japanese Skipper and Chief Engineer (Trial computation for Reference No. 3)

Item	Amount	Base for computation
Incomings		
[Fish proceeds]	[160,950]	
Skipjack GR-I	148,770	
Skipjack GR-II	12,180	
Miscellaneous fishes	0	
Outgoings		
[Materials cost]	[38,284]	
Ship gear	5,000	
Fishing gear	5,000	
Fuel	25,900	
Lubricant	1,844	
Ice	540	
Expendables	0	
[Labor Cost]	[111,817]	
Crewmen's wage	70,100	$2,000 x 2 men (Skipper and chief engineer) x 11 months + 16 Palauan crewmen x $150 x 10 months + 7 men x $150 x 2 months
Commission	26,856	($63,570 - $63,570 x 4/20 men) - (16 men x $150 x 10 months)
Health and welfare	1,011	16 men x $100/18 x 11 months + 6 men x $100/18 x 1 month
Provision	13,850	$2.50 x 16 men x 335 days + $2.50 x 6 men x 30 days

Item	Amount	Base for computation
[Expenses]	[34,125]	
Repair	4,300	
Depreciation	19,000	
Insurance	4,500	
Lease	4,125	
Taxes and public imposts	0	
Communication	0	
Travel allowance	1,600	$800 x 2 men for return trips between Japan and Palau
Conference	0	
Port and Harbor	0	
Miscellaneous	600	
[Depreciation of cost for business inception]	[3,334]	
[Project cost]	[187,560]	
[Interest]	[19,000]	
[Fish cost]	[206,560]	

Remarks:

Appendix 10. Computation of Commission Fees

		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Fish haul (S/T)	20	30	30	40	40	40	30	20	20	20	290
VAN CAMP	Proceeds	11,100	16,650	16,650	22,200	22,200	22,200	16,650	11,100	11,100	11,100	160,950
GR-I 570$	Minus cost	5,600	11,150	11,150	16,700	16,700	16,700	11,150	5,600	5,600	5,600	105,950
GR-II 420$	Commission fee (at 60%)	3,360	6,690	6,690	10,020	10,020	10,020	6,690	3,360	3,360	3,360	63,570
	Commission fee paid (at 60%)	360	3,690	3,690	7,020	7,020	7,020	3,690	360	360	360	33,570
	Commission fee (at 50%)	2,800	5,575	5,575	8,350	8,350	8,350	5,575	2,800	2,800	2,800	52,975
	Commission fee paid (at 50%)	0	2,575	2,575	5,350	5,350	5,350	2,575	0	0	0	23,775
PFFA	Proceeds	11,640	17,460	17,460	23,280	23,280	23,280	17,460	11,640	11,640	11,640	168,780
GR-I 600$	Minus cost	6,140	11,960	11,960	17,780	17,780	17,780	11,960	6,140	6,140	6,140	113,780
GR-II 420$	Commission fee (at 60%)	3,684	7,176	7,176	10,668	10,668	10,668	7,176	3,684	3,684	3,684	68,268
	Commission fee paid (at 60%)	684	4,176	4,176	7,668	7,668	7,668	4,176	684	684	684	38,268
	Commission fee (at 50%)	3,070	5,980	5,980	8,890	8,890	8,890	5,980	3,070	3,070	3,070	56,890
	Commission fee paid (at 50%)	70	2,980	2,980	5,890	5,890	5,890	2,980	70	70	70	26,890
Expected Price	Proceeds											178,350
GR-I 630$	Minus cost											123,350
GR-II 480$	Commission fee (at 60%)											74,010
	Commission fee paid (at 60%)											44,010
	Commission fee (at 50%)											61,675
	Commission fee paid (at 50%)											31,675

Author's Profile

Koshichi Takahashi:

Born on June 13, 1928. Graduated from the Imperial Fisheries Institute in December 1950. From 1951 to 1962, engaged mainly in tuna long line fishing and/or skipjack pole-and-line fishing as a captain/fishing master of vessels run by Nichiro Gyogyo Co , Ltd. and Kyokuyo Co., Ltd. Up to date, involved deeply in a number of practical operations of Kyokuyo, associated with tuna long line and skipjack pole-and-line fishing ventures being carried out abroad. During the above period, dispatched to such countries as PNG, Madagaskar, Philippines, India and so forth for the purpose of instructing fishing fleets and/or fishery resources survey. Also, as a chief advisor or short/long-term expert of JICA, since 1978 involved in skipjack pole-and-line fishing operations and live-bait conditioning of Telai in Palau and other neighboring islands located in the Trust Territory of the Pacific Islands in connection with Japanese-Micronesian Fishery Development Project having been executed by JICA in close collaboration with Resources Bureau of the TTPI and Marine Resources Division of Palau district.