

**REPORT
ON
BASIC DESIGN SURVEY
FOR THE FISHERIES TRAINING VESSEL
IN
TUVALU**

SEPTEMBER 1980

Japan International Cooperation Agency

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PREFACE

In response to the request of the Government of Tuvalu, the Japanese Government decided to conduct a basic survey on the promotion of Pole and Line Fisheries Development Project and entrusted the Japan International Cooperation Agency (JICA) with the survey.

JICA sent to the Tuvalu a survey team headed by Mr. Kenichi Kasai from July 19 to August 2, 1980. The team exchanged views with the officials concerned of the Tuvaluan Government and conducted a field survey in Funafuti area.

After the team returned to Japan, further studies were made and the present report has been prepared. I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Tuvaluan Government for their close cooperation extended to the team.

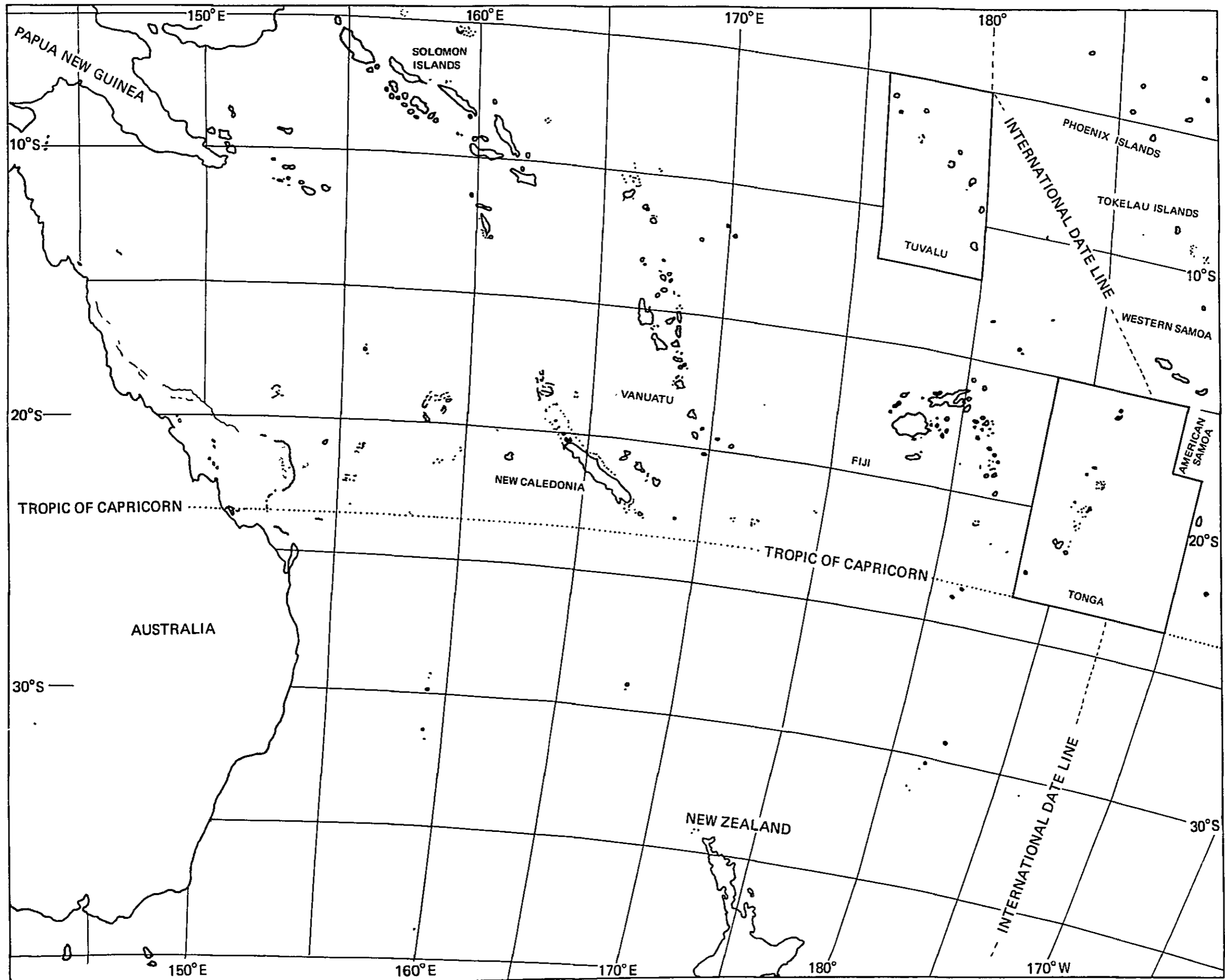
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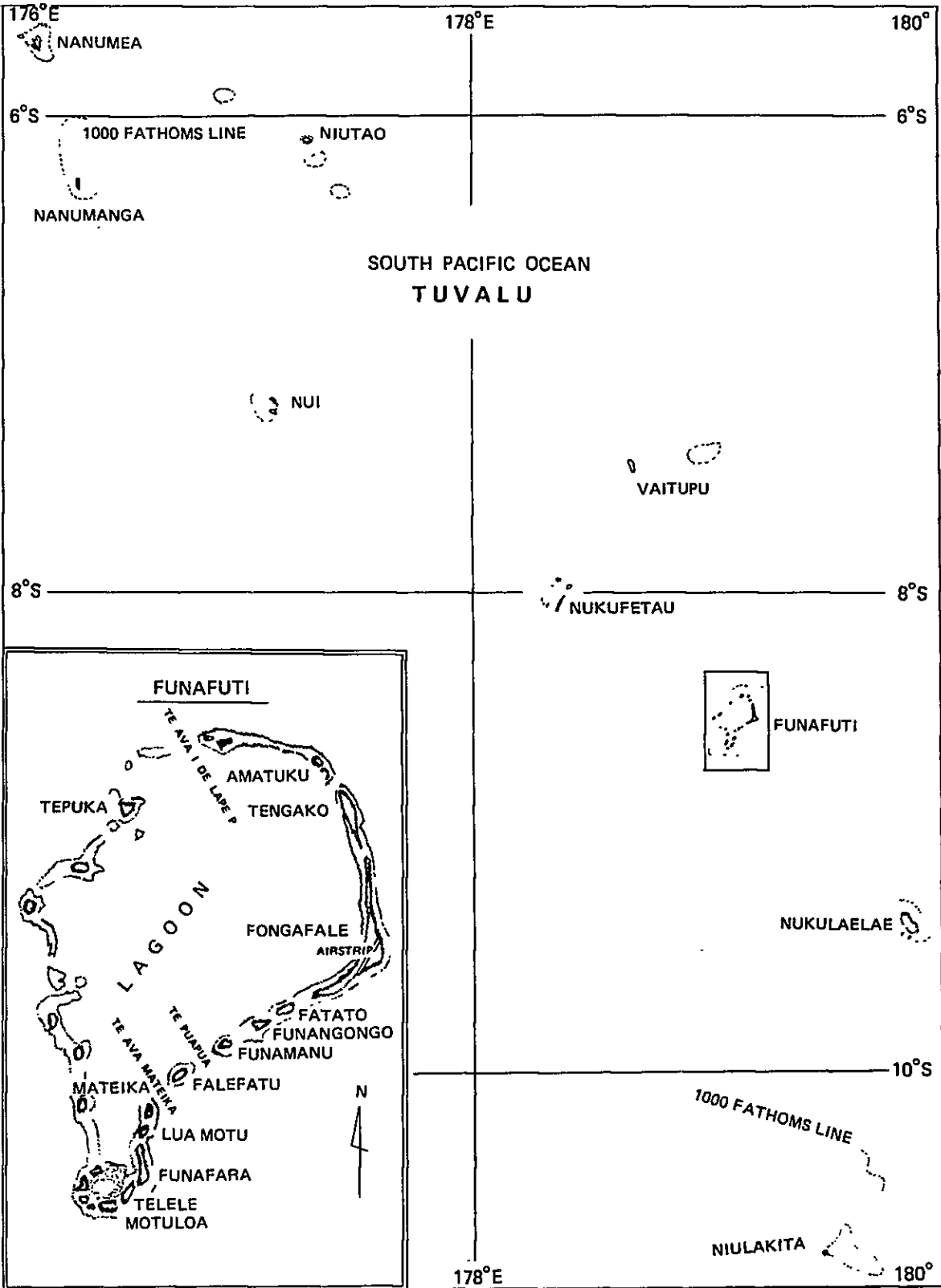


Keisuke Arita

President

Japan International Cooperation Agency





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Summary and Recommendations

1. Survey Team's Itinerary

The basic design Survey Team for Tuvaluan and Tongan fisheries training vessels stayed in Funafuti, Tuvalu from July 24 through 31 during the survey period of July 19 to August 11, 1980. During their stay in Funafuti, the Survey Team held rounds of discussions with the Fisheries Division, the organization responsible for this project in the Tuvaluan Government, and also conducted field surveys for investigation of the basic design.

2. Geographical Conditions

Tuvalu consists of nine coral islands dotted in a Central Pacific area at lat. 5° to 11° S and long. 176°-180° W, including Funafuti atoll where the capital of Funafuti is located. With a population of about 9,000 Polynesians, Tuvalu is a new nation that gained independence and became a member of the British Commonwealth on October 1, 1978.

Tuvalu covers a total area of about 26 square kilometers whose terrain consists mostly of limestone, coral sand and shells. Because of these geological features, the land is infertile and unfit for plant growth. Thus there is little hope for development of agriculture. Copra production is the sole export-oriented industry at present and there is no other industry worthy of particular attention. For these reasons, the Tuvaluan Government has been making a major effort to promote fisheries development.

3. Fishery situation

The fishing industry in Tuvalu consists of small-scale pole and line fishing with canoes and some motorized skiffs as well as long lining and angling with a few government owned motor boats, for subsistence. Fishing operations by large fishing vessels are non-existent. Regarding relations with other countries, the Government concluded an agreement with Fiji's IKA Corporation for a survey of skipjack resources in the Tuvaluan fishery zone waters. Under this agreement, two skipjack pole and line fishing vessels are now engaged in survey activities. The Tuvaluan Government also signed an licensing agreement with the Republic of Korean Government to allow Korean tuna fishing vessel to operate in the Tuvaluan waters.

From these facts, as well as various survey data obtained in the past on catches and the distribution of fishing grounds, Tuvalu's future off-shore fishery is likely to be mainly based on pelagic fish species such as skipjack and tuna.

4. Content of Grant Request

According to the information the Survey Team obtained from the Japanese Embassy in Fiji in advance, the Government of Tuvalu was expected to request a 130-ton class skipjack pole and line fisheries training vessel as technical assistance from Japan. Based on this information, the specifications and general arrangement of a fisheries training vessel were prepared.

However, the technical consultant for the Tuvaluan Government could attend only some of the meetings with the Survey Team because of other duties. Consequently, no overall agreement was reached on technical details of the fisheries training vessel, although a series of discussions were held on this matter. Under these circumstances, the Survey Team had to be content with their recommendation of the specifications of the following fisheries training vessel prepared in Japan to the Tuvaluan Government after some amendments. It was arranged for the Tuvaluan side, after their study, to submit their view on these specifications to the Japanese Government through the proper diplomatic channels.

The Tuvaluan views were made known to the Japanese Government on September 16 and 19, 1980. After a careful study of their views, the Survey Team concluded that a fisheries training vessel with the following principal specifications would be best suited as the type of vessel for the Tuvaluan Government.

Type of vessel	Skipjack pole and line and tuna long line fisheries training vessel
Length O.A.	Approx. 39.5 meters
Breadth MLD	Approx. 6.80 meters
Depth MLD	Approx. 3.05 meters
Design draft MLD	Approx. 2.60 meters
Gross tonnage	Approx. 170 tons
Main engine	Approx. 1,100 HP
Fish hold	Approx. 100 cubic meters
Fuel oil tank	Approx. 90 cubic meters
Fresh water tank	Approx. 20 cubic meters
Complement	30 persons

5. Crew members and trainees

A survey was also made on trainees of fishermen and crew members to be arranged by the Tuvaluan Government, having been considered the case that the fisheries training vessel is granted to Tuvalu. To train seamen the Tuvalu Maritime School was opened last summer on Amatuku, a small islet to the north of the Funafuti atoll. Also, at the request of the Tuvaluan Government, IKA Corporation of Fiji is giving on board training to 10 fishermen. However, it appears that no definite arrangement has been developed with proper coordination among these students, IKA Corporation's trainees and trainees of fishermen to be on board the proposed fisheries training vessel and the Tuvaluan Government has not yet made a decision on this problem.

It also appears that no preparations have been made for officers to man the vessel.

6. Recommendations

To ensure smooth operation of the fisheries training vessel, the Survey Team recommends that the Tuvaluan Government provides a sufficient maintenance budget to ensure that an adequate supply of parts will be maintained and periodical services and repair works will be thoroughly carried out. These maintenance efforts are indispensable, if the vessel is to operate at peak efficiency at all times.

During the discussions, the Tuvaluan side repeatedly requested technical assistance by Japanese experts. Under the present situation in the local fishery industry and supporting facilities, the Survey Team considers that continuous technical assistance by Japanese experts for several years is absolutely imperative for smooth operation of the proposed fisheries training vessel after its delivery.

The Survey Team also considers that the dispatch of a Japanese fishing master to Funafuti two or three months before the arrival there of the training vessel would be highly effective in recruiting crew members in advance, in cooperation with the Tuvaluan Government, and in arranging for local procurement of supplies and running stores.

However, if this plan for technical assistance is implemented, the Survey Team recommends that the Tuvaluan Government gives a special consideration to the efficient impartment of the technical expertise from Japanese experts to local trainees by assigning well qualified crew members to the vessel and taking other effective measures.

7. Benefits of the Grant

If all conditions mentioned above are met, the grant of the fisheries training vessel should be of great significance to the Government of Tuvalu particularly in the following four areas:

- 1) Establishment and development of off-shore fishing techniques,
- 2) Training of fishing experts, 3) Expansion of fishery related facilities and 4) Increased job opportunities.

The Survey Team also made on-the-spot surveys of related facilities such as jetties, oil storage, etc, and confirmed that although there is some needs to depend on overseas facilities for repairs, etc., there are no problems presenting particular obstacles to the possession of the proposed fisheries training vessel.

The Survey Team believes that this fisheries training vessel will greatly contribute to development of the Tuvaluan fishery industry through its efficient operations after delivery to Tuvalu.

Chapter I: Survey Objectives and Background to the Grant

1.1 Survey Objectives

The objectives of the survey were, in connection with the grant of the fisheries training vessel to Tuvalu for promotion of their fishery industry, to make a local survey centering on the fishery industry and related facilities, to make an overall evaluation of this grant including its justifiability and benefits and to produce an optimum plan for the grant and the basic design of the vessel.

1.2 Background to the Grant Request

The immediate target for the Government of Tuvalu is a self-reliant economy, and the development of its fishery industry is given top priority as a specific measure to accomplish this target.

The request from the Government of Tuvalu for a grant covers fishing vessels and all facilities related to the fishery industry. As a first step, the Government of Tuvalu requested a skipjack pole and line and tuna long line fisheries training vessel.

1.3 List of Survey Team Members

Head of the Team

Kenichi KASAI

Fishing Boat Division, Ocean Fisheries Department,
Fisheries Agency, Ministry of Agriculture, Forestry and
Fisheries

Member (coordination)

Tadao SHIGA

Social Development Cooperation Department, Japan International
Cooperation Agency

Member (consultant, marine engine and electric)

Hirofumi IGARASHI

Maritime and Shipping Department, Taiyo Fishery Co., Ltd.

Member (consultant, Tuna fisheries in general)

Eiji HIGUCHI

International Relations Department, Taiyo Fishery Co., Ltd.

Member (consultant, Fishing Vessel Designer)

Shunichi MORITA

Maritime and Shipping Department, Taiyo Fishery Co., Ltd.

1.4 List of Participating Tuvaluan Government Officials

Mr. Ionatana Ionatana	Secretary to Government
Mr. R.N.R. Davidson	Attorney General
Mr. Kitiseni Lopati	Secretary for Communications and Transport
Mr. Semu Taafaki	Secretary for Commerce and Natural Resources
Mr. S. Rawlins	Acting Secretary for Commerce and Natural Resources
Mr. Tulanga Manuella	Acting Secretary for Finance
Mr. K.J. Barnett	Captain Superintendent The Tuvalu Maritime School
Mr. J.B. Gallon	Chief Engineer The Tuvalu Maritime School

1.5 Survey Team's Itinerary

July 19	(Sat)	Leave Tokyo.
20	(Sun)	Arrive at Suva, Fiji.
21	(Mon)	Courtesy call at Japanese Embassy. Visit President Ochi of Fiji National Fishery Corporation. (IKA Corp.)
22	(Tue)	Visit Pacific Fishing Company on Levuka Island.
23	(Wed)	Visit shipyard and repair facilities at Suva.
24	(Thu)	Arrive at Funafuti, Tuvalu Hold 1st meeting with the Government of Tuvalu in the afternoon
25	(Fri)	Visit The Tuvalu Maritime School in the morning. Visit new jetty, etc. in the afternoon.
26	(Sat)	Prepare reports
27	(Sun)	Prepare reports

July	28	(Mon)	Hold 2nd meeting with the Fisheries Division of the Tuvaluan Government.
	29	(Tue)	Hold 3rd meeting.
	30	(Wed)	Sign Minutes of Discussion.
	31	(Thu)	Proceed to Suva, Fiji.
August	1	(Fri)	Hold discussion with Captain Barnett of The Tuvalu Maritime School.
	2	(Sat)	Leave Suva for Tonga.
	3	(Sun)	
	through		Visit Tonga.
	8	(Fri)	
	9	(Sat)	Leave Tonga for Suva. Make report to Japanese Embassy at Suva.
	10	(Sun)	Leave Suva.
	11	(Mon)	Arrive in Tokyo.

1.6 Minutes of Discussion

The Survey Team had extensive discussions with the responsible officials of the Tuvaluan Government on the grant of the skipjack pole and line fisheries training vessel during their stay in Funafuti from July 24, 1980. The results of these discussions were prepared in the Minutes. On July 30, 1980, Mr. Kenichi Kasai, Head of the Survey Team, and Mr. I. Ionatana, Secretary to the Government, signed the Minutes. A copy of the Minutes is inserted after this page of the report.

MINUTES OF DISCUSSION

ON

THE BASIC DESIGN SURVEY FOR THE SKIP-JACK POLE AND LINE
FISHERIES DEVELOPMENT PROJECT IN TUVALU

At the request of the Government of TUVALU for assistance in providing a fishery training vessel (with fishing gear) for the purpose of promoting the Skip-Jack Pole and Line Fisheries Development Project (hereinafter referred to as "the Project") in TUVALU, the Government of Japan, through Japan International Cooperation Agency (hereinafter referred to as "JICA"), has sent the Basic Design Survey Team (hereinafter referred to as "the Team") headed by Mr Kenichi KASAI to conduct a basic design survey for the Project from 24th July, 1980 to 30th July, 1980.

During its stay in TUVALU, the Team exchanged views and had a series of discussions with the authorities concerned of the Government of TUVALU in respect to the desirable measures to be taken by both Governments for the successful implementation of the above-mentioned Project.

As a result of the discussions, both parties agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

30th July, 1980
Funafuti, TUVALU

K. Kasai

Mr Kenichi KASAI
Head of the Japanese
Basic Design Survey Team

I. Ionatana

Mr I Ionatana
Secretary to Government
TUVALU

- I
1. It was mutually confirmed that the proposed project is to be in accordance with the rules and regulations of Japanese Grant Aid.
 2. The Team explained about the system of Japanese Grant Aid.
 3. The Team was requested to accept Tuvaluan nominees for training in connection with the project to the maximum extent possible and to send relevant Japanese experts to Tuvalu.
 4. The Team has taken note of the importance of this project to the Government of Tuvalu and will make every effort to speed implementation of the project as far as is possible within the framework of the Japanese budgetary mechanism.

II

The Team recommended that the fishery training vessel for pole and line fishing should have preliminary principal particulars in accordance with the ammended specifications of construction for 37.5 meter type fishery training vessel dated July 1980 provided by the Team to the Government of Tuvalu; subject to such alterations or adaptations as may be proposed by any consultant who may at a later date be employed in connection with the project. However, the Team was asked by the Tuvaluan delegation to consider the following matters:-

1. that the shipping Ordinance Chapter 85, and the Laws and Regulations of Tuvalu should be applied.
2. that the horse power of the main engine should be decided after careful evaluation in order to supply a maximum service speed of about 11 knots.
3. that the type of main engine should be decided to achieve the most economical fuel consumption.
4. that their final acceptance of the recommendations be deferred until their experts had fully examined the Team's recommendations.

It was therefore agreed that the detailed response of the Government of Tuvalu to the recommendations would be forwarded to the Japanese Government through the proper diplomatic channels as soon as possible.

37.5 METER TYPE FISHERY TRAINING VESSEL
(POLE AND LINE FISHING)

Amendment for the Specifications and the General Arrangement
recommended by the Japanese Basic Design Survey Team:

the Specifications

	Original	Amended
page 2. Depth (moulded)	2.75m	2.85m
page 3. Fuel Oil Tank	about 42m ³	about 60m ³
page 3. Cruising Range	about 2000miles	about 3000miles

the General Arrangement

Depth (MLD.)	2.75m	2.85m
Designed Draft (MLD.)	2.40m	2.50m
Fuel Oil Tank	about 42m ³	about 60m ³

Above mentioned amendment was recommended to the Government
of TUVALU in order to increase cruising range and constitute
a part of the Specifications and the General Arrangement.

30th July, 1980

Chapter II: Present Situation and Structure of the Fishery Industry

2.1 Structure of the Fishery Administration

The fishery administration in Tuvalu is handled by the Fisheries Division under the Minister of Commerce and Natural Resources. The fisheries Division consists of the following officials: Fisheries Officer, Expatriate Fish Processing Officer, Assistant Processing Officer and Fisheries Assistant. The Division employs 10 staff members for these officials. These subordinate personnel are engaged mainly in field jobs on fishing vessels and in storage facilities. It is essential to improve the technical level in the fisheries and the ability of government officials and employees. The Fisheries Division desires that these people improve their ability and gain experiences by taking undergoing overseas training courses.

As a specific example of overseas training, government officials who have acquired qualifications for overseas training upon completion of local training in sea cucumber processing are now taking a cadet course in fisheries in New Zealand (cadet course: a training course of study and practice to be completed in three years).

The main assets of the Fisheries Division are fishing vessels. At present, this Division operates three aluminum boats with outboard engines and one 20-horsepower wooden boat for investigation and development. The Division owns six outboard engines ranging from 5Hp to 40Hp. However, they can use only one 20Hp unit at present, because the other five units are out of order. In addition, Division has one FRP boat, "Eileen." However, this boat is now being repaired at this Carpenters Dockyard in Fiji. The Eileen is 8.8 meters in overall length and about 3 meters in width. The Fisheries Division wants to replace the existing 35Hp engine with a 60Hp engine.

Apart from the above two twin-hulled vessels, each about 8 meters long, are now being built in Kiribati for Tuvalu with aid from UNDP (United Nations Development Program). These vessels will be delivered to Tuvalu in late 1980 or early 1981.

The 20Hp wooden boat is 8.4 meters in overall length and about 2 meters in width, and is used for trolling line fishing for shipjack and tuna and for hand line fishing operations for bottom fish.

2.2 Importance of Fishery Promotion Project in the National Development Project

Natural conditions in Tuvalu are not suited for agriculture, because the available land is extremely limited and soil is lacking in nutrients and moisture.

Some artisanal fishermen engage in fishing in the fishing grounds around ring-shaped coral islands and reefs. However, most fishing activities are carried out for subsistence purposes and are concentrated in shallow waters near atolls. For adjacent and off-shore fisheries for pelagic fish, the first step of exploitation was taken only recently by two skipjack pole and line fishing vessels of Fiji's IKA Corporation.

Tuvalu's economy is traditionally a self-supporting one. However, the desire for increased cash income has been growing among the people. Sources of monetary income in Tuvalu are virtually nil except jobs that are related to the Government or exports of copra. Sources of income from the outside include remittances by emigrant workers in phosphate mines in Kiribati and Nauru, and remittances from seamen on board foreign merchant vessels.

Emigrant workers at the phosphate mine in the Gilberts were one of Tuvalu's major sources of foreign exchange. However, the deposits at this mine were exhausted in 1979 and emigrant workers were forced to return home. This presented Tuvalu with two big problems: an economic problem caused by a sharp drop in foreign exchange earnings and a social problem due to a population increase.

These two major issues urged Tuvalu to secure both food resources and foreign exchange as top priorities. This further increased the importance of fishery development. Tuvalu plans to train more efficient fishermen in order to increase fishery production, raise the level of self-sufficiency in fish and realize lower dependency on imports for foods. Tuvalu also recognizes the necessity of small fish, fish bones, skins and heads, and residues from the fish processing industry for their use as fertilizer and feeds in the agriculture and livestock industries. Furthermore, Tuvalu plans to earn more foreign exchange by developing its marine products for export markets.

The followings are specific projects that the Tuvaluan Government has already placed in the implementation stages and plans to start in the 2nd fisheries development phase from 1980 through 1983:

1. Development of fisheries products for export
2. Statistics collection
3. Construction of fish market
4. Introduction of Fishermens Loan Scheme
5. Development of general fisheries
6. Assessment of fish resources
7. Aquaculture Study Project

These projects will be described one by one as follows:

The Gross Domestic Product for 1977 is estimated at A.\$2,243,700. Total production in the fisheries industry is estimated at A.\$119,000, or about 5% of the Gross Domestic Product. Among the fisheries products represented in these figures, no products that could be identified as export items are found. However, in 1979 Tuvalu earned A.\$9,000. by exporting dried sea cucumber (Beche-de-mer). Skipjack and yellowfin tuna will be major potential export items in the future.

For collection of the information under item 2, the Fisheries Division of the Tuvaluan Government plans to start compiling statistics within this year if possible.

Concerning item 3 no fish market exists in Tuvalu. There is a specific plan for construction of a fish market in Funafuti. This plan will be discussed later in the paragraph dealing with distribution.

As for item 4, local fishermen are short of funds for purchasing fishing boats and fishing gears. To solve this problem and promote the fisheries industry, the Government is expected to study the introduction of a fishermen loan scheme at the Government Financing Committee.

Fisheries development under item 5 is being studied not only for in-shore waters in lagoons, etc. but also for the high seas. Of research projects undertaken by foreign organizations, the UNDP project involves tests on fish attracting devices. The SPC project concerns reassessment of sea bream resources with the use of bottom hand line fishing. Also Stocking with tagged skipjack is being continued, although this survey was conducted twice in the past.

Regarding item 6 which overlaps with item 5 in some areas, FAO and SPC are conducting various surveys and researches. It is needless to say that assessment of fish resources is important to fisheries development.

However, Tuvalu in particular, their great expectation is placed on the assessment of skipjack and tuna resources.

One of the prosperous projects under item 7 is the culture of live bait fish for skipjack pole and line fishing. The forthcoming arrival of aquaculture experts from Taiwan is awaited with great expectations. A part from the above, much attention is focused on the culture of pearls, turbo, trochus, shrimp and crab.

2.3 Present Situation of Fishing in the Private Sector

Fisheries in the private sector of Tuvalu include small-scale fishing operations conducted in coastal waters and shallow waters in and out of lagoons, as well as skipjack pole and line fishing and live bait fishing which were started this year in cooperation with IKA Corporation, Fiji.

In the processing field, dried sea cucumber is processed and exported in some localities. No operation worthy to mention exists in the propagation and culture fisheries.

Fishermen's organizations such as fishermen's cooperative units do not exist. However, since Tuvalu is traditionally a strong cooperative community by nature, it could be said that fishermen's cooperatives exist, although there are no such official organizations.

Small-scale fishing inshore and in and out of lagoons is practiced both by artisanal fishermen and by subsistent fishermen. Artisanal fishermen use boats with outboard engines. Their main fishing implements are trolling line fishing for pelagic fish and hand line fishing for bottom fish. Upon returning to their ports, they land their catches and sell them by hawking. Although no fish market exists at present, there is a plan to construct a fish market to meet consumer demand, etc. Thus it will become possible to purchase fish on the market in the near future.

The catch by subsistent fishermen probably accounts for 95% of the total in Tuvalu. Their fishing methods are limited but include fishing boats ranging from motorized skiffs to canoes, coastal net-fishing, and fishing by diving.

No commercial fishery has ever existed in Tuvalu. In 1980, an agreement was made between IKA Corporation of Fiji and the Tuvaluan Government. Under this agreement, two Japanese-flag skipjack pole and line fishing boats chartered by IKA Corporation are now investigating resources for skipjack and live bait fishing in Tuvaluan territorial waters and its exclusive fishery zone. The crew members consist of Japanese, Tuvaluans and Fijians.

2.4 Fishing Methods, Fish Species and Fishing Grounds

2.4.1 Fishing Methods

Fishing methods used in Tuvalu include coastal trolling line fishing for skipjack and tuna, extensively practiced hand line fishing for bottom fish, surface gill net for flying fish, spoon net for catching schools of fish lured to fish lamps, a net called a fishing net that combines the functions of both a drive-in net and gill net, and spearing by diving. Since no continental shelf in the strict sense of the word exists around Tuvalu, trawling for bottom fish on shallow waters is ruled out. No fresh water fishing exists, because there are neither lakes nor streams.

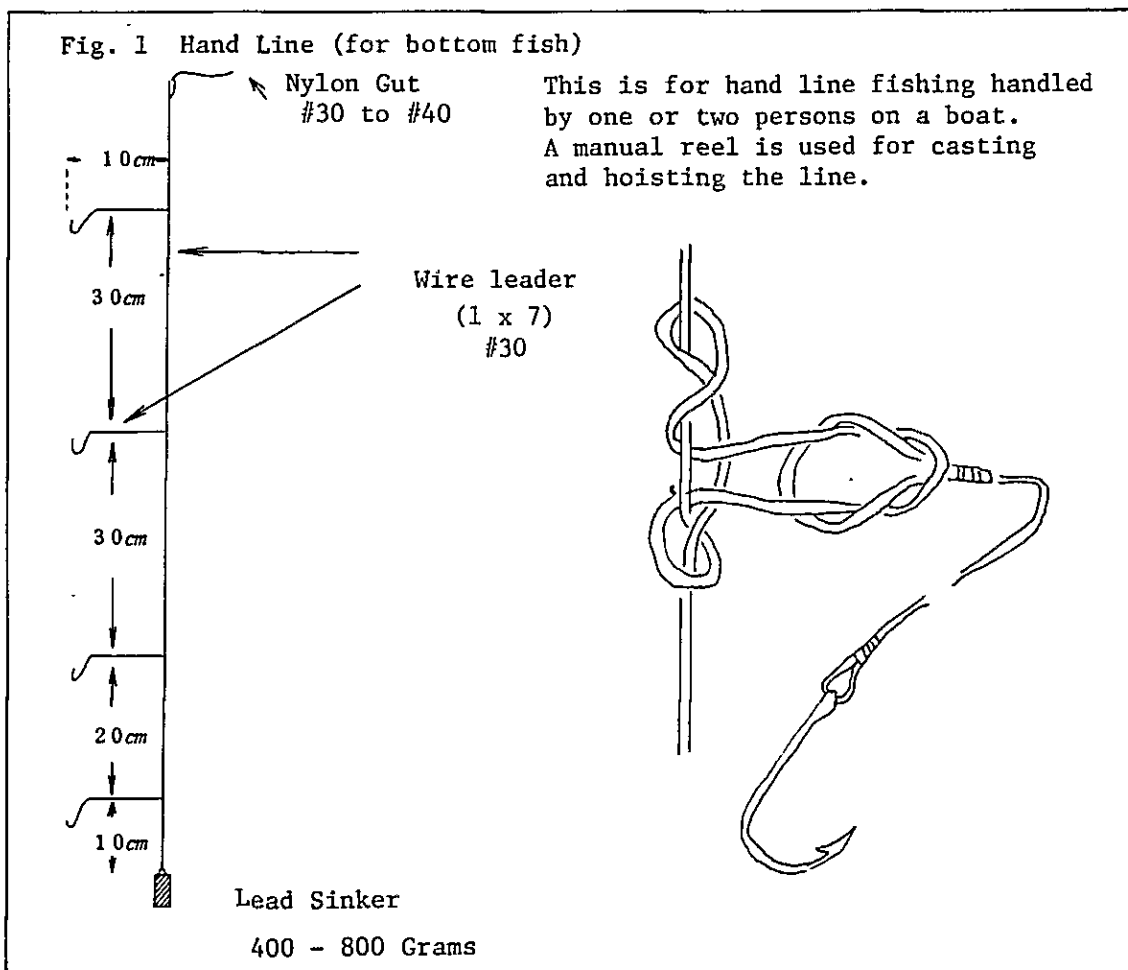


Fig. 2 Spoon Net (for flying fish)

To be handled by one fisherman

A fisherman rides on a boat, steers it, and scoops a school of fish attracted under the lamp.

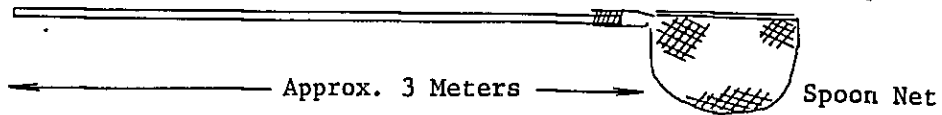
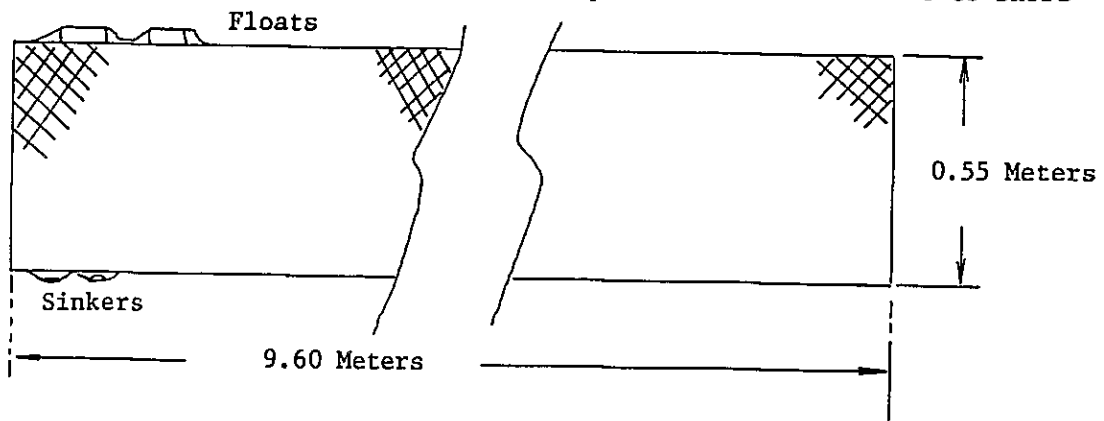


Fig. 3 Fishing Net (for small type fish)

To be handled by one or two persons in waters close to shore



Float: Wood, 5cm in length, 2cm in diameter, to be set at 60cm intervals

Sinker: Lead, approx. 30 grams, to be set at 10cm intervals

Net: Nylon, monofilament, 0.44mm thread diameter, 5.5cm mesh size

2.4.2 Fish Species

Main fish species caught in and out of lagoons of Tuvalu are shown below. Skipjack is caught in the largest quantity.

Japanese Name	English Name	Tuvaluan Name	Scientific Name
Katsuo	Skipjack	Atu	Katsuwonus pelamis
Kihada Maguro (under 9 kg)	Yellowfin " (under 9kg)	Takua Kasai	Thunnus albacres
Mebachi Maguro	Bigeye tuna	No nume	Thonnus obesus
Iso Maguro	Dog tooth tuna	Valu	Gymosarda Nuda
Tobiuo	Flying fish	Isaue	
Baramutsu	Oil fish	Palu	Ruvettus pretiosus
Hamadai	Ruby snapper	Palu malau	Etelis evrus
Fuedai	Red snapper		Lytyanus Spp
Makajiki	Striped marlin	Sakula	Makairce audax
Basho Kajiki	Pacific sailfish	Ulu lau	Istiophorus orientalis
Kurokawa Kajiki	Pacific Blue marlin		Makairc mazara
Shirokawa Kajiki	Black marlin		Istiomax indicus
Same-Rui	Sharks	Maneor	
Shiira	Dolphin fish	Masimasi	Coryphaena hipprus
Aji	Horse mackerel	Aseyo	Megalaspio cordyla
Oni Aji-Rui	Trevallies	Ulua	
Ei-Rui	Ray	Fai	

2.4.3 Fishing Grounds

Waters in lagoons and over reefs where fishing operations by small boats are conducted, are only several hundred square kilometers in area.

On the skipjack and tuna fishing grounds in in-shore and off-shore waters in the 200-mile exclusive fishery zone, almost none were clarified by Tuvalu. Results of the surveys conducted by Japanese fishing vessels and SPC will be described in the section dealing with fishery resources. The 200-mile exclusive fishery zone for Tuvalu covers an area of about 778,000 square kilometers.

2.5 Fisheries Resources

2.5.1 Bottom Fish

The water depth is said to precipitately plunge to 500 to 700 meters one mile off the coast in most areas around Tuvalu. Trawling is not feasible because of this depth and because there are still many reef-forming corals. An inflow of nutrient salts from the infertile soil of the islands cannot be expected. Consequently, there is not much hope for bottom fish resources including sea bream either from the geological standpoint or from the standpoint of the fishing grounds.

2.5.2 Skipjack and Tuna

From the geographical location of Tuvalu, it is only natural that attention is focused on pelagic fish resources such as skipjack and tuna. Their production in the 200-mile exclusive fishery zone is shown in Table 1.

Table 1 Production of Skipjack and Tuna
In the Tuvaluan 200-Mile exclusive Fishery Zone
Unit: Metric tons

Domestic production	Approx. 40	Estimate for 1978
Foreign long liners	" 1,886	1976
Japanese skipjack pole and line boats	" 7,611	1976 (year with particularly good catch)
Total	" 9,537	
Tuvaluan share	Approx. 0.4%	

Source: SPC, 1979 Occasional Paper No.16

1) Resources Survey

A review of major survey projects thus far conducted on skipjack and tuna resources shows the following:

- (1) A project for the assessment of small fishing boats and engines best suited for Tuvaluan fishermen (SPS, 1977):

It was found that tuna resource, the subject for trolling line fishing,

is abundant and can be caught with small boats. This fishing technique is economically feasible.

It was also found that a catch of 30 kilograms per hour can be made in flying fish operations.

(2) Interim Report of The Activities of The Skipjack Survey and Assessment Programme in the Waters of Tuvalu, SPC 1978

- i) Survey period: 10 days from June 25 through July 4
- ii) Vessel used: Hatsutori-Maru
 - Gross tonnage: 192.36 tons
 - Main engine: 820 HP (AKASAKA)
 - Crew: Japanese 9
 - Fijians 12
- iii) Fishing gears used: fishing poles and stick-held dip net (for catching bait fish)
- iv) bait fish Mollies transported in the live bait hold from American Samoa and fish caught in Funafuti lagoon.

Bait fish were caught with stick-held dip net at night.

The dominant specie was *Spratelloides Delecatulus*. With single fishing operation, 177 buckets of fish were caught and 354 buckets for one night. This was a record catch. 708 buckets of fish were caught in a two night operation. This report made no reference to Mollies loaded at American Samoa. The fishing ground for bait was located in Funafuti lagoon when the moon was 25 to 27 days old.

It was reported that very promising results were obtained in skipjack and tuna resources with the sighted fish at a frequency of one school per hour. The number of schools sighted and the number of baited schools are shown in Table 2.

Table 2 Resume of Sightings

(SJ = skipjack (*Katsuwonus pelamis*), YF = yellowfin (*Thunnus albacares*).
 RR = rainbow runner (*Elegatis bipinnulatus*), DF = dolphin fish
 (*Coryphaena hippurus*), UNID = unidentified)

DATE	NO. OF HOURS SPENT SEARCHING	NO. AND SPECIES OF SCHOOLS	NO. OF POSITIVE RESPONSES
22/6*	9	13 UNID	-
24/6*	8.5	11 UNID	-
25/6	12	10 SJ, 1 SJ+YF, 1 SJ+YF+RR, 6 UNID	6
26/6	3	3 SJ, 1 SJ+YF, 7 UNID	2
27/6	11.5	7 SJ, 1 SJ+YF, 1 YF+RR, 2 SJ+ YF+RR, 6 UNID	4
28/6	10	4 SJ, 1 SJ+DF 1 YF+RR	2
29/6	11	5 SJ, 1 YF, 1 SJ+YF+RR, 1 SJ+YF, 1 UNID	4
30/6	12	2 SJ+YF, 6 UNID	1
1/7	10.5	6 SJ, 2 UNID	3
2/7	6	5 SJ, 1 SJ+YF	4
3/7	6.5	3 UNID	-
4/7	12	3 SJ, 4 UNID	1
TOTALS	112	43 SJ, 1 YF 7 SJ+YF, 68 Others	27

* Sporting en route from the Samoas to Tuvalu.

Source: Interim Report of the Skipjack Survey in the Waters of Tuvalu,
 1978, SPC

V) Catch: Skipjack stocked after being tagged and skipjack taken into the fish hold were estimated at 8.1 tons in total. The operation was conducted for 9 days. The operating efficiency of a survey vessel was considered to be 0.29 of that of a commercial fishing vessel. According to the calculation made by taking this efficiency rate into account, the catch per day would amount to 2.8 tons. However, the report says that this calculation result should be taken with some reservation, because the survey period was rather short and the area covered by the survey was limited to only a small part of the Tuvaluan waters, and bait conditions had to be also taken into account.

The survey covered the waters around Funafuti and Nukufetau.

The survey report also stated that these areas were some of the most interesting waters for survey and was worthy of further investigation. Tuvalu is situated near the equator. This means that skipjack and tuna should be abundant throughout the year. The operations of Japanese skipjack fishing boats also indicate that skipjack fishing in the waters of Tuvalu are very promising.

(3) Report of The Activities of The Skipjack Survey and Assessment Programme in The Waters of Tuvalu, SPC 1980:

Although this report was not published as of July 27, available information indicates the following operation outline:

- i) Survey period: The survey vessel sailed off shore and engaged in operations for only about three days.
- ii) Survey vessel: No.5 Hatsutori-Maru
Gross tonnage: 254.41 T
Main engine: 1,300 HP (Hanshin)
Fishing gears: Fishing rod and stick-held dip net
(for catching live bait)
- iii) Live bait fish: It is said that the live bait catch was very poor with the moon around 15 moon day old

2) Environmental Conditions of Fishing Grounds

Island nations in the Central West Pacific generally do not have any continental shelf, and there is little inflow of nutrient salts from the land to the waters surrounding these islands. As a result, not too much can be expected from fishery resources in these waters. However, these regions are blessed with off-shore fish resources of highly migratory species of fish, particularly skipjack and tuna. It could possibly be said that all the areas within Tuvalu's 200-mile zone are fishing grounds for skipjack and tuna. Waters that satisfy necessary conditions as a fishing ground are those around the islands. In addition it is believed that waters over submarine mountains lying at both the eastern and southern sides of the 200-mile zone toward the outside of this zone are considered worthy of thorough survey in the future.

For tuna species, this area is a long line fishing ground mainly for yellowfin tuna. Albacore is abundant in winter and yellowfin tuna becomes dominant in spring through summer.

Resource assessment for highly migratory species of fish is said to require survey and research over an extensive area of water. Thus the assessment depends much on future survey and research.

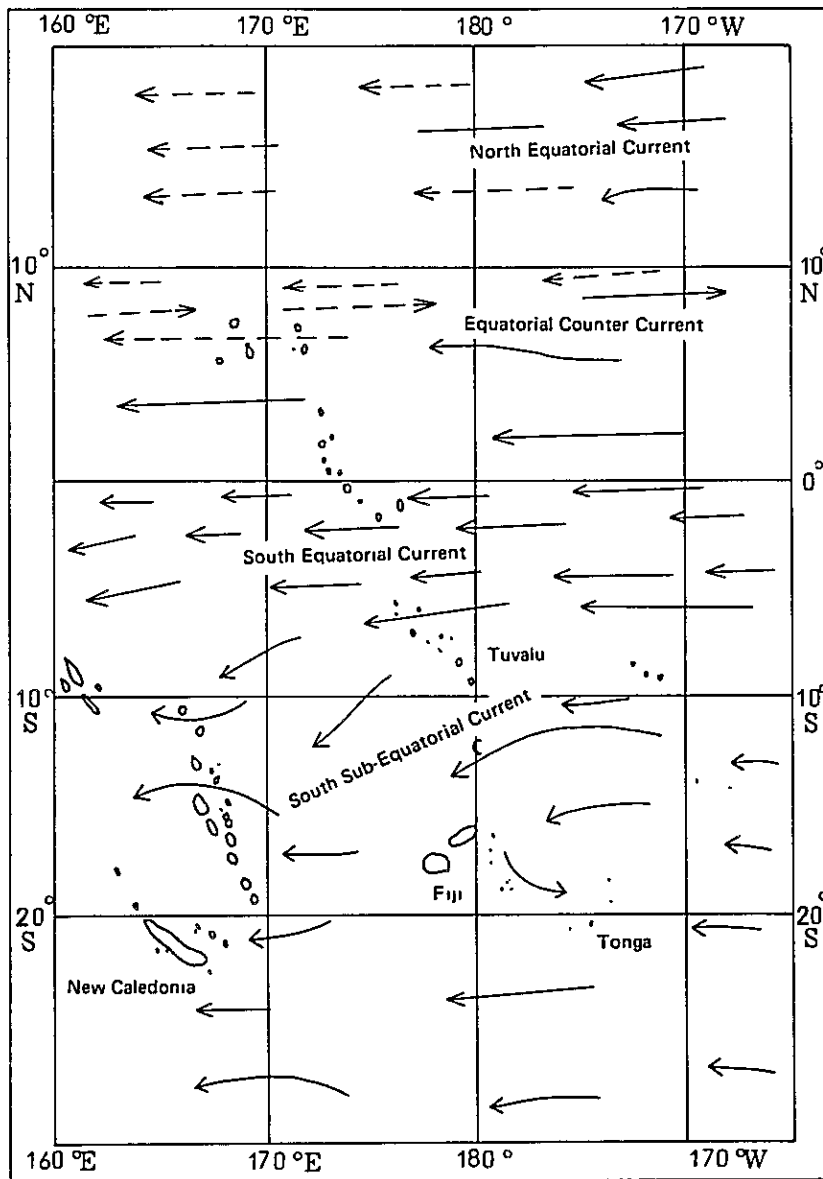
The currents that flow in the waters of Tuvalu are as follows: Tuvalu is situated in the south equatorial and south sub-equatorial currents that flow to the west by the southeasterly trade winds. These currents run nearly westward 7 to 8 miles off Funafuti but head to the northwest on the northeast side. It is said that normally the strongest of these currents has a speed of 0.75 knots and that it will seldom exceed 1.5 knots even under abnormal strong winds.

The prevailing winds are mostly southeasterly but turn to the north from around January to April. Virtually no hurricanes hit Tuvalu.

The north winds from January through April are believed to have an adverse effect on skipjack pole and line fishing. Skipjack and tuna are highly migratory species of fish and migrate under the influence of subjective factors and also depending upon meteorological and oceanographic conditions. Thus their fishing grounds will change as they move. As with the case of resource assessment, fishing grounds for skipjack and tuna must be considered in terms of a wide fishing area.

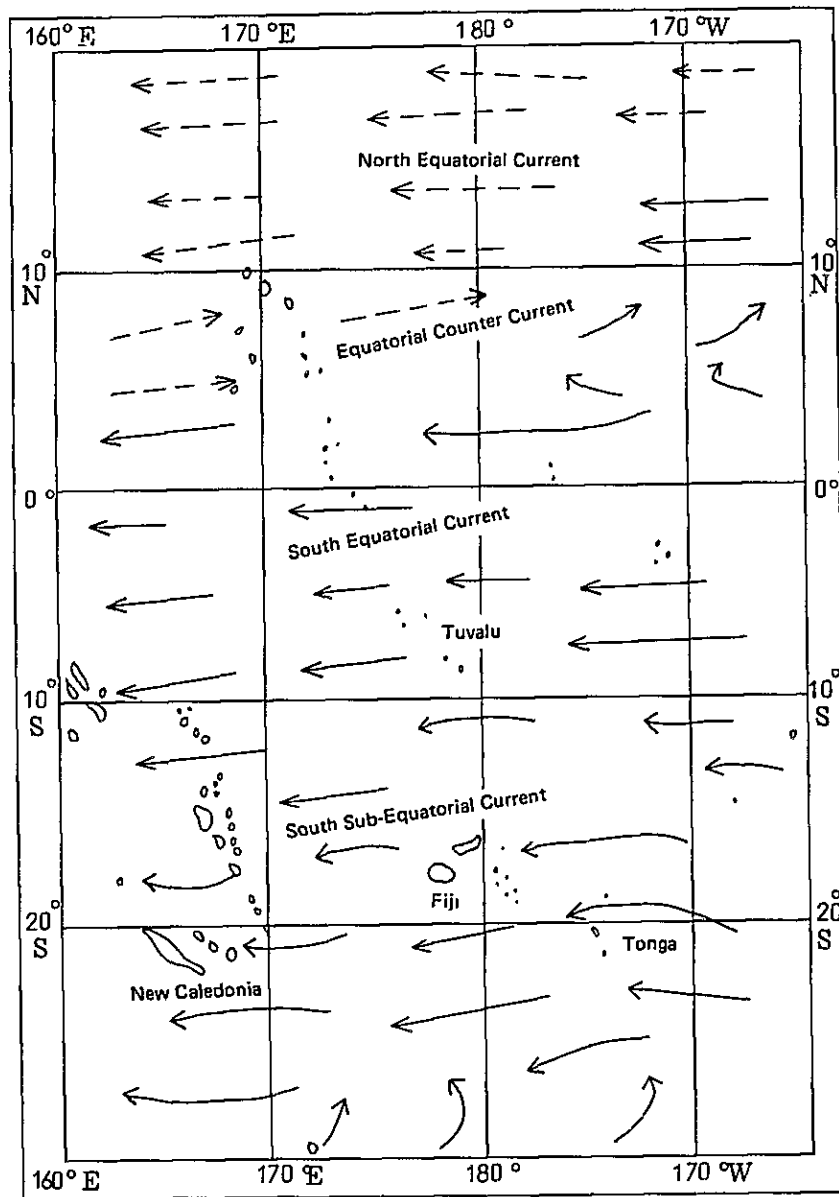
Current charts are shown in Figs. 4 through 7.

Fig. 4 Current Chart (March to May)



Dotted line: Current plotted based on few observations
Source: Pilot Book (English edition)

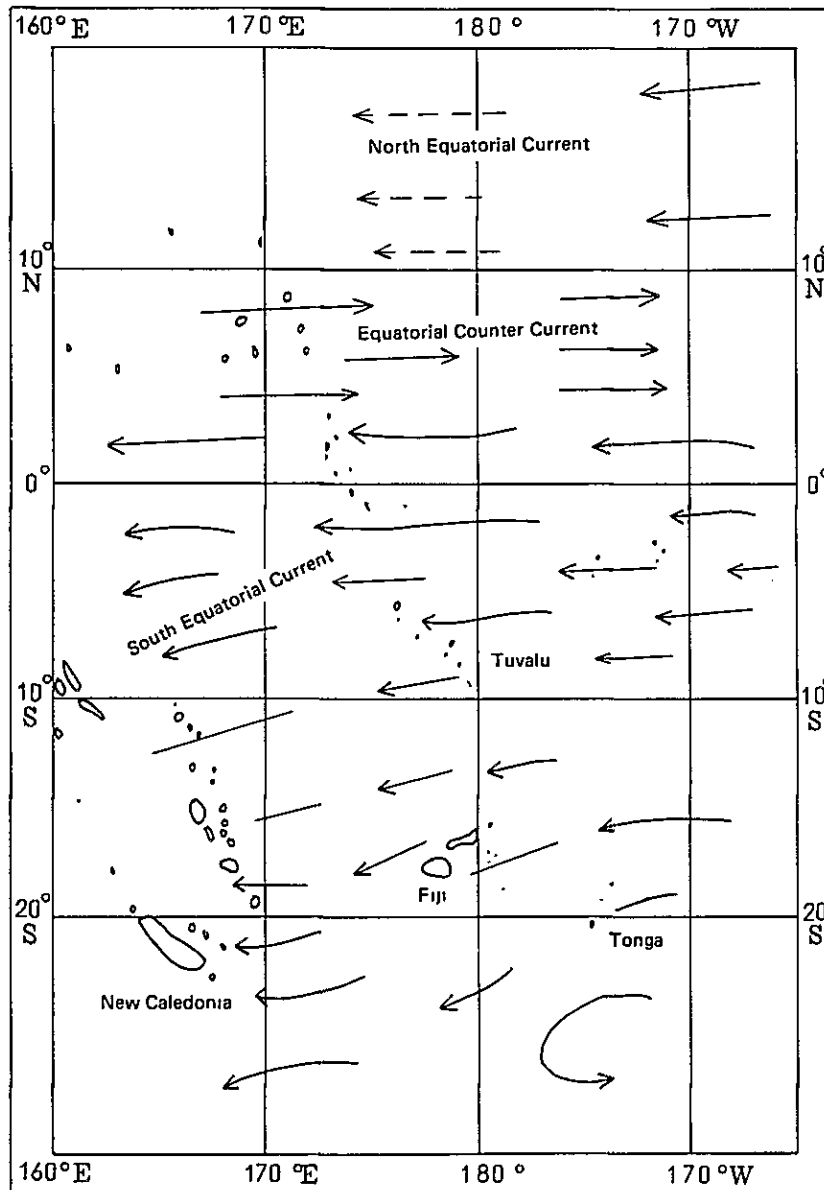
Fig. 5 Current Chart (June to August)



Dotted line: Current plotted based on few observations

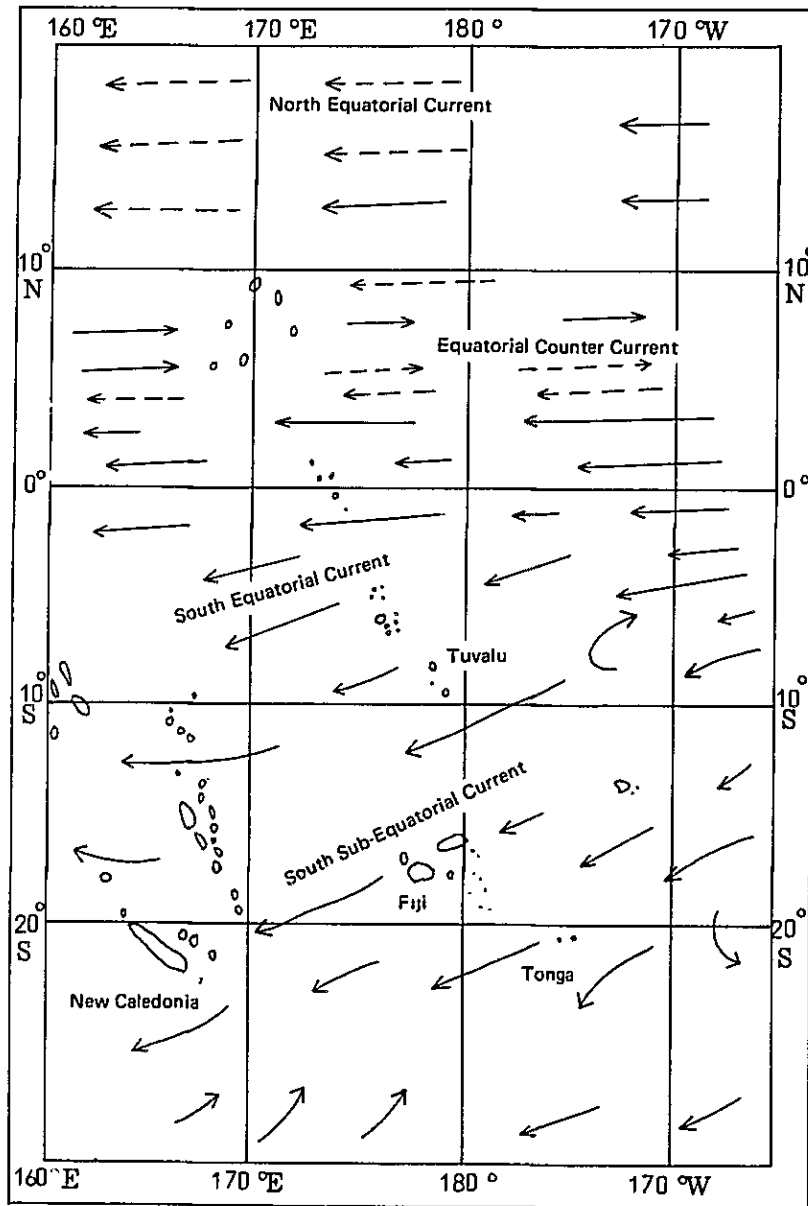
Source: Pilot Book (English edition)

Fig. 6 Current Chart (September to November)



Dotted line: Current plotted based on few observations
 Source: Pilot Book (English edition)

Fig. 7 Current Chart (December to February)



Dotted line: Current plotted based on few observations

Source: Pilot Book (English edition)

2.5.3 Sea Cucumber (Beche-de-mer)

A resource survey on sea cucumber has already been made in the major islands of Nanumea, Funafuti, Vaitupu, Nukulaelae and Nukufetau, and species of commercial value were discovered in Funafuti and Nukufetau. Guidance and training in gathering and processing sea cucumber were given to fishermen.

Dried products experimentally shipped to Fiji, Hawaii, Hong Kong, Singapore and Korea were received with favorable comments. These products were graded as first class particularly in size and quality, and were priced at A.\$4.40 to 5.50 per kilogram. Since sea cucumber live abundantly in coastal areas, this is considered to be one of the promising export-oriented products.

2.5.4 Flying Fish

Although this fish is caught only on a small scale at present, it is said there will be no fear of exhaustion of resources, even if the fish is caught on a commercial scale. Some fishermen even consider the possibility of using flying fish as bait for tuna long line fishing.

2.5.5 Live Bait for Skipjack Pole and Line Fishing

Live bait is now caught at night by stick-held dip net in the lagoons of Funafuti and Nukufetau. Species caught include *Spratelloides Delecatulus*, *Phabdamia Cyselura*, and *Allanetta Forskali*. Of these fish *Spratelloides Delecatulus* accounts for more than 80% of the total catch. Although this fish can be caught in large quantities, it can only survive in the live fish hold for less than 24 hours. *Phabdamia Cyselura* can survive longer and is said to live in the fish hold for 3 to 4 days. However, this fish is not caught in quantity. *Allanetta Forskali* can live longer but is not suited as bait for skipjack and yellowfin tuna. Species of live bait fish are as follows:

Japanese Name	Scientific Name
Minamikibinago	Spratelloides Delecatulus
Ishimochi/Kurosuji sukashi tenjikudai	Phabdamia Cyselura
Tōgoroiwashi	Allanetta Forskali
Minamitaiheiyo saba	Scomber australasicuo
Mongarakawahagi	Balistes Viridescens
Okinotarekuchi	Stolephorus buccaneeri

Sparatelloides Delecatulus is the main live bait as mentioned above but it cannot live more than 24 hours. This is critical, as the survivability of live bait limits the operating range of skipjack pole and line fishing vessels. On the other hand, skipjack and tuna are highly migratory and their fishing grounds extend from coastal areas to high seas. It is, therefore believed to be both important and imperative for skipjack pole and line fisherman to secure their supply of long living live bait in the territorial waters of other countries.

Main species of bait fish are shown in Fig. 8.

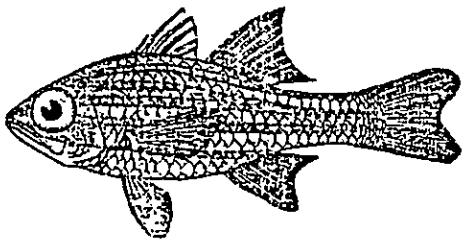
Fig. 8 Main Species of Live Bait Fish for Skipjack Pole and Line Fishing in the Waters of Tuvalu



Minamikibinago (*Spratelloides Delecatulus*)

This fish can be caught in large quantities but does not survive long.

It can grow to a maximum of 5cm in length but is usually only 2 to 3cm.



Ishimochi/kurosuji sukashi
tenjikudai (Phabdamia Cyselura)
can survive a long time but
cannot be caught in large
quantities.



Tōgoroiwashi
(Allanetta Forskali)
can survive a long time but
is not suitable as bait.

2.6 Fishermen and Fishing Boats

At present no statistics are available, because statistics have never been compiled on Tuvalu before. The Government will start taking fisheries statistics by December 1980. Followings are information compiled from interviews with government officials concerned and from field surveys:

2.6.1 Fishermen

Except for only a few artisanal fishermen, most people engage in some type of subsistent fishing. Thus it could be said that most islanders are fishermen.

2.6.2 Fishing Boats

The Tuvaluan Government imposes a registration requirement on foreign-flag ships only. No registration is required for domestic boats and ships.

Canoes have been used traditionally in Tuvalu. Tuvaluan canoes are fitted with an outrigger only on one side. They are paddled as no engine is mounted. Two types of canoes are used: hollowed out canoes and those with planking. It is estimated that some 300 to 400 canoes are used throughout the islands.

Example 1: Large Canoe		
	Overall length	8.20 meters
	Width	0.40 meters
	Depth	0.50 meters

Example 2: Small Canoe		
	Overall length	4.00 meters
	Width	0.40 meters
	Depth	0.47 meters

Most boats are built of wood but there are some aluminum boats. All these boats are propelled by outboard engines. It is estimated that there are 20 to 30 of these boats in all at the islands.

Example 3: Wooden Boat		
	Overall length	4.60 meters
	Width	1.27 meters
	Depth	0.50 meters
	Engine	Outboard, 40Hp

Example 4: Aluminum Boat		
	Overall length	5.50 meters
	Width	2.00 meters
	Depth	0.68 meters
	Engine	Outboard

2.7 Weight and Value of Catches

With no fisheries statistics, accurate figures are not available. However, catches were estimated as shown below. According to these estimates the total catch for 1977 in Tuvalu has been calculated at approximately 410 tons, based on the estimated fish consumption per household per week.

The records of the catches from skipjack and tuna trolling line fishing operations by a government owned fishing boat are below. This is the only available data on catches in Tuvalu.

Table 3 Skipjack and Yellowfin tuna Catches

Unit: kilograms

	1979	1980
Jan.	25	848
Feb.	62	709
Mar.	354	622
Apr.	145	
May	477	
Jun.	534	
Jul.	639	
Aug.	1327	
Sep.	1527	
Oct.	1053	
Nov.	848	
Dec.	441	
Total	7,432	

Source: Tuvaluan Government

Artisanal fishermen sell their catches on the shore upon returning from fishing grounds. The price of skipjack and yellowfin tuna is said to be about A.\$1.57 per kilogram. Catches by government owned fishing boats are mostly sold to local consumers at prices lower than those of artisanal fishermen: about A.\$0.65 per kilogram for skipjack and yellowfin tuna and A.\$0.60 for other fish.

The total fisheries production for 1977 is estimated at A.\$119,000.

The total fisheries production shown in Table 4 accounts for 5.3% of the estimated 1977 Gross Domestic Product of A.\$2,243,700.

Table 4 Total Fisheries Production (1977)

	Catch	Total Production
Fishes	410 ton	A.\$ 114,800
Shellfish		
Coconut crab	No data available	A.\$ 4,200
Turtle		
Total		A.\$ 119,000

Source: Tuvaluan Government

2.8 Consumption and Distribution

2.8.1 Consumption

Catches will vary, depending on the season and geographical conditions. From a sampling survey conducted in Funafuti between February and July 1978, skipjack landed over this six month period was estimated at about 60 tons. Since about 90 tons are anticipated to be landed during the major fishing season from August to January 1979, the annual catch of skipjack would be summed up to 150 tons. With an estimated 30 tons of reef fish and bottom fish added, the total landed would come to 180 tons. In terms of fish consumption per household per week, this figure would represent about 11 kilograms.

Generally, fish is eaten at least once a day in every household. For a family of six, the fish consumption per week at Funafuti is estimated at about 9 kilograms. Catches by islands other than Funafuti are believed to be smaller. Accordingly the fish consumption per household per week was estimated at 9 kilograms for Funafuti 8 kilograms for Nukufetau and Nukulaelae, and 7 kilograms for the other islands. Based on these figures, the total catch for 1977 was estimated at about 410 tons.

In case that the per capita annual fish consumption for 1977 is based upon these figures, the consumption is estimated as 78 kilograms for Funafuti, 70 kilograms for Nukufetau and Nukulaelae, and 61 kilograms for the other islands.

There is no doubt that the principal source of animal protein for the Tuvaluans is fish. This conclusion is based on the following facts: The annual per capita fish consumption is very high, people have a strong liking for fish, and most people are engaged in some form of fishing.

2.8.2 Distribution

The fact that most people are involved in fishing means that there is no need for distribution of fish except for a few establishments such as a hospital and a hotel.

At present, fish is sold by government marketing channels and artisanal fishermen, both on a small scale.

The fish sold through government channels is that caught by trolling line and bottom hand line fishing by fishing vessels of the Fisheries Division.

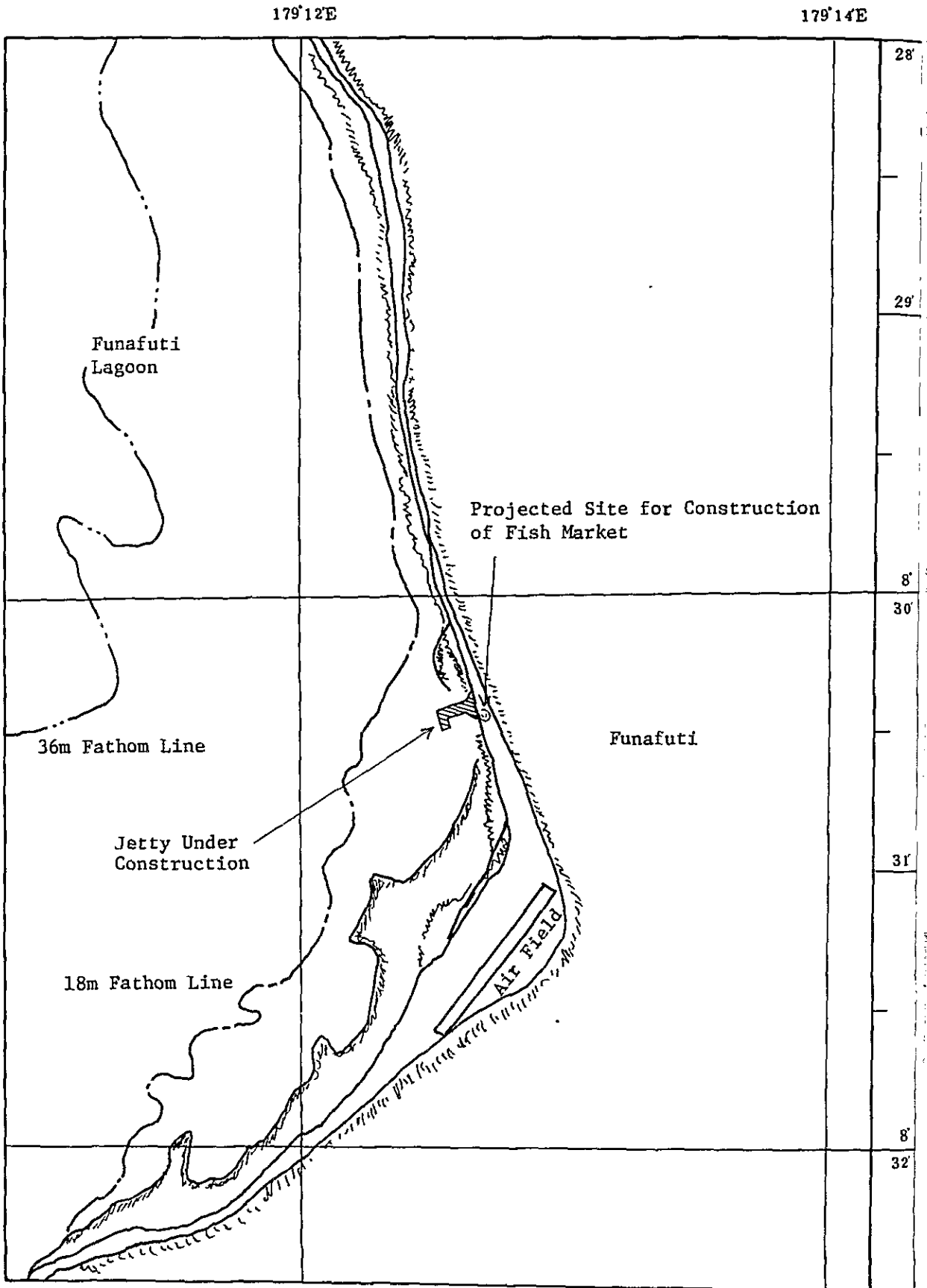
The whole catch is as a rule sold to the general public. As mentioned at item 2.7, the price of fish is A.\$0.65 per kilogram for skipjack and yellowfin tuna and A.\$0.60 for other types of fish. The only available freezer storage is a French-made one of about 1 ton capacity located in a storage-cum-processing plant of the Fisheries Division in Funafuti. Most landed fish are preserved in frozen condition in this storage until they are sold. Adjacent to this storage-cum-processing plant, a warehouse for the ship's tackles and fishing gears and a field office are located. A jetty is under construction near these buildings. The jetty will be described in detail in a separate chapter.

The marketing channels used by artisanal fishermen has already been described, so the repetition will be avoided here.

The necessity for a fish market is not so strong in the environment of a self-supported economy where most islanders are fishermen. However, in connection with the demand for the development of a monetary economy, demands for construction of a local market have begun to be made and the Government has decided to build a fish market near the storage-cum-processing plant of the Fishery Division during 1981 (see Fig. 9).

Aside from the freezer storage above mentioned, a very small English-made smoking machine can be found in storage on Funafuti. There is also a very small refrigerator of 1.2 cubic meters capacity. However, it is not operational because new machine parts have not yet been delivered. A small ice maker is scheduled to arrive in the near future. All these items of equipment are British made.

Fig. 9 Projected Site for Construction of Fish Market



2.9 Tuvaluan's Aptitude for Fishing

The Secretary to the Government of Tuvalu and two members of the Survey Team participated in trolling line operations conducted along the western coast of the Funafuti lagoon from 7 am to 1 pm on July 26. The weather on that day was cloudy with a strong squall later. With a wind force of 3 and occasionally 4, this was rough weather to the 8m-class boat. Only a small catch of coarse fish including dolphinfish was taken. The color scale of water was 2.

The same two members of the Survey Team participated in hand line fishing for bottom fish in the waters over the reefs of Funafuti from 10 am to 1 pm on July 30. It was fine with a wind force of 0 to 1. The color scale was 1. Five fish were caught including ruby snapper.

From observations in these two operations as well as from evaluation of the performance of the 10 Tuvaluan trainees being trained by IKA Corporation, it is believed that Tuvaluan fishermen have excellent qualifications for line and hook fishing.

2.10 Future of the Fishing Industry

Although the waters of Tuvalu are not considered to be particularly good fishing grounds for skipjack and tuna, the future of the Tuvaluan fishing industry must depend on pelagic fish resources including skipjack and tuna. As mentioned earlier, their fishing grounds will change and move depending upon their highly migratory nature. In this respect, the Tuvaluans must maintain close cooperation with other neighboring countries in the Central and Western Pacific. Through this cooperation, Tuvaluan fishermen can expand their fishing grounds and also expect to improve their fishing techniques and skills. Coupled with their gifted ability for angling, it is believed that they will develop off-shore fishing even if only gradually.

Chapter III Qualification, Training and Education for Crew

3.1 Laws and Qualification

The minimum number of crew member (including master and officers) for Tuvaluan vessels is set forth in law as follows:

Class of Ship	Description	Minimum Crew Number
A	Sailing or paddling canoes of native design and construction engaged in inter-island trade or passenger traffic.	2
BI	Lagoon service vessels under 20 feet in length.	1
BII	Lagoon service vessels of 20 feet or over but under 50 feet in length.	2
BIII	Lagoon service vessels of 50 feet or over in length.	3
CI	Inter-island vessels under 50 tons, other than vessels of class A.	3 plus 1 for every additional 20 tons
CII	Inter-island vessels of 50 tons or over up to and including 120 tons.	3 plus 1 for every additional 20 tons
CIII	Inter-island vessels over 120 tons	9
DI	Foreign-going vessels under 120 tons.	3 plus 1 for every additional 15 tons
DII	Foreign-going vessels of 120 tons or over but less than 500 tons.	12
DIII	Foreign-going vessels of 500 tons and upwards	15

Source: Laws of Tuvalu Revised Edition 1977

Except for the training vessel "Nivanga" (about 350 gross tons), the existing Tuvaluan-flag vessels are up to BII class. Thus the laws are believed to have been established with future development of the shipping and fisheries industries in mind.

Of the crew members, officers who have passed the national examination are given the following seaman's competency certificates:

- | | |
|--|---------------------|
| (a) Foreign-going vessel | Master |
| (b) Foreign-going vessel | Chief mate |
| (c) Foreign-going vessel | Second mate |
| (d) Inter-island vessel | Master |
| (e) Inter-island vessel | Mate |
| (f) Lagoon service vessel | Principal in charge |
| (g) Steam, diesel or petrol
main engines or engines
over 300 brake horsepower | Engineer |
| (h) Steam, diesel or petrol
main engines or engines
over 150 brake horsepower
and up to and including
300 brake hose power | Engineer |
| (i) Diesel or petrol engines
of 150 brake horsepower
or under | Engineer |
| (j) Engine of lagoon service
vessel | Engineer |

The contents of examination, qualification for the candidate and ages of the candidate are also defined in detail by law.

3.2 Officers

Under the law, officers as classified below must be on board all vessels used in Tuvalu for commercial activities and passenger transport regardless of their propulsion method:

- (a) DIII class: Master, chief mate and second mate must be qualified officers (seaman's competency certificate holders).

- (b) DII class: Master and chief mate must be qualified officers.
- (c) DI class: Master must be a qualified officer.
- (d) CIII class: Master and mate must be qualified officers.
- (e) CII, Ci class: Master must be a qualified officer.
- (f) BIII, BII, BI class: A principal in charge must be a qualified person.

In addition to these requirements, for vessels propelled by an engine, at least one engineer must be on board. However, for lagoon service vessels, no engineer needs to be on board, if a principal in charge has the qualified certificate for engineer.

Actually, only a few qualified Tuvaluan officers exist, because the shipping and fisheries industries have yet to be developed. No maritime technical school for officers exists in Tuvalu, either.

For seaman's competency certificates, equivalent certificates issued in England are also acceptable along with those issued in other countries. For this reason, guidance and instructions from qualified foreign officers would be a more practical solution to the Tuvaluan requirements for the next few years.

As an example of foreign maritime technical school there is "School of Maritime Studies" in Suva, Fiji. This school is open not only to students in Suva but to students sent from other countries.

Students from Kiribati, Solomon Islands, West Samoa, Tonga, New Hebrides, etc. are now studying at this school. For the future need for qualified officers, it is believed necessary for Tuvalu to send cadets to such a school. The seaman's competency certificates issued by the school in Fiji are said to be given for navigation, engine and shipbuilding courses according to IMCO's S.T.C.W. (International Standards of Training, Certification and Watchkeeping for Seafarers, 1978).

3.3 Seamen

During the current survey, we heard from many people that Tuvaluans are excellent seafarers.

Although there used to be no training school on Tuvalu, many Tuvaluans worked as seaman on foreign merchant ships. For reference, their present status is given in the table below.

Unit: person

	Deck			Engine			Galley			Total
	P.O	AB/ GPII	OS/ GPIII	P.O	QG/ GPII	OS/ GPIII	P.O	QS/ GPII	OS/ GPIII	
On board	5	73	20	-	15	14	-	8	5	140
On leave	-	40	9	-	7	1	-	5	4	66
Waiting	4	24	5	1	2	1	-	5	1	43
Total	9	137	34	1	24	16	-	18	10	249

Note: P.O Petty officer
 AB Able seaman
 OS Ordinary seaman
 QG Qualified greaser
 QS Qualified steward

Source: Tuvalu and The Tuvalu Maritime School

Last summer, the Tuvalu Maritime School was opened on Amatuku Islet for the training of seamen. At the present time it is not certain that graduates from this school will be connected in anyway with the fisheries training vessel to be granted to Tuvalu. However, taking this opportunity, we would like to give a few details about this school for the following reasons: (a) Development of the fisheries industry is indispensable to the future of this country; (b) the school officials said that it is possible to add the fishery department at any time and also that they look forward to the dispatch of fishery experts to the school from Japan; and (c) this is the only training school for seamen in Tuvalu at present.

3.3.1 Background to the Establishment of the Tuvalu Maritime School (TMS)

To produce a feasible solution to a growing unemployment problem in Tuvalu and to generate an in-flow of solely needed foreign exchange, in 1977 the Government of Tuvalu requested the Australian Government to extend financial aid for a study to assess the feasibility of establishing a maritime school for the purpose of training Tuvaluan seamen for employment on foreign merchant vessels. Later that year, the investigation was made with a view to establishing the school. By 1978, its construction was commenced on Amatuku, a small islet to the north of Funafuti atoll, with Australian Government aid. By Early 1979, the staff were in residence preparing for the initial intake of trainees and the school was officially opened in September 1979.

3.3.2 TMS Teaching Staff

Training is to be given to students by four foreign instructors (two of them have not yet arrived) and five Tuvaluan instructors under the principal, Captain K.J. Barnett (Englishman). The job titles of the teaching staff are as follows:

Captain Superintendent	(foreigner, UNDP/IMCO)
Chief Officer	(" -under recruitment)
Marine Officer	(" -to be recruited)
Chief Engineer	(")
Marine Instructor	(Tuvaluan)
Catering Instructor	(")
Asst. Engineer	(")
Asst. Instructor	(")
English Teacher	(")

3.3.3 TMS Facilities

TMS's facilities include, besides the quarters for the staff, administration office, etc., as follows:

Classroom	2 (each for 20 trainees)
Engine workshop	1 (lathe 1, drilling machine 1, generator 50KVA x 2, etc.)
Seamanship workshop	1

Trainees Dormitory 1 (for 60 students)
Dining room and
 service room 1 each

The present conditions at the school are by no means considered satisfactory, partly because the school was opened only recently. However, it is expected that the various facilities will be improved along with the expansion plan by making use of the spacious area and abundant labor of trainees under the guidance of devoted instructors.

3.3.4 TMS Training Courses

1) Enrollment

For admission to TMS, applicants must meet the following conditions:

- a. Must be a youth of 17 to 23 year of age
- b. Must have some knowledge of English
- c. Must be healthy with normal vision
- d. Must be a man of good conduct

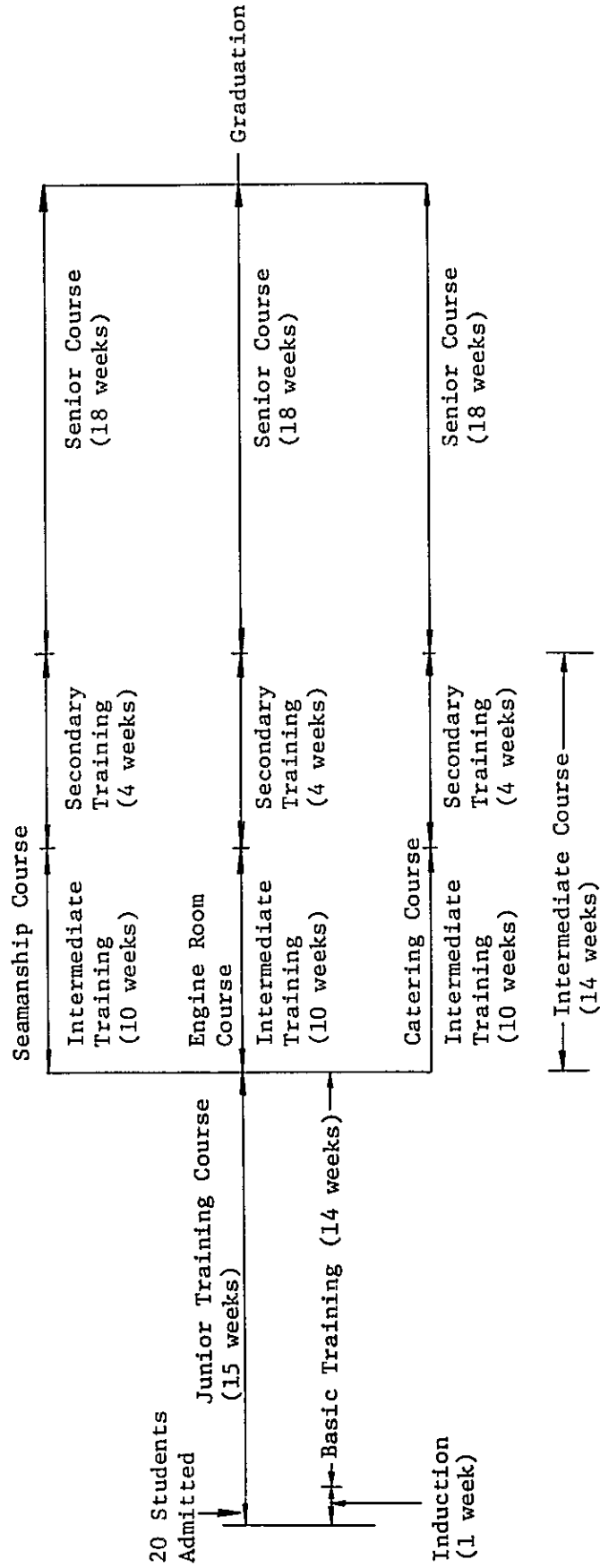
Out of applicants who satisfy all these conditions, TMS officials will select successful applicants after interviews. There are a large number of applicants. For the first enrollment, about 250 people applied. The school admits trainees three times a year in January, May and August. Each time 20 students are admitted and the registration of applicants is made one to two months in advance of enrollment.

2) Duration of the Courses

After enrollment, trainees are required to take a common junior training course for 15 weeks. Thereafter, depending on their aptitude and examination results, they can select any one of the three special courses offered at TMS, namely the seamanship course, engine course and catering course.

Trainees will study at TMS for one year from enrollment to graduation. During this period, they must live in the dormitory. An outline of training and the training periods at TMS are shown in the following chart:

TMS Training Courses



3) Senior Course

The Tuvaluan Government owns a training vessel by the name of "Nivanga". This is a twin-screw cargo-passenger boat that is 15 years old and whose gross tonnage is about 350 tons (it can carry 50 passengers and 150 tons of cargo). TMS trainees on the senior course are required to spend the whole course aboard this vessel, receiving practical training.

The complement of crew is limited to 20 persons on this vessel. As 10 of these crew are government employees, only 10 trainees can be trained at one time. Because of this limitation, trainees are rotated to receive practical training.

This vessel transports cargo, passengers, fuel oil, etc. between the various islands of Tuvalu.

Emphasis is placed on the following points in the senior course trainings:

- (1) Technical training is arranged so that trainees will be assigned in turn to all posts. For instance Seamanship Training Course includes steering, watch, cargo work, boat work, routine work, cleaning, carpentry, winchman, etc.
- (2) Trainees on the Engine Course are required to keep a watch for the engine room both at anchor and at sea and to perform maintenance work in the engine room, and also service deck machines, electrical equipment, etc.
- (3) Trainees on the Catering Course are required to serve as mess boy, galley boy and saloon steward in the living quarters and attend to officers, crew, and passengers.
- (4) While trainees are on board, fire drill, board drill etc. for emergency situations are frequently carried out.
- (5) While they are on shore, Senior Course trainees will perform practical maintenance work at the school, and help supervise trainees on junior and Intermediate Courses.

Upon completion of the 12-month training course, all trainees take a final medical checkup and X-ray test, then medical certificate, able seaman certificate, and ID card are issued to all trainees. Trainees with excellent performance are additionally awarded the lifeboat certificate and the fire-fighting certificate.

The following three courses are offered to seamen on home leave and trainees who wish to upgrade their acquired qualifications:

- a) Able seaman course
- b) Qualified greaser course
- c) Qualified steward course

3.3.5 TMS Graduates

The training costs for each trainee at TMS are said to be about A.\$2,000. a year. All these costs and expenses are budgeted by the government expenditure.

Trainees are given navy-type uniforms and caps and are required to follow severe daily training programs from 5:30 in the morning to 9:00 in the evening. However, the first TMS graduates to have endured such rigorous training will graduate this September. There is said to be only a few dropouts. The addition of the fisheries and cadet courses in future are awaited with much expectation.

3.4 Composition of Crew Members

The training vessel that the Survey Team has recommended to the Tuvaluan Government is a skipjack pole and line fisheries training vessel of about 130 gross tons. This ship should fall under DII class according to the aforementioned laws. For this class, at least 12 crew are needed and the master, first mate and chief engineer must be all qualified officers. The Tuvaluan Government made the following proposals on the composition of the crew after a discussion with the Survey Team:

Master	1
Fishing master	1
First mate	1
Second mate	1
Chief engineer	1
First engineer	1
Second engineer	1
Wireless operator	1
Boatswain	1
Asst. boatswain	1
Fishermen	16 - 17
<u>(trainees including deck hands and engine room personnel)</u>	
Total	26 - 27

This is a proposal and of course not final. The Survey Team asked the Tuvaluan side questions on the specific plan for the assignment of all these crew members. However, no clearcut answer was given.

Thus the specific crew assignment plan must be finalized through future discussions. As one possible plan, the Tuvaluan side expressed their hope to receive technical cooperation from Japan for top-class officers and that other than top-class officers could be filled with Tuvaluans.

On fishermen (trainees), they gave the following explanation.

The Tuvaluan Government concluded a fisheries agreement with the Fijian Government's IKA Corporation, this spring. Under this agreement, several skipjack fishing boats of IKA Corporation will be permitted to operate in the fishery zone of Tuvalu, but each fishing boat is required to accept five Tuvaluan trainees on board specified by the Tuvaluan Government. At present, 10 Tuvaluan trainees are undergoing on board training under this arrangement.

This spring, prior to the introduction of the fisheries agreement, the Tuvaluan Government invited applications for skipjack boat trainees. There were more than 300 applicants. From these, government officials selected 25 persons using the following criteria:

- a) Must be 18 to 25 years of age
- b) Must be clear headed
- c) Must have no drinking habit
- d) Must have no criminal record
- e) Must have a workable knowledge of English

Of these 25 successful applicants, 10 are on board and the other 15 are waiting for assignments. The Tuvaluan Government mentioned that they planned to recruit fishermen for the training vessel from these trainees.

Some trainees are required to perform duties as engine personnel, deck hands and catering members besides being trained as fishermen. For this reason, the Survey Team considers it would be better to obtain such trainees from TMS.

Chapter IV: Port Facilities and Locally Available Equipment and Supplies

4.1 Port Facilities

Of the islands comprising Tuvalu, only Funafuti and Nukufetau have lagoons that can accommodate large oceangoing vessels. Funafuti where the capital of Tuvalu is located is considered most suited as a base port for the fisheries training vessel to be granted from the standpoint of convenience of supplies and other advantages. Thus the following description is devoted to various facilities in Funafuti.

4.1.1 Jetties

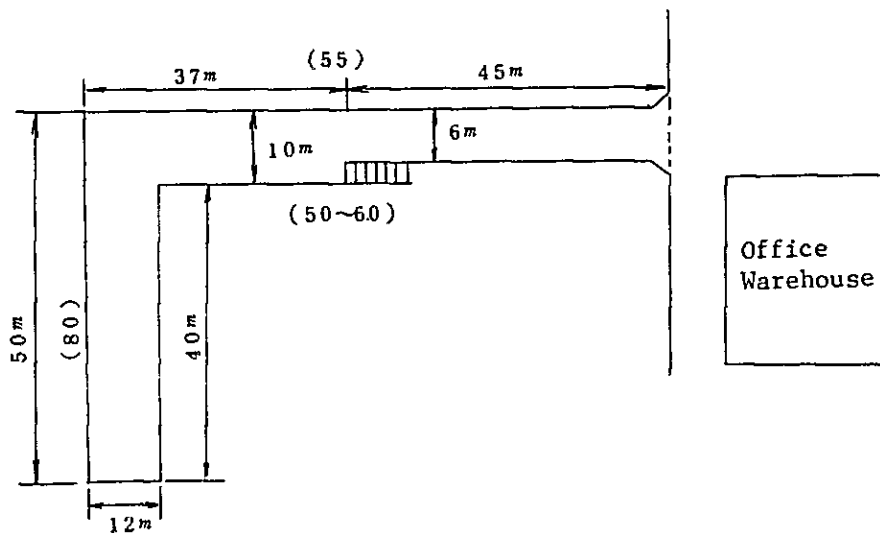
There are only two small jetties on Funafuti, one for launches and the other for barges. Cargo that arrives by cargo boat must be landed by small barges. These barges must make a number of trips to cargo boats at anchor in the lagoon to unload cargo little by little. This is very time consuming and extremely inefficient. There is one crane truck.

With Australian funds, a dolphin type jetty is under construction at a point about 1.7 kilometer to the north of the center of town. The jetty is scheduled for completion by the middle of September, 1980. By the end of September, ships will be able to lie alongside the jetty.

Upon completion of this jetty, cargo boats and fishing boats can enter the lagoon through breaks in the coral reef and come directly alongside the jetty. Needless to say, the fisheries training vessel can also lie alongside the jetty for loading supplies and fuel and landing the catch.

According to the data shown to the Survey Team by Mr. David Thomas, who is responsible for construction of the new jetty, its dimensions and other details are as shown below.

A warehouse that includes an office is also under construction and is nearly completed. No cargo handling machines are available. There is a plan to introduce a mobile crane if it is necessary. The location of the jetty is shown in the following map.

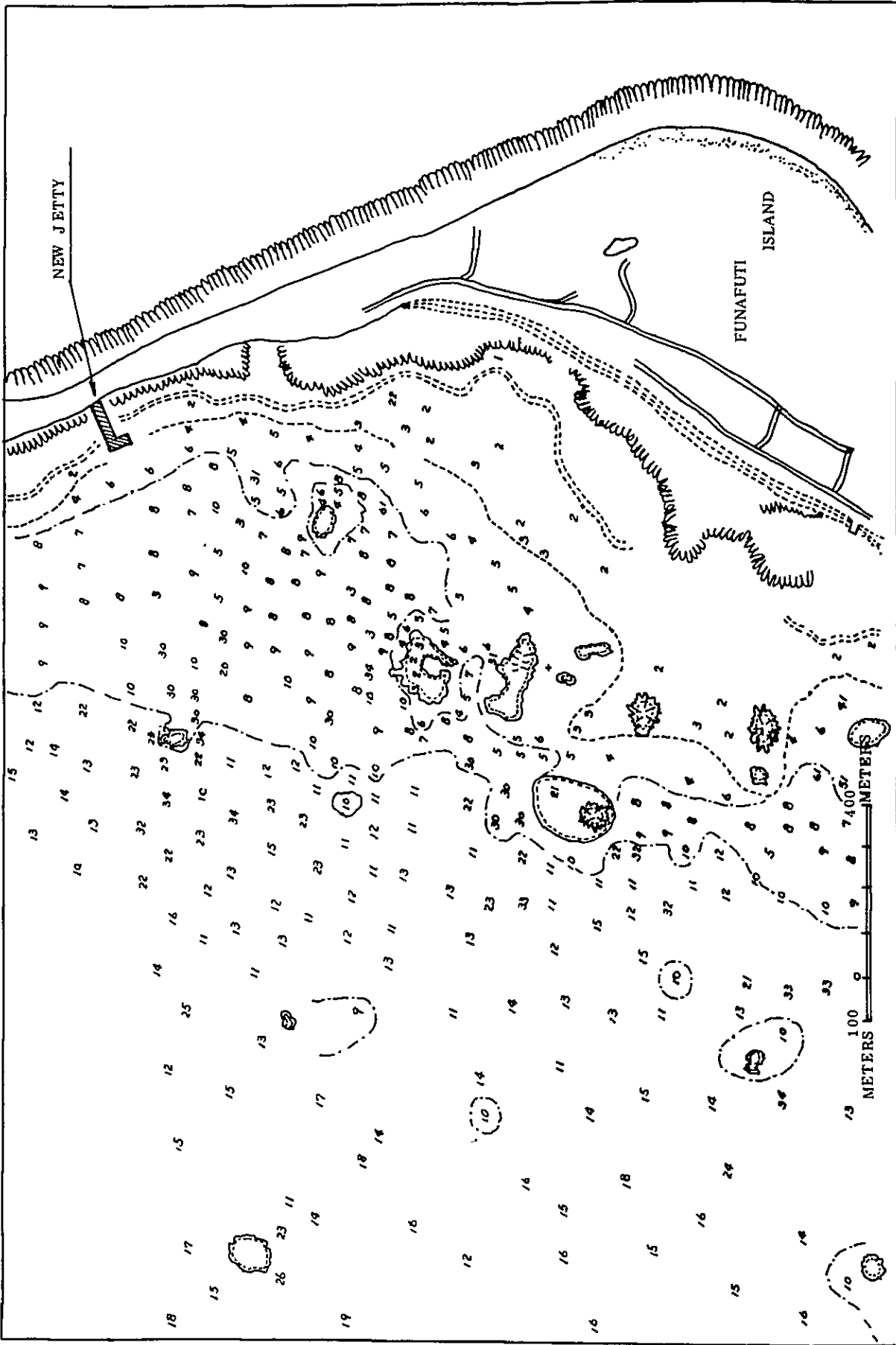


Figures in parentheses indicate depth at low tide in meter.

Height of jetty over water level:

Approx. 1.7m at high tide

Approx. 3.6m at low tide



4.1.2 Water Supply Facilities

Because of atolls, the islands of Tuvalu have no water resources at all and depend on rain water for a fresh water supply. This also applies to the water replenishment to vessels at the jetty. Water for the jetty must be obtained either by catching rain water from the roof of the aforementioned warehouse and storing water thus collected in an underground tank or by bringing in water by an oceangoing tanker and storing this water in the underground tank. The underground tank has a capacity of about 160 cubic meters, and pipes have been laid under the jetty so that water can be supplied by two pumps to the ships.

4.1.3 Fuel Oil Supply Facilities

British Petroleum has already constructed fuel oil tanks adjacent to the northern side of the new jetty and these tanks are now serving as the oil supply source for Funafuti.

The tanks for gas oil and the gasoline have capacities of 490 and 53 kiloliters respectively. These tanks are replenished by a tanker which calls at the port once every a few months.

As no storage facilities exist for lubricants, they are imported in drums. Although the supply line to the jetty is not included in the new jetty construction project, a 10cm diameter pipe has been laid from the tank to the shore line inside the lagoon. The price of fuel oil on Funafuti is said to be much higher than that in Fiji. At present, gas oil costs about A.\$436 per kiloliter as compared with about A.\$213 in Fiji and is said to be increased in price every time the tanker arrives.

4.1.4 Navigational Courses and Marks

Vessels can enter the lagoon from the ocean through some of breaks in the atoll, and there are several buoys indicating the routes in the lagoon. However, entering the port at night is believed to be extremely dangerous, because there are no beacon lights.

4.1.5 Radio Facilities

At present, the first floor of the control room at the airstrip serves as the center for telegraph communications with the rest of the world (via Suva), telephone communications with the other Tuvaluan islands and SSB communications with the government owned vessel (Nivanga). For both telegraph and SSB, the station name is FUNAFUTI RADIO, and the call sign T2U. There is no VHF. There is a radio beacon on each island. Funafuti uses 340KHz, Nui 380KHz, Vaitupu 394KHz, and Nanumea 358KHz.

A representative of a Japanese fishery company (Hokoku Marine Products Co.) is now stationed on Funafuti and is communicating with their fishing vessels and Suva every day by the SSB in the office of the Fisheries Division.

4.1.6 Freezer Storage

There is a small freezer in the warehouse-cum-processing plant of the Fisheries Division that is located adjacent to the south side of the new jetty. At present, a small quantity of fish is stored before being released for sale. If a large quantity of fish is landed and needs to be stored in future, either a large freezer or a freezing container will become necessary.

4.2 Locally Available Equipment and Supplies

At present, fuel oil (gas oil is costly as compared with that available in Fiji, etc.), fresh water (rain water or water imported by tanker) and some foods are locally available. However, it is impossible to obtain other supplies and equipment in Tuvalu and vessels therefore must call at Suva in Fiji and some other ports for full supplies. At Suva, fuel oil, lubricant, refrigerant, fresh water, and foods are available. However, there is virtually no stock of parts and it takes time to obtain them from suppliers.

4.3 Ship Building and Repair Facilities

Only small repair shops for automobiles exist in Tuvalu but there are no repair facilities for ships at all. Any repair work on ships may have to be done at shipyards in Suva, Fiji. Ship building and repair yards in Suva are as follows:

(1) Fiji Marine Shipyard

This is a government owned shipyard and consists of a shipyard and a repair yard. The shipyard is equipped with two 500-ton capacity slipways and one 250-ton slipway. The shipyard is now building a passenger cargo boat for the Solomon Islands. The repair yard has each of 1,000, 500 and 200-ton slipway as well as a 1,000 and a 500-ton winch. The depth of water is about 3 meters at high tide. This shipyard is also open to the private sectors.

(2) Carpenters Industrial Co., Ltd.

This private shipyard builds and repairs ships. It has only one 100-ton slipway.

(3) Bish Co., Ltd.

This private shipyard specializes in repairs. It has no slipway but does engage in iron foundry work.

These three shipyards are rather well equipped and considered to be the best in the South Pacific. If there were no problems with parts supplies, these facilities could handle virtually all ships servicing requirements.

Chapter V: Laws and Regulations on Fisheries, Ships and Maritime Affairs

No special laws or regulations regarding fishing vessels are enacted, although there are general provisions regarding the licensing of local small fishing boats as well as laws governing crew members and equipment on ships. For crew members and equipment on ships, there is the Shipping Ordinance (Shipping) under Chapter 85 of the Collection of Tuvaluan Laws providing for management and safety of ships and the Shipping Ordinance (Shipping-Certification of Seamen) under Chapter 90 which defines the qualification of able seamen among crew members other than officers. Certification of officers are defined under the Shipping Ordinance under Chapter 85.

The Shipping Ordinance under Chapter 85 consists of 23 articles which are supplemented by 36 articles of the Shipping Regulations and 6 articles of the Shipping Regulations (Provisions). The Shipping Regulations has nine schedules (A through I) and the Shipping Regulations (Provisions) two schedules.

Chapter VI: Basic Design of the Fisheries Training Vessel for Tuvalu

6.1 Basic Policy

It has already been mentioned that future off-shore fisheries for Tuvalu will be developed mainly for skipjack and tuna.

Before departing to make local surveys, the Survey Team learned through the Japanese Embassy in Fiji that the Government of Tuvalu had requested a skipjack pole and line fisheries training vessel of about 130 gross tones, with a main engine of about 900 horsepower and with a freezing fish hold.

Further, according to the request of the Tuvaluan Government for grant aid which the Survey Team obtained in advance, Tuvalu has concluded that the most desirable vessel for Tuvalu at present is a skipjack pole and line fisheries training vessel. This decision was made based on their consultations with various quarters, taking into account the results of skipjack resources surveys made by SPC and IKA Corporation of Fiji.

The Tuvaluan request further states that the Government intends to sell the catch from this training vessel to canning plants in Fiji and American Samoa as well as to supply some fish for home consumption. Therefore, the holding capacity of fish hold, fuel, fresh water supply, etc. of the vessel should be designed with these points in mind. The request also includes that to preserve the freshness of the fish caught the vessel should be provided with freezing equipment and a fish hold capable of preserving frozen fish.

The Survey Team studied all these contents of the request in detail and designed and recommended to the Government of Tuvalu a fisheries training vessel. However, as shown on the next page, the Survey Team arrived at the following conclusion based on results obtained from a study of the views subsequently submitted by the Tuvaluan Government: The survey of skipjack and tuna resources in the Tuvaluan waters will depend largely on future research activities. Therefore, the fisheries training vessel which is primarily intended to expand fisheries resource survey activities and extend the scope of fisheries training, should be a multi-purpose training vessel completely equipped with fishing gears for both skipjack pole and line fishing and tuna long line fishing rather than for skipjack operation only.

6.2 Design Criteria and Discussions

- 1) The Survey Team originally intended to commence a series of discussions with the Tuvaluan Government by presenting these specifications and general arrangement. However, the Survey Team could not discuss the basic design in detail with the Tuvaluan side, because their consultant, Captain Barnett, Captain superintendent of the Tuvalu Maritime School, was not available. Although Captain Barnett attended the first general discussion held on July 24, he left for Suva on July 26 in connection with dock work on a government vessel.

Given below is an outline of the specifications of the fisheries training vessel which the Survey Team originally submitted to the Tuvaluan Government on their visit for the field survey.

Type of vessel	steel skipjack pole and line fisheries training vessel
Length overall	approx. 37.50 m
Length registered (JAPAN)	approx. 29.50 m
Length between perpendiculars	approx. 29.00 m
Breadth (moulded)	approx. 6.30 m
Depth (moulded)	approx. 2.75 m
Draft designed (moulded)	approx. 2.40 m
Gross tonnage (OSLO Convention)	approx. 130 ton
Main engine	
900 PS fixed pitch propella	1 set
Capacity	
Fish hold (bale)	approx. 80 m ³
Fuel oil tank	approx. 42 m ³
Fresh water tank	approx. 18 m ³
Cruising speed	approx. 9.5 knots
Cruising range	approx. 2,000 N.miles
Complement	27 persons

The followings are the specific requests made by the Tuvaluan Government to the Survey Team on that occasion as well as the subsequent amendments to the specifications by these requests.

- (1) Items requested by the Government of Tuvalu (described in MINUTES OF DISCUSSION).
- (a) Shipping Ordinance under Chapter 85 of the Collection of Tuvaluan Laws should be applied.
 - (b) The horsepower of the main engine should be decided after careful evaluation in order to supply a maximum service speed of 11 knots.
 - (c) The type of main engine to be used should be decided so as to achieve the most economical fuel consumption.
- (2) The portion of the specifications amended by the Team in response to the request by the Government of Tuvalu.

The Team amended the specifications and recommended as follows in response to the request of the Tuvaluan Government in order to increase the cruising range of the vessel.

approx.	Amended Specifications	Original Specifications
Depth (moulded)	2.85 m	2.75 m
Fuel oil tank capacity	approx. 60 m ³	approx. 42 m ³
Cruising range	approx. 3,000 N.miles	approx. 2,000 N.miles
Designed draft (moulded)	2.50 m	2.40 m

- 3) As mentioned above, the Survey Team could not have sufficient opportunities to hold discussions with the Tuvaluan side during their visit and had to wind up their local survey for the basic design of the fisheries training vessel having expressed, in "Minutes of Discussion", their request that the Tuvaluan Government's view be made known to the Japanese side through formal diplomatic channels later on. Subsequently, the specifications and the general arrangement of the fisheries training vessel as desired by the Tuvaluan Government were delivered to the Japanese Government on September 16, 1980. This was followed by a cable from the Tuvaluan Government on September 19, giving their specific comments. The salient points of these Tuvaluan documents as well as their comments are as follows:

(1) Major points of the comments made in the documents received on September 16

- (a) The vessel should be a multi-purpose fisheries training vessel which will be equipped not only with skipjack pole and line fishing gear but also tuna long lining gear. For this purpose, the vessel should be provided with the necessary line hauler, gangway, fishing gear hold, etc.
- (b) As a cruising speed of 9.5 knots would not be sufficient to chase schools of skipjack in the Tuvaluan waters, the vessel should have a cruising speed of 11 knots with a main engine of approximately 1,000Hp. Its fish hold should have a capacity of at least 100 cubic meters.
- (c) It is necessary to supply enough spares, tool and stores for two years of operation.
- (d) The anchoring equipment shall be comprised of a windlass installed with a chain locker instead of a capstan.
- (e) 2 sets of life rafts having a capacity of 20 persons each shall be installed and a line throwing gun shall be necessary.
- (f) Life jackets for 30 persons shall be provided.
- (g) 3 fire hydrants shall be provided.
- (h) The piping shall be distinguished by painted colors.
- (i) Fresh air for turbo-charge of main engine shall be directly supplied from boat deck through duct.
- (j) 2 sets of interchangeable radars and scanners shall be installed.
- (k) Fish finder shall be dry type instead of wet type.
- (l) A gyro-compass shall be installed and a VHF telephone shall be equipped.
- (m) Electrical source shall be A.C.220/240V, 50Hz.
- (n) Transfer of fish on deck shall be done not by shoot but by reversible conveyor, which can be used for tuna long line fishing.

- (o) A 400 litter electric refrigerator and a 400 litter electric freezer shall be installed in the galley.
- (p) Anchors, anchor chains, mooring ropes.
- | | |
|--|--------|
| i) Bower anchor (500kg) | 2 |
| ii) Chain cables for bower anchor (150m) | 2 sets |
| iii) Stream anchor (150kg) | 1 |
| iv) Steel wire cable for stream anchor (30m/m) | 1 |
| v) Mooring rope (38ø x 110m) | 4 |
- (q) Design condition of sea water temperature in summer shall be 32°C.
- (r) Main engine and auxiliary engine.
- | | |
|---------------------|----------------------------|
| i) fuel oil: | gas oil |
| ii) cooling system: | fresh water cooling system |
- (s) Capacity of refrigerating system shall be studied by checking detail heat calculations.
Piping diagram of refrigerating system shall be submitted.
- (t) Flow meter of fuel oil shall be installed.
- | |
|---|
| i) Between service tank and main engine. |
| ii) Between service tank and auxiliary engine. |
| iii) Between double bottom tank and transfer pump |
- (u) The size of the beds in the living quarters shall be 2m x 0.7m.
- (v) Deck height (clearance) shall be more than 2m.
- (2) Recommendation of the Tuvaluan Government by the cable received on September 19
- | | |
|------------------------------------|-------------------|
| (a) Gross tonnage | 170 G/T |
| (b) Cruising speed | 11.5 knots |
| (c) Main engine | 1,100 HP |
| (d) Fuel tank capacity | 71 m ³ |
| (e) Cruising range | 3,000 N.miles |
| (f) Fresh water tank capacity | 20 m ³ |
| (g) Fresh water generator capacity | 1 T/day |
| (h) Principal dimensions | |
| i) Length overall | 39 m |
| ii) Length registered | 31 m |

iii)	Length between perpendiculars	30.5 m
iv)	Depth	3.05 m
v)	Draft designed	2.60 m
(i)	Complement	30 persons

6.3 Specifications

As mentioned in the preceding section, the Survey Team subsequently received comments from the Tuvaluan Government on the specifications and general arrangement of the fisheries training vessel which the Survey Team had delivered to the Tuvaluan Government on their field survey visit. After their return to Japan, the Survey Team continued their study and compiled the specifications outlined below as the most recommendable.

6.3.1 General Description

1) Type of vessel

Steel skipjack pole and line and tune long line fisheries training vessel.

2) Rules and regulations applied

(1) Relevant Tuvaluan regulations

(2) International conventions

(a) International Regulations for Tonnage Measurement of Ships as concluded in Oslo, 1965.

(b) International Convention on Load Line, 1966.

(c) International Regulations for Preventing Collisions at Sea, 1972.

(3) Japanese Ship Safety Rules and Regulations

3) Inspection and certificates

(1) The following certificates shall be issued by NIPPON KAIJI KYOKAI (NK) after inspection thereby.

(a) Certificate for safety equipment.

(b) Radio telephone certificate.

(c) Calculation sheet of tonnage.

(d) Calculation sheet of free board.

(e) Seaworthiness certificate.

(2) The necessary documents for sending the vessel from Japan to Tuvalu, such as a provisional certificate of nationality, provisional radio station license, etc. shall be issued by the Government of Tuvalu.

4) Principal particulars

(1) Principal dimensions

Length O.A.	approx. 39.50 m
Length registered (JAPAN)	approx. 31.00 m
Length P.P.	approx. 30.50 m
Breadth MLD	approx. 6.80 m
Depth MLD	approx. 3.05 m
Draft designed MLD	approx. 2.60 m

(2) Gross tonnage (OSLO Convention) approx. 170 ton

(3) Main engine

4 cycle diesel engine	1,100 HP
	1 set (fixed pitch propella)

(4) Capacity

Fish hold (bale)	approx. 100 m ³
Fuel oil tank	approx. 90 m ³
Fresh water tank	approx. 20 m ³

(5) Speed

Cruising speed	approx. 10.0 knots
----------------	--------------------

(6) Cruising range

Between port and fishing ground and return	6 days
Operations at fishing ground (drill)	20 days

(7) Complement 30 persons

5) Others

(1) Language

English shall be used for all drawings, marks etc.

Instruction books shall be written in both English and Japanese.

(2) Unit of measure

The Metric system shall be used.

(3) Spares and stores

To supply enough spare parts and stores for two years of operations.

6.3.2 Hull Part

1) Material, etc.

All material used for the vessel shall be of good quality and the electrical welding method shall be used.

2) Hull framing

The transverse framing system shall be adopted.

3) Anchoring and mooring equipment

One electric motor windlass shall be installed at the fore part of ship.
One electric motor capstan shall be installed at the after part of ship.

4) Boat davit

One boat davit and one 0.5 ton electric motor hoist shall be installed on the starboard of the bridge deck.

5) Steering system

Electro-hydraulic steering gear shall be adopted and emergency steering equipment shall also be included.

Interchangeable steering stands shall be installed in the bridge and on the compass deck.

6) Ladder

Two light, metal portable ladders shall be provided for the fish holds. Steps shall be fitted between the upper deck and the fishing platform.

7) Mast

Fore mast and radar mast shall be arranged and necessary outfittings shall be fitted.

8) Awning

Awnings shall be fitted on the upper deck, compass deck and crow's nest.

9) Lifesaving equipment

Life raft (20 persons)	2
Life jacket	30
Life buoy	6
Emergency position indicating radio beacon	1 (2,182KHz, 5W)
Self igniting light	2
Self activating smoke signal	2
Rocket signal	2
Parachute signal	12
Line throwing gun	1

10) FRP boat

One approx. 5 meter length FRP boat with two 15HP outboard Engines, a 5KVA generator and a 2KW water lamp shall be provided.

11) Fire-fighting equipment

Bucket	2
Portable fire extinguisher	11
Fire hydrant (with hose and nozzle)	2
Sand box	1
Safety lamp	1
Fire axe	1
Breathing apparatus	1
Life line	1

12) Piping

All pipes except the oil pipe shall be galvanized and the bilge, scupper and soil pipes shall be of thick steel pipe.

13) Communication equipment

(1) Buzzer	2:1	1 set
	2:3	1 set
(2) Interphone	1:2	1 set
(3) Whistle		1 set
(4) Daylight signal (60W portable type)		1 set
(5) Electrical engine telegraph		1 set
	(Engine room, bridge, compass deck)	

14) Window and ventilation

- (1) Square windows shall be installed in the bridge including one clear view screen.
- (2) Side scuttles shall be used for the living quarters, galley, W.C., engine room, etc.
- (3) A mechanical ventilation system shall be provided in the bridge, living quarters, galley, provision stores, engine room, pipe recess, etc.
- (4) Natural ventilation means shall be provided where necessary.

15) Nautical equipment

(1) Magnet compass	1
(2) Radar	2
(3) Fish finder	1
(4) Clock	necessary number
(5) Satellite navigation system	1
(6) Electro-magnetic log	1
(7) Gyro compass	1
(8) Ruder angle indicator	1

16) Radio equipment

(1) SSB radio telephone	1
(2) Receiver	1

(3) Public address system	1
(4) Direction finder	1
(5) Fishing radio buoy	2
(6) Radio facsimile receiver	1
(7) VHF	1

17) Fishing equipment

- (1) Sprinkler system
- (2) Temporary cover for bait hold
- (3) Bait tubs
- (4) Chutes
- (5) Back net
- (6) Fish restraining board
- (7) Winch for stick-held dip net fishing gears (including guide roller, lead roller and davit)
- (8) Poles
- (9) Fish lamps (2KW x 2)
- (10) Line hauler
- (11) Gangway
- (12) Conveyor
- (13) Line thrower
- (14) Store for fishing gears

18) Fish hold and refrigerating system

- (1) The fish holds shall be 4 bait holes and 8 brine holds.
- (2) A sea water circulating system for bait holds shall be provided.
- (3) The refrigerating system shall be a brine system, the brine being cooled to -17°C .
Refrigerating capacity shall be 5 tons/8 hour for shipjack.
- (4) A cooling coil shall be provided in each fish hold so as to cool the fish holds to -25°C .
- (5) An electric thermometer shall be provided in each fish hold.
- (6) The insulation material shall be of spot foamed polyurethane-foam. The inner sides of the fish holds shall have steel plate linings.



19) Deck covering

Compass deck	wooden grating
Bridge deck	8mm deck composition
Forecastle deck	50mm wooden plank
Upper deck	65mm wooden plank
Fishing platform	4mm deck composition

20) Galley equipment

Oil cooking range	1
Sink and cabinet	1
Electric rice cooker	1
Electric refrigerator (approx. 400 l)	1
Electric freezer (approx. 400 l)	1
Hand pump	1
Others	

21) Painting and anti-corrosion system

(1) Painting

Shell plate	chlorinated rubber paint
Fish hold lining	pure epoxy paint
Fresh water tank	wash cement
Under wooden plank	tar epoxy paint
Inside of fish-hold shell	"
Floor of pipe recess	"
Floor of engine room	"
Ballast tank	"
Cofferdam	"
Others	oil-base paint

(2) Anti-corrosive zinc plates shall be fitted on bilge keels, shell plates, stern frame, rudder and sea chest.

6.3.3 Machinery Part

1) Temperature condition

	(Summer)	(Winter)
Ocean surface temp.	32°C	28°C
Ambient air temp.	32°C	30°C

- 2) Main engine
- 4 cycle diesel engine with turbocharger: 1,100 HP 1 set
- Cooling system: fresh water
- Fuel oil: gas oil
- 3) Shafting propeller
- Shaft: forged steel
- Propeller shaft: rubber lined
- Propeller: manganese bronze fixed-pitch propeller
- 4) Auxiliary engines
- 4 cycle diesel engine: 145 HP 2 (Cooling system: fresh water)
- Generator: 120 KVA 2
- 5) Air compressors, Air reservoirs
- Main air compressor 1
- Aux. air compressor 1
- Main air reservoir 2
- Aux. air reservoir 1
- 6) Remote control and automatic control
- (1) General
- Main engine: remote control (start & stop shall be operated at side of engine).
- Air compressors: automatic start & stop
- Fresh water service pump: automatic pressure operation
- (2) Main engine remote control system
- Controlled by interchangeable control stands in wheel house, on compass deck and in engine room.
- 7) Refrigerating plant
- Refrigerant: Freon-22
- Compressor: 2
- Other necessary machinery are also installed.

8) Pumps

(1) Motor driven pumps

G.S., fire and bilge pump, bilge pump, fresh water service pump, fuel oil transfer pump, brine pump, sea water circulating pump, sea water sprinkler pump, etc.

(2) Hand pumps

Bilge, fuel oil, lub oil, sea and fresh water for galley, etc.

9) Fresh water generator

Capacity: 1.0 tons/day 1

6.3.4 Electric Part

1) Electricity

for power A.C.240V, 50Hz, 3 phase
for emergency D.C. 24V

2) Illumination

(1) General

Fluorescent lighting shall in principle, be used for all interior illumination.

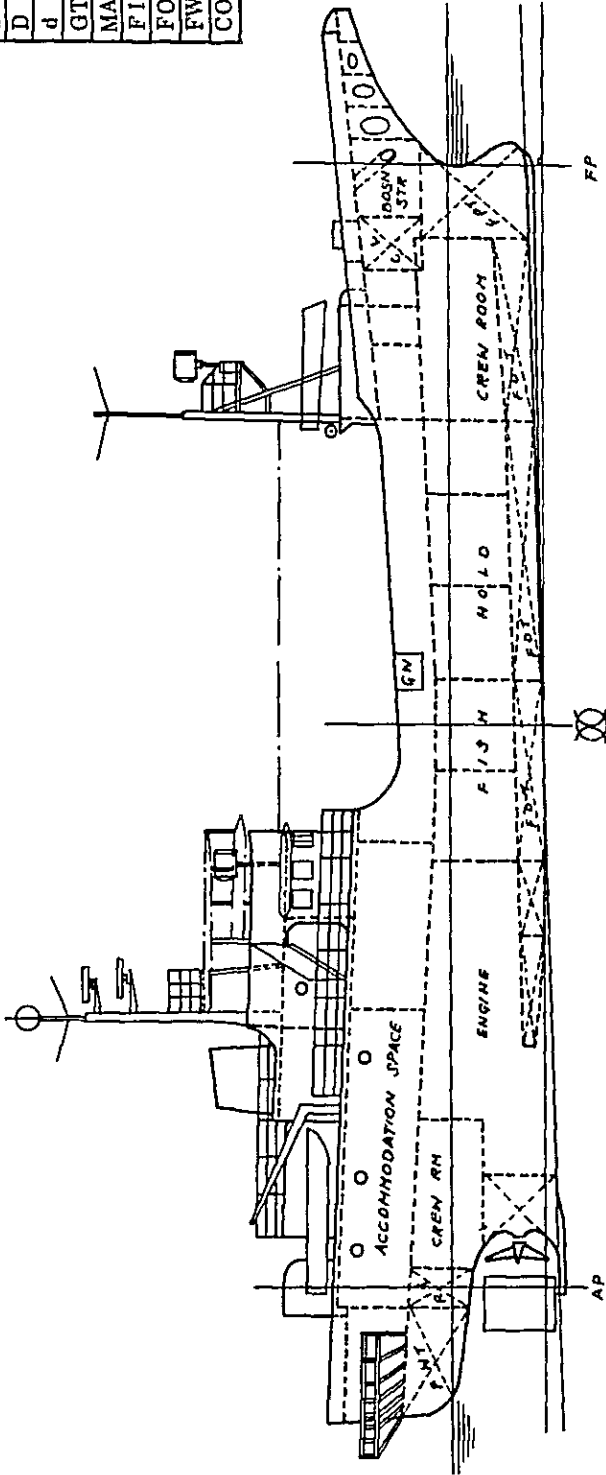
Incandescent lighting shall be used for exterior illumination.

(2) Working light

Search light 2KW x 1, 1KW x 1
Fishing light 2KW x 2
Projector 500W x 4

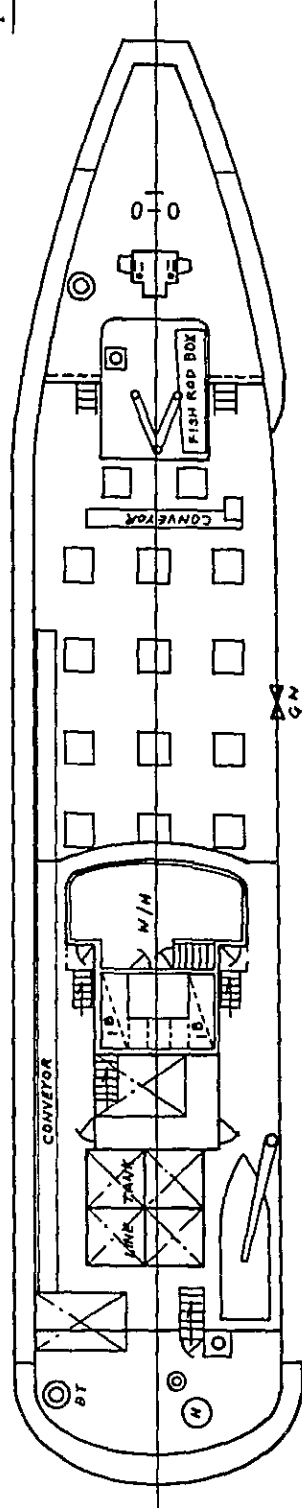
6.4 General Arrangement

PRINCIPAL PARTICULARS	
L (OA)	ABT 39.50 m
L (R)	ABT 31.00 m
L (PP)	30.50 m
B (MLD)	6.80 m
D (MLD)	3.05 m
d (design MLD)	2.60 m
GT(OSLO)	ABT 170 T
MAIN ENGINE	1,100 HP
FISH HOLD (Bale)	ABT. 10.0 m ²
FOT	ABT. 90 m ³
FWT	ABT. 20 m ³
COMPLEMENT	30 P



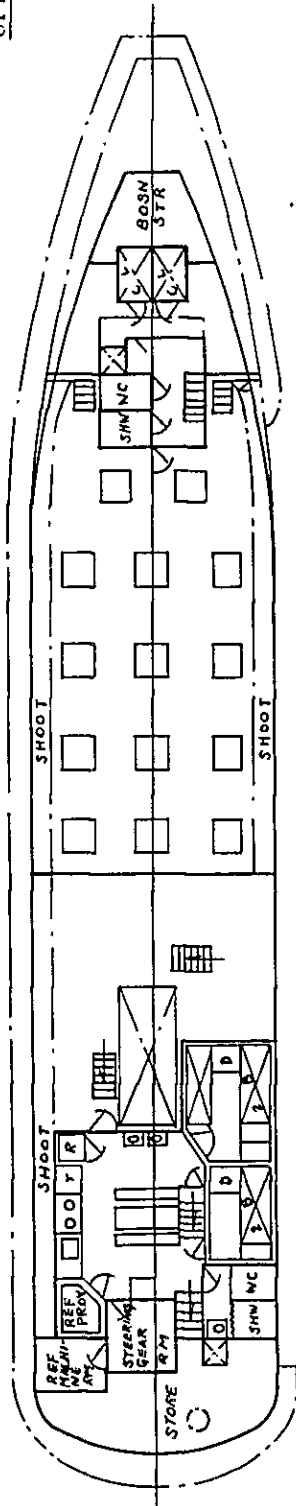
POOP DECK

F'CLE DECK

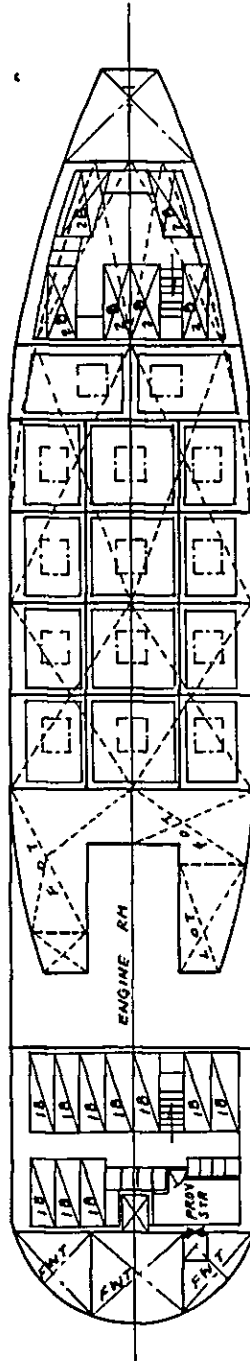


SCALE: 1/200

UPPER DECK



HOLD PLAN



GENERAL ARRANGEMENT
 OF
 FISHERY TRAINING VESSEL
 FOR
 POLE AND LINE FISHING
 AND
 LONG LINE FISHING

Chapter VII: Construction Cost and Schedule of the Fisheries Training
Vessel for Tuvalu

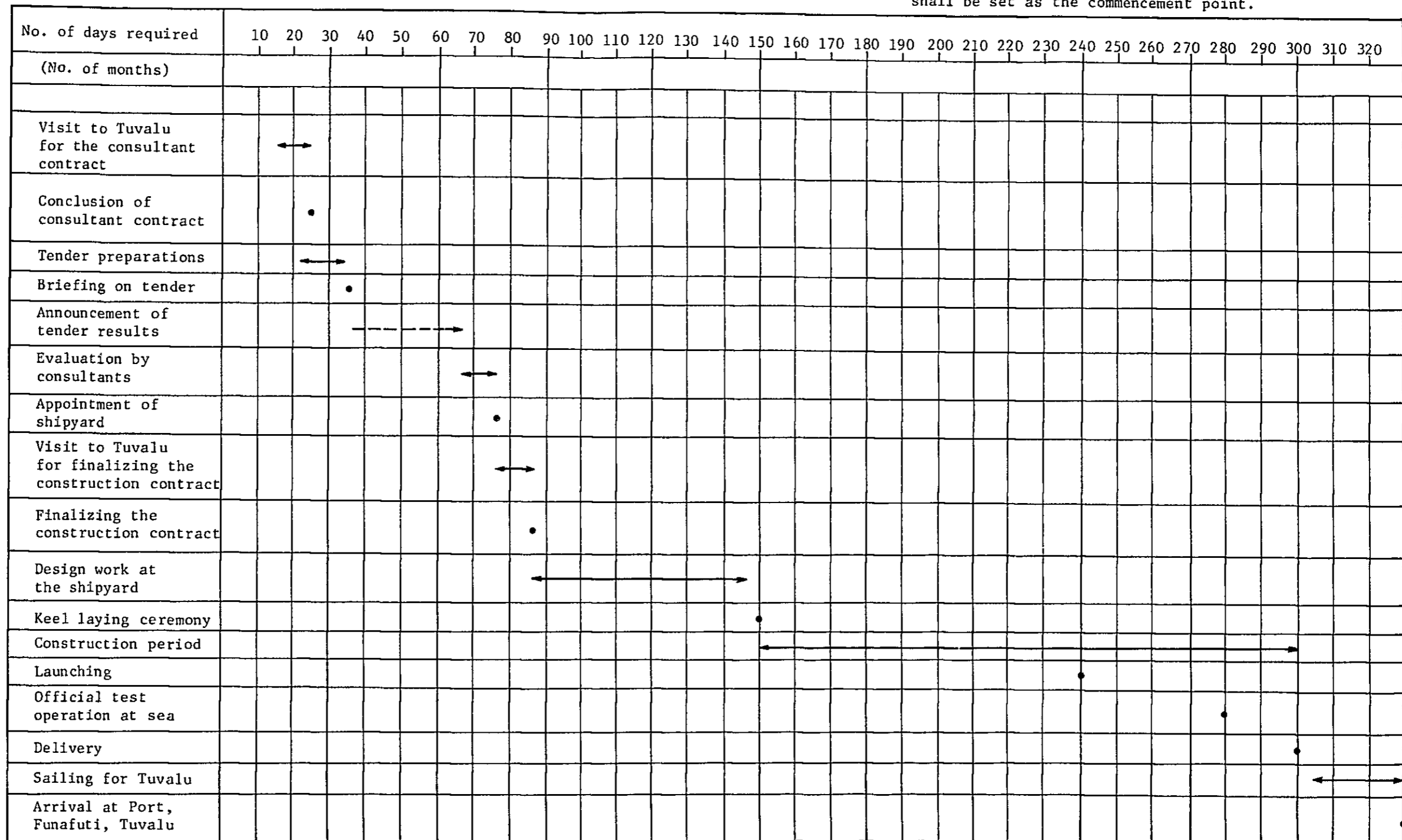
7.1 Construction Cost

	Unit: Yen
1. Basic cost of vessel	320,000,000
2. Cost of Delivering the ship to Tuvalu	20,000,000
3. Fishing gears	30,000,000
4. Consultant fees	<u>30,000,000</u>
Total	400,000,000

Note: These costs have been estimated assuming that the ship
will be built in 1980.

7.2 Construction Schedule

Note: The date of Signing of Exchange of Notes shall be set as the commencement point.



Chapter VIII: Justifiability and Benefits of the Grant

8.1 Justifiability of the Grant

The Government of Tuvalu now depends mainly on copra production for its exports. Tuvalu cannot expect for agricultural development, because its soil which is made up of coral reef is infertile and because the land area is extremely small. Thus the Government has been making a major effort toward development of fisheries. Based on the results of various surveys conducted to date, it is believed that their fisheries industry should be developed with skipjack, yellowfin-tuna, big-eye tuna, etc. as the main resources.

In this situation, the Government of Tuvalu declared the establishment of its 200-mile economic zone on January 1, 1979. In 1980, Tuvalu concluded fisheries agreements with South Korea and Fiji on skipjack and tuna fishing operations in Tuvaluan waters. In this way, it is believed that Tuvalu has steadily been accomplishing its fishery objectives in its external relations.

Conversely, various facilities related to the coral fisheries industry, including the infrastructure in Tuvalu, have yet to be developed. Except for the jetty under construction in Funafuti and fuel oil and fresh water supply facilities adjacent to this new jetty, there are no facilities and installations necessary for development of the fisheries industry. It is therefore considered necessary to provide the following facilities and equipment as soon as practicable. Some of these facilities are said to be already in the planning stage for construction.

- a. Fishing boats
- b. Fish markets
- c. Cold storage on land (including quick freezing rooms and ice makers)
- d. Sea transport for distribution between islands
- e. Maintenance and repair facilities

At the same time, Tuvaluans need to acquire necessary technical abilities to efficiently operate these facilities.

Among these facilities, top priority should be given to the building of fishing boats, because all the other facilities would be of no use without the boats to catch the fish. Consequently, the current request from the Government of Tuvalu for the grant of a skipjack pole and line and tuna

long line fisheries training vessel is considered to be highly appropriate for a country that presently owns no fishing boats as well as fishing know-how for skipjack pole and line and tuna long line fisheries.

8.2 Benefits of the Grant

It is difficult to quantitatively forecast the benefits of the grant of a fisheries training vessel. However, under the condition that technical assistance and guidance by Japanese experts will be given to Tuvaluan trainees as requested, a number of benefits, as listed below, could be fully achieved. It is hoped that the Government of Tuvalu will strive to accomplish these objectives by creating a favorable condition for Japanese technical guidance.

(1) To lay the foundation for the development of a fisheries industry

Judging from surveys made in the past by SPC, etc. and from the distribution of fishing grounds as currently confirmed, it is obvious that the most promising species for exploitation in the waters of Tuvalu are skipjack and tuna as already mentioned.

When the future is taken into consideration, there is no viable industry in Tuvalu except fisheries. It is therefore only natural that Tuvalu must develop its skipjack and tuna fisheries as soon as practicable.

If the fisheries training vessel is granted to Tuvalu, Tuvaluans can of course acquire navigation and fisheries techniques by operating this ship. Moreover, it is expected that a full survey of fishing grounds in the waters of Tuvalu will be made. The operation of the training vessel will also provide data that will be needed to study the commercial feasibility of fishing boats, whose construction should continuously be studied by the Tuvaluan Government.

(2) To train skilled fishermen and marine engineers for on-shore duties and increases employment opportunities

If several Japanese experts are assigned to the fisheries training vessel to be granted with an adequate budget appropriation from the Government of Tuvalu, its efficient operation will be possible. If the training vessel is operated in this manner, trainees who board the ship as crew members will be able to become fisheries experts.

In the next stage of development, facilities for cold storage and preservation of catches will become necessary as well as technical staff to manage these facilities. Furthermore, if catches are to be distributed to markets at other islands, similar cold storage, preservation facilities and personnel for management of these facilities will also become necessary for each of these islands along with transport facilities. In this way, the grant of this fisheries training vessel will play a major role in training technical personnel in the fisheries industry and triggering the creation of job opportunities in such a manner as mentioned above.

Thus it is hoped that the Government of Tuvalu will make full use of this fisheries training vessel.

(3) To earn foreign exchange and contribute to the balance of payments

The Government of Tuvalu reports that its imports made up 50% of Tuvalu's Gross Domestic Product in 1977 (The GDP was A.\$2,243,000 at producers prices). The Tuvaluan economy is highly vulnerable to outside influences due to this heavy dependence on imports. It is also reported that in 1978 food imports increased sharply and accounted for 36% of the total imports.

The fisheries training vessel cannot be operated on a commercial basis as it is different from ordinary fishing boats. Nevertheless, part of the catches from the training vessel can be supplied for domestic consumption, thereby helping Tuvalu with reducing imports of canned products. Some of the catches may be exported, thus foreign exchange earned can contribute to the international balance of payments.

(4) Technical Guidance

All effects and benefits described in the foregoing paragraphs can be obtained on the condition that technical guidance by Japanese experts is provided to Tuvaluans.

During the discussions with Tuvaluan Government staff, the Survey Team was repeatedly requested both formally and informally to extend technical guidance to them. This request could be considered natural, because Tuvalu owns no large ship or fishing boat except for the training vessel "Nivanga".

The officials of the Tuvaluan Government in charge hope for technical guidance by Japanese experts in all positions on the training vessel. If there should be limits to the number of Japanese experts, they want at least the chief fisherman, master and chief engineer to be trained by Japanese experts. For these three positions, they said they could not give any priority, because all three are very important.

The Survey Team explained to the Tuvaluan Government that in many cases the chief fisherman concurrently holds the post of master on Japanese fishing boats and suggested that two Japanese experts should be sufficient, if one of them can serve as the chief fisherman and master. However, the Tuvaluan Government insisted that the local chief fisherman and master be trained not by the same instructor but by two respective experts. The reason for this request, they said, was that it would be very difficult for the same person to perform his own duties as officer and at the same time train the trainees in both ship handling and fisheries.

In answering a question from the Survey Team, the Tuvaluan side requested, but not definitely, that if these three Japanese experts are available for technical guidance, Tuvaluan trainees be taken on board for all other positions including those of the first mate and first engineer. The responsible official at TMS unofficially requested that the Japanese fishing master be sent to Tuvalu immediately to start training trainees before the arrival of the training vessel.

The Survey Team believes that this technical guidance is necessary and imperative with the grant of the fisheries training vessel and should be continued for at least several years if the expected results are to be accomplished.

It is believed necessary that the fishing master should start his training activities in Tuvalu at least two or three months before the arrival of the vessel at Funafuti.

Dispatch of the fishing master before the arrival at Funafuti of the training vessel as requested by the TMS official is considered very effective for the reasons below.

- (a) To organize and train crew members and trainees
- (b) To arrange for supplies and equipment required for on-board training well in advance

8.3 Budgetary Measures

During discussions with the officials of the Tuvaluan Government, the Survey Team was asked about the operating costs of the fisheries training vessel.

Since the Survey Team obtained at Suva, Fiji, data on the operating costs of IKA Corporation's training vessel, based on this data and dependent on certain conditions, the Survey Team gave the following as an idea of the operating costs to the Tuvaluan Government.

Annual Operating Costs of the Fisheries Training Vessel

Unit: Australian dollar

Wages (for 23 persons)	28,000
Fuel (684 Kl)	232,000
Maintenance and repair	22,000
Provisions	31,000
Ship insurance	12,000
Traveling expenses	1,000
Wharfage	1,000
Social welfare charge	12,000
Miscellaneous	1,000
<hr/>	
Total	340,000

- Note:
1. The above figures are necessary costs and expenses for the first year operations after delivery of the vessel.
 2. No earning from the catches is taken into account.
 3. Costs and expenses for Japanese experts are not included.
 4. Fuel cost is not based on fuel costs in Tuvalu.

Because of the limited time, these estimated operating costs were not studied in full and complete agreement was not reached. The Tuvaluan side commented that the first year operations would probably require a budget of more than this amount.

The Tuvaluan Government officially stated that the necessary budget will be obtained, starting next year.

The estimated operating costs which the Survey Team presented include only a small budget for maintenance and repair, because this estimate was made for the first year of operations. As far as this amount is concerned, the estimated expenses for maintenance and repair will probably be far short of the actual expenses incurred in the second year.

If necessary parts are not available, it often happens that vessels cannot be operated at all. In the case of the fisheries training vessel under discussion, all its parts are Japanese products and it is conceivable that much lead time will be needed for their supply. For these reasons, it is necessary to recommend to the Tuvaluan Government that with an adequate budget the supply of parts be arranged well in advance.

JICA

