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PRELIMINARY SURVEY REPORT ON DEVELOPMENT OF FISHERIES RESOURCES IN THE PHILIPPINES

MARCH 1976

JAPAN INTERNATIONAL COOPERATION AGENCY

PRELIMINARY SURVEY REPORT

ON

DEVELOPMENT OF FISHERIES RESOURCES

IN

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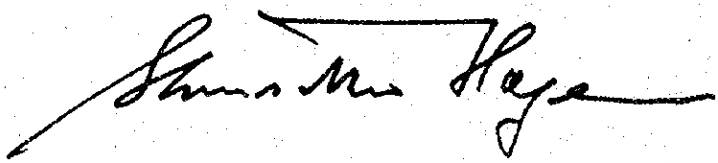
Preface

The Government of the Republic of the Philippines, which has been exerting great efforts for the development of offshore fishery. It is particularly interested in the exploitation of fisheries resources in the waters east of the Philippines and in the Celebes Sea -- the seas which still remain unexploited -- and has called on the Japanese Government to render cooperation. In response to this request, the Japan International Cooperation Agency dispatched a survey team for 22 days in October 1975 to conduct a preliminary survey with a view to formulating concrete plans for the forthcoming full-fledged survey.

This report is a summary of the preliminary survey and it is printed to serve as a reference for the parties concerned both in the Philippines and Japan.

Availing myself of this opportunity, I wish to express my most sincere appreciation to those in the Philippines and Japan who have extended great cooperation as well as each member of the preliminary survey team.

March 1976



Shinsaku Hogen
President, JICA

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I. Introduction

1. Circumstances Leading to Preliminary Survey

The Government of the Republic of the Philippines has been exerting great efforts for the development of offshore fisheries. Above all, the Philippine Government is placing particular emphasis on the development of fisheries in the underdeveloped fishing grounds and the improvement of the fishing methods. In this conjunction, the Government of the Republic of the Philippines sent verbal notes to the Japanese Government both in March and May, 1975, and called for Japan's cooperation in its plans for a survey on fisheries resources.

The verbal notes proposed a joint survey on the acquatic living resources both in the Pacific Ocean off the Philippines and in the Celebes Sea. Specifically, the verbal notes called on the Japanese Government to send a skipjack pole-and-line fishing vessel and Japanese experts.

Being convinced that this survey would deepen friendship and goodwill between both countries, the Japanese Government decided to comply with this request from the Philippine Government and dispatched a preliminary survey team to assure that a forthcoming joint survey could be conducted in an effective manner.

2. Purpose of Preliminary Survey

The preliminary survey aimed at:

(1) Checking upon on the plans of the Philippine Government for a survey on tuna (skipjack) resources and the related circumstances;

(2) Gathering information necessary for the planning of the survey on tuna (skipjack) resources;

(3) Obtaining information concerning availability in the survey areas of the live baits indispensable for pole-and-line fishing; and

(4) Selecting places suitable for stocking.

3. Method of Preliminary Survey

To accomplish the aforementioned purpose, field surveys were conducted on the land and sea and in the air. In parallel with the field sur-

veys, officials of the central government, local fisheries administrators and nongovernmental persons were interviewed to exchange views.

The survey regions were selected with consideration given to the following conditions:

(1) A port with equipment to permit supply of fuel oil, fresh water and food is available.

(2) The base for the survey ship is close to the place where stocking facilities and live wells will be established. The base is also situated at the place where bait available for stocking purposes.

(3) The base is close to the fishing grounds for offshore fisheries were bait fish may be supplied by local fishermen to the survey ship as well as the stocking facilities and live wells.

(4) The base is not far away from potential skipjack fishing grounds.

(5) The base is readily accessible from the land and assures communication and liaison with other cities without difficulty.

(6) The boarding facilities for the Japanese stocking experts may be assured at places close to the base.

With due consideration given to the aforementioned conditions, the following regions were selected:

Infanta on Luzon Island and its peripheral area

Davao on Mindanao Island

Tacloban on Leyte Island

In addition to these regions, the survey team visited Iloilo to have interviews with officials of the Oceanic Fisheries (Phil.) Inc. which is engaged in the pole-and-line fishing of skipjack in the Sulu Sea.

4. Organization of Preliminary Survey Team and Sectors Covered

Leader	Kazuo Yasufuku	President, Japan Marine Fishery Resource Research Center
Fishing grounds	Michiie Hashimoto	Development and Extension Division, Research and Development Department, Fishery Agency
Fish resources	Takeshi Asahi	International Division, Oceanic Fisheries Department, Fishery Agency

Bait fish	Keiichiro Mori	Shimonoseki Branch, Seikai Region Fisheries Research Laboratory, Fishery Agency
Planning	Shigeo Miyamoto	Fisheries Advisor, Japan International Cooperation Agency
Liaison and coordination	Shuji Ishida	Japan Marine Fishery Resource Research Center

5. Schedule for Preliminary Survey

October 14 Arrived at Manila at 16:30 via KL-862.

October 15 Talked with officials of the Japanese Embassy and JICA Manila Office.

October 16 Visited the Navotas Fish Market, interviewed market officials and surveyed hauled fish. Paid a curtesy visit to Mr. Felis R. Gonzales, Director, BFAR, and briefed him on the plans for the preliminary survey. Checked with Mrs. Aurora D. Rayes, planning staff officer of the Bureau of Fisheries on the survey schedule.

October 17 Had technical talks with Mrs. Rayes and other officials concerned. Conducted an aerial survey on Infanta and its peripheral region.

October 18 Left Manila for Davao.

October 19 Conducted sea and aerial surveys on the coastline and visited a local market on Samal Island.

October 20 Called at the BFAR Davao Office and interviewed its deputy director, Mr. Horracio B. Torres. Called on Mrs. Marcianz Lozada, owner of Banca and gathered information on the local fishing industry. Conducted an on-the-spot inspection of the Basnig fishing method from 8 to 11 p.m.

October 21 Visited the local market and the fish landing place and checked hauled fish. Started an aerial survey on the Davao Gulf at 9 a.m. Surveyed the Malalag Bay from the land in the afternoon. Talked with Mr. Torres and

	Mrs. Lozada at night.
October 22	Moved to Tacloban.
October 23	Visited the BFAR Tacloban Office and talked with Mr. Gregorio L. Escritor, its director, and other officials. Had talks with the members of the Agricultural Co-operation Corps sent by the Japan International Cooperation Agency at night.
October 24	Visited the markets, fishing landing places and fisheries product processing plants in Tanauan and Tacloban.
October 25	Conducted an aerial survey along the Bay of San Pedro up to Catbalogan. Had a technical talk with Mr. Antonio Pulanco of the local BFAR Office.
October 26	Left Tacloban for Iloilo. Visited Iloilo Port. Interviewed the Japanese fishing masters engaged in the pole-and-line fishing of skipjack in the Sulu Sea to gather information on their operations and the bait fish used. Met Mr. Toshiaki Sugiyama, Vice President of the Oceanic Fisheries (Phil.) Co.
October 27	Visited the Iloilo Central Market. Met Mr. Guieb, Regional Director, BFAR and other officials to be briefed on the local fisheries. Visited the SEAFDEC Culture Fisheries Office.
October 28	Proceeded to Manila from Iloilo. Talked with officials of the Japanese Embassy and the JICA Manila Office for the preparation of a interim report.
October 29	Prepared the interim report.
October 30	Paid a courtesy visit to Mr. Antonio J. Aguenza, Assistant Secretary, Department of Natural Resources, who was provided with an outline on the findings of the preliminary survey. Discussed with Mrs. Aurora D. Reyes, planning staff officer of BFAR, on the planning of future surveys. Attended the dinner party given by the Japanese Embassy.

October 31	Talked with Mr. Toshiaki Sugiyama, Vice President of the Oceanic Fisheries (Phil.) Co.
November 1	Engaged in the preparation of the interim report at the hotel.
November 2	Engaged in the preparation of the interim report at the hotel.
November 3	Had talks with officials of the Japanese Embassy and the JICA Manila Office. Engaged in the preparation of the interim report. Hosted a dinner party.
November 4	Paid a curtesy visit to Mr. Felis R. Gonzales, Director of BFAR, who was briefed on the findings of the survey and provided with the provisional report. Left Manila and arrived Tokyo at 16:15 via NW-006.

II. Perticulars

1. Outlook of Fisheries

1-1 Environment of Fishing Grounds

1-1-1 Meteorological and Oceanographic Conditions

Weather

Meteorological information about the Philippines and its periphery is provided by the Fleet Meteorological Agency at Sangley Point. Weather reports are broadcast at 2,350 KHz on a regular basis. Besides, meteorological information is furnished by the Fleet Meteorological Agency and the Meteorological Office at the Philippine Navy's Cubic Point Air Station on request.

Meteorological data on the Philippines are given below:

Winds: The winds that sweep over the Philippines are seasonal. The northeasterly monsoons are predominant in the winter time, the southwesterly monsoons in the summer time, and the northeasterly trade winds in the spring time. With respect to the northeasterly monsoons, The Asian anticyclone in the winter time has grown both in dimension and strength

(January)

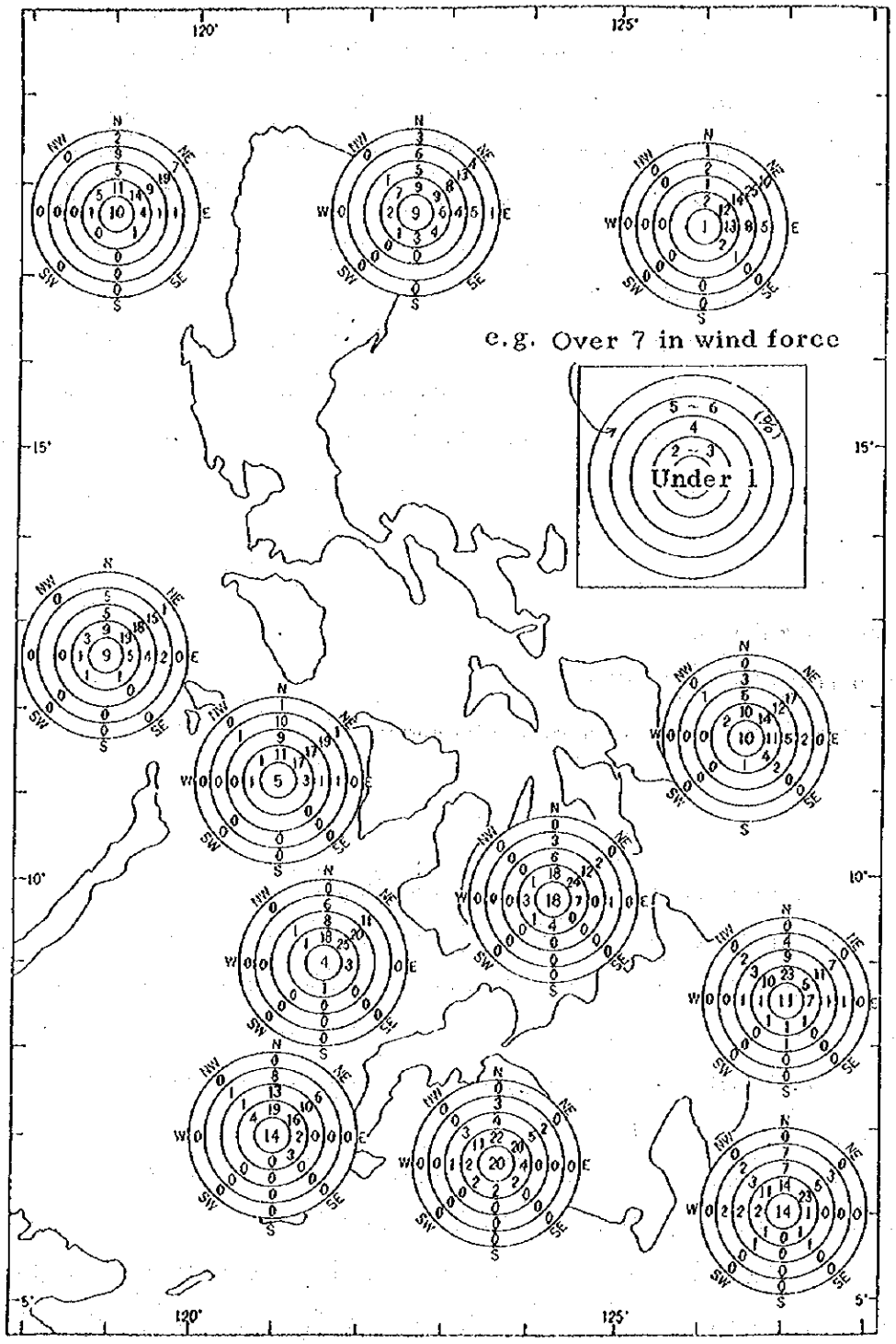
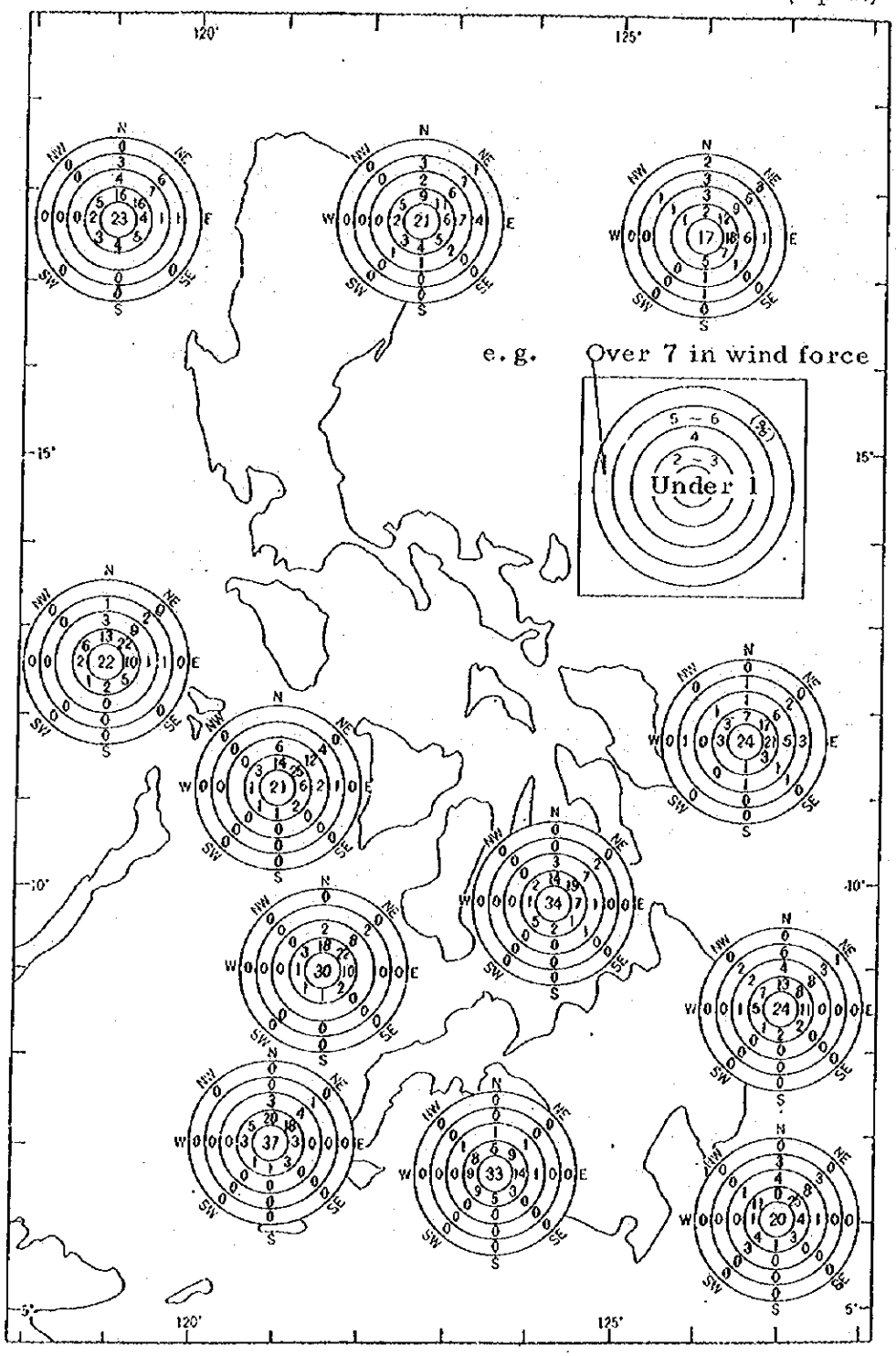
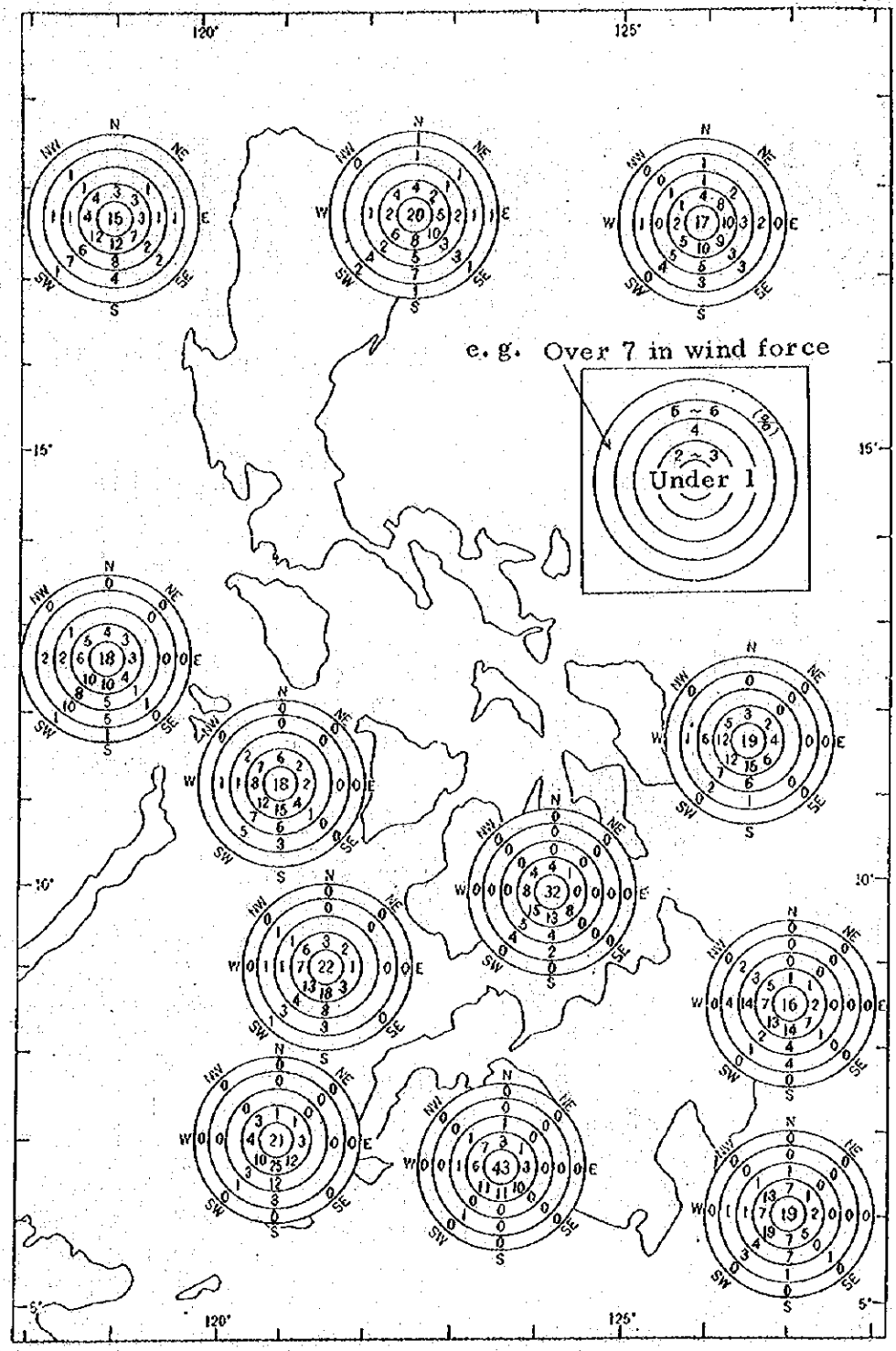


Fig. 1 Wind Rose of the Philippines

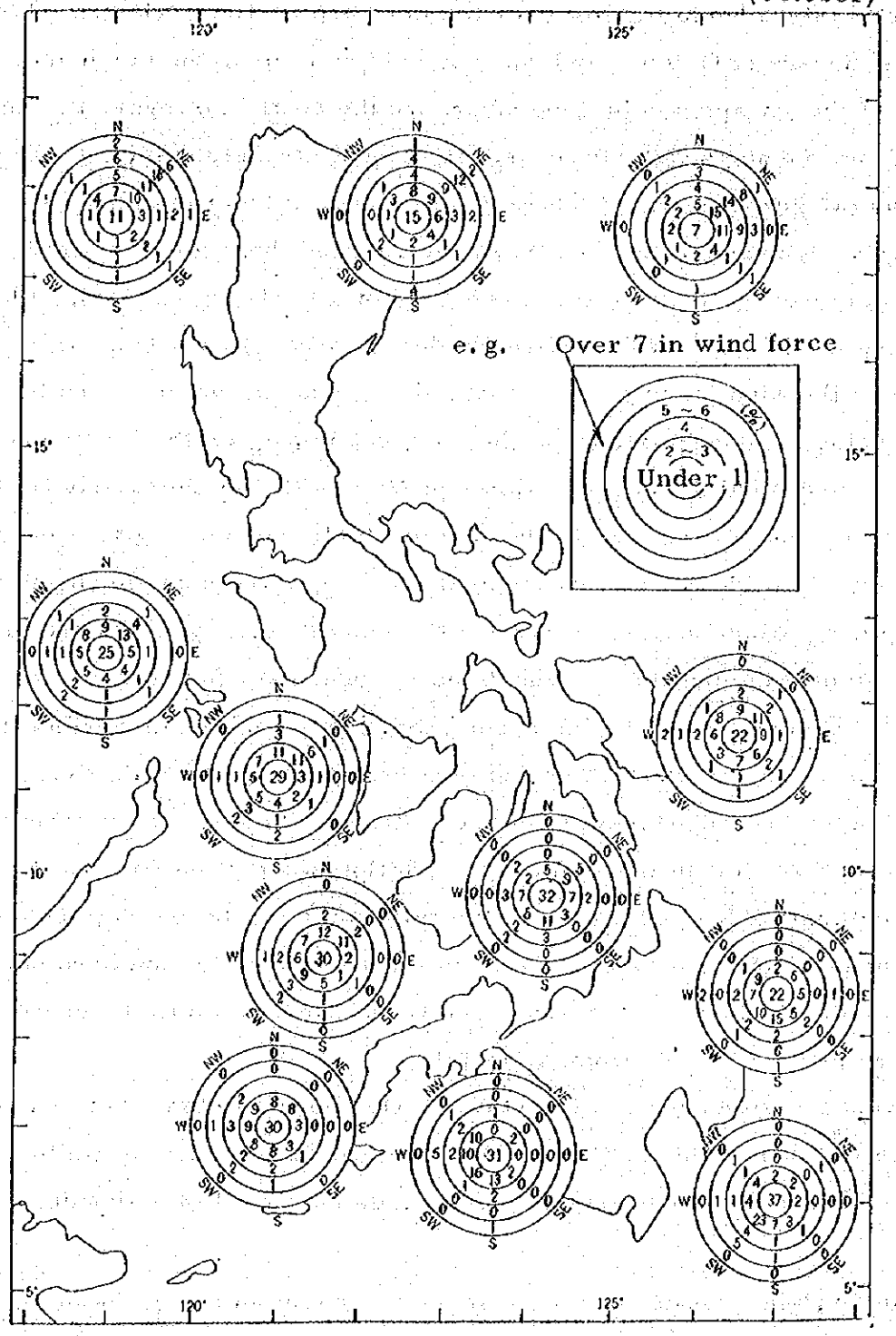
(April)



(July)



(October)



before October or November and jutted out to the east to hold sway over the circulation of winds over the Philippines. The time when the northeasters begin to blow varies, from one year to another year. Normally, the northeasters begin to blow over the northern section of Luzon Island in the first decade of October and come to hold sway over the north and center of the Philippines by November. In the south, however, the impacts from the northeasterly monsoons are not strongly manifest. Over the seas off Luzon Island which have no influences from the land, the northeasterly monsoons, when they have reached their highest zenith, sometimes exceed the wind force category of six (strong breeze), although the mean wind force stands at five (moderate breeze), and become as strong as the wind storms. In March, the Asian anticyclone is on the wane, being no longer able to product a great impact on the Philippines. In March and April -- and sometimes in May -- the northeasterly trade winds are predominant. When the northeasterly monsoons give way to the northeasterly trade winds, the tropical maritime air mass envelopes the Philippines, bringing it fine weather, the least amount of cloud and the year's highest temperature. The direction of the northeasterly trade winds is instable. In many instances, they blow from north-northeast to south, but there are cases in which they blow in different directions, depending on the local topographical conditions. In May, the northeasterly trade winds are felt in the south of the Philippines for the first time. This is the outcome of a combination of the influences left by the semipermanent Asian area of low pressure in the summer time with the southern hemisphere trade winds which lean eastward. The trade winds to up to the central and northern parts of the Philippines in July.

This wind is southeasterly or southwesterly and is predominant in June through October. The southwesterly trade winds gradually begin to blow, but the shift to the northeasterly trade winds starts all of a sudden.

Atomospheric Pressure: Minor seasonal variations in atmospheric pressure are observed over the northern part of the Philippines. The mean atmospheric pressure at Aparri, the northern tip of Luzon Island, stands at 1,015 mil-

libars in January and 1,005 millibars in July and August. At Iloilo on Panay Island in the south, the mean atmospheric pressure is 1,011 millibars in January and 1,008 millibars in July and August, showing an insignificantly small difference in atmospheric pressure between the two places.

The irregular variations in atmospheric pressure are brought about by changes in the strength and position of the anticyclone in the winter time. In other instances, they are influenced by the typhoons approaching the Philippines in summer and autumn. The variations in atmospheric pressure daily take on a regular pattern, reaching the highest at 9 a.m. and the lowest at 3 a.m. and about 3 p.m. The daily differential between the highest and the lowest is about 3 millibars. When the reading obtained from the barometer is 3-6 millibars lower than the monthly mean atmospheric pressure of the given hour of the month, this phenomenon must be taken as a warning for generation of approach of a tropical wind storm (see Table 1).

Table 1 Mean Atmospheric Pressure in Major Areas for Months

Weather Sta.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual average	Years of statistics taken
Aparri	1.015	1.014	1.013	1.011	1.008	1.007	1.005	1.005	1.007	1.010	1.012	1.014	1.010	15
Manila	1.015	1.015	1.014	1.013	1.011	1.010	1.009	1.009	1.010	1.012	1.013	1.014	1.012	52
Legaspi	1.012	1.012	1.012	1.010	1.009	1.008	1.007	1.007	1.007	1.008	1.009	1.011	1.009	15
Iloilo	1.011	1.010	1.010	1.009	1.008	1.008	1.008	1.008	1.008	1.009	1.009	1.009	1.009	15

Typhoons: In the Philippines, the typhoon is called "baguio." The English word "typhoon" is used in weather forecasts and warnings. It is used only when the surface winds exceed 33.4 m/sec. When the velocity is less than this speed, the winds are known as "tropical disturbance" or "tropical storm." As it is true that even the storms degraded in wind force are extremely perilous to seiling vessels, there is a need to pay full heed to weather messages. The majority of the wind storms which influence the Philippines are generated over the seas from 5°~20°N, 170°E, to the Philippines -- particularly, over the seas centering around the Caroline

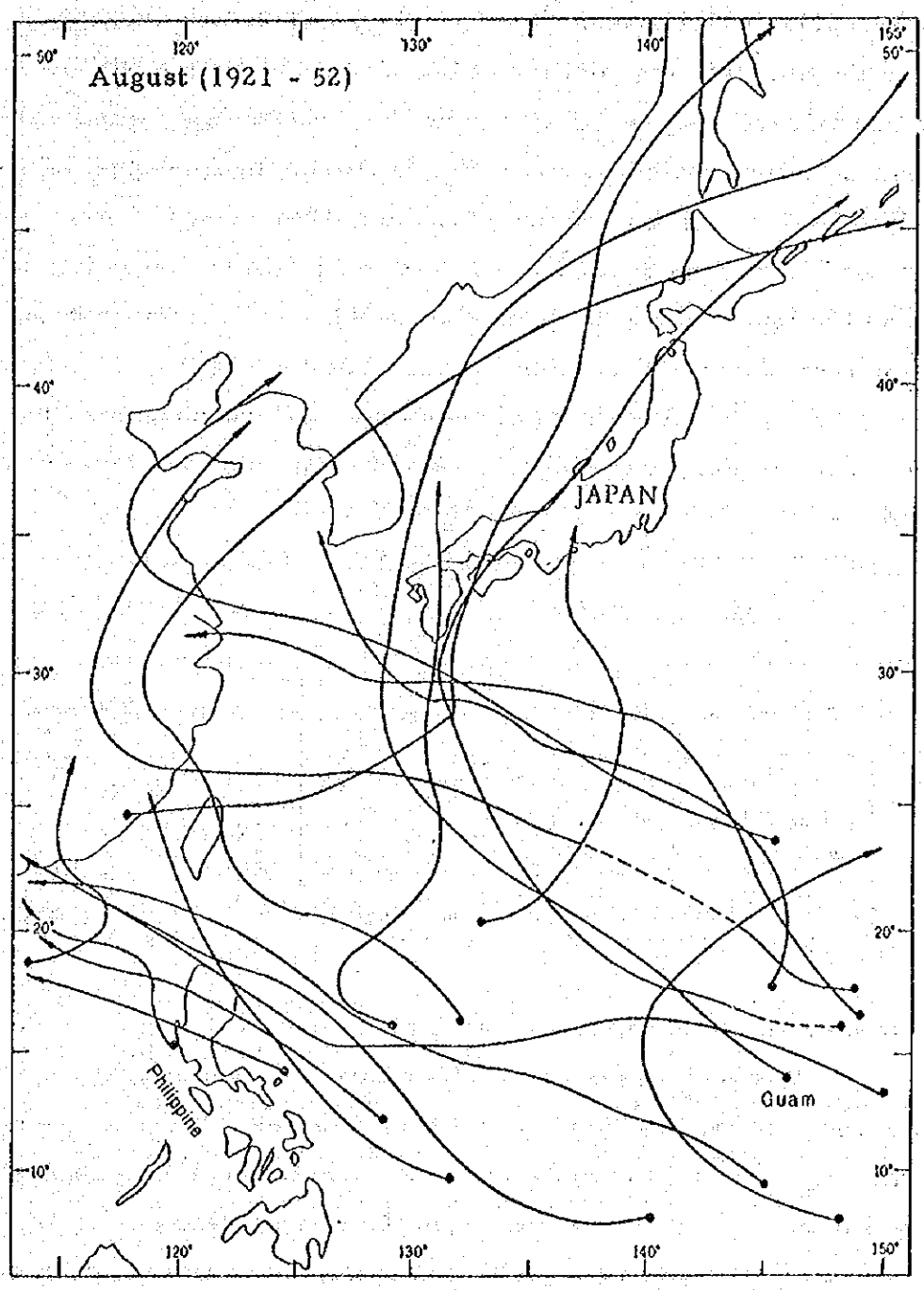
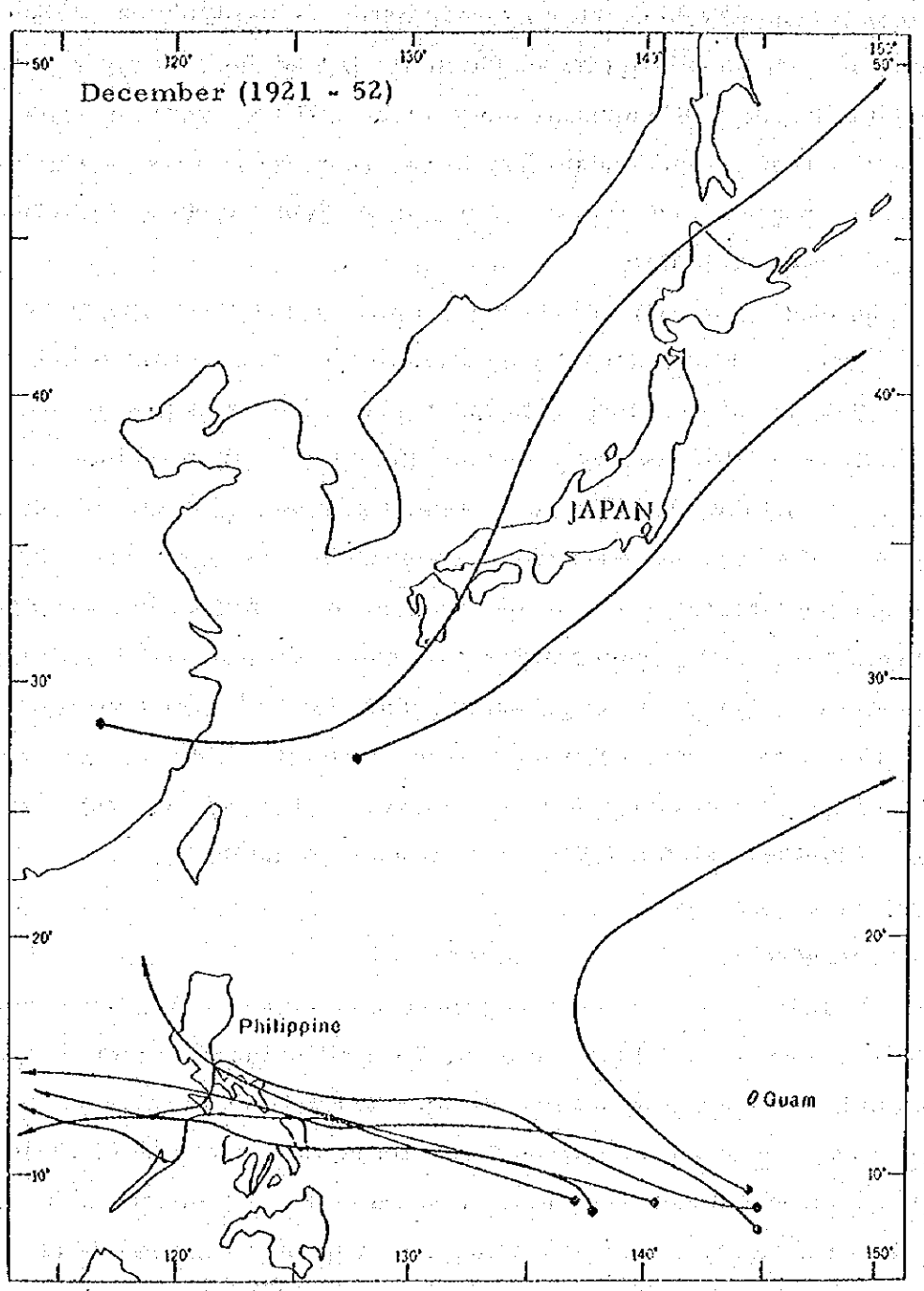


Fig. 2 Courses of Typical Typhoons and Wind Storms


December (1921 - 52)
JAPAN
Philippine
Guam
50°
120°
130°
140°
150°
40°
30°
20°
10°

Islands. They are also sometimes generated over the seas between the Paracel Islands in the middle of the South China Sea and the Macceficlol Bank. At their zenith (in July through October), the typhoons churn across the seas north of the Philippines on their way to Taiwan or Japan. Otherwise, they roll across the South China Sea to reach the Chinese coast. In this season, a considerable number of wind storms and typhoons reach the north and center of the Philippines, which are threatend with the year's most fierce typhoon. Although there are signs that they churn relatively straight to the west or northwest, but there are no fixed courses for them. Strictly precautionary measures must be taken when a typhoon or strong wind storm is approaching (see Fig. 2).

Precipitation: The extremly irregular coastlines and mountainous terrain are responsible for great variations in the maximum rainfall depth and the rainfall duration in the north and middle of the Philippines. Normally, the rainfalls are severe, reaching over 3,800 millimeters every year. Considerably different seasonal patterns of rainfalls are created due to the influences from local topographical conditions, northeasterly and southwesterly monsoons and degrees to which they are checked. In broad terms, the seacoast which is exposed to the northeasterly monsoons but has the southwesterly monsoons checked by mountains is pluvial in the winter time, whereas the seacoast which faces the southwesterly monsoons but has the northeasterly monsoons checked by mountains features the highest rainfall both in summer and autumn.

Oceanographic Conditions:

Volcanic activities were responsible for the appearance of the Philippine Islands. The continental shelf enclosing the Philippines is slanted at 11 degrees on the average and has a depth up to about 1,800 meters.
A number of troughs are carved out from the slanted continental shelf east and north of Luzon Island, and the troughs stretch out from the points about three nautical miles from the coastline and about 90 meters in depth. The tides in this region consist of daily cycling and mixed tides. Off the seacoasts facing the South China See, the seacoast of Palawan Island facing the

Sulu Sea and Mindanao Island's seacoast as well as in Surigao and San Juanico Straits, there is a cycle of high and low tides twice a day in general. There exist considerable inequities in daily tidal cycle between two high tides or between two low tides or between high and low tides, resulting in the appearance of mixed tides.

In broad terms, the ocean currents in this region consist of the north equator ocean current and the drift current brought in by the various monsoons. The westernmost point to which the north equator ocean current runs is the seas off the eastern seacost of the Philippines, so that the current in the Celebes Sea takes on a relatively stable pattern. The current in areas other than the Celebes sea has seasonal features and in normal circumstances drifts in tune with the seasonal monsoon.

Waves: The entire area of the Philippines is affected by the predominant northeasters in the winter time and the waves in the north are higher than those in the south for the seas off the coast exposed directly to the northeasters. The appearance of waves over 1.5 meters in wave hight off the east coast of Luzon Island is more than seven times as many as off the east coast of Mindanao Island. Waves more than 6.1 meters in wave height are reported in the seas north to Luzon Island, although no such reports are available for the seas south to Luzon Island. No high waves are reported off the west coasts of the Philippines, and the waves over 1.5 meters in wave hight account for only less than three percent of those that have been reported, and the waves registered at zero to three in the state of sea on the Japanese Meteorological Agency's scale of zero to nine account for 90 percent of the waves that have been observed. The offshore regions in the Sulu, Celebes and Visayan Seas are limited in area, so that the waves are calm.

The pattern of waves in summer is generally contrary to that of the winter time. The waves along the Pacific seacoasts are low, whereas the waves along the northeast and east coasts in the north of Luzon Island are high as the north and east winds are predominant. In this season, however, the typhoons which have been churned over the west of the Pacific Ocean frequently roll across these seas, with the consequence that there are

chances at all times for the waves to become extremely high. On the other hand, the waves along the west coasts of the Philippines are registered at zero to three in the state of sea in quite many instances. In the Sulu Sea which is hemmed in by many islands, the waves registered at four to five in the state of sea account for about 17 percent, whereas practically 100 percent of the waves in the Visayan Sea are less than 1.5 meters in height.

Surface Temperature: The mean annual surface temperature stands at 27.8° C in the seas around the Philippines. The mean annual range is 4.4° C for the Bashi and Balintany Straits and the South China Sea, 5.6°C for the Pacific side facing the east coast of Luzon Island, and 2.2°C for the North Pacific side south to Luzon Island. The lowest water temperature is registered in January-March and the highest temperature in August-October (Fig. 3).

The water temperature in winter, which is represented by the mean value registered for February, ranges from 26.7 to 27.8°C, showing a relatively insignificant difference in the seas southeast to the Philippines, whereas the difference is relatively great in the seas northeast to the Philippines. In the seas east to the Philippines, the water temperature widely ranges from less than 23.3°C to more than 27.8°C. In January through May, a ligulate cold water mass makes its appearance, stretching over the seas off the northeast down to the south of Luzon Island. This mass, however, does not appear in summer and autumn but once again appears in January. In the South China Sea northwest to the Philippines, the water temperature ranges from less than 23.3°C to more than 30.0°C, and the water temperature drops when a ligulate cold water mass stretching out from the west makes its appearance. High water temperatures are registered in the seas off Cape Bolinao. In the seas southeast to the Philippines and also in the Sulu Sea, no significant changes appear in water temperature, as it ranges from 26.7 to 27.8°C.

In the summer time whose water temperature is represented by the mean value registered for August, the water temperature of the entire seas off the Philippines is exceedingly equilibrated, ranging from 26.7°C in the north to 28.9°C in the southeast. The water temperature along the east

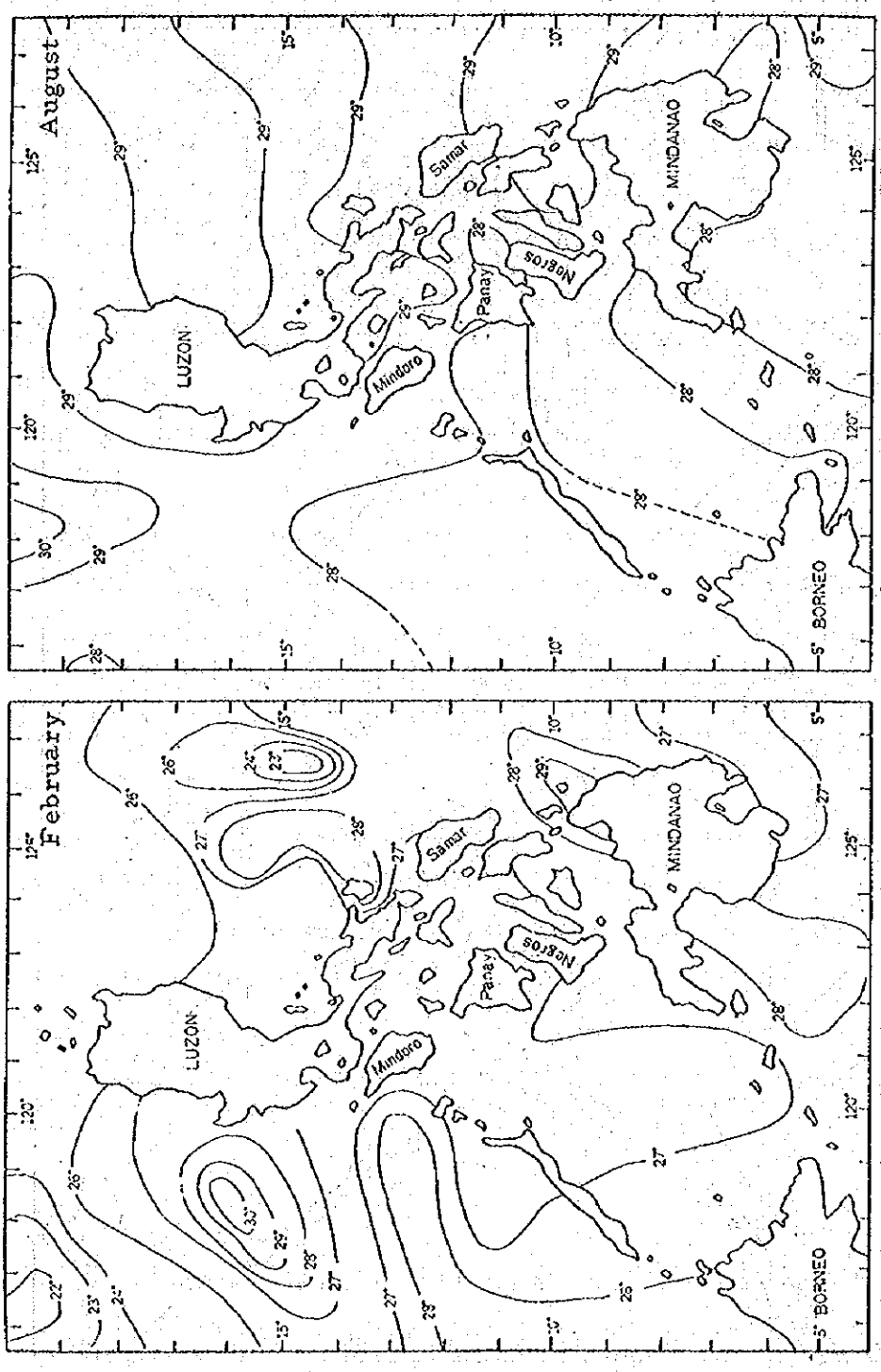


Fig. 3. Surface Water Temperature Distribution

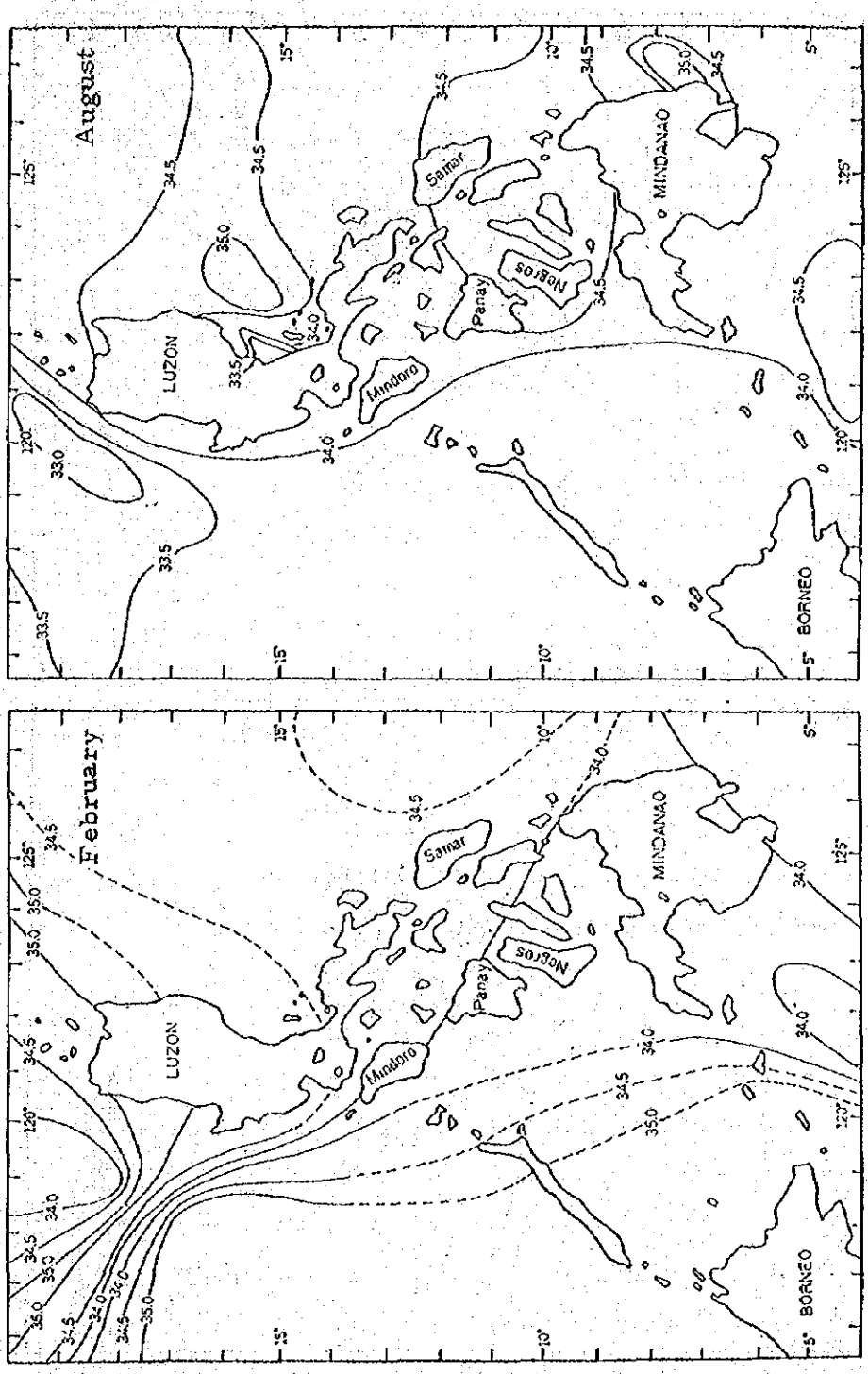


Fig. 4 Saline Density Distribution °/00

coasts of the Philippines under the influence of the northeastern monsoon in November is 28.9° C from Mindanao Island to Cape San Ildefonso and 27.8° C from Cape San Ildefonso to the Balintang Channel. The water temperature, however, gradually drops as it goes north from Cape Bolinao to the Bata Islands.

Salinity: The mean annual salinity in the seas around the Philippines stands at about 34.4 per mill. The mean salinity on the sea surface ranges from about 33 per mill in the seas off the northwest coast of Luzon Island in late summer to over 35 per mill in the seas east to the Philippines in summer and in the North Pacific north to the Philippines in winter. The extreme salinity values of 30.5 per mill and 35.9 per mill have been observed in the past, but the normal values range from 33.0 per mill to 35.5 per mill. The lowest value is registered in the water whose salinity has been diluted by the effluents from the land (Fig. 4).

In winter, a ligulate mass of water low in salinity flows into the Philippine region from the seas northwest to Lugon Islands. In the seas northeast to Luzon Island and the South China Sea west to the Philippines, the salinity is high, exceeding 35 per mill. The salinity of the east section of the Sulu Sea as well as that of the Mindanao and Sibuyan Seas are less than 34 per mill.

In Summer, a ligulate mass of water with its salinity standing at less than 33 per mill hangs around in the waters northwest to Luzon Island, whereas the salinity off the east coasts of both Luzon Island and Mindanao Island is high, exceeding 35 per mill. The massive rainfalls on the South China Sea in May through October and the flows of water from the many rivers of the Asian Continent into the South China Sea are responsible for its low salinity.

1-1-2 Ocean and Tidal Currents

The ocean currents around the Philippines are drifted by the northeasterly and southwesterly monsoons and the north equator ocean current (Fig. 5). The relatively stable sea currents off the east coasts of the Philippines and in the Celebes Sea constitute the westernmost part of the

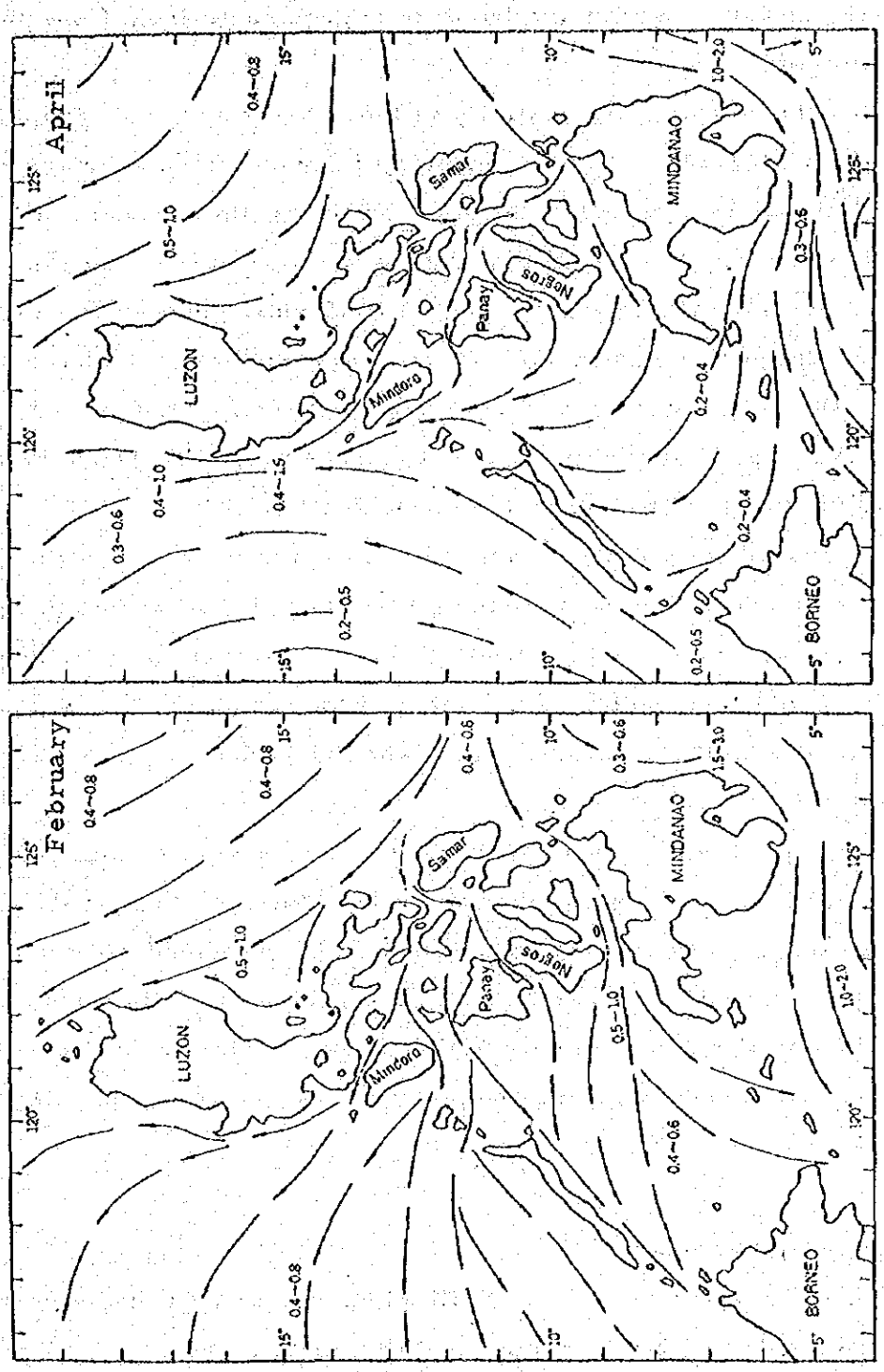
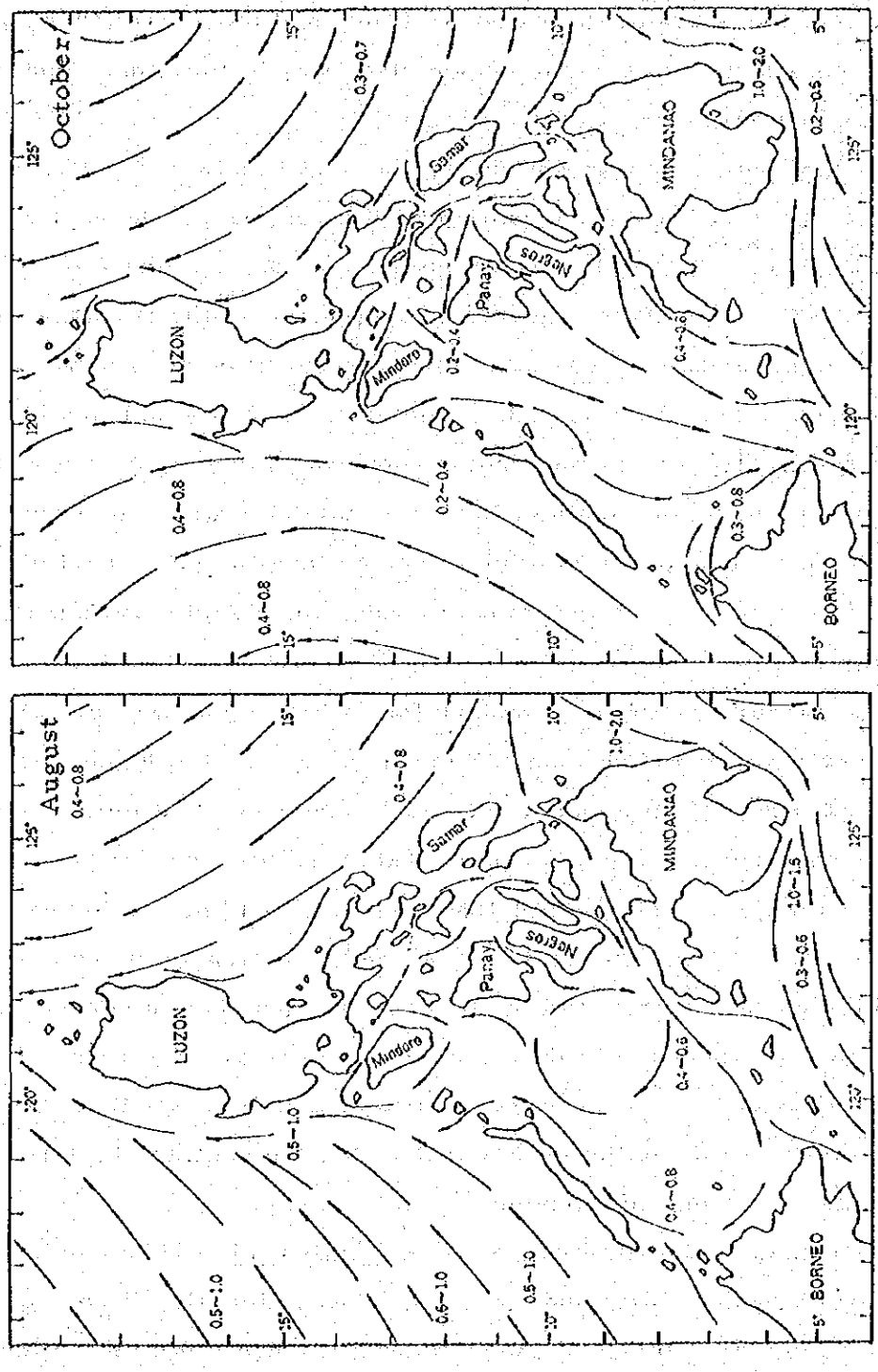


Fig. 5 Current Chart for Philippines


October
August
LUZON
MINDANAO
BORNEO
Samar
Negros
Panay
Mindoro
0.2~0.4
0.3~0.7
0.4~0.8
0.4~0.6
0.5~1.0
0.6~1.0
1.0~2.0
0.2~0.5
0.3~0.8
1.0~1.5
0.3~0.5
125°
120°
15°
10°
5°

north equator ocean current. The ocean currents in the South China and Sulu Seas are generally seasonal in nature, so that they drift in tune with the predominant monsoon. The ocean currents in the regions which are affected by monsoons develop the highest speed both in January and August when both monsoons are at their mature time, and there are few changes. The speed goes down when one monsoon gives way to the other, and the direction is instable.

A check of the ocean currents along the east coasts of the Philippines reveals that the north equator ocean current bifurcate off the east coasts of the Philippines. One main stream goes up north, sending some of its branches into the seas of the Philippines and pushing others further north to let them join Kuroshio. The other main stream advances down south along the coast of Mindanao Island, some of its branches shifting to the southeast and finally joining the counter-equatorial ocean current and others turning around the south of Mindanao Island to drift southwest into the Celebes Sea. The ocean current running along the east coast of Mindanao Island is fast and constant in speed, the speed occasionally exceeding three knots.

The ocean current running through the Celebes Sea connects with the southern portion of the north equator ocean current. After going around the Southeast coast of Mindanao Island, this ocean current moves to the west and cuts across the north section of the Celebes Sea. It later goes down south along the east coast of Borneo Island and then advances to the east along Sulawasi's north coast. Most of the portion which goes to the east join the counter-equatorial ocean current. The ocean current which returns counter-clockwise in the Celebes Sea is relatively powerful and constant. The ocean current in the various channels of the Sulu Archipelago generally flows to the southwest generally, but the southwesters run through the channels in spring and early summer.

With respect to the tidal currents, the rising tide drifts north along the Pacific coasts of the Philippines (Fig. 6). Exceptionally, it goes down south off the coasts south to Palanan Point and moves into the Lamon Bay. The rising current which runs the entire west coasts of the Philippines and

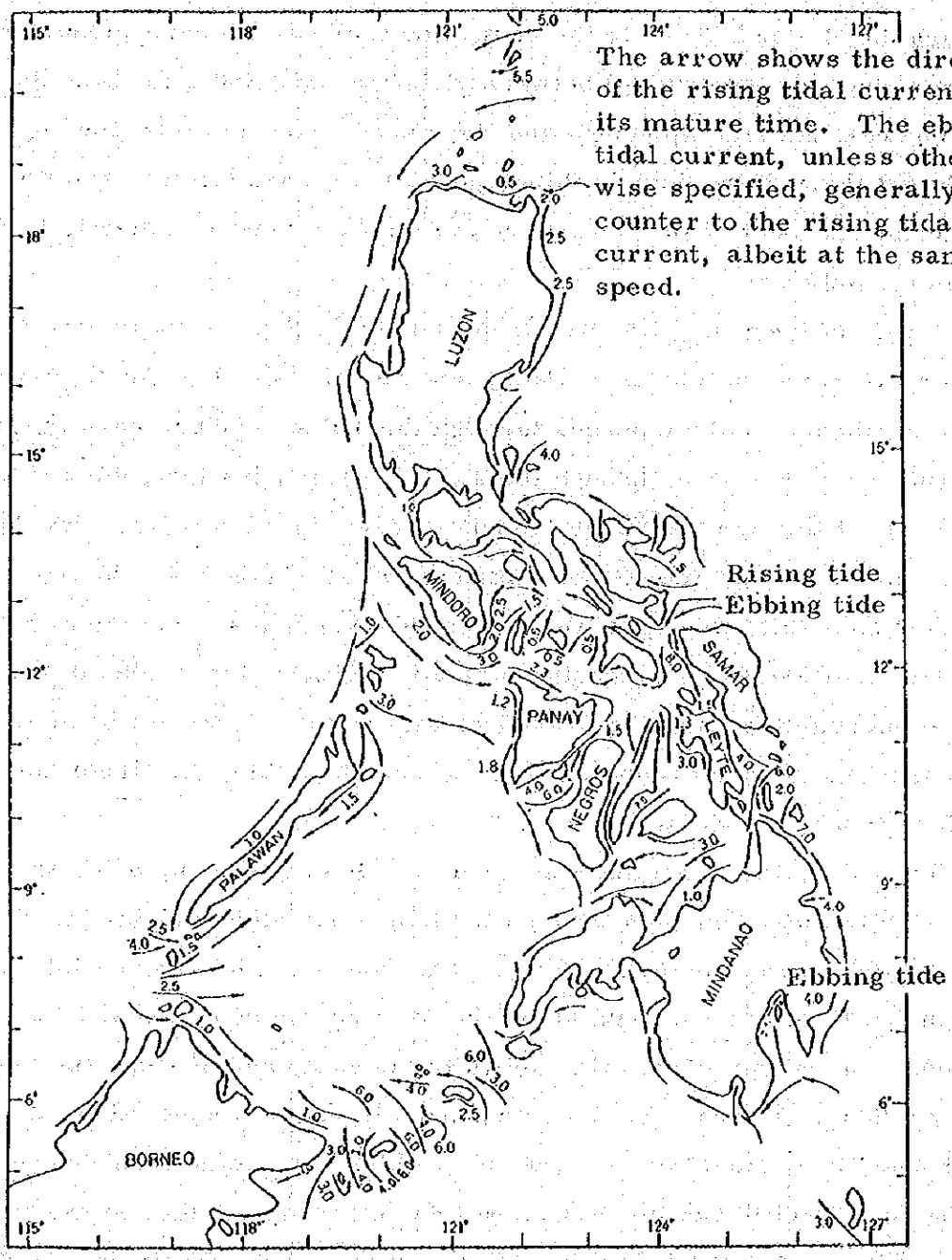


Fig. 6 Tidal Current Chart (Kn)

the northwest coast of Borneo Island moves into the Luzon Strait and turns around to the south off the northern tip of Luzon Island, drifting into the South China Sea. Branches of the rising tide which branches into all the channels of the Philippines continue to the east, while meandering the various islands' configurations.

The rising tides which flow into the Sulu Sea come in the tide running through the Balabec Strait to the east, tide moving southeast through the various channels sandwiched between Palawan and Mindanao Islands, the running west between Mindanao and Negros Islands, and tide flowing northwest through the Sulu Archipelago. These tides join one another off the northeast coast of Borneo Island and the east coast of Palawan Island and in the Sulu Sea.

A part of the rising tide which has run through the Mindro Strait goes down south along the coasts of Panay and Negros Islands. Another switches to the northeast and then passes through the Tabias and Guimaras Straits. The tide which has gone through the Tablas Strait joins the ebbing tide which has run east through the Verde Island Passage. It also meets with the rising tide which has moves south off the Pondoc Point from the San Bernardino Strait. A part of the rising tide which has come from the Surigao Strait heads to the north, instead of drifting into the Sulu Sea, and passes through the Tanon and Bohol straits and the Canigao Channel. At the north end of each channel, it meets the rising tide which has come from the San Bernardino Strait.

The tides, flowing to the west from the Pacific Ocean, enter the seas of the Philippines, running through the San Bernardino and Surigao Straits and the Philippines' many channels. The tide which has moved into the Luzon Strait goes down south along the west coasts of Luzon and Parawan Islands. Some part of this tide shifts to the east, passing into the Sulu and Sibuyan Seas, whereas the other continues to go down south along the northwest coast of Borneo Island. The tides which have come from the South China Sea, Pacific Ocean and Celebes Sea meet one another in the east and middle part of the Sulu Sea. Off the coasts of the Philippines and in its channels, the daily cycling tide and the mixed tide are predominant, with

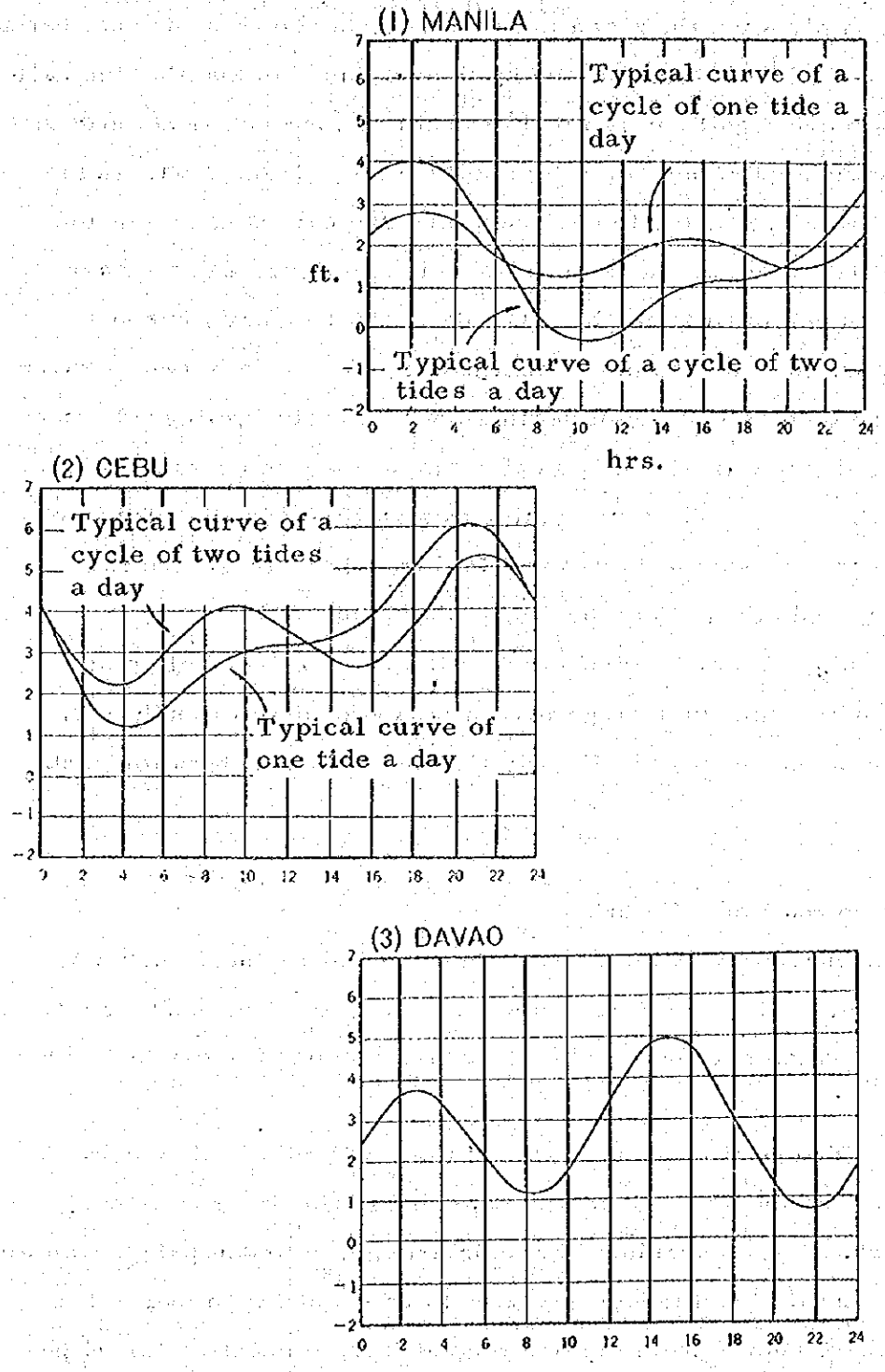


Fig. 7 Tidal Current Curves in Major Resions

the result that the daily rising and ebbing of the tide are influenced by changes in the declination of the moon, rather than those in its age. In the region which has daily cycing tides like Manila, there is one cycle of rising and ebbing tide per lunar day (24 and 48 hours) in most of the days of each lunar months. Only when the moon is in the neighborhood of the declination, there are two cycles of rising and ebbing tides a day. In Manila, the daily cycling tide is more significantly manifest both in June and December than both in March and September due to the solar effects (Fig. 7-1). In the region where there are mixed tides, there are two cycles of rising and ebbing tides a day when the moon is close to the equator, and they are practically the same in tidal height. The daily tidal inequity becomes larger in proportion to a rise in the declination. The tide in two or three days around the moon's maximum declination is a daily cycling tide or a tide similar to it (topic tide). A typical example may be observed in the Cebu region (Fig. 7-2). The tide cycling in a pattern of half a day is observed only in the harbors of Davao and Pollok, where there are two cycles of rising and ebbing tides per lunar day (Fig. 7-3).

The tidal range is intermediate for all the seas of the Philippines. The averages maximum tidal range over a period of half a month is 0.6 meters for the coasts facing the Pacific Ocean and 2.1 meters for each strait.

1-1-3 Main Species and Fishing Grounds

The fishes inhabiting in the seas around the Philippines, including those in its inland waters, are reported as coming in about 2,200 species. Of them, those which may be considered commercially important include the following:

Sharks -- Observed in every water of the Philippines, they come in 10 families and 49 species. Of them, blue shark (Galeocerda artcus), black-finned shark (Carcharhinus melanopterus), Scoliodon palasorrah and short-lobbed hammerhead (Sphysiazygaena) are great in number. The greatest fish haul comes from the San Miguel Bay, accounting for 94 percent of the Philippines' total catch of sharks.

Rays -- Many of the rays inhabit in bays. It is known that sawfish (Prisitis cuspidatus) and P. microdon, which are saw sharks, go up rivers to lakes. The main species include guitar fish (Phynchobatus djiddensis), blue-spotted sting-ray (Dayatis kuhlii), cow-nosed ray (Rhinoptera javanica) and giantic devil ray (Mobula eregoodoo-tankee). The main fishing grounds are the Visayan Sea and San Miguel Bay. The Visayan Sea accounts for about 70 percent of the Philippines' total haul of rays.

Herrings and Sardines -- Twenty-five species of herrings and sardines are recorded. Of the sardines, nine are main species. Of them, the most common species are Sardinella perforata and S. sirm ("Mizun" in Japanese). Particularly, S. sirm is the biggest species inhabiting in the waters off Minadanao Island and the Sulue Sea and commercially important. In addition, those sardines which are commercially hauled are Sardinella fimbriata (which also belongs to the family of "Mizun" in Japanese) and big-eyes herring (Ilisha hoevenii) (the family of "Hira" in Japanese). Harengula tawilis (the family of "Sappa" in Japanese) is the only fresh water sardine, inhabiting in the Taal Lake in the State of Batangas. Of the commercially recognized herrings, those inhabiting in the Visayan Sea are greatest in number, accounting for 65 percent of the Philippines' total haul. The Visayan Sea is followed by the Samar Sea and the Malampaya Sound in terms of catch. Those which are generally termed sardines are caught all over the Philippines, but the biggest haul is registered by the Sulu Sea with 16,000 tons, or slightly over 40 percent of the Philippines' total catch. The Sulu Sea is followed by the Visayan Sea with 22 percent and the Malampaya Sound with 17 percent.

Deep-bodies Anchovies -- Thirteen species are recorded. Of them, long-jawed anchovy (Stolephorus commersonii) and Indian anchovy (S. indicus), inhabiting in the bays and shallow seas around the Philippines, are commercially important as the resources for fish paste (Bagoong). These species were caught to the tune of about 11,000 tons in 1973, of which 1,700 tons came from the Visayan Sea, 1,100 tons from the San Miguel Bay and 800 tons from the Manila Bay. The species which is commercially important as a species close to anchovy is milk fish (Chanos

chanos), which is widely cultivated in the culture ponds in the shallow seas, brackish and inland waters and whose output is great in amount.

Catfishes -- Twenty-five species are recorded. In Manila City, sea-born Arius thalassinus, A. leitetocephalus and A. manillensis are put on the market, but their hauls are extremely small in amount. Practically every fishing ground is situated in the San Miguel Bay. They may also be caught in Laguna de Bay.

Lizard fishes -- Lizard fish (Sauride tumbil) and lizard fish (Trachinocephalus myops) are observed on the sand beds of shallow waters and bays. In the open sea off Vicol on Luzon Island, deep-sea lantern fish (Myctophum), which is one of the hummalos, is hauled in a blanket net fishing method. Of the total amount of about 7,500 tons of lizard fishes caught in the Philippines, 77 percent come from the Visayan Sea, which is followed by the San Miguel Bay in terms of catch. The catch in the San Miguel Bay is only eight percent. These fishes are processed for fish meal.

Garfishes and halfbeaks -- Of the garfishes, Tylosurus and garfish (Ablennes hians) are hauled with what is known as "fish coral" (a kind of driver-in net) at times. Of the halfbeaks, some of those which belong to Hemiramphus are known to the fishermen, and they go up rivers, lakes and marshes. For the flying fish species, Cypselurus sp. is caught by a special fishing method seen in Cebu. The hauls of these fishes are not so great in amount. The region which features the biggest haul of flying fish is the Malambaya Sound.

Horse Mackerels -- They inhabit in the waters off all the coasts of the Philippines and are commercially important. They are hauled along all the coasts. Particularly important are long-finned cavalle (Caranx armatus), cavalla (C. malabaricus), spotted cavalla (C. stellatus), cavalla (C. sexfasciatus) and others. Rainbow runner (Elagatis bipinnulatus), hard tail (Megalaspis cordyla), big-bodies round scad (Decapterus sp.) and big-eyed scad (Selar sp.) are also commercially important. Cavalla (C. malabaricus), spotted cavalla (C. stellatus) are caught colloq. about 6,300 tons in the Philippines. Their major fishing grounds include the Visayan Sea, Malampaya Sound and Sulu Sea. Big-eyed scad (Selar sp.)

is hauled colloq. 14,000 tons, of which about 70 percent come from the Visayan Sea, which is followed by the Davao Gulf, Malampaya Sound and Moro Gulf, each with 500 tons. Of all the horse mackerels, big-bodied round scad (Decapterus sp.) is greatest in haul, as the gross national haul runs up to a total of about 17,000 tons. Their main fishing grounds include the Malampaya Sound (62,000 tons), Sulu Sea (43,000 tons) and Visayan Sea (37,000 tons). These fishing grounds are followed by the Mindoro Strait, Asid Gulf, Tayabas Bay, Coron Bay and Moro Gulf.

Mackerels -- They are one of the most commercially important species for the Philippines. Spanish mackerel (Scomberomorus commerson) is caught in all the regions of the Philippines. Short-bodied mackerel (Rastrelliger brachysomus) is commonly observed in all the bays and inlets of the Philippines. Its hauls are particularly great in the Malampaya Sound in February through August. R. chrysozonus, which is one of the close species, is caught off Palawan and Zamboanga all the year. Mackerels are hauled to the tune of 26,000 tons, of which the Visayan Sea accounts for 55 percent and the Manila Bay for 25 percent. Of the total haul of Spanish mackerel (Scomberomorus commerson), 38 percent come from the Burias Pass and 27 percent from the Davao Gulf.
Hairtail (Trichiurus hanmela) is caught in many bays and inlets, but its haul in the Visayan Sea is greatest with 70 percent.

Tunas and swordfishes -- The species which are frequently observed in the Philippines and considered commercially important include skipjack (Katsuwonus pelamis), blue bonito (Euthunnus yaito), yellow fin tuna (Neothunnus macropterus), frigate mackerel (Auxis thazard and A. tapeinosome). In addition, double-lined mackerel (Grammatorcynus bicarinatus), dog fish tuna (Gymnosarda sp.), Kishinoella tonggol, albacore (Germo alalunga) and bluefin tuna (Thunnus thynuus) are recorded. Bluefin tuna (Thunnus thynuus) is caught in the waters north to Luzon Island in some specific seasons, whereas Germo alalunga is rarely caught. Some of the swordfishes are recorded but they are not hauled in great quantities. Of the total haul of bonitos, 74 percent come from the Visayan Sea. As regards yellowfin tuna (Neothunnus macropterus), 55 percent are hauled in the Sulu Sea and 20

percent in the Visayan Sea. Of the total haul of Auxis thazard, 34 percnet come from the Malampaya Sound and 12 percent each from the Davao Gulf and the Visayan Sea.

Groupers -- The grouper is known as "lapu-lapu" in the Philippines and highly valued for cooking on festive occasions. The species which are commonly observed include Epinephelus spp., Variola spp., Cromileptes spp. and Plectropomus spp. The groupers in the Philippines come in various species. With respect to the snappers, 36 species are recorded. Of them, those which are commercially important are malabar red snapper (Lutjannus malabaricus), hampbacked red snapper (L. gibbus), aliso (L. argentimaculatus) and dolesen (L. decussatus). Groupers are caught to the tune of 2,400 tons in the Philippines, of which 78 percent come from the Sulu Sea, Malampaya Sound and Visayan Sea. The amount of snappers caught in the Philippines is 3,100 tons, of which slightly over 40 percent comes from the Visayan Sea, 27 percent from the Sulu Sea and 20 percent from the Malampaya Sound.

Caesio -- Caesio spp., Pomadasy hasta and Scolopsis spp. are considered important. Theraponids are observed in bays and brackish waters, and more than 20 species of common porgies (Lethrinus spp.) are known to the fishermen and important for use in cooking. About 19,000 tons of caesio are hauled in the Philippines. Of them, 46 percent come from the Visayan Sea, 25 percent from the Malampaya Sound and 23 percent from the Sulu Sea. Ribbon-finned nemipterids (Nemipterus taeniopetrus) are caught to the tune of nearly 26,000 tons, of which 54 percent come from the Visayan Sea and 24 percent from the Manila Bay. Practically every haul of common porgies comes from the Visayan Sea and San Miguel Bay.

Mullets -- Twenty-five species of mullets are inhabiting the seas of the Philippines. Long scaled mullet (Mugil vaigiensis), long finned mullet (M. caeruleomaculatus), black-finned mullet (M. melinopterus) and thick-lipped mullet (M. dussumieri) are typical species, many of them inhabiting in the seas. But, M. dussumieri, M. troscheli and M. melinopterus grow in fresh water and go back to sea in the spawning season.

Other fishes which are considered commercially important include

Table 2 English and Local Nomenclatures of Major Fish Species in the Philippines

English name	Local name	Japanese name	Scientific name
Tiger shark			Galeocerdo arcticus
Black-finned shark	Pating inglesa	ツマグロ	Carcharhinus melanopterus
			C. menisorrah
Sharp-nosed shark	Pating		Scoliodon palasorrah
Short-lobed hammerhead	Binkungan	シュモクザメ	Sphyrna zygaena
Sawfish	Tagan	ノコギリエイ	Pristis cuspidatus
Guitar fish	Pating sodsod	トンガリ	Rhynchobatus djiddensis
Blue-spotted sting-ray	Dahonan	ヤッコエイ	Dasyatis kuhlii
Marbled sting-ray	Paging bulik		D. uarnak
Eagle ray	Paol	マダラトビエイ	Aetobatus narinari
Cow-nosed ray	Palimanok	ウシバナトビエイ	Rhinoptera javanica
Gigantic devil ray	Salangn	イトマキエイ	Mobula eregoodoo-tenkee
Ten pounder	Bid-bid	カライワシ類	Elops saurus
Tarpon	Buan-buan	イセゴイ	Megalops cyprinoides
Lady fish		ソトイワシ	Albula vulpes
Silver-bar fish	Parang-parang	オキイワシ	Chirocentrus dorab
Short-finned gizard shad	Kabasi		Anodontostoma chacunda
Milkfish	Bangos	サバヒー	Chanos chanos

English name	Local name	Japanese name	Scientific name
Round herring		ウルメイワシ類	Dussumieria spp.
"		〃	Etrumeus spp.
"		〃	Spratelloides spp.
Sardines	Lapad	ミズン類	Sardinella perforata
"	Kasig	〃	S. sirm
Indian sardine	Tamban	〃	S. longiceps
Fimbriated herring	Tunsoy	サッパ類	Sardinella fimbriata
Big-eyed herring	Tuwabak	ヒラ類	Ilisha hoevenii
	Tawilis	サッパ類	Harengula tawilis
Long-jowed anchovy, dilis	Dilis	タイワンアイノコ	Stolephorus commersonii
Indian anchovy	Tuakang	インドアイノコ	S. indicus
			Thrissocles spp.
			Thrissina spp.
		カタクチイワシ類	Engraulis spp.
Deep-bodied anchovy	Dumpilas		Scutengraulis hamiltonii
			Cyprinidae
			Nematabramis spp.
			Rasbora spp.
		ドロクイ類	Nematalestes spp.
			Puntius spp.

English name	Local name	Japanese name	Scientific name
			Mandibularca spp.
			Cephalakompsus spp.
			Ospatulus spp.
			Sprallellicypris spp.
Common carp		コ イ	Cyprinus carpio
Weather fish	Dojo, jojo	ドジョウ	Misgurnus anguillicandatus
Sea catfish			Arius thalassinus
"	Arahan, kanduli		A. leitetocephalus
Manila sea catfish	" "		A. manillensis
Freshwater catfish	Hito		Clarias batrachus
Catfish	Balik, pantat		Clarias gilli
"			Hito taytayensis
"			Penesilurus palavenensis
Lizard fish	Kalaso	ワニエソ	Saurida tumbil
"	"	オキエソ	Trachinocephalus myops
Deep-sea lantern fish		ハダカイワシ類	Myctophum spp.
Garfish	Kambabalo	ダ ツ	Tylosurus sp.
"	"	ハマダツ	Ablennes hians
Halfbeaks	Buguing	サヨリ類	Hemiramphus spp.
Flying fish	Bolador	トビウオ類	Cypselurus spp.

English name	Local name	Japanese name	Scientific name
Long-finned cavalla	Lawayan, talakitok	イトヒキアジ(?)	Caranx armatus
Cavalla	Sebo	カスミアジ	C. malabaricus
Spotted cavalla	Talakitok	ヒラアジ	C. stellatus
Cavalla	Pinkit	ギンガメアジ	C. sexfasciatus
Golden jack	Garopeche	コガネシマアジ	Gnathanodon speciosus
Crevalles		マブタシマアジ類	Atule spp.
Rainbow runner	Salmon	ツムブリ	Elagatis bipinnulatus
Hardtail	Orites	オニアジ	Megalaspis cordyla
Big-bodied round scad	Galongong	ムロアジ	Decapterus macrosoma
Big-eyed scad		メアジ類	Selar sp.
Leather jacket	Dorado	イケガツオ類	Scomberoides sp.
Spanish mackerel	Tanguingue	ヨコシマサワラ	Scomberomorus commerson
Short-bodied mackerel	Hasa-hasa	ツマリグルクマ	Rastrelliger brachysomus
"	Alumahan	グルクマ	R. chrysozonus
Hairtail	Balila	タチウオ科の一種	Trichiurus hanmela
Skipjack	Skipjack	カツオ	Katsuwonus pelamis
Blue bonito	Katchorita	ヤイト	Euthynnus yaito
Yellow fin	Albacora	キハダ	Neothunnus macropterus
Frigate mackerel	Bonito	ヒラソウダ	Auxis thazard
"	"	マルソウダ	A. tapeinosoma

English name	Local name	Japanese name	Scientific name
Double-lined mackerel		ニジョウサバ	Grammatorcynus bicarinatus
Dogfish tuna		イソマグロ	Gymnosarda nuda
			Kishinoella tonggol
Albacore			Germo alalunga
Bluefin tuna		クロマグロ	Thunnus thynnus
Sailfish	Malasugi	バショウカジキ	Istiophorus orientalis
Marlin		マカジキ	Makaira mitsukurii
Swordfish		メカジキ	Xiphias gladius
Wany-lined grouper	Lapu-lapu	モヨウハタ類	Epinephelus spp.
Yellow-margined grouper	Lapo-laoing senorita	バラハタ類	Variola spp.
Painted thick-lipped grunt	Labian	スジハタ類	Plectropomus spp.
High-finned grouper	Lapu-lapu	サラサハタ類	Cromileptes spp.
White sea bass	Apahap	アカメ	Lates calcarifer
Malabar red snapper	Maya-maya	フエダイ	Lutjannus malabaricus
Humpbacked red snapper	"	ヒメフエダイ	L. gibbus
Aliso	Iso	ゴマフエダイ	L. argentimaculatus
Snapper	Dolesan	アミメフエダイ	L. decussatus
Caesio	Dalagang bukid	タカサゴ類	Caesio spp.
Spotted pomadasid	Agoot	ホシミゾイサキ	Pomadasys hasta
Striped scolopsid	Tagisang lawin	タマガシラ類	Scolopsis spp.

English name	Local name	Japanese name	Scientific name
Theraponid	Babansi, bagaong	シマイサキ類	Therapon
Four-barred grunt	Agaak	〃	Pelates spp.
Silver perch	Ayungin		Demia spp.
Long-tailed nemipterid	Bisugo	ニホンイトヨリ	Nemipterus japonicus
Ribbon-finned nemipterid	〃	イトヨリ類	N. taeniopterus
Common porgies	Bitilla	フエフキダイ類	Lethrinus spp.
Spotted moonfish	Sapatero	ギンカガミ	Mene maculata
Sergeant fish	Hele	ス　ギ	Rachycentron canadus
Dulphin		シ イ ラ	Coryphaena hippurus
Slipmouth	Sapsap	ヒイラギ類	Leiognathus spp.
Spotted mojarras	Malakapas	クロサギ類	Gerres spp.
Goat fishes		ヒメジ類	Upeneoides spp.
Croakers		ニ ベ 類	Sciaena spp.
Whiting		キ ス 類	Sillago spp.
	Kilang	クロホシマンジュウダイ	Scatophagus argus
Surgeon fish		ニザダイ類	Acanthurus spp.
	Samarals	アイゴ類	Siganus spp.
Tilapia		ティラピア	Tilapia mossambica
Palileng	Ipon	フデハゼ類	Sicyopterus lacrymosus
Rock goby	Biyang boto	ウロハゼ	Glossogobius giurus
〃	Bucto, biyang boto		Chonophorus melanocephalus

English name	Local name	Japanese name	Scientific name
Sleepers	Birot	カワアナゴ類	Eleotris melanosoma
	Campa	ツバサハゼ	Rhyacichthys aspro
			Mistichthys luzonensis
Transparent goby			Microgobius lacustris
Murrel	Dalag	トラギス	Ophicephalus striatus
Climbing perch	Martiniko	キノボリウオ	Anabas Testudineus
			Clarias batrachus'
Gouramy		グラミィー	Trichogaster trichopterus
Giant gouramy		〃	Osphronemus gouramy
Dwarf gouramy	Pla-salit	〃	Trichogaster pectoralis
Large scaled mullet	Banak	ボラ類	Mugil vaigiensis
Long-finned mullet	Banak	〃	M. caerulleomaculatus
Black-finned mullet	Talilong	〃	M. melinopterus
Thick-lipped mullet	Talilong	〃	M. dussumieri
Barracuda	Asogon	オオカマス	Sphyraena jello
〃		カマス類	S. abtusata
Threadfins	Mamale		Eleutheronema tetradactylum
Small-mouthed threadfin	Mamaleng bato	ツバメコノシロ類	Polynemus microstoma
Indian turbot flatfish	Kalangkao	ボウズガレイ	Psettodes crumei
Smooth-scaled brill	Dapang bilog	ヒラメ類	Pseudorhombus arsius
Specked sole	Dapang haba	ウシノシタ類	Cynoglossus punoticeps

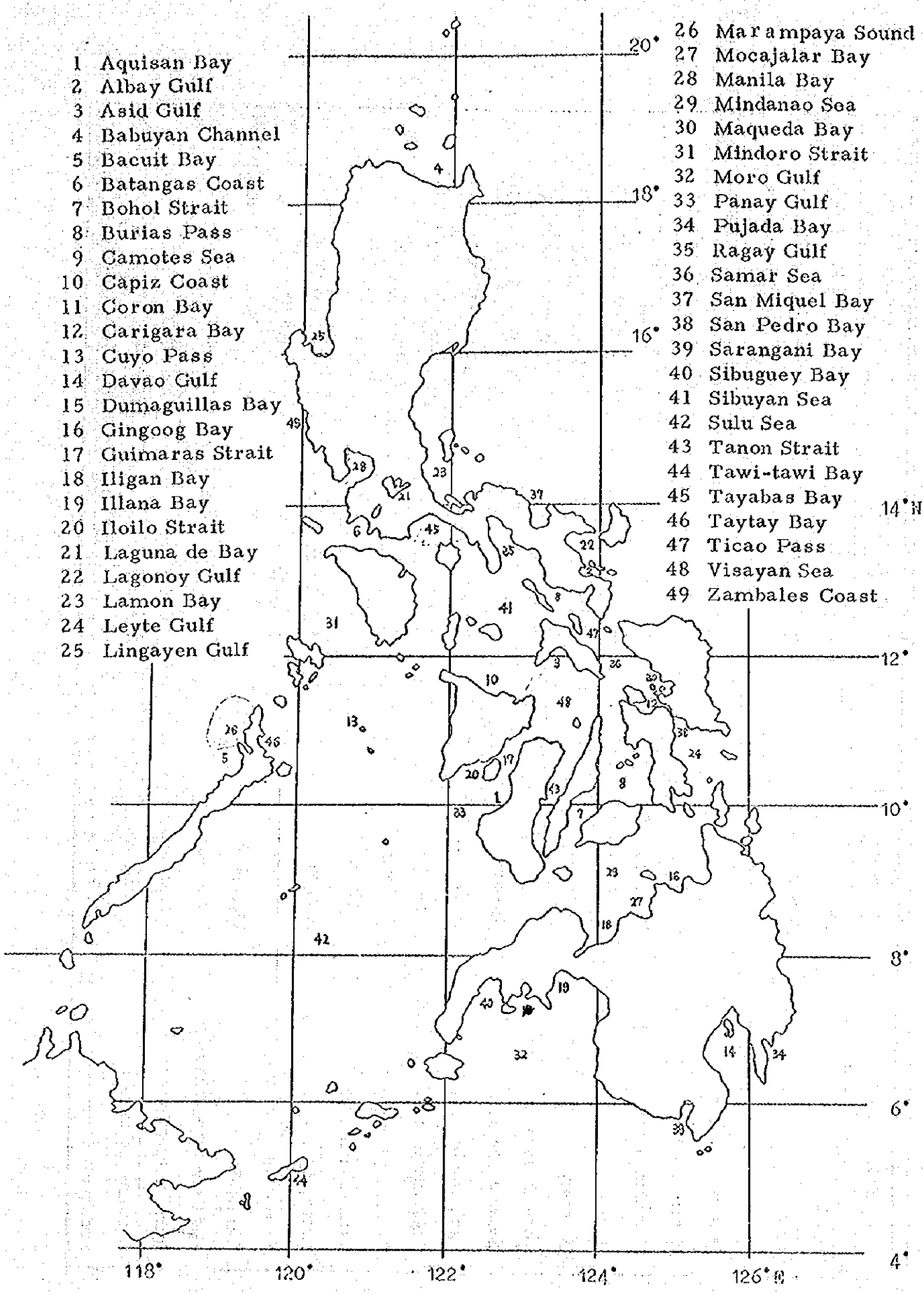


Fig. 8 Main Fishing Grounds in the Philippines

barracuda (Sphyraena jello), Sobtusata sp., surgeon fish (Acanthurus spp.), Siganus spp., slipmouth (Leiognathus spp.) and whiting (Sillago spp.). of these species, slipmouths are hauled to the tune of 41,000 tons, the main fishing grounds being the Visayan Sea (56%), Manila Bay (16%) and San Miguel Bay (8%).

Table 2 provides the English and local nomenclatures of major fish species in the Philippines, whose main fishing grounds are shown in Fig. 8.

1-1-4 Outlook of Major Ports and Harbors

The following is a summary on Manila, Davao, Tacloban, Legaspi, Jose Panganiban and Cebu, which are important open ports and likely to be used by the survey for a forthcoming survey.

Manila

The Manila, Philippines' largest port, is divided into the north and south ports and Pasig River. The south port, used mainly for deep-daught vessels, have five piers (Piers 3, 5, 9, 13 and 15), and the water depth ranges from 7.9 to 12.1 meters (in 1966). The north port has eight piers (Piers 2, 4, 6, 8, 10, 12, 14 and 16) mainly for coastwise ships, the distance between the respective piers being 135 meters. Pier 2 is set aside for exclusive use by fishing vessels. The water depth of the north port is shallower than that of the south port, ranging from 1.7 to 6.1 meters (in 1957). Pilotage is mandatory for any ocean-going vessel coming into Manila Port. In normal circumstances, embarkation is authorized at the quarantine anchorage upon completion of a quarantine.

The cargo gear arrangements available at Manila Port are modern. The cargo gear available alongside a ship is used for cargo loading and unloading in most instances, but port workers, barges, tugboats and mobile cranes and cargo gear are fully available.

With respect to the supplies, food, ship articles, and spare deck and engine parts are readily available. Fresh water may be piped at 40 tons an hour, and water supply ships are also available. Fuel oil and lubricating oil may be supplied from piers and barges. Fuel oil may be taken in from barges at a rate of 150 tons an hour. For an oil supply, however,

there is a need to file an application at least 72 hours before the supply.

Practically every type of repair work may be conducted at Manila Port. The Mariveles shipyard has a 10,000-ton dock. One thousand four hundred-ton and 300-ton slipways are available at Engineer Island, and 2,000-ton and 1,500-ton slipways at Varadero de Manila, Cavite.

Davao

Four privately-managed piers are available in addition to the government-operated Santa Ana and Sasa Marginal wharves. The water depth is 0.9 to 3 meters (in 1966) at the Santa Ana Wharf and 7.6 meters at the Sasa Marhonal Wharf. The private wharves, owned by Shell, Macleod, Stanvac and Caltex, have water depths of 8.2, 18, 9.1 and 7.6 meters, respectively.

At Davao Harbor, pilotage is mandatory for all foreign vessels putting out to sea from their anchorages or shifting from one anchorage to another within the harbor. Pilotage is also mandatory for any foreign vessel which is to moor at a voernmental wharf or leave the wharf in the event that its gross tonnage exceeds 100 tons. Pilotage, however, is optional for mooring at a private wharf. In normal circumstances, the pilot embarks at an anchorage off the Santa Ana Wharf. Ocean-going vessels are subject to quarantine and customs clearance at the anchorage off the wharf.

As regards the supplies, perishables may be supplied, but excessive hopes cannot be pinned on the supply of deck, engine and other ship articles. Fresh water may be supplied at a wharf at a rate of 50 tons a day, and a water supply vessel with a capacity of 60 tons may be used. If ordered well in advance, fuel oil may be obtained. Diesel oil may be pumped in from the wharf of an oil firm at Sasa. Repairs are limited to those of winor scale, but machine plants capable of welding and casting are available in the city. Slipways are available only for small-sized launches and barges.

Tacloban

Tacloban is the Leyte Island's main port. The main part of this port is a small inlet which penetrates about one mile to the south between the

Panviugan Point and the Arbong Point, about one mile northwest-by-west to the Panviguan Point. Most of the small inlet are walled with coastal embankments, four to five meters, and an extremely narrow fairway turns at a point immediately close to the Panirugan Point and leeds to the Tacloban Wharf. The water depth of this fairway is about 5.4 meters (in 1958). Pioltage is mandatory for any vessels coming in toward Tacloban through the San Juenico Strait, and no port entries are made at night in normal circumstances. The vessel which calls for pilotage must radio an application containing necessary items 24 hours in advance. Fresh water may be pumped in at the wharf but its water pressure is low. Perishables may be obtained at markets in the city of Tacloban to some extent, but vegetables are not available in abundance. Fuel oil is available but only in a small amount, and it is required to place an order in advance. High hopes cannot be pinned on the supply of deck, engine and other ship articles. Repairs are enable so far as they are of small scale. Neither slipways nor building berths are available: Tacloban has three general hospitals and one clinic.

Legaspi

Legaspi is the open port situated deep in the Albay Gulf. Being one of the main ports and situated on the east coast of Luzon Island, Legaspi Port is exposed to the northeasterly monsoons and there are cases of rough water surface. Further, the fairway leading to the wharf is narrow, measuring about 110 meters in breadth, so that safety cannot be assured for port entries unless the weather conditions are favorable. Pilotage is mandatory for any vessel, 50 tons and heavier, The area within a radius of three miles from the lighthouse is subject to pilotage. The water depth in areas within 100 meters from the wharf is about six meters. Perishables and ship articles may be obtained in small quantities, but neither fresh water nor feul oil is available. Diesel and lubricating oils are available in drums and other cans, but it is advisable to place orders in advance. Small workshops are available for minor repair work and welding. There are a number of hospitals in the city, and they are equipped with modern medical facilities.

Jose Panganiban

Situated almost in the middle part of the east coast of Luzon Island, this port is exposed to the southwesterly monsoons. From the last decase of March through September, the sea is generally calm, but chopping seas are raised and surges run high during the season when this area is exposed to the northeasterly monsoons. A 67-meter-long L-shaped wharf and a passway are situated at a point about 1.7 miles northwest-by-north to Jose Panganiban. The water depth is 6.1 meters. Pilotage is mandatory for any vessels, over 50 tons in gross tonnage. Diesel oil pipes are available on the wharf for refueling purposes. Perishables may be obtained to some extent.

Cebu

Being the capital of the State of Cebu, it is the open port which faces the strait that goes between Cebu Island and Mactan Island. Cebu is a commercial hub in the middle and southern parts of the Philippines. All types of vessels can be enter the port from the northeast and south. The northeast fairway is 7.6 meters in water depth and its minimum breadth is 140 meters, but this fairway is relatively straight. The moorage includes nine berths, their aggregate length being 1,650 meters, and three wharves, each measuring 155 meters in length. The water depth is 3.6 to 8.2 meters at the berths and 3.6 to 7.9 meters at the wharves. Labor power is adequately available, so barges and loading gear. Food may be procured in considerable large quantities. Water pipes are equipped to Berth No.7, Wharf No.1 and Wharf No.2 for fresh water supply. Fresh water may also be procured from water supply ships at a rate of 40 to 50 tons an hour. Fuel oil, diesel oil and lubricating oil are procurable from the wharves used by oil firms on Mactan Island or oil barges. Pilotage is mandatory for a trip to any oil firm's wharf. A dry dock for vessels of the 1,000-ton class is available on Mactan Island, and a 1,200-ton dry dock is under construction, making is possible to conduct repair work. There is a national hospital. Cebu also has several clinics where seamen may be treated.

1-2 Structure of Fisheries and Production

1-2-1 Production Structure

The population of the Philippines' fishing industry is estimated at 2,200,000, and its output is 1,230,000 tons (in 1975). When the Philippines' total population of 40,000,000 is taken into consideration, it is evident that its dependency on the fisheries industry is fairly high. Administratively, the fisheries industry is divided into three sectors: commercial fisheries, fish ponds, and municipal fisheries and sustainance fishing. Anybody who intends to commit himself in fisheries must secure a license from the local government.

"Commercial fisheries" mean the kind of fisheries in which fishing vessels, over three tons in gross tonnage, are used with an approval of the State (Department of Natural Resources and the Bureau of Fisheries and Aquatic Resources), and fishing operations are authorized only in the waters with depths exceedings seven fathoms. Control and guidance are provided by BFAR, and the fishermen in this are obligated to file reports on their fish hauls. The population of this category of fishermen was 47,000 in 1973, and their output was 465,000 tons.

Those who are falling under the category of "fish ponds" are the fishermen who operate hatcheries. The hatcheries, as referred to here, include the privately owned or public plots which are rent by the State or local governments to individuals, organizations, cooperatives or businesses to construct hatcheries. The rent hatcheries must not exceed 50 hectares for individuals and 500 hectares for organizations and businesses. The rental period is set at 25 years, which may be extended for another 25 years. With the exception of the hatcheries rent by the central Government, practically no data are available on area, working population, production, etc., with respect to the hatcheries leased by individuals and local governments. Consequently, the production data are based on extremely rough estimates. As of the end of 1973, the hatcheries owned by individuals meansured 85,000 hectares in area, those on loan from the government were 91,000 hectares, and the total output form both types of hatcheries was estimated at about 100,000 tons. Milk fish is practically the only fish

raised in these hatcheries.

"Municipal fisheries and sustenance fishing" are the kind of fisheries to be conducted in use of fishing vessels, less than three tons in gross tonnage, fishing vessels and of or without used culturing oysters. Licenses for this type of fisheries are granted by local governments in accordance with their ordinance which is approved by the State. Almost all of the fishing population of 2,200,000 of this country belongs to this category, which constitutes an important sector in administrative terms. It is not an exaggeration to say that practically no attempts are made to collect data on this sector at the national level. With respect to statistics, local governments are obligated to file reports with the State, but extremely rough estimates are made at present, as the statistical data collecting system has not been integrated. The output in this category was estimated at about 640,000 tons in 1973.

The yearly outputs in each sector in terms of quantity and value are shown in Table 3.

The production structure of the commercial fisheries whose statistics are relatively well provided is shown in Tables 4 through 10.

These tables reveal that the Philippines highly relies on the pelagic fish fishing industry in which purse seines and bagnets (a kind of lift net) are mainly put to use. This type of fishing industry accounts for 58.7 percent of all the fish haul and is followed by the trawl net fishing industry with 32.8 percent and the drive-in net fishing industry with 5.7 percent.

A check of the numbers of fishing vessels, as classified by types of fishing industries, shows that the trawlers which were greatest in number tended to decrease from 1969. In 1973, however, the trawlers were increased in number, up 100 vessels over the previous year. There has also been a remarkable rise in the number of purse seine fishing vessels in recent years. As compared with 1969, there was an increase of 217 vessels, or about 85 percent. With respect to the bagnet fishing vessels, there are relatively drastic annual changes within the range of 750 to 850 vessels. The drop in 1972 was more conspicuous than in the average year, as the vessels decreased to 650 ships. There signs for a slight increase

Table 3 Fish Output and Value by Fishing Industries (In 1,000 metric tons and 1 mil. peso)

	Commercial fisheries		Fishponds		Municipal fisheries and Sustinance fishing		Total	
	Amount	Value	Amount	Value	Amount	Value	Amount	Value
1955	107.2	75.0	36.7	45.9	219.0	201.5	362.9	322.4
1960	120.0	93.6	60.1	96.2	264.5	274.6	444.6	464.4
1964	258.1	389.7	62.7	104.1	282.7	292.2	603.5	785.0
1965	300.1	372.1	63.2	106.2	303.9	328.2	667.2	806.5
1966	314.9	366.1	63.7	129.9	326.7	330.0	705.3	826.0
1967	330.9	423.7	63.9	135.5	351.2	403.9	746.1	963.1
1968	406.8	548.4	86.7	182.4	444.2	631.1	937.7	1,361.9
1969	368.7	556.8	94.6	191.0	477.5	709.6	940.8	1,457.4
1970	381.9	614.8	96.5	252.7	510.5	857.7	988.9	1,725.3
1971	382.3	879.2	97.9	323.0	542.9	1,123.8	1,023.1	2,331.1
1972	424.8	1,106.1	98.9	332.4	598.7	1,389.1	1,122.4	2,827.5
1973	465.4	1,261.6	99.6	434.3	639.8	1,599.5	1,204.8	3,295.3

Source: Fisheries Statistics of the Philippines, 1973

Table 4 Numbers of Fishing Vessels Used by Fishing Methods

	1969	1970	1971	1972	1973
Total	2,273	2,284	2,180	2,222	2,513
Otter trawl	667	653	652	690	794
Bagnet	796	858	743	650	791
Purse seine	253	245	265	320	470
Hand line	97	88	83	94	81
Drive-in net	24	26	37	39	37
Others	436	414	400	429	340

Source: Fisheries Statistics of the Philippines, 1973

Table 5 Numbers of Fishing Vessels by Fishing Methods and Tonnage, 1973

	Total	3 - 5 (t)	5-10 (t)	10-20 (t)	20-50 (t)	50-100 (t)	100 - 200(t)	200- (t)
Total	2,513	268	426	529	534	495	203	58
Otter trawl	794	35	64	95	297	247	55	1
Bagnet	791	123	234	265	99	38	32	-
Purse seine	469	21	50	69	30	168	90	41
Hand line	81	1	2	20	45	13	-	-
Drive-in net	37	1	-	-	5	1	20	10
Others	341	87	76	80	58	28	6	6

Source: Fisheries Statistics of the Philippines, 1973

Table 6 Fish Hauls by Fishing Methods

(in 1,000 metric tons)

	1969	1970	1971	1972	1973
Total	368.7	381.9	382.3	424.8	465.4
Otter trawl	134.1	135.6	146.4	144.0	152.8
Bagnet	115.3	125.5	85.9	104.2	40.6
Purse seine	80.1	86.7	117.7	148.5	232.6
Hand ling	9.3	8.3	7.6	5.3	6.5
Drive-in net	19.3	16.8	17.9	16.8	26.5
Others	10.6	9.0	7.1	6.0	6.4

Source: Fisheries Statistics of the Philippines, 1973

Table 7 Fish Hauls by Fishing Methods and Tonnage, 1973

(in 1,000 metric tons)

	Total	3 - 5 (t)	5 - 10 (t)	10-20 (t)	20-50 (t)	50-100 (t)	100-100 (t)	200- (t)	Unknown
Total	465.4	8.9	16.6	36.3	68.5	160.6	103.7	41.7	29.1
Otter trawl	152.8	1.5	2.4	8.3	48.8	69.2	14.2	0.5	8.0
Bagnet	40.6	3.0	9.9	14.3	5.9	2.2	1.5	-	2.8
Purse seine	232.6	1.7	2.7	10.7	9.3	85.2	76.4	29.9	16.6
Hand line	6.5	-	0.1	1.0	3.5	0.9	-	-	1.0
Drive-in net	26.5	-	-	-	0.9	2.2	11.4	11.3	0.7
Others	6.4	2.7	1.5	2.0	0.1	0	0.2	0	0

Source: Fisheries Statistics of the Philippines, 1973

Table 8 Fish Hauls by Specie

(in 1,000 metric tons)

	1969	1970	1971	1972	1973
Total	368,727	381,877	382,276	424,754	465,442
Big-bodied round scad	109,729	150,713	142,921	150,356	169,968
Dulphin	30,926	30,254	32,579	42,101	40,571
Sardine	34,347	32,883	44,086	40,161	39,740
Short-bodied mackerel	23,944	21,010	19,992	20,556	25,875
Nemipterid	18,919	17,154	16,654	21,852	25,610
Caesio	9,974	7,159	9,315	9,150	19,165
Big-eyed scad	17,014	14,373	18,414	11,325	13,517
Skipjack	12,392	7,247	4,256	7,253	11,071
Engraulis spp.	11,005	9,241	7,410	21,491	11,056
Shrimp	10,970	10,378	12,702	12,893	10,369
Tuna	2,656	1,892	3,812	1,918	6,865
Croakers	15,338	10,073	9,404	7,966	8,736
Lizard fish	14,559	12,278	12,305	9,052	7,563
Squid	6,366	5,862	5,713	7,451	7,174
Spotted cavalla	5,303	6,369	4,830	5,658	6,327
Ribbonfish	8,871	6,738	7,066	5,086	4,869
Others	41,414	38,253	30,827	50,485	57,065

Source: Fisheries Statistics of the Philippines, 1973

Table 9 Catch by Fishing Grounds, 1973

Unit : tons

	Total	Asid Gulf	Burias Pass	Coron Bay	Davao Gulf	Guimaras Strait	Lamon Bay	Malampaya Sound
Total	465,442	4,223	3,847	4,281	5,189	3,844	3,227	88,043
Anchovy	11,056	9	450	329	25	230	924	395
Big eyed scad	13,516	53	4	118	565	233	33	553
Bonito (Oceanic)	11,071	22	995	82	1,316	67		3,779
Caesio	19,066				21		17	4,749
Cavalla	6,327		56		41	119	139	1,554
Crab	2,072	9				29	6	
Crevalla	3,012	47		8		139	15	37
Croaker	8,736	45	23			219	45	47
Flatfish	2,240					36		19
Flying fish	1,000				8			354
Grouper	2,364					22		601
Hairtail	4,869	50			3	33		193
Herring	4,265	2	14			88	54	321
Lizard fish	7,563	16				212		71
Macherel chub	25,875	16	3	29	11	25	27	934
M. fligate	3,201		1,209		851			
Mackerel sp.	1,327				1	3		92
Moon fish	3,599		41		350	279		537
Nemipterid	25,610			19		343	17	927
Panpano	1,658			27		36	7	164
Porgy	1,076					15		
Prawn	433					25		
Round scad	169,968	3,795	713	3,341	1,175	61	543	62,188
Runner	2,810	2			87	130		164
Sardine	39,740		117	143	182	118	407	6,707
Shrimp	10,369	20		10		324	41	177
Skipjack	1,463					3		6
Slipmouth	40,571	84	71	1	75	689	279	169
Snapper	3,146					13		600
Squid	7,174	50	9		213	298	594	102
Surgeon fish	3,466				13	7		902
Tuna (Y. F.)	6,865	3	122	41	52		1	324

Table 9 (continued)

	Manila Bay	Mindro Strait	Moro Gulf	Samar Sea	San Miguel Bay	Sulu Sea	Tayabas Sea	Visayan Sea
Total	30,683	9,788	7,921	4,987	14,647	77,330	10,515	169,393
Anchovy	800	55	582	429	1,133	17	110	1,655
Big eyed scad	489	10	449	314	138	268	89	9,482
Bonito (Oceanic)	314	524	591	38	22	155	95	1,340
Caesio	821		12		32	4,287	12	8,842
Cavalla		53	99	21	360	650	86	1,864
Crab	145			103	463	22	10	1,149
Crevalla	121	14		168	82	32	1	1,574
Croaker	288			108	1,677	54	3	5,903
Flatfish	101			2	30	45	17	1,865
Flying fish	36							179
Grouper	6	184		18	2	518		719
Hairtail	159	49	5	303	14	90		3,395
Herring	14		21	420	109	5	25	2,757
Lizard fish	120			65	536	76	211	5,798
Mackerel chub	6,435	227		649	52	1,315	1,134	14,213
M. fligate			340	3	3	60		46
Macherel sp.	99	80		54	137	178	3	520
Moonfish	26			8	4	51	39	1,630
Nemipterid	6,017	166		238	381	1,607	1,374	13,797
Panpano	117	73		18	85	337	9	761
Porgy					402			639
Prawn					2			339
Round scad	220	7,919	2,053	453	821	42,890	3,976	37,128
Runner			10	6		203		2,072
Sardine	515	62	2,155	527	449	16,334	618	8,568
Shrimp	2,270	5		84	1,819	299	284	4,420
Skipjack			284				75	1,084
Slipmouth	6,460	35	803	534	3,048	901	1,035	22,613
Snapper					17	840		1,294
Squid	594	10	73	117	1,039	109	155	2,977
Surgeon fish	401		11			774	15	1,261
Tuna (Y. F.)		19	420	190	16	3,769	11	1,396

Table 10 Catch Per Unit Effort, 1973

	Number of fishing vessel A	Number of workers B	Fish haul C	Number of crew members a ship B/A	Fish haul per ship C/A	Fish haul per person C/B
			tons			
Total	2,513	46,506	465,442	18.5	185.2	0.9
Otter trawl	794	13,355	152,766	16.8	192.4	11.4
Bagnet	791	14,363	40,601	18.2	51.3	2.8
Purse seine	470	9,779	232,587	20.8	494.9	23.8
Pole-and-line	81	1,949	6,521	24.1	80.5	3.3
Round Hand Seine	50	1,754	3,657	35.1	73.1	2.1
Muro Ami	37	1,793	26,475	48.5	715.5	14.5
Others	290	3,813	2,835	13.5	9.8	0.98

in the number of drive-in net fishing boats.

1-2-2 Outlook of Major Fisheries

Otter Trawl Fishing Industry

This fishing industry was introduced to the Philippines for the first time in 1909. It was not employed suspended actually for some time, as its operations had not proved successful in the initial years. It was in 1947 that the industry began to operate on a full scale. Due to the subsequent successes, 130 groups were in operation in 1950. The trawl nets come in two types -- mestiso and balloon. The otter trawl vessels come in four types -- the open dugout type, 2 to 3 tons, which is equipped with a 25 HP engine; the launch type, 30 to 40 feet, which is motorized; the sampan type, 10-30 tons; and the 30-80 ton type. The vessels of 20 to 100 tons in tonnage were greatest in number 1973, and the crew was 16.8 men per ship.

The fish hauls in the trawl fishing industry totaled 153,000 tons. Then classified by fish species, the hauls of slipmouths were greatest with 37,000 tons. They were followed by ribbon-finned nemipterids with 24,500 tons, mackerels (R. chrysozonus) with 18,300 tons, shrimps with 10,000 tons, croakers with 8,400 tons and lizard fishes with 7,000 tons. When classified by fishing grounds, the hauls in the Visayan Sea were greatest with 94,000 tons, accounting for about 60 percent of the Philippines' total fish hauls. The Visayan Sea was followed by the Manila Bay with 27,000 tons (18 percent) and San Miguel Bay with 11,000 tons (seven percent). The hauls in these three seas accounted for 84 percent of the Philippines' total hauls. Trawl fishing is also conducted in the Sulu Sea, Toyabas Bay, Samar Bay, Magilas Bay, Leyte Bay and Camotes Sea, but the hauls of each region ranged from 2,000 to 4,000 tons.

Purse Seining

The two-boat purse seining system was introduced to the Philippines in 1962, but the Philippine Government strived to introduce one-boat purse seining of the 24.4-meter type, which would be more efficient. In actuality, however, those converted from larger, second-hand Japanese purse seine

and trawl ships were put to use, with the result that the ships ranged from about 60 to 145 tons. The average tonnage stood at 145 tons.

Purse seining is conducted at night. Purse seine ships and transports, positioned at an interval of 800 to 1,600 meters, hang their underwater lamps at depths ranging from 5.5 to 10.0 meters, using their own generators, to attract fish. Watching the air bubbles which come from under the sea, the fishing masters judge whether fish have been attracted by the lamps. The purse seines used to catch sardines generally measure 400 to 550 meters in length and 65 to 85 meters in breadth, each purse seine consisting of wing, main body and bag, and each mesh normally measures 22 millimeters. For fish gathering purposes, what is locally known as "payaw," or the raft which is made of palm and other trees and from which palm leaves hang down is used to gather sardines, mackerels and others during the daytime, and purse seining is conducted with the lamps switched on in the neighborhood at night. This seining method is put to common use. In normal circumstances, the fishing vessels are put to sea for about one week.

The statistics available for 1973 reveal that the hauls in purse seining totaled 232,500 tons, of which big-bodied round scads accounted for 159,800 tons or about 69 percent. They were followed by sardines with 30,700 tons (13 percent), frigate mackerels with 7,900 tons (three percent), tunas with 6,200 tons (three percent), big-eyed scads with 6,500 tons (three percent) and short-bodied mackerels (R. chrysozonus) with 4,500 tons (two percent). The hauls of skipjack were very small with only 1,400 tons, or less than one percent of the total hauls in purse seining. When classified by fishing grounds, the hauls in purse seining were greatest in the Malampaya Sound with 25,900 tons. It was followed by the Sulu Sea with 62,700 tons, Visayan Sea with 60,700 tons and Mindoro Strait with 8,900 tons. The hauls in these four regions accounted for 89 percent of the total hauls in purse seining. By seasons, the hauls are great in March through September, although purse seining is done all the year. Of these months, purse seining comes to a peak in May through September. The big-bodied round scads the hauls of which are greatest consist mainly

of Decapterus russelli and Decapterus lajang. In the Sulu Sea, Decapterus russelli are predominant in winter and D. lajang in summer.

Basnig Net (Bagnet)

Basnig net fishing is one of the lift net fishing methods and conducted roughly in the following manner.

Fish is gathered during the day time with raftshaped "payaw" which has been described with respect to purse seine fishing. In its neighborhood at night, one 500 - 1000W underwater lamp and several bow lamps are switched on to attract sardines, anchovies, big bodied round scads and others. With the air bubbles coming up from under the sea, a full gathering of fishes is ascertained, all the lamps with the exception of the undersea lamp are immediately switched off and at the same time crew members position themselves on the edges of the outriggers which stretch overside. At a depth of 20 meters, they set a square net, each side measuring 20 meters, which shapes like "furoshiki" or a Japanese cloth wrapper, while positioning themselves at its four corners. When the net has been set, the undersea lamp which hangs down from either bow or stern of the vessel is gradually moved amidships. When there is no longer any doubt that fishes have gathered at the center of the net, the undersea lamp is raised. At it has come close to the water surface, the lamp is capped from above with a cylinder the inner part of which is painted in red. At the same time, the crew members who have been standing by at the four corners pull the ropes. When the edges of the net emerge out of the sea surface, the net will be closed tight and brought alongside the ship to catch the fish. This seining procedure is normally repeated two or three times a night. The spreading and drawing of the net at done only with manpower, and the crew is organized by 16 to 20 men. Each mesh measures 8 - 10 millimeters in the fishing catching section and 10 - 20 millimeters in other sections. During the daytime, the ship is berthed at Payaw and put to sea for two or three days or for one week at the longest. The fish haul is carried by the fishing boat at some time and transports at other times.

With respect to the fish hauls, the catches were extremely lean in

1973, as they were registered at 40,600 tons. In the average year, the catches run up to a total of 100,000 to 120,000 tons. Of all the fishes, the hauls of Engraulis spp., big-bodied round scads, sardines, were the largest, each accounting for 16 - 20 percent. They were followed by slipmouths (nine percent), frigate mackerels (six percent), squids (five percent) and short-bodied mackerels (R. chrysozonus) (five percent). By regions, this type of fishing is conducted all around the coasts of the Philippines. Above all, the Visayan Sea turned out to be the biggest fishing ground with about 50,000 tons and is followed by the Moro, San Miguel, Manila and Lamon Bays, each accounting for 3,000 to 3,500 tons. The fishing boats engaged in this type of fishing are relatively large in size. Their hulls are slim and supported by two outriggers. Their broadsides are low, and they are not so strong against waves. For the landing of fish, the fishing boats move to a region on the leeward of an islet to avoid a monsoon. In the northeasterly monsoon season, fishing is done on the east sides of the Sulu and Visayan Seas, whereas it is done on the west side of the Visayan Sea and along the west coast of the Pacific in the southwesterly monsoon.

1-3 Marketing and Foreign Trade

1-3-1 Marketing and Prices

There are 203 fish markets and 54 fish landing centers throughout the Philippines. The fish markets which make their appearance in the statistics of the Bureau of Fisheries total 119. Of them, the Navatas Fish Market north to the city of Manila is biggest, landing fish to the tune of 283,000 tons a year, or 61 percent of the Philippines' total fish hauls. Cadiz and Bacolod Ports on Negros Island land 29,000 and 26,000 tons, respectively. They are followed by the north harbor of the city of Manila with 26,000 tons and Iloilo Port on Panay Island with 18,000 tons. These five fishing ports account for 82 percent of the Philippines' total fish hauls. The main fishing landing ports other than these five ports include, among others, Camaligan, Mercedes and Pio Duran on Luzon Island, General Santos on Mindanao Island and Madridejos on Bohol Island, each landing

3,000 to 7,000 tons. Practically every fishing port other than those just listed land less than 1,000 tons each. On the basis of the statistics available for 1973, the relationship between the fishes landed at main fishing ports and the fishing grounds is shown in Table 11.

With the Philippines put under martial law, fish landing for markets must be conducted after 4 a.m. It appears to be a common practice to start fish landing at 5 - 6 a.m., whereas fish landing is begun at some places near midday. At Iloilo, fishing landing was started near midnight with a special approval from the government authorities. Incidentally, fishermen are able to conduct fishing operations at night upon approval by the government authorities, notwithstanding the martial law.

In general, the hauled fishes are sold to brokers, processors and general consumers by the shipowners and wholesale dealers who borrow parts of the market. In 1971, there were 98 fresh fish brokers, 146 salted and dried fish dealers and 84 other brokers.

In the Philippines, practically no fishing boats are equipped with freezing facilities. The fishes caught by purse seining and trawl ships are cooled with cracked ice and landed at fish markets, whereas those caught by small-sized fishing vessels are landed in most instances as they are. At the markets, therefore, these fish are treated as fresh fish. For shipment to inland areas, iced fish are trucked, with the consequence that it is difficult to retian their freshness and most of the fish for consumption are preserved with salt.

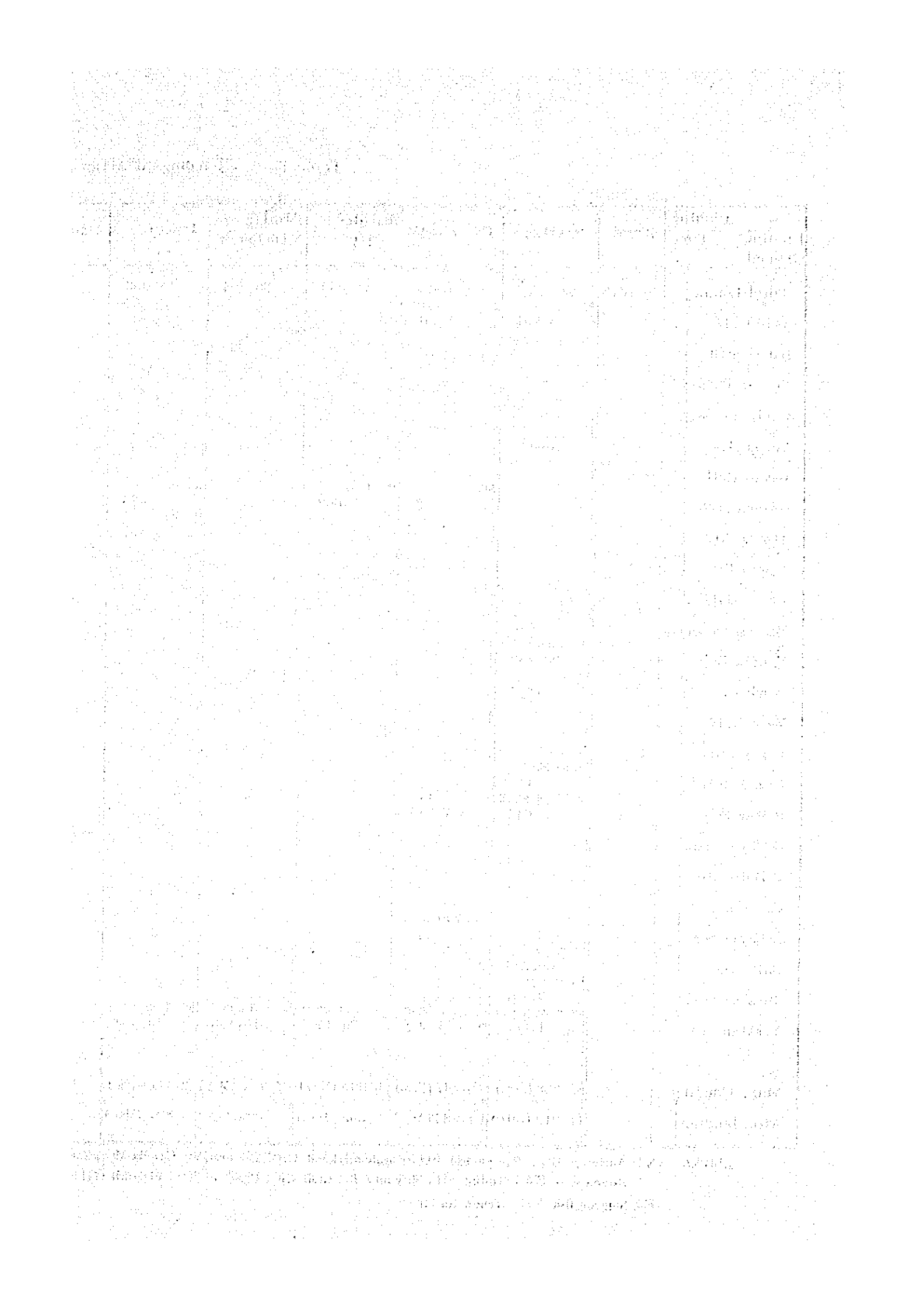
There are refrigeration houses and ice plants at 265 places, but they are extremely small in scale. These refrigeration houses are rarely used for dealing with fisheries products for domestic consumption. They are used for preservation of tunas, shrimps and other fisheries products for exportation. The operation rate of the refrigeration houses is only 30 - 40 percent. BFAR officials at the Navotas fish market said that consumers are of the belief that the iced fish are those which are preserved with ice because of the drop in their freshness, with the result that the response to the iced perishables is unfavorable and their purchases are extremely sluggish.

Table 11 Landings of Major Fishing Port by Fishing Grounds, 1973

Unit : tons

Fishing Ground \ Fishing Port	Total	Navotas	Cadiz City	Bacolod City	Manila North Harber	Iloilo	Camaligan	Mercedes	Gen Santos City	Pio Duran	Madridejos	Tacloban	Davao
Total landing	465,442	282,751	28,879	26,350	26,204	18,002							
Asid Gulf		RS 3,701	CK 351										
Babuyan Ch.					BO 430								
Burias Pass										MF BO 3,577			
Carigara Bay												AN SL 1,037	
Coron Bay		RS 3,596											
Davao Gulf													BO RS MF 2,128
Guimaras St.			SL 9	NE SL CV 862		AN SL 426							
Iloilo St.						MC SL 67							
Lamon Bay								AN SQ RS 3,148					
Leyte Gulf												SL CV SQ 1,667	
Malampaya Sound		RS SA CA 77,986			CA SF 7,783								
Manila Bay		MC NE SL 28,252											
Mindro St.		RS BO 8,884			GR NE PO 121								
Moro Gulf									SL RS BO YF 3,140				
Panay Gulf				SL NE 34		HE AN 14							
Ragay Gulf		SL RS NE SH 114											
Samar Sea		CR LF NE SA SL 840	HE SA RS BS 2,249									SQ SH FL 8	
S.Miguel Bay							CK SL SH 8,059	AN RS SQ 3,875					
S.Pedro Bay												CR NE SL 144	
Sarangani Bay									MF RS 996				NE 22
Sibuyan Sea			CK CV HT SL 772										CV CA 601
Sulu Sea		Rs SA YF 69,373			CA SF 6,975								
Tayabas Coast		RS NE MC 8,147											
Visayan Sea		RS NE MC SA SL 81,860	BS CK HT LF NE SL 25,390	BS CK LF SL SA 25,454	CA SF CV FL 10,896	BS SL RS NE 17,494					SA RS SL MC 3,459	MC SL SQ 117	
Max. Canding		32,308 (Sep.)	3,147 (Feb.)	5,297 (May)	4,714 (May)	2,411 (Aug.)							
Min. landing		11,210 (Nov.)	1,285 (Aug.)	565 (Mar.)	(Jan. Feb.)	821 (Mar.)							

Marks AN : Anchovy BS : Big-eye scad BO : Frigate mackerel CA : Caesio CV : Cavalla MC : Short-bodied Mackerel MF : Spanish Mackerel NE : Nemipterid PO : Snapper
RS : Round scad SA : Sardine SH : Shrymp CR : Crab CK : Croakers FL : Flat fish GR : Grouper HT : Hairtail HE : Herring LF : Lizand fish SL : Slipmouth SQ : Squid
SF : Surgeon fish YF : Yellow fin tuna



The fluctuations in the prices of main fish tabulated by the Navotas Fish Market every month are shown in Table 12. In the latest survey, the fish hauls classified by months and fish species could not be ascertained, so that no accurate statements cannot be made here. What could be stated in broad terms on the basis of this table is the fact that the price of every fish registered rises of 50 to nearly 100 percent in the months of January, February, October and November, 1973, when the fish hauls were not much. Because refrigeration houses and other preservation facilities are not fully replenished and because there is no other alternative but to dispose of landed fish in one way or another within the day of their landing, it might be said that the prices are knocked down in the season with big catches but soar in the season with small hauls. The various fish species may be divided into the expensive and cheap types with 150 pesos per 30 kilograms as the borderline. If those which come in the high price range could be called fish of the high grade, shrimps, Spanish mackerels, spotted cavallas, squids and caesios come in the category. If those whose prices are cheap may be called popular fish, lizard fishes, big-bodied round scads, slipmouths, hairtails and sardines come in this category.

A check of the price fluctuations indicates that there have been no big fluctuations in the prices of shrimps with the exception of those in January 1973 and that there are signs for a rise in their prices. The prices of squids are practically levelling off. With respect to other fish species, their prices are cheap in summer when there are big catches, whereas the prices go up in winter when there are not big hauls. The fluctuations in the prices of Spanish mackerels and milk fish take on an extremely similar pattern. Now taking the chub mackerels and short-bodied mackerels, they belong to the mackerel family and are of very close Kinship, yet their price fluctuations take on extremely different patterns. For example, chub are traded at prices some 80 Pesos higher per 30 kilograms in some instances, whereas short-bodied mackerels are sold at prices about 80 Pesos higher per 30 kilograms in others. A check of the price fluctuations in the year indicates, however, that there exists no seasonal synchronization.

Table 12 Average Wholesale Prices at Navotas Fish Market by Months

(1974)

(in Pesos and 30 kg)

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Caesio	191	192	169	147	145	149	156	172	155	187	211	215
Spotted cavalla	222	193	182	174	178	190	206	222	-	-	-	-
Grouper	219	215	182	187	187	208	179	211	240	185	-	-
Hairtail	126	106	94	89	91	93	76	88	63	98	113	119
Lizard fish	108	98	81	75	72	88	94	83	64	96	111	126
Short bodied mackerel (R. brachysomus)	192	167	122	113	127	155	97	163	164	171	202	198
Ribbon-finned nemipterid	175	167	146	143	133	151	113	148	116	7	165	147
Big-bodied round scad	153	128	102	75	83	97	180	130	103	150	170	169
Sardine	121	123	80	88	81	89	78	89	-	104	136	-
Shrimp (middle-sized)	461	308	283	350	336	359	400	365	363	390	409	407
Shrimp (large-sized)	654	597	559	554	469	421	475	524	-	-	-	-
Slipmouth	103	93	75	70	67	93	93	116	87	108	126	133
Squid	280	194	187	188	178	208	159	208	172	205	212	201
Spanish mackerel	260	204	186	189	180	206	158	238	193	248	274	305
Short-bodied mackerels (R. chrysozonus)	229	195	182	197	170	186	114	123	-	130	154	138
Milk fish	197	192	178	176	162	161	165	195	202	235	254	257

(1975)

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Caesio	245	202	177	200	204	193	151	169	171			
Spotted cavalla	-	-	-	-	189	266	-	-	-			
Grouper	-	-	-	-	267	192	-	-	-			
Hairtail	136	101	98	95	81	65	78	84	87			
Lizard fish	135	104	104	104	104	101	101	104	104			
Short bodied mackerel (R. brachysomus)	220	197	188	180	150	140	150	200	181			
Ribbon-finned nemipterid	170	148	164	158	165	157	149	164	170			
Big-bodied round scad	180	124	120	95	122	101	91	90	99			
Sardine	-	-	-	-	-	86	62	-	-			
Shrimp (middle-sized)	443	422	469	461	469	472	453	473	477			
Shrimp (large-sized)	-	-	-	-	-	-	-	-	-			
Slipmouth	142	113	113	111	114	106	97	90	97			
Squid	226	210	210	208	206	201	201	200	187			
Spanish mackerel	325	316	302	250	251	200	-	200	-			
Short bodied mackerel (R. chrysozonus)	151	119	176	175	175	159	166	186	181			
Milk fish	234	231	238	223	181	179	168	184	207			
Yellowfin	-	-	-	-	-	-	138	136	144			

1-3-2 Outlook of Nabotas Fish Market

The Nabotas Fish Market is outlined below:

The Nabotas Fish Market is situated at a point about 40 minutes north by car from downtown Manila and is the Philippines' largest fish market dealing with 283,000 tons of marine products a year. It turns out to be the strategic point for the supplying of marine products to Manila and its periphery. The fish landing facilities of this fish market, constructed on a filled-in land of the coast of the Manila Bay in 1971, consist of two roofed and concrete-floored cargo handling stations, a small ice plant and an office for BFAR. Each cargo handling station has a floor space of 4,800 square meters, which is divided into 6.93 x 2.3m. blocks, and each block is on loan to consignees at 500 Pesos.

As the sea is shallow for some distance from the coast of the fish landing place, fishing boats stop one to two kilometers off the coast, and the fish brought in by them are put into cylindrical metal containers (shaping like whashihand-basins), each with a capacity of 30 kilograms, and moved to the fish market by amphibious vehicles known as "Amphibias." The fish lined up on the floor of the cargo handling station are sold by auction to consignees. The auction is conducted with countersigns.

Of the main fish species landed at this fish market, big-bodied round scad is greatest in amount with 155,000 tons, which is followed by sardine with 29,000 tons, chub mackerel with 20,000 tons, ribbon-finned nemipterid with 18,000 tons, slipmouth with 17,000 tons, bonito with 16,000 tons, shrimps with 5,000 tons, yellowfin with 6,000 tons, swordfish with 4,000 tons, caesio with 4,000 tons and butterfly fish with 4,000 tons. By sea regions, most of the fish traded at the fish market come from three sea regions -- the Visayan Sea (82,000 tons), Malambaya Sound (178,000 tons) and Sulu Sea (69,000 tons). They are followed by the Manila Bay (28,000 tons), Mindanao Strait (9,000 tons), Tayabas Strait (8,000 tons) Coron Bay (4,000 tons) and Asid Gulf (4,000 tons).

A check of the interrelations between these fish species and fishing grounds reveals that the hauls of big-bodied round scad are great in the Malambaya Sound with 62,000 tons, which is followed by the Sulu Sea with

43,000 tons, Visayan Sea with 31,000 tons and Mindanao Strait with 8,000 tons. Sardine is caught to the tune of 16,000 tons in the Sulu Sea and this amount accounts for about 56 percent. It is followed by the Malampaya Sound with 7,000 tons and the Visayan Sea with 6,000 tons, suggesting that practically every haul of sardines comes from these three sea regions. With respect to ribbon-finned nemipterids, 9,000 tons come from the Visayan Sea, 6,000 tons from the Manila Bay, 1,000 tons from the Sulu sea and 1,000 tons from the Tayabas Strait. Chub mackerels are hauled in the Visayan Sea, Manila Bay, Sulu Sea and Tayabes Strait practically at the same rates as ribbon-finned nemipterids. Practically every haul of slipmouths comes from the Visayan Sea and Manila Bay.

1-3-3 Processing and Foreign Trade

The typical examples of the processed marine products in the Philippines are salted, dried and smoked sardines, anchovies, shrimps and slipmouths, and they are produced on a scale of cottage industry in many instances.

Of the foods preserved with salt, those which are put to frequent use are Bagoong, the salted guts of anchovies and other tiny fishes; Patis, a fish sauce; and fish paste. There were 132 registered Bagoong production plants and 82 registered Patis production plants in 1971. The production process of Bagoong is the same as that of Patis. First, anchovies, slipmouths and other small fishes are cleaned with fresh water to remove foreign objects. Salt is sprayed over them at a rate of one part of salt to three parts of fish or two parts of salt to seven parts of fish. Then, the salted fishes are preserved for two weeks to one year. The temperature will be kept at 45°C in the first week and 37°C in the second week. After this process, they will be kept at the room temperature for more than six months. When the fishes have been preserved for six months to one year, they are fermented, producing the kind of supernatant fluid which is fragrant and looks like soy sauce. The fish sauce known as Patis is produced by isolating and filtering this supernatant fluid. Incidentally, this liquid contains nine to 10 percent of protein. Bagoong is produced by

crushing with a meat grinder the grounds squeezed from Patis. Bagoong and Patis are sold in bottles or cans.

The production method of fish paste is practically the same as that of Bagoong. After the heads and intestines have been removed, salt is added to the fishes at a rate of one part of salt to 2.5 to three parts of fish. For their preservation, weights are put on the fishes. After three or four months of preservation, the fishes are taken out and washed with dense salt water and their skin and bones are removed before their meat is minced with meat grinders. In the case of seabed and other less fatty fishes, high-quality salad oil is added at a rate of two ounces of oil to one pound of fish meat.

As regards to the dried fishes, sardines, anchovies and other tiny fishes are dried in the shade. In the case of fairly large fishes, both sides of meat are separated and then kept in 10 percent salt water for about half an hour. After the blood has been removed, the slices of meat are evenly salted at a rate of one part of salt to three or four parts of fish meat and then preserved in basket-like containers for about two days (one-and-a-half days for relatively small fishes). Next, Salt is sprayed over the fishes, while they are put into another container one after another, and preserved for about one week (one-and-a-half days for relatively small fishes). Then they are taken out of the containers, and the blood and foreign objects are washed away with clean salt water, before they are dried in the sun. On the first day, they are dried in the sun all day. From the second day on, they are dried for three to six hours a day. On the last day, they are once again dried in the sun all day. To accelerate their drying, a weight is sometimes put on the dried fishes that have been piled up. The drying period is three for middle-sized fishes and 10 days for large-sized ones.

There are 48 plants for smoked products in the Philippines. After fully rinsed fishes have been preserved in salt water for one to four hours (a full day for large-sized fishes), they are placed on wirenetted crates for drying. After the fire in the kilns has been fully made up, the sawdust of lauan is sprayed over the fire to emit smoke, and the crates of the dried fishes are put over the smoke.

There are 22 canning plants in the Philippines. Canned mackerel and fruit are produced, but many of the plants are small in scale. In the Philippines, the canning industry has not made much progress, as the can production cost is high and the price competition with foreign products is intense. For this reason, the Philippine Government began to control the imports of cannned mackerel to protect the domestic canning industry.

Foreign Trade

The foreign trade of marine products is shown in Table 13. The exports have been increasing at a steady pace year after year. They totaled 18,000 tons (125,480,000 Pesos) in 1973, up 68 percent in quantity and 78 percent in value over the previous year. On the other hand, the imports amounted to 41,000 tons (135,600,000 Pesos) in 1973, down 36 percent in quantity and 46 percent in value from the previous year. Although the difference between exports and imports were narrowed in 1973, the imports still remained exceeding the exports.

As regards the exports, frozen tunas and shrimps are greatest in terms of quantity with 8,500 and 3,100 tons, respectively. These two species account for nearly 90 percent of the exports. Others include processed sea food and shell fishes. In value, the tunas earned 3,120,000 Pesos and the shrimps 60,830,000 Pesos, the shrimps account for about half of the total export values. A check of the countries to which the Philippines' marine products are diverted reveals that 76 percent is shipped to the United States and 17 percent to Japan. Eighteen percent of the shrimp exports go to Japan and slightly less than 16 percent to the United States. A check of the export growth in the last five years indicates that the exports are 14.5 times as much as in 1969 in terms of value. By types of sea food, the exports of frozen sea food registered an epochal rise of 27 times. Of them, the exports of frozen shrimps increased by 26.5 times and those of frozen tunas by 23 times. The processed sea foods consist mainly of Patis and salt-preserved sea food, but the rise in their exports was relatively low, as they registered an increase of eight times. The exports of frozen marine products have registered such an epoch-making increase, as they have been sustained by strong demands from

Table 13 Foreign Trade of Marine Products

Exports

(in tons and 1,000 Pesos)

	1969		1970		1971		1972		1973	
	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value
Total	2,841	8,648	3,404	17,986	7,300	40,053	10,746	70,527	18,053	125,484
Fresh and frozen	1,165	3,792	1,589	11,091	4,473	31,067	8,068	57,818	13,322	102,067
Tunas	841	1,287	820	2,519	2,770	8,719	5,161	17,737	8,545	30,120
Shrimps	244	2,295	574	7,951	1,472	20,768	2,227	36,978	3,143	60,830
Processed	259	509	279	719	471	1,491	609	2,486	603	4,180
Seaweeds	428	478	318	527	340	676	484	1,414	1,433	4,062
Shell fish	842	2,948	990	4,274	1,747	4,384	1,095	4,564	1,862	6,850

Imports

	1969		1970		1971		1972		1973	
	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value
Total	71,034	77,748	62,746	108,119	68,883	142,847	64,202	143,131	41,204	135,597
Canned	58,267	71,190	52,987	98,716	58,743	132,620	52,596	130,918	39,879	132,917
Fresh	38	107	7	45	2	20	1	16	1	11
Meal	12,423	5,976	9,614	9,105	10,134	10,142	11,602	12,141	1,322	2,634
Processed	306	275	137	264	5	65	2	55	3	37

foreign countries and aggressive measures to encourage exports have been instituted to assure an adequate reserve of foreign currency.

The imports in 1973 totaled 41,000 tons in quantity and 135,600,000 Pesos in value. The imports began to drop from 1971 in quantity and 1972 in value. Canned foods account for the majority of the imports, amounting to 40,000 tons in quantity and 132,920,000 Pesos. This amount accounts for 98 percent of the total import values of marine products. Of the canned foods, canned mackerel accounts for three fourths, most of it being diverted to Japan. Canned mackerel is followed by canned sardine, the imports of which amount to 26,550,000 Pesos, or about 20 percent of the total import values. They are diverted to Morroco and Japan. A check of the import fluctuations in the past five years reveals that the imports of canned sea food had levelled off (52,000 to 58,000 tons) until 1972 in terms of quantity. There had also been signs for a slight rise in terms of value, but the imports drastically dropped to about 40,000 tons (1,355,900 Pesos) in 1973. The drop may be attributed to the high tariffs on imports and the import control necessiated by a shortage of foreign currency. In addition to the imports of canned marine products, those of fresh and processed sea food and fish meal also registered sharp drops. Particularly in 1973, the imports of fish meal dropped to 1,000 tons, or one-tenth of the quantity imported in the previous year.

1-4 Fisheries Administration and Policy

1-4-1 Administrative Structure

The fisheries in the Philippines are administered by the Bureau of Fisheries and Aquatic Resources of the Department of Natural Resources. With the Bureau of Fisheries and Aquatic Resources as the core of fisheries administration, the local districts are classified into regions and each region is placed under the jurisdiction of a BFAR branch office. As indicated in Fig. 9, the Bureau of Fisheries and Aquatic Resources has six divisions of Administration Fisheries Research, Fish Propagation, License and Protection, Technological Services, and Fishery Economic and Information under its Director, and also the Planning and Management

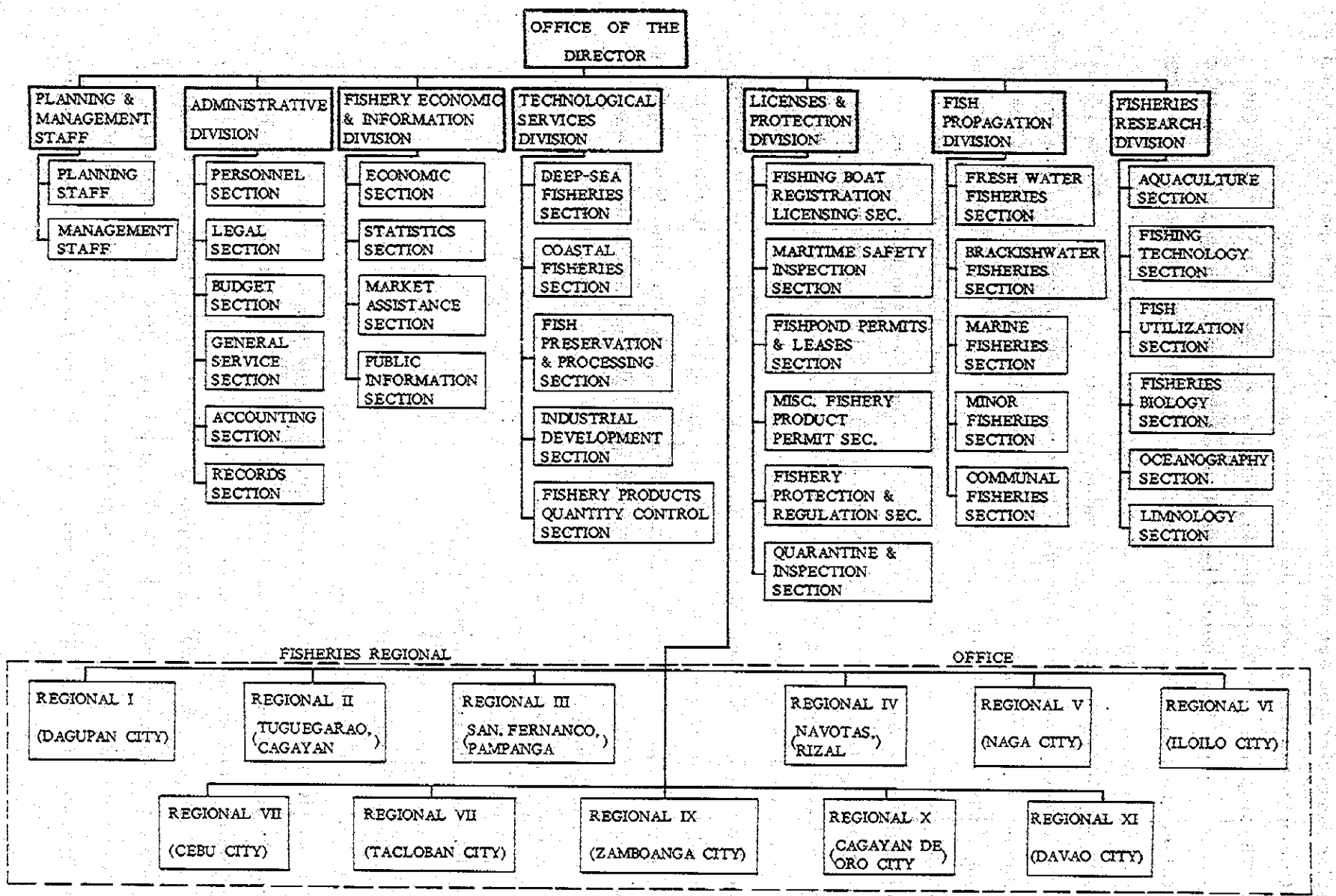


Fig. 9 BFAR's Organizational Chart

Staff under his direct control. Thirty-two sections and two staffs are placed under their umbrella. The administrative regions are demarcated as shown in Fig. 10.

The Bureau of Fisheries and Aquatic Resources has jurisdiction over, and is responsible for, the management, protection, exploitation, utilization and disposal of marine resources in all water regions other than the municipal water regions which are placed under the jurisdiction of local governments or municipal assemblies (the sea region hemmed in by the line drawn three miles offshore in parallel with the coastline at the low tide and the inland waters placed under the management of local governments). With an approval of the Marine Product Industry Development Council, the Bureau of Fisheries and Aquatic Resources prepares and implements plans for the development of the marine product industry.

The Marine Product Industry Development Council is established to formulate integrated administrative guidelines for the management, protection and utilization of aquatic resources in the Philippines and also for the creation of an environment necessary for financing the development of marine product industry. With the Secretary of Natural Resources acting as Chairman, the Marine Product Industry Development Council is organized by the Secretary of Agriculture, Secretary of National Defense, Secretary of Industry, Secretary of Public Works, Transportation and Communication, President of the Philippine Central Bank, President of the Philippine Development Bank, Chairman of the Investment Council, Director of the Bureau of Fisheries and Aquatic Resources, and representatives of the inland water and oceanic fisheries organizations. The Executive Board of the Marine Product Industry Development Council meets twice a month and passes votes for necessary regulations, etc.

The municipal waters are managed by local governments or municipal assemblies in accordance with the ordinances approved by the Secretary of Natural Resources. One of the main lines of duty of the local governments is to select and license the qualified persons from those who intend to engage in fisheries using fishing boats of less than three tons in gross tonnage or in fisheries without any fishing boats, those who intend to con-

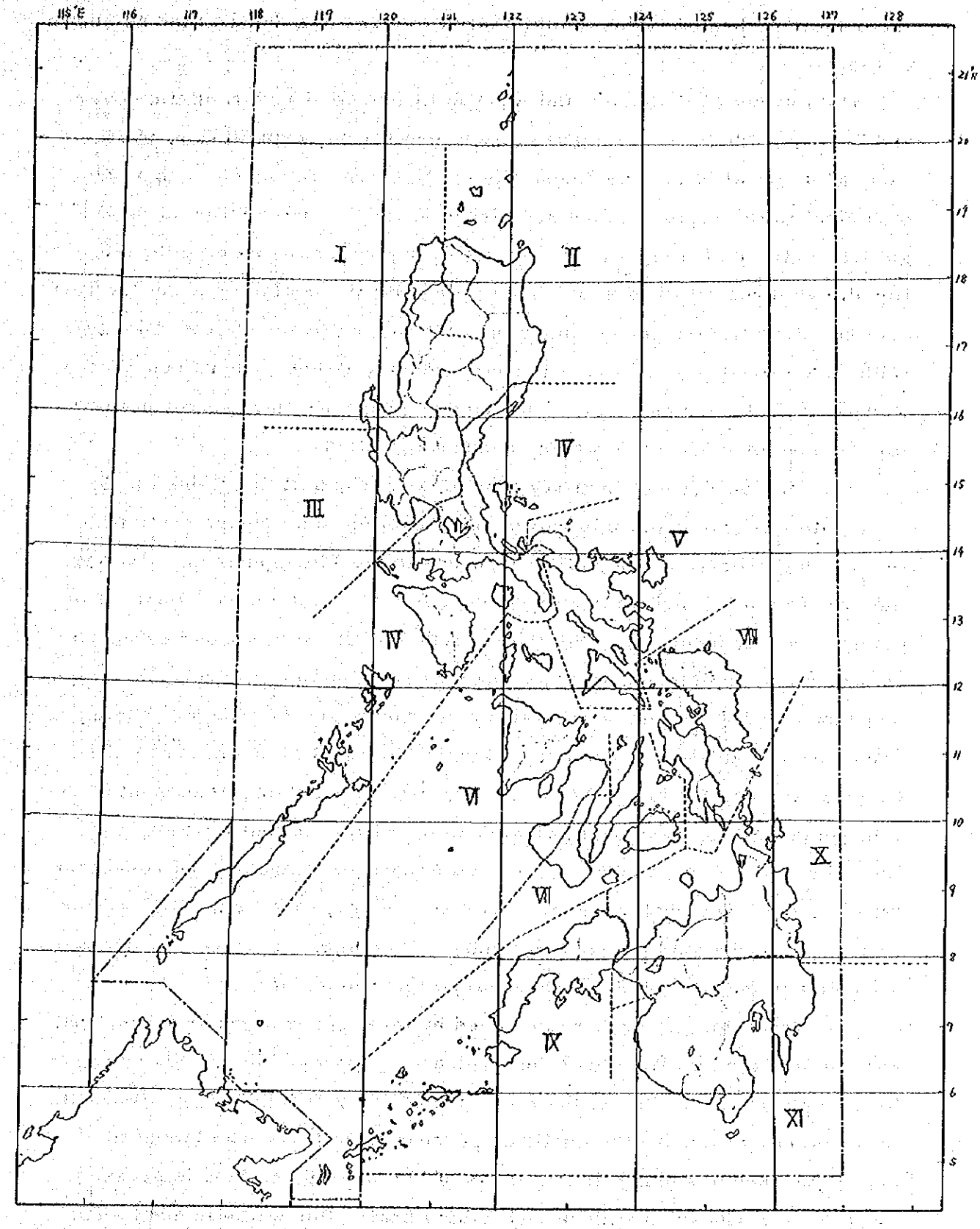


Fig. 10 Regional Offices of Bureau of Fisheries and Aquatic Resources and Areas of Jurisdiction

struct and manage oyster nurseries, and those who intend to catch bangos (milk fish) and other fry in accordance with the procedure set forth by the Bureau of Fisheries and Aquatic Resources. Another is to file reports with the Bureau of Fisheries and Aquatic Resources on the data gathered with respect to the fisheries.

1-4-2 Fisheries Policy

The President of the Philippines amended and consolidated the laws which had been in existence for the fisheries industry and issued the 1975 Aquatic Product Industry Decree on May 16, 1975.

The 1975 Aquatic Product Industry Decree is made up of a preamble and seven chapters. The decree is outlined below:

Chapter 1 sets forth the policy of expediting and stepping up an integrated development of the aquatic marine product industry in the Philippines and sustaining it in a reasonable state of productivity through appropriate preservation of aquatic resources. At the same time, it also defines the legal terms used in the Decree.

Chapter 2 concerns the Bureau of Fisheries and Aquatic Resources and provides the scope of its jurisdiction and duties of the Bureau. According to this chapter, the Bureau of Fisheries and Aquatic Resources, in addition to the duties described in the preseding paragraph, provides assistance and formulates training programs for the development of the aquatic product industry. It also offers assistance in conjunction with the research and educational activities of aquatic product industry training institutes, conducts researches and surveys on fish species and aquatic products, licenses commercial fishing boats, and designates fish landing places.

Chapter 3 stipulates the organization of the Aquatic Product Industry Development Council and the roles of the departments and other government agencies which take part in the Aquatic Product Industry Development Council.

Chapter 4 concerned with the utilization and exploitation of aquatic resources, and stipulates that no persons shall be allowed to engage in fishing operations without a license or approval of the central or local

government and also that the persons who are engaged in commercial fisheries with an approval of the Bureau of Fisheries and Aquatic Resorces are prohibited from operating in any sea region of a depth less than seven fathoms. The Chapter obligates the Philippine Coast Guards to inspect ships for security reason, set forth the qualifications of navigators and other ship officer, and formulate standards for medical care facilities. It also contains provisions for a ban on the exportation and importation of unauthorized aquatic products and also for the scope of authority invested on local governments and other institutions.

As qualified persons for licenses for operation in commercial fisheries are listed the Philippine citizens and legitimately registered organizations or businesses. More than 60 percent of capital of these organizations or businesses must be owned by the Philippine citizens. The persons engaged in commercial fisheries, including the licensed businesses, may conclude assistance contracts with foreigners or alien businesses upon approval from the Secretary of Natural Resources.

These provided contracts must conform to the guidelines set forth by the Aquatic Industry Development Council, and the contract fees must be paid in the form of fishes or aquatic export products. To promote the rearing industry and, at the same time, for effective use of the public plots they are leased to individuals or businesses who are going to construct culture ponds, over a period of 25 years. This period may be extended for an additional period of 25 years.

Chapter 5 stipulates that the Government or its related agencies may designate waters for its exclusive use.

Chapter 6 contains provisions for illegal fishing operations and disposal of illegally hauled fishes and illegal aquatic products. This Chapter also prohibits the use of explosives, toxicants and electricity in fishing operations and places a ban on the use of fishing nets whose meshes are smaller than those stipulated under the provisions of Article 7. Penal clauses are contained in this Chapter for such violations.

Chapter 7 contains miscellaneous provisions.
For example, it , provides for the establishment of a Fisheries Loan

Credit Fund, which will be controlled by the Philippine Central Bank to advance funds to persons engaged in commercial fisheries for the development of the aquatic product industry. It also contains provisions for the exemption of persons engaged in commercial fisheries from application of the Blue Sunday Act and the Eight-hour Work Act.

2. Outline on Skipjack Resources and Bait Fish

2-1 Skipjack Resources

There are not a few reports which indicate that there is much room left for further exploitation of tunas or, more particularly, skipjack in the Philippine seas. But, in reality large-scale fisheries oriented toward the fishing of tunas and skipjack are not present. Thus, it seems that some of these reports contain estimates assumed from the actual records of the skipjack hauled in other seas or their exploitability.

2-1-1 History of Development of Skipjack Fishing in Philippines

The history of the fishing of skipjack and tunas in the Philippine seas is relatively new. No modern tuna and skipjack fisheries industry had existed in the Philippines before 1935 (Warfel, 1950). Domantay (1940) gave a full account of the activities of Sea Foods Corporation established with Japanese capital in Zamboanga in 1935. He reported that this corporation had four skipjack pole-and-line fishing boats, 24 to 40 tons, and a cannery, turning out 200 to 300 cases of canned food in terms of 21 pounds per case every month from 1937 to 1939. The output was reported as reaching a total of 400 cases during World War II. The fishing boats, machinery and methods were unexceptionally of the Japanese type, and practically every crew was made up of Japanese seamen, for whom a limited number of Filipino fishermen worked. The fishing grounds included the Sulu Sea, Moro Gulf and Celebes Sea, and the main fishes caught in these regions were skipjack and yellowfin. In 1938, the hauls of yellowfins totaled about 250 tons and those of skipjack ran up to a total of 1,050 tons. The brisk fishing sea extends from April through June, the hauls reaching the highest peak in May. The catches remained slack from July to November (Table 14).

Table 14 Catch of Tunas

Unit : tons

	1969	1970	1971	1972	1973
Total	368,726	381,877	382,275	424,754	465,441
Yellow fin tuna	2,522	1,685	3,774	1,855	6,864
Skipjack	2,316	122	225	130	1,462
Blue bonito	12,391	7,247	4,245	7,252	11,071
Frigate Mackerel	—	—	—	—	3,200

Source : Fisheries Statistics of the Philippines, 1973

A small-scale skipjack fisheries industry made its appearance in Davao in 1936. This firm produced dried skipjack and supplied fresh fish to many Japanese residents there (reportedly about 20,000) (Martin, 1938). The skipjack fisheries industry of a similar scale also made its debut at Apari and Bangui in the northern part of Luzon Island in the latter half of the 1930's. The skipjack fishing operations sustained with Japanese capital came to an end in the last days of World War II and have never been restored.

Martin also reported that the Philippine Packing Corporation established with American capital conducted the experimental seining and pole-and-line fishing of skipjack and tunas in the sea region extending from the south of the Philippines to the Pacific Ocean for about two years from 1934. Based on his interviews with surviving fishermen, Warfel (1950) reported that the seining did not prove successful and that only 265 tons were hauled in the pole-and-line fishing in the two years. Particularly, difficulties were encountered in securing to live baits for the pole-and-line fishing operations.

Immediately after World War II, the U.S. Government dispatched the Spencer F. Baird and two other ships to these sea regions for an oceanic and aquatic survey. The Spencer F. Baird was concentratedly engaged in pole-and-line fishing experiments. As live baits could not be adequately

secured, however, the results were not favorable (Warfel, ibid.).

Under the South China Sea Fisheries Development and Coordinating Program, the Food and Agriculture Organization (FAO), chartering two seining vessels of Canadian registry, has been conducting a large-scale exploitation survey since 1974. The ships are the 112.5-foot Southward Ho and the 96-foot Royal Venture. Equipped with fish finders, radar and sonar equipment, and large-sized seining gear, they are ships of the latest type. The two vessels conducted experimental fishing operations during their four navigations in Sulu Sea, Celebes Sea and Moro Gulf until May 1975. In the first (December 1 through 13, 1974) and second (January 5 through February 3, 1975) navigations, no worthwhile hauls were recorded either in the Sulu Sea or the Celebes Sea (Peterson et al., 1975). In the third navigation (February 9 through March 26), the favorable hauls of 8.5 tons (6.8 percent) of yellowfin tuna, 84 tons (67.2 percent) of skipjack, and 32 tons (26.0 percent) of bonitos and frigate mackerels were recorded mainly in the Moro Gulf (the figures qouted here represent the total hauls of both ships). In the fourth navigation (April 9 through May 24), 69 tons (24.4 percent) of yellowfin tuna, 81 tons (63.8 percent) of skipjack, and 30 tons (10.8 percent) of frigate mackerels were hauled in the Moro Gulf and the Sulu Sea. Particularly, when favorable conditions lasted for two weeks during the period, 25 fishing operations were conducted with as much yield as 294 tons (11.8 tons per operation). The skipjack hauled in these fishing operations were large in size, weighing 5.1 kilograms on the average (Rosenberg et al., 1975). In every navigation, many dispersed small schools were observed in each navigation during the daytime, but it was reported that the schools were too small for seining and that the fishes had dived deep and escaped through the net before the net bottom was tightened up. For this reason, the schools of fish which were swimming near floating logs and rafts were gathered with lamps at night and seined before the sunrise.

2-1-2 Present Status of skipjack and Tuan Fisheries in Philippines

The hauls of skipjack and tunas are reproduced in Table 14 from the 1973 edition of the Philippines' fisheries statistics (Bureau of Fisheries and Aquatic Resources, Fisheries Statistics of the Philippines). Sortages of the Philippines' fisheries statistics have been pointed out in the past (e.g., Kume, 1973), and the statistics contain incomprehensible factors, such as the fact that no reference whatsoever had been made to the hauls of skipjack before 1972. The hauls shown in the statistics are only those hauled by the fishing boats of 3.0 tons and over (which fall under the category of commercial fisheries in the statistics), and the statistics do not contain data on the yellowfin tuna and other fishes angled by smaller fishing boats in considerably great quantities. On the basis of this table, it might roughly be said that skipjack and tunas are relatively small in the total hauls of the Philippines' aquatic product industry and that there are markedly big yearly fluctuations in the hauls of yellowfin tuna and skipjack. In 1973, yellowfin tuna and skipjack accounted for only 1.5 percent and 0.3 percent, respectively, of the total hauls. With respect to the fishing grounds, 3,768 tons of yellowfin tuna came from the northern part of the Sulu Sea, which was followed by the Visayan Sea with 1,395 tons, and the remainder was hauled in a large number of fishing grounds, each with small quantities. In the hauls of skipjack, the Visayan Sea came on top of the list with 1,084 tons and was followed by the Moro Gulf with 283 tons. As in the case of yellowfin, the remainder was hauled in many fishing grounds, each with small quantities.

As classified by fishing methods, practically all yellowfin tuna and skipjack were seined (with purse seines). The pole-and-line fisheries, as far as we came to know in our latest survey, are limited to those conducted experimentally the Pure Food Co., a cannery in Manila and in a small scale by the Oceanic Fisheries (Philippine) Inc., a joint Philippine-Japanese undertaking, with its base at Iloilo.

2-1-3 Skipjack Resources in Philippine Seas and Their Exploitability

The skipjack are highly migratory, so that there is a need to have a broad perspective when one argues about the skipjack resources. The

resources of large-sized tunas are levelling off in the entire part of the Pacific Ocean, and no increase in the hauls expectable. But, with respect to the skipjack, it is reported that there still remains room for their exploitation. Nevertheless, the hauls of skipjack in the seas off the Philippines are smaller than expected, and there is a need to study the reason.

The fishing boat fisheries conducted in the seas off the Philippines consist mainly of offshore fisheries with small fishing vessels, as far as we know from the statistics available from the Bureau of Fisheries and Aquatic Resources. Most of the 756 fishing vessels exceeding 50 tons are trawl and seining ships.

As reported in the findings of the several surveys (ibid.) conducted by the Food and Agriculture Organization (FAO), on the other hand, the skipjack in the seas off the Philippines, are often dispersed in small schools and move too fast to be caught with seines. In the FAO surveys, therefore, a special device was worked out whereby the groups swimming close to floating logs are seined at dawn. In the Philippines, the raft which is locally known as Payaw is used in the same way as the Japanese raft for dorados. The method of seining the yellowfin tuna and skipjack gathering at the Payaw rafts seems to be put to considerably widespread use. The fisheries statistics indicate that a greater portion of the yellowfin tune and skipjack were hauled in the seas off the Philippines with seines, but they do not indicate the amount of the fishes caught with Payaw rafts.

The seining fisheries for yellowfin tuna and skipjack prove successful in the Pacific Ocean off the east coasts of the Philippines islands, and the background for this success consists of the existence of a shallow spring layer and schools of porpoises. Few schools of porpoises were observed in the Philippine seas according to FAO's extensive surveys, and it is hardly inconceivable that there exist shallow spring layers in the seas situated at low latitudes. When this fact and the ecological features of the schools of skipjack in these seas are taken into account, we are inclined to think that pole-and-line fishing would be preferable to seining for the hauling of skipjack at least in the Philippine seas.

When it is taken into consideration that many schools of skipjack,

although small in size, are extensively observed and that skipjack can actually be hauled in considerably great quantities with specially devised seines, it seems that the fact that the hauls of skipjack in the seas off the Philippines are small in quantity suggests the less development of skipjack fisheries, and not vice verse. As has been described earlier, no large-sized fishing vessels are available on these seas for offshore skipjack. When consideration is given to the facts that the several navigation surveys conducted by the Food and Agriculture Organization (FAO) produced favorable results and that the Japanese type of fishing of skipjack were conducted off the south coast of Mindanao Island before World War II, we would rather be inclined to conclude that there still is room for the exploitability of skipjack in the seas off the Philippines and pole-and-line fishing is preferable for their exploitation.

When pole-and-line fishing is to be introduced to these sea regions, the question does not lie in the availability of skipjack but in the difficulties encountered in securing live baits.

2-2 Bait Fish

To put the pole-and-line fishing of skipjack on the right track, the abundance and availability of skipjack as well as the adequate local procurability of bait fish turn out to be determinants. When an actual survey is to be conducted, there will be a need to conduct a full study on the fish species which are usable as bait fish in the seas off the Philippines and their quantities as resources (or the actual hauls). In the following, an attempt will be made to describe bait fish in detail on the basis of the results of the latest preliminary survey and also the existing data and research reports.

2-2-1 Conditions Necessary for Bait Fish

Brock and Tanaka (1955) specified various conditions necessary for the fishes which would be used as baits in the pole-and-line fishing of skipjack. In the following, some of the conditions are cited:

a. Exist in massive quantities.

b. Available. It is more desirable to catch bait fish in commonly used

fishing methods, such as with fish lamp-using lift nets, rather than in special fishing methods, such as with drive-in nets.

c. The following conditions have to be satisfied with respect to the configuration.

c-1 The size must be appropriate. In the spraying of baits, the number of fish is more important than the gross weight. If the bait fish is large in size, there will be a limit to the number of fish which may be stocked. As a general yardstick, it might be said that the sizes ranging from four to 10 cm are appropriate.

c-2 The bodies must be in loud silver white color.

c-3 There should be no thorny shrubs and other objects inconvenient to their treatment.

d. When baits have been scattered about, the skipjack must follow the fishing boat in schools, instead of diving deep.

e. The baits must be strong enough to resist shocks at the time of their catch and also survive stocking and transportation.

Of those fish species which satisfy the aforementioned conditions and serve as live baits in the pole-and-line fishing of skipjack, those whose distribution extends over the low-altitude seas of the Pacific Ocean are anchovies, herrings and sardines, sprats, silversides, mackerels, scads and round scads, and caesios. Also conceivable as live baits are mullets, goatfishes and cardinal fishes.

2-2-2 Distribution and Quantities of Fish Species Conceivably Suitable as Baits in Philippine Seas

To know the quantities of the aforementioned fish species in the seas off the Philippines in offshore fisheries, the hauls as classified by types of fishes and fisheries are extracted in Table 15 from the Fisheries Statistics of the Philippines, BFAR, 1973. As these statistics do not indicate the hauls as classified by types of fishes, there is no way of knowing in detail about the types, but we are able to know that the fish species which are considered suitable as live baits are caught in large quantities by the coastal fisheries of the Philippines. The fish hauls indicated in the stati-

stics are those of fishing boats of 3.0 tons and over and consequently do not include those of the municipal fisheries in which smaller fishing boats and stationary nets are used. The various fish species referred to here are unexceptionally small coastal fishes. In the municipal fisheries whose hauls are not included in the statistics, fishing operations are unexceptionally conducted immediately off the seacoast, and their total fish hauls are estimated at being about 1.4 times those of fishing boats of 3.0 tons and over. From the foregoing, it might be safely said that the fish species fitted as live baits, as argued here, are not only caught in the seas off the Philippines in large quantities but also constitute greater portion of the total fish haul of these seas. In the latest survey, the fishes landed at the

Table 15 Hauls of Main Bait Fishes by Fishing Method, 1973

(in metric tons)

	Bagnet	Beach seine	Muro ami	Purse seine	Round haul seine
Total (A)	40,600	1,627	26,475	232,587	3,656
Anchovy	8,368	838	-	517	542
Herring	1,107	21	-	2,589	122
Sardine	6,881	237	-	30,684	594
Silver side	222	-	-	-	-
Round scad	7,727	46	-	159,823	1,126
Big-eyed scad	774	19	-	6,456	150
Chub mackerel	1,900	12	-	5,472	210
Caesio	-	-	18,593	-	-
Total (B)	26,979	1,173	18,593	205,541	2,744
B/A (%)	66.5	62.1	70.2	88.4	75.1

Source: Fisheries Statistics of the Philippines, 1973

Navotas Fish Market on the outskirts of the city of Manila and those in Davao, Tacloban and Iloilo were checked, and we were under the impression that they are mostly from the costal fisheries in terms of fish species composition and quantity.

As has been described earlier, the Fisheries Statistics do not indicate hauls in terms of fish types. For statistics' sake, similar fishes are grouped (which does not correspond to the taxological family), and a maximum of 72 groups, including "miscellaneous fishes," are cited in the statistics. Consequently, it would be impossible to argue what types of fishes are fitted as live baits on the basis of the statistics and where their distribution and quantities stand, and there is no alternative but to depend on individual research reports to secure information. In the following, an attempt will be made to sort out for each fish group the findings which will be of use in the forthcoming full survey on the basis of the data that have been gathered.

Anchovy: The anchovies (Engraulis japonicus) which are exclusively used as live baits in Japan do not inhabit this sea region (Herre, 1950). The fishes of this family which are usable as live baits in this sea region consist mainly of Stolephorus. Tiews and Ronquillo (1970) reported that eight species, including a new species yet to be registered, are distributed in the Philippines and that these species except one are widely distributed in this sea region. Mr. Sugiyama of the Oceanic Fisheries (Philippine Inc.), which is headquartered in Iloilo and was conducting experimental pole-and-line fishing of skipjack mainly in the Sulu Sea at the time of the latest survey, reported that at least three species -- Dilis putch, Dilis bulino and Dilis bahora -- where distinguished from this species for use. The interviews with others engaged in fisheries and officials of fish markets revealed that what is called Dilis puteh does not represent a specific species but seems to be the general appelation of alveins of the Stolephorus species (known as Shirasu or Kaeri in the Japanese language). The other two species -- D. bulinao and D. bahora -- seem to correspond to Stolephorus indicus and S. commersoni, but we could not ascertain them with samples. Later, the samples brought back from the Iloilo and Tacloban

fish markets were surveyed and these two species were ascertained. In the same species, they were quantitatively predominant.

Round herring: In the observations conducted at fish markets, round herrings (Dussumieria hasselti) was predominant. From the Philippines, D. acuta, another species of the same family, was reported (Herre, 1953), but whitehead argued that these two are one and the same species with different appellations. The two species of Spratelloids delicatulus and S. gracili (= S. japonicus) were not observed in large quantities at fish markets contrary to our expectation. The observations at the fish markets must probably be of underestimate, because they are consumed in large quantities as fish sause (Patis) or a kind of salted fish guts (Bagoong) but not as fresh fish.

Herrings and sardines: Sardinella spp. of this family are classified into herrings and sardines in the fisheries statistics of the Bureau of Fisheries and Aquatic Resources, but the ground for this classification is not clear. Of this species, it seems that those with large body heights are called sardines and those with small body heights are known as herrings. Roxas (1934) documented 16 species of this family in the Philippines sea, whereas Herre (1950) listed 11 species. Manacop (1951) reported that of these species, three species -- Indian sardines (Sardinella longiceps), fimbribated sardines (S. fimbriata) and perforated sardines (S. perforata -- were hauled in large quantities.

Big-eyed scads and round scads: In the fisheries statistics of the Bureau of Fisheries and Aquatic Resources, the scads are classified into a large number of species, such as big-eyed scads, caballas, crevalles (in the same genus as cavallas), hard tails (only the species of jacks), round scads, and runners. Of them, big-eyed scads and round scads seem to be of importance as live baits. Tiews and Ronquillo (1968) reported that of the four species of round scads reported from the Philippines, Decapterus macrosoma could not actually be distinguished from D. lajang and that this species and the species of D. russellii are commercially important.

Mackerels: Of the mackerel family, the mackerels which belong to the Rastrlliger species are the only genus available as baits. Monacop (1951) reported that only two species of the chub mackerel genus -- that is, short-bodied mackerels (R. brachysoma) and striped mackerels (R. chrusozonus = R. kanangurta) -- are industrially important. Matsui reported that R. faughni is one species of the R. brachysoma genus most commonly observed in the Philippines.

2-2-3 Conventional Findings on Live Baits in Philippine Seas

It was introduced in the descriptions on skipjack resources that the pole-and-line fishing of skipjack, although on a small scale, was conducted in the Philippine seas before World War II. To sustain the operations of its four fishing boats, the Sea Foods Corporation with its base at Zamboanga used indigenous fishing instruments with fish lamps in its attempt to catch sardines, among others, as live baits (Domantay, 1940). Sardinella melanura, S. perforta, S. fimbriata, S. leiogaster and one more species plus an additional two species "with big eyes and yellow-spotted gillds" were used as baits. Of these species, the last two species were favored due to its long suvival. When the aforementioned sardines were not available, the anchovy genus (Stolephorus indicus and others), silverside genus (Atherira duodecimalis and others), barracuda genus, silver sardine genus, chub mackerels, queen fishes and hard tails are reported as having been used. There is no record of on the baits used for the pole-and-line fishing boats operating with their base at Davao, but the interviews with the elderly people who had once participated in fishing operations as seamen indicated that a wide variety of fishes were actually used as baits but the round scad genus (the species unknown) was the most favored bait due to their robustness. The bait grounds used in the periphery of Zamboanga in those days are illustrated by Damontay (ibid.) and Warfel (1950).

Martin (1938) reported that the experimental pole-and-line fishing of skipjack conducted by the Philippine Packing Corporation for about two years from 1934 ended in faliure because live baits could not be secured at

a smooth pace. In these fishing operations, the most favored baits were the yellow mackerel genus (Selar sp.).

The pole-and-line fishing operations experimentally conducted by the United States in the same sea region with the Spencer F. Baird and other vessels after World War II also proved abortive partly because the fishing of sardines was generally slack off the middle and south coasts of the Philippines (Warfel, 1950). In this survey, the bait seines commonly used off the west coast of North America were utilized, but adequate quantities of baits could not be secured. For this reason, an attempt was made to use milkfish as a substitute for the natural baits. They were favorable as they inhabit stocking ponds over a long span of time. In the Philippines, however, they are dear and therefore could not be placed on a commercially paying basis (Warfel, ibid.).

2-2-4 Conclusion

It is almost certain that the fishes which may be considered generally fitted as baits are inhabiting in the seas off the Philippines. It is also certain, however, that all these species, as pointed by Domantay (1940), are not just as strong as the Japanese anchovies. A check of the specific fish species or fishing grounds reveals that the fluctuations in their hauls are considerably great. The Sea Foods Corporation which operated four fishing boats with their base at Zamboanga had 16 bait fishing grounds to sustain their operations and these fishing grounds were put to use on a shift basis, depending on the situation (Warfel, 1950). This fact reflects the difficulties encountered in the supplying of live baits in this sea region as well as the instability of the supplying.

From the foregoing, it is surmisable that when a survey is to be conducted or pole-and-line fisheries are to be introduced in the future, the availability of live baits will constitute the most important question. The excessive dependence on specific species of fishes would presumably be too risky, and special care will have to exercised about the selection of bait fishing grounds. In spite of the necessity of live baits surviving over a long span of time for a full-fledged pole-and-line fishing operation, the

fish species expectable in this sea region are problematical, in this respect, and there will be a need for special devices or techniques for their stocking. When these difficulties are taken into account, it seems advisable to purchase fish hauls from local people or businesses engaged in fisheries in the forthcoming full-fledged survey. Of all the fisheries operated in the Philippines, the Basnig or bag net or stationary net fisheries are most suitable for the purpose in that hauled fishes may be purchased as they are alive.

3. Outline on Survey Areas

3-1 Infanta and Its Periphery (Fig.11)

Infanta is situated east to Manila and along the east of the central part of Luzon Island (lat. 14°45' N, long. 121°39' E). The survey team had anticipated before the preliminary survey that this region will be good for the base from which the entire part of the Pacific coast of Luzon Island would be surveyd.

On October 17, an aerial survey of the entire part of this region was conducted aboard two light aircraft. The east coastline of the central part of Luzon Island is monotonous and not protected by sleeve, barrier and other reefs. Particularly, the seabed stretching from Infanta to the Caluba Point in the south becomes suddenly deep. It is hardly conceivable that these topographical conditions are fitted to the hauling of live baits. One exception to the monotonous coastline is the inlet situated at the mouth of the Pulo River which flows into the Pacific Ocean by way of Infanta. The water in this area is muddy, and it was not conceivable that it would be usable as a bait fishing ground.

The west coast of Polillo Island, like the coast south of Infanta, is generally monotonous, but there is a bight in the Polillo region near the south tip of this island. However, reefs develop in complicated configurations on the seabed close to the entrance to this inlet, and it is presumably difficult for large-sized vessels to enter port. The chart warns that the tidal currents in this periphery are fast.

Judging from its color, the water of the Polillo Strait is oceanic,

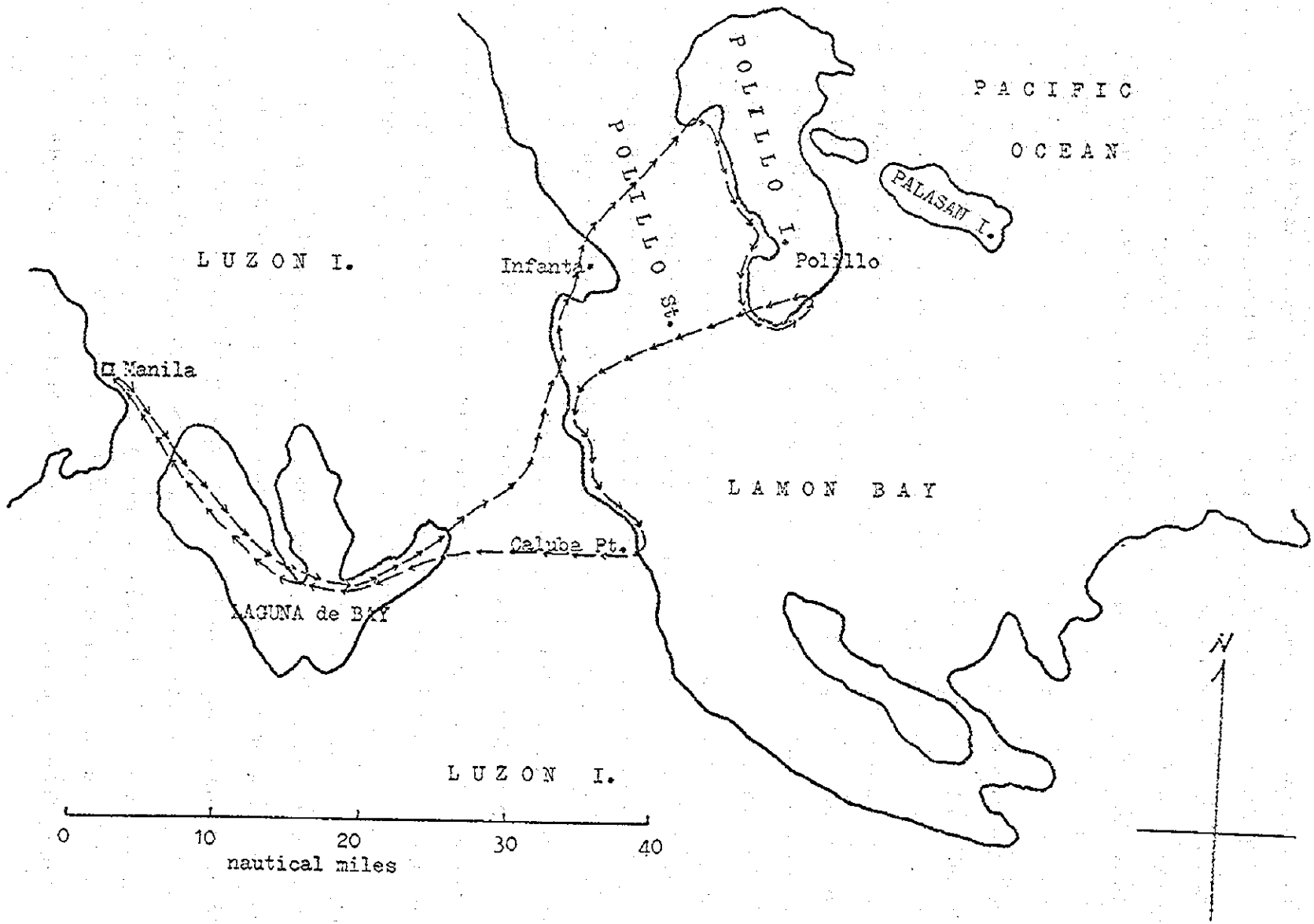


Fig. 11 Route of Survey Aircraft (Manila and Infanta Region)

suggesting the possible distribution of high-sea fishes.

The Lamon Bay constitutes the sea region south of Polillo Island, and statistics indicate that 3,227 tons of fishes were hauled in 1973. The main fishing method is the lift net fishing method in which what is locally known as Basing or bag nets are used. The fish hauls in this method totaled 2,979 tons, the trawled fishes amounted to 168 tons, and the remainder was caught with round haul and other seines. The hauled fishes included anchovies with 924 tons, squids with 594 tons, mackerel scads with 543 tons, and sardines with 407 tons. The hauls of skipjack and yellowfin tuna are extremely small, as yellowfin tuna were caught to the tune of 0.6 tons.

When the various environmental and geographical conditions are taken into account, it would not be advisable to set up a base in Infanta and its periphery for the forthcoming survey. However, this should not be taken as denying the possibility of this sea region being used as a skipjack fishing ground.

3-2 Davao and Malalag Region (Fig.12)

Surveys were conducted on this region from October 18 through 21. The surveys included a survey on the configurantion of the coast from the land, a small aircraft and the sea, a survey on hauled fishes at the landing places and markets, interviews with regional administrators and other officers of the Bureau of Fisheries and Aquatic Resources, and an on-the-spot inspection of the lift net which is known as Basnig and used in the local fisheries.

The city of Davao is situated at lat. 7°05' N, long. 125°38' E. It is a modern city situated deep in the Davao Gulf with Samal Island on the east side and Talikud Island on the southeast side. The Davao Gulf is fully equipped for the port calls of the surevy ship. There seems to be no trouble with respect to the supplying of fresh water, fuel oil and food.

According to statistics, the fishes hauled in the Davao Gulf in 1973 totaled 5,188 tons, of which 4,159 tons were caught with round haul seines, and the round haul seines were followed by Basnig seines with 934 tons and drive-in seines with 94 tons. By fish species, skipjack totaled 1,316 tons,

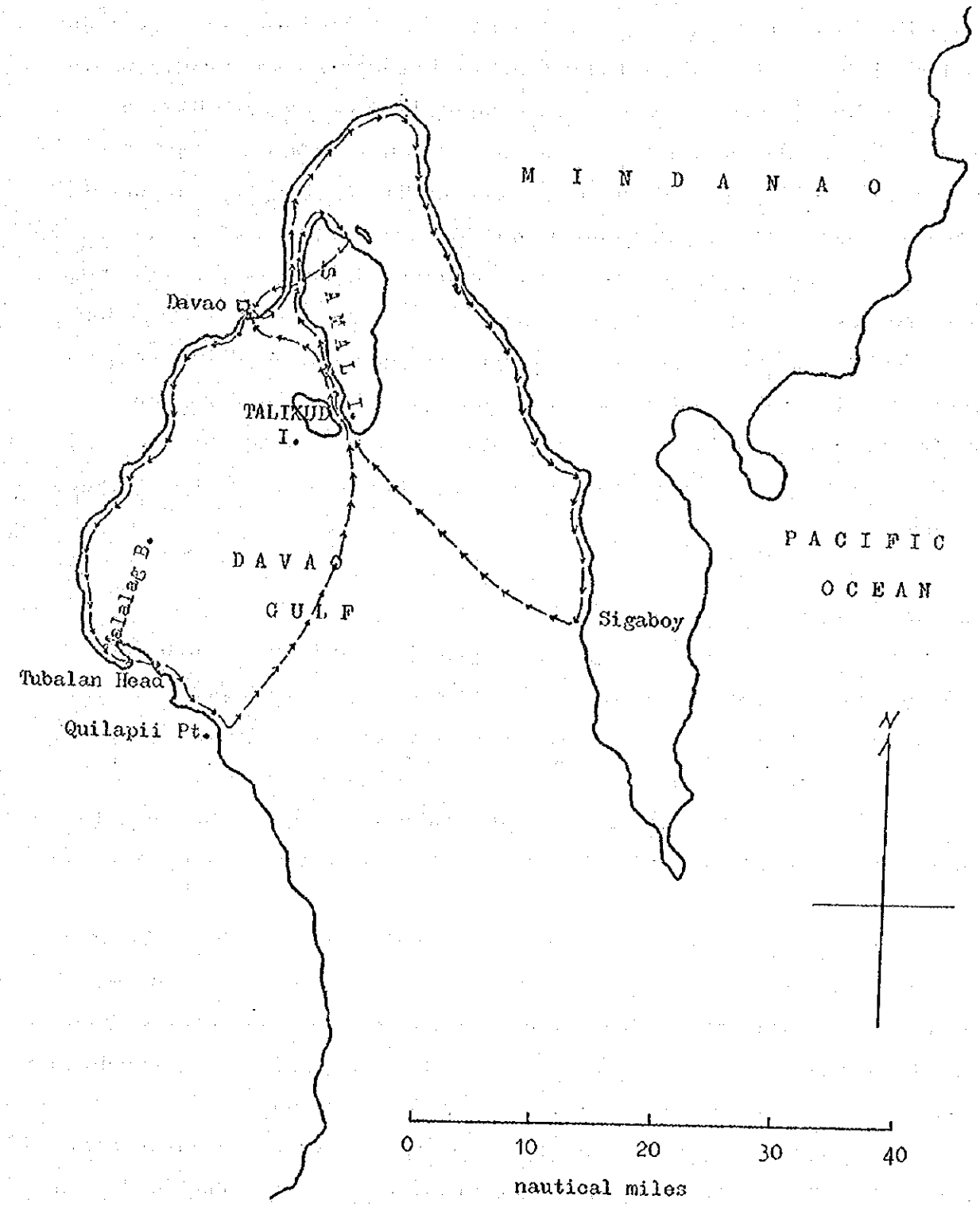


Fig. 12 Route of Survey Aircraft (Davao and Malalag Region)

mackerel scads 1,175 tons, frigete mackerel 850 tons, yellow mackerels 564 tons, moon fishes 349 tons, and short bodied mackerel 110 tons. Yellowfin fund were registered at 51 tons, but it was stated no haul of skipjack was recorded. It was not immediately clear whether this is due to some statistical shortage or there were hauls actually but by smaller fishing boats of the kind not included in the statistics. As a matter of fact, skipjack were seen being landed along with yellowfin fund during the survey period. The Ricsan Development Co. with its bases at Davao and General Santos use a freezing career, converted from a Japanese tuna fishing boat of the 250 tons class, in purchasing skipjack from smaller local fishing boats for export to Japan. It is our understanding that these skipjack were hauled in the Davao Gulf and its adjacent Moro Gulf with the lift seines, known locally as Payaw, which are similar to the Japanese dorado raft. Statistics indicate that 420 tons of yellowfin fund and 283 tons of skipjack were hauled in the Moro Gulf, but these hauls seem to have been underestimated. In addition to the Ricsan Development Co., two Japanese freezing careers are reportedly engaged in purchasing skipjack and tunas at General Santos. From every datum and circumstantial evidence, the Davao Gulf, Moro Gulf and their adjacent Sulu Sea appear to be favorable grounds for fishing of skipjack and yellowfin tuna. As mentioned in the description.

On skipjack resources, the experimental round haul seine fishing operations conducted by the Food and Agriculture Organization (FAO) have gained favorable results, and it is a fact that the Japanese pole-and-line fishing ships based on Zamboanga and Davao before World War II made this sea region their fishing ground (Fig. 13).

Inside the Davao Gulf, Basnig seining is conducted practically all the year. Located at a low latitude, this sea region is seldom affected by typhoons, but the fishing boats used in this fishing mathod move to the sea region leeward of the seasonal wind during the typhoon season because they cannot withstand the wind due to their small sizes and the structural features of their fishing gear. During the survey period, Basnig seining was being conducted near Samal Island. This fishing method has been gradually

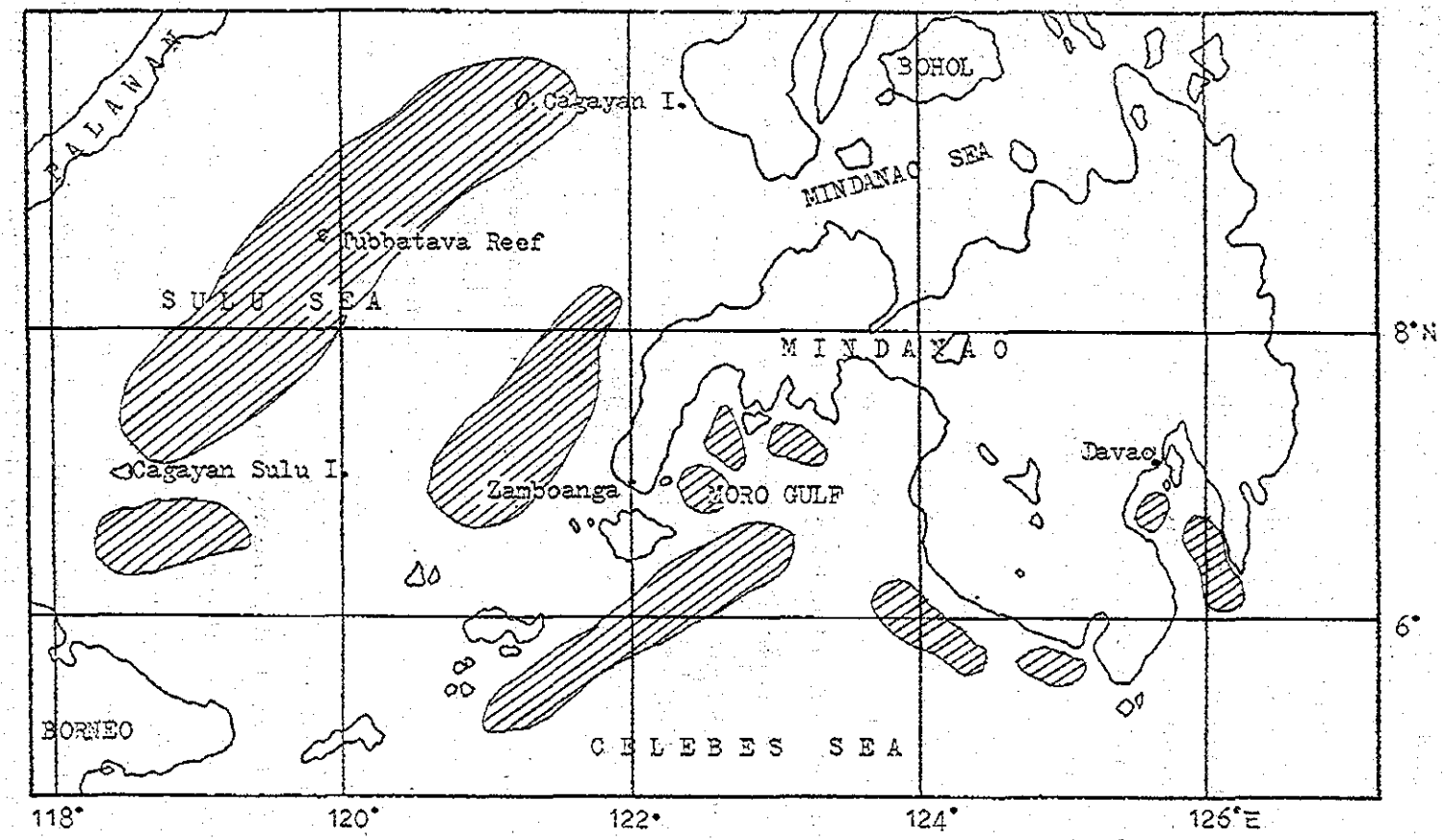


Fig. 13 Fishing Grounds Used by Skipjack Pole-and-Line Fishing Boats Based at Zamboanga and Davao Before WWII

replaced by the round haul seine fishing method in recent years but still accounts for the greater part of the coastal fisheries. The main fishes hauled with Basnig seines in this sea region are short bodied mackerel, big-eyed soad, moon fishes and others. In addition to these fishes, sardines and anchovies are reportedly caught in considerably large quantities by smaller fishing boats. In view of the features of their fishing gears, it seems easy to take in hauled fishes alive. The forthcoming survey will be easy to conduct, should baits be purchased from Basnig or hauled on a charter basis.

With respect to the places where crawls are to be installed or the places where live baits are to be stocked in the enclosures floating on the sea, Malipano and Malalag appear to be suitable places. Malipano is situated on the west coast of Samal Island or the coast across the bay from the city of Davao, and there is an inlet which is hemmed in by a number of small islands. Obviously, this inlet is suitable for the installation of crawls, and there seems to be no need to worry about seasonal winds because this inlet is fully protected from the high sea. The Agiraldo Pearl Farm is reported as having the right to exclusively use the waterfront of Malipano under a long-term contract, so there will arise a need for an advance adjustment, should crawls be installed at this place. Malalag is also an inlet fully protected from the high sea, and its water depth is suitable for the installation of crawls. Malalag may be reached from Davao on the land but is not best fitted for living, as this area is studded only with small hamlets. As far as the natural conditions for the installation of crawls are concerned, there is nothing to choose between Malipano and Malalag, but the conditions of Malipano are better in the light of its convinient transportation and communication, housing and proximity to the port of call of the survey ship.

Davao is the most promising base for the full-fledged survey. This is due to its fully equipped port and harbor facilities, promising skipjack resources in its neighboring seas, and availability of live baits from the daily fish hauls from the coastal fisheries.

3-3 Tacloban Region (Fig.14)

Surveys were conducted on this region from October 23 through 25. The items surveyed there are practically the same as in the case of Davao.

The city of Tacloban is situated at lat. 11°15' N, long. 125°00' E on Leyte Island. It is located at the deepest point of the San Pedro Bay which is situated deep into the Leyte Gulf. It has a well equipped port for the calls of ocean-going vessels. No probems what-soever will crop up on the supply and other factors for the port call of the survey ship.

Even at the deepest part of the Leyte Gulf, the depth is less than 120 meters, and the Leyte Gulf turns out to be a favorable fishing ground for local trawlers. The statistics in 1973 indicate that 1,645 tons of the total fish haul of 1,667 tons were hauled by trawlers. By the types of fishes hauled in the Leyte Gulf reveals, slipmouths (530 tons), goatfishes, horse mackerels, flatfishes, nemipterids and flounders share the greater portion, indicating that the fishes hauled in this gulf are of the inland sea type. Essentially, the skipjack is oceanic, and a local specialist pointed out that skipjack are distributed in the waters as far as Guian near the Gulf but do not move further deep into the Gulf. He also said that yellowfin tuna are hauled in a considerably large quantity in the hand lining of small-sized fishing boats operating off the east side of Samar Island but that surface schools of skipjack are seldom seen in this sea region. As his statement is not the outcome of a deliberate survey, there seems to be no need to take it as a denial of the significance of skipjack hauling experiments in this sea region.

According to the same informed source, the fishes which may be used as live baits for pole-and-line fishing are greater in quantity on the Pacific side of Leyte Island -- that is, on the Samar Sea side including the Maqueda Bay -- than the San Pedro Bay and the Leyte Gulf. We also understood that the places suitable for the installation of crawls are greater in number in the periphery of Catvalogan on the Samar Sea side. It was pointed out that the hauls of sardines in the Leyte Gulf are stable but that extreme fluctuations are observed in the hauls of anchovies. The fish hauls of the San Pedro Bay and Leyte Gulf totaled 1,865 tons, whereas the total fish hauls

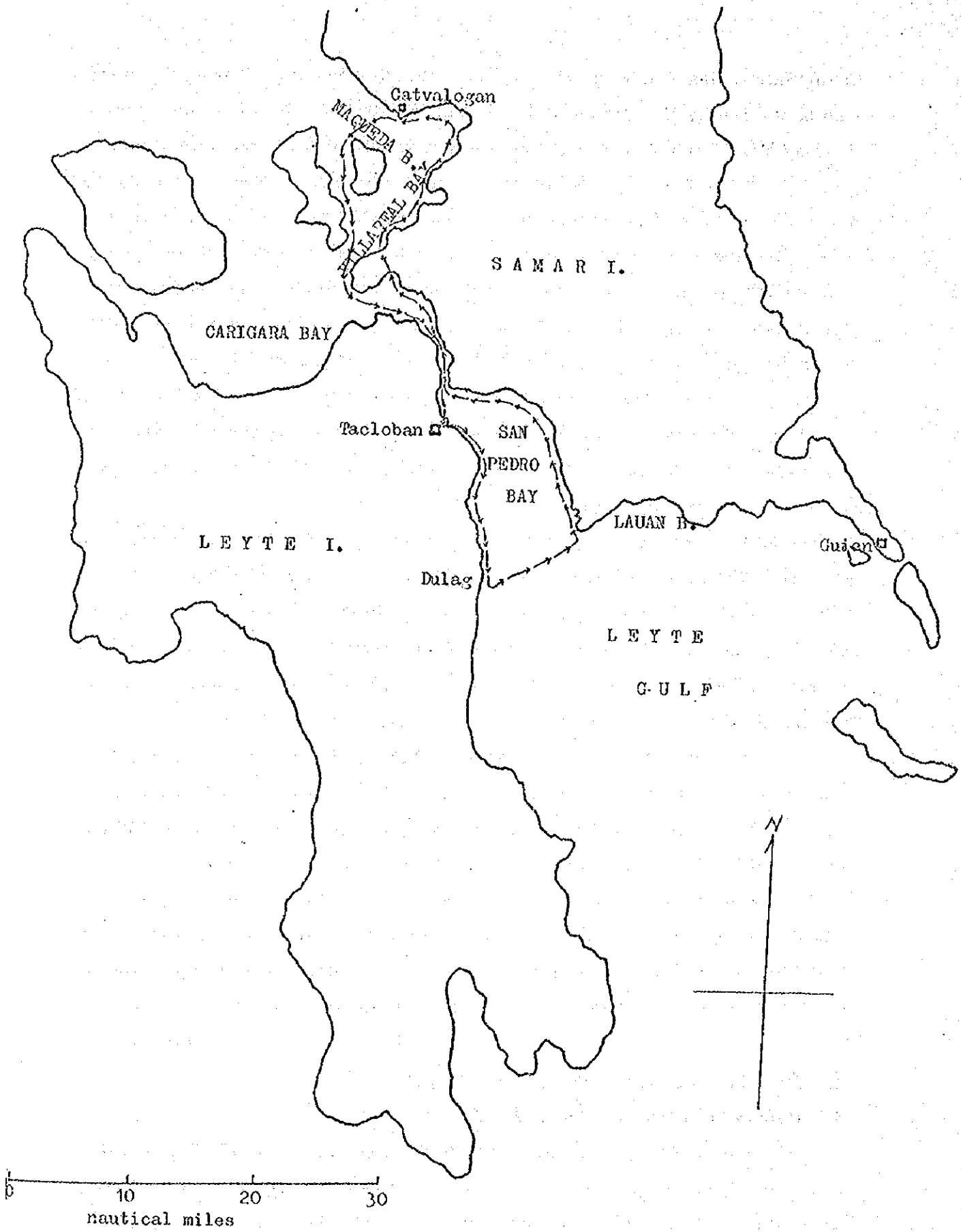


Fig. 14 Route of Survey Aircraft (Tacloban Region)

of the Samar Sea and Maqueda Bay totaled 5,008 tons, indicating the latter's fish hauls are by far greater. However, the distance between the mouth of the Leyte Gulf and that of the San Pedro Bay is about 50 kilometers and it takes about two hours and a half to get to Catvalogan from Tacloban via the San Fanico Strait. We understood, however, that this strait features in fast tidal currents, shallow water depths and a narrow way, turning out to be a trying spot for navigation and calling for the accompaniment of a local pilot. In the forthcoming fullfledged survey, as it is hardly expectable that the techniques for the stocking of live baits in crawls over a long span of time will be developed with ease. It will become necessary for the survey ship to make frequent trips between the skipjack fishing grounds and the bait base. Consequently, it does not seem appropriate to establish a bait base on the Samar Sea side.

Should the survey base including crawls is established in the periphery of Tacloban, the inlet situated on the north side of Lipata on Samar Island will presumably be the appropriate place. Because this inlet is close to Tacloban and geographically shielded to the full extent and because Basnig seining is conducted in its periphery, it will be technically possible to have access to live baits from local fishing boats.

Summing up what has been described in the foregoing, we will come to realize the existence of one difficulty with Tacloban as the survey base. That is, the skipjack fishing ground is considerably away from the place suitable for the stocking of live baits. When other conditions are taken into account, this region is fully recommendable as the survey base. There are no problems about the port and harbor facilities, and the conditions for the hauling of baits seem fairly favorable. It is also possible to have access to live baits from the local coastal fisheries.

4. Plans for Sea Survey on Bait Fish for Skipjack

4-1 Reasons for Selection of Survey Method

As described in the foregoing, the dependence in the Philippines on fisheries products as a source of animal proteins is greater as compared with other foods, and the demand for fisheries products will become all

the greater in the future. Presently, utilization of skipjack in the sea regions east and south of the Philippines is not necessarily great, and there is room for skipjack resources. For these reasons, the forthcoming survey on the exploitation of fisheries resources should desirably be directed toward the exploitation of skipjack resources in these regions. For the exploitation of skipjack resources, the traditional Japanese pole-and-line fishing method and the purse seine fishing method developed in the United States may be cited. In the purse seine fishing method, it is possible to assure big hauls with relatively small manpower. On the one hand, the conditions necessary for the formation of fishing grounds, such as the existence of the kind of thermocline which prevents the dispersion of fishes under the seine in fishing operations and the stability of the oceanic conditions, must be satisfied. Then there are other restrictive conditions. One is that capital outlays, such as in fishing gears, fishing boats and other equipment, are greater than in the pole-and-line fishing operations. Another is that the operation will call for a considerably high level of technical skill and will not prove effective unless the ships to be used in the purse seine fishing operations are large enough in scale. On the contrary, there are relatively few restrictive conditions for the fishing grounds insofar as the pole-and-line fishing operations are concerned. As long as live baits are secured, the pole-and-line fishing operations may be conducted even on a relatively small scale. There will be no need for great capital outlays. There will also be increased job opportunities in that a relatively large number of fishermen must be used. Technical co-operation, if called for, may readily be rendered be the Japanese experts who are well acquainted with the pole-and-line fishing operations. It will then be most effective to develope the pole-and-line fishing operations. Fortunately, that the anchovies and sardines usable as baits in the skipjack pole-and-line fishing operations inhabit abundantly in the seas around the Philippines. If these fish species could put up with stocking, the chances would be extremely great for the exploitability of skipjack resources in the future.

For these reasons, it is advisable that sea surveys focused mainly on

the development of pole-and-line fishing operations and surveys on the stocking in crawls of the fish species available as bait fish should be closely tied in with each other and conducted in parallel when the forthcoming surveys on the development of oceanic fisheries are conducted.

4-2 Survey Method

The premise for the forthcoming sea and stocking surveys is that they will be conducted with the cooperation of both Philippine and Japanese Governments. The outline of the surveys is as follows:

4-2-1 Sea Survey by Survey Ship

The sea survey will be conducted by Japanese surveyors and crew members and filipino surveyors and crew members. The survey will be focused on the following items.

Survey on Skipjack Resources:

1) Survey on the hauls of skipjack in pole-and-line fishing.

2) Survey on the hauls and survey on the distribution of schools of skipjack in observations.

3) Oceanic and meteorological observations.

4) Biological surveys on hauled fishes.

Survey on Bait Fish:

1) Survey on the bait fish hauls by the survey ship.

2) Survey on the distribution of bait fish.

3) Stocking survey on live fish in the hold of the survey ship.

4) Testing on the aptitude of bait fish in skipjack pole-and-line fishing operations.

Survey Ship:

It is necessary that the survey ship should be provided with the following conditions and gears.

1) The survey ship must have adequate accommodation space for the

personnel required for the survey on skipjack hauls and many other surveys to be conducted by the survey ship and also for the navigation of the survey ship (about 20 persons) plus the surveyors to be dispatched by the Philippine Government and the crew members (several).

2) The survey ship must have various facilities permitting a long period of navigation and be equipped with adequate wave making resistance.

3) The survey ship must be equipped with fishing gears necessary for skipjack pole-and-line fishing operations, such as fishing tackle, water sprayer, live fish hold, hauled fish stocking facilities (freezing or icing facilities).

4) The survey ship must be equipped with facilities for the stocking of bait fish, such as stick-held dip nets and other hauling equipment, fish lamps, fish finders and auxiliary, smallsized crawls.

5) The survey ship must be equipped with equipment necessary for oceanographic and meteorological observations, such as B.T., surface water samplers, Secchi discs, thermometers, manometers, anemometers and anemoscopes.

6) The survey ship must be equipped with equipment necessary for biological surveys, such as body length measurement plates, scales, anatomical instruments and various chemicals required for sampling.

7) The survey ship must be equipped with equipment necessary for navigation, such as loran, radar and radio equipment.

8) The survey ship must have mounted thereon a small fishing boat which will be used for trips and bait fish collection.

Survey Method

In order to survey the aforementioned items, the survey ship will conduct its surveys in the following manner:

In the evening, the survey ship will drift on an inlet where the hauling of bait fish is deemed feasible. At night, bait fish will be collected with fish lamps and stick-held dip nets, and their composition, distribution and density will be checked. The hauled bait fish will be accommodated in the ship's live fish hold. At sunrise, the survey ship will move out of the inlet to conduct a survey on the hauls of skipjack. Here, surveys will also be

conducted on the distribution and density of schools of skipjack, oceanographic and meteorological observations carried out, and the sustainability of the bait fish in the ship's live fish hold checked. If the bait fish may survive in the live fish hold for over two days, the survey ship will be kept at sea for two or three days, instead of making a homeward trip every day. An appropriate number of skipjack will be chosen for biological survey, such as on the body length, body weight and weight of the genital gonad.

As there is the necessity of securing a certain quantity in the hauling of bait fish, it is advisable that one or two of the Basnig seining and other small fishing boats engaged in the hauling of bait fish be hired in an attempt to secure bait fish and that local persons engaged in fisheries be trained in the stocking technology of bait fish for skipjack and in the transferring of bait fish alive into the live fish holds of fishing ship.

4-2-2 Stocking Survey with Crawls

Stocking surveys will be conducted by a stocking expert of the Japanese survey team and the surveyor and assistant surveyor to be disptached by the Philippine Government. Crawls will be set up in an appropriate sea region and testing conducted on the sustainability of bait fish. The following is the items to be included in the surveys.

1) Studies on an appropriate fishing method for the hauling of bait fish.
2) Survey on the stocking of bait fish in crawls.
3) Selection of the places suitable for stocking in the survey areas.
4) Studies on the stocking methods fitted to the local conditions.
5) Studies on the ways of transporting bait fish from their hauling boats to the crawls and from the crawls to the live fish hold of the survey ship.
6) Biological surveys on bait fish.
7) Environmental surveys.

Places for Installation of Stocking Crawls

It is necessary that stocking crawls be in a sea region which may satisfy the following conditions:

1) Crawls must be floated on the surface which is not so much influenced by the tidal current and which is fully shielded from high-sea waves and calm. The water depth must be enough to allow the crawls to be fixed with anchors.

2) As the surveys will be conducted in collaboration with the survey ship, the water depth must be enough to allow the survey ship to approach with ease. There should be neither shallows nor rocks hazardous to the navigation of the survey ship.

3) There should be appropriate land facilities where the stocking experts may reside and engage in clerical work.

4) Appropriate communication facilities must be available for liaison with the survey ship or related agencies.

5) The places where crawls are to be installed must be adequately near the bait fish hauling grounds where live bait fish may be procured from local fishing boats.

Survey Method

The stocking experts will install the survey ship-transported crawls on the water surface which satisfy the aforementioned conditions, accommodate in the crawls the bait fish caught by the survey ship and the local fishing boats hired during the survey period, and survey the possibility of stocking bait fish. At the same time, they will study the most appropriate method for accepting bait fish from the aforementioned ships without injuring bait fish. Biological surveys on the stocked bait fish and environmental surveys (water temperature, natural enemy relations between fish species, distribution as classified by fish species, ecology) will be conducted. In this instance, these surveys will be carried out in clollaboration with local surveyors and persons engaged in fisheries, as it is difficult for the Japanese stocking experts to conduct them by themselves.

4-3 Survey Sea Region, Period and Time

With the various conditions taken into account, Davao and Tacloban are considered appropriate for the aforementioned surveys. The afore-

mentioned two surveys referred to in the preceding paragraph, and there is the necessity of their being closely tied in with each other, should be conducted in one and the same sea region.

With respect to the survey period, the most ideal thing would be to carry on the surveys all the year. To ckeck changes in each year, it would also be advisable to conduct them for more than one year. In the light of the considerable amount of money to be required for the surveys, it is advisable to conduct them over a total period of six months, each survey being carried out at different times over a length of more than one year.

The date at which the survey is to be started is timed in with the small-sized fishing boats which will be hired for the hauling of bait fish. Consideration will also have to be give to interrelationship between the seasonal wind and the survey region, the bait fish hauling season and their trips, so that the most apropriate time may be selected. In the light of these considerations as well as the various procedures to be required for the surveys, it seems advisable to carry out the surveys from the last decade of September or October through February or March of the following year.

4-4 Dealing of Hauled Fish and Survey Findings

The fish to be hauled in the sea survey will in principle be turned over to the Philippine Government with the exception of those which will be necessiated by the Japanese side as research samples.

A report on the findings of the surveys will be compiled by the Japanese surveyors in the English language and submitted to the Philippine Government within one and half years after completion of the surveys. The Japanese side will receive cooperation from the Filipino surveyors aboard the survey ship and those engaged in the survey on stocking with respect to the matters on which such cooperation is obtainable.

4-5 Survey Cooperation System and Necessary Procedures

To step up the forthcoming survey on the exploitation of skipjack resources in an effective manner, there will be a need to establish a system of close cooperation between the Philippines and Japan beforehand. For

this purpose, the following matters will have to be dealt with beforehand.

1) Negotiating and Administrative Service Agencies of Both Countries

In order to make preparations for, and carry out, the forthcoming survey in a smooth and prompt manner, it is necessary to clarify the names of negotiating agencies between both countries and the agencies or individuals of both countries who will be engaged in actual administrative service.

2) Administrative Procedures Necessary for Survey

The steps that are to be taken by the Japanese side may be cited as follows:

(1) Budgetary measures for the expenses to be shared by the Japanese Government.

(2) Steps stipulated in the Ship Law which will enable Filipinos to go aboard the survey ship, which will be selected from among the general fishing boats.

(3) Steps necessary for using the survey ship as an ocean-going vessel.

The steps which are to be taken by the Philippine side may be enumerated as follows:

(1) Budgetary measures for the expenses to be shared by the Philippine Government.

(2) Authorization of a survey ship of Japanese registry for engaging in survey activities in the Philippine territorial waters.

(3) Exemption of the surveyors, including the Japanese surveyors, from application of the legal measures for the prohibition of nocturnal outings under martial law, as the survey will have to be carried out day and night.

(4) Measures for the treatment of the survey ship as a coastal vessel in the Philippines during the survey period.

(5) Simplification of the formalities for embarkation and disembarkation to facilitate the survey and tax exempting measures for embarkation and disembarkation.

(6) Prevention of troubles to, and security measures for the naviga-

tion of the survey ship and the stocking surveyors.

(7) Advance notice to related agencies (Philippine Navy, Philippine Coast Guards, related persons engaged in fisheries and other parties concerned) on the activities of the survey ship and the stocking surveyors.

(8) Simplification of embarkation and disembarkation for the Japanese people associated with the survey, and the offering of facility to them.

(9) Other administrative measures necessary for the execution of the survey.

(10) Offering of facilities necessary for smooth communication between the survey ship and the land.

4-6 Items and Expenses to be Shared by Both Coutries

The forthcoming survey should be conducted while the Japanese Government closely collaborates with the Philippine Government. To conduct the joint survey in an effective manner, it would seem advisable to have both Governments share the items and expenses as follows:

The items of which the Japanese side should take charge and the incidental expenses are as follows:

(1) Preparation of ship fitted to the conditions of the survey described in 4-2, above.

(2) Personnel expenses and the expenses for the dispatch of the Japanese surveyors and the crew who will man the survey ship.

(3) Personnel expenses for the stocking specialists who will take part in the stocking survey and the expenses for their dispatch.

(4) Expenses required for the hiring of the survey ship (depreciation cost, interest, taxes and other public charges, etc.).

(5) Fuel cost necessary for the navigation of the survey ship.

(6) Cost for the fishing gears and observation instruments required for the surveys of the survey ship.

(7) Various expenses other than the taxes required for the entering and clearing of Philippine ports and harbors by the survey ship.

(8) Expenses for communication and liaison with Japan.

(9) Expenses for survey equipment, such as the crawls to be used in

the stocking survey.

(10) The expenses for the conferences required in Japan.

(11) The expenses required for the analysis of the findings of the surveys and their compilation by the Japanese side.

(12) The expenses for the preparation of the survey report and its transmittal to the Philippine Government.

(13) Risk bearing for the Japanese people associated with the survey.

The items of which the Philippine side should take charge and the incidental expenses are as follows:

(1) Preparation in each sea region of a local fishing boat or boats which will take part in the survey for the hauling of bait fish and the offering of bait fish as they are alive, and all the incidental expenses therefor.

(2) Offering of places suitable for stocking.

(3) Offering of more than one ferryboat to be for trips in the stocking survey, and all the incidental expenses therefor.

(4) All the expenses necessary for the dispatch of the Filipino surveyors aboard the survey ship and its Filipino crew, including their personnel expenses and the cost of their meals while aboard the ship.

(5) Personnel expenses for the surveyors participating in the stocking survey and the expenses for their dispatch.

(6) Offering of manpower required for the stocking survey and their personnel expenses.

(7) All the taxes required for the entering and clearing of Philippine ports and harbors by the survey ship (in case no tax exemption is available).

(8) Assurance of a moorage for the survey ship and offering of facility preferential to other vessels in supplies, etc.

(9) Offering of an office necessary for the stocking survey, and the expenses therefor.

(10) Dispatch of security and other officers for security, and the incidental expenses required for their dispatch.

(11) Offering of an automobile for liaison and transportation, and all the incidental expenses therefor.

(12) Assurance of a means of communication between the survey ship and the land station, and all the incidental expenses therefor.

(13) Offering of convenience to the Japanese personnels concerned.

(14) The expenses for the conferences required by the Philippine side.

(15) Expenses required for the analysis and compilation of the findings of the surveys conducted by the Philippine side.

(16) Risk bearing for the Filipinos associated with the survey.

(17) All other incidental expenses required for the on-the-spot surveys.

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APPENDICES

Appendices

Appendix 1 Local BFAR Offices and Areas of Jurisdiction

BFAR Office No.	Location	Area of Jurisdiction
I	Dagupan City	States of Abra, Benguet, Ifugao, Ilocos Norte, Ilocos Sur, La Union and Mountain Province, and City of Pangasinan
II	Tuguegarao, Cagayan	States of Batanes, Cagayan, Isabela, Kalinga Apayao, Nueva Vizcaya and Quirino
III	San Fernando Pampanga	States of Aurora Sub-province, Bataan, Bulacan, Nueva Ecija, Pampanga, Tarlac and Zambales, and the cities these states
IV	Navotas, Rizal	States of Batangas, Cavite, Laguna, Marinduque, Occ. Mindoro, Or. Mindoro, Palawan, Quezon (except the substate of Aurora), and the cities in these states
V	Naga City	States of Albay, Camarines Norte, Camgrines Sur, Catanduanes, Masbate and Sorsogon
VI	Iloilo City	States of Aklan, Antique, Capig, Iloilo, Negros Occ. and Romblon
VII	Cebu City	States of Bohol, Cebu, Negros Or. and Siquijor
VIII	Tacloban City	States of Eastern Samar, Leyte, Northern Samar, Southern Leyte and Western Samar, and the cities in these states
IX	Zamboanga City	States of Basilan, Sulu, Tawitawi, Zamboanga del Norte, and Zamboanga del Sur, and the cities in these states
X	Cagayan de Oro City	States of Agusan del Norte, Agusan del Sur, Bukidnon, Camiguin, Lanao del Norte, Lanao del Sur, Mizamis Occ., Mizamis Or., Surigao del Norte and Surigao del Sur., and the cities in these states
XI	Davao City	States of Datu Kudarat, Davao del Norte, Davao Or., Davao del Sur, Maguindonao, Norte Colabato and South Cotabato, and the cities in these states

Appendix 2 Oceanographic and Fishery Research Institutes and Major Researchers in Philippines

1. Silliman University
   Dumaguete City

2. National Museum
   Herran, Manila

3. College of Arts and Sciences
   University of the Philippines
   Diliman, Quezon City

4. Weather Bureau
   Port Area
   Manila

5. National Institute of Science and Technology
   Herran
   Manila

6. Philippine Atomic Energy Commission
   Herran
   Manila

7. Philippine Fisheries Commission
   Intramuros
   Manila

Alcala, Dr. Angel C.	1	Marine ecology
Alcasid, Godofredo L.	2	Conchology
Abad Santos, Prof. Fraterno	3	Marine biology, invertebrate taxonomy
Arafiles, Catalino P.	4	Meteorology
Arcega, Mrs. Luz Baens	5	Microbiology
Bernardo, Benito	6	Marine pollution (radioactive wastes)
Blanco, Dr. Guillermo J.	7	Fisheries biology, taxony
Borja, Prof. (Mrs.) Priscilla C.	7	Fisheries biology, taxonomy
Brillo, Dr. (Mrs.) Leticia	9	Administration
Canlas, Dr. Dominador	3	Physical oceanography
Castillo, Bartolome	9	Hydrography
Castillo, Nestor	10	Coastal engineering
Comsti, Francisco A.	11	Marine geology
Domantay, Prof. Jose A.	12	Marine biology and invertebrate taxonomy
Esquierrez, Pablo	7	Fisheries
Fernandez, Juanito	11	Marine geology and geophysics
Flores, Jesus F.	4	Meteorology
Gutierrez, Prof. Fernando I.	3	Micropaleontology
Kintanar, Dir. Roman L.	4	Administration and meteorology
Legaspi, Capt. Constancio M.	13	Administration and physical oceanography
Legasto, Mrs. Rizalina M.	8	Plankton (general)

8. Dagat-dagatan Fishery Research Laboratory
Philippine Fihseries Commission
Lañgos
Malabon, Rizal

9. National Science Development Board
95 E. Rodriguez Sr. Blvd.
Quezon City

10. Bureau of Public Works
Port Area
Manila

11. Bureau of Mines
Herran
Manila

12. University of Santo Tomas
España
Manila

13. Bureau of Coast and Geodetic Survey
421 Barraca
Binondo
Manila

14. National Water and Air Pollution
Control Commission
Herran
Manila

Lesaca, Dr. Reynaldo M	14	Marine pollution
Llorca, Manuel	7	Chemical oceanography
Manansala, Mario	13	Physical oceanography and marine geophysics
Mane, Com. Andres M.	7	Administration and fisheries biology
Martin, Claro	7	Fisheries biology
Matias, Anselmo	3	Fisheries biology
Militante, Dr. (Miss) Priscilla J.	3	Micro-paleontology
Mines, Prof. Antonio	15	Fisheries biology
Nemenzo, Prof. Francisco C.	3	Stony corals, marine biology
Ordoñez, Jose A.	8	Benthos, fish biology
Pages, Mrs. Paulina D.	16	Botany
Palma. Dir. Cayetano	13	Administration and hydrography
Paus, Mrs. Roseli O.	5	Marine botany
Pidlaoan, Dir. Nazario A.	15	Fisheries technology
Ronquillo, Prof. Inocencio A.	7	Fisheries biology, taxonomy
Samaniego, Mrs. Remedios	11	Micropaleontology
Santos, Mrs. Lina M.	8	Fish taxonomy
Sarenas, Prof. Artemio	17	Marine zoology
Su, Fr. (Dr.) Sergio	18	Marine geophysics
Sunido, Dr. Ernesto	3	Geophysics
Tamesis, Dr. Emmanuel V.	3	Sedimentology and stratigraphy
Tan, Dr. (Miss) Elvira O.	7	Fisheries oceanography and physiology
Trono, Engr. Alfredo N.	10	Coastal engineering
Trono, Dr. Gavino	3	Marine botany
Umali, Agustin F.	2	Ichthyology
Uyengeo, Dr.	3	Marine fungi

15. College of Fisheries
University of the Philippines
Diliman
Quezon City

16. San Carlos University
Cebu City

17. University of the East
Manila

18. El Observatorio de Manila
Loyola Heights
Quezon City

19. Philippine Navy
Roxas Blvd.
Manila

20. National Research Council of the Philippines
Diliman
Quezon City

21. Mindanao State University
Marawi City

(Miss) Flordeliz Velasco, Cdr. Pedro R.	19	Environmental studies
Velasquez, Dr. (Miss) Carmen C.	3	Parasites of fishes and soft corals
Velasquez, Dr. Gregorio T.	20	Marine algae
Ventura, Cdr. Antonio	13	Physical oceanography
Vera Santos, Dr. Jose	3	Marine botany
Villaluz, Dean Domiciano K.	21	Invertebrates biology
Yapchiongeo, Dean (Dr.) Jose V.	15	Administration and fisheries

Appendix 3 Main Fishing Grounds and Their Locations

1. Aguisan Bay	Western coastline of Central Negros Occidental Province (opposite Himamaylan).
2. Albay Gulf	Eastern coastline of Albay Province (opposite Legaspi City).
3. Asid Gulf	Southern coastline of Masbate Province.
4. Babuyan Channel	Northern coastline of Cagayan Province.
5. Bacuit Bay	Northwestern coastline of Palawan Island.
6. Batangas Coast	Western coastline of Batangas Privince (Verde Island Passage).
7. Bohol Strait	Between Bohol and Cebu Islands.
8. Burias Pass	Between Burias Island and Albay Province.
9. Camotes Sea	Between Bohol, Cebu and Leyte Islands.
10. Capiz Coast	Northern coastline of Aklan and Capiz Provinces.
11. Coron Bay	Between Busuanga, Coron and Colion Islands (northern Palawan Province).
12. Carigara Bay	Northern coastline of Leyte Province.
13. Cuyo Pass	Around Cuyo Islands (northwestern Palawan Province).
14. Davao Gulf	South of Davao City.
15. Dumaguillas Bay	Northwestern coastline of Zamboanga del Sur Province.
16. Gingoog Bay	Northern coastline of Misamis Oriental Province.
17. Guimaras Strait	Between Iloilo and Negros Occidental Provinces.
18. Iligan Bay	Between Misamis Occidental, Lanao del Norte and Misamis Oriental Provinces.
19. Iltana Bay	Between Northwestern Zamboanga del Sur, Lanao del Norte and Lanao del Sur Provinces.
20. Iloilo Strait	Between Iloilo Province and Guimaras Island.
21. Laguna de Bay	Between Cavite, Rizal and Laguna Provinces.
22. Lagonoy Gulf	Between Catanduanes Island and Camarines Sur Provinces.
23. Lamon Bay	East of Central Quezon Province.
24. Leyte Gulf	East of Leyte Island.
25. Lingayen Gulf	North of Pangasinan Province.
26. Malampaya Sound	Northwestern coastline of Palawan Island.

27. Macajalar Bay	Southern coastline of Misamis Oriental Province.
28. Manila Bay	Between Cavite, Rizal and Bataan Provinces (west of the city of Manila).
29. Mindanao Sea	Between northern Mindanao and the Visayas.
30. Maqueda Bay	Western coastline of central Samar Province (south of Catabalogan).
31. Mindoro Strait	Between Mindoro Occidental Palawan Provinces.
32. Moro Gulf	Between Zamboanga del Sur and Cotabato Provinces.
33. Panay Gulf	Between southern Iloilo and southwestern Negros Occidental Provinces.
34. Pujada Bay	Eastern coastline of Davao Oriental Province.
35. Ragay Gulf	Between southern Quezon and Camarines Sur Provinces.
36. Samar Sea	Between Samar and Masbate Provinces.
37. San Miguel Bay	Between eastern Camarines Norte and northern Camarines Sur Provinces.
38. San Pedro Bay	Between Samar and Leyte Provinces (opposite Tacloban City).
39. Sarangani Bay	Southern coastline of Cotabato Province.
40. Sibuguey Bay	Southern coastline of Zamboanga del Sur Province.
41. Sibuyan Sea	Between Romblon and Masbate Provinces.
42. Sulu Sea	Between Palawan, Mindanao and Visayas Islands.
43. Tanon Strait	Between Cebu and Negros Islands.
44. Tawi-Tawi Bay	Eastern coastline of Tawi-Tawi Island, Sulu.
45. Tayabas Bay	Southern coastline of Quezon Province.
46. Taytay Bay	Northern coastline of Palawan Province.
47. Ticao Pass	Between Ticao Island and Sorsogon Province.
48. Visayan Sea	Between Panay, Negros, Cebu, Leyte and Masbate Island.
49. Zambales Coast	Western coastline of Zambales Province.

Appendix 4 Meteorological Data for Main Districts

Manila's Meteorological Table

(14°34'N., 120°58'E.) Altitude 10.1 m

Month	Mean surface pressure (mb)	Temperature (°C) Mean	Mean Max.	Mean Min.	Extreme value Max.	Extreme value Min.	Mean humidity (%)	Cloudness Mean	Average number of days of cloudness less than 2	Average number of days of cloudness more than 8	Precipitation Mean (mm)	Max. (mm)	Min. (mm)	Max. in 24 hrs. (mm)	Number of days *	Number of days of thunder and rain on average	Wind Direction (%) N	NE	E	SE	S	SW	W	NW	Calm	Number of days of storm **	Visibility (Number of days on average) 0 1.3 M	0 2.5 M	0 6 M
1	1015	25.6	32.8	17.8	33.9	14.4	78	5.5	3	5	25.4	195.6	0	185.4	5	0	23	15	16	5	3	9	7	4	19	0	0.3	0.6	4.1
2	1015	25.6	33.9	17.9	35.6	15.6	74	4.9	3	3	12.7	40.6	0	38.1	3	0.1	11	14	25	9	3	10	7	2	17	0	0.3	0.3	1.3
3	1014	27.2	35.6	18.9	36.7	16.1	71	4.5	4	3	17.8	99.1	0	61.0	3	0.9	9	13	27	11	3	10	7	2	17	0	0.6	0.9	5.4
4	1013	28.3	36.1	20.0	37.8	17.2	70	4.0	4	0.5	30.5	172.7	0	142.2	4	2.7	6	9	27	16	4	11	8	2	18	0	0.3	1.1	2.2
5	1011	28.9	36.7	22.2	38.3	20.2	76	5.7	2	5	129.5	487.7	0	167.6	11	9.3	8	8	15	10	8	18	8	2	21	0	0.6	1.1	2.7
6	1010	28.3	34.4	22.3	37.8	21.1	81	7.0	0	10	251.5	660.4	25.4	254.0	16	11.6	8	9	12	9	11	20	7	3	20	1	1.9	2.4	5.0
7	1009	27.2	33.3	22.8	36.1	20.6	83	7.8	0.2	15	431.8	1,191.3	134.6	289.5	22	7.7	7	6	7	8	15	28	7	3	18	1	3.0	5.6	12.1
8	1009	27.2	32.8	22.8	35.0	20.6	85	7.8	0	14	421.6	1,983.7	711.2	226.1	22	8.4	6	6	7	5	15	32	7	4	18	1	0.9	3.4	7.0
9	1010	27.2	33.3	22.8	35.6	20.6	86	7.5	0.2	11	365.8	1,470.7	50.8	335.3	21	8.0	7	6	7	6	15	31	7	4	18	7	0.9	2.1	5.2
10	1012	27.2	33.3	21.1	35.0	19.4	84	6.7	0.1	10	195.6	589.3	10.2	193.0	17	5.7	13	11	10	7	8	15	7	4	25	4	0.8	1.6	4.2
11	1013	26.7	32.8	20.0	34.4	16.7	83	6.4	0.7	7	142.2	594.3	5.0	180.3	13	1.7	21	15	9	5	4	8	6	5	27	1	0.9	2.0	3.1
12	1014	25.6	32.8	18.3	33.3	15.6	81	6.2	1	7	63.5	279.4	0	99.1	9	0.5	33	14	11	3	3	7	6	5	27	1	2.0	3.7	4.0
All years	1012	27.2	36.7	17.8	38.3	14.4	80	6.2	18	91	2,087.9	3,921.6	937.2	335.3	146	56.6	13	10	14	8	8	17	7	3	20	16	-	-	-
Years of statistics taken	52	53			49		48	48	10		73			54	72	10	12									52	5		

* Number of days of precipitation of over 0.3 mm

** Number of days of wind velocity of over 8

Visibility shown at 0800

Cebu's Meteorological Table

(10°18'N., 123°54'E.)

Altitude 7 m

Month	Mean surface pressure	Temperature (°C)					Mean relative humidity	Cloudness		Precipitation						Wind Direction (%)									Number of days with strong winds of over 15.3 m/s on average
		Mean	Each month		Extreme			Mean	Number of days of under 3/10 on average	Mean (mm)	Max. (mm)	Min. (mm)	Max. in 24 hrs. (mm)	Number of days on average		N	NE	E	SE	S	SW	W	NW	Calm	
			Max. Mean	Min. Mean	Max.	Min.								Over 10 mm	Thunder and storm										
1	1009	26.1	31.1	21.1	32.8	18.9	76	5.1	5.3	107.4	327.7	7.8	180.3	14	1.8	27	39	9	*	1	1	*	1	23	0.5
2	1010	26.1	31.1	21.1	32.2	18.3	75	5.2	6.4	71.3	218.2	5.0	66.0	11	2.5	23	41	10	1	1	*	*	1	24	0.1
3	1011	26.7	31.7	21.1	32.8	18.9	73	4.4	10.5	51.0	106.9	0.5	40.6	9	5.4	22	40	13	1	1	*	*	1	23	0.2
4	1011	27.8	32.8	22.8	33.3	21.1	73	4.2	8.1	43.2	145.2	1.0	63.5	8	9.8	15	37	13	1	2	1	*	2	28	0.4
5	1009	28.3	33.9	22.8	35.0	21.1	75	5.0	5.5	114.4	176.5	29.1	66.0	11	15.8	8	20	10	4	10	7	2	2	37	1
6	1008	27.8	33.3	22.8	35.0	22.2	76	5.9	5.9	162.6	302.9	33.0	86.4	16	18.0	6	12	7	4	11	15	4	3	37	2
7	1008	27.2	32.8	22.8	34.4	21.7	77	6.3	2.4	183.6	339.3	34.2	63.5	17	15.9	3	4	2	3	14	32	8	2	33	7
8	1008	27.8	32.8	22.8	33.9	21.1	76	6.0	2.4	141.2	328.6	18.8	68.6	15	14.9	2	3	2	2	14	34	9	3	30	7
9	1008	27.2	32.8	22.2	33.9	21.1	77	6.4	1.7	175.4	391.3	45.5	121.9	16	14.8	3	4	2	2	15	28	7	3	35	4
10	1008	27.2	32.8	22.2	34.4	20.6	78	5.9	4.0	195.2	588.2	43.7	299.7	18	16.9	9	13	6	4	7	15	5	4	37	2
11	1008	26.7	32.2	22.2	33.9	20.0	78	5.5	4.8	161.5	366.5	37.8	88.9	15	9.1	19	23	7	2	4	6	3	4	32	1.5
12	1009	26.7	31.7	21.7	32.8	20.0	78	5.7	4.2	127.7	425.7	29.4	114.3	15	6.5	24	37	5	1	2	3	1	2	26	0.4
Year	1009	27.2	32.2	22.2	35.0	18.3	76	5.5	-	1540.0	2243.0	780.3	299.7	165	131.5	13	23	7	2	7	12	3	2	30	26
Number of years recorded	15	16	16	16	16	16	16	16	10	36	36	36	16	36	11	16	16	16	16	16	16	16	16	16	15

* Under 0.5 %

Tacloban's Meteorological Table

(11°15'N., 125°00'E.)

Altitude 22 m

Month	Mean surface pressure (mb)	Temperature (°C)					Mean relative humidity (%)	Cloudness		Precipitation				
		Mean	Each month		Extreme			Mean	Number of days of under 3/10 on average	Mean (mm)	Max. (mm)	Min. (mm)	Max. in 24 hrs. (mm)	Number of days of thunder and storm on average
			Max. Mean	Min. Mean	Max.	Min.								
1	-	25.6	31.1	21.7	33.3	18.9	84	7.1	4.5	337.8	1409.7	83.8	246.4	0.9
2	-	25.6	32.2	21.1	34.4	17.8	82	6.9	6.2	215.9	551.2	12.7	132.1	1.0
3	-	26.1	33.3	22.2	34.4	17.8	80	6.3	6.6	170.2	561.3	30.5	96.5	2.2
4	-	27.2	34.4	22.8	36.1	20.0	81	6.0	7.9	137.2	322.6	22.9	73.7	4.5
5	-	27.8	35.6	23.9	36.1	22.2	82	6.7	5.0	154.9	383.5	17.8	142.2	10.5
6	-	27.2	35.0	23.3	36.1	22.2	83	7.4	3.8	182.9	492.8	53.3	134.6	11.4
7	-	27.2	34.4	22.8	35.6	21.7	82	8.0	1.4	165.1	355.6	25.4	243.8	10.2
8	-	27.8	33.3	22.8	35.6	21.1	80	7.7	2.0	139.7	284.5	25.4	61.0	7.6
9	-	27.2	33.9	22.8	36.1	21.7	81	7.8	1.0	154.9	274.3	73.7	116.8	8.7
10	-	26.7	33.3	22.8	35.6	21.7	84	7.2	1.5	213.4	388.6	66.0	68.6	8.0
11	-	26.7	32.8	22.2	34.4	20.0	85	7.1	2.3	302.8	558.9	137.2	132.1	2.9
12	-	26.1	31.7	22.2	33.3	17.8	86	7.4	3.7	373.4	866.1	139.7	134.6	1.6
Year	-	26.7	33.3	22.8	36.1	17.8	82	7.1	-	2540.7	3807.5	1813.6	246.4	69.5
Number of years recorded	-	15	16	16	16	16	15	11	10	34	34	34	16	10

Davao's Meteorological Table

(7°01'N., 125°35'E.)

Altitude 3 m

Month	Mean surface pressure	Temperature (°C)					Mean relative humidity	Mean cloudness	Precipitation (mm)				Wind Direction (%)								
		Mean	Each month		Extreme				Mean	Max.	Min.	Max. in 24 hrs.	N	NE	E	SE	S	SW	W	NW	Calm
			Max. Mean	Min. Mean	Max.	Min.															
1	1011	26.2	32.9	19.5	34.4	17.2	82	6.6	122	243	22	74	8	16	1	2	1	1	5	16	50
2	1011	26.4	33.8	19.2	36.7	17.8	82	6.2	113	352	0	65	14	14	0	1	*	2	6	21	42
3	1011	26.9	34.6	19.8	36.7	17.2	81	6.1	131	482	19	118	11	25	1	2	0	2	2	12	45
4	1010	27.6	34.8	20.7	36.7	18.9	80	6.0	146	307	14	89	11	19	4	3	3	2	2	8	48
5	1010	27.5	34.4	21.2	37.2	20.0	82	6.3	235	418	91	100	5	9	4	4	4	13	4	11	46
6	1010	26.9	33.2	21.4	35.0	20.6	84	6.3	236	415	98	99	3	6	2	5	4	16	5	8	51
7	1010	26.7	32.8	21.0	35.0	20.0	84	6.5	164	342	38	68	1	1	1	3	11	16	4	9	54
8	1010	26.9	33.2	20.9	36.1	18.3	84	5.9	165	328	46	94	*	1	1	4	12	22	4	7	49
9	1010	27.0	33.5	21.0	34.4	20.0	83	6.3	171	478	34	124	1	1	1	2	9	17	7	11	51
10	1010	27.0	33.8	20.7	35.6	19.4	82	6.0	200	463	50	133	3	6	3	4	8	15	4	11	46
11	1010	26.9	33.7	20.8	36.1	18.9	84	6.2	135	290	33	74	7	14	2	2	2	6	4	21	42
12	1010	26.4	33.1	20.1	34.4	16.7	84	6.5	155	494	30	154	4	8	1	1	1	4	7	18	46
Year	1010	26.9	33.7	20.5	37.2	16.7	83	6.2	1970	3627	121	154	6	11	2	3	5	10	4	13	46
Number of years	16	16					5	16	36			16	5								

* Under 0.5 %

Place	Position Lat.	Position Long.	Corr. Diff.	Corr. Ratio	M.H.W.I.	M.L.W.I.	Sp.R.	Np.R.	M.S.L. (Zo)
	° ′ N	° ′ E	h m		h m	h m	m	m	m
PHILIPPINE ISLANDS									
Luzon's Northcoast and its Periphery						(S. T. : 8hE.)			
				Standard Port : 那覇 Naha			p. 35		
Basco (*Batan I.*)	20 28	121 59	−0 45	0.50	6 41	...	0.8	0.5	0.40
Babuyan I.	19 34	121 56	−1 30	0.70	5 56	...	1.1	0.8	0.55
Camiguin I.	18 55	121 50	−1 15	0.65	6 14	...	1.0	0.7	0.49
				Standard Port : CEBU		on Cebu	p. 62		
Fuga I.	18 52	121 17	−4 45	0.50	6 29	...	0.6	0.4	0.30
Claverla Bay	18 37	121 6	−4 10	0.40	7 6	...	0.5	0.4	0.24
				Standard Port : 那覇 Naha		on Naha	p. 35		
Port San Vicente	18 31	122 10	−1 50	0.75	5 39	...	1.2	0.8	0.58
Aparri (*Cagayan River*)	18 22	121 38	−1 10	0.65	6 17	...	1.0	0.7	0.52
Luzon's West Coast				Standard Port : MANILA		on Manila	p. 59		
† Naga Bungan	18 29	120 34	高 −1 0 / 低 +3 50	0.55	6 56	...	0.4	0.3	0.31
					(19 55)	(9 50)	(0.7)	(0.0)	
† Salomague	17 47	120 25	高 −1 35 / 低 +0 50	0.55	8 10	...	0.4	0.4	0.30
					(20 30)	(6 50)	(0.8)	(0.0)	
† San Fernando	16 37	120 18	高 −0 55 / 低 +0 20	0.55	9 25	...	0.5	0.4	0.37
					(20 55)	(6 20)	(0.9)	(0.0)	
† Sual (*Lingayen Gulf*)	16 4	120 6	高 −0 35 / 低 +0 55	0.65	9 31	...	0.5	0.4	0.34
					(21 15)	(6 50)	(0.9)	(−.1)	
† Bolinao	16 24	119 54	高 −0 50 / 低 +0 15	0.70	9 35	...	0.4	0.3	0.27
					(21 5)	(6 15)	(0.8)	(−.2)	
† Santa Cruz	15 46	119 54	高 −1 0 / 低 −0 20	0.70	9 21	...	0.5	0.4	0.34
					(20 50)	(6 40)	(0.9)	(−.1)	
† Port Masinloc	15 31	119 55	高 −0 50 / 低 −0 15	0.75	9 35	...	0.6	0.5	0.43
					(21 5)	(5 45)	(1.0)	(−.1)	
† Olongapo (*Subic Bay*)	14 49	120 17	高 −0 15 / 低 −0 35	0.90	10 6	...	0.7	0.5	0.43
					(21 35)	(5 45)	(1.1)	(−.1)	
Manila Bay									
† Corregidor I.	14 23	120 36	高 +0 25 / 低 +0 40	0.90	11 4	...	0.7	0.6	0.49
					(22 20)	(6 40)	(1.2)	(−.1)	
				Standard Port : MANILA		on Manila	p. 59		
† MANILA	14 35	120 58	0 0	1.00	10 20	...	0.7	0.6	0.47
					(21 55)	(6 0)	(1.2)	(−.1)	
† Anilao (*Balayan Bay*)	13 46	120 55	高 +0 15 / 低 −0 15	1.10	10 43	...	0.9	0.7	0.55
					(22 10)	(5 50)	(1.5)	(−.1)	
Luzon's East Coast				Standard Port : 那覇 Naha		on Naha	p. 35		
Port Bikobian	17 16	122 26	−1 20	0.85	6 10	...	1.3	0.9	0.64
Diapitan Bay	16 24	122 13	−1 20	0.85	6 8	...	1.3	0.9	0.64
Baler Bay	15 45	121 35	−1 30	0.90	5 54	...	1.4	1.0	0.67
Umiray River Entrance	15 12	121 26	−1 35	0.90	5 52	...	1.4	1.0	0.67
Lamon Bay									
Port Lampon	14 40	121 37	−1 20	1.00	6 6	...	1.6	1.1	0.79
Atimonan	14 0	121 55	−1 20	1.10	6 8	...	1.7	1.2	0.79
Jose Panganiban	14 18	122 41	−1 20	1.00	6 10	...	1.6	1.1	0.76
Borabod	13 56	123 39	−1 20	1.00	6 14	...	1.6	1.1	0.76
Cabgan I. (*San Miguel Bay*)	13 46	123 16	−1 15	1.20	6 17	...	1.9	1.3	0.88
Port Anajao (*Calanduanes I.*)	13 57	124 20	−1 20	0.95	6 17	...	1.5	1.0	0.73
Tabaco (*Tabaco Bay*)	13 22	123 44	−1 35	0.95	6 2	...	1.5	1.0	0.73
Legaspi (*Albay Gulf*)	13 9	123 45	−1 30	0.95	6 5	...	1.5	1.0	0.73
Luzon's South Coast				Standard Port : CEBU		on Cebu	p. 62		
Lucena	13 54	121 36	+0 5	0.85	11 23	...	1.3	0.9	0.70
Aguasa Bay	13 17	122 31	0 0	1.05	11 23	...	1.5	1.0	0.79
Ragay Gulf									
Port Pasgo	13 31	122 36	+0 5	1.10	11 29	...	1.6	1.0	0.82
Guinayangan	13 53	122 27	+0 20	1.10	11 43	...	1.6	1.1	0.85
Pasacao	13 30	123 2	+0 10	1.10	11 31	...	1.5	1.0	0.79
Sorsogon	12 58	124 0	+0 35	0.90	12 2	...	1.2	0.8	0.64
Bagatao I.	12 50	123 48	+0 10	1.00	11 37	...	1.4	1.0	0.76
Butag Bay	12 37	123 56	+0 10	0.75	11 37	...	1.1	0.7	0.61

† denotes that the daily tide inequity is so large there are many cases in which there appears one cycle of tiding a day. The eqinoteal tide is shown in the upper row, hereas topic tide is parenthesized in thelower row.

地名 Place	位置 Position 緯度 Lat.	經度 Long.	改正數 Corr. 潮時差 Diff.	潮高比 Ratio	平均高潮間隔 M.H.W.I.	平均朔潮間隔 M.L.W.I.	大潮昇 Sp.R.	小潮昇 Np.R.	平均水面 M.S.L. (Zo)
	° ′ N	° ′ E	h m		h m	h m	m	m	m
				(經度時 S. T. : 8h E.)					
Luzon's South Coast					Standard Port : MANILA on Manila p. 59				
†Port Tilic [*Lubang I.*]	13 49	120 12	(A- 0 10) (M- 0 10)	1.00	10 19	...	0.8	0.6	0.52
					(21 40)	(5 40)	(1.2)	(-.1)	
Mindoro									
†Paluan	13 23	120 29	(A- 0 5) (M- 0 10)	1.05	10 27	...	0.9	0.7	0.55
					(21 50)	(5 50)	(1.3)	(-.1)	
†Mangarin	12 21	121 5	(A- 0 5) (M- 0 20)	1.20	10 43	...	0.9	0.7	0.55
					(22 00)	(5 40)	(1.3)	(-.2)	
					Standard Port : CEBU on Cebu p. 62				
Mansalay	12 31	121 26	-0 10	0.85	11 8	...	1.3	1.0	0.76
Calapan	13 26	121 11	-0 10	0.75	11 8	...	1.2	0.9	0.67
Port Balanacan [*Marinduque*]	13 32	121 52	-0 5	0.90	11 14	...	1.3	1.0	0.73
Maestre de Campo I.									
Port Concepcion	12 55	121 44	-0 5	0.90	11 12	...	1.3	1.0	0.76
Looc [*Tablas I.*]	12 16	122 0	0 0	0.90	11 17	...	1.4	1.0	0.79
Romblon [*Romblon I.*]	12 35	122 16	0 0	1.05	11 21	...	1.5	1.1	0.82
Masbate									
Nin Bay	12 14	123 17	+0 5	1.05	11 29	...	1.5	1.0	0.79
Port Barrera	12 22	123 37	+0 10	1.05	11 35	...	1.5	1.0	0.79
Cataingan	12 0	124 0	+0 10	0.95	11 37	...	1.3	0.8	0.70
					Standard Port : CEBU on Cebu p. 62				
San Pascual [*Burias I.*]	13 8	122 59	+0 5	1.10	11 27	...	1.6	1.1	0.85
Batuan Bay [*Ticao I.*]	12 25	123 46	+0 15	0.75	11 43	...	1.1	0.7	0.58
Luzon's South to Luzon									
Sumar									
Calbayog	12 4	124 35	+0 20	0.90	11 50	...	1.1	0.7	0.55
Catbalogan	11 47	124 52	+0 15	1.10	11 46	...	1.5	1.0	0.76
San Juanico Strait									
Santa Rita	11 27	124 57	+0 30	0.90	12 0	...	1.2	0.7	0.61
					Standard Port : MANILA on Manila p. 59				
†Santa Elena R. Entrance	11 21	124 59	(A- 0 15) (M- 0 25)	0.85	10 46	...	0.7	0.5	0.40
					(21 55)	(5 55)	(0.9)	(-.1)	
					Standard Port : CEBU on Cebu p. 62				
Guiuan	11 2	125 44	-5 10	0.50	6 27	...	0.7	0.6	0.37
					Standard Port : 那覇 on Naha p. 35				
Hilaban I.	12 2	125 34	-1 20	0.90	6 21	...	1.5	1.0	0.73
Laoang Bay	12 35	125 1	-1 20	0.95	6 21	...	1.5	1.1	0.76
					Standard Port : VALPARAISO on Valparaiso p. 146				
Biri I.	12 39	124 22	-5 20	0.65	5 43	...	0.7	0.5	0.34
Leyte					Standard Port : CEBU on Cebu p. 62				
Palompon	11 3	124 23	+0 20	1.15	11 46	...	1.6	1.1	0.85
Baybay	10 41	124 48	0 0	1.05	11 33	...	1.5	1.0	0.85
Maasin	10 8	124 50	-0 15	0.80	11 17	...	1.2	0.9	0.70
					Standard Port : 高雄 on Kaohsiung p. 41				
Liloan [*Sogod Bay*]	10 9	125 7	+2 10	1.95	10 58	...	1.0	0.7	0.58
					Standard Port : MANILA on Manila p. 59				
†Hinunangan Bay	10 24	125 12	(A- 1 30) (M- 1 40)	0.70	8 25	...	0.5	0.4	0.31
					(20 20)	(4 40)	(0.8)	(0.0)	
					Standard Port : 高雄 on Kaohsiung p. 41				
†Tacloban	11 15	125 0	-0 35	1.00	7 37	...	0.5	0.4	0.27
					(20 0)	(3 30)	(0.8)	(0.0)	
Bohol									
Garcia Hernandez	9 36	124 17	+2 30	2.20	11 12	...	1.1	0.8	0.64
					Standard Port : CEBU on Cebu p. 62				
Cebu									
Bantayan [*Bantayan I.*]	11 10	123 43	+0 25	1.25	11 50	...	1.7	1.2	0.91
Balamban Bay	10 30	123 43	+0 15	1.50	11 43	...	1.6	1.1	0.85
Moalboal	9 56	123 24	+0 10	1.20	11 37	...	1.6	1.0	0.82
Boljoon	9 38	123 29	-0 15	0.90	11 12	...	1.3	0.8	0.67
CEBU	10 18	123 54	0 0	1.00	11 27	...	1.4	0.9	0.72
Bogo Bay	11 4	124 0	+0 20	1.15	11 48	...	1.6	1.1	0.82

† denotes that the daily tide inequity is so large that there are many cases in which there appears one cycle of tiding a day. The equinotical tide is shown in the upper row, whereas the topic tide is parenthesized in the lower row.

港名 Place	位置 Position 緯度 Lat.	位置 Position 経度 Long.	改正数 Corr. 潮時差 Diff.	改正数 Corr. 潮高比 Ratio	平均満潮間隔 M. H. W. I.	平均低潮間隔 M. L. W. I.	大潮昇 Sp. R.	小潮昇 Np. R.	平均水面 M.S.L. (Zo)
	° ′ N	° ′ E	h m	(標準時 S. T. 8h E.)	h m	h m	m	m	m
Negros									
Bacolod	10 40	122 57	+0 20	1.15	11 41	...	1.6	1.2	0.91
Himamaylan	10 6	122 52	−0 5	0.90	11 17	...	1.3	1.0	0.76
Campomanes Bay	9 42	122 25	−0 20	0.90	11 2	...	1.3	0.8	0.67
Port Bonbonon	9 3	123 7	−0 25	0.90	11 0	...	1.3	0.8	0.67
Larena [*Siquijor I.*]	9 15	123 35	−0 20	0.90	11 6	...	1.2	0.8	0.64
Bais	9 36	123 8	+0 5	1.20	11.31	...	1.5	1.0	0.76
		Standard Port : CEBU on Cebu p. 62							
San Carlos	10 29	123 25	+0 15	1.20	11 41	...	1.7	1.1	0.88
Cadiz	10 57	123 19	+0 30	1.40	11 54	...	1.9	1.3	1.01
Panay									
Borocay I.	11 57	121 56	−0 20	1.05	10 58	...	1.5	1.0	0.79
Tibiao	11 17	122 2	−0 25	0.95	10 54	...	1.4	1.0	0.82
Aninly	10 26	121 55	−0 25	0.90	10 56	...	1.3	0.9	0.73
Iloilo	10 40	122 35	+0 5	0.95	11 29	...	1.4	1.0	0.76
Banate	11 0	122 49	+0 25	1.20	11 48	...	1.8	1.4	1.07
Estancia	11 28	123 9	+0 20	1.40	11 43	...	2.0	1.4	1.04
Capiz Landing	11 36	122 43	+0 10	1.10	11 33	...	1.5	1.0	0.79
		Standard Port : 高 雄 on Kaohsiung p. 41							
Camiguin I.									
Mambajao	9 15	124 43	+2 35	2.20	11 19	...	1.0	0.7	0.55
Mindanao's North and Westcoast									
Macabalan Point [*Macajalar Bay*]	8 30	124 40	+2 35	2.40	11 19	...	1.1	0.7	0.55
Iligan Bay									
Iligan	8 14	124 14	+2 40	2.40	11 21	...	1.2	0.8	0.64
Misamis	8 9	123 51	+2 45	2.65	11 27	...	1.2	0.7	0.58
Plaridel	8 37	123 43	+2 25	2.40	11 4	...	1.2	0.8	0.64
Dapitan	8 40	123 25	+2 10	2.40	10 50	...	1.1	0.7	0.58
Port Santa Maria	7 46	122 7	+2 5	1.95	10 41	...	1.0	0.7	0.55
Sibuco Bay	7 19	122 4	+2 0	2.05	10 35	...	1.1	0.7	0.61
Mindanao's Eastcoast									
Surigao	9 48	125 29	+2 35	1.50	11 25	...	0.8	0.6	0.52
		Standard Port : 那 覇 on Naha p. 35							
Dahikan Bay	9 27	125 56	−1 20	0.95	6 25	...	1.6	1.1	0.79
Port Pilar [*Siargao I.*]	9 52	126 6	−1 15	0.80	6 29	...	1.3	0.9	0.61
Tandag	9 5	126 12	−1 25	1.00	6 19	...	1.5	1.0	0.70
Hinatuan	8 22	126 20	−1 30	1.00	6 17	...	1.6	1.1	0.76
Caraga Bay	7 17	126 34	−1 35	1.00	6 12	...	1.6	1.1	0.79
Mati [*Pujada Bay*]	6 57	126 13	−1 30	0.95	6 10	...	1.6	1.1	0.76
Mindanao's Southcoast									
Davao Gulf									
Sigaboy	6 39	126 4	−1 35	1.05	6 10	...	1.6	1.0	0.76
Davao	7 5	125 40	−1 35	1.10	6 8	...	1.7	1.1	0.79
		Standard Port : 鎮南浦 on Chinnampo p. 20							
Port Lebak	6 32	124 3	−3 30	0.40	6 6	...	1.9	1.2	0.88
Illana Bay									
Polloc Harbour	7 21	124 13	−3 20	0.40	6 14	...	1.9	1.1	0.85
Ticouan Point [*Sibuguey Bay*]	7 45	122 44	−3 15	0.45	6 14	...	2.0	1.2	0.94
Sulu Archipelago									
		Standard Port : MANILA on Manila p. 59							
Jolo I.									
†Jolo	6 4	121 0	(A−4 15, B−5 15)	0.95	8 10 (20 40)	... (11 15)	0.6 (1.0)	0.4 (0.0)	0.34
		Standard Port : 鎮南浦 on Chinnampo p. 20							
Malmbung	5 56	121 2	−3 15	0.25	6 8	...	1.2	0.7	0.52
Bongao [*Tawitawi I.*]	5 2	119 46	−3 55	0.30	5 21	...	1.3	0.7	0.55
Palawan Periphery									
		Standard Port : MANILA on Manila p. 59							
†Apo Reef [*Mindoro Strait*]	12 40	120 24	(A+1 5, B−0 15)	1.15	10 35 (22 0)	... (5 45)	0.9 (1.3)	0.7 (−.1)	0.55

† denotes that the daily tide inequity is so large that there are many cases in which there appears one cycle of tiding a day. The equinotical tide is shown in the upper row, whereas the topical tide is parenthesized in the lower row.

地名 Place	位置 Position 緯度 Lat.	経度 Long.	改正数 Corr. 潮時差 Diff.	潮高比 Ratio	平均満潮潮時 M. H. W. I.	平均干潮潮時 M. L. W. I.	大潮昇 Sp. R.	小潮昇 Np. R.	平均水面 M. S. L. (Zo)
	° ′ N	° ′ E	h m		h m (基準時 S. T. : 8hE.)	h m	m	m	m
			Standard Port : MANILA		on Manila		p. 59		
†Coron	12 1	120 12	入 +0 30 出 −0 5	1.20	10 45	...	1.0	0.8	0.67
					(22 10)	(5 55)	(1.4)	(0.0)	
†Halsey [*Culion I.*]	11 48	119 57	入 +0 15 出 0 0	1.15	10 43	...	0.9	0.8	0.61
					(22 5)	(5 55)	(1.4)	(−.1)	
†Cuyo [*Cuyo I.*]	10 51	121 0	入 +0 30 出 −0 30	1.45	10 43	...	1.2	0.8	0.67
					(22 25)	(5 55)	(1.5)	(0.0)	
Palawan's Westcoast									
†Ulugan Bay	10 6	118 47	入 +0 30 出 0 5	1.10	10 41	...	0.9	0.7	0.61
					(21 55)	(6 0)	(1.4)	(−.1)	
†Eran Bay	9 3	117 44	入 +0 25 出 +0 20	1.15	10 50	...	0.9	0.7	0.61
					(22 5)	(6 10)	(1.4)	(−.1)	
Palawan's Eastcoast									
†North-west Bay [*Linapacan I.*]	11 28	119 46	入 +0 15 出 0 0	1.20	10 43	...	1.0	0.7	0.61
					(22 5)	(5 55)	(1.4)	(−.1)	
†Puerto Princesa	9 44	118 42	入 +0 25 出 −0 5	1.40	10 35	...	1.1	0.8	0.67
					(22 15)	(5 50)	(1.5)	(−.1)	
†Balabac [*Balabac I.*]	8 0	117 4	入 +0 40 出 +0 25	1.20	10 54	...	1.0	0.8	0.64
					(22 15)	(6 10)	(1.4)	(−.1)	

† denotes that the daily tide inequity is so large that there are many cases in which there appears one cycle of tiding a day. The equinotical tide is shown is shown in the upper row, whereas the topical tide is parenthesized in the lower row.

MANILA

Tide
1976

Lat. 14° 35′ N. Long. 120° 58′ E.

1 月								2 月							
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm			h m	cm			h m	cm			h m	cm	
1	05 19	-30	16	04 50	-27	1	06 12	-21	16	05 28	-18	1	05 31	-6	16	04 39	6
●	21 27	119		21 13	116		22 52	101	○	11 34	37		11 24	43		10 35	55
										15 19	18	●	15 43	18	E○	15 50	12
										22 45	110		22 57	85		22 45	91
2	05 58	-34	17	05 26	-30	2	06 39	-15	17	05 58	-12	2	05 55	3	17	05 04	15
	22 07	116	○	22 00	119		12 43	30		11 58	43		11 44	49		10 59	67
							16 54	21	P P	16 28	15	E	16 35	15	P	16 59	3
							23 28	91		23 37	101		23 33	79		23 40	79
3	06 34	-30	18	06 01	-30	3	07 04	-9	18	06 26	-3	3	06 13	9	18	05 26	21
	22 45	113		22 48	119		13 03	37		12 25	55		12 04	55		11 27	79
						☾	16 50	21		17 38	12		17 27	15		18 05	-3
4	07 10	-24	19	06 36	-27	4	00 02	82	19	00 27	85	4	00 06	70	19	00 32	67
	23 23	107		13 05	30		07 25	-3		06 51	9		06 27	15		05 42	27
				15 47	24		13 25	43		12 54	64	A	12 27	61		11 59	91
				23 35	113		17 49	24		18 53	12		18 20	15		19 11	-6
5	07 43	-18	20	07 10	-18	5	00 34	73	20	01 17	70	5	00 39	61	20	01 26	52
	14 23	27	P	13 32	37		07 42	6		07 11	15		06 37	21		05 54	27
	15 56	27		16 55	27	A	13 52	49		13 28	76		12 53	67		12 36	98
	23 59	98					18 57	24		20 11	9		19 17	15		20 17	-9
6	08 13	-12	21	00 23	101	6	01 05	61	21	02 13	52	6	01 14	49	21	02 33	40
	14 47	34		07 42	-9		07 53	12		07 28	21		06 40	24		05 59	30
	17 02	30	E	14 02	46		14 21	58		14 07	82		13 21	70		13 18	104
				18 13	27		20 16	27		21 36	9		20 17	15		21 30	-6
7	00 36	85	22	01 11	85	7	01 36	49	22	03 27	34	7	01 53	40	22	14 10	101
E	08 40	-6		08 10	3		08 00	15		07 38	21		06 32	27		22 53	-6
	15 15	40		14 34	55		14 56	64	☾	14 58	88		13 50	73	S		
	18 18	37		19 49	27		21 49	27		23 17	6		21 25	15			
8	01 12	73	23	02 03	67	8	02 10	37	23	05 47	24	8	02 45	30	23	15 15	98
	09 02	3		08 34	9		07 56	18		07 35	24		05 52	27	☾		
	15 49	49		15 12	64	☽	16 37	70	S	16 03	91		14 24	79			
	20 06	40		21 33	24		23 54	21					23 50	15			
9	01 48	58	24	03 05	49	9	02 58	24	24	01 18	-3	9	15 09	82	24	00 29	-6
A ☽	09 18	9	☾	08 51	15		07 26	18		17 20	94	☽ N				16 35	94
	16 26	58		15 58	76		16 25	76									
	22 21	37		23 31	18												
10	02 26	46	25	04 56	30	10	02 11	12	25	02 37	-12	10	00 58	9	25	01 43	-6
	09 29	15		09 04	21		17 19	82		18 34	98		16 08	85		17 58	91
	17 07	64		16 56	85												
11	00 43	30	26	01 41	6	11	02 56	3	26	03 26	-15	11	02 07	3	26	02 34	-3
	03 18	30		07 29	21		18 13	91		19 41	98		17 17	91		19 17	88
	09 34	18		09 05	21	N											
	17 48	73		17 59	94												
12	02 21	18	27	03 01	-9	12	03 26	-9	27	04 04	-15	12	02 45	-3	27	03 12	-3
	06 54	21		18 58	101		19 07	101		20 40	98		18 26	98		09 32	43
	09 30	18	S													13 00	34
	18 27	82														20 26	85
13	03 11	6	28	03 51	-18	13	03 56	-15	28	04 36	-15	13	03 16	-6	28	03 44	6
	19 07	94		19 53	107		20 02	107		10 49	34		19 35	101		09 50	49
										13 35	27					14 21	27
										21 32	94					21 23	82
14	03 46	-9	29	04 32	-24	14	04 25	-21	29	05 06	-12	14	03 44	-6	29	04 11	12
N	19 48	104		20 44	107		20 56	113		11 06	37		10 08	37		10 10	55
										14 47	21		13 01	30	E	15 20	21
										22 17	91		20 42	101		22 11	76
15	04 17	-18	30	05 07	-27	15	04 56	-21				15	04 12	-3	30	04 34	18
	30 30	110		21 30	107		11 19	30					10 15	43		10 31	61
							14 00	24					14 35	21		16 11	15
							21 51	113					21 47	98		22 56	73
			31	05 41	-27										31	01 52	21
			●	22 14	101										●A	10 52	70
																17 00	9
																23 33	64

3 月								4 月							
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm			h m	cm			h m	cm			h m	cm	
1	05 31	-6	16	04 39	6	1	05 04	27	16	03 54	37				
	11 24	43		10 35	55		11 16	76		10 42	107				
●	15 43	18	E○	15 50	12		17 47	6		18 20	-16				
	22 57	85		22 45	91										
2	05 55	3	17	05 04	15	2	00 12	68	17	00 46	49				
	11 44	49		10 59	67		05 14	30		04 03	37				
E	16 35	15	P	16 59	3		11 40	82		11 19	116				
	23 33	79		23 40	79		18 34	3		19 18	-18				
3	06 13	9	18	05 26	21	3	00 53	49	18	01 50	40				
	12 04	55		11 27	79		05 20	34		04 10	37				
	17 27	15		18 05	-3		12 06	85	S	11 58	119				
							19 22	3		20 17	-18				
4	00 06	70	19	00 32	67	4	01 42	43	19	12 43	116				
	06 27	15		05 42	27		05 07	37		21 18	-12				
A	12 27	61		11 59	91		12 32	88							
	18 20	15		19 11	-6		20 13	3							
5	00 39	61	20	01 26	52	5	02 58	37	20	13 34	110				
	06 37	21		05 54	27		01 18	37		22 24	-9				
	12 53	67		12 36	98	N	12 58	88							
	19 17	15		20 17	-9		21 08	6							
6	01 14	49	21	02 33	40	6	13 28	91	21	14 34	104				
	06 40	24		05 59	30		22 11	6		23 31	-3				
	13 21	70		13 18	104				☾						
	20 17	15		21 30	-6										
7	01 53	40	22	14 10	101	7	14 09	91	22	15 44	94				
	06 32	27		22 53	-6		23 31	6							
	13 50	73	S												
	21 25	15													
8	02 45	30	23	15 15	98	8	15 11	91	23	00 32	6				
	05 52	27	☾			☽				17 04	85				
	14 24	79													
	23 50	15													
9	15 09	82	24	00 29	-6	9	00 47	6	24	01 19	9				
☽ N				16 35	94		16 26	91		08 14	52				
										11 44	46				
										18 33	76				
10	00 58	9	25	01 43	-6	10	01 35	6	25	01 59	15				
	16 08	85		17 58	91		17 48	91		08 33	58				
									E	13 29	37				
										19 57	70				
11	02 07	3	26	02 34	-3	11	02 10	12	26	03 28	21				
	17 17	91		19 17	88		19 12	88		08 55	67				
										14 40	27				
										21 06	67				
12	02 45	-3	27	03 12	-3	12	02 40	15	27	03 52	27				
	18 26	98		09 32	43		08 59	55		09 18	76				
				13 00	34	E	13 49	30	A	15 31	18				
				20 26	85		20 35	82		22 01	61				
13	03 16	-6	28	03 44	6	13	03 05	21	28	03 11	34				
	19 35	101		09 50	49		09 16	67		09 41	85				
				14 21	27		15 12	18		16 24	9				
				21 23	82		21 49	76		22 49	58				
14	03 44	-6	29	04 11	12	14	03 27	30	29	03 25	37				
	10 08	37		10 10	55		09 40	82		10 07	91				
	13 01	30	E	15 20	21	P○	16 19	6	●	17 10	3				
	20 42	101		22 11	76		22 50	70		23 35	52				
15	04 12	-3	30	04 34	18	15	03 44	34	30	03 36	40				
	10 15	43		10 31	61		10 08	98		10 34	98				
	14 35	21		16 11	15		17 21	-9		17 54	-6				
	21 47	98		22 56	73		23 47	61							
			31	01 52	21										
			●A	10 52	70										
				17 00	9										
				23 33	64										

Hrs. : 8 hE.

潮高の基準面：平均水面下 47 cm
Datum : 47 cm below mean sea level

MANILA

Lat. 14° 35′ N. Long. 120° 58′ E.

Tide 1976

5月						6月						7月						8月					
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm		h m	cm		h m	cm		h m	cm		h m	cm		h m	cm		h m	cm		h m	cm
1	09 23	49	16	10 50	131	1	11 38	119	16	12 05	125	1	12 12	125	16	02 13	55	1	02 09	79	16	01 57	85
	03 44	40		19 19	-21		19 52	-12		20 34	-3		20 06	3		05 09	49	P	07 22	49		08 11	49
	11 02	101													E	12 37	107		13 46	94	A	13 35	70
	18 37	-9														20 26	18		20 13	34		19 42	43
2	01 22	46	17	11 34	131	2	12 13	116	17	12 49	113	2	13 56	116	17	02 40	64	2	02 42	88	17	02 33	91
	03 37	43		20 10	-18		20 34	-6		21 11	6		20 40	12		06 26	52		08 56	49		09 39	46
	11 30	104														13 14	91		14 42	76		14 13	58
	19 21	-9														20 47	24		20 31	40		19 39	46
3	11 58	104	18	12 19	125	3	12 53	113	18	13 34	101	3	03 37	61	18	03 12	70	3	03 23	98	18	03 15	94
N	20 06	-9		20 59	-12		21 16	3		21 44	12		06 09	58		08 03	55		10 39	43		11 24	43
												E	13 41	104		13 49	82	☽	16 08	58	☾	15 13	49
													21 08	21		21 02	30		20 42	46		19 08	46
4	12 25	104	19	13 07	116	4	13 36	107	19	04 46	58	4	04 01	70	19	03 50	79	4	04 15	110	19	04 05	101
	20 54	-6		21 50	-6		21 54	9		07 42	55		08 13	68		09 54	55		12 44	34		13 29	37
									E☾	14 19	88		14 33	88	☾A	14 38	67						
										22 12	21		21 32	27		21 13	37						
5	12 57	104	20	14 00	104	5	14 30	94	20	05 20	67	5	04 32	79	20	04 32	88	5	05 19	119	20	05 00	107
	21 44	-3		22 38	6	☽	22 26	18		10 00	55		10 19	55		11 49	49		14 28	21	N	14 33	27
										15 06	73	☽	15 39	70		15 16	55						
										22 34	27		21 49	37		21 19	40						
6	13 39	101	21	14 56	91	6	06 22	64	21	05 54	79	6	05 09	91	21	05 19	98	6	06 22	125	21	05 55	113
	22 38	6	☾	23 20	12		09 04	61		12 05	49		12 29	46		13 42	40	S	16 27	12		15 08	21
						E	15 34	82		16 08	58		17 35	55		17 35	43						
							22 53	27		22 50	34		22 01	40		21 18	40						
7	14 38	98	22	06 47	68	7	06 18	73	22	06 29	88	7	05 54	104	22	06 04	104	7	07 21	131	22	06 49	122
☽	23 27	9	E	09 46	55		11 51	62	A	13 41	40	P	14 19	30		14 54	30		16 11	6		15 39	15
				16 01	79		17 07	67		18 16	49		19 50	46									
				23 56	18		23 14	34		23 03	37		22 10	43									
8	15 51	88	23	07 07	67	8	06 40	85	23	07 03	98	8	06 43	116	23	06 49	113	8	08 17	131	23	07 42	128
				12 05	49		13 48	37		14 52	27		15 29	15		15 36	18		16 49	3		16 07	12
				17 24	67		19 18	55		20 30	43												
							23 30	40		23 14	40												
9	00 08	18	24	00 26	27	9	07 12	101	24	07 38	107	9	07 32	128	24	07 32	122	9	09 09	134	24	08 35	131
E	08 06	55		07 34	76		15 06	21		15 43	18	S	16 21	3		16 10	12		17 23	6		16 35	12
	10 15	55		13 39	40										N				23 45	49		23 56	55
	17 19	79		19 17	68																		
10	00 40	24	25	00 49	30	10	07 50	116	25	08 13	116	10	08 20	134	25	08 16	128	10	01 22	49	25	01 46	49
	07 45	64		07 59	85	P	16 07	6		16 24	9		17 04	-9		16 41	6		09 57	131		09 30	131
	13 00	43	A	14 47	27													O	17 54	9	●	17 04	15
	19 03	70		20 44	52														23 59	52		23 11	61
11	01 05	30	26	01 05	37	11	08 31	125	26	08 49	122	11	09 08	137	26	09 01	134	11	02 40	46	26	03 02	46
	07 59	79		08 26	94		16 59	-9	N	17 02	-3	O	17 44	-9		17 13	3		10 41	125		10 24	128
	14 33	27		15 41	15														18 23	15		17 34	21
	20 41	64		21 51	49																	23 35	70
12	01 25	37	27	01 21	40	12	09 13	134	27	09 27	128	12	09 54	137	27	09 47	137	12	00 19	58	27	04 11	40
	08 24	94		08 55	104		17 47	-15	●	17 37	-9		18 22	-9	●	17 47	-3		03 43	46		11 16	122
	15 41	16		16 28	6	SO													11 20	116	E	18 02	27
	21 58	58		22 49	46														18 47	21			
13	01 41	43	28	01 38	43	13	09 56	137	28	10 07	131	13	10 38	134	28	10 35	137	13	00 40	64	28	00 01	79
P	08 56	107		09 26	110		18 32	-18		18 15	-9		18 57	-3		18 20	3		04 12	46		05 20	37
	16 43	-6		17 10	-3													E	11 55	107	P	12 06	110
	23 06	49		23 47	46														19 08	27		18 26	37
14	01 53	43	29	01 52	43	14	10 38	131	29	10 48	131	14	11 20	128	29	00 46	55	14	01 01	70	29	00 29	91
	09 33	119		09 57	116		19 14	-15		18 51	-9		19 29	6		03 36	49		05 44	46		06 32	34
O	17 37	-15	●	17 49	-9											11 21	131		12 29	94		12 58	91
																18 53	9		19 25	34		18 47	43
15	10 11	128	30	10 31	119	15	11 21	131	30	11 28	131	15	01 50	49	30	01 11	61	15	01 28	76	30	01 01	101
S	18 29	-21	N	18 30	-12		19 55	-12		19 29	-6		04 00	46		04 42	49		06 54	46		07 48	31
													11 59	119	E	12 09	122		13 01	82		13 55	76
													19 59	12		19 24	18		19 36	40		19 01	46
			31	11 04	119										31	01 39	70				31	01 39	110
				19 11	-12											05 56	49					09 08	30
																12 57	110					15 08	61
																19 50	27					19 10	49

Hrs. : 8 hE.

潮高の基準面：平均水面下 47 cm

Datum : 47 cm below mean sea level

MANILA

Tide
1976

Lat. 14° 35′ N. Long. 120° 58′ E.

9月						10月						11月						12月					
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm		h m	cm		h m	cm		h m	cm		h m	cm		h m	cm		h m	cm		h m	cm
1	02 27	116	16	02 06	101	1	02 44	122	16	01 43	104	1	01 38	91	16	03 01	88	1	00 09	43	16	04 10	55
	10 39	27		10 48	34		11 56	12		11 19	18		12 50	15		11 37	15		05 07	58		10 39	21
☽	17 14	49	N						☾				19 53	61		20 34	61		11 59	21		18 18	73
	19 05	49											23 47	55		21 44	61		19 15	73			
2	03 29	119	17	02 54	104	2	04 03	116	17	02 40	104	2	06 11	82	17	04 32	76	2	01 42	30	17	01 42	30
	12 34	24		12 34	30		13 10	15		12 22	18		13 26	21		12 05	21		07 14	49		06 39	40
S			☾									E	20 11	70	E	19 34	67		12 20	24		10 55	27
																			19 43	85		18 47	88
3	04 43	122	18	03 51	107	3	05 27	110	18	03 56	101	3	01 29	43	18	00 57	49	3	02 47	18	18	02 54	9
	14 03	18		13 41	24		14 02	15		13 04	18		07 38	73		06 20	67		08 41	43		08 37	34
													13 57	27		12 29	30		12 37	30		11 10	27
													20 34	79		19 38	82		20 11	91		19 24	104
4	05 59	122	19	04 57	110	4	06 47	107	19	05 14	98	4	02 37	34	19	02 21	30	4	03 39	6	19	03 49	-9
	14 56	12		14 17	21		14 41	18		13 35	21		08 49	67		08 07	58		09 49	40		20 06	116
							21 05	64		20 56	64		14 20	34		12 49	34	A	12 51	34	P		
										23 40	61		20 56	88		20 00	98		20 40	101			
5	07 08	122	20	06 02	113	5	00 50	52	20	06 36	94	5	03 30	21	20	03 25	12	5	04 22	-6	20	04 38	-24
	15 37	12		14 47	18		07 59	101		14 02	27		09 49	64		09 30	52		10 48	37		20 48	125
							15 13	24		20 40	70		14 35	37		13 04	37		13 05	34	S		
							21 26	70					21 20	94		20 30	113		21 09	107			
6	08 11	122	21	07 07	116	6	02 11	46	21	01 39	46	6	04 18	12	21	01 21	-6	6	05 02	-15	21	05 23	-30
	16 11	15		15 18	21		09 01	98		08 00	88		10 38	58		10 38	46		11 47	34		21 32	131
	22 21	58		21 46	61	E	15 40	30	E	14 26	34	A	14 44	43	P●	13 21	40		13 18	34	●		
							21 46	76		20 49	82		21 44	104		21 05	125		21 40	110			
7	01 15	52	22	00 50	55	7	03 12	37	22	02 55	30	7	05 02	-3	22	05 14	-18	7	05 40	-18	22	06 06	-34
	09 08	119		08 13	116		09 53	91		09 16	82		11 27	52		11 45	40		22 12	113		22 16	128
	16 42	18		15 41	24		16 03	37		14 47	40	○	14 51	43		13 36	37	○N					
	22 39	61		21 50	67		22 07	85		21 12	98		22 10	107		21 44	134						
8	02 31	46	23	02 20	46	8	04 03	27	23	04 00	16	8	05 44	-3	23	06 06	-27	8	06 16	-21	23	06 49	-34
	09 58	113		09 18	113		10 39	82		10 21	76		22 36	110		22 24	137		22 45	113		23 00	125
○	17 07	24	E	16 07	30	○	16 18	43	●P	15 02	43				S								
	23 00	67		22 08	79		22 28	91		21 40	113												
9	03 30	43	24	03 32	34	9	04 50	21	24	05 00	3	9	06 26	-6	24	06 56	-27	9	06 53	-21	24	07 28	-27
	10 41	107		10 18	107		11 20	76		11 21	67		23 04	113		23 06	134		23 17	110		23 44	116
E	17 30	30	●	16 31	37		16 26	46		15 13	46												
	23 20	73		22 32	91		22 49	98		22 12	125												
10	04 25	37	25	04 39	24	10	05 38	18	25	05 58	-6	10	07 08	-9	25	07 45	-24	10	07 32	-21	25	08 06	-18
	11 20	98		11 14	98		12 01	67		12 22	55		23 33	110		23 51	128		23 48	107		14 56	30
	17 48	37	P	16 50	43	A	16 29	49		15 23	46	N										16 14	30
	23 40	79		23 00	104		23 13	101		22 49	131												
11	05 17	37	26	05 44	18	11	06 26	16	26	06 56	-12	11	07 52	-6	26	08 34	-18	11	08 11	-18	26	00 27	101
	11 55	88		12 09	85		12 44	61		13 29	46		23 59	110								08 42	-12
	17 59	43		17 06	49		16 25	49	S	15 29	43												
				23 31	116		23 40	104		23 28	134												
12	00 02	88	27	06 49	12	12	07 14	15	27	07 53	-12	12	08 38	-6	27	00 39	116	12	00 20	101	27	01 10	88
	06 12	34		13 07	70		13 39	62								09 23	-12		08 49	-12		09 15	-3
	12 30	79		17 14	49		16 06	49													E	16 04	46
	18 05	46																				19 25	40
13	00 27	91	28	00 08	122	13	00 06	107	28	00 08	131	13	00 26	107	28	01 31	104	13	00 57	94	28	01 53	70
	07 10	34		07 55	12		06 04	16		08 55	-9		09 26	-3		10 10	-3		09 26	-6		09 43	6
A	13 07	67		14 16	58										☽						☽	16 45	55
	18 04	49		17 16	49																	21 47	40
14	00 56	98	29	00 49	125	14	00 34	107	29	01 03	126	14	01 00	101	29	02 28	88	14	01 41	82	29	02 41	55
	08 11	34		09 06	12		09 01	16		09 58	-3		10 15	6		10 52	6		09 56	6		10 05	12
	13 50	58	S			N										18 29	55	E☾				17 27	64
	17 49	49														21 39	52					23 58	34
15	01 28	101	30	01 39	126	15	01 04	107	30	02 03	116	15	01 49	94	30	03 34	73	15	02 40	70	30	03 46	40
	09 20	34	☽	10 25	12		10 04	16		11 04	6	☾	11 00	9	E	11 28	16		10 21	15		10 21	18
									☽							18 49	64		18 04	61		18 08	73
																			23 34	40			
									31	03 15	104										31	01 42	21
										12 02	9										A	06 50	27
																						10 31	21
																						18 47	82

Hrs. : 8 hE.

潮高の基準面：平均水面下 47 cm
Datum : 47 cm below mean sea level

CEBU

Lat. 10° 18' N. Long. 123° 54' E.

Tide
1976

1月								2月							
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h	m	cm		h	m	cm		h	m	cm		h	m	cm
1	05	37	34	16	06	31	-24	1	06	30	-27	16	06	09	-27
	11	55	76		11	51	73		12	32	86		12	08	98
●	16	03	43		15	57	46		17	33	24	○	17	23	12
	22	48	177		22	39	168		23	58	162		23	49	166
2	06	15	-37	17	06	05	-34	2	06	53	-21	17	06	34	-24
	12	30	76		12	18	76		12	53	94		12	30	107
	16	46	40	○	16	41	37		18	06	18	E P	18	05	3
	23	27	180		23	19	177								
3	06	50	-34	18	06	36	-37	3	00	29	155	18	00	27	162
	12	58	79		12	41	82		07	14	-18		06	58	-15
	17	26	37		17	20	30	E	13	14	104		12	57	119
					23	55	177		18	41	15		18	49	-9
4	00	01	174	19	07	04	-34	4	00	57	146	19	01	05	149
	07	19	-27		13	05	88		07	32	-12		07	22	-9
	13	25	82		18	02	21		13	36	110		13	25	131
	18	04	34						19	15	16		19	34	-9
5	00	37	168	20	00	33	174	5	01	24	134	20	01	45	131
	07	45	-21		07	32	-27		07	50	-6		07	46	6
	13	50	85	P	13	32	94	A	14	00	116		13	57	140
	18	41	34		18	46	15		19	50	18		20	23	-6
6	01	08	165	21	01	11	165	6	01	53	122	21	02	26	110
	08	11	-15		07	59	-21		08	10	6		08	09	16
	14	17	91	E	14	02	104		14	27	119		14	35	143
	19	21	34		19	34	15		20	31	21		21	20	6
7	01	41	143	22	01	50	146	7	02	24	107	22	03	09	85
	08	34	-6		08	26	-9		08	31	12		08	31	24
E	14	47	98		14	35	113		14	59	119	☾	15	19	140
	20	03	37		20	27	15		21	20	27		22	36	15
8	02	13	128	23	02	33	125	8	02	59	88	23	04	08	61
	08	58	6		08	54	6		08	52	21		08	51	34
	15	22	101		15	16	122	☽	15	39	119	S	16	18	137
	20	55	43		21	30	21		22	28	34				
9	02	48	110	24	03	22	98	9	03	47	70	24	00	34	21
	09	25	15		09	22	18		09	13	34		17	48	131
A ☽	16	04	107	☾	16	05	128		16	32	119				
	22	01	46		22	55	27								
10	03	32	91	25	04	25	73	10	00	22	37	25	02	47	15
	09	56	24		09	53	30		05	24	52		19	38	131
	16	56	110		17	07	131		09	26	43				
	23	38	49						17	51	119				
11	04	36	70	26	00	04	24	11	02	47	24	26	03	54	3
	10	31	34		06	22	55		19	28	126		10	41	67
	18	02	116		10	29	40	N					14	02	58
					18	27	134						21	01	137
12	01	46	40	27	02	52	12	12	03	56	6	27	04	35	-9
	06	51	58		19	53	143		10	59	61		10	56	79
	11	21	43	S					13	17	61		15	25	46
	19	14	122						20	45	137		21	57	146
13	03	19	21	28	04	04	-6	13	04	38	-9	28	05	07	-12
	09	26	58		10	43	61		11	09	70		11	16	88
	12	43	52		13	46	52		14	55	52		16	17	34
	20	19	134		21	04	152		21	41	149		22	41	149
14	04	14	6	29	04	52	-18	14	05	11	-21	29	05	34	-12
	10	41	64		11	17	70		11	27	76		11	35	98
N	14	06	55		15	11	49		15	54	40		16	57	21
	21	12	140		22	00	168		22	29	162		23	17	152
15	04	56	-15	30	05	31	-27	15	05	41	-27				
	11	21	70		11	45	76		11	47	85				
	15	09	52		16	08	40		16	41	27				
	21	58	168		22	46	165		23	10	168				
				31	06	02	-27								
					12	09	82								
				●	16	53	30								
					23	26	165								

3月								4月							
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h	m	cm		h	m	cm		h	m	cm		h	m	cm
1	05	56	-12	16	05	30	-9	1	00	02	128	16	00	16	122
	11	55	110		11	27	122		05	51	16		05	37	27
●	17	33	12	E ○	17	21	-6		11	56	149		11	49	177
	23	48	149		23	42	152		18	23	-12		18	43	-37
2	06	15	-9	17	05	55	-3	2	00	30	122	17	00	57	110
	12	15	119		11	52	137		06	09	18		06	02	30
E	18	04	6	P	18	04	-21		12	18	152		12	22	183
									18	50	-16		19	26	-34
3	00	16	143	18	00	22	143	3	00	58	116	18	01	36	98
	06	33	-6		06	19	6		06	27	24		06	26	37
	12	34	125		12	20	149		12	40	165	S	12	57	180
	18	34	3		18	46	-27		19	22	-12		20	13	-21
4	00	43	134	19	01	00	131	4	01	26	107	19	02	17	82
	06	50	3		06	41	12		06	44	27		06	50	40
A	12	56	131		12	50	158		13	01	158		13	35	174
	19	04	-3		19	31	-27		19	56	-9		21	02	-9
5	01	10	126	20	01	39	113	5	01	57	94	20	03	05	73
	07	08	9		07	04	21		07	03	34		07	12	46
	13	17	137		13	24	165	N	13	32	155		14	17	158
	19	35	-3		20	17	-18		20	37	-3		22	03	9
6	01	36	116	21	02	19	94	6	02	31	82	21	04	14	64
	07	26	15		07	25	27		07	21	40		07	35	55
	13	42	137		14	00	162		14	06	149	☾	15	08	140
	20	10	6		21	11	-6		21	27	12		23	24	24
7	02	07	101	22	03	04	76	7	03	22	70	22	16	25	122
	07	45	21		07	46	37		07	39	46				
	14	09	137	S	14	42	152		14	48	143				
	20	52	12		22	19	12		22	42	21				
8	02	41	85	23	04	07	58	8	04	52	61	23	01	00	30
	08	02	30		07	59	46		07	53	65		08	38	79
	14	42	134	☾	15	37	140	☽	15	51	131		11	48	76
	21	49	21										18	29	110
9	03	25	70	24	00	08	21	9	00	30	24	24	02	10	30
	08	17	40		17	07	125		17	38	122		08	59	94
☽ N	15	27	128										14	19	61
	23	17	27										20	13	110
10	04	49	52	25	02	13	21	10	02	06	31	25	02	55	27
	08	17	46		19	17	119		09	09	79		09	23	110
	16	36	122						13	03	67	E	15	23	43
									19	39	122		21	19	110
11	01	48	27	26	03	18	15	11	03	02	18	26	03	29	27
	18	32	122		10	03	79		09	27	91		09	49	125
					14	23	61		14	45	49		16	07	24
					20	47	125		20	59	128		22	07	113
12	03	15	15	27	03	57	12	12	03	41	15	27	03	57	27
	10	32	67		10	15	91		09	51	113		10	12	140
	13	01	64		15	32	43	E	15	41	24	A	16	43	9
	20	16	131		21	44	131		21	58	134		22	46	116
13	04	00	3	28	04	26	9	13	04	14	15	28	04	24	27
	10	28	79		10	35	107		10	19	131		10	38	149
	14	51	52		16	17	27		16	34	-3		17	16	-3
	21	23	140		22	28	134		22	49	134		23	20	113
14	04	34	-6	29	01	50	9	14	04	43	18	29	01	16	30
	10	43	91		10	56	122		10	48	149		11	02	158
	15	51	34	E	16	53	12	P ○	17	17	-21	☾	17	45	-12
	22	15	149		23	03	134		23	34	131		23	52	113
15	05	03	-9	30	05	13	9	15	05	10	21	30	05	09	34
	11	01	107		11	16	131		11	17	165		11	24	165
	16	38	12		17	26	3		18	01	-30		18	15	-18
	23	00	165		23	34	134								
				31	05	33	12								
					11	37	140								
				● ☌	17	55	-6								

Hrs. : 8 hE.

潮高の基準面：平均水面下 72 cm
Datum : 72 cm below mean sea level

CEBU

Tide
1976

Lat. 10° 18' N. Long. 123° 54' E.

5月								6月							
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm			h m	cm			h m	cm			h m	cm	
1	00 23	107		16	00 57	94		1	01 26	91		16	02 04	88	
	05 30	37			05 28	43			05 49	49			06 30	49	
	11 48	171			12 04	195			12 27	183			13 11	177	
	18 44	-18			19 25	-30			19 49	-18			20 30	-6	
2	00 53	104		17	01 36	88		2	01 59	88		17	02 38	91	
	06 51	40			05 59	46			06 20	52			07 11	52	
	12 13	174			12 41	189			13 01	180			13 48	162	
	19 17	-18			20 07	-21			20 24	-12			21 02	9	
3	01 24	91		18	02 17	82		3	02 34	85		18	03 16	94	
	06 11	43			06 30	49			06 57	52			08 00	58	
N	12 40	174			13 19	180			13 39	171			14 26	143	
	19 50	-15			20 52	-9			21 02	-3			21 33	21	
4	01 57	88		19	03 02	76		4	03 16	88		19	01 00	101	
	06 32	46			07 04	65			07 43	65			09 02	64	
	13 10	171			14 00	162			14 23	158		E ☾	15 06	125	
	20 31	-9			21 37	9			21 44	9			22 07	30	
5	02 37	82		20	03 57	76		5	04 08	91		20	04 53	107	
	06 57	49			07 48	61			08 49	61			10 29	67	
	13 46	165			14 45	143		☽	15 16	140			16 00	104	
	21 18	3			22 29	21			22 32	21			22 45	40	
6	03 27	76		21	05 11	82		6	05 10	101		21	05 55	116	
	07 29	55			08 59	70			10 26	64			12 30	67	
	14 30	162		☾	15 43	122		E	16 28	119			17 27	85	
	22 15	12			23 27	34			23 26	30			23 34	49	
7	04 42	73		22	06 34	91		7	06 18	116		22	07 00	125	
	08 19	64			11 21	76			12 33	68			14 23	52	
☽	15 29	137		E	17 11	104			18 12	101		A	19 35	76	
	23 26	21													
8	06 23	79		23	00 29	40		8	00 23	40		23	00 34	55	
	10 10	70			07 36	107			07 19	131			07 57	137	
	16 59	122			13 45	64			14 19	37			15 30	37	
					19 08	94			20 07	91			21 19	79	
9	00 43	27		24	01 25	43		9	01 24	49		24	01 41	58	
	07 36	94			08 20	122			08 14	149			08 45	149	
E	12 53	64			15 01	46			16 32	15			16 17	18	
	18 56	113			20 38	91			21 36	88			22 25	82	
10	01 46	30		25	02 14	43		10	02 19	62		25	02 38	61	
	08 23	113			08 56	137			09 04	168			09 29	162	
	14 33	43		A	15 50	27		P	16 28	-9			16 56	6	
	20 33	110			21 41	94			22 42	91			23 11	88	
11	02 37	34		26	02 55	46		11	03 09	52		26	03 26	61	
	09 01	131			09 30	149			09 50	183		N	10 07	171	
	15 37	18			16 29	12			17 17	-24			17 33	-9	
	21 44	110			22 31	98			23 34	91			23 49	91	
12	03 18	37		27	03 32	46		12	03 53	52		27	04 01	58	
	09 37	155			10 01	162			10 34	192		●	10 42	180	
	16 29	-9			17 04	-3		S ○	18 01	-30			18 05	-15	
	22 41	110			23 11	98									
13	03 54	40		28	04 03	46		13	00 18	91		28	00 22	91	
	10 14	171			10 31	168			04 34	52			04 39	55	
P	17 16	-24			17 38	-12			11 16	198			11 16	186	
	23 30	107			23 48	98			18 43	-30			18 37	-21	
14	04 28	40		29	04 32	49		14	00 57	88		29	00 50	94	
	10 50	186			10 59	177			05 13	49			05 13	52	
○	17 59	-31		●	18 11	-18			11 55	198			11 49	189	
									19 21	-27			19 08	-21	
15	00 15	101		30	00 22	98		15	01 32	88		30	01 17	94	
	04 59	43			04 59	49			05 51	49			05 47	49	
S	11 27	192		N	11 27	180			12 34	189			12 23	189	
	18 43	-37			18 41	-21			19 57	-18			19 38	-18	
				31	00 54	94									
					05 24	49									
					11 56	183									
					19 14	-21									

7月								8月							
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm			h m	cm			h m	cm			h m	cm	
1	01 45	98		16	02 02	110		1	02 09	134		16	02 07	140	
	06 25	46			07 14	43			08 02	27			08 20	34	
	12 58	183		E	13 34	158		P	14 10	146		A	14 14	122	
	20 07	-12			20 20	12			20 27	18			20 11	30	
2	02 13	101		17	02 28	116		2	02 44	143		17	02 37	143	
	07 08	46			07 56	46			08 58	30			09 04	40	
	13 36	174			14 04	143			14 54	122			14 47	107	
	20 37	-3			20 41	21			20 54	30			20 31	40	
3	02 47	110		18	02 59	122		3	03 27	149		18	03 13	140	
	07 59	46			08 42	49			10 08	37			10 03	46	
E	14 17	155			14 37	125		☽	15 46	98		☾	15 26	88	
	21 08	9			21 04	27			21 20	40			20 49	49	
4	03 26	116		19	03 36	125		4	04 21	149		19	04 00	137	
	09 01	49			09 41	55			11 47	40			11 40	52	
	15 05	134		☾ A	15 15	107			17 10	73			16 41	70	
	21 41	21			21 29	37			21 49	52			20 59	58	
5	04 15	125		20	04 22	128		5	05 34	152		20	05 11	134	
	10 21	52			11 03	61			14 00	34			14 17	46	
☽	16 05	110			16 07	88			20 21	64		N			
	22 18	34			21 57	49			22 26	64					
6	05 13	134		21	05 24	131		6	07 07	155		21	06 58	134	
	12 09	49			13 10	58			16 34	18			15 40	30	
	17 34	85			17 66	70		S	22 28	73			23 07	79	
	23 03	46			22 34	58									
7	06 23	146		22	06 40	134		7	00 49	70		22	00 47	79	
	14 07	34			16 04	43			08 33	165			08 28	146	
P	19 52	73							16 29	6			16 22	15	
									23 00	82			22 59	88	
8	00 04	58		23	07 57	143		8	02 42	61		23	02 48	73	
	07 36	158			16 04	24			09 37	174			09 29	158	
	15 32	15			22 38	79			17 11	-6			16 56	6	
	21 49	76							23 27	91			23 14	98	
9	01 24	61		24	01 43	70		9	03 50	58		24	03 46	58	
	08 42	171			08 59	155			10 29	180			10 17	171	
S	16 32	-6		N	16 46	9			17 45	-9			17 26	-3	
	22 55	82			23 14	85			23 52	101			23 33	107	
10	02 40	61		25	02 69	67		10	04 41	46		25	04 31	46	
	09 40	183			09 49	168			11 11	183			10 57	177	
	17 19	-15			17 21	-6		○	18 13	-9		●	17 51	-6	
	23 38	85			23 42	91							23 51	116	
11	03 40	58		26	03 51	61		11	00 15	110		26	05 11	30	
	10 29	189			10 29	177			05 23	35			11 35	180	
○	17 59	-21			17 52	-12			11 48	180			18 16	-3	
									18 39	-3					
12	00 13	91		27	00 06	94		12	00 37	116		27	00 12	128	
	04 31	52			04 34	55			05 59	30			05 51	18	
	11 13	195		●	11 07	186			12 20	174		E	12 12	174	
	18 34	-21			18 22	-15			19 00	6			18 39	6	
13	00 44	91		28	00 29	101		13	00 58	125		28	00 36	140	
	05 .6	46			05 13	46			06 31	27			06 32	9	
	11 54	192			11 44	189		E	12 50	162		P	12 49	165	
	19 07	-18			18 49	-15			19 18	12			19 00	12	
14	01 11	98		29	00 60	107		14	01 19	131		29	01 03	152	
	05 56	43			05 51	37			07 08	27			07 14	3	
	12 29	183			12 19	186			13 17	149			13 25	149	
	19 34	-9			19 14	-12			19 35	18			19 22	21	
15	01 36	104		30	01 14	116		15	01 42	137		30	01 32	162	
	06 34	43			06 30	30			07 42	27			07 59	6	
	13 03	174		E	12 54	180			13 45	137			14 01	128	
	19 57	3			19 38	-3			19 53	24			19 45	30	
				31	01 39	125						31	02 07	165	
					07 11	27							08 51	12	
					13 32	165							14 45	107	
					20 02	9							20 07	40	

Hrs. : 8 hE.

潮高の基準面：平均水面下，72 cm
Datum : 72 cm below mean sea level

CEBU

Lat. 10° 18′ N. Long. 123° 54′ E.

Tide
1976

9月						10月					
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm		h m	cm		h m	cm		h m	cm
1	02 48	165	16	02 23	152	1	03 08	168	16	02 27	152
	09 56	24		09 27	30		11 13	27		10 12	24
☽	15 36	85	N	16 11	85		17 37	67	☾	16 25	73
	20 28	49		20 00	55		19 56	64		19 46	64
2	03 39	158	17	03 02	146	2	04 31	143	17	03 20	140
	11 30	34		10 43	40		13 12	34		11 42	30
S	17 07	67	☾	16 21	70						
	20 42	58		20 04	61						
3	04 53	149	18	04 01	137	3	06 23	131	18	04 49	128
	13 49	34		12 56	43		14 40	30		13 21	34
							21 33	91		20 44	85
4	06 47	143	19	05 47	131	4	01 46	73	19	00 18	79
	15 20	24		14 47	34		08 13	131		06 54	122
	22 24	82		22 35	82		15 27	24		14 27	30
							21 51	101		21 05	101
5	01 15	76	20	00 22	82	5	03 11	65	20	02 23	61
	08 28	149		07 48	134		09 22	137		08 30	125
	16 10	15		15 37	24		16 03	24		15 12	27
	22 35	94		22 14	94		22 14	119		21 30	119
6	03 02	64	21	02 40	70	6	04 03	37	21	03 27	37
	09 36	158		09 04	146		10 12	140		09 36	131
	16 46	9		16 12	15	E	16 29	24	E	15 47	27
	22 56	107		22 26	107		22 36	134		21 57	137
7	04 03	49	22	03 39	52	7	04 42	21	22	04 17	15
	10 25	162		09 58	155		10 52	137		10 28	131
	17 14	9		16 42	12		16 53	24		16 18	30
	23 17	116		22 46	119		22 59	146		22 26	155
8	04 46	34	23	04 26	30	8	05 16	9	23	05 00	-9
	11 04	165		10 43	158		11 24	137		11 14	131
○	17 38	9	E	17 09	15	○	17 14	27	●P	16 46	34
	23 38	128		23 07	137		23 20	155		22 56	171
9	05 23	24	24	05 07	12	9	05 47	3	24	05 44	-24
	11 38	162		11 24	158		11 55	131		11 58	125
E	17 59	12	●	17 33	18		17 33	30		17 13	37
	23 58	137		23 31	152		23 41	162		23 28	186
10	05 55	15	25	05 48	-6	10	06 16	-6	25	06 26	-30
	12 08	155		12 04	152		12 23	125		12 39	113
	18 18	18	P	17 56	21	A	17 52	34		17 40	40
				23 59	165						
11	00 18	146	26	06 29	-15	11	00 04	168	26	00 02	192
	06 26	12		12 43	140		06 44	-6		07 10	-30
	12 36	146		18 19	27		12 50	119	S	13 19	104
	18 34	21					18 11	37		18 06	43
12	00 39	152	27	00 27	177	12	00 26	171	27	00 39	192
	06 56	9		07 11	-18		07 14	-6		07 55	-24
	13 01	137		13 21	125		13 18	113		14 02	91
	18 51	27		18 41	34		18 29	40		18 33	46
13	01 00	155	28	01 01	183	13	00 50	171	28	01 17	186
	07 26	12		07 56	-12		07 46	-3		08 42	-12
A	13 28	125		14 00	110		13 49	101		14 48	79
	19 08	34		19 05	40		18 49	46		19 01	49
14	01 24	158	29	01 36	180	14	01 18	168	29	01 59	174
	08 00	15		08 47	-3		08 24	6		09 37	6
	13 57	116	S	14 44	91	N	14 24	91		15 49	73
	19 26	40		19 28	46		19 08	49		19 34	58
15	01 50	158	30	02 17	174	15	01 49	162	30	02 48	155
	08 38	21		09 47	15		09 11	16		10 46	21
	14 30	101	☽	15 40	76		15 11	82	☽	17 28	73
	19 45	46		19 49	55		19 28	68		20 19	67
									31	03 53	134
										12 09	30
										19 32	82
										22 48	76

11月						12月					
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm		h m	cm		h m	cm		h m	cm
1	05 38	116	16	01 12	122	1	01 04	61	16	05 13	91
	13 26	34		11 54	24		06 26	85		11 34	30
	20 23	98		18 53	91		12 46	40		18 34	119
							19 48	116			
2	01 43	67	17	00 01	67	2	02 41	43	17	01 34	37
	07 35	110		05 59	107		08 11	82		07 10	76
E	14 21	37	E	13 00	30		13 39	43		12 32	40
	20 56	113		19 48	110		20 33	131		19 36	137
3	03 04	49	18	01 59	49	3	03 39	24	18	03 02	15
	08 56	110		07 49	101		09 27	82		08 59	73
	15 01	37		13 56	37		14 26	43		13 34	43
	21 26	128		20 31	128		21 11	143		20 33	152
4	03 53	30	19	03 13	24	4	04 21	9	19	04 05	-9
	09 51	110		09 13	101		10 21	82		10 18	76
	15 33	37		14 42	40	A	15 08	43	P	14 33	46
	21 54	143		21 11	149		21 46	152		21 25	171
5	04 32	12	20	04 08	-3	5	04 57	-6	20	04 57	-27
	10 35	110		10 18	101		11 04	85		11 14	76
	16 01	37		15 23	40		15 44	43	S	15 25	46
	22 21	155		21 50	168		22 18	162		22 12	183
6	05 07	-3	21	04 56	-21	6	05 31	-15	21	05 44	-40
	11 11	110		11 10	101		11 41	88		12 01	79
A	16 28	37	P●	16 00	43		16 17	43	●	16 12	43
	22 46	165		22 28	183		22 49	168		22 57	189
7	05 38	-9	22	05 42	-34	7	06 04	-21	22	06 26	-43
	11 45	107		11 58	98		12 15	88		12 40	79
○	16 52	40		16 35	43	○N	16 46	43		16 57	37
	23 11	171		23 07	192		23 19	171		23 41	189
8	06 08	-15	23	06 26	-40	8	06 34	-27	23	07 05	-40
	12 16	104		12 40	91		12 47	85		13 15	79
	17 14	40	S	17 09	43		17 14	43		17 40	37
	23 35	174		23 47	195		23 47	174			
9	06 37	-18	24	07 10	-40	9	07 05	-27	24	00 22	186
	12 46	101		13 21	85		13 18	85		07 42	-34
	17 37	43		17 42	43		17 42	43		13 49	79
										18 22	34
10	00 01	174	25	00 26	192	10	00 18	174	25	01 01	174
	07 08	-18		07 52	-30		07 38	-21		08 16	-21
N	13 17	94		14 02	79		13 49	82		14 21	82
	17 58	46		18 18	43		18 12	43		19 05	37
11	00 27	174	26	01 05	183	11	00 49	171	26	01 38	158
	07 42	-15		08 35	-18		08 09	-21		08 47	-9
	13 49	88		14 45	76		14 21	82		14 55	88
	18 22	49		18 57	46		18 47	43		19 53	40
12	00 58	171	27	01 48	168	12	01 24	165	27	02 16	137
	08 19	-9		09 19	-6		08 44	-15		09 16	6
	14 27	82		15 33	76		14 56	82	E	15 34	94
	18 47	52		19 45	52		19 31	46		20 49	46
13	01 31	165	28	02 33	146	13	02 03	152	28	02 55	116
	08 59	-3		10 05	12		09 19	-6		09 44	15
	15 13	79	☽	16 34	79		15 39	88	☽	16 19	101
	19 19	65		20 51	61		20 27	49		22 04	62
14	02 11	155	29	03 25	125	14	02 49	134	29	03 41	94
	09 49	-9		10 55	21		09 58	6		10 15	27
	16 14	76		17 45	88	E☾	16 31	94		17 16	107
	20 06	61		22 42	67		21 46	52		23 49	62
15	03 01	140	30	04 38	104	15	03 49	113	30	04 50	73
	10 48	18		11 48	31		10 43	18		10 53	37
☾	17 35	82	E	18 51	101		17 30	107		18 22	113
	21 32	70					23 35	49			
									31	01 55	43
										06 56	61
									A	11 47	43
										19 26	125

Hrs. : 8 hE.

潮高の基準面：平均水面下 72 cm
Datum : 72 cm below mean sea level

那　覇 NAHA

Tide
1976

Lat. 26° 12′ N.　　Long. 127° 40′ E.

1月								2月							
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm			h m	cm			h m	cm			h m	cm	
1	00 37	- 6		16	00 28	- 3		1	01 40	2		16	01 28	- 7	
	07 25	181			07 17	177			08 18	188			07 59	197	
●	12 44	68			12 37	70			13 60	53		○	13 39	34	
	18 46	200			18 33	193			19 58	196			19 62	211	
2	01 19	-10		17	01 07	- 6		2	02 12	6		17	02 06	- 5	
	08 05	186			07 52	185			08 48	189			08 33	200	
	13 26	64		○	13 16	62			14 24	50		EP	14 19	27	
	19 29	201			19 16	200			20 34	192			20 34	209	
3	01 58	- 9		18	01 45	-11		3	02 43	14		18	02 42	4	
	08 41	188			08 26	191			09 16	188			09 07	199	
	14 07	62			13 55	55		E	14 59	49			14 58	24	
	20 10	198			19 59	204			21 08	184			21 17	202	
4	02 35	- 3		19	02 23	- 9		4	03 12	24		19	03 20	18	
	09 17	187			09 01	193			09 44	185			09 41	195	
	14 46	63			14 35	60			15 33	51			15 40	25	
	20 50	191			20 41	203			21 43	174			22 02	189	
5	03 10	- 8		20	03 01	- 1		5	03 40	37		20	03 57	36	
	09 52	184			09 36	192			10 12	180			10 18	189	
	15 26	65		P	15 16	48		A	16 08	55			16 27	31	
	21 29	181			21 25	196			22 19	162			22 51	173	
6	03 45	21		21	03 40	12		6	04 08	51		21	04 37	56	
	10 25	179			10 12	189			10 42	175			10 57	180	
	16 07	68		E	16 00	48			16 49	60			17 23	40	
	22 08	169			22 12	186			22 59	150			23 48	155	
7	04 18	36		22	04 21	29		7	04 38	65		22	05 24	77	
	11 00	174			10 51	184			11 16	168			11 43	170	
E	16 52	73			16 51	50			17 40	65		☾	18 40	48	
	22 50	155			23 03	171			23 50	138					
8	04 52	51		23	05 04	48		8	05 14	80		23	01 01	139	
	11 35	168			11 32	178			11 56	162			06 38	94	
	17 48	76			17 53	54		☽	18 56	67			12 40	160	
	23 37	142											20 17	50	
9	05 31	67		24	00 03	155		9	00 57	128		24	02 63	133	
	12 14	163			05 57	68			06 18	94			08 32	101	
A☽	19 01	77		☾	12 20	172			12 49	157		S	13 59	154	
					19 14	54			20 29	62			21 39	43	
10	00 34	131		25	01 18	142		10	02 39	126		25	04 50	141	
	06 24	81			07 13	85			08 22	102			09 59	96	
	12 59	159			13 17	167			13 59	155			15 36	156	
	20 21	72			20 41	49			21 44	50			22 42	34	
11	01 52	124		26	03 01	136		11	04 37	136		26	05 45	153	
	07 48	92			08 44	94			09 52	98			10 58	85	
	13 53	157			14 27	165		N	15 22	159			16 53	165	
	21 28	61			21 55	38			22 40	35			23 31	25	
12	03 42	127		27	04 50	144		12	05 36	151		27	06 22	164	
	09 13	95			10 02	93			10 52	87			11 44	72	
	14 56	159		S	15 47	169			16 36	169			17 49	175	
	22 22	47			22 54	25			23 27	19					
13	05 10	138		28	05 53	156		13	06 16	166		28	00 10	18	
	10 18	93			11 02	86			11 39	73			06 52	173	
	16 00	165			16 56	177			17 34	183			12 22	59	
	23 07	31			23 44	13							18 32	183	
14	06 01	152		29	06 37	167		14	00 09	6		29	00 46	15	
	11 10	87			11 52	77			06 52	179			07 21	180	
N	16 57	174			17 52	186			12 22	59			12 57	48	
	23 49	16							18 23	196			19 09	188	
15	06 40	165		30	00 26	5		15	00 50	- 4					
	11 55	79			07 14	177			07 25	190					
	17 48	184			12 35	58			13 01	45					
					18 38	193			19 08	206					
				31	01 05	1									
				●	07 47	183									
					13 13	59									
					19 20	196									

3月								4月							
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm			h m	cm			h m	cm			h m	cm	
1	01 17	15		16	01 06	1		1	01 43	35		16	01 58	27	
	07 47	185			07 26	198			07 56	184			08 06	202	
●	13 29	39		E○	13 21	9			14 03	14			14 22	-19	
	19 43	190			19 40	210			20 29	176			20 58	195	
2	01 46	18		17	01 43	4		2	02 09	41		17	02 37	39	
	08 12	188			08 00	202			08 21	183			08 43	197	
E	14 00	34		P	14 00	1			14 32	13			15 05	-13	
	20 16	188			20 23	209			21 01	172			21 44	183	
3	02 13	23		18	02 21	14		3	02 37	48		18	03 16	53	
	08 37	188			08 35	202			08 47	181			09 22	188	
	14 30	31			14 39	- 1			15 03	15		S	15 50	- 1	
	20 47	183			21 07	201			21 36	165			22 33	169	
4	02 39	31		19	02 58	28		4	03 05	58		19	03 59	68	
	09 02	186			09 10	197			09 15	176			10 05	175	
A	15 00	32			15 22	3			15 37	20			16 40	15	
	21 20	175			21 52	187			22 15	157			23 27	155	
5	03 06	41		20	03 36	45		5	03 37	68		20	04 52	83	
	09 27	182			09 48	189			09 49	169			10 53	160	
	15 32	35			16 07	13		N	16 18	27			17 44	32	
	21 53	166			22 41	170			23 03	148					
6	03 33	53		21	04 15	63		6	04 15	80		21	00 32	144	
	09 54	177			10 27	177			10 32	161			06 18	93	
	16 07	40			17 00	26			17 11	37		☾	11 54	145	
	22 32	155			23 37	153							19 09	46	
7	04 01	66		22	05 03	82		7	00 03	140		22	01 53	138	
	10 26	170			11 14	164			05 13	91			08 13	92	
	16 49	46		S	18 11	40			11 29	151			13 16	133	
	23 20	144							18 32	45			20 37	51	
8	04 36	80		23	00 49	138		8	01 19	136		23	03 23	141	
	11 07	162			06 23	97			07 12	96			09 34	81	
	17 49	53		☾	12 14	151		☽	12 47	144			15 02	132	
					19 49	48			20 12	46			21 43	51	
9	00 23	134		24	02 35	133		9	02 47	140		24	04 26	148	
	05 29	94			08 30	99			09 01	85			10 28	66	
☽N	12 01	154			13 39	142			14 22	145			16 30	139	
	19 24	56			21 16	47			21 29	39			22 33	50	
10	01 53	130		25	04 22	140		10	04 00	151		25	05 07	156	
	07 39	102			09 54	89			10 05	66			11 08	51	
	13 16	149			15 27	142			15 51	156		E	17 25	148	
	21 00	50			22 20	41			22 27	29			23 13	48	
11	03 44	137		26	05 16	150		11	04 52	165		26	05 37	164	
	09 28	95			10 49	75			10 54	44			11 43	38	
	14 50	152			16 49	151			17 00	171			18 07	156	
	22 07	37			23 07	36			23 16	21			23 47	47	
12	04 54	151		27	05 52	160		12	05 36	178		27	06 05	170	
	10 31	79			11 31	60			11 38	22			12 13	26	
	16 15	163			17 40	162		E	17 54	186		A	18 41	163	
	23 00	22			23 46	32			23 59	16					
13	05 39	166		28	06 20	168		13	06 14	189		28	00 18	47	
	11 19	60			12 06	46			12 20	3			06 39	175	
	17 19	179			18 22	170			18 43	197			12 42	16	
	23 45	11											19 13	167	
14	06 17	179		29	00 20	29		14	00 40	15		29	00 47	48	
	12 01	40			06 45	175			06 52	198			06 54	179	
	18 10	194		E	12 37	34		P○	13 00	-11		●	13 11	9	
					18 56	176			19 29	202			19 44	170	
15	00 26	3		30	00 49	29		15	01 20	19		30	01 15	50	
	06 52	191			07 09	180			07 28	202			07 20	182	
	12 41	23			13 06	25			13 41	-18			13 40	4	
	18 56	205			19 28	178			20 13	202			20 16	171	
				31	01 16	31									
				●A	07 33	183									
					13 35	18									
					19 58	179									

Hrs. : 9 hE.

潮高の基準面：平均水面下 118 cm
Datum : 118 cm below mean sea level

那　覇　NAHA

Lat.　26° 12′ N.　　Long.　127° 40′ E.　　Tide　1976

5月				5月				6月				6月			
時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.		
	h m cm				h m cm				h m cm				h m cm		
1	01 41 51			16	02 19 52			1	02 36 74			16	03 33 75		
	07 46 182			S	08 22 200				08 34 188				09 34 192		
	14 10 1				14 51 -17				15 07 4				15 59 20		
	20 49 170				21 35 185				21 55 176				22 43 185		
2	02 14 59			17	03 01 62			2	03 16 77			17	04 22 81		
	08 15 181				09 04 191				09 15 183				10 19 178		
	14 43 2				15 35 -4				15 47 13				16 41 38		
	21 25 167				22 22 176				22 37 173				23 25 178		
3	02 46 65			18	03 47 72			3	04 01 80			18	05 19 87		
N	08 48 178				09 49 179				10 03 176				11 07 163		
	15 19 7				16 22 12				16 33 25				17 27 56		
	22 06 162				23 10 166				23 22 170						
4	03 22 72			19	04 41 82			4	04 58 82			19	00 09 172		
	09 25 172				10 37 161				10 59 167				06 31 90		
	15 59 15				17 15 31				17 27 39			E☾	12 03 149		
	22 52 156												18 22 73		
5	04 07 80			20	00 03 157			5	00 12 168			20	00 56 167		
	10 12 163				05 56 88				06 15 81				07 53 88		
	16 50 26				11 34 148			☽	12 06 158				13 10 138		
	23 45 151				18 21 48				18 37 53				19 30 87		
6	05 08 87			21	01 02 152			6	01 08 167			21	01 49 165		
	11 10 154				07 33 88				07 44 73				09 05 80		
	17 56 37			☾	12 43 135			E	13 24 152				14 42 133		
					19 37 60				19 56 63				20 42 95		
7	00 47 149			22	02 07 150			7	02 08 170			22	02 45 165		
	06 46 87				08 54 80				09 00 58				10 00 69		
☽	12 25 146			E	14 12 129				14 53 153			A	16 25 138		
	19 22 45				20 48 67				21 09 67				21 44 98		
8	01 55 150			23	03 12 152			8	03 10 176			23	03 40 169		
	08 25 76				09 53 67				10 02 39				10 45 57		
	13 52 145				15 51 131				16 19 161				17 31 149		
	20 45 46				21 46 70				22 10 68				22 36 98		
9	03 03 157			24	04 05 157			9	04 09 185			24	04 29 175		
	09 34 57				10 38 54				10 54 20				11 23 44		
E	15 22 151				17 02 139				17 28 173				18 14 160		
	21 50 44				22 32 71				23 04 67				23 20 96		
10	04 01 168			25	01 45 163			10	05 03 195			25	05 12 182		
	10 28 35				11 16 -12				11 43 3				11 59 32		
	16 38 164			A	17 49 148			P	18 23 184				18 50 171		
	22 43 40				23 11 71				23 52 65				23 59 92		
11	04 52 179			26	05 19 170			11	05 52 204			26	05 52 190		
	11 15 14				11 49 30				12 28 -8				12 33 21		
	17 39 177				18 27 156				19 12 192			N	19 23 181		
	23 31 38				23 47 70										
12	05 37 190			27	05 50 176			12	00 37 64			27	00 37 88		
	12 00 -4				12 20 19				06 38 210				06 31 197		
	18 31 188				19 01 164			S○	13 12 -14			●	13 07 13		
									19 57 197				19 56 188		
13	00 14 37			28	00 30 70			13	01 22 65			28	01 13 84		
	06 19 199				06 26 181				07 23 212				07 08 203		
P	12 42 -18				12 51 10				13 51 -14				13 42 8		
	19 19 194				19 34 170				20 39 198				20 29 194		
14	00 56 40			29	00 52 69			14	02 04 66			29	01 50 81		
	07 00 204				06 50 186				08 07 210				07 48 206		
○	13 25 -24			●	13 22 3				14 37 -7				14 18 7		
	20 05 195				20 07 175				21 21 196				21 04 197		
15	01 37 45			30	01 25 70			15	02 48 70			30	02 27 79		
	07 40 205				07 22 189				08 51 203				08 28 207		
	14 07 -24			N	13 54 0				15 18 4				14 55 12		
	20 50 192				20 41 177				22 02 191				21 38 198		
				31	02 09 72										
					07 56 189										
					14 29 0										
					21 17 178										

7月				7月				8月				8月			
時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.		
	h m cm				h m cm				h m cm				h m cm		
1	03 07 77			16	03 52 79			1	04 20 70			16	04 33 83		
	09 10 203			F	09 57 196			P	10 36 201				10 48 183		
	15 34 21				16 06 51				16 35 69			A	16 24 95		
	22 15 196				22 42 200				23 02 208				22 57 200		
2	03 51 77			17	04 36 85			2	05 14 74			17	05 19 91		
	09 56 196				10 38 182				11 36 189				11 34 170		
	16 16 35				16 39 69				17 21 89				16 55 110		
	22 54 193				23 17 193				23 45 202				23 35 192		
3	04 41 78			18	05 26 91			3	06 24 78			18	06 24 97		
	10 48 186				11 22 168				12 37 174				12 35 159		
E	17 00 52				17 14 86			☽	18 22 108			☾	17 40 125		
	23 37 190				23 53 187										
4	05 43 78			19	06 31 95			4	00 38 196			19	00 22 185		
	11 47 175				12 16 155				07 53 78				08 01 97		
	17 55 70			☾A	17 57 102				14 06 165				14 09 154		
									19 55 121				19 46 136		
5	00 24 187			20	00 36 181			5	01 45 192			20	01 28 180		
	07 02 76				07 53 94				09 19 70				09 23 88		
☽	12 57 164				13 27 146				16 04 166			N	16 23 162		
	19 07 86				19 11 116				21 27 123				21 35 133		
6	01 20 186			21	01 26 177			6	03 06 194			21	02 54 182		
	08 25 68				09 09 88				10 26 57				10 23 75		
	14 25 159				15 22 145			S	17 25 179				17 25 176		
	20 29 96				20 49 123				22 37 116				22 37 123		
7	02 23 187			22	02 29 177			7	04 26 201			22	04 16 191		
	09 38 54				10 08 76				11 21 45				11 11 60		
P	16 06 163				17 08 155				18 15 193				18 09 191		
	21 43 99				22 03 122				23 30 106				23 25 109		
8	03 32 192			23	03 39 181			8	05 29 212			23	05 17 205		
	10 38 38				10 56 62				12 07 36				11 52 46		
	17 24 174				17 57 169				18 53 204				18 36 205		
	22 45 97				22 57 116										
9	04 37 201			24	04 42 189			9	00 16 94			24	00 06 93		
	11 31 24				11 37 48				06 21 221				06 07 219		
S	18 21 187			N	18 33 183				12 47 30				12 31 36		
	23 37 92				23 42 108				19 27 213				19 07 216		
10	05 36 210			25	05 34 200			10	00 56 81			25	00 43 78		
	12 17 13				12 15 36				07 05 228				06 51 230		
	19 06 197				19 06 195			○	13 23 29			●	13 08 30		
									19 59 219				19 38 224		
11	00 25 86			26	00 22 98			11	01 34 76			26	01 21 65		
	06 26 218				06 19 211				07 45 229				07 33 218		
○	13 01 7				12 53 26				13 58 33				13 45 31		
	19 46 205				19 37 205				20 30 221				20 10 229		
12	01 08 80			27	01 01 89			12	02 10 71			27	01 58 56		
	07 12 222				07 00 220				08 22 226				08 14 210		
	13 41 7			●	13 28 20				14 30 41			E	14 21 37		
	20 23 210				20 08 213				21 00 221				20 43 231		
13	01 51 76			28	01 37 80			13	02 45 70			28	02 36 50		
	07 56 222				07 41 226				08 58 219				08 56 236		
	14 20 12				14 04 19			E	15 03 52			P	14 57 49		
	20 59 211				20 40 217				21 28 219				21 16 229		
14	02 31 75			29	02 15 73			14	03 20 72			29	03 16 50		
	08 37 218				08 22 228				09 34 209				09 39 226		
	14 56 22				14 40 25				15 29 65				15 33 64		
	21 35 209				21 13 219				21 57 214				21 52 224		
15	03 11 76			30	02 53 69			15	03 55 77			30	03 59 54		
	09 18 209				09 05 225				10 09 196				10 26 211		
	15 32 35			E	15 17 35				15 56 80				16 11 83		
	22 08 205				21 47 217				22 26 207				22 29 216		
				31	03 35 68										
					09 49 217										
					15 54 51										
					22 22 214										

Hrs. : 9 時

潮高の基準面：平均水面下　118 cm
Datum : 118 cm below mean sea level

那　　覇　NAHA

Tide
1976

Lat.　26° 12′ N.　　Long.　127° 40′ E.

9月				10月				11月				12月			
時刻 Time	潮高 Ht.	時刻 Time	潮高 Ht.	時刻 Time	潮高 Ht.	時刻 Time	潮高 Ht.	時刻 Time	潮高 Ht.	時刻 Time	潮高 Ht.	時刻 Time	潮高 Ht.	時刻 Time	潮高 Ht.
h m	cm	h m	cm	h m	cm	h m	cm	h m	cm	h m	cm	h m	cm	h m	cm
1 05 54	73	16 05 22	82	1 06 59	72	16 05 54	69	1 02 17	152	16 01 12	155	1 03 14	132	16 02 07	148
12 23	177	12 02	166	13 40	165	12 49	162	09 09	71	08 02	63	09 19	74	08 27	69
☽ 17 52	121	N 17 03	124	19 40	127	☾ 18 28	121	15 45	167	14 22	169	15 32	162	14 30	173
		23 34	183					22 01	85	21 03	76	22 19	61	21 30	45
2 00 05	195	17 06 45	89	2 00 58	173	17 00 13	167	2 03 55	155	17 02 41	157	2 04 41	141	17 03 38	152
07 25	80	13 22	160	08 35	75	07 30	73	10 07	71	09 15	62	10 11	82	09 37	71
S 13 54	167	☾ 18 53	135	15 28	167	14 08	164	E 16 37	173	E 15 24	176	16 22	167	15 32	179
19 40	132			21 20	119	20 30	113	22 48	70	22 02	54	23 01	64	22 28	25
3 01 17	187	18 00 43	176	3 02 41	169	18 01 43	164	3 05 04	163	18 04 05	167	3 05 38	149	18 04 58	162
09 00	77	08 29	86	09 48	72	08 55	70	10 52	71	10 13	59	10 55	81	10 37	70
15 59	170	15 10	164	16 40	176	15 24	172	17 14	180	16 19	186	17 01	172	16 32	188
21 24	130	21 07	129	22 23	104	21 41	96	23 26	55	22 52	32	23 37	96	23 20	7
4 02 52	185	19 02 16	175	4 04 17	176	19 03 17	171	4 05 52	171	19 05 13	180	4 06 21	162	19 06 00	174
10 12	69	09 43	76	10 42	67	09 59	62	11 30	70	11 05	56	11 34	86	11 28	67
17 14	181	16 31	176	17 23	186	16 22	183	17 45	187	17 07	197	A 17 36	177	P 17 25	197
22 33	118	22 14	114	23 09	87	22 33	73			23 37	12				
5 04 23	193	20 03 49	184	5 05 19	187	20 04 33	185	5 00 00	43	20 06 08	192	5 00 10	98	20 00 07	-8
11 06	60	10 38	63	11 25	62	10 51	63	06 31	177	11 51	54	06 55	164	06 52	185
17 56	193	17 18	190	17 57	195	17 07	196	12 03	70	17 52	206	12 08	79	S 12 17	63
23 22	103	23 02	96	23 48	71	23 18	51	18 13	192			18 07	182	18 16	205
6 05 26	204	21 04 57	199	6 06 05	196	21 05 32	200	6 00 31	32	21 00 22	-4	6 00 41	17	21 00 52	-17
11 50	52	11 24	51	12 01	60	11 36	47	07 05	182	06 59	200	07 28	178	07 37	192
18 30	204	17 55	204	E 18 25	202	E 17 49	207	A 12 34	70	P 12 35	54	12 41	75	● 13 02	61
		23 43	75			23 59	30	18 40	195	18 36	213	18 38	186	19 03	209
7 00 04	88	22 05 51	215	7 00 22	58	22 06 22	212	7 01 01	25	22 01 05	-14	7 01 12	19	22 01 36	-21
06 14	214	12 06	42	06 43	202	12 17	45	07 37	184	07 45	204	08 00	174	08 21	195
12 27	48	18 29	216	12 34	60	18 26	217	○ 13 03	72	● 13 17	57	ON 13 14	77	13 46	59
19 00	212			18 52	207			19 07	197	19 19	215	19 10	186	19 49	209
8 00 40	75	23 00 22	56	8 00 52	47	23 00 39	14	8 01 30	19	23 01 48	-17	8 01 44	5	23 02 19	-17
06 55	221	06 37	227	07 18	205	07 08	220	08 08	185	08 31	203	08 32	177	09 02	195
○ 13 01	47	E 12 44	38	○ 13 03	62	●P 12 57	46	13 32	74	S 13 59	61	13 48	76	14 30	60
19 28	218	19 03	225	19 18	210	19 05	222	19 34	197	20 02	213	19 43	196	20 34	204
9 01 14	65	24 01 00	40	9 01 22	40	24 01 21	3	9 02 00	17	24 02 31	-14	9 02 17	4	24 03 00	-8
07 32	223	07 21	235	07 50	206	07 53	222	08 41	184	09 16	198	09 05	179	09 42	191
E 13 32	50	● 13 22	39	13 31	65	13 37	51	14 02	78	14 42	67	14 22	76	15 14	62
19 55	221	19 37	230	19 42	211	19 42	224	20 02	196	20 45	206	20 19	188	21 18	194
10 01 47	58	25 01 38	29	10 01 52	37	25 02 01	-1	10 02 31	17	25 03 15	-4	10 02 52	-6	25 03 42	6
08 06	222	08 04	237	08 22	202	08 38	218	09 15	182	10 01	191	09 39	175	10 22	186
14 01	66	P 13 59	46	A 13 58	71	14 16	60	N 14 34	82	15 28	75	15 00	77	16 02	66
20 22	222	20 11	231	20 07	210	20 21	221	20 34	192	21 30	195	20 58	185	22 04	181
11 02 18	56	26 02 18	24	11 02 22	36	26 02 43	2	11 03 05	21	26 04 02	11	11 03 28	12	26 04 23	23
08 38	217	08 47	232	08 53	198	09 24	209	09 52	178	10 48	182	10 17	176	11 04	178
14 28	64	14 36	57	14 24	78	14 56	72	15 08	88	16 20	83	15 42	76	16 54	71
20 47	220	20 46	229	20 33	207	21 00	213	21 09	186	22 18	180	21 42	179	22 51	165
12 02 49	56	27 02 58	26	12 02 52	38	27 03 28	11	12 03 42	27	27 04 52	29	12 04 09	22	27 05 07	42
09 11	209	09 31	221	09 27	191	10 12	197	10 35	173	11 37	173	10 58	174	11 46	171
14 54	74	15 13	72	14 52	86	S 15 39	85	15 50	93	17 24	89	16 32	79	E 17 58	75
21 13	215	21 22	222	21 01	202	21 43	202	21 52	178	23 12	164	22 33	170	23 43	149
13 03 20	60	28 03 42	33	13 03 24	43	28 04 16	26	13 04 26	37	28 05 50	47	13 04 56	35	28 05 56	60
09 45	199	10 19	206	10 05	183	11 04	183	11 22	168	12 31	165	11 43	171	12 30	164
A 15 21	86	15 52	88	15 23	95	16 29	98	16 43	98	☽ 18 50	91	17 36	79	☽ 19 17	76
21 39	209	22 02	211	21 32	194	22 31	187	22 45	169			23 33	169		
14 03 53	66	29 04 31	45	14 04 01	50	29 05 14	43	14 05 22	48	29 00 15	149	14 05 51	49	29 00 46	135
10 22	188	11 11	190	10 48	175	12 02	171	12 17	165	06 59	62	12 33	169	06 58	77
15 48	98	S 16 37	105	N 15 59	105	17 40	108	18 04	100	13 30	161	E☾ 18 57	74	13 20	159
22 09	201	22 47	198	22 11	185	23 27	171	23 52	100	20 17	85			20 36	71
15 04 32	74	30 05 33	60	15 04 48	59	30 06 28	58	15 06 37	58	30 01 35	139	15 00 44	152	30 02 09	126
11 06	176	12 15	174	11 41	167	13 11	164	13 18	165	08 13	73	07 07	61	08 13	88
16 19	111	☽ 17 42	121	16 50	115	☽ 19 26	110	☾ 19 45	92	E 14 33	160	13 29	169	14 15	157
22 45	193	23 42	185	23 03	175					21 25	74	20 21	62	21 40	62
						31 00 40	158							31 04 06	127
						07 51	68							09 23	93
						14 33	162							15 15	157
						20 58	100							22 31	51

Hrs. ： 9 hr.

潮高の基準面：平均水面下　118 cm
Datum : 118 cm below mean sea level

高　雄　KAOHSIUNG

Tide 汐
1976

Lat.　22° 37′ N.　　Long.　120° 16′ E.

1月				1月				2月				2月			
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h	m	cm		h	m	cm		h	m	cm		h	m	cm
1	02	45	10	16	02	19	12	1	03	30	16	16	03	00	17
	08	40	42		08	27	44		09	15	47		08	57	67
●	12	19	32		12	09	34		13	39	29	○	13	51	28
	19	48	105		19	30	100		20	52	93		20	47	97
2	03	24	10	17	02	55	11	2	03	53	20	17	03	32	21
	09	14	42		08	09	46		09	41	50		09	29	62
	12	55	31	○	13	50	33		14	18	30	E P	14	40	28
	20	27	104		20	10	102		21	24	87		21	31	91
3	04	01	13	18	03	32	12	3	04	18	23	18	04	03	25
	09	48	43		09	31	47		10	10	53		10	04	68
	13	31	32		13	31	32	E	14	57	32		15	35	29
	21	06	100		20	52	101		21	57	89		22	17	81
4	04	37	16	19	04	09	16	4	04	41	27	19	04	33	30
	10	23	44		10	06	50		10	43	56		10	44	70
	14	07	33		14	17	33		15	40	34		16	40	31
	21	43	94		21	34	97		22	30	73		23	06	70
5	05	13	20	20	04	48	19	5	05	05	29	20	05	01	35
	11	02	46		10	44	53		11	18	58		11	29	73
	14	46	36	P	15	08	34	A	16	32	31		18	07	33
	22	21	87		22	20	89		23	04	65				
6	05	50	23	21	05	26	24	6	05	25	32	21	00	02	59
	11	44	48		11	26	56		11	58	60		05	24	38
	15	30	40	E	16	13	37		17	47	40		12	23	76
	22	59	78		23	09	79		23	41	67		19	54	32
7	06	26	27	22	06	05	29	7	05	43	34	22	01	13	48
	12	32	51		12	15	61		12	45	63		05	35	40
E	16	29	44		17	48	40		19	42	40	☾	13	26	79
	23	38	70										21	46	29
8	07	03	29	23	00	05	68	8	00	30	49	23	14	39	81
	13	22	54		06	43	33		05	55	36		23	20	24
	18	31	46		13	09	66	D	13	40	66	S			
					19	50	39		21	31	37				
9	00	22	61	24	01	12	56	9	01	53	42	24	15	56	84
	07	38	32		07	22	36		06	05	37				
A D	14	16	58	☾	14	11	72		14	44	70				
	30	39	45		21	42	34		22	56	31				
10	01	17	53	25	02	47	46	10	04	37	39	25	00	25	19
	08	15	34		08	03	37		06	03	39		07	47	43
	15	09	63		15	18	77		15	51	75		09	26	42
	22	14	40		23	19	27		23	56	25		17	06	87
11	02	11	46	26	05	26	40	11	07	08	41	26	01	10	17
	08	52	35		08	51	38		09	10	40		07	48	44
	16	01	68		16	23	84	N	16	52	82		10	39	40
	23	27	34										18	02	89
12	04	42	42	27	00	31	20	12	00	41	20	27	01	43	17
	09	29	36		07	11	39		07	16	43		07	53	46
	16	47	75	S	09	45	37		10	27	39		11	37	36
					17	22	89		17	47	89		18	49	90
13	00	22	27	28	01	24	14	13	01	20	16	28	02	08	19
	06	22	41		07	47	39		07	37	45		08	01	49
	10	09	37		10	40	36		11	24	37		12	25	33
	17	30	81		18	14	94		18	36	95		19	29	90
14	01	05	21	29	02	05	12	14	01	54	14	29	02	27	21
	07	18	42		08	09	40		08	02	49		08	20	63
N	10	50	36		11	30	33		12	15	33		13	07	31
	18	11	89		18	59	97		19	21	98		20	04	88
15	01	42	16	30	02	37	12	15	02	28	14				
	07	55	43		08	30	42		08	28	53				
	11	29	35		12	17	31		13	03	30				
	18	51	95		19	39	98		20	04	99				
				31	03	05	13								
				●	08	52	44								
					12	59	30								
					20	17	96								

3月				3月				4月				4月			
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h	m	cm		h	m	cm		h	m	cm		h	m	cm
1	02	45	21	16	02	19	25	1	03	20	36	16	02	21	39
	08	38	57		08	22	72		08	42	78		09	02	99
●	13	46	29	E ○	14	03	25		15	00	28		16	00	20
	20	36	84		20	40	88		21	21	66		22	11	62
2	03	03	27	17	02	47	29	2	02	32	38	17	02	42	41
	09	00	61		08	54	78		09	07	81		09	43	101
E	14	22	29	P	14	54	23		15	40	28		17	05	21
	21	07	79		21	26	84		21	53	61		23	06	55
3	03	19	30	18	03	13	33	3	02	43	39	18	02	59	43
	09	23	65		09	30	83		09	34	83		10	29	100
	15	00	29		15	51	23		16	27	29	S	18	20	23
	21	37	74		22	13	72		22	32	56				
4	03	35	32	19	03	37	37	4	02	56	39	19	00	11	49
	09	49	68		10	09	86		10	07	85		03	06	45
A	15	40	31		16	56	25		17	28	31		11	21	97
	22	07	67		23	05	62		23	22	51		19	41	25
5	03	48	34	20	03	56	40	5	03	13	41	20	13	19	92
	10	18	70		10	54	88		10	50	86		20	59	25
	16	27	32		18	17	27	N	18	48	34				
	22	41	61												
6	01	00	36	21	00	06	52	6	00	28	47	21	13	26	87
	10	53	72		04	05	42		03	32	42		22	03	26
	17	32	34		11	47	87		11	42	85	☾			
	23	22	54		19	54	28		20	15	31				
7	04	13	37	22	01	30	45	7	02	07	45	22	14	42	82
	11	36	73		03	49	43		03	46	44		22	52	28
	19	05	35	S	12	49	86		12	47	85				
					21	33	26		21	29	29				
8	00	18	47	23	14	02	84	8	14	06	84	23	06	24	57
	04	27	38		22	52	24		22	27	28		09	36	62
	12	29	75	☾									16	02	78
	20	49	34										23	29	30
9	01	51	42	24	15	23	83	9	06	17	52	24	06	25	61
	04	37	40		23	49	23		08	25	51		10	51	48
D N	13	35	77						15	31	81		17	13	75
	22	13	30						23	15	27		23	57	33
10	14	53	79	25	07	17	50	10	05	52	57	25	06	35	65
	23	16	26		09	34	48		10	17	47		11	18	43
					16	41	82		16	50	85	E	18	09	72
									23	51	27				
11	16	12	83	26	00	29	23	11	06	16	64	26	00	30	36
					07	11	52		11	26	40		06	50	70
					10	49	44		17	57	85		12	35	39
					17	44	82						18	54	70
12	00	03	22	27	00	58	25	12	00	29	29	27	00	38	38
	06	46	49		07	19	55		06	15	72		07	07	75
	10	20	43		11	45	10	E	12	24	33	A	13	14	35
	17	21	88		18	34	82		18	54	85		19	32	68
13	00	42	21	28	01	20	28	13	01	01	31	28	00	55	40
	07	01	53		07	29	60		07	16	80		07	27	80
	11	26	39		12	32	36		13	18	27		13	51	31
	18	18	92		19	14	80		19	45	82		20	06	65
14	01	17	21	29	01	37	30	14	01	30	34	29	01	10	11
	07	25	59		07	44	61		07	49	88		07	48	85
	12	22	33	E	13	12	32	P ○	14	10	22	●	14	25	29
	19	08	94		19	49	78		20	34	77		20	38	62
15	01	49	22	30	01	52	33	15	01	57	36	30	01	22	41
	07	52	65		08	02	69		08	24	95		08	10	90
	13	12	28		13	49	30		15	03	20		15	03	28
	19	55	93		20	20	74		21	22	70		21	12	59
				31	02	07	35								
				● A	08	22	75								
					14	24	29								
					20	50	70								

Hrs. ：8 hE

潮高の基準面：平均水面下　60 cm
Datum：60 cm below mean sea level

約13分、約25分等を周期とする副周の昇降があるが顕著でない。

高　　雄　KAOHSIUNG

Tide 1976

Lat.　22° 37′ N.　　Long.　120° 16′ E.

5月								6月							
時刻 潮高 Time Ht.				時刻 潮高 Time Ht.				時刻 潮高 Time Ht.				時刻 潮高 Time Ht.			
	h	m	cm		h	m	cm		h	m	cm		h	m	cm
1	01	35	42	16	01	57	43	1	01	39	47	16	02	44	61
	08	36	93		09	24	113		09	28	107		10	39	107
	15	43	27		17	06	21		17	22	29		18	31	33
	21	51	56		23	02	52		23	25	53				
2	01	49	42	17	02	20	45	2	02	13	49	17	00	22	59
	09	05	96		10	10	109		10	12	106		03	30	55
	16	31	27		18	09	23		16	16	31		11	26	99
	22	35	52										19	18	37
3	02	07	43	18	00	04	50	3	00	21	55	18	01	20	62
N	09	11	97		02	38	47		02	55	51		04	45	59
	17	29	28		10	59	103		11	03	102		12	15	90
	23	39	50		19	14	26		19	10	33		20	00	40
4	02	31	41	19	01	22	51	4	01	18	58	19	02	19	66
	10	24	97		02	49	50		03	55	55		07	07	61
	18	36	29		11	52	96		12	01	96	E☾	13	07	81
					20	14	29		20	01	36		20	37	43
5	00	37	49	20	12	51	88	5	02	15	63	20	03	14	71
	02	58	46		21	05	32		05	53	59		08	53	60
	11	17	95					☽	13	07	88		14	07	73
	19	44	30						20	47	39		21	12	46
6	01	59	50	21	05	23	59	6	03	08	70	21	04	01	76
	03	30	49		07	33	58		08	37	57		10	19	56
	12	18	91	☾	13	55	81	E	14	23	80		15	22	66
	20	46	30		21	47	35		21	28	41		21	43	48
7	03	25	54	22	05	07	61	7	03	58	78	22	04	41	81
	04	32	54		09	22	56		10	12	61		11	29	51
☽	13	31	87	E	15	07	74		15	51	73	A	16	50	62
	21	37	32		22	22	38		22	07	44		23	12	50
8	04	15	60	23	05	22	69	8	04	46	87	23	05	18	87
	08	35	55		10	40	62		11	28	43		12	24	46
	14	53	83		16	24	69		17	19	68		18	11	59
	22	22	33		22	51	40		22	43	45		22	39	51
9	04	52	67	24	05	43	74	9	05	33	97	24	05	51	92
	10	14	49		11	42	47		12	33	35		13	09	41
E	16	18	79		17	35	65		18	35	64		19	10	59
	23	02	35		23	16	42		23	18	46		23	06	52
10	05	29	75	25	06	06	79	10	06	17	100	25	06	23	98
	11	25	41		12	33	42		13	31	28		13	47	37
	17	36	76	A	18	32	62	P	19	36	61		19	53	58
	23	37	37		23	38	41		23	52	46		23	31	52
11	06	06	85	26	06	30	85	11	07	01	113	26	06	55	101
	12	37	33		13	14	37		14	24	24		14	22	34
	18	40	73		19	18	69		20	26	59	N	20	30	58
					23	58	45						23	58	61
12	00	09	39	27	06	53	90	12	00	25	46	27	07	28	110
	06	43	91		13	52	34		07	44	118		14	59	32
	13	23	26		19	57	59	SO	15	14	22	●	21	05	59
	19	37	70						21	12	57				
13	00	39	41	28	00	16	46	13	00	58	16	28	00	29	51
	07	22	102		07	19	95		08	21	120		08	01	114
P	14	17	21		14	27	31		16	01	23		15	37	31
	20	28	65		20	34	57		21	56	56		21	39	59
14	01	07	42	29	00	32	46	14	01	31	46	29	01	03	61
	08	01	108		07	16	100		09	10	118		08	41	116
O	16	10	19	●	15	05	29		16	52	26		16	17	32
	21	18	61		21	11	56		22	42	56		22	17	60
15	01	33	42	30	00	50	16	15	02	07	48	30	01	41	52
	08	42	112		08	15	104		09	53	114		09	22	115
S	16	06	19	N	15	45	28		17	42	29		16	59	35
	22	07	56		21	51	54		23	30	57		22	57	62
				31	01	12	46								
					08	19	107								
					16	31	28								
					22	36	53								

7月								8月							
時刻 潮高 Time Ht.				時刻 潮高 Time Ht.				時刻 潮高 Time Ht.				時刻 潮高 Time Ht.			
	h	m	cm		h	m	cm		h	m	cm		h	m	cm
1	02	26	53	16	03	48	57	1	05	14	59	16	05	54	61
	10	07	111		10	59	99		11	44	93		11	51	80
	17	43	38	E	18	10	47	P	18	00	57	A	17	30	60
	23	41	66												
2	03	22	56	17	00	07	73	2	00	30	90	17	00	25	89
	10	56	105		04	53	60		07	00	59		07	31	62
	18	27	42		11	40	90		12	46	82		12	42	73
					18	45	60		18	44	59		17	40	62
3	00	28	70	18	00	54	77	3	01	28	95	18	01	18	91
	04	38	59		06	29	63		08	49	57		09	07	59
E	11	51	96		12	25	82	☽	14	01	72	☾	13	59	67
	19	10	45		19	20	63		19	22	61		17	44	63
4	01	20	76	19	01	45	80	4	02	32	100	19	02	17	93
	06	41	61		08	13	62		10	25	51		10	27	55
	12	52	87	☾A	13	16	74		16	58	65		16	12	64
	19	52	49		19	52	55		20	07	62		17	36	64
5	02	14	83	20	02	37	84	5	03	39	106	20	03	22	97
	08	41	58		09	46	59		11	45	45		11	29	51
☽	14	05	77		14	25	67		18	25	63	N	19	13	66
	20	31	51		20	26	56		21	08	61		20	48	66
6	03	11	90	21	03	31	88	6	04	46	111	21	04	26	102
	10	16	52		11	04	55		12	47	41		12	16	47
	15	37	68		16	11	62	S	19	16	63		18	58	68
	21	10	53		21	03	58		22	11	60		22	09	65
7	04	10	98	22	04	22	93	7	05	44	116	22	05	22	108
	11	37	45		12	05	50		13	35	38		12	51	44
P	17	22	63		18	09	61		19	42	64		19	16	70
	21	52	54		23	42	59		23	09	58		23	07	62
8	05	06	106	23	05	09	99	8	06	36	119	23	06	13	113
	12	33	38		12	51	45		14	12	38		13	29	42
	18	47	60		19	10	62		20	05	66		19	38	74
	22	34	53		22	26	59						23	58	59
9	05	58	114	24	05	53	105	9	00	01	55	24	07	00	117
	13	39	33		13	29	41		07	22	121		14	02	42
S	19	42	60	N	19	41	63		14	43	39		20	04	78
	23	18	52		23	09	58		20	29	69				
10	06	47	119	25	06	35	111	10	00	49	53	25	00	46	55
	14	26	30		14	04	38		08	03	120		07	44	118
	20	22	60		20	13	65	O	16	10	42	●	14	34	44
					23	52	57		20	54	73		20	31	82
11	00	02	51	26	07	14	116	11	01	33	62	26	01	33	53
	07	32	122		14	37	37		08	42	116		08	27	117
O	16	07	30		20	40	67		15	37	46		15	04	48
	20	57	61						21	22	77		21	01	87
12	00	45	50	27	00	31	55	12	02	16	52	27	02	22	51
	08	15	123		07	51	119		09	19	110		09	11	112
	15	46	32	●	15	12	38		16	02	50	E	15	34	52
	21	31	62		21	10	70		21	52	80		21	35	92
13	01	27	50	28	01	17	54	13	03	00	53	28	03	14	61
	08	56	120		08	35	120		09	55	101		09	57	104
	16	22	35		15	47	40	E	16	26	53	P	16	03	67
	22	06	65		21	41	73		22	21	83		22	12	96
14	02	10	51	29	02	03	54	14	03	46	56	29	01	17	52
	09	37	115		09	18	117		10	31	96		10	18	95
	16	59	39		16	22	44		16	50	56		16	29	61
	22	42	67		22	16	70		23	00	85		22	56	99
15	02	56	53	30	02	53	55	15	04	41	59	30	05	35	51
	10	18	108		10	03	111		11	09	88		11	41	84
	17	35	43	E	16	58	48		17	12	59		16	52	64
	23	22	70		22	55	80		23	40	87		23	48	102
				31	03	51	37					31	07	13	54
					10	51	103						12	53	74
					17	31	53						17	07	65
					23	39	85								

Hrs. ：8 hE.

潮高の基準面：平均水面下　60 cm
Datum：60 cm below mean sea level

約13分、約25分等を同期とする副潮の振幅があるが顕著でない。

高　　雄　KAOHSIUNG

Tide
1976

Lat.　22° 37′ N.　　Long.　120° 16′ E.

9月						10月						11月						12月					
時刻 Time		潮高 Ht.				時刻 Time		潮高 Ht.				時刻 Time		潮高 Ht.				時刻 Time		潮高 Ht.			
	h	m	cm				h	m	cm				h	m	cm				h	m	cm		
1	00	48	104	16	00	07	96	1	01	26	104	16	00	17	97	1	03	33	86	16	02	14	83
	08	57	52		08	29	64		10	08	41		09	03	42		10	58	37		09	52	35
☽	14	36	67	N	14	03	65					☾					17	53	71		16	28	69
	16	47	66		16	07	64										22	37	65		21	54	53
2	01	57	106	17	01	09	97	2	02	46	102	17	01	32	95	2	04	48	81	17	03	41	78
	10	27	48		09	46	61		11	07	40		09	58	41		11	29	40		10	31	36
S				☾					18	42	69		18	18	67	E	18	07	75	E	17	04	78
									21	14	67		20	10	67		23	37	49		23	07	44
3	03	13	107	18	02	23	98	3	04	06	100	18	02	56	94	3	05	51	78	18	05	03	74
	11	37	44		10	45	47		11	50	41		10	43	40		11	53	43		11	07	38
	19	14	68						18	38	72		17	26	72		18	26	80		17	40	87
	20	59	67						22	31	62		22	01	61								
4	04	27	109	19	03	40	101	4	05	14	99	19	04	16	93	4	00	27	43	19	00	07	35
	12	28	42		11	31	45		12	22	43		11	22	41		06	40	74		06	12	71
	19	12	69		18	20	71		18	46	75		17	50	78		12	14	45		11	40	39
	22	18	64		22	05	66		23	31	67		23	08	54		18	47	85		18	18	96
5	05	32	111	20	04	51	104	5	06	10	97	20	05	26	93	5	01	08	39	20	01	04	27
	13	07	42		12	10	44		12	48	46		11	57	42		07	22	71		07	12	67
	19	21	71		18	35	76		19	01	80		18	18	85		12	32	46		12	10	40
	23	19	60		23	09	61										19	08	90		18	56	101
6	06	25	112	21	05	51	107	6	00	20	51	21	00	06	46	6	01	46	35	21	01	56	21
	13	37	44		12	46	44		06	56	95		06	26	92		07	57	67		08	05	63
	19	35	74		18	58	81	E	13	08	48	E	12	29	44	A	12	46	47	P●	12	39	41
									19	19	85		18	49	93		19	31	94		19	36	110
7	00	11	56	22	00	03	55	7	01	03	47	22	00	58	39	7	02	21	33	22	02	49	17
	07	10	111		06	43	109		07	35	91		07	20	89		08	30	61		08	55	59
	14	01	47		13	18	45		13	26	51		12	59	46	○	12	58	47		13	07	41
	19	53	79		19	24	87		19	39	89		19	23	101		19	53	97		20	16	114
8	00	56	52	23	00	53	49	8	01	42	44	23	01	50	33	8	02	55	31	23	03	42	16
	07	50	109		07	32	108		08	09	87		08	09	85		09	03	61		09	45	54
○	14	22	50	E	13	48	48	○	13	41	53	●P	13	25	48		13	08	47	S	13	32	42
	20	15	83		19	53	94		20	01	93		19	56	108		20	17	100		20	59	114
9	01	38	50	24	01	42	45	9	02	19	43	24	02	41	30	9	03	34	31	24	04	38	18
	08	25	105		08	18	105		08	41	83		08	59	79		09	39	57		10	38	51
E	14	40	53	●	14	15	51		13	54	54		13	50	50		13	22	47		13	56	43
	20	38	87		20	25	100		20	23	97		20	34	112		20	44	101		21	44	111
10	02	19	49	25	02	33	42	10	02	55	42	25	03	37	29	10	04	17	31	25	05	39	30
	08	59	99		09	05	98		09	13	78		09	50	71		10	22	64		11	37	49
	14	58	55	P	14	41	55	A	14	06	55		14	10	52	N	13	39	47		14	20	45
	21	04	91		21	00	105		20	47	99		21	14	114		21	17	102		22	32	105
11	02	58	60	26	03	28	41	11	03	36	42	26	04	38	29	11	05	08	31	26	06	44	23
	09	32	93		09	52	90		09	18	73		10	46	64		11	15	53		12	51	49
	15	13	58		15	04	58		14	15	55	S	14	27	53		14	02	48		14	38	48
	21	30	93		21	38	108		21	14	100		21	59	113		21	56	100		23	25	97
12	03	40	61	27	04	31	42	12	04	21	43	27	05	51	31	12	06	10	32	27	07	45	26
	10	06	87		10	46	81		10	28	68		11	53	59		12	22	52				
	15	26	59		15	22	61		14	26	56		14	37	55		14	27	50				
	22	00	95		22	22	109		21	45	101		22	51	109		22	44	97				
13	04	28	53	28	05	48	44	13	05	19	44	28	07	11	32	13	07	16	33	28	00	24	88
	10	43	80		11	50	72		11	20	63		23	49	104		13	46	63		08	38	28
A	15	37	60		15	33	62		14	42	56						14	55	53	☽	16	52	57
	22	35	96		23	14	109		22	24	100						23	13	93		19	07	56
14	05	31	55	29	07	20	44	14	06	33	44	29	08	28	33	14	08	16	33	29	01	31	78
	11	28	74		13	15	65		12	30	60										09	22	31
	16	47	61	S	15	25	63	N	14	58	58										16	37	62
	23	15	96						23	14	99										21	10	53
15	06	56	55	30	00	15	107	15	07	53	44	30	00	55	97	15	00	53	88	30	02	16	70
	12	29	68		08	52	43					☽	09	31	34		09	07	31		09	59	31
	15	59	62	☽												☾	15	54	62	E	15	59	67
																	20	07	59		22	35	47
												31	02	12	91								
													10	20	35								
													17	52	67								
													21	21	61								

Hrs. : 8 hE

潮高の基準面：平均水面下　60 cm
Datum : 60 cm below mean sea level

約13分、約25分等を周期とする両面の昇降があるが顕著でない。

鎭南浦 CHINNAMPO

Tide

Lat. 38° 43′ N. Long. 125° 24′ E. 1976

1月								2月							
時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.		
	h	m	cm		h	m	cm		h	m	cm		h	m	cm
1	02	53	73	16	02	37	94	1	01	03	61	16	03	35	43
	09	06	433		08	48	411		10	15	463		09	46	485
●	14	43	37		14	28	55		15	56	43	○	15	35	21
	21	33	576		21	14	546		22	33	561		22	06	579
2	03	41	61	17	03	19	73	2	04	35	55	17	04	12	24
	09	51	412		09	23	430		10	47	472		10	26	509
	15	29	34	○	15	09	40		16	32	46	E P	16	17	12
	22	12	579		21	49	561		23	03	552		22	43	579
3	04	21	55	18	03	57	55	3	05	06	52	18	04	49	15
	10	30	448		10	02	448		11	17	479		11	02	530
	16	09	37		15	47	27	E	17	04	62		16	59	15
	22	49	573		22	23	573		23	30	539		23	20	567
4	04	58	55	19	04	33	40	4	05	36	52	19	05	27	15
	11	06	451		10	37	466		11	47	482		11	41	539
	16	46	43		16	27	21		17	39	61		17	43	30
	23	23	561		22	57	576		23	57	524		23	57	543
5	05	33	58	20	05	10	30	5	06	08	58	20	06	08	24
	11	39	448		11	15	482		12	16	482		12	24	536
	17	25	58	P	17	09	24	A	18	16	76		18	32	61
	23	55	543		23	33	570								
6	06	09	64	21	05	49	27	6	00	29	503	21	00	37	509
	12	13	448		11	55	491		06	42	64		06	50	43
	18	03	73	E	17	52	40		12	50	482		13	11	521
									18	58	98		19	25	98
7	00	29	521	22	00	12	552	7	01	01	479	22	01	21	466
	06	45	73		06	31	34		07	19	76		07	40	70
E	12	48	445		12	37	491		13	30	473	☾	14	04	497
	18	48	94		18	42	64		19	45	122		20	30	137
8	01	01	497	23	00	53	521	8	01	38	451	23	02	15	421
	07	25	82		07	17	46		08	07	94		08	44	101
	13	30	439		13	27	485	☽	14	18	460		15	10	469
	19	35	119		19	40	98		20	44	149		21	48	165
9	01	40	469	24	01	40	479	9	02	25	421	24	03	24	378
	08	10	91		08	10	61		09	00	113		09	57	126
A ☽	14	17	433	☾	14	35	472		15	15	448	S	16	40	454
	20	31	140		20	47	131		21	55	168		23	14	171
10	02	25	436	25	02	36	433	10	03	21	387	25	05	11	360
	09	03	101		09	13	85		10	07	125		11	16	131
	15	13	430		15	37	460		16	30	442		18	19	466
	21	37	168		22	08	155		23	10	171				
11	03	18	405	26	03	47	393	11	04	39	369	26	00	30	155
	10	01	113		10	22	101		11	16	125		06	51	378
	16	21	127		17	07	457	N	17	56	451		12	29	122
	22	47	165		23	32	155						19	31	491
12	04	27	381	27	05	26	369	12	00	19	155	27	01	34	131
	11	03	113		11	37	101		06	17	369		07	57	411
	17	42	439	S	18	38	479		12	19	110		13	31	101
	23	58	158						19	12	479		20	24	518
13	05	48	372	28	00	49	140	13	01	20	128	28	02	21	104
	12	01	104		06	59	378		07	31	393		08	45	442
	18	51	463		12	14	88		13	17	88		14	21	79
					19	47	509		20	05	512		21	06	536
14	00	59	140	29	01	51	116	14	02	11	98	29	03	04	82
	07	01	378		08	03	402		08	26	424		09	23	469
N	12	56	91		13	41	73		14	06	61		15	03	61
	19	49	494		20	40	536		20	50	513		21	41	643
15	01	51	116	30	02	42	91	15	03	54	67				
	08	00	393		08	58	427		09	08	454				
	13	44	73		14	32	58		14	51	37				
	20	34	521		21	22	555		21	30	567				
				31	03	27	73								
				●	09	41	418								
					15	17	49								
					22	01	564								

3月								4月							
時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.			時刻 Time	潮高 Ht.		
	h	m	cm		h	m	cm		h	m	cm		h	m	cm
1	03	38	67	16	03	06	37	1	04	02	64	16	03	59	15
	09	56	488		09	27	530		10	27	536		10	30	610
●	15	40	55	E ○	15	20	21		16	23	70		16	37	30
	22	13	543		21	47	567		22	37	503		22	48	521
2	04	07	58	17	03	47	18	2	04	29	61	17	04	40	21
	10	26	500		10	07	558		10	51	543		11	12	610
E	16	13	52	P	16	04	12		16	54	73		17	23	49
	22	38	536		22	26	564		23	02	494		23	28	500
3	04	35	55	18	04	25	9	3	04	57	64	18	05	23	40
	10	53	509		10	46	576		11	18	546		11	54	594
	16	45	55		16	48	18		17	25	79	S	18	10	76
	23	04	527		23	04	549		23	28	485				
4	05	02	52	19	05	04	12	4	05	27	67	19	00	10	472
	11	18	515		11	27	582		11	47	546		06	06	67
A	17	15	61		17	30	37		18	00	91		12	39	567
	23	28	515		23	41	524		23	59	475		19	02	107
5	05	31	55	20	05	44	27	5	06	00	76	20	00	57	442
	11	47	518		12	08	573		12	21	539		06	57	101
	17	49	73		18	21	64	N	18	40	107		13	30	533
	23	55	500										20	01	134
6	06	00	61	21	00	23	491	6	00	34	457	21	01	51	415
	12	16	518		06	26	52		06	40	94		07	56	137
	18	26	88		12	53	549		13	03	521	☾	14	25	497
					19	14	104		19	30	128		21	08	155
7	00	26	482	22	01	08	451	7	01	17	439	22	02	57	393
	06	36	73		07	17	85		07	30	116		09	08	165
	12	52	509	S	13	45	515		13	53	506		15	36	466
	19	09	113		20	15	140		20	30	146		22	17	165
8	01	01	460	23	01	59	411	8	02	12	418	23	04	24	390
	07	17	91		08	18	122		08	35	137		10	27	174
	13	35	491	☾	14	47	482	☽	14	52	488		17	00	454
	20	01	137		21	29	168		21	44	155		23	25	155
9	01	46	433	24	03	10	378	9	03	21	402	24	05	53	408
	08	10	113		09	34	149		09	53	149		11	40	165
☽ N	14	28	475		16	11	457		16	07	475		18	17	457
	21	07	162		22	51	174		23	00	146				
10	02	41	402	25	04	57	369	10	04	49	405	25	00	20	137
	09	15	134		10	57	158		11	11	140		07	00	442
	15	32	460		17	48	457		17	32	479	E	12	41	149
	22	24	171										19	18	469
11	03	53	381	26	00	04	158	11	00	01	122	26	01	10	119
	10	32	140		06	33	390		06	17	436		07	49	179
	16	56	457		12	09	146		12	19	116		13	34	128
	23	40	158		19	04	476		18	46	497		20	05	479
12	05	29	381	27	01	04	137	12	01	02	88	27	01	50	101
	11	45	128		07	39	127		07	24	479		08	29	506
	18	22	475		13	10	125	E	13	21	85	A	14	16	110
					19	57	491		19	47	518		20	42	485
13	00	43	131	28	01	49	113	13	01	50	58	28	02	26	88
	06	56	108		08	21	453		08	19	527		09	01	630
	12	49	101		14	00	104		14	14	55		14	56	98
	19	29	506		20	40	509		20	37	533		21	18	485
14	01	39	91	29	02	30	91	14	02	37	34	29	02	58	82
	07	57	418		09	00	491		09	06	567		09	35	513
	13	44	70	E	14	42	85	P ○	15	01	34	●	15	30	91
	20	21	536		21	15	518		21	25	539		21	46	482
15	02	24	64	30	03	01	76	15	03	19	18	30	03	28	76
	08	43	491		09	32	512		09	48	597		10	03	553
	14	34	43		15	19	73		15	51	27		16	02	88
	21	06	558		21	46	515		22	07	536		22	12	475
				31	03	31	79								
				● A	10	00	527								
					15	51	70								
					22	12	512								

Hrs. : 8 bE

潮高の基準面：平均水面下 305 cm
Datum : 305 cm below mean sea level

鎭南浦 CHINNAMPO

Tide
1976

Lat. 38° 43′ N. Long. 125° 24′ E.

5月								6月							
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm		h m	cm			h m	cm			h m	cm		
1	03 57	76	16	04 19	40		1	01 38	85		16	05 31	91		
	10 28	558	S	10 59	632			11 09	579			12 08	591		
	16 34	91		17 12	67			17 26	104			18 26	104		
	22 38	469		23 17	482			23 22	463						
2	04 28	76	17	05 04	55		2	05 14	88		17	00 29	469		
	10 56	561		11 42	607			11 44	579			06 16	113		
	17 06	94		18 00	85			18 05	104			12 45	564		
	23 05	466										19 09	119		
3	04 58	76	18	00 00	466		3	00 00	466		18	01 11	463		
	11 25	564		05 49	82			05 55	98			07 06	140		
N	17 41	98		12 24	579			12 21	573			13 27	533		
	23 37	453		18 47	107			18 50	107			19 54	131		
4	05 31	85	19	00 45	448		4	00 44	466		19	01 59	457		
	12 00	561		06 38	110			06 45	113			08 02	165		
	18 21	107		13 09	549			13 06	561		E	14 10	503		
				19 40	128			19 40	110		☾	20 47	140		
5	00 15	457	20	01 33	433		5	01 37	466		20	02 55	451		
	06 15	98		07 33	140			07 43	134			09 03	186		
	12 40	552		13 59	515		☽	13 56	536			15 02	472		
	19 08	119		20 35	143			20 38	113			21 40	146		
6	00 58	448	21	02 33	421		6	02 36	466		21	03 55	454		
	07 03	116		08 36	168			08 54	152			10 09	195		
	13 25	536	☾	14 55	482		E	14 55	512			16 04	448		
	20 04	128		21 34	149			21 42	113			22 37	146		
7	01 51	436	22	03 42	418		7	03 48	472		22	05 08	466		
	08 06	137		09 48	183			10 11	158			11 16	195		
☽	14 23	515	E	16 01	460			16 04	485		A	17 13	433		
	21 10	134		22 34	149			22 46	107			23 32	143		
8	02 57	430	23	05 01	430		8	05 08	494		23	06 17	485		
	09 21	149		10 58	183			11 27	152			12 19	186		
	15 29	497		17 14	445			17 23	469			18 26	430		
	22 19	128		23 30	140			23 50	94						
9	04 18	439	24	06 11	454		9	06 27	524		24	00 23	134		
	10 39	119		12 01	171			12 38	134			07 15	512		
E	16 43	485		18 23	445			18 43	466			13 15	171		
	23 24	110										19 26	433		
10	05 40	466	25	00 22	128		10	00 46	79		25	01 12	125		
	11 53	131		07 07	485			07 31	564			08 03	533		
	18 04	483	A	12 58	155		P	13 39	113			14 03	155		
				19 20	448			19 49	472			20 17	439		
11	00 25	85	26	01 07	116		11	01 41	64		26	01 55	116		
	06 53	506		07 57	512			08 29	597			08 45	555		
	12 59	107		13 47	140			14 37	91		N	14 45	140		
	19 12	494		20 05	454			20 48	479			20 56	448		
12	01 18	61	27	01 49	104		12	02 32	55		27	02 31	107		
	07 52	552		08 34	536			09 19	619			09 20	570		
	13 57	79		14 29	128		S○	15 27	82		●	15 22	128		
	20 11	503		20 46	457			21 36	485			21 31	454		
13	02 06	43	28	02 26	98		13	03 19	55		28	03 11	101		
	08 45	591		09 09	552			10 01	628			09 53	582		
P	14 50	61		15 09	119			16 15	79			16 00	119		
	21 03	506		21 30	457			22 22	485			22 03	463		
14	02 53	34	29	02 59	91		14	04 04	68		29	03 46	94		
	09 31	616		09 41	561			10 47	625			10 24	591		
○	15 38	62	●	15 43	113			16 59	82			16 35	110		
	21 51	506		21 51	457			23 07	485			22 35	472		
15	03 37	30	30	03 33	88		15	04 49	73		30	04 21	88		
	10 15	628		10 10	570			11 27	613			10 54	597		
	16 27	55	N	16 18	110			17 43	91			17 10	101		
	22 34	497		22 18	457			23 47	479			23 10	485		
			31	01 01	85										
				10 39	573										
				16 51	107										
				22 49	460										

7月								8月							
時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.		時刻 Time		潮高 Ht.	
	h m	cm		h m	cm			h m	cm			h m	cm		
1	04 69	88	16	00 03	503		1	00 13	546		16	00 40	530		
	11 29	597		05 54	113			06 16	107			06 45	146		
	17 47	98	E	12 16	573		P	12 29	573		A	12 46	521		
	23 47	494		18 32	113			18 47	88			19 03	128		
2	05 42	94	17	00 40	500		2	01 00	516		17	01 17	521		
	12 03	591		06 34	134			07 09	131			07 33	171		
	18 29	94		12 52	546			13 11	539			13 27	491		
				19 11	122			19 35	104			19 48	146		
3	00 30	503	18	01 19	497		3	01 51	536		18	02 03	509		
	06 29	110		07 22	158			08 12	165			08 28	195		
E	12 48	573		13 30	518		☽	14 02	500		☾	14 12	463		
	19 14	98		19 54	134			20 33	125			20 44	165		
4	01 17	506	19	02 04	491		4	02 54	524		19	02 57	494		
	07 25	131		08 15	180			09 26	192			09 36	213		
	13 33	549	☾A	14 10	488			15 03	460			15 08	436		
	20 07	104		20 44	146			21 42	140			21 48	177		
5	02 14	506	20	02 56	485		5	04 13	515		20	04 11	488		
	08 31	158		09 18	201			10 49	201			10 50	216		
☽	14 27	512		15 01	457			16 29	430		N	16 24	418		
	21 07	113		21 40	158			22 57	146			22 57	177		
6	03 20	506	21	03 58	479		6	05 46	524		21	05 34	491		
	09 47	177		10 27	210			12 09	192			12 02	304		
	15 32	475		16 03	433			18 11	424			17 56	418		
	22 12	119		22 40	162		S								
7	04 39	512	22	05 16	485		7	00 09	140		22	00 02	165		
	11 05	180		11 37	207			07 07	552			06 51	515		
P	16 51	448		17 23	421			13 18	168			12 59	180		
	23 20	116		23 40	158			19 31	445			19 12	439		
8	06 02	530	23	06 30	503		8	01 12	125		23	00 59	113		
	12 19	168		12 38	195			08 08	579			07 17	546		
	18 19	412		18 43	421			14 13	143			13 50	152		
								20 29	472			20 05	466		
9	00 22	107	24	00 36	146		9	02 08	107		24	01 49	119		
	07 18	561		07 28	527			08 58	600			08 29	573		
S	13 26	146	N	13 34	177			14 59	122			14 32	125		
	19 36	451		19 44	436			21 17	500			20 48	497		
10	01 23	94	25	01 26	131		10	02 54	94		25	02 32	91		
	08 19	591		08 19	555			09 39	613			09 09	591		
	14 24	125		14 19	155		○	15 41	107		●	15 11	101		
	20 37	466		20 32	454			21 59	515			21 25	524		
11	02 17	82	26	02 13	116		11	03 36	88		26	03 14	79		
	09 09	616		08 58	576			10 16	610			09 46	604		
○	15 17	110		15 01	131			16 18	101			15 49	82		
	21 27	485		21 11	469			22 32	527			22 02	549		
12	03 06	76	27	02 51	101		12	04 15	88		27	03 54	67		
	09 53	625		09 33	591			10 50	600			10 20	607		
	16 02	98	●	15 38	116			16 51	98		E	16 25	70		
	22 11	494		21 46	488			23 04	533			22 38	570		
13	03 51	76	28	03 34	88		13	04 51	98		28	04 35	67		
	10 31	625		10 05	601			11 18	585			10 51	600		
	16 42	94		16 13	101		E	17 22	101		P	17 01	64		
	22 52	500		22 20	506			23 35	536			23 17	582		
14	04 33	82	29	04 08	82		14	05 28	110		29	05 18	76		
	11 10	613		10 40	610			11 47	567			11 30	582		
	17 20	98		16 50	88			17 52	107			17 39	67		
	23 28	503		22 55	524							23 55	585		
15	05 16	98	30	04 48	79		15	00 07	536		30	06 03	98		
	11 44	694		11 12	607			06 03	125			12 10	555		
	17 56	104	E	17 27	82			12 16	516			18 20	82		
				23 31	539			18 26	116						
			31	05 31	88										
				11 48	597										
				18 05	82										

Hrs. : 8 hr.

潮高の基準面：平均水面下 305 cm
Datum : 305 cm below mean sea level

鎭南浦 CHINNAMPO

Lat. 38° 43′ N. Long. 125° 24′ E.

Tide 1976

9月				9月			
時刻 Time	h m	潮高 Ht.	cm	時刻 Time	h m	潮高 Ht.	cm
1	01 33		555	16	01 19		527
	07 56		165		07 16		177
☽	13 45		475	N	13 33		460
	20 06		137		19 51		168
2	02 33		530	17	02 10		509
	09 11		195		08 49		198
S	14 47		436	☾	14 27		433
	21 20		162		20 57		177
3	03 55		509	18	03 15		491
	10 36		207		10 05		201
	16 20		408		15 37		415
	22 42		171		22 14		183
4	05 32		509	19	04 36		485
	11 56		195		11 21		192
	18 11		418		17 09		415
	23 58		162		23 27		171
5	06 56		530	20	05 58		500
	13 02		168		12 22		165
	19 26		451		18 35		442
6	01 02		140	21	00 28		143
	07 55		555		07 05		527
	13 55		140		13 15		134
	20 19		488		19 31		479
7	01 57		119	22	01 23		113
	08 42		573		07 57		552
	14 37		119		14 00		101
	21 01		516		20 21		518
8	02 42		104	23	02 13		85
	09 20		582		08 42		573
○	15 11		104	E	14 42		73
	21 38		536		21 02		555
9	03 21		91	24	02 56		61
	09 51		582		09 20		582
E	15 48		91	●	15 19		55
	22 10		549		21 42		585
10	03 57		91	25	03 40		49
	10 25		573		09 59		582
	16 16		91	P	15 56		43
	22 38		555		22 19		607
11	04 30		91	26	04 23		49
	10 50		558		10 38		570
	16 46		91		16 35		43
	23 06		558		22 58		613
12	05 02		101	27	05 06		61
	11 15		543		11 14		549
	17 15		98		17 14		52
	23 33		558		23 40		610
13	05 36		113	28	05 52		85
	11 41		527		11 53		518
A	17 45		101		17 57		73
14	00 03		553	29	00 24		588
	06 12		131		06 11		119
	12 13		509	S	12 40		482
	18 21		119		18 45		104
15	00 39		513	30	01 17		558
	06 50		152		07 43		155
	12 48		485	☽	13 30		145
	19 01		137		19 43		140

10月				10月			
時刻 Time	h m	潮高 Ht.	cm	時刻 Time	h m	潮高 Ht.	cm
1	02 15		531	16	01 33		515
	08 55		183		08 10		165
	14 39		411	☾	13 51		427
	20 59		171		20 10		158
2	03 34		491	17	02 29		497
	10 18		192		09 21		171
	16 16		396		15 01		411
	22 25		180		21 29		171
3	05 09		485	18	03 40		482
	11 31		177		10 34		162
	17 59		418		16 25		415
	23 43		171		22 48		165
4	06 30		197	19	05 02		482
	12 37		155		11 40		137
	19 07		454		17 50		442
					23 58		140
5	00 46		119	20	06 17		497
	07 31		515		12 35		107
	13 28		128		18 59		485
	19 57		491				
6	01 41		125	21	00 59		107
	08 17		530		07 18		515
E	14 08		107	E	13 26		73
	20 40		521		19 52		530
7	02 24		107	22	01 50		76
	08 56		536		08 13		530
	14 42		91		14 09		49
	21 15		543		20 38		573
8	03 01		94	23	02 40		52
	09 28		533		08 56		539
○	15 15		82	●P	14 51		30
	21 45		558		21 22		604
9	03 38		88	24	03 27		40
	09 57		527		09 38		536
	15 41		79		16 31		21
	22 12		561		22 04		622
10	01 09		88	25	04 12		37
	10 21		515		10 30		524
A	16 12		79		16 11		24
	22 38		564		22 45		625
11	04 39		91	26	04 56		49
	10 49		503		11 01		506
	16 40		82		16 53		37
	23 06		561		23 28		613
12	05 11		101	27	05 43		70
	11 15		491		11 44		482
	17 10		88	S	17 39		61
	23 33		561				
13	05 47		113	28	00 13		588
	11 41		479		06 31		101
	17 44		101		12 29		454
					18 25		91
14	00 08		552	29	01 01		552
	06 24		126		07 30		128
N	12 18		463		13 24		424
	18 24		116		19 25		131
15	00 45		536	30	01 56		515
	07 11		146		08 39		152
	13 01		445	☽	14 28		402
	19 09		137		20 39		162
				31	03 05		179
					09 19		158
					15 51		393
					21 58		177

11月				11月			
時刻 Time	h m	潮高 Ht.	cm	時刻 Time	h m	潮高 Ht.	cm
1	04 27		457	16	02 57		485
	10 59		152		09 18		122
	17 27		411		15 41		424
	23 17		171		22 09		149
2	05 50		457	17	01 09		166
	11 58		131		10 55		107
E	18 38		415	E	17 05		115
					23 24		131
3	00 22		152	18	05 26		463
	06 51		106		11 56		82
	12 49		110		18 22		485
	19 31		482				
4	01 15		131	19	00 30		107
	07 44		475		06 39		466
	13 31		91		12 49		58
	20 13		512		19 24		527
5	02 00		110	20	01 28		79
	08 26		479		07 41		479
	14 09		82		13 39		34
	20 50		533		20 17		570
6	02 42		98	21	02 24		52
	09 02		479		08 34		485
A	14 43		73	P	14 26		15
	21 22		549		21 06		600
7	03 17		88	22	03 14		37
	09 33		475		09 23		488
○	15 14		70	●	15 11		9
	21 50		555		21 51		619
8	03 49		85	23	04 00		34
	09 59		469		10 07		482
	15 41		67	S	15 55		12
	22 18		558		22 35		619
9	01 21		85	24	04 46		40
	10 27		460		10 52		472
	16 13		70		16 39		24
	22 44		558		23 18		607
10	04 53		88	25	05 35		55
	10 52		457		11 36		457
N	16 43		73		17 23		46
	23 12		555				
11	05 27		94	26	00 00		582
	11 23		454		06 23		73
	17 17		79		12 21		439
	23 44		519		18 13		76
12	06 03		101	27	00 45		519
	11 57		445		07 14		91
	17 55		91		13 11		424
					19 06		110
13	00 21		539	28	01 33		509
	06 18		110		08 07		113
	12 37		436	☽	14 07		405
	18 40		110		20 09		140
14	01 05		524	29	02 28		472
	07 38		119		09 08		125
	13 30		427		15 16		399
	19 38		131		21 23		162
15	01 56		503	30	03 32		442
	08 41		125		10 10		128
☾	14 31		421	E	16 34		408
	20 49		146		22 36		168

12月				12月			
時刻 Time	h m	潮高 Ht.	cm	時刻 Time	h m	潮高 Ht.	cm
1	01 47		421	16	03 24		454
	11 10		122		10 10		82
	17 51		430		16 23		454
	23 43		158		22 60		134
2	06 01		415	17	04 37		433
	12 04		110		11 15		73
	18 51		460		17 45		479
3	00 43		140	18	00 04		119
	07 04		418		06 01		421
	12 51		94		13 17		58
	19 41		488		18 59		515
4	01 34		122	19	01 10		94
	07 52		424		07 18		427
A	13 34		82	P	13 15		40
	20 24		512		20 01		555
5	02 19		107	20	02 11		67
	08 34		430		08 21		439
	14 13		73	S	14 06		21
	20 59		530		20 54		585
6	02 58		91	21	03 03		49
	09 11		433		09 14		451
	14 48		67	●	14 56		12
	21 31		539		21 43		604
7	03 33		85	22	03 52		37
	09 43		433		10 01		457
○N	15 20		61		15 43		9
	22 02		546		22 26		607
8	04 05		82	23	04 37		37
	10 12		433		10 41		460
	15 54		58		16 29		18
	22 29		549		23 08		597
9	04 37		79	24	05 22		40
	10 39		433		11 27		457
	16 25		58		17 12		31
	22 57		552		23 48		576
10	05 11		76	25	06 03		52
	11 07		436		12 08		451
	16 58		61		17 57		58
	23 28		549				
11	05 47		73	26	00 26		546
	11 41		439		06 47		67
	17 36		67		12 49		412
					18 45		85
12	00 02		546	27	01 07		512
	06 26		76		07 32		82
	12 21		442	E	13 38		430
	18 21		79		19 35		116
13	00 42		533	28	01 49		476
	07 11		76		08 20		98
	13 09		442	☽	14 28		421
	19 11		98		20 36		143
14	01 27		512	29	02 39		439
	08 01		82		09 13		110
E☾	14 03		412		15 29		418
	20 15		119		21 15		162
15	02 20		485	30	03 37		405
	09 03		85		10 13		116
	15 08		412		16 41		421
	21 32		134		22 54		168
				31	01 50		384
					11 12		113
				A	17 59		436

Hrs. : 8 hE.

潮高の基準面：平均水面下 305 cm
Datum : 305 cm below mean sea level

Appendix 6 Landings of Tuna and Suitable Tuna Baitfish by Month 4/

Species	Month	Visayan Sea 1/	Sibuyan Sea	Davao Gulf	Eastern Moro Gulf 2/	Basilan Zamboanga	Northwest Mindanao 3/	TOTAL
Anchovy		60.9		0.8			5.1	66.8
Big-eye scad		692.4	52.9	24.7	2.3			772.3
Herring		668.3	10.0					678.3
Round scad		385.4	9.8	21.5	- 11.8	15.9		444.4
Sardine	January	450.5	10.9	8.6		24.4		694.4
Silverside								
Bonito				32.0	112.9			144.9
Skipjack					10.1			10.1
Yellowfin		85.8	9.7	1.2	48.9			145.6
Anchovy		88.2		1.2				89.4
Big-eye scad		880.4	10.7	22.5	0.4			914.0
Herring	February	166.3						166.3
Round scad		361.1		12.1	45.8	1.2		420.2
Sardine		211.6		2.9		1.0		215.5
Silverside								
Bonito				40.4	96.0			136.4
Skipjack		40.9			50.9			91.8
Yellowfin		174.6		0.6	54.8			230.0
Anchovy		26.9		0.7	0.2		2.8	30.6
Big-eye scad		456.5	19.8	11.3	7.1	1.4		496.1
Herring		170.4						170.4
Round scad	March	843.8		17.0	9.4	5.1		875.3
Sardine		361.0		2.6		4.6	5.4	373.6
Silverside		4.4		0.2				4.6
Bonito		70.8		47.1	5.8			123.7
Skipjack					64.5			64.5
Yellowfin		118.7		0.6	51.3			170.6

1/ This includes catches from Asia Gulf, Guinaras Strait,, Jintatola, Samar Sea, Tonon Strait, Visayan Sea, Panay Gulf

2/ This includes catchs from Jilana Bay, Moro Gulf, Saragani Bay

3/ This includes catches from Dipolog, Margos, Dapitan

4/ Date includes those Landings by boats over 3 G/T.)

Source : Bureau of Fisheries, Regional Office XI, VI and III

Species	Month	Visayan Sea	Sibuyan Sea	Davao Gulf	Eastern Moro Gulf	Basilan Zamboanga	Southwest Mindanao	TOTAL
Anchovy	April	100.8		2.1		1.3	2.0	106.2
Big-eye scad		323.0		8.6	76.0	3.9	9.1	420.6
Herring		49.0						49.0
Round scad		1 155.8		14.0	84.4	15.7	70.4	1 340.3
Sardine		178.4		1.9		23.8	7.0	211.1
Silverside								
Bonito		52.7		15.5	4.3			72.5
Skipjack		12.5			41.7	1.2	3.0	58.4
Yellowfin		5.0			109.7	6.5	3.0	124.2
Anchovy	May	64.0		0.7	0.2		2.8	67.7
Big-eye scad		799.2		11.2	7.1	1.4		818.8
Herring		287.3						287.3
Round scad		636.6		17.0	9.4	5.1		668.1
Sardine		512.0		2.6		4.9	5.4	524.9
Silverside		2.0		0.2				2.2
Bonito				47.1	5.8			52.9
Skipjack		17.9			64.5			82.4
Yellowfin		116.1		0.6	51.3			168.0
Anchovy	June	162.6		5.0		4.4	3.3	175.3
Big-eye scad		662.9		20.7	7.3			690.9
Herring		484.3						484.3
Round scad		773.7		50.5	1.8	17.3	3.0	846.3
Sardine				5.6		16.6	2.8	25.0
Silverside				0.4				0.4
Bonito					23.7			23.7
Skipjack		10.0			125.0			135.0
Yellowfin		175.2			51.7			226.9

Species	Month	Visayan Sea	Sibuyan Sea	Davao Gulf	Eastern Moro Gulf	Basilan Zamboanga	Northwest Mindanao	TOTAL
Anchovy	July	5.7		21.1		4.3	2.7	33.8
Big-eye scad		587.9		26.1	10.8			624.8
Herring		168.6				9.9		178.5
Round scad		1 100.3		51.0	48.2	5.0		1 204.5
Sardine		402.0		5.1		6.8	23.7	437.6
Silverside								
Bonito				32.2	44.2			76.4
Skipjack		13.4			30.4			43.8
Yellowfin		139.9		1.2	47.4			188.5
Anchovy	August	37.5		34.1		1.4	3.7	76.7
Big-eye scad		368.1		15.9	9.8			393.8
Herring		8.0				0.4		8.4
Round scad		1 321.7		29.9	43.5	11.1	8.9	1 415.1
Sardine		392.6		7.2		17.8	4.1	421.7
Silverside								
Bonito					18.4			18.4
Skipjack		55.5			122.0			177.5
Yellowfin		8.2			25.1			33.3
Anchovy	September	172.9		15.2		0.8	6.5	195.4
Big-eye scad		566.8		14.4	1.9			583.1
Herring		151.4						151.4
Round scad		1 040.1		23.3	39.9	16.5		1 119.8
Sardine		508.6		4.8		25.6		539.0
Silverside								
Bonito				92.7	69.3			162.0
Skipjack		27.3			45.7			73.0
Yellowfin		93.4			33.4			126.8

Species	Month	Visayan Sea	Sibuyan Sea	Davao Gulf	Eastern Moro Gulf	Basilan Zamboanga	Northwest Mindanao	TOTAL
Anchovy	October	233.1		1.6			5.9	240.6
Big-eye scad		599.2		21.4	1.1			621.7
Herring		57.0		8.1				65.1
Round scad		364.4		30.5	25.6	16.3	1.5	438.3
Sardine		343.3				61.6	3.9	408.8
Silverside								
Bonito				71.5	139.4			210.9
Skipjack		38.4			25.6			64.0
Yellowfin		92.2		1.7	25.0			118.9
Anchovy	November	52.3		1.0		2.4		55.7
Big-eye scad		692.3		10.6	0.7			703.6
Herring		98.6						98.6
Round scad		369.1		21.8	11.7	16.6		419.2
Sardine		230.2		6.1		31.1	3.5	270.9
Silverside								
Bonito				99.9	65.9			165.8
Skipjack		3.6			76.8		0.6	81.0
Yellowfin				2.8	4.4			7.2
Anchovy	December	155.7		3.5		4.1		163.3
Big-eye scad		734.5		19.4	5.0		0.9	759.8
Herring		169.1						169.1
Round scad		686.6		9.0	11.1	20.1		726.8
Sardine		83.3		3.4		39.8		126.5
Silverside								
Bonito				104.3	103.4		0.1	207.8
Skipjack		16.6			98.7			115.3
Yellowfin				1.7	12.3			14.0

Appendix 7 Monthly Production of Commercial Fishing Vessels, by Kind of Gear Used, 1973
(in kilog

(in tons)

Month	Bagnet	Beach Seine	Gillnet	Hook and Line	Muro-Ami	Purse Seine	Otter Trawl	Round Haul Seine	Push Net	Total
	40,601	1,627	1,029	6,521	26,475	232,587	152,766	3,657	179	465,442
January	3,998	86	94	67	76	10,119	13,384	396	-	28,220
February	6,183	497	56	414	95	10,634	9,803	332	-	28,014
March	3,969	264	141	327	117	24,567	11,974	228	-	41,587
April	3,389	224	109	484	-	20,678	11,292	379	-	36,555
May	3,302	180	82	940	3,981	29,508	14,387	524	-	52,904
June	4,008	85	124	458	3,193	23,482	12,666	152	-	44,168
July	3,816	76	113	343	3,831	21,822	11,376	425	-	41,801
August	3,282	86	79	400	3,251	22,848	13,552	335	-	43,835
September	3,808	72	29	748	4,418	26,966	16,066	378	-	52,483
October	1,829	32	54	744	2,838	18,840	15,707	201	48	40,292
November	1,867	25	99	743	2,103	13,009	11,505	202	94	29,648
December	1,150	-	48	853	2,573	10,114	11,054	106	38	25,935

Appendix 8 Monthly Production of Commercial Fishing Vessels by Kind of Fish: January to June, 1973

(Kg)

Kind of Fish	January	February	March	April	May	June	Sub-total
Total	28, 220, 040	28, 013, 750	41, 586, 640	36, 555, 280	52, 903, 910	44, 167, 590	231, 447, 210
Anchovy	1, 148, 290	1, 213, 410	1, 395, 830	1, 210, 320	1, 099, 490	1, 152, 830	7, 220, 170
Barracuda	-	1, 700	8, 250	13, 990	392, 600	38, 280	454, 820
Big-eyed scad	565, 760	879, 070	679, 760	1, 007, 500	2, 147, 830	888, 130	6, 168, 050
Bonito (Oceanic)	425, 190	829, 980	1, 208, 960	2, 492, 040	1, 683, 150	517, 020	7, 156, 340
Butterfly fish	-	8, 760	-	-	-	-	8, 760
Caesio	676, 600	96, 610	158, 270	203, 310	2, 192, 880	2, 498, 080	5, 825, 750
Cavella	194, 850	282, 480	382, 330	466, 970	1, 617, 310	419, 540	3, 363, 480
Cigar fish	11, 420	27, 010	2, 330	2, 330	280	1, 190	44, 560
Crab	149, 020	102, 050	148, 660	111, 460	109, 830	85, 840	706, 860
Crevalle	164, 140	121, 650	102, 310	202, 560	177, 300	321, 180	1, 089, 140
Croaker	606, 110	632, 950	368, 540	697, 540	1, 408, 780	750, 270	4, 464, 190
Cutlass	122, 200	60, 380	81, 320	64, 470	53, 810	89, 940	472, 120
Eel	-	90	-	-	-	-	90
Flatfish	105, 660	83, 610	45, 560	140, 330	977, 400	224, 570	1, 577, 130
Flying fish	51, 070	51, 290	47, 460	171, 300	540, 630	43, 540	905, 290
Garfish	-	180	-	2, 460	-	1, 250	3, 890
Gizzard shad	27, 240	-	2, 210	-	-	-	29, 450
Glass fish	-	7, 480	53, 940	8, 930	11, 920	400	82, 670
Goatfish	-	23, 220	26, 000	6, 380	32, 780	64, 500	152, 880
Grouper	69, 550	219, 360	187, 110	229, 160	180, 010	183, 500	1, 068, 690
Grunt	3, 300	24, 120	23, 070	35, 050	175, 370	28, 280	289, 190
Hairtail	621, 900	697, 860	333, 880	372, 620	329, 070	358, 930	2, 714, 260
Halfbeak	31, 960	14, 610	1, 440	-	-	-	48, 010
Hardtail	29, 320	43, 180	77, 840	20, 940	2, 960	28, 690	202, 930
Herring	299, 480	269, 510	140, 960	173, 410	987, 900	410, 400	2, 281, 660
Leaf fish	3, 280	7, 140	-	-	-	-	10, 420
Leather jacket	-	6, 780	-	-	-	-	6, 780
Lizard fish	625, 420	546, 300	476, 040	617, 440	503, 450	621, 710	3, 390, 360
Mackerel, chub	2, 918, 480	1, 938, 700	2, 658, 950	2, 810, 920	2, 293, 870	2, 039, 450	14, 660, 370
Mackerel, Frigate	281, 000	362, 290	235, 410	143, 760	364, 700	297, 130	1, 684, 290
Mackerel, sp.	26, 920	102, 880	174, 980	64, 920	113, 360	177, 990	661, 050
Macolor	-	-	-	-	-	30, 730	30, 730
Mojarra	-	25, 480	-	-	2, 290	-	27, 770
Moonfish	173, 460	220, 220	228, 520	504, 050	1, 360, 230	106, 040	2, 592, 520
Mullet	31, 600	300	-	-	101, 760	340	134, 000
Nemipterid	2, 452, 220	1, 564, 810	1, 952, 570	2, 189, 410	2, 303, 040	2, 047, 070	12, 509, 120
Pampano	423, 880	265, 080	105, 030	141, 140	52, 770	59, 680	1, 047, 580
Parrot fish	7, 570	19, 370	30, 040	-	-	-	56, 980
Porgy	16, 870	1, 490	-	46, 790	21, 520	-	86, 670
Prawns	-	-	7, 220	62, 850	63, 830	-	133, 900
Ray	-	5, 450	-	-	1, 940	230	7, 620
Round scad	8, 475, 830	9, 435, 080	21, 751, 630	15, 285, 980	21, 145, 530	22, 301, 080	98, 395, 130
Runner	53, 040	75, 890	84, 200	183, 780	350, 260	171, 360	918, 530
Sardine	1, 052, 800	1, 040, 220	840, 310	938, 270	1, 947, 840	965, 930	6, 785, 370
Sea Bass	-	4, 700	14, 340	1, 190	-	-	20, 230
Sea Catfish	-	6, 070	11, 440	1, 190	7, 320	2, 200	28, 220
Shark	-	16, 590	14, 300	4, 760	6, 730	15, 580	57, 960
Shrimp	1, 202, 250	984, 050	1, 180, 460	714, 470	656, 570	737, 180	5, 474, 980
Siganid	7, 060	18, 980	10, 520	-	-	-	36, 560
Silverside	5, 990	13, 060	7, 300	4, 610	-	790	31, 750
Skipjack	22, 270	-	58, 050	15, 800	42, 690	171, 090	309, 900
Slipmouth	3, 392, 310	2, 950, 200	3, 122, 160	2, 561, 660	5, 025, 190	3, 082, 280	20, 133, 800
Snapper	46, 660	189, 370	164, 270	96, 400	224, 770	198, 220	919, 690
Squid	192, 880	377, 320	346, 200	367, 310	613, 890	1, 059, 660	2, 957, 260
Surgeon fish	392, 050	63, 270	16, 690	24, 480	534, 240	199, 720	1, 230, 450
Ten Pounder	-	-	54, 820	340	-	-	55, 160
Tuna (Yellow fin)	182, 430	260, 180	315, 440	332, 760	461, 370	203, 120	1, 755, 300
Whiting	-	4, 660	-	4, 620	-	-	9, 280
Miscellaneous	920, 710	1, 817, 260	2, 249, 720	1, 803, 310	583, 450	1, 572, 650	8, 957, 100

Appendix 8 (continued)

Kind of Fish	July 1	August	September	October	November	December	Sub-total	Grand Total
Total	41,801,270	43,834,620	52,483,300	40,291,960	29,648,260	25,935,280	233,994,690	465,441,900
Anchovy	1,054,730	890,980	738,990	426,310	401,400	323,310	3,835,720	11,055,890
Barracuda	18,020	89,250	19,990	15,500	1,620	73,060	217,440	672,260
Big-eyed scad	947,490	1,550,220	2,149,030	858,180	892,440	951,990	7,349,350	13,517,400
Bonito (Oceanic)	1,821,880	586,800	673,760	420,330	193,850	218,300	3,914,920	11,071,260
Butterfly fish	-	-	-	-	-	-	-	8,760
Caesio	2,823,930	2,125,430	3,093,540	1,911,100	1,471,600	1,814,880	13,240,480	19,066,230
Cavalla	326,940	427,980	873,870	440,560	429,930	464,200	2,963,480	6,326,960
Cigar fish	380	-	-	790	-	-	1,170	45,730
Crab	79,390	82,070	176,880	331,480	465,500	229,770	1,365,090	2,071,950
Crevalle	231,130	183,750	148,590	235,050	371,210	753,170	1,922,900	3,012,040
Croaker	459,840	747,670	815,880	881,640	648,910	718,070	4,272,010	8,736,200
Cutlass	17,380	58,560	16,280	58,680	117,070	100,950	368,920	841,040
Eel	-	-	-	16,280	-	-	16,280	16,370
Flatfish	70,670	282,240	71,400	164,310	29,950	44,510	663,080	2,240,210
Flying fish	25,560	8,430	25,510	-	590	34,400	94,490	999,780
Garfish	5,130	-	-	-	-	-	5,130	9,020
Gizzard shad	790	-	2,960	-	-	45,050	48,800	78,250
Glassfish	2,820	4,220	27,150	10,690	-	-	44,880	127,550
Goatfish	78,450	81,660	71,110	68,350	51,100	102,300	452,970	605,850
Goby	-	-	-	1,530	5,750	6,360	13,640	13,640
Grouper	93,120	175,190	272,190	202,790	248,620	303,540	1,295,450	2,364,140
Grunt	16,880	51,990	11,180	47,920	1,630	59,790	189,390	478,580
Hairtail	311,610	260,440	279,140	435,690	386,050	482,110	2,155,040	4,869,300
Halfbeak	-	-	-	-	3,220	-	3,220	51,230
Hardtail	8,780	41,930	660	7,070	78,250	6,570	143,260	346,190
Herring	327,760	350,830	399,400	195,040	470,270	240,420	1,983,720	4,265,380
Leaf fish	-	-	-	-	-	-	-	10,420
Leather jacket	-	-	-	-	-	-	-	6,780
Lizzard fish	528,590	738,550	910,750	744,400	718,680	531,490	4,172,460	7,562,820
Mackerel, chub	1,956,380	2,339,050	2,325,730	2,003,960	1,540,270	1,049,270	11,214,660	25,875,030
Mackerel, frigate	283,020	298,060	337,120	238,540	212,810	146,700	1,516,250	3,200,540
Mackerel, sp.	53,000	200,120	132,890	77,430	65,890	136,840	666,170	1,327,220
Macolor	110,840	17,750	223,280	145,460	65,280	40,460	603,070	633,800
Mojarra	-	-	20,060	32,980	-	54,400	107,440	135,210
Moonfish	118,200	139,490	235,120	151,160	146,740	215,730	1,006,440	3,598,960
Mullet	5,590	5,410	6,250	9,550	4,330	2,510	33,640	167,640
Nemipterid	1,909,590	2,074,410	2,473,420	3,049,400	1,931,550	1,662,990	13,101,360	25,610,480
Pampano	20,130	2,220	198,430	187,280	198,250	3,620	609,930	1,657,510
Parrot fish	5,360	10,520	4,010	3,430	1,640	6,560	31,520	88,500
Porgy	413,240	254,630	75,460	114,750	45,320	85,540	988,940	1,075,610
Prawns	790	90,740	169,980	2,830	10,880	24,200	299,420	433,320
Ray	5,330	31,640	155,890	10,160	14,870	9,330	227,220	234,840
Round scad	18,840,770	21,462,040	8,053,080	11,631,450	6,926,070	4,659,350	71,572,760	169,967,890
Runner	312,450	216,500	583,710	317,220	295,780	165,530	1,891,190	2,809,720
Sardine	1,597,540	937,350	17,913,670	6,564,810	5,443,650	497,830	32,954,850	39,740,220
Sea catfish	620	1,060	1,670	16,810	3,400	400	23,960	52,180
Shark	12,540	22,180	8,270	27,590	16,990	13,200	100,770	158,730
Shrimp	789,920	903,220	959,720	750,060	819,530	671,950	4,894,400	10,369,380
Sea Bass	-	-	-	4,660	-	-	4,660	24,890
Siganid	20,330	17,140	7,850	55,220	65,670	17,810	184,020	220,580
Silver perch	-	-	-	3,030	16,240	3,990	23,260	23,260
Silverside	570	47,500	133,610	14,030	-	850	196,560	228,310
Skipjack	6,620	80,580	386,850	105,640	322,480	250,730	1,152,900	1,462,800
Slipmouth	2,932,040	3,216,830	4,120,510	4,256,070	2,566,350	3,345,480	20,437,280	40,571,080
Snapper	413,970	350,250	338,260	348,090	368,970	407,710	2,227,250	3,146,940
Spadefish	-	-	-	-	7,010	5,510	12,520	12,520
Squid	644,350	796,930	884,450	704,400	537,580	649,490	4,217,200	7,174,460
Surgeon fish	367,810	476,920	547,770	307,890	236,230	298,850	2,235,470	3,465,920
Sword fish	-	-	-	2,550	240	-	2,790	2,790
Tarpon	-	-	-	-	-	7,080	7,080	7,080
Ten Pounder	-	-	-	21,080	1,060	1,230	23,370	78,530
Tuna (Yellow fin)	214,870	157,300	373,710	218,170	328,180	3,817,290	5,109,520	6,864,820
Whiting	-	-	12,580	7,100	4,130	6,290	30,100	39,380
Miscellaneous	1,514,130	946,590	1,021,690	1,435,470	460,400	172,320	5,550,600	14,507,700
Wrasse	-	-	-	-	2,830	-	2,830	2,830

Appendix 9

Republic of the Philippines

INTERIM REPORT

for

Skipjack Fisheries Development Project

November 1975

JICA Survey Mission

for

Skipjack Fisheries Development Project

in

the Philippines

JAPAN

Hon. Jose Leido Jr.

Secretary
Department of Natural Resources
Republic of the Philippines

Dear Mr. Leido:

At your govenment's request, the Japan International Cooperation Agency (JICA) dispatched a preliminary survey team in ahead of the joint survey for skipjack, that will be held under the name of "Skipjack Fisheries Development Project in the Philippines".

This interim report is an outcome of our effort, but various findings of us included in this report are tentative and suggestions herein included are subject to the approval by the Japanese Government. In the meantime, however, this could be used as a basis for your policy decision for possible follow-up actions. I hope that this report to be a stepping stone in the course of development of fisheries in your country.

Sincerely yours,

KAZUO YASUFUKU

Leader
JICA Survey Mission for "Skipjack Fisheries Development
Project in the Philippines".

CONTENTS

1. PARTICULARS

The government of the Republic of the Philippines has exerted all her effort to promote the development of the fishing industries in her coastal waters from some-time in the past. Along this line, the effort has been focused upon the development of fishery in some unexploited waters and the improvement of fishing techniques. In this connection, the Philippine Government sent note verbals to the Government of Japan twice in the past, last March and May, requesting our coordination in a research project for fishery resources.

The note proposed a joint survey by both two countries for fishery resources in the waters off the Pacific coast of the Philippines, i. e. Southern Selebes Sea and the waters off the Pacific Coast of the Archipelago. For this purpose, the notes required the Japanese Government to provide with a tuna pole-and-line fishing boat as well as (a) Japanese expert(s).

Japanese Government determined to meet the request from the Philippine Government from the viewpoint that it would produce further promotion of friend-ship and good will between the two countries. So, she sent this preliminary survey team in order to make the result of the coming joint survey more efficient.

2. THE OBJECTIVES OF THE PRELIMINARY SURVEY

The objectives of this survey is as follows:

(1) To know the plan of Philippine Government toward the survey for tuna (skipjack) resources and some relevant situation.

(2) Collecting information necessary for the planning of the survey on tuna (skipjack) resources.

(3) Collecting information on the availability of live-bait in the assigned area that is indispensable for skipjack pole-and-line fishery.

(4) To locate some suitable sites for bait-pen to be settled.

3. METHOD AND STRATEGY OF THE PRELIMINARY SURVEY

To perform the objectives listed above, field surveys were carried out by land, sea and air. In pararell with these survey, interviews and exchanging opinions with the government officials, local fisheries officers and citizens were held.

The place to be surveyed were selected considering the conditions as follows:

(1) The port to be called should be properly equipped and fuel oil, water and food should be supplied with ease.

(2) The base for research boat should be closely located to the bait-station where the bait-pen will be set and in which newly captured live-bait are supposed to be acclimatized for confinement. The bait station to be accesible for the research boat.

(3) The base should be closely located to fishing ground of local fishery so that both the research boat and bait-pen to be supplied with bait from local fishery.

(4) The base should not be located far from the anticipated fishing ground for skipjack.

(5) The base should be accesible from land and easy to communicate with other cities.

(6) Japanese specialist on live-bait should be properly accomodated somewhere near the base.

Taking into account all the conditions listed above, the following places were adopted as to be surveyed, i. e.

Infanta and environs, Lazon Id.
Tacloban, Leyte Id.
Davao, Mindanao Id.

In addition to these, Iloilo was visited in order to make interviews with the personnels of Oceanic Fisheries (Phil.) Inc. which has been operating skipjack pole-and-line fishery in the Sulu Sea.

4. RESULTS OF THE SURVEY

(1) Infanta and environs

Infanta is right in the middle of Luzon I. and is located to the east of Manila. We anticipated, prior to the survey, that Infanta might be advantageous as a base for the reserch boat because it would allow her to cover all over the Pacific coast of Luzon.

Air-born surveys were carried out on Oct. 17 by two light planes. Flight course was determined based on perior studies of marine chart. The coast line of east central-Luzon is rather simple and is open to the ocean without being protected. In general, sea bottom go abruptly to the deep not far away from the coast. In this geographical condition, unfortunately, it is of very little hope to be successful in catching live-bait in quantity.

As only exception to this, there is a cove at the mouth of River Pulo that runs all the way through Infanta and drains into the Pacific. The water in the said area was observed to be muddy enough not to allow the probablity of the presence of bait fish. The west coast of Polillo I. is somewhat similar to the coast south of Infanta and has only inlet in Polillo region. Although this inlet had been expected to be suitable as the base for the research boat, it was found that the networks of submerged coral reefs would not allow the boat to center into.

In addition to this, marine charts tells that tidal current is fast in this area. Judging from the color, the water in Palillo straight is oceanic, indicating the possibility of distribution of oceanic fishes such as skipjack.

Resume : Considering various environmental and geographical conditions, we are rather pessimistic in trying to locate a suitable base for the survey in Infanta and environs. This should not be take as we are denying the value of the area as possible fishing ground for skipjack.

(2) Davao and Malalag Area

In this area the following surveys were carried out; Geographical observations along the coast line both by land and air and also from shipboard, examination of fishes landed at landing spots and market, interviews and consultations with local fisheries officer and etc.

Davao is a modernized city located deep inside Davao Gulf and protected with Samal I. in the east and Talikud I. in the South-east respectively.

The port of Davao is equipped well enough to be called by research boat, and no problem is expected in supplying fuel oil, water, food and etc.

According to local information, tunas are more abundant in Moro Gulf compared to off Davao Gulf. However, tunas, specially yellowfin and skipjack, is distributed in and out of Davao Gulf and being utilized by local purse-seine in combination with "payaw". Some twenty thousands of Japanese population, mainly from Okinawa, had been settled in Davao area in prewar period and were practising pole-and-line skipjack fishery in the area.

In Davao and environs local fishery called "basnig" are commonly operated all over the area, and among the catch of them are included

such fishes as potential live-bait for pole-and-line fishery, i.e. sardines and anchevies, silversides and scads and round scads and etc. If it is possible to obtain supply of live-bait from these local fishery in the main survey, it will be of great help and will increase the chance of successful fishing for skipjack.

As for the site for setting bait-pen, or atacking the live-bait in floating net-enclosure, we are in the opinion that two places, Malipano and Malalag, will be best. Malipano is located on the west coast of Samal I. and there is a cove, apparently suitable as bait pen station, protected from outside by several islets. Either Malag and Malipano is enough protected not to necessitate to take monsoon into consideration. Also in both area the water is deep enough to allow the setting of bait pen. If compared among the two, Malipano is more recommendable because of its conveniences in communications, living conditions for Japanese expert(s), accessibility and etc. However, prior agreement or approval may be necessary to facilitate the setting up of bait-pen in the said area since the farm is said to have been authorized to use the area in a long team contract.

Resume : Davao region is one of the most promising area : as a base for the future survey, because of its well equipped harbour, favourable prospects for skipjack resources and also favourable aspect in supply of live-bait from the daily catch of local fishery.

(3) Tacloban and environs

The city of Tacloban is located at the inermost part of San Pedro Bay that lies between Leyte I. and Samar I., and the bay leads to Samar Sea through San Juanico Straight between these two islands. In Leyte Gulf the water is shallow to afford good fishing ground for local seiners, but skipjack which is oceanic is distribution, enter into the Gulf so far as off Guiaan but does not go further inside, according to local expert. According to him, yellowfin tuna is caught in numbers by local handliners from small skiffs off the eastern coast of Samar I., but he has not observed skipjack school often in the area. However, since this is not a result of survey conducted intentionally, it is not always necessary to believe this to deny all the possibility of finding skipjack in the area.

There is no problem either with harbour facilities or with supplies in Tacloban. The port is often called by ocean-going vessels. There are floral "basnig" fisheries distributed in San Pedro Bay area and they catch fishes like anchovies, sardines, herrings, scads and round scads, all are possible bait for skipjack pole-and-line fishery. This will be advantageous for the survey in two ways, the research boat may be able to catch live-bait herself without difficult and she may be able to obtain bait from local fisherman. As for the abundance of anchovies (Species undetermined) in the area, local fisheries officer pointed out that it undergoes drastic annual fluctuation, although the catch of sardines are staple. This should be borned in mind in planning the main survey.

Local officers added that each fishes as suitable for live-bait are caught in larger quantities in Samar Sea than in San Pedro Bay, off Catbalogan and nearby waters, and the location for the site of bait-pen will be more easier in the former. Nevertheless, the shortest distance from the mouth of Leyte Gulf to the mouth of San Pedro Bay is approximately 50 nautical miles, and it takes about two and a half hours from Tacloban to Catbalogan through San Juanico Straight. Furthermore, there are several unfovourable features with the straight such as fast tidal current, shallow water, narrow and complicated waterway. It is said to be necessary to be attended by local pilot to pass through the channel. In coming survey, it may not be easy to keep bait alive for many days in bait-pen and it means that the research boat will have to commute daily between fishing ground for skipjack and bait station. Therefore, Catbalogan and nearby area in Samar Sea will not be adequate as a base for the main survey.

All in all, we strongly recommend a cove as the site of bait-pen station north of Lipata on Samar I., as it is adequately sheltered geographically and closely located to Tacloban. In this time of survey, no more suitable site was found on the coast south of Tacloban than this Cove.

Resume : There is only one difficulty with Tacloban as the base for the main survey, that is anticipated fishing ground for skipjack is distant from possible bait-pen station. However, taking into all other conditions

into account, Tacloban is advisable as a base for the coming survey. There is no problem with the harbour facility and bait-fish catching supply of it from local fishery is promising.

5. SUGGESTIONS ON THE COMING SURVEY

As the result of the exchanging opinions with the officials of the Philippine Government, and also as the result of field surveys, we reached to the conclusion that pole-and-line fishing is the most suitable method in exploiting skipjack resources in the assigned area. We are in the opinion that the coming survey should adopt this as its method. Along this line, we believe it's our responsibility to leave some practical suggestions to the coming survey.

(1) Outline of the Coming Survey

The survey should include two aspects, independent of each other i.e. experimental fishing for skipjack from a research boat and feasibility test of bait-fish in the bait-pen. However, these two parts of suvey should be carried out in close connection. Details of each aspect will be as follows:

(a) Survey from the research boat

Oceangraphical and meteorological observation

Experimental fishing for skipjack

Estimation of the abundance and deliniation of the distribution of skipjack through visual observations with help of acoustic techniques.

Biological observations of skipjack caught in the above experiments.

Survival test of bait-fish in the bait-well on shipboard.

(b) Feasibility test of bait-fish in bait-pen

Long-term survival test of bait-fish should be carried out in this way. The material should be provided by the catch of the research boat or by local fishery.

(2) Requirements for the research boat

The research boat should be equipped with these as follows;

Fishing gears efficient enough to catch both skipjack and bait-fish.

Apparatus for oceangraphical and meteorological observations.

Living-facilities good enough to accomodate a few Philippine scientists

and crews, as well as Japanese scientist.

At least one skiff for the purpose of transportation and assisting the mother boat in her bait-fish operation.

(3) Requirements for the site for bait-pen

Bait station were the bait-pen will be set and anchored to the bottom should be protected geographically from external waters. The water should be deep enough to allow the research boat to approach to the bait-pen without difficulty. Accommodation for the bait-fish specialist should be secured on land close to the bait-station.

Bait station should be located so as to allow enough supply of bait from local fishery.

(4) Base for the research boat

Base for the research boat should be selected carefully so as to allow the boat to get enough supply of fuel oil, foods and also recreation of the crews. At present, we strongly suggest to take Davao and Tacloban as the base.

(5) Period of the Survey

Period and season in which survey goes should be chosen in relation with the locality of the base, fishing ground and seasonal wind in the area to be surveyed.

(6) Responsibilities for the future survey and its sharing

It is hoped the coming survey to be carried out in close cooperation between Japanese and Philippine governments. In order to make the cooperation effective, responsibility be shared by both two countries as shown below;

(a) Responsibilities that should be taken by Japanese Government

1. To provide a research boat with Japanese Crews and shipboad scientist(s).
2. To provide Japanese expert(s) for live-bait experiment.
3. To provide necessary equipment and fishing gears.

(b) Responsibilities that should be taken by Philippine Government

1. To send personnels, including scientists or technicians, to work on shipboad as counter parts.

2. To provide both the research boat and bait-pen with suitable quantity of live-bait. In order to meet the requirement, either buying catch from or chartering local fishing boat may be advisable.
3. To provide personnel or laborers necessary for the management and maintenance of bait-pen and live-bait experiment.
4. To secure the site for the setting of bait-pen.
5. To take all the necessary procedures to avoid possible friction with local fishery and local fisherman.
6. To provide Japanese personnels with all the necessary conveniences.
7. To provide all other local expenses necessary to accomplish the survey.

6. PROCEDURES THAT SHOULD BE TAKEN IN NEAR FUTURE

This survey team, with her all of influence, will be pursuacing the Japanese Government to actualize the said plan in coordination with the Philippine Government, along the course shown in this report.

This survey team also wishes the Philippine Government to take all the necessary procedures to actualize the plan.

Out Tentative Schedule is as follows;

a. Recommendations or suggestions of Philippine Government on this preliminary report are requested to be submitted to the JICA Headquarters by the end of December, 1975.
b. Taking the above-mentioned recommendation into account, English edition of the final report of this preliminary survey will be submitted to the Philippine Government by the end of March, 1976.
c. The Japanese Government will assign (an) expert(s) to negotiate and finalise the official terms of reference around July, 1976.
d. The main survey will be commenced around October, 1976.

Acknowledgement

The Japanese survey mission will express the great gratitude for the kind cooperation of the Government of the Philippines and provincial governments given to them during the survey.

Appendix 1

LIST OF SURVEY TEAM MEMBER

Leader	Mr. Kazuo Yasufuku	President, Japan Marine Fishery Resource Research Center
Fishing ground	Mr. Michiie Hashimoto	Development and Extension Division, Research and Development Dept. Fishery Agency
Fishery resources	Mr. Takeshi Asahi	International Affairs Division Oceanic Fishery Dept. Fishery Agency
Bait-fish	Mr. Keiichiro Mori	Shimonoseki Branch Seikai Regional Fisheries Research Laboratory, Fishery Agency
Planning	Mr. Shigeo Miyamoto	Fisheries Advicer, Japan International Cooperation Agency
Coordinator	Mr. Syuji Ishida	General Affair Dept. Japan Marine Fishery Resource Research Center

Appendix 2

PERSONNEL INTERVIEWED

Mr. Antonio J. Aguenca	Assist. -Secretary, Dept. of Natural Resources, Quezon
Mr. Felis R. Gonzales	Director, Bureau of Fish. Aqua. Resor. Manila
Mrs. Aurora D. Reyes	Planning Staff, B. F. A. R., Manila
Mr. Exequiel R. Aguilar	Supervising Fish. Technologist, Deep-Sea Fish. Sec. B. F. A. R., Manila
Mr. Ricardo Caboteja	Senior Fishery Technologist, B. F. A. R., Manila
Mr. Bartolome B. Castillo	Chief, Oceanographic Sec., B. F. A. R., Manila
Mr. Mauel R. Brucelas	Sen. Fish. Biologist, Tech. Serv. Div. B. F. A. R.
Mr. Hachiro Miura	Colombo Plan Expert, B. F. A. R.
Mr. Fumitoshi Suzuka	Taiyo Fishery Co.
Mr. Horacio B. Torres	Asst. Regional Director, B. F. A. R., Davao
Mr. Ricardo T. Ang	Chairman and President, Ricsan Development Corporation, Davao
Mrs. Marcianz Lozada	Owner of bag-net boats, 293 L. Carcia St., Davao
Mr. Gregorio L. Escritor	Regional Directors, B. F. A. R., Tacloban
Mr. Antonio Pulanco	Supervising Fish. Technologist, B. F. A. R., Tacloban
Mr. Dominador Lin	Owner of bag-nets. Bislig, Tanawan, Tacloban City
Mr. Tatsuo Kawachi	Deputy Chief, Aquaculture Dept., SEAFDEC
Mr. Utao Kobayashi	Senior Researcher, Aquaculture Dept., SEAFDEC
Mr. Oshiro	Master Fisherman, Oceanic Fisheries (Phil.) Inc.
Mr. Yoshiaki Sugiyama	Vice-President, Oceanic Fisheries (Phil.) Inc.
Mr. Koike	Manager, Afro-Asia Dept., Ajinomoto Co., Inc.
Mr. Matias Curb	Regional Directer, B. F. A. R., Iloilo
Mr. Arthur C. Simpson	Directors, Resource Evaluation, S. C. S. F. D. C. P., FAO

Mr. Arthur Woodland	Programme Leader, S.C.S., F.D.C.P., FAO
Mr. Brling O. Oswald	Deputy Programe Leader, S.C.S., F.D.C.P., FAO
Mr. Keh-oh Kim	Fishery Training Officer, S.C.S., F.D.C.P. FAO
Mr. Kenneth J. Rosenberg	Senior Economist, S.C.S., F.D.C.P., FAO

Appendix 3

RECORD OF ACTIVITIES OF SURVEY TEAM

Oct. 14 Arrived in Manila 16:30 by KL 862

15 Meeting with staffs of Japanese Embassy and JICA Manila Office.

16 Visited Navotas Fish Mkt., for interview with local fisheries officers and for examination of fishes caught by local fishery.
Courtesy call to Mr. Gonzales, Director of BFAR in the afternoon, explained the mission and had exchanged opinions on general aspect of the survey.
Detailed discussion with Mrs. Reyes on itinerary schedule.

17 Technical discussion with Mrs. Reyes and technical staffs at BFAR.
Air-bornes survey in and around Infanta area in the afternoon.

18 Left Manila to Davao

19 Surveyed coastal geography from sea and from land. Examination of fishes at local fish market at Panaplata on Samar I.

20 Visited BFAR Davao Office, interviewed Mr. Torres, assistant director. Visited Mrs. Lozada, the owner of "banca" with Mr. Torres to get informed of local fishery.
Observation of basnig operation at sea, 08:00 - 11:00 P.M.

21 Visited local market and landing spot for the examination of fishes and landing facilities. From 09:00, air-borne survey along the west coast of Samar I. and South of Malalag. Visited Malalag for survey from land, 13:00 - 19:00 Technical discussion with Mr. Torres and Mrs. Lozada.

22 Left Davao to Tacloban

23 Visited BFAR Tacloban Office, to have technical discussion with Mr. Escritor and his staff, 09:30 - 11:00
In the evening, held a meeting with Japanes experts dispatched by JICA

24 Examination of catches of local fishery at Tanauan landing and Tacloban Market. Visited fish processing plant near Tacloban in the afternoon.

25 Air-born survey in San Pedro Bay, San Juanico Straight through Catbalogan areas. Technical discussion with Mr. Pulanco, BFAR in the afternoon.

26 Left Tecloban to Iloilo. Visited Iloilo Port, interviewed Japanese master fisherman operating pole-and-line fishing in Sulu Sea. Technical discussion on fishing condition and on live-bait. Interviewed Mr. Sugiyama, vice-president of Oceanic Fisheries (Phil.) Inc.

27 Examination of local fish catch at Iloilo Central Supermarket. Visited BFAR Iloilo Office to meet Mr. Guieb, the director and his staff. Held technical discussion on local fishery 09:45 - 11:30. Visited SEAFDEC Mariculture Dept. in the afternoon.

28 Left Iloilo to Manila. Exchange of opinions on the preparation of interim report.

29 Preparing the manuscript of the report.

30 Courtesy call to Mr. Aguenzan Assist. Sec., Dept. of Nat. Resources, 09:30. Technical discussion with Mrs. Reyes at BFAR Reception dinner at Japanese Ambassador's court.

31 Interviewed Mr. Sugiyama, of Oceanic Fisheries (Phil.) Inc., 09:30 - 10:18.

Nov. 1 Preparation of the report at hotel

2 Discussion with Mr. Muraoka, Japan Ambassy and Mr. Goto, JICA

3 Courtesy call to Mr. Gonzales. Leave Manila to Japan

Appendix 4

LIST OF POSSIBLE BAIT FISHES DISTRIBUTED IN PHILIPPINE WATERS

English Name	Scientific Name
Anchovy	Stolephorus spp.
Anchovy, deep bodied	Scutengraulis sp.
Sardine	Sardinella spp.
Sardine, deep-bodied	Sardinella perforate
Sardine, fimbriated	Sardinella fimbriata
Herring	Harengula spp.
Sprat	Spratelloides delicatulus and Spratelloides japonicus
Round herring	Dussumieria spp.
Silverside	Atherina spp., Stenatherina spp., Planesus spp., Alanetta spp. and some other atherinid fishes
Cardinalfish	Apogon spp. and related apogonid fishes
Caesio	Caesio spp.
Cavalla	Caranx spp. and related genera and species
Scad, big-eyed	Selar crumenophthalmus
Round scad	Decapterus spp.
Mackerel	Restrelliger spp.
Mackerel, short-bodied	Restrelliger brachysoma
Damselfish	Pomacentridae, Chromidae and Pseudochromidae

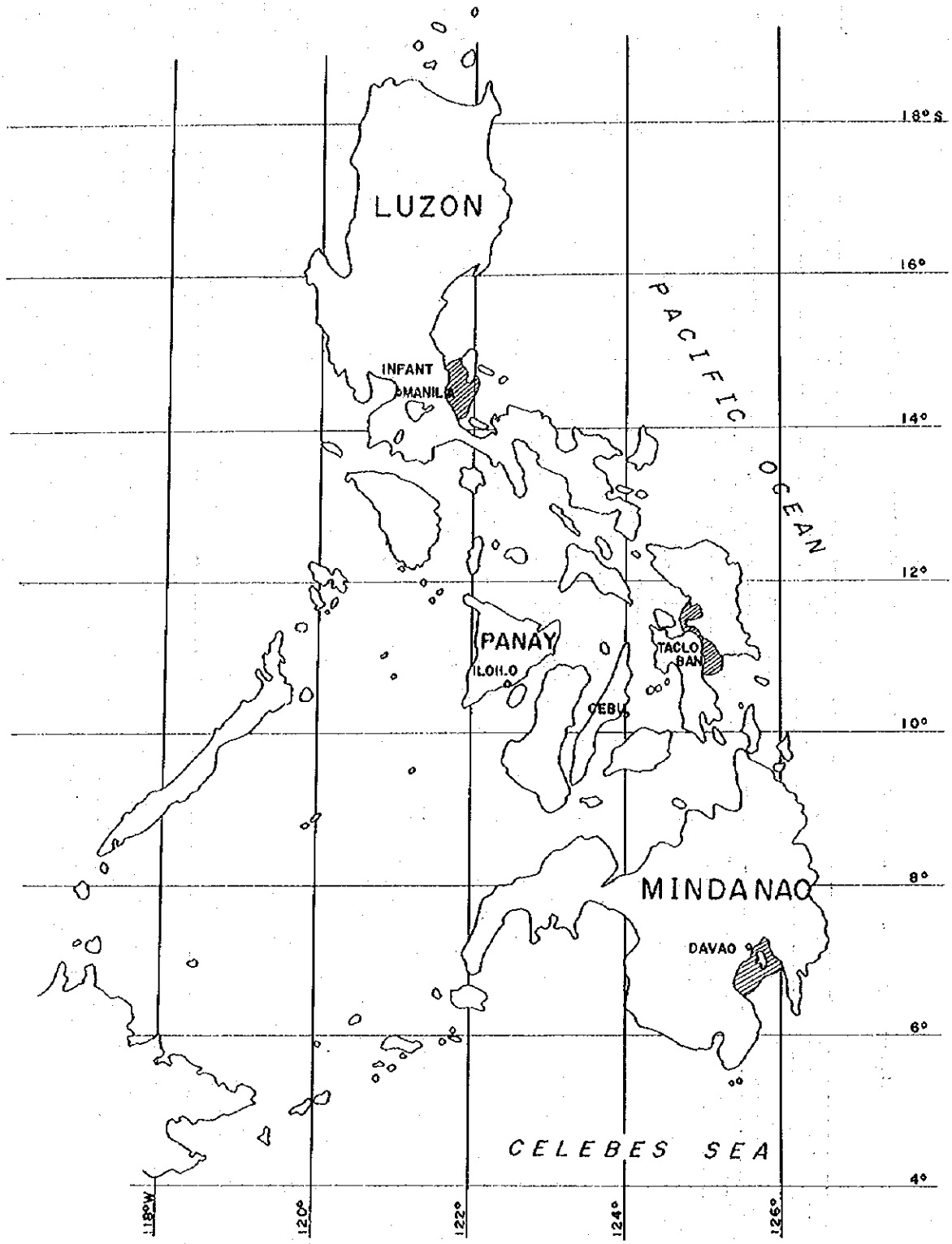
Appendix 5

Fishing seasons of tunas and bait-fishes by fishing ground, by fishing gears

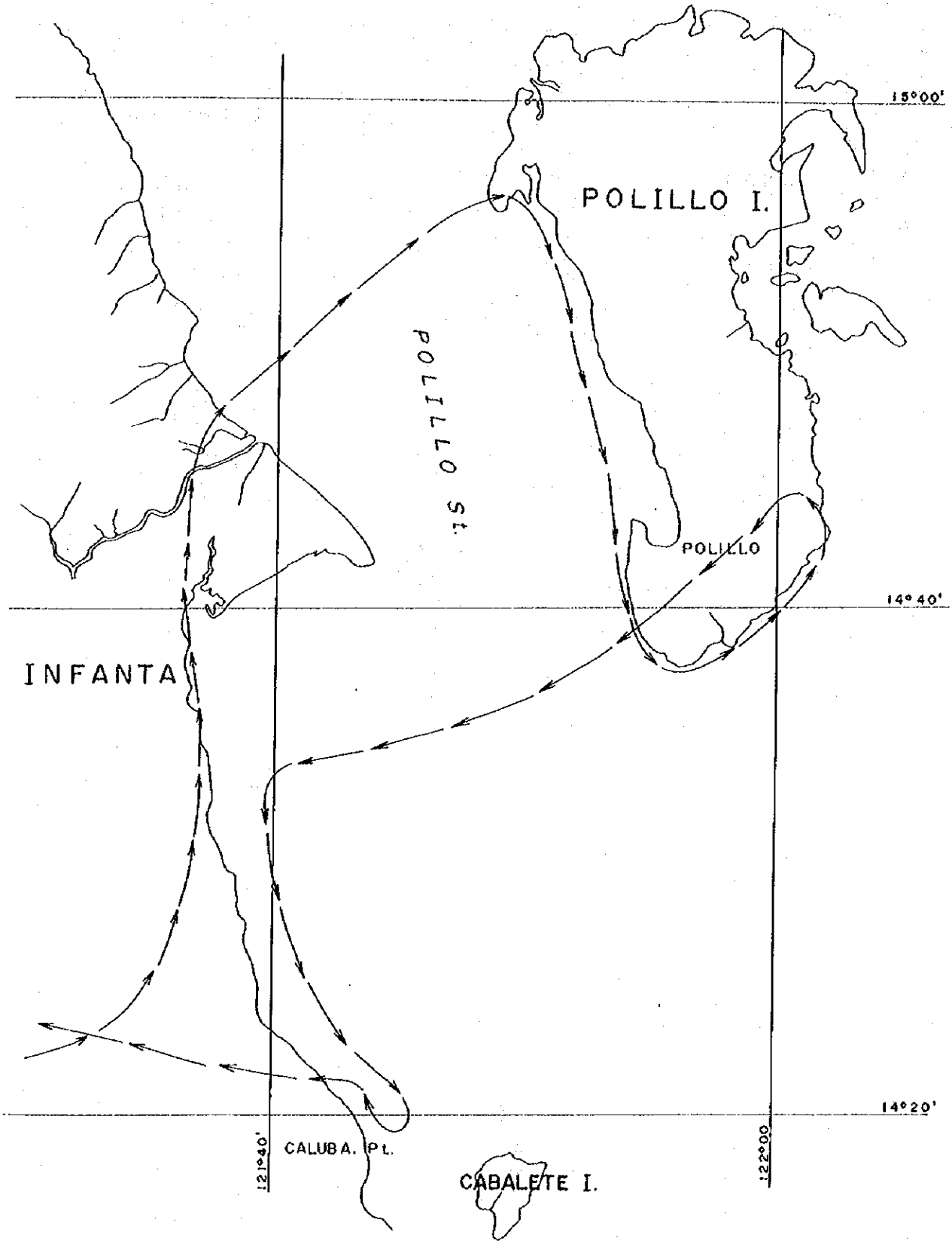
English name / Local name / Season & gear / Fishing ground	Tuna, Bonitos		Anchovy		Caesio		Round scad		Rastrelliger		Sardine, Herring		Spanish mackerel	
	Albacore Katcherite		Dilis		Dulagang Bukid		Golanggong		Hasa-hasa Alumaham		Tamban Tunsoy		Tangingl	
	Season	Gear	Season	Gear	Season	Gear	Season	Gear	Season	Gear	Season	Gear	Season	Gear
Babuyan Channel	1-10	L.H.FC	1-7	FC.S.B.BS										
Lamon Bay	3-9	L.H.FC	3-9	FC.S.B.BS			3-9	B.PS.FC.BS.OT.						
San Miquel Bay			6-10	FC.S.B.BS			6-10	B.PS.FC.BS.OT.	6-10	PS.B.OT.FC	10-2	B.PS.BS.FC.OT.S.GN.	6-12	TL.H.L.PS
Lagonoy Gulf	5-10	L.H.FC	3-4	FC.S.B.BS			2-10	B.PS.FC.BS.OT.	2-10	PS.B.OT.FC	2-10	B.PS.BS.FC.OT.S.GN.		
Albay Gulf	5-10	L.H.FC					2-10	B.PS.FC.BS.OT.	2-10	PS.B.OT.FC	2-10	B.PS.BS.FC.OT.S.GN.		
Samar Sea			9-10	FC.S.B.BS			5-12	B.PS.FC.BS.OT.	2-5	PS.B.OT.FC				
Maqueda Bay	1-4	L.H.FC	9-10	FC.S.B.BS										
Carigara Bay	10-2	L.H.FC	10-2	FC.S.B.BS			10-2	B.PS.FC.BS.OT.	10-2	PS.B.OT.FC				
Visayan Sea			1-12	FC.S.B.BS			5-12	B.PS.FC.BS.OT.	9-6	PS.B.OT.FC	1-12	B.PS.BS.FC.OT.S.GN.	3-5	TL.H.L.PS
Surigao Str.	3-4	L.H.FC	11-5	FC.S.B.BS										
Sogod Bay	3	L.H.FC					7-9	B.PS.FC.BS.OT.			7-9	B.PS.BS.FC.OT.S.GN.		
Dinagat Sound			11-5	FC.S.B.BS										
Gingoog Bay	1-4	L.H.FC												
Macajalar Bay	1-4	L.H.FC												
Iligan Bay			1-5	FC.S.B.BS							1-12	B.PS.BS.FC.OT.S.GN.		
Davao Gulf	1-12	L.H.FC												
Celebes Sea	1-12	L.H.FC												

Note : FC Fish corral; S Sapiano; B Bashig; BS Branch seine; OT Otter trawl; H Handline; BT Baby trawl; GN Gill net; PS Purse seine; TL Troll line; L Longline

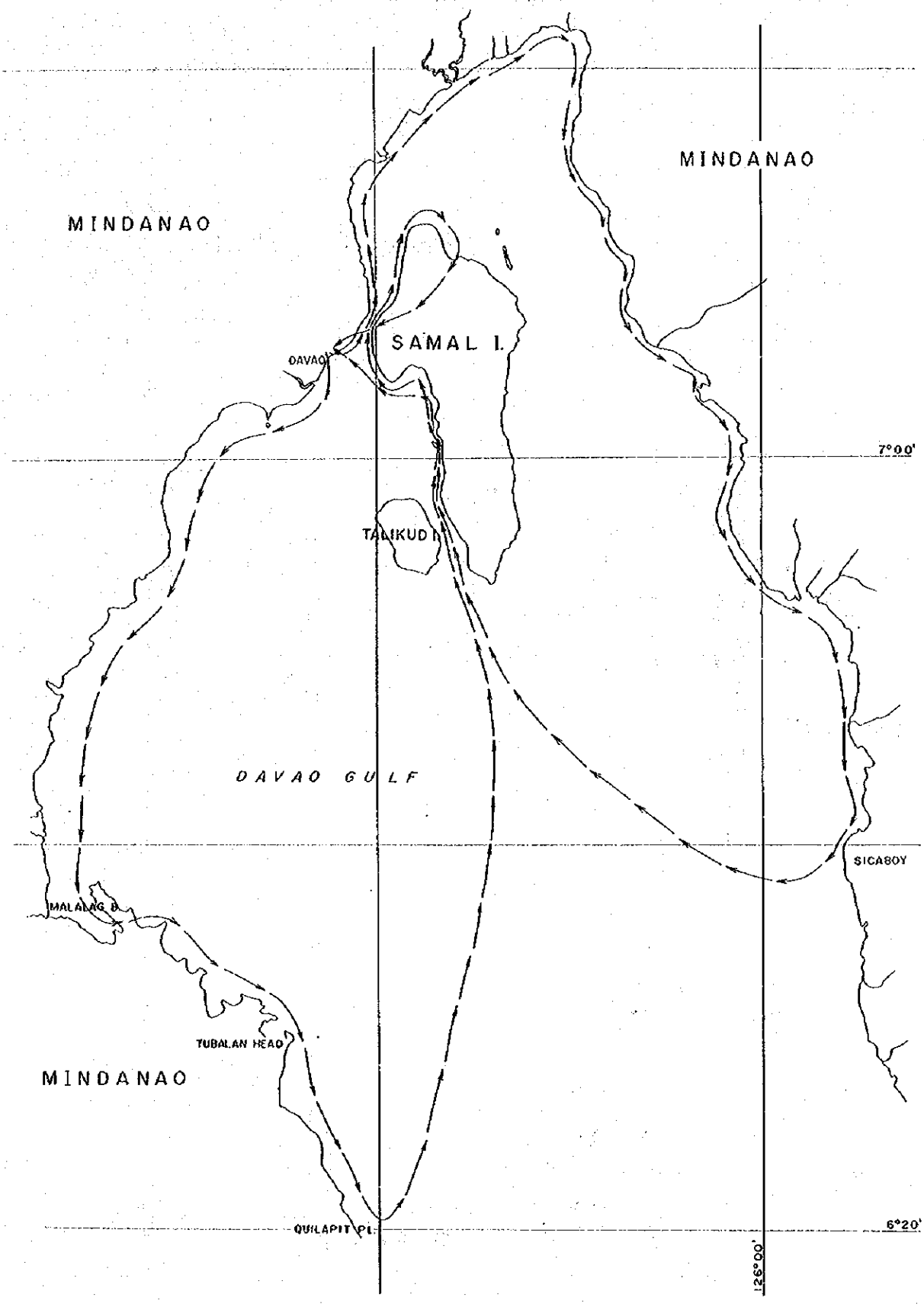
Appendix 6. GENERAL MAP



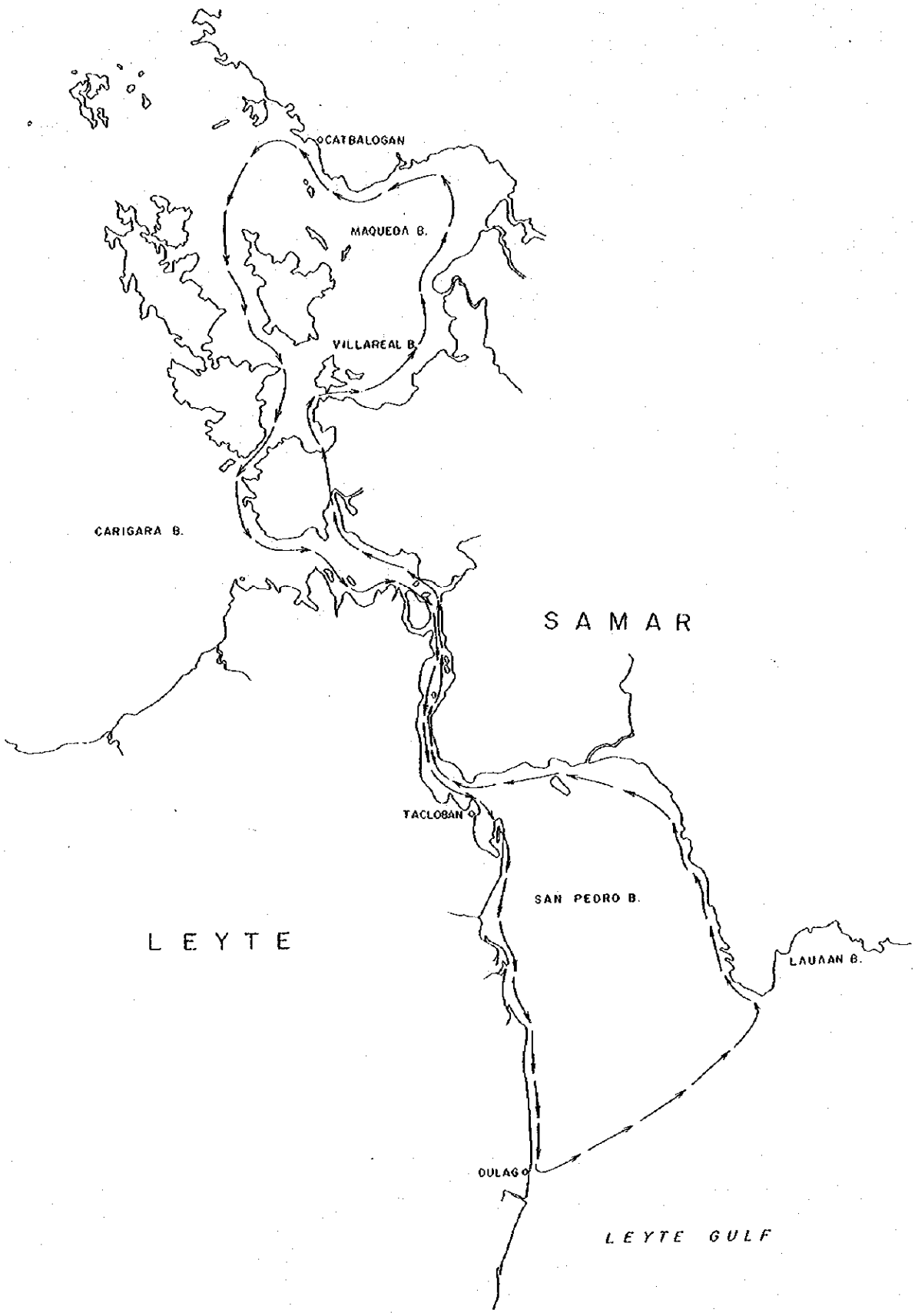
Appendix 7 Track charts of the air-born surveys
(1) Infanta and environs



(2) Davao and Malalag Area

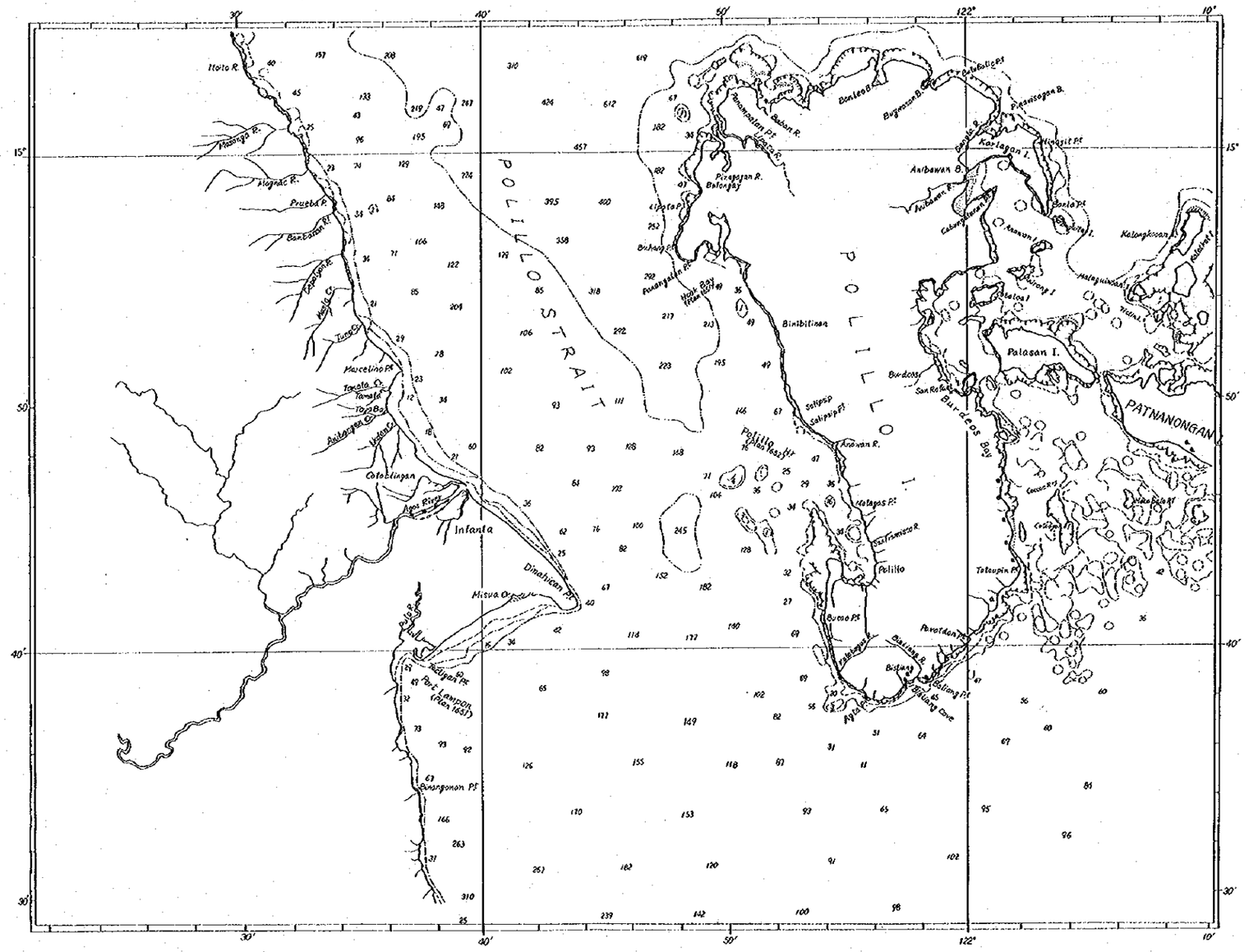


(3) Tacloban and environs

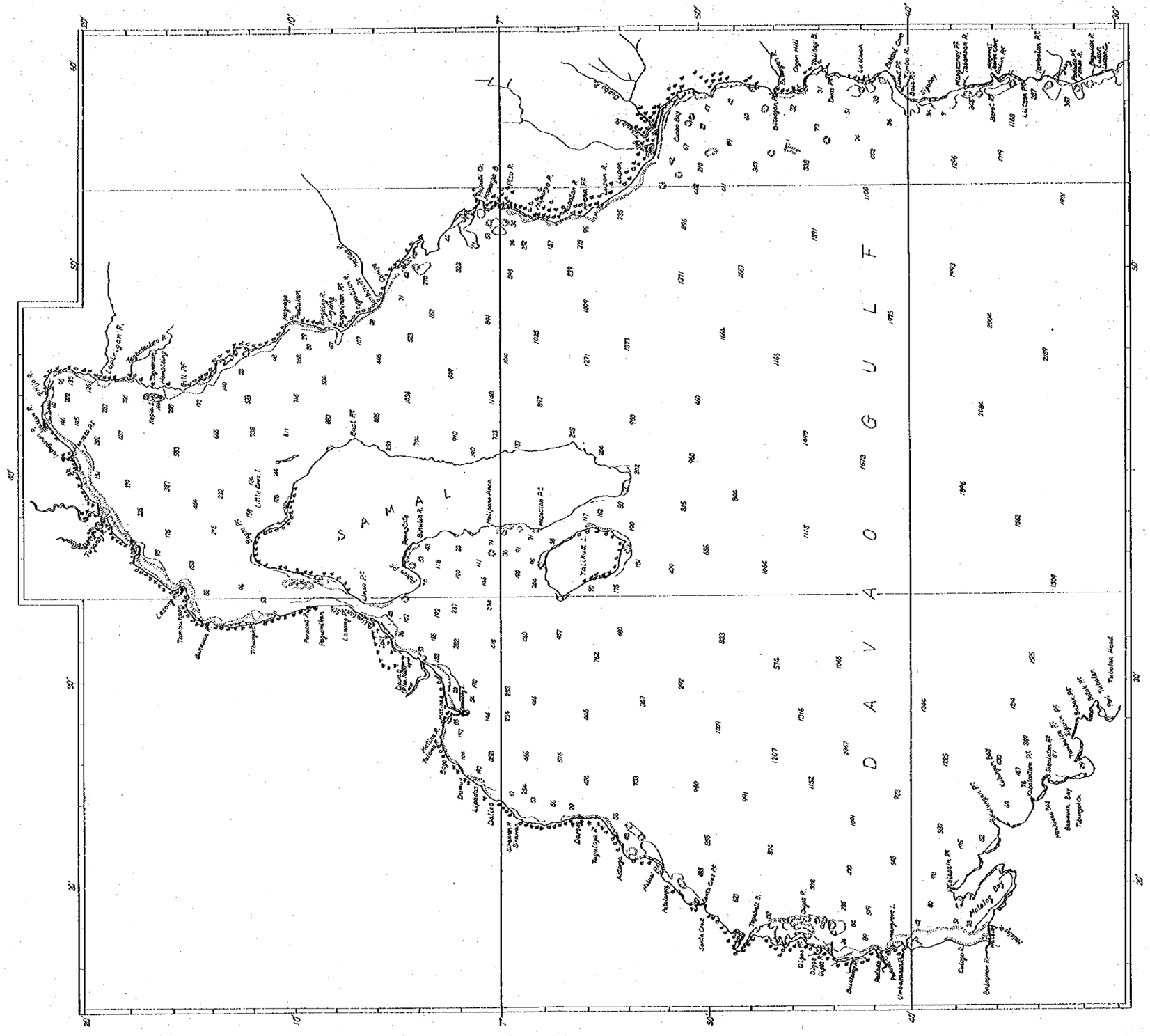


Charts Depths of Survey Regions and Their Peripheries

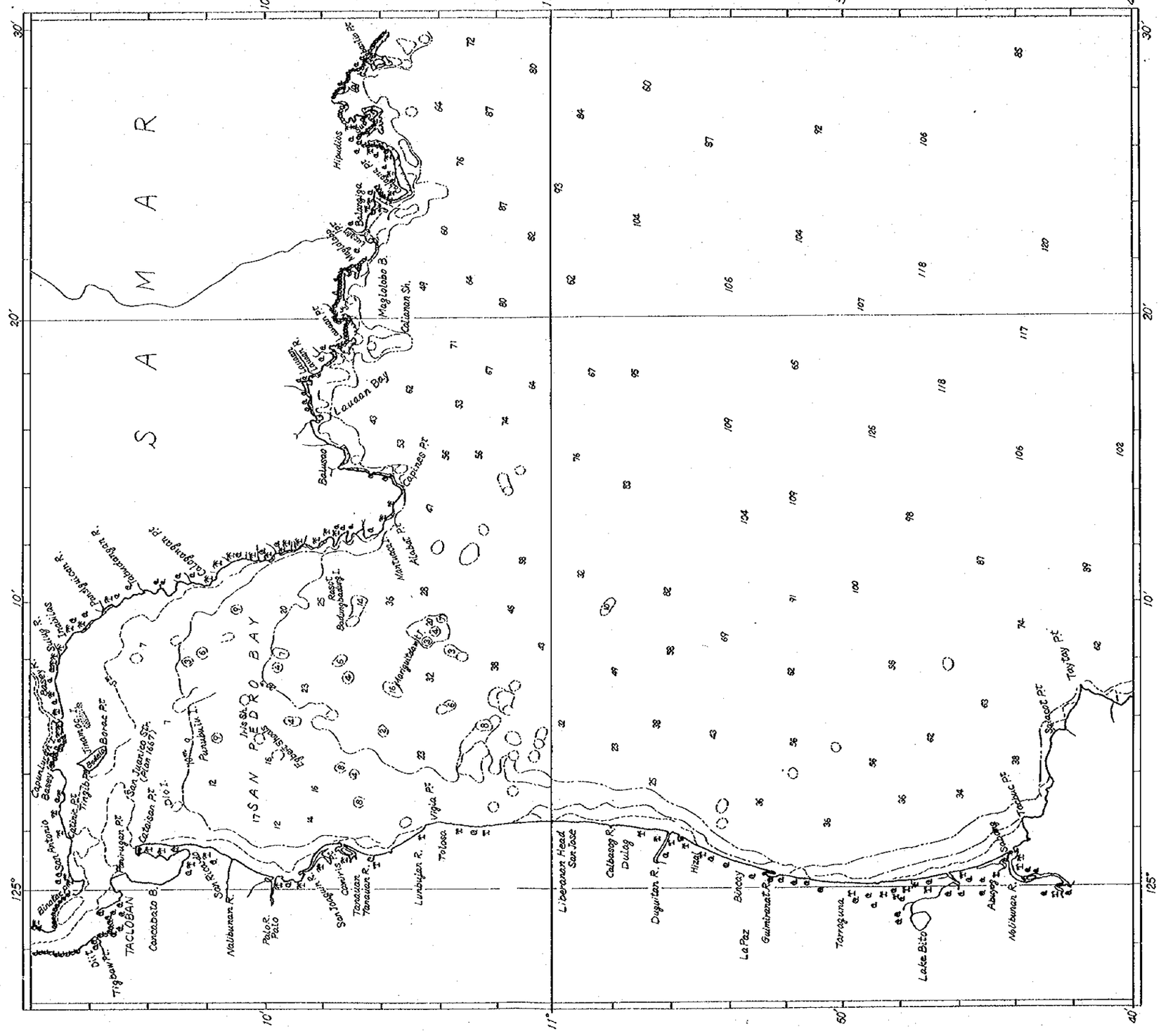
1) Infanta and Polillo Island and Their Peripheries



2) Davao



3) Tacloban and Its Periphery

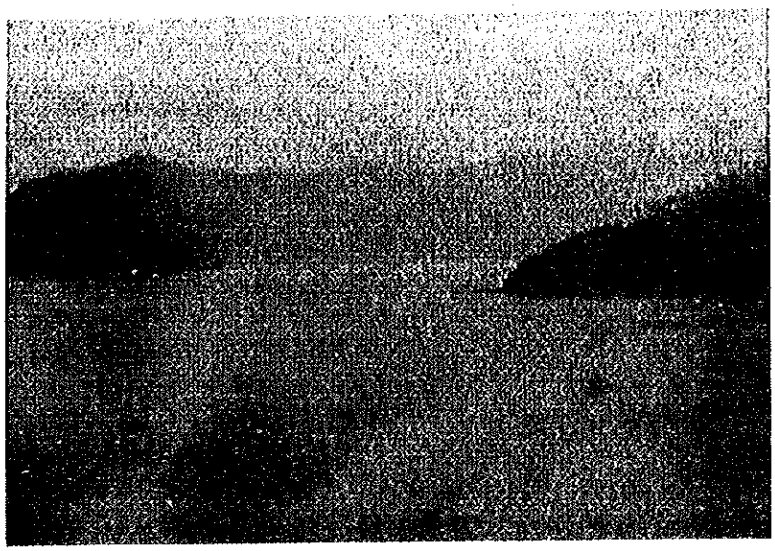


Photos

Japanese survey team visiting the Navotas Fish Market

Amphibious vehicle used in landing fish at Navotas fish market.

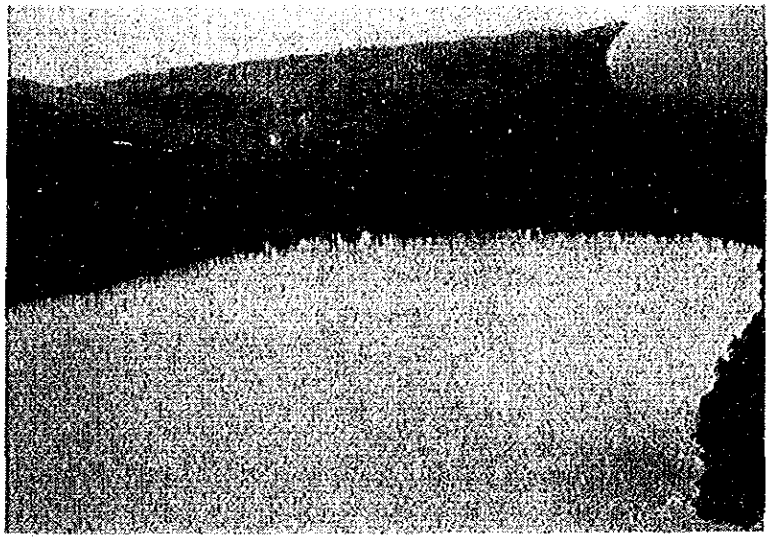
Indian anchovies landed at the market and the iron container used as a unit for trading.



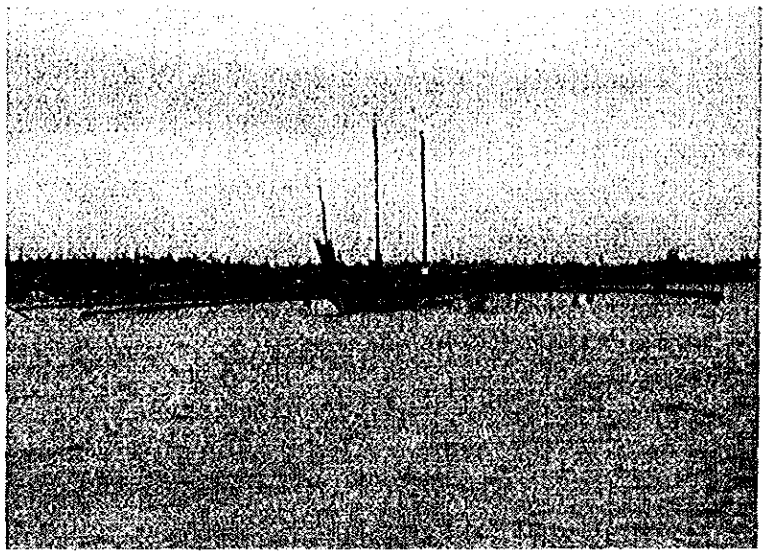
Small inlet near Sigaboy on the east coast of Davao Gulf

Periphery of Malipano on Samal Island in Davao Gulf

Small inlet at the mouth of San Pedro Bay

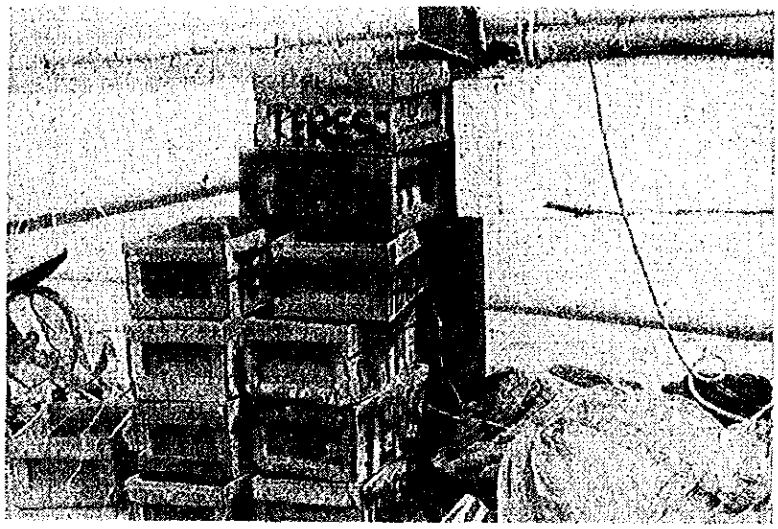


Small inlet at the mouth of San Pedro Bay



Basnig net fishing boat in Davao Gulf

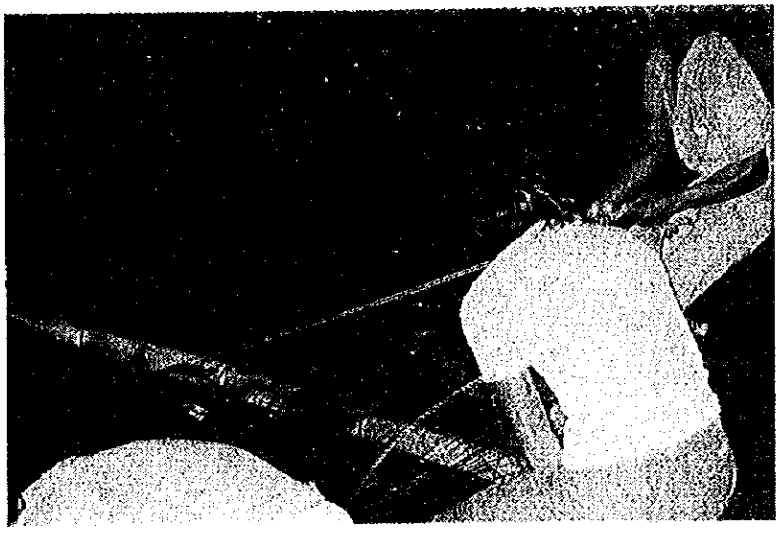
Fish gathering lamp used by a Basnig net fishing boat



Basnig net and fish containers

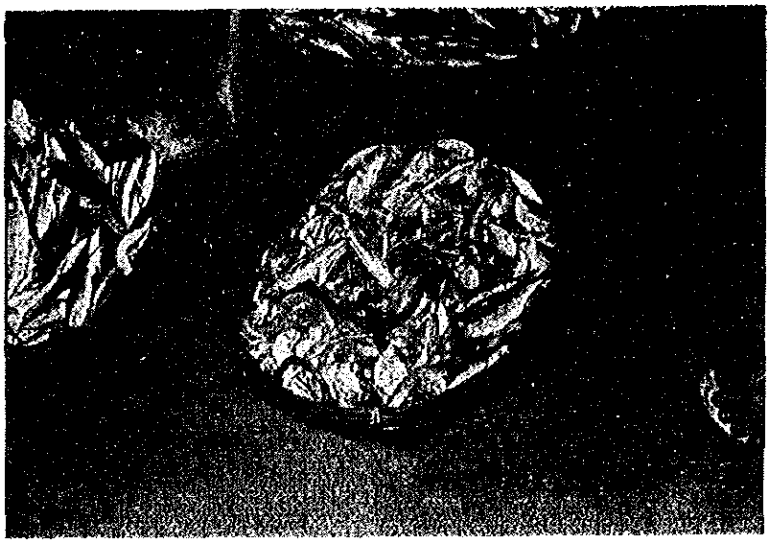
A member of the Japanese survey team, interviews a member of a Basnig net fishing boat crew.

Basnig ship engaged in gathering fish with a fish gathering lamp

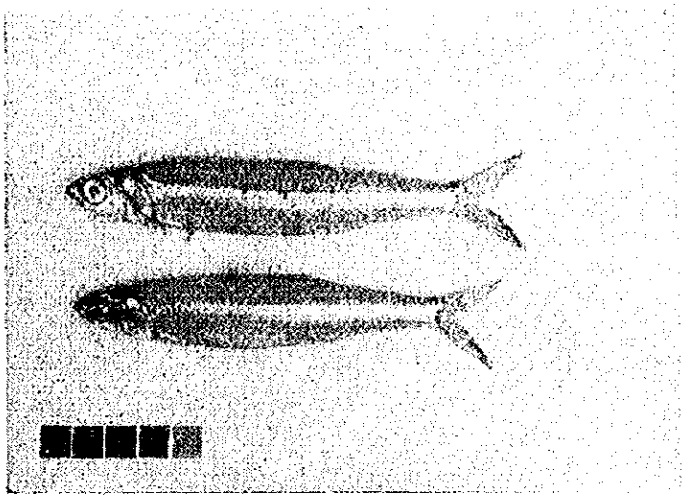


Crew of a Basnig ship engaged in drawing the net

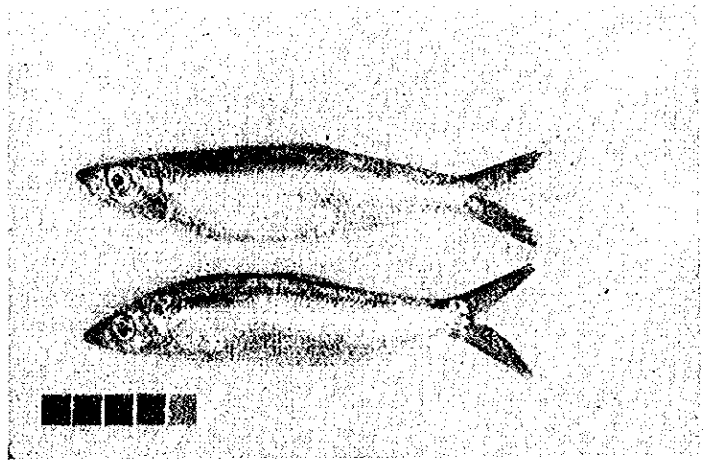
Crew of Basnig fishing boat engaged in landing fish



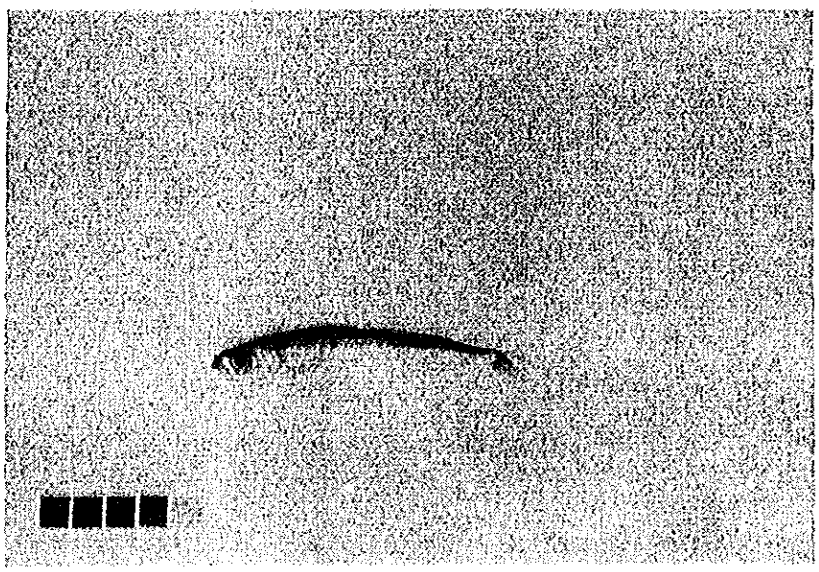
Fish caught with a Basnig net



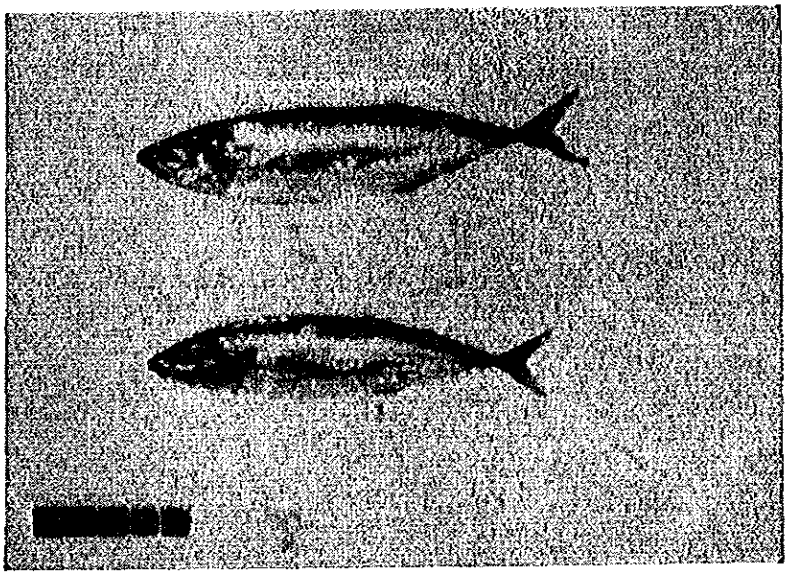
Engraulidae
Engraulis sp.



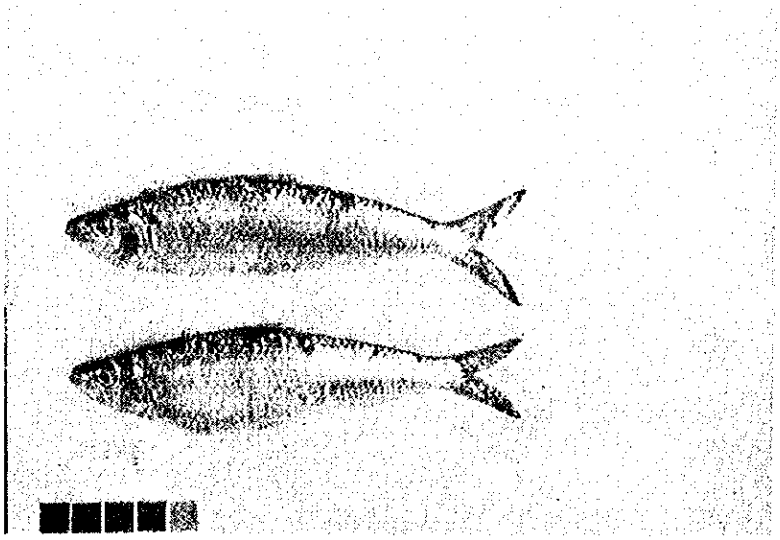
Dussumieriidae
Dussumieria hasselti Bleeker



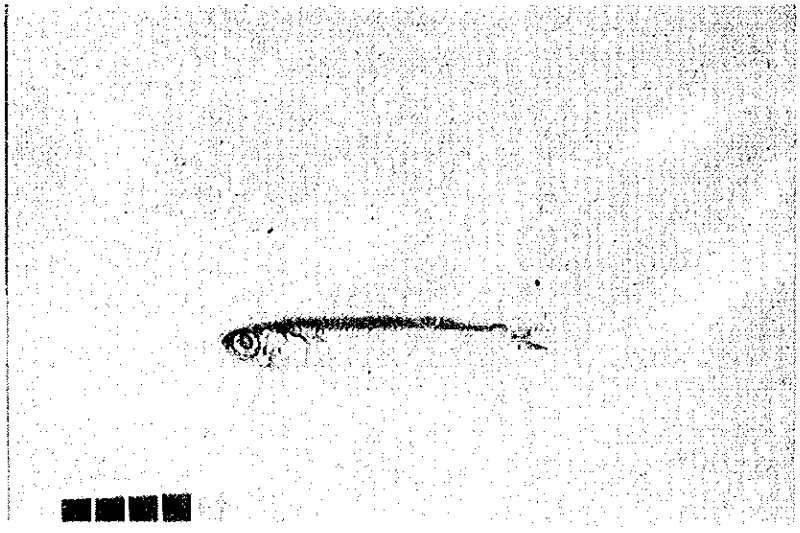
Caesiodae
Caesio sp.



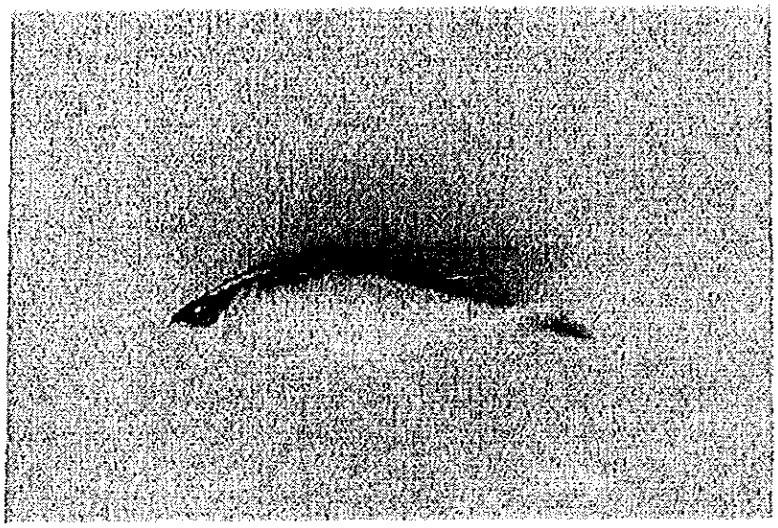
Scombridae
Rastrelliger Kanagurta (Cuvier)



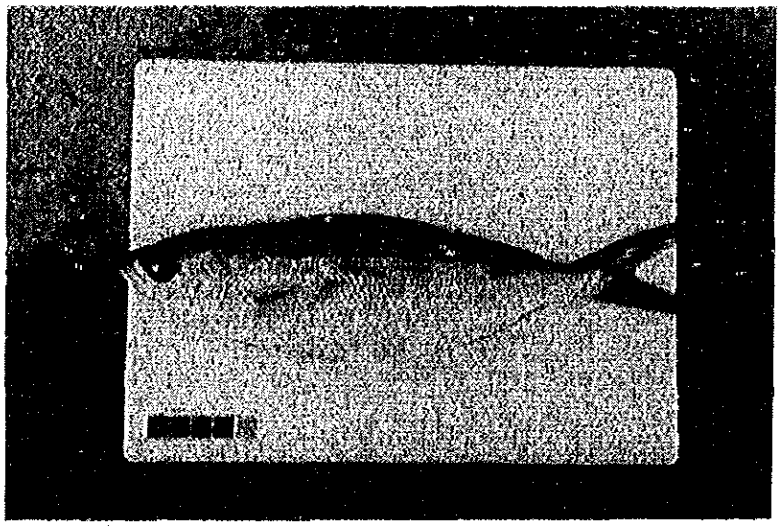
Clupeidae



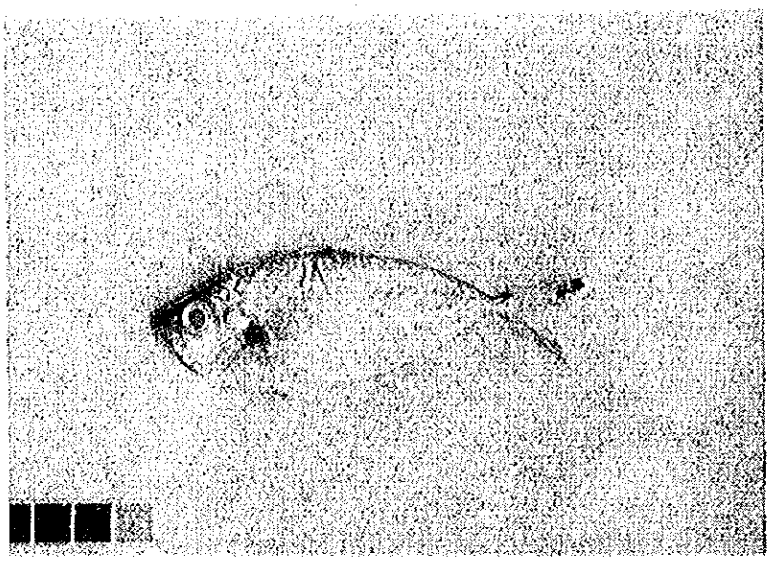
Atherinidae
Allanetta forskali (Rupell)



Clupeidae
Herengula tawilis (?)

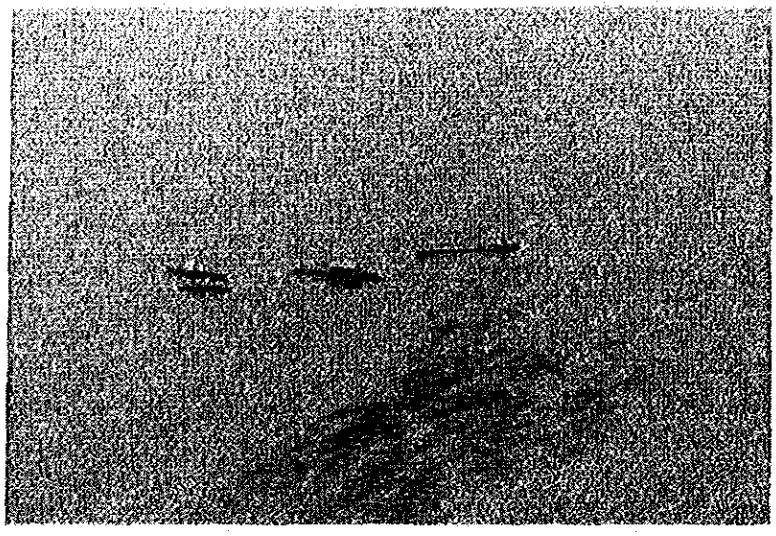


Caesiodae
Caesio sp.



Leiognathidae
Leiognathus equulus (Forskal)

Scombridae
Katsuwonus pelamis (Linne)



Fishing vessel operating nearby "Payaw"