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# REPORT OF FISH FINDING (SKIPJACK) SURVEY IN THE PHILIPPINES

MAY 1977

JAPAN INTERNATIONAL COOPERATION AGENCY

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JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団
受入月日 '84. 5.14
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Name of writer AKIRA HASHIMOTO

## FORWARD

The Government of the Republic of the Philippines has been exerting great efforts to the development of offshore fishery with particular interest in the exploitation of fishery resources in the waters east of the Philippines and Celebes Sea, and it has requested the Government of Japan to cooperate in this field.

The Japan International Cooperation Agency, in response to the request, dispatched a preliminary survey team in October 1975. The team made a recommendation to the Government of the Republic of the Philippines to exploit skipjack resources in the above areas. The Agency then entrusted the Japan Marine Fishery Research Center to carry out an offshore survey in the period of November 1976 through March 1977.

This report is a summary of the results of the above-mentioned survey and is to be sent to the Government of the Republic of the Philippines. I hope that the report will serve as a reference for the authorities concerned both in the Philippines and Japan.

I avail myself of this oppertunity to express my sincere appreciation to the government and people of the Philippines who have extended kind cooperation to the team as well as members of the team.

May 1977

Shinsaku Hogen
President,
Japan International
Cooperation Agency

## CONTENTS

## SUMMARY

1. Survey on skipjack resources and bait fishes for skipjack pole-and-line fishing was conducted by the Hatsutori-Maru No. 3 (79.37 GT) in the waters centering around Leyte Gulf and Davao Gulf located in the southeastern part of the Philippine Islands from 12 November 1976 to 31 March 1977.

2. Survey was conducted on the following items: environment of fishing ground, fishing test of skipjack and bait fishes, biological conditions, keeping test of bait fishes, etc.

3. Environment of Fishing ground

Weather was generally fine but cloudy, however, as the area of Leyte Gulf was corresponded to the rainy season, there were comparatively a lot of rainfalls.

Since this survey corresponded to the period of northeasterly monsoon, the northeasterly wind prevailed particularly in the area of Leyte Gulf, which resulted in some difficulty in fishing operations.

Although the area of Davao Gulf was not so much affected by monsoon, sometimes stormy weather hit this area because of the front passing through the area.

Surface water temperatures tended to be somewhat low for skipjack fishing grounds, showing the level of 26 to 27°C in the area of Leyte Gulf and the level of 26 to 29°C in the area of Davao Gulf.

4. Survey on Skipjack

Fish schools appeared a few in the area of Leyte Gulf; there were just sighted plain schools of small type and bird-associate schools which composed mainly of yellowfin tuna. The catch amounted to a total of 42.7 kg. Both skipjack and yellowfin, were of small size respectively and weight were less than 1 kg and being generally immatured in the growth of sexual gonad.

In Davao Gulf, appearance of fish schools were a few, too.

There were just sighted mostly bonito schools of small type only inside of Davao Gulf and they could not be the object of real fishing operation.

Therefore, fishing test were mainly carried out off the entrance of Davao Gulf against the small type of plain schools and bird associated schools of skipjack as nucleus.

The catch was 4,095.2 kg in total.

The size of fish body of each skipjack and yellowfin were small and their sexual gonad were generally immature.

5. Survey on Bait Fishes

In the area of Leyte Gulf, fishing test took place mostly around Guiuan. The catch by means of fish attraction lamps was in a low tone, the catch indicating 119.8 basketfuls in total, about 6 basketfuls in average and about 35 basketfuls in maximum per operation.

Following fish species prevailed: Dussumieridae sp., Clupeidae sp., Atherinidae sp. and

Engraulidae sp., and the fry belonging to the family of Dissumieridae or Engrauridae (whitebait) were obtained characteristically a lot.

As for the keeping tests of bait fishes, testing materials were insufficient because of the low-toned catch of bait fishes. As a result, though it was difficult to make the enough observation a prospect was obtained on the possible keeping of bait fishes in locality.

In the area of Davao Gulf, most of the fishery grounds of bait fishes were found in the inner area of Davao Gulf. Fish attraction was in a low tone, with 327.7 basketfuls in total, in which about 4 basketfuls were average and 45 basketfuls maximum per operation.

The following fish species were caught: Dussumieriidae sp., Engraulidae sp., Clupeidae sp. and others.

The result on keeping test of bait fishes was about the same with that in the area of Leyte Gulf.

## I. Outline of the Survey Plan

### 1. Purpose of the Survey

Purpose of Survey was to conduct maritime surveys in order to clarify the distribution of skipjack resources, abundance of bait fishes for skipjack pole-and-line fishing, and, aptitude of bait fishes in the southeasterly area of the Philippine Islands.

### 2. Survey Plan

This survey, based at Tacloban and Davao of the Philippines, was conducted. In the area centering around Leyte Gulf and Davao Gulf located in the southeasterly part of the Philippines on the following items: fishing test of skipjack by pole-and-line, fishing test of bait fishes for skipjack pole-and-line fishing by using stick-held dip net and keeping test of bait fishes by bait pen and live bait well on board, together with meteorological observation, oceanographic observation and biological survey.

## II. Outline of the Survey Conducted

### 1. Area and Period of the Survey

Area of Leyte Gulf, from 12 November 1976 to 2 January, 1977 (24 days).

Area of Davao Gulf, from 3 January to 17 March, 1977 (74 days).

### 2. The Survey Vessel

Table 1 indicates the specifications of the survey vessel Hatsutori-Maru No. 3.

Table 1 Specification of Hatsutori Maru No. 3

| Items | Pasticulas | |
|---|---|---|
| Name of vessel | Hatsutori Maru No. 3 | |
| Owner | Hokoku Fishery Company | |
| Registered No. | 1 1 6 3 2 2 | |
| Call sign | J G 3 3 8 8 | |
| Registered No. (Fishing boat) | T K 2 — 1 2 7 5 | |
| Tonnage | Gross tonnage 7 9. 3 7 tons Net tonnage 2 4. 4 9 tons | |
| Main particulars | L 3 5. 0 0 m × B 5. 7 0 m × D 2. 6 0 m | |
| Date of construction | April 25, 1974 | |
| Ship yard | Nagasaki Shipyard | |
| Ship hold | | |
| Fuel oil | 4 3. 9 2 Kℓ (9holds) | |
| Fresh water | 8. 5 6 (2 holds) | |
| Fish hold | 5 7. 6 7 $M^3$ (9 holds) Loading capacity 30tons | |
| Freezing capacity | 7 tons/day ( Brine ) | |
| Engine | | |
| Main | Yammar Diesel 6 M A — D T | |
| | 4 Cycle Diesel engine 9 0 0 RPM 5 5 0 PS | 1 set |
| Aux. | Yammar Diesel 6 K F L 1, 2 0 0 RPM 1 4 5 PS | 2 set |
| Generator | Shinko Electric DP 120KVA 60cycle | 2 set |
| Refrigirator | Mitsubishi Electric M A — 4 B H, 6 B H | 2 set |
| Propellar | Kamome Propella 3 blades | 1 set |
| Navigation equipment | | |
| Auto pilot | Tokyo Keiki G L T ( Repeater 6 sets ) | 1 set |
| Gyro compass | Tokyo Keiki E S 1 1 A | 1 set |
| Radar | Anritsu Denki A R — M 3 2 — 6 0 8 | 1 set |
| Fish finder | Kaijo Denki D — 3 4 — 2 R | 2 set |
| Thermometer | Murayama Denki M — 2 2 Z ( — 6 ~ + 3 6 ℃ ) | 1 set |
| Radio equipment | | |
| Transmitter | Anritsu Denki T K 3 2 B — 2 | 1 set |
| Receiver | Anritsu Denki R G 1 8 A | 1 set |
| SSB Transceiver | Anritsu Denki S S 1 2 A 5 0 W, S S 1 1 A 1 0 W | 1 set |
| Skiff | FRP 16ft. 25ps out-board engine | 1 boat |
| Gears | Stick-held dip net | 1 set |
| | Bait pen 4 m × 8 Depth 6 m | 2 set |
| | 3 m × 4 Depth 4 m | 1 set |
| | Fish attraction lump Survey vessel 2 kw, 1 kw | 2 pcs |
| | Skiff 2 kw | 1 pc |
| | Glass fiver fishing pole | 70 |
| Spead | 10knots | |
| Complement | 25persons (crew 21, others 4) | |

3. Base Ports

Area of Leyte Gulf ..... Tacloban City, Leyte Island

Area of Davao Gulf ..... Davao City, Mindanao Island

4. Research Specialists, Crew and Participants in Locality

Research Specialists

| | |
|---|---|
| Mr. Akira Hashimoto (in charge of general supervision) | Japan Marine Fishery Resource Research Center. |
| Mr. Hitoshi Ida (in charge of biology concerned with keeping test of bait fishes) | School of Fisheries Sciences, Kitasato University. |
| Mr. Tatsuyoshi Sawairi (in charge of the techniques concerned with keeping test of bait fishes) | Hiyoshi Fisheries Company. |

Crew

| | |
|---|---|
| Mr. Etsuo Saito | Master Fisherman |
| Mr. Takehiro Ohhira | Captain |
| Mr. Yukihiro Momma | Chief Engineer |
| Mr. Yukio Sasaya | Chief Radio Operator |

Participants in Locality

Area of Leyte Gulf

Researcher on board

| | |
|---|---|
| Mr. Vitaliano Encina | Manila Central Office, Bureau of Fisheries |

Assistants for keeping test of bait fishes

| | |
|---|---|
| Mr. Marcerino Odeña | Guiuan Fishery Station, Bureau of Fisheries |
| Mr. Ulderico Abueva | " |
| Mr. Oldan | " |
| Mr. Marceling | " |

Area of Davao Gulf

Researchers on board

| | |
|---|---|
| Mr. Vialiano Encina | Manila Central Office, Bureau of Fisheries |
| Mr. Eutropio G. Verano Jr. | " |
| Mr. Reoberto C. Baltazar | " |
| Mr. Edgardo Togonon | Davao Regional Office, Bureau of Fisheries |
| Mr. Severino R. Pastral | " |
| Mr. Alfeo Piloton | " |

Assistants for keeping test of bait fishes

| | |
|---|---|
| Mr. Alfredo Cimagala | Davao Regional Office, Bureau of Fisheries |
| Mr. Mario Dimaano | " |
| Mr. Edgardo Togonon | " |
| Mr. Vedasto R. Belarmino | " |

| | |
|---|---|
| Two divers and three watchmen of bait pen | Davao Regional Office, Bureau of Fisheries |

## 5. Fishing Gears and Methods

### 5-1 Survey on Skipjack

#### 5-1-1 Skipjack Pole-and-Line Fishing

1) Pole: grass fiber, 3.1 m or 3.8 m long; 3.5 cm dia. at the base, 0.5 cm at the end.
2) Line: nylon gut No. 30, 40; 2.4 m or 3.2 m long.
3) Hook: Lure hook for skipjack, No. 2.8, 3.0.

#### 5-1-2 Trolling Line for Skipjack

1) Main line: Cremona rope No. 3, anti-clockwise twisting; tied together with 5 mm dia./20 m in length and 4mm/20 m.
2) Branch line: nylon gut; tied together with 3 m in length (Ct. 30, No. 3, anti-clockwise twisting) and 1.5 m in length (Ct. 60, No. 3, anti-clockwise twisting)
3) Hook: Lure hook for skipjack
4) Swivel: brass
5) Rubber band for prevention from cutting

Figure 1 shows the structure of trolling line.

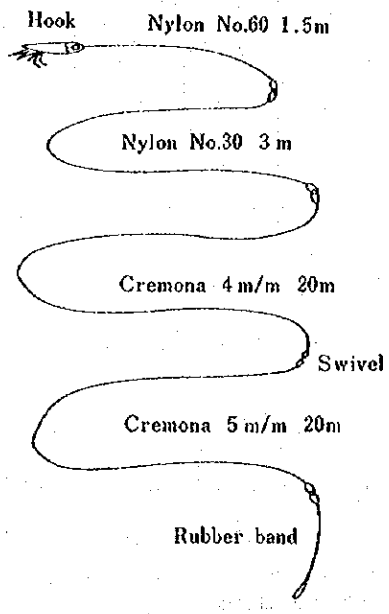



Fig. 1 Structure of Trolling Line

### 5-2 Survey on Bait Fishes

1) Fish attraction lamp

| | | |
|---|---|---|
| For survey vessel | Underwater fish attraction lamp (2 KW) | 2 sets |
| For skiff | Underwater fish attraction lamp (2 KW) | 1 set |
| Generator for skiff | Yammar diesel 3 ps. | 1 set |

(Spare ..... 1 set)

2) Stick-held dip net ..... 1 set

Netting: Cremona, minnow net, 4 x 4, dyed with catechu, 120 meshes, 68 pieces, 3 strips (hang 30%).

Selvage stirp: Nylong, 210 d/6, 12 mm, 6 meshes, 24 m.

Edge rope: Cremona rope, 5mm, 24 m.

Hand rope: Cremona, 20 mm, 35 m.

Spring rope: Cremona, 20 mm, 35 m.

Sinker: Lead, 40 momme, 260 pieces.

Ditto: Oval type of lead, 3.5 kg, 10 pieces.

Main supporting bamboo pole:

Moso bamboo, tied with 4 pieces.

Side supporting bamboo pole:

Moso bamboo, tied together with 2 pieces, 15 cm dia. at the base, 5 cm dia. at the end.

Figures 2 and 3, show the structure of stick-held dip net and the order of stick-held dip net fishing method.

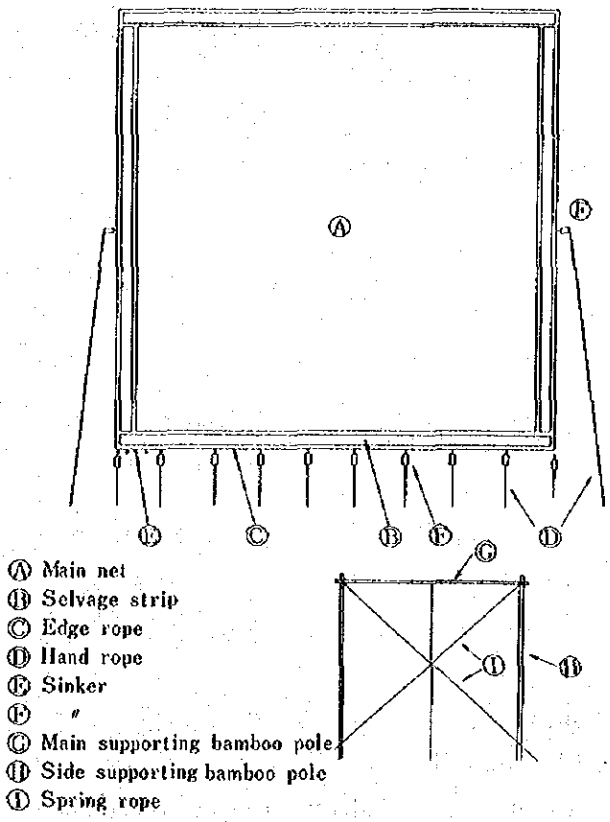



Fig. 2 Structure of stick-held dip net

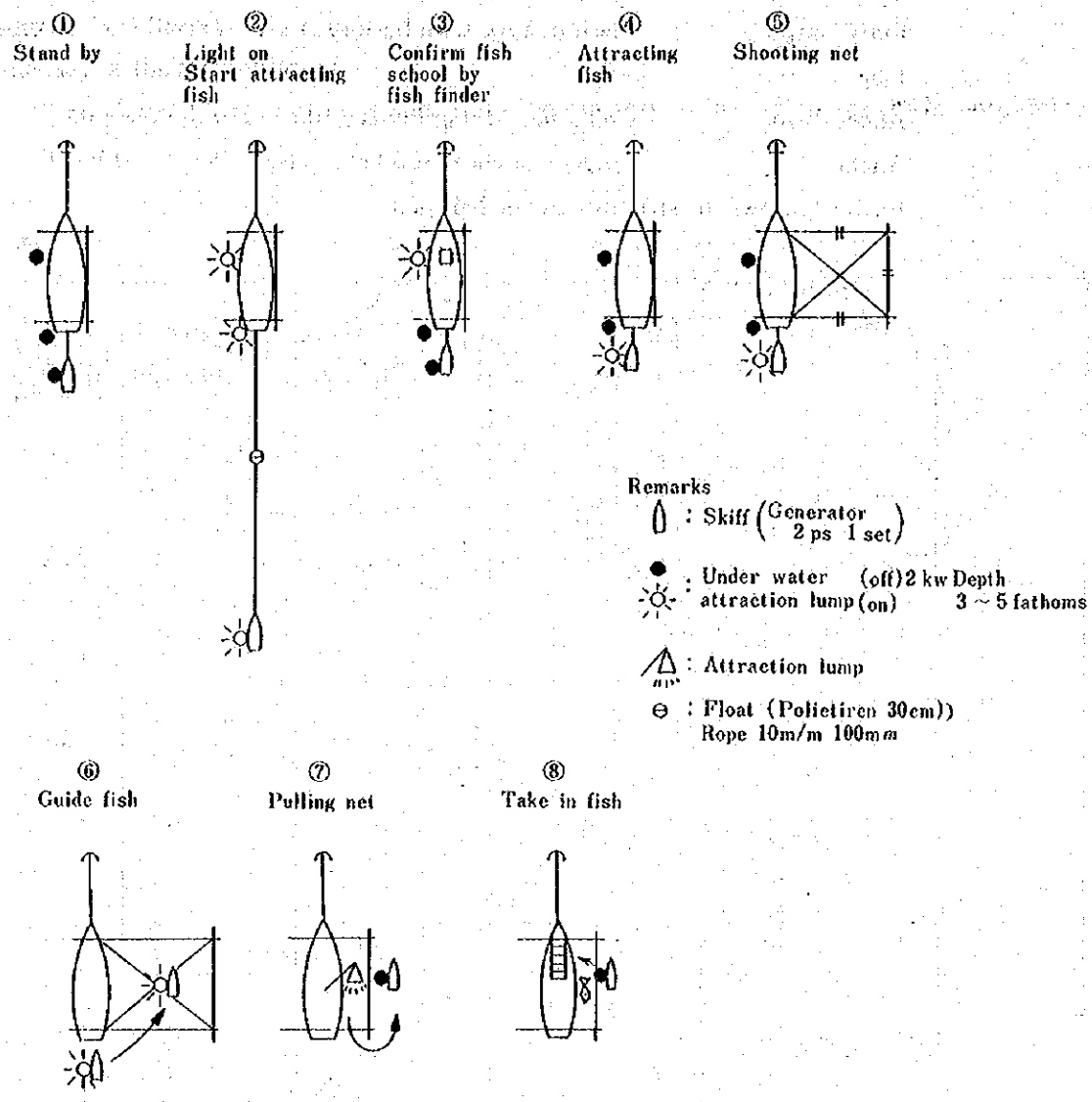



Fig. 3 Order of Stick-held Dip Net Fishing Operation

3) Bait Pen

| | |
|---|---|
| Wooden frame: | Pine deal, 5 m in length, 15 cm in dia., square, assortment of 8 pieces. |
| Side pole: | Pine deal, some 3.5 m in length, some 6 cm in dia., 24 pieces. |
| Selvage wedge: | Pine deal, 3.5 cm in length, 6 cm square, 40 pieces. |
| Netting: | Cremona, minnow net, 5 x 5, dyed with catechu. |
| Edge rope: | Cremona, 14 mm in dia. |
| Strengthening rope: | Cremona, 6 mm in dia. |
| Side-pole ring: | Cremona rope, 6 mm in dia. |
| Sinker: | Lead, 40 momme, 192 species; oval type of lead, 3.5 kg, 8 pieces. |

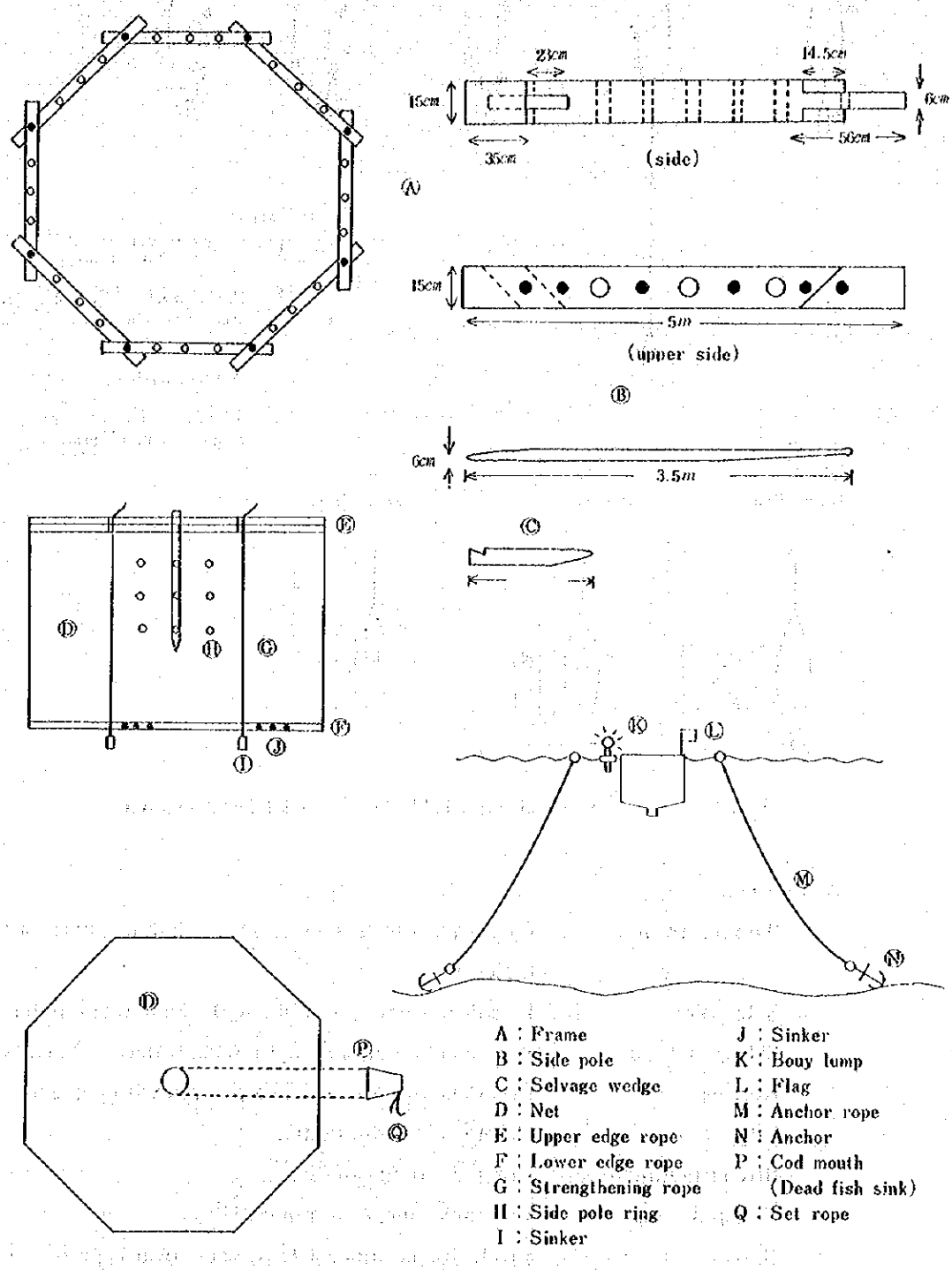
Buoy lamp: Flashing type with battery, 1 set

Flag: 1 set

Anchor rope: Cremona, 34 mm in dia., 100 ~ 130 m in length.

Anchor: Stocked anchor, 500 kg, 2 sets.

Figure 4 shows the structure of the bait pen.




A : Frame
B : Side pole
C : Selvage wedge
D : Net
E : Upper edge rope
F : Lower edge rope
G : Strengthening rope
H : Side pole ring
I : Sinker
J : Sinker
K : Bouy lump
L : Flag
M : Anchor rope
N : Anchor
P : Cod mouth (Dead fish sink)
Q : Set rope

Fig. 4 Structure of Bait Pen

## 6. Itinerary of the Survey

### 6-1 Itinerary of the Survey Vessel

Table 2 and Figure 5 show respectively the itinerary of the survey vessel, Hatsutori-Maru No. 3 and track chart.

Table 2 Itinerary of the Survey Vessel

| Date | Items | Operation | | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | anchored | Cruised | moved | operated | no operated | Total | |
| Nov.12,'76 | Kurihama | days 3 | days | days | days | days | days 3 | Started chartering |
| 15 | Lve. 〃 | | 9 | | | | 9 | |
| 23 | Arr. Manila | 13 | | | | | 13 | Consultation on survey |
| Dec. 7, | Lve. 〃 | | 4 | | | | 4 | Oceanographic obs. Ocular obs. |
| 10 | Arr. Tacloban | 1 | | | | | 1 | Consultation on suruey |
| 12 | Lve. 〃 | | | | 9 | 2 | 11 | Bait fish survey,in Leyte Gulf |
| 22 | Arr. 〃 | 0 | | | | | 0 | Supply |
| 23 | Lve. 〃 | | | | 8 | 1 | 9 | Bait fish suruey,skipjack survey |
| 31 | Arr. 〃 | 1 | | | | | 1 | Supply |
| Jan. 2, '77 | Lve. 〃 | | 3 | | | | 3 | Oceanographic obs. Ocular obs. |
| 4 | Arr. Davao | 1 | | | | | 1 | Supply |
| 6 | Lve. 〃 | | | 2 | 2 | | 4 | Bait fish survey,Oceanographic obs. |
| 9 | Arr. 〃 | 0 | | | | | 0 | |
| 10 | Lve. 〃 | | | 2 | 11 | | 13 | Bait fish survey |
| 22 | Arr. 〃 | 0 | | | | | 0 | Supply |
| 23 | Lve. 〃 | | | | 12 | | 12 | Bait fish survey, Skipjack survey |
| Feb. 3 | Arr. 〃 | 0 | | | | | 0 | Supply |
| 4 | Lve. 〃 | | | | 4 | | 4 | Bait fish survey, Skipjack survey |
| 7 | Arr. 〃 | 0 | | | | | 0 | |
| 7 | Lve. 〃 | | | | 14 | | 14 | Bait fish survey, Skipjack survey |
| 21 | Arr. 〃 | 0 | | | | | 0 | Supply |
| 22 | Lve. 〃 | | | | 15 | | 15 | Bait fish survey, Skipjack survey |
| Mar. 8 | Arr. 〃 | 0 | | | | | 0 | Supply |
| 9 | Lve. 〃 | | | 1 | 6 | | 7 | Bait fish survey, Skipjack survey |
| 15 | Arr. 〃 | 2 | | | | | 2 | Fish unloading supply |
| 18 | Lve. 〃 | | 12 | | | | 12 | |
| 29 | Arr. Tokyo | 2 | | | | | 2 | Finished chartering |
| 31 | Tokyo | | | | | | | |
| Total | | 23 | 28 | 5 | 81 | 3 | 140 | |

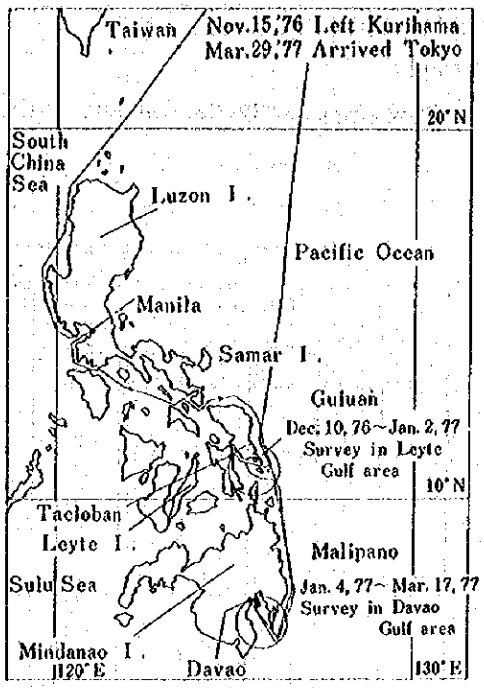



Fig. 5 Sailing Track Chart

## 6-2 Itinerary of the Keeping Test of Bait Fishes

Table 3 shows the itinerary of the keeping test of bait fishes.

Table 3 Itinerary of the Keeping Test of Bait Fish

| Date | | Remarks |
|---|---|---|
| Nov. 9, | 1976 | Research specialists left Japan. Arrived at Manila. |
| 10, | | Left Manila and arrived at Tacloban. |
| 11, | | Made arrangements with the Tacloban Regional Office, Bureau of Fisheries |
| 12, | | Survey vessel left Tacloban and arrived at Guiuan. Made arrangements with the Guiuan Fishery Station, Bureau of Fisheries and the Pearl Culture Farm, Ministry of Natural Resources. |
| 13, | | Started the keeping test of bait fish in bait pen in the area of Leyte Gulf. |
| 24, | | Started the keeping test of boit fish in live bait well on board the survey vessed. |
| 29, | | Finished the keeping test in bait pen. Transfered the bait fishes from bait pen to the live bait well on board, |
| Jan. 2, | 1977 | The survey vessel left Tacloban. Finished the survey operation in the Leyte Gulf. |
| 4, | | The vessel arrived at Davao. Made arrengements with the Davao Regional office, Bureau of Fisheries. |
| 6, | | The vessel left Davao and arrived at Malipano. Made arrangements with Aguinald Development Corporation. |
| 7, | | Started the keeping test in bait pen in the Davao Gulf. |
| 23, | | Researcn specialists (two) for keeping test. Returned to JAPAN. |
| 29, | | Finished the keeping test in live bait well on board (Continuation of the test in the area of Leyte Gulf). Finished the keeping test in bait pen in the area of Davao Gulf. |
| Feb. 5, | 1977 | Started the keeping test in live bait well on board. |
| 16, | | Finished the test. |

## 7. Items and Means of the Survey

### 7-1 Survey on Skipjack

1) Meteorological observation

At the finding of fish schools and at fishing operations, observation was made on weather, wind direction and force, air temperature and pressure.

2) Oceanographic observation

At the finding of fish schools and at fishing operations, observation was made on wave, swell, surface water temperature and water color. Besides those items, observation by BT on vertical water temperatures up to 250 m in depth was made in survey areas according to circumstances.

3) Ocular observation for fish schools and fishing test

At the finding of fish schools and at fishing operations, the following were recorded: date, hours of finding, feeding and catching, position, species of fish schools, behavior, size, swimming direction and catch by fish species.

4) Biological survey

Out of catches, 100 fishes as rule were measured in body length and weight by species and operation. Also, 10 fishes were measured in body length, weight, sex, weight of sexual gonad and stomach contents.

### 7-2 Survey on Bait Fishes

1) Meteorological observation

At the time of operations, observation was made on weather, wind direction and force, air temperature and pressure.

2) Oceanographic observation

At the time of operations and at the time of arrival at fishing grounds, respectively, observation was made on surface water temperature, current, transparency, depth and bottom materials.

3) Fishing test

At the time of operations, the following items were recorded: date, hours of operation, fish concentration, response to fish finder and catch by species.

4) Biological survey

At the time of catching, observation was made on catch composition by species, also, 100 fishes were measured in body length at one operation and by species.

5) Keeping test of bait fishes

Keeping test of bait fishes were conducted in bait pen and in live bait well on board; and observation was made on the lapse of keeping hours and the survival condition of bait fishes. Also, for the purpose of clarifying the environmental conditions under which bait fishes are kept, measurement was made, inside and outside of bait pen as well as inside of live bait well and overboard, on water temperatures, dissolved oxygen, hydrogen ion concentration, electrical conductivity, turbidity and transparency.

## 8. Outline of Progress

### 8-1 Outline of the Navigation of Survey Vessel

Survey vessel left Kurihama on 15 November, 1976, and arrived at Manila Port on the 23rd of the same month. The vessel stood by for operation till completion of necessary procedures there on this survey.

Leaving Manila on 7 December, the vessel proceeded to Leyte Gulf, the first area of survey. On her way, the following were carried out in the offshore waters of Samar Island: ocular observation for skipjack schools and oceanographic observation. Then, arrived at Tacloban Port on 10 December.

On 11 December, necessary arrangements were made on the survey in the area of Leyte Gulf with the Tacloban Regional Office, the Bureau of Fisheries and other offices concerned. At the same time, checkup and arrangement were made on the fishing gears. Leaving Tacloban Port on 12 December, the vessel arrived at Guiuan, where the base for keeping test of bait fishes is located. At the same port, arrangement on the survey activities with the Guiuan Fishery Station, the Bureau of Fisheries and the Pearl Culture Farm, the Ministry of Natural Resources and other offices concerned were made. On the other hand, preparatory works such as setting-up of bait pen were also made, and then, survey operation on bait fishes were started from the night of 13 December.

Until 22 December after that, the fishing test of bait fishes continued to take place mostly in the coastal waters around Guiuan while the vessel was moving from one fishing ground to another; and, in the meantime, the catch was taken into bait pen to secure the bait fishes for keeping test.

The charging of bait fishes into bait pen was stopped on 24 December. From the same day onward, the survey vessel continued to carry out the ocular observation for skipjack schools and the fishing test in the daytime in Leyte Gulf and in the offshore waters of the Pacific, and successively the fishing test of bait fishes was carried out at night in the coastal area of Leyte Gulf.

Upon expiration of the itinerary on keeping test on 29 December, the equipment were withdrawn from the testing site; and the vessel carried out the fishing test of skipjack and bait fishes from that day to 30 December. Also, the bait fishes kept in bait pen had been loaded in the live bait well on board, and the observation was continued.

On 30 December the vessel entered Tacloban Port; and the necessary procedures were made concerning an expiration of the survey conducted in the area of Leyte Gulf, and, at the same time, provisions, fuel, etc. were supplied to the vessel.

Having finished the survey operation in the area of Leyte Gulf on 2 January, 1977, the vessel left Tacloban on the same day and proceeded to Davao Gulf, the next survey area.

The research vessel conducting on its way, ocular observation for skipjack schools and oceanographic observation in the offshore waters of Mindanao Island in the Pacific, then arrived at Davao Port on 4 January.

Necessary arrangement and consultation was made on the coming survey in the area of Davao with the Davao Regional Office, the Bureau of Fisheries and the other offices concerned.

After that, the vessel left Davao Port on 6 January and proceeded to Malipano anchorage, a site for keeping test of bait fishes. Necessary arrangement and consultation for the survey activities with the Aquinaldo Development Corporation were made, and the other hand, preparational works such as the setting-up of bait pen were also made.

In the period of 7 to 21 January, the vessel carried out the fishing test of bait fishes at night in the coastal area of Davao Gulf and charging of baitfish catches into bait pen, ocular observation for skipjack schools and oceanographic observation in Davao Gulf were also carried out in the daytime.

As of 22 January, the charging of baitfish catches into bait pen was stopped. From 23 January to 28 January, the vessel carried out ocular observation for skipjack schools and fishing test in the daytime mostly in the offshore waters of Davao Gulf as well as a fishing test of bait fishes at night in the coastal area of Davao Gulf.

Successively after expiration of the itinerary on keeping test of bait fishes in Malipano on 29 January, the vessel carried out the fishing test of skipjack and bait fishes as well as oceanographic observation in Davao Gulf, from 30 January to 14 March.

From 6 to 16 February within this period, the vessel carried out the keeping test of bait fishes in the live bait well on board.

During the period of the survey activities, the vessel entered Davao Port half-monthly or so; and the supply of provisions, fuel, etc. was taken place.

On 15 March, the vessel, having finished the survey in the area of Davao Gulf, entered Davao Port. After making the necessary procedures regarding the expiration of the survey activities and supply to the vessel, the survey vessel left Davao on 18 March for Japan, and entered Tokyo Port on 29 March. Thus the all survey operation was completed.

### 8-2 Keeping Test of Bait Fishes

Keeping test of bait fishes were carried out in connection with the survey activities on board the survey vessel, the base being established in the neighborhood of the survey area. The equipment and parts for the keeping test were transported to the locality aboard the survey vessel.

On 9 December, 1976, two specialists for keeping test left Japan, arriving at Manila on the same day, and made necessary consultation with the Bureau of Fisheries and other offices concerned. Then, on 10 January, they proceeded to Tacloban, the base port for the first survey area.

After making arrangements with the Tacloban Regional Office, The Bureau of Fisheries and other offices concerned, they proceeded to Guiuan by the survey vessel on 12 January.

After making arrangements with the offices concerned in Guiuan, the survey activities were started by using some space of facilities as local base for keeping test, belonging to the Guiuan Fishery Station, the Bureau of Fisheries as well as the Pearl Culture Farm, the Ministry of Natural Resources located on Cantican Island off Guiuan Town.

On 13 December, bait pen were set up near Balinatio Island. Bait fishes caught by the survey vessel were charged into the bait pen and the observation on bait fishes was started. After that, on 18 December, the bait pen being set up near Balinatio Island was transferred to the neighborhood of Cabalarian Island close to Cantican Island, the local base.

This is because (i) it was difficult to maintain the bait pen due to strong tidal current in the area near Balinatio Island, (ii) it was inconvenient for the management and observation of the bait pen because its location was rather far from Cantican Island, the local base.

After that, from 19 to 24 December successively, the charging and observation of bait fishes were continued at the same place. Having finished charging bait fishes into the bait pen on 24 December, observation of bait fishes was conducted until 29 December.

Upon expiration of the itinerary of keeping test of bait fishes on 29 December, the equipment for the keeping test were withdrawn and the bait fishes kept in bait pen were loaded into the live bait well on board the survey vessel for continuous observation.

On 2 January, 1977, the survey vessel left Tacloban, and proceeded to Davao, next survey area, and the specialists for keeping test proceeded to Davao by plane.

On 4 January, the vessel arrived at Davao.

On 6 January, the specialists proceeded to Malipano. where a site for keeping test in the area of Davao Gulf by the survey vessel was located. The survey activities of keeping test were started at Malipano by using some space of the facilities of the Pearl Culture Farm belongs to the Aguinaldo Development Corporation, and bait pen was set in the waters of Malipano anchorage in front of the same facilities.

From 11 January, charging of bait fishes into the bait pen and observation on it were started.

From that day to 22 January, charging bait fishes into the bait pen was continued. After that, the itinerary on keeping test was extended one more week from initial schedule until 29 January.

On 22 January the specialists for keeping test finished their local work and left Davao for Manila on 23 January. They left Manila for Japan by air on 29 January.

During the extended period for keeping test, the researcher on board left the vessel and stayed at Malipano to continue the same test.

On 29 January, the keeping test of bait fishes by using the bait pen at Malipano was finished.

After that, during the period of 6 to 16 February, keeping test of bait fishes in live bait well on board was carried out. Thus the whole itinerary on keeping test of bait fishes in the survey were completed.

## III. Findings of the Survey

### 1. Area of Leyte Gulf

### 1-1 Survey on Skipjack

#### 1-1-1 Environment of Fishing Ground

Table 4 indicates the observed value of weather, wind direction and force, and surface water temperature on the days of skipjack survey in the area of Leyte Gulf and the offshore waters of the Pacific.

Table 4 Environmental Conditions of Skipjack Fishing Ground

(Leyte Gulf area)

1. Weather

| Weather \ Month | December | | January | | Total | |
|---|---|---|---|---|---|---|
| b c | 3 days | 4 3 % | 1 days | 1 0 0 % | 4 days | 5 0 % |
| c | | | | | | |
| o | 3 | 4 3 | | | 3 | 3 8 |
| r | 1 | 1 4 | | | 1 | 1 2 |
| Total | 7 | | 1 | | 8 | |

Note : By noon observation

2. Water surface temperature

| Water temperature \ Month | December | | January | | Total | |
|---|---|---|---|---|---|---|
| 26.1 ~ 26.5 ℃ | 1 days | 1 4 % | days | % | 1 days | 1 3 % |
| 26.6 ~ 27.0 | 1 | 1 4 | | | 1 | 1 3 |
| 27.1 ~ 27.5 | 2 | 2 9 | 1 | 1 0 0 | 3 | 3 7 |
| 27.6 ~ 28.0 | 3 | 4 3 | | | 3 | 3 7 |
| Total | 7 | | 1 | | 8 | |

3. Wind direction

| Month / Wind direction | December | | January | | Total | |
|---|---|---|---|---|---|---|
| | days | % | days | % | days | % |
| N W | 1 | 1 4 | | | 1 | 1 2 |
| N N W | | | | | | |
| N | 1 | 1 4 | | | 1 | 1 2 |
| N N E | | | | | | |
| N E | 1 | 1 4 | | | 1 | 1 2 |
| E N E | 1 | 1 4 | | | 1 | 1 2 |
| E | 2 | 3 0 | | | 2 | 2 5 |
| E S E | 1 | 1 4 | | | 1 | 1 2 |
| S S E | | | 1 | 1 0 0 | 1 | 1 2 |
| Total | 7 | | 1 | | 8 | |

4. Wind force

| Month / Wind force | December | | January | | Total | |
|---|---|---|---|---|---|---|
| | days | % | days | % | days | % |
| 3 | 4 | 5 7 | 1 | 1 0 0 | 5 | 6 3 |
| 4 | 2 | 2 9 | | | 2 | 2 5 |
| 5 | 1 | 1 4 | | | 1 | 1 2 |
| Total | 7 | | 1 | | 8 | |

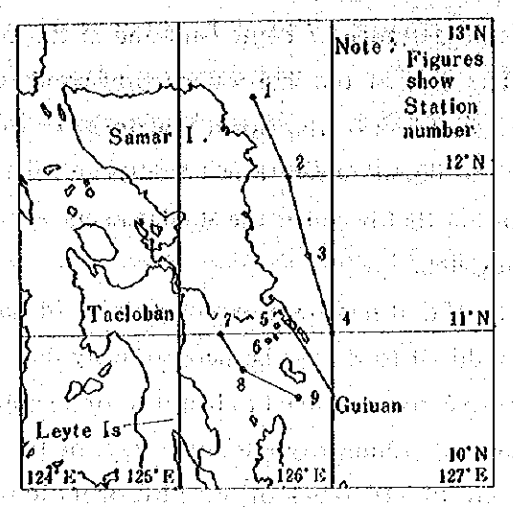
As for the weather, fine but cloudy, cloudy and overcast respectively accounted for 50 per cent or so. Also, since the survey period relating to the survey area corresponded to that of notheasterly monsoon, the northeasterly wind of 3 to 5 (somewhat strong) prevailed, which affected to the ocular observation and fishing operations for skipjack. Surface water temperatures varied at the level of 26 to 27°C, which meant somewhat low temperatures as compared with normal ones in skipjack fishing grounds.

Figure 6 points out the oceanographic observation stations, and, Figure 7 does the vertical distribution of water temperatures by BT observation in the offshore waters of Samar Island facing the Pacific and in Leyte Gulf.

In both of Leyte Gulf and the offshore waters of the Pacific, the thermocline of water temperature (layer where the variation of water temperatures is vertically large) as one of the condition of skipjack fishing ground to be formed was not confirmed.

The following was observed: the water color of 2 to 4 in Leyte Gulf and 1 to 4 in the offshore waters of the Pacific. Also, the transparency of 10 to 35 m in Leyte Gulf and 21 to

27 m in the offshore waters of the Pacific, which meant a tendency similar to water color.




oceanographic o

Fig. 6 Stations of Oceanographic Observation (Leyte Gulf Area)

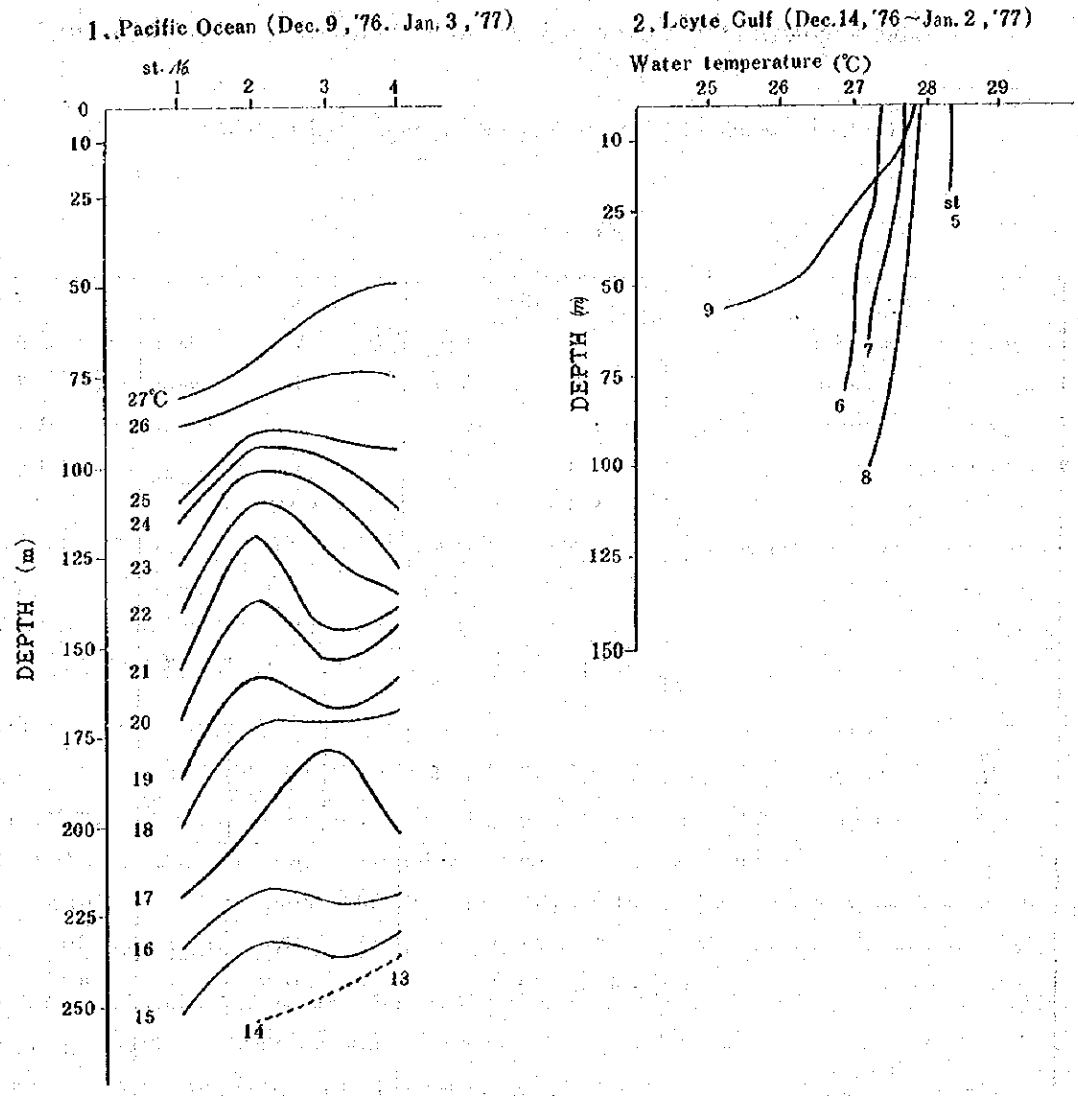



Fig. 7 Vertical Distribution of Water Temperature (Leyte Gulf Area)

During the survey period, it was observed that there were current rips eminently formed with coastal water at the entrance of Leyte Gulf and in the waters of 10 sea miles off the coast in the Pacific. The area of the said waters corresponds with that of north and south diverging waters of the west end of the North Equatorial Current and complicated currents were observed among the north current that becomes an original current of the "Kuroshio Current", the south current that becomes the Mindanao current and the coastal current.

### 1-1-2 Fishing Operations and Catches

Although the survey period had been expected to be 24 days, the full-fledged operation days of skipjack was reduced to 8 days because so many days were needed for catching an enough quantity of bait fish to be charged to bait pen for keeping test.

In the 8 days of stay at fishing grounds and 7 days of fishing operations, the 18 schools were found out, and, by the 14 times of effective operations, total catch of 42.7 kg, i.e. 5.3 kg of skipjack, 31.7 kg of yellowfin and 5.7 kg of bonito, were recorded.

Table 5 indicates the result of skipjack fishing operation and catch by month.

Table 5 Result of Skipjack Fishing Operation and Catches

(Leyte Gulf Area)

| Month | | December | | | January | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of days staying in fishing ground | | 7 days | | | 1 days | | | 8 days | | |
| Number of days on effective operation | | 6 days | | | 1 days | | | 7 days | | |
| Number of fish schools observed | | 15 schools | | | 3 schools | | | 18 schools | | |
| Number of effective operation (Schools) | | 13 times schools | | | 1 times schools | | | 14 times schools | | |
| Ratio of effective operation | | 85.7 % | | | 100.0 % | | | 87.5 % | | |
| Number of fish schools observed per day operation | | 2.1 schools | | | 3.0 schools | | | 2.3 schools | | |
| Number of effective operation per day | | 2.2 times | | | 1.0 times | | | 2.0 times | | |
| Ratio of effective operation (schools) | | 86.7 % | | | 33.3 % | | | 77.8 % | | |
| Catch by species | | pcs | Kg | % | pcs | Kg | % | pcs | Kg | % |
| | Skipjack | 4 | 5.3 | 12.6 | | | | 4 | 5.3 | 12.4 |
| | Yellowfin tuna | 27 | 31.7 | 75.1 | | | | 27 | 31.7 | 74.2 |
| | Bonito | 4 | 5.2 | 12.3 | 1 | 0.5 | 100 | 5 | 5.7 | 13.4 |
| | Total (E) | 35 | 42.2 | | 1 | 0.5 | | 36 | 42.7 | |
| Catch per day of operation (E/D) | | 5.8 | 7.0 | | 1 | 0.5 | | 5.1 | 6.1 | |
| Catch per day of operation and person (E/D/10) | | 0.6 | 0.7 | | 0.1 | 0.05 | | 0.5 | 0.6 | |
| Catch per operation (E/O) | | 2.7 | 3.2 | | 1 | 0.5 | | 2.6 | 3.1 | |
| Catch per operation and person (E/O/10) | | 0.3 | 0.3 | | 0.1 | 0.05 | | 0.3 | 0.3 | |
| Remarks | | | | | | | | | | |

In Leyte Gulf, the offshore waters of the Pacific and the Straits of Suvigao, ocular observation for fish schools was carried out on board from sunrise to sunset every day and three trolling lines were towed at the stern at all times.

At the finding of fish schools, observation was made on the behavior of fish schools and the biting of fish at baits scattered, and then, the catching was carried out by using of trolling line and pole-and-line.

Figure 8 shows the track chart on skipjack surveys in the area of Leyte Gulf.

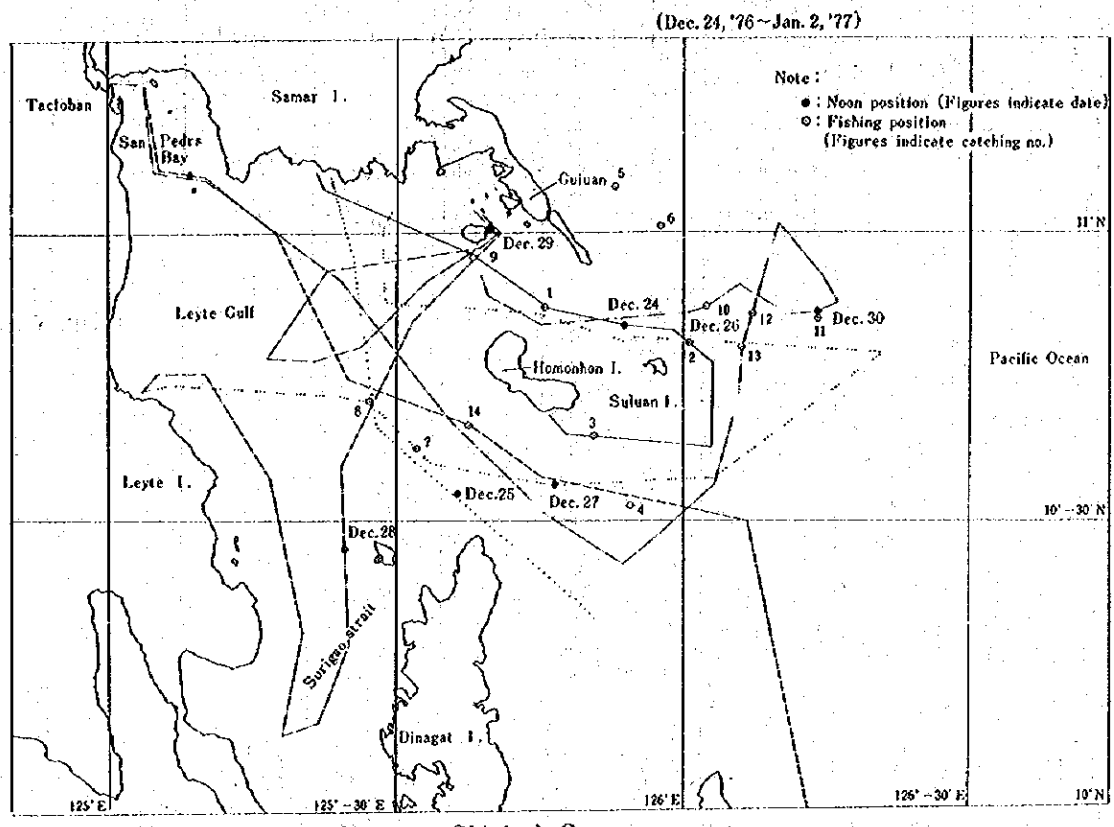



Fig. 8 Track Chart on Skipjack Survey

### 1-1-3 Distribution and Behavior of Fish Schools

Figure 9 shows the catching ratio of skipjack by fishing grounds in the area of Leyte Gulf.

Fish schools were mostly found off the entrance of Leyte Gulf and near the both islands of Homonon and Suluan, however, no fish schools were found in the inner part of Leyte Gulf. Table 6 and Figure 10, show respectively the appearance of fish schools by behavior.

Number of the fish schools found out was 6 of skipjack, yellowfin and bonito, respectively. Throughout all the species, the schools were of small type, and plain schools, birds-associate schools and three drifting log-associate schools of yellowfin were sighted. Also, five jumping schools and one of breezing school were sighted, but almost all of the others were not in the status of jumping and former school were not sighted. Catch composition by species was 75% in yellowfin, 13% in skipjack and 12% in bonito, i.e. skipjack prevailed.

Figure 11 shows the catch composition by fish species.

ratio by fishing grounds (Leyte Gulf Area)

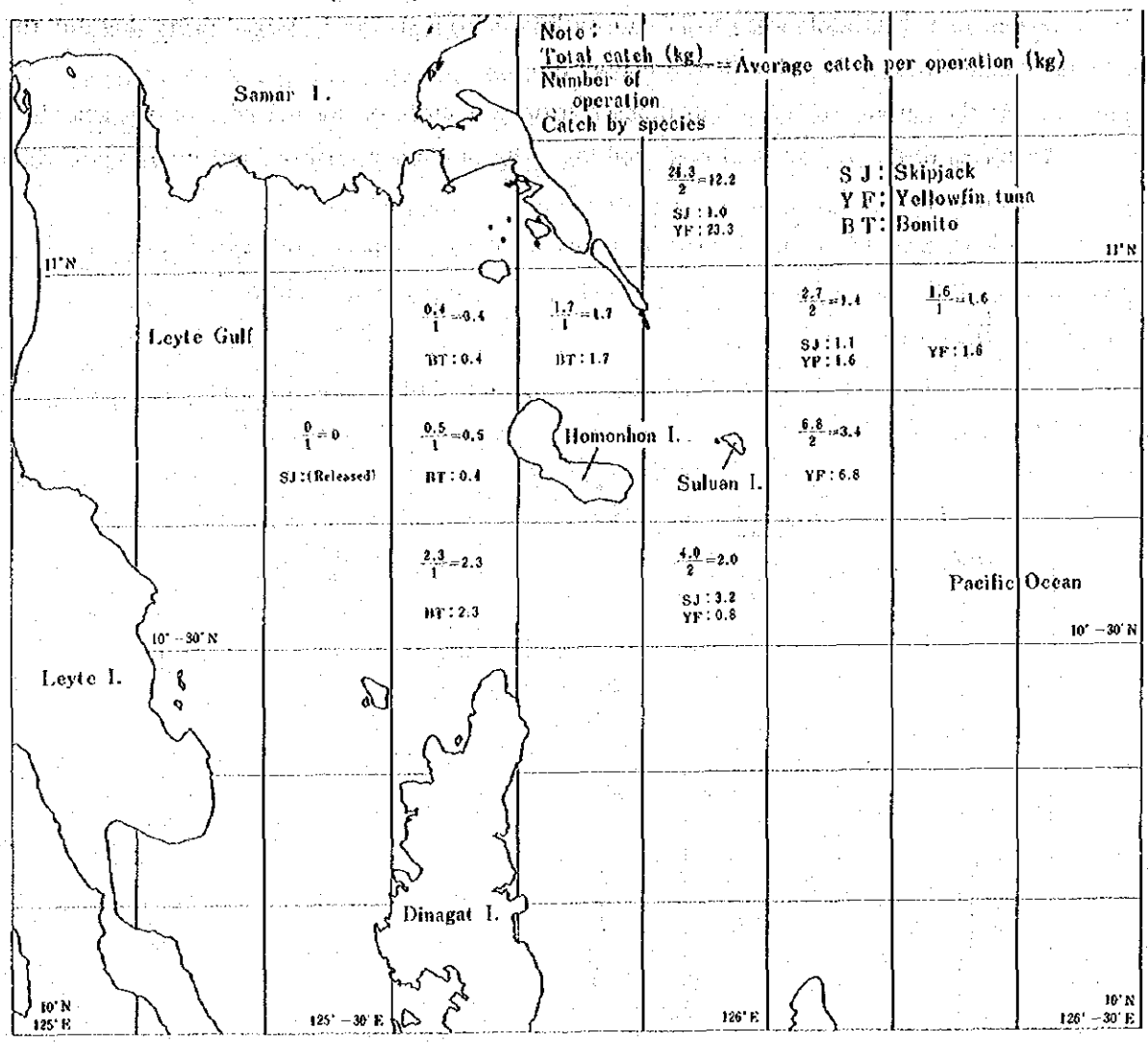



Fig. 9 Catching Ratio by Fishing Grounds

Table 6 Appearance of Fish Schools by Behavior (Leyte Gulf Area)

| Behavior / Species | Plain school | | Birds-associate | | Log-associate | | Total | | Jumper | | Breezer | | Former | | Unknown (Not jump) | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | schools | % | schools | % | schools | % | schools | % | schools | % | schools | % | schools | % | schools | % | schools | % |
| Skipjack | 3 | 50 | 3 | 50 | | | 6 | 100 | 3 | 50 | | | | | 3 | 50 | 6 | 100 |
| Yellowfin | 1 | 17 | 2 | 33 | 3 | 50 | 6 | 100 | 1 | 17 | | | | | 5 | 83 | 6 | 100 |
| Bonito | 4 | 67 | 2 | 33 | | | 6 | 100 | 1 | 17 | 1 | 17 | | | 4 | 66 | 6 | 100 |
| Total | 8 | 44 | 7 | 39 | 3 | 17 | 18 | 100 | 5 | 28 | 1 | 6 | | | 12 | 66 | 18 | 100 |

Notes : 1. Behavior of fish school :
1) Plain school : made up of skypjack/tuna only without any association.
2) Associated school
- Birds-associate : Sea birds fly over the school and prey on the baitfish in surface waters with skipjack tuna school.
- log-associate : School with driftwood
- Others : With shark, whale and dolphin

2. Status of fish school
1) Jumper : Fish appear jumping over the water surface
2) Breezer : Because of the oscillated waves resulting from the fish swimming in sub-surface waters the pertinent water surface makes up a wave shape differnt from the condition of nearby sea surface.
3) Former : While a fish school is preying on baifish in the surface waters, white-cresting water can be seen on the water surface.

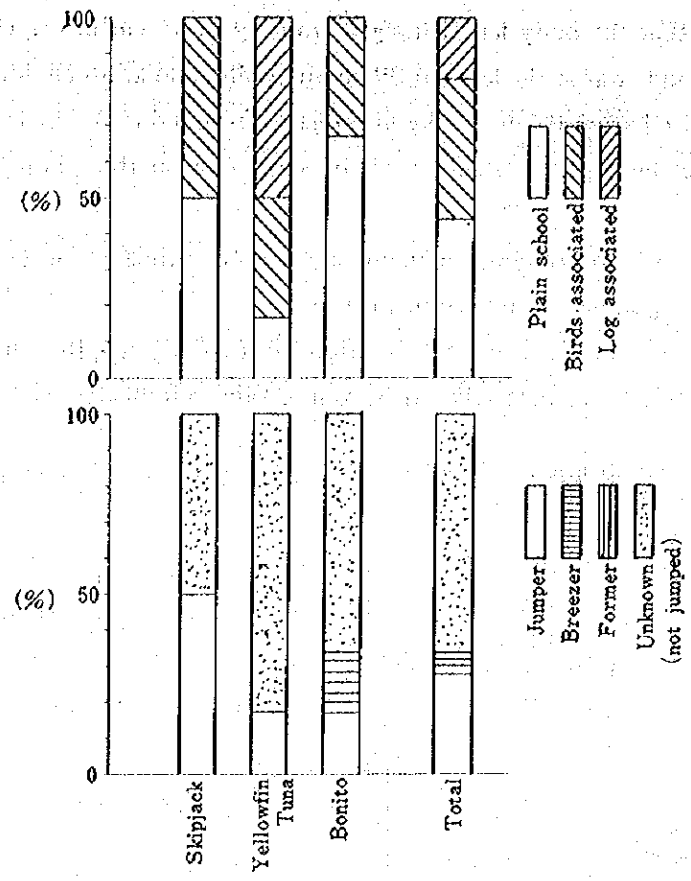



Fig. 10 Fish School Composition by Behavior
(Leyte Gulf Area)

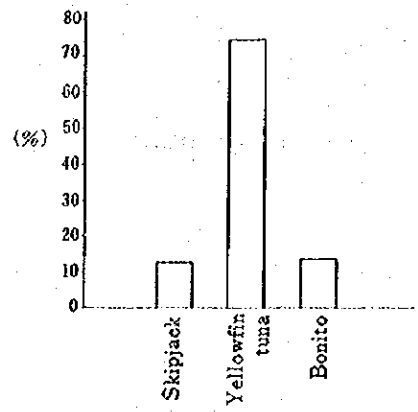



Fig. 11 Catch Composition by Species
(Leyte Gulf Area)

### 1-1-4 Biological Survey

Enough samples were randomly taken by species out of catches and measurement was made on the body length and weight, at the same time, observation was made on the sexual gonad and the stomach contents.

Estimating of the exact tendency was prevented because of few samples, however, it was

confirmed that the body length ranged from 29 to 55 cm in skipjack, from 32 to 60 cm in yellowfin, and, was at the level of 29 cm in bonito, and at 38 cm level in yellowfin. Weight of catches ranged from 0.4 to 3.2 kg in skipjack, from 0.6 to 3.7 kg in yellowfin, and was at the 0.4 kg level in bonito. Catches were of small size on the whole, whose sexual gonad was immature.

There were no contents in many stomachs of skipjack and bonito, and some yellowfin had preyed upon mysid and Carangidae sp.

Figures 12 and 13 show the distribution of body length and the relationship of body length and weight, respectively. Also, Annex Table 5 indicates the measuring of fish body.

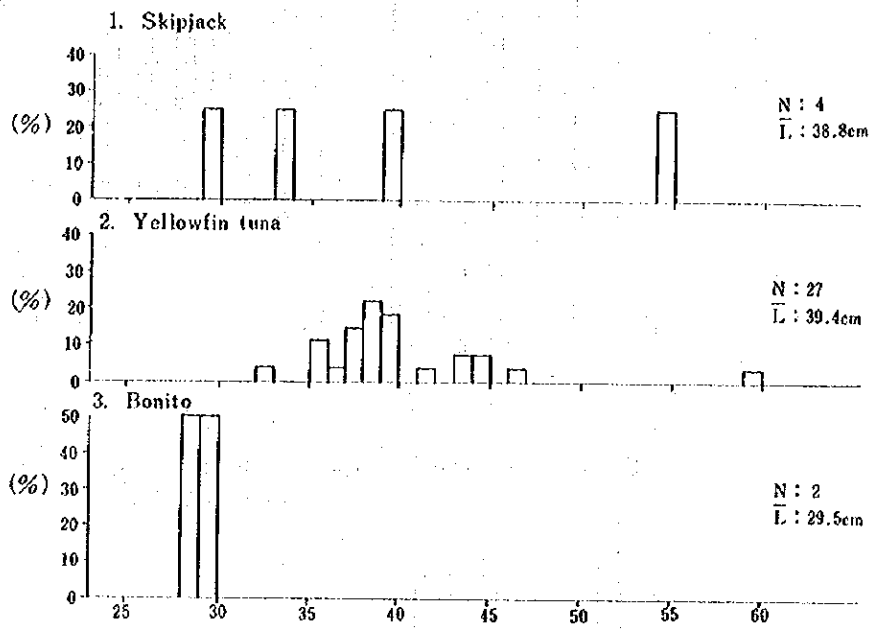



Fig. 12 Body Length Distribution (Leyte Gulf Area)

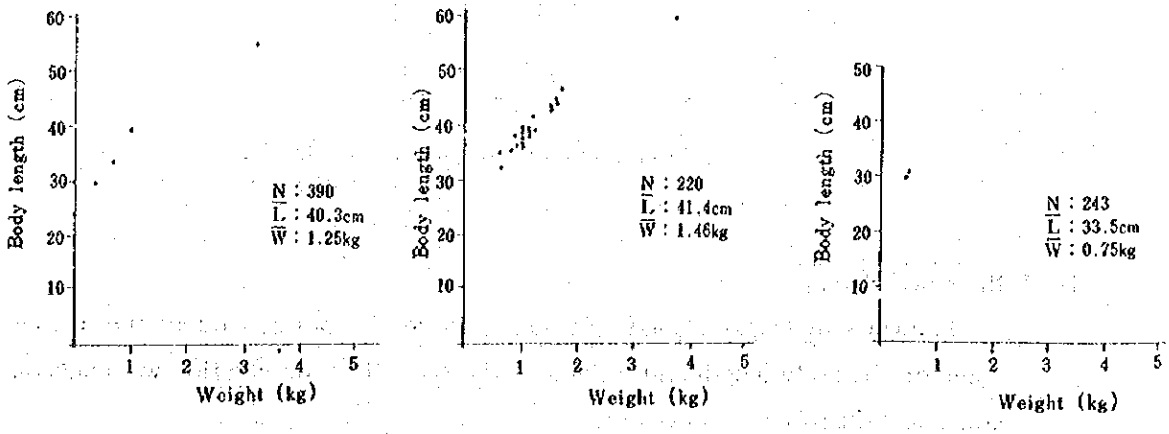



Fig. 13 Relationship of Body Length and Weight

## 1-2 Survey on Bait Fishes

### 1-2-1 Environment of Fishing Ground

Survey on bait fishes in the area of Leyte Gulf was made mostly in the reef area around off Guiuan and the coastal waters in Leyte Gulf. Weather at operations had frequency of fine but cloudy.

On the other hand, as the survey period corresponded to be the rainy season of this area, frequent rainfalls were encountered.

Also, as this area is affected by the northeasterly monsoon, the northeasterly wind of 2 to 4 in force were recorded, and the strong wind of more than 3 in force prevented the vessel from operating.

Surface water temperature ranged from 25 to 28°C and the average water temperature showed the 27°C level.

Transparency of 7 to 14 m was measured and, after a rainfall, a low transparency was observed due to the inflow of land water.

Table 7 indicates the observed value of weather, wind direction and force, and surface water temperature at the time of baitfish fishing in Leyte Gulf.

Table 7 Environmental Conditions of Bait Fishing Ground (Leyte Gulf Area)

1. Weather

| Month / Weather | December | |
|---|---|---|
| b c | 9 day | 6 5 % |
| c | 1 | 7 |
| o | 2 | 1 4 |
| r | 2 | 1 4 |
| Total | 1 4 | |

2. Water surface temperature

| Water Temperature | December | |
|---|---|---|
| 25.6 (C) ~ 26.0 | 1 days | 7 % |
| 26.1 ~ 26.5 | | |
| 26.6 ~ 27.0 | 2 | 1 4 |
| 27.1 ~ 27.5 | 7 | 5 0 |
| 27.6 ~ 28.0 | 2 | 1 4 |
| 28.1 ~ 28.5 | 2 | 1 4 |
| Total | 1 4 | |

3. Wind direction

| Month / Wind direction | December | |
|---|---|---|
| N | 1 | 7 |
| NNE | 3 | 2 1 |
| NE | 4 | 2 9 |
| ENE | 4 | 2 9 |
| E | | |
| ESE | 1 | 7 |
| Calm | 1 | 7 |
| Total | 1 4 | |

4. Wind force

| Month / Wind force | December | |
|---|---|---|
| Calm | 1 | 7 |
| 1 | | |
| 2 | 6 | 4 3 |
| 3 | 4 | 2 9 |
| 4 | 3 | 2 1 |
| Total | 1 4 | |

### 1-2-2 Fishing Operation and Catch

Figure 14, Tables 8 and 9, respectively show the catching position of bait fishes in the area of Leyte Gulf, the result of fishing operation and catch and the result of bait fishing by fishing grounds.

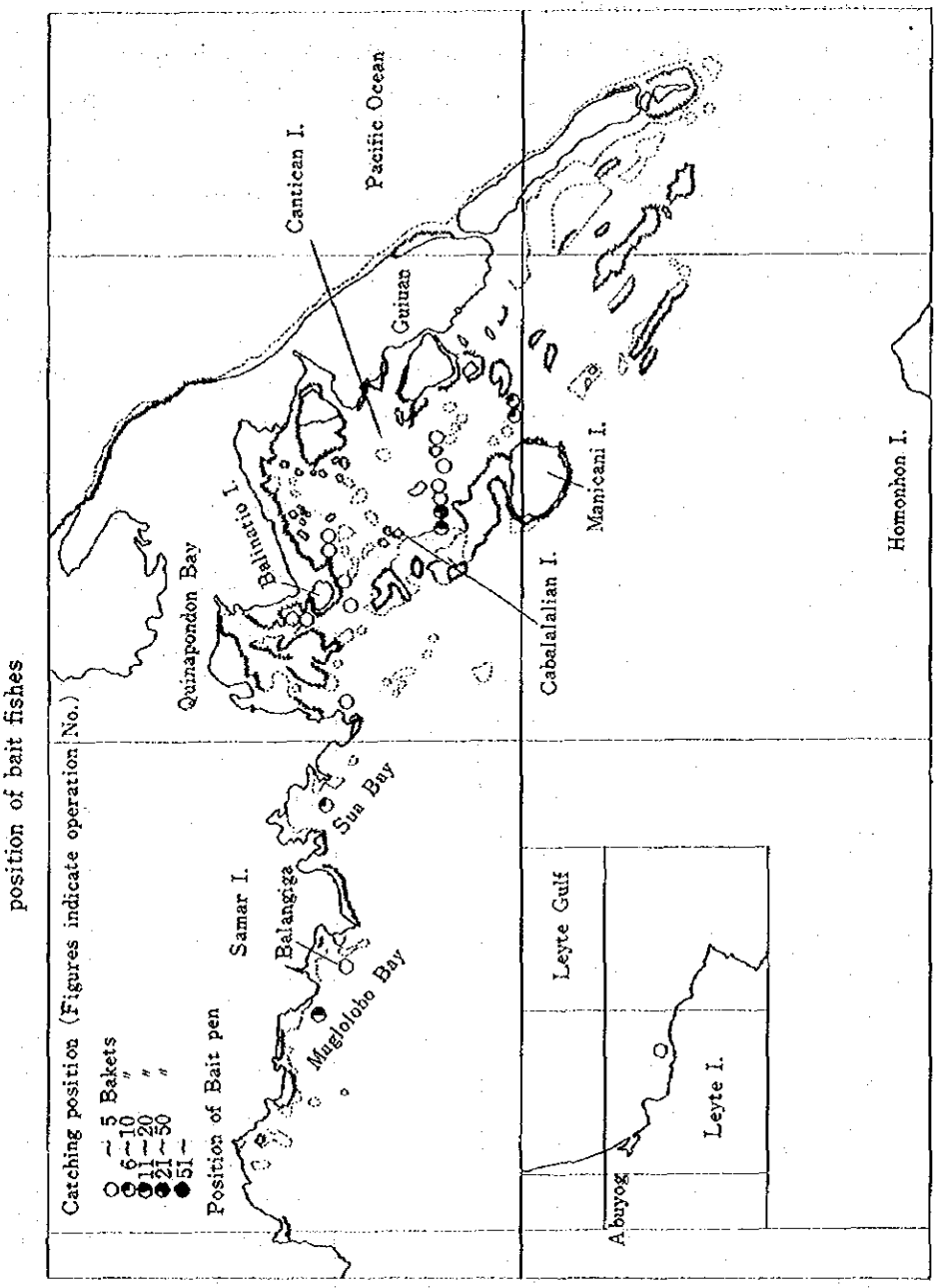



Fig. 14 Catching Position of Bait Fishes (Leyte Gulf Area)

Table 8 Result of Bait Fishing Operation and Catch (Leyte Gulf Area)

| Month | | December | |
|---|---|---|---|
| Number of days staying in fishing ground (A) | | 17 | days |
| Number of days on effective operation (B) | | 14 | days |
| Number of operation (C) | | 20 | times |
| Effective ratio of operation (B/A) | | 82.4 | % |
| Number of operation per operation day (C/B) | | 1.4 | times |
| Catch by species | Engraulidae | 16.48Bkts | 13.8% |
| | Dussumieriidae | 39.97 | 33.4 |
| | Atherinidae | 17.65 | 14.7 |
| | Clupeidae | 42.70 | 35.6 |
| | Caesionidae | — | — |
| | Carangidae | 2.30 | 1.9 |
| | Siganidae | — | — |
| | others | 0.70 | 0.6 |
| | Total (E) | 119.80 | 100 |
| Catch per one day operation (E/B) | | 8.56 | |
| Catch per one operation (E/C) | | 5.99 | |
| Remarks | | | |

Note : No bait fishing operation in the Leyte Gulf in January

Main fishing ground was the waters in the reef area off Guiuan.

By different sites, as shown in Figure 15, the catch in the waters off Cabalarian Island was prevailed.

In the 17 days stay at fishing grounds, including 14 days of operations and 20 times of operations, total catch of 119.8 basketfuls and some 6 basketfuls of average catch per operation were recorded.

Out of the catches, Sardinella sp., Spratelloides delicaturus (Bennett) and S. japonicus (Houttuyn) accounted for a major part in the distribution of species, followed by the order of Atherinidae sp. and Engraulidae sp. (most of Stolephorus heterolobus Ruppell) and others.

Figure 16 shows the composition of bait fishes by fishing grounds.

Table. 9 Resuet of Bait Fishing by Fishing Grounds (Leyte Gulf Area)

| Location | | Caninoan Is. | | Balinatio Is. | | Quinapondan Bay | | Cabalarian Is. | |
|---|---|---|---|---|---|---|---|---|---|
| Distance from shore | | 0.35～ 1.4 | | 0.45～ 1.0 | | 0.4 ～ 0.6 | | 0.35 | |
| Depth | | 23 | | 29～34 | | 23, 36 | | 25 | |
| Sea bottom | | S | | S | | S, M | | S | |
| Transparency | | 10 | | 12～13 | | 11, 13 | | 12, 13 | |
| Water surface temperature | | 26.9 ～27.6 | | 27.7 ～28.1 | | 27.2 ～27.7 | | 25.8 ～27.5 | |
| Catch by species (Bkt) | Engraulidae | Bkts 1.75 | % 50.0 | Bkts 0.80 | % 7.0 | Bkts 0.53 | % 6.4 | Bkts 2.20 | % 4.5 |
| | Dussmieriidae | | | 10.20 | 88.7 | 4.57 | 55.1 | 3.80 | 7.8 |
| | Athierinidae | 1.75 | 50.0 | | | 3.00 | 36.1 | 0.30 | 0.6 |
| | Clupeidae | | | 0.50 | 4.4 | | | 40.40 | 82.5 |
| | Caesiodae | | | | | | | | |
| | Caragidae | | | | | | | 2.30 | 4.7 |
| | Siganidae | | | | | | | | |
| | others | | | | | 0.20 | 2.4 | | |
| | Total | 3.5 | | 11.5 | | 8.3 | | 49.0 | |
| Number of days on operation (Times) | | 1.5 | | 2.5 | | 2.5 | | 2 | |
| Catch per operation (Bkts) | | 2.33 | | 4.60 | | 3.32 | | 24.50 | |
| Number of operation (Times) | | 2 | | 4 | | 3 | | 4 | |
| Catch per one operation (Bkts) | | 1.75 | | 2.88 | | 2.76 | | 12.25 | |
| Remarks | | | | | | | | | |

(Leyte Gulf Area)

| Sua Bay | | Maglolobo Bay | | Balangiga Bay | | Abuyog | | Manicani Is. | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.65 | | 0.3 | | 0.8 | | 0.3 | | 1.3～1.4 | | 0.3～1.4′ | |
| 30 | | 31 | | 23.5 | | 23 | | 27.5～28 | | 23～36 | |
| M | | M | | M | | M | | S | | S, M | |
| 14 | | 11 | | 7 | | 10 | | 12 | | 7～14 | |
| 26.8 | | 27.1 | | 26.9 | | 27.2 | | 27.2～27.4 | | 25.8～28.1 | |
| Bkts | % | Bkts | % | Bkts | % | Bkts | % | Bkts | % | Bkts | % |
| 5.00 | 90.9 | 5.40 | 30.0 | 0.40 | 10.0 | | | 1.40 | 7.8 | 17.48 | 14.6 |
| | | 10.80 | 60.0 | 3.60 | 90.0 | 2.00 | 100 | 4.00 | 22.2 | 38.97 | 32.5 |
| | | | | | | | | 12.60 | 70.0 | 17.65 | 14.7 |
| | | 1.80 | 10.0 | | | | | | | 42.70 | 35.6 |
| | | | | | | | | | | | |
| | | | | | | | | | | 2.30 | 1.9 |
| | | | | | | | | | | | |
| 0.50 | 9.1 | | | | | | | | | 0.70 | 0.6 |
| 5.5 | | 18.0 | | 4.0 | | 2.0 | | 18.0 | | 119.80 | |
| 0.5 | | 1 | | 1 | | 0.5 | | 2.5 | | 14 | |
| 11.00 | | 18.00 | | 4.00 | | 4.00 | | 7.20 | | 8.56 | |
| 1 | | 1 | | 1 | | 1 | | 3 | | 20 | |
| 5.50 | | 18.00 | | 4.00 | | 2.00 | | 6.00 | | 5.99 | |

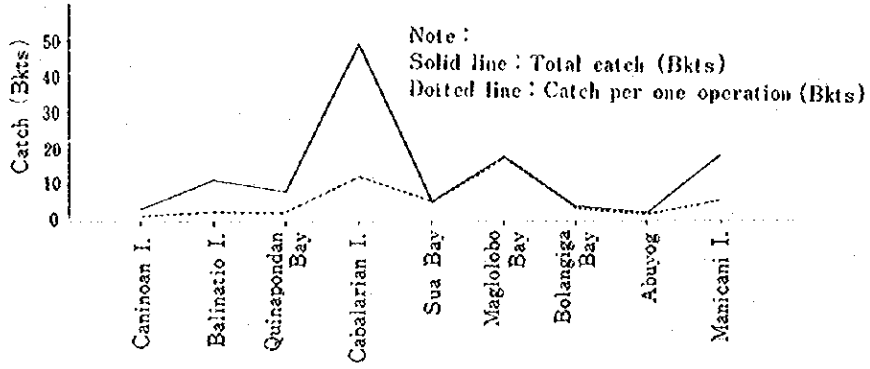



Fig. 15 Catch of Bait Fishes by Fishing Grounds(Leyte Gulf Area)

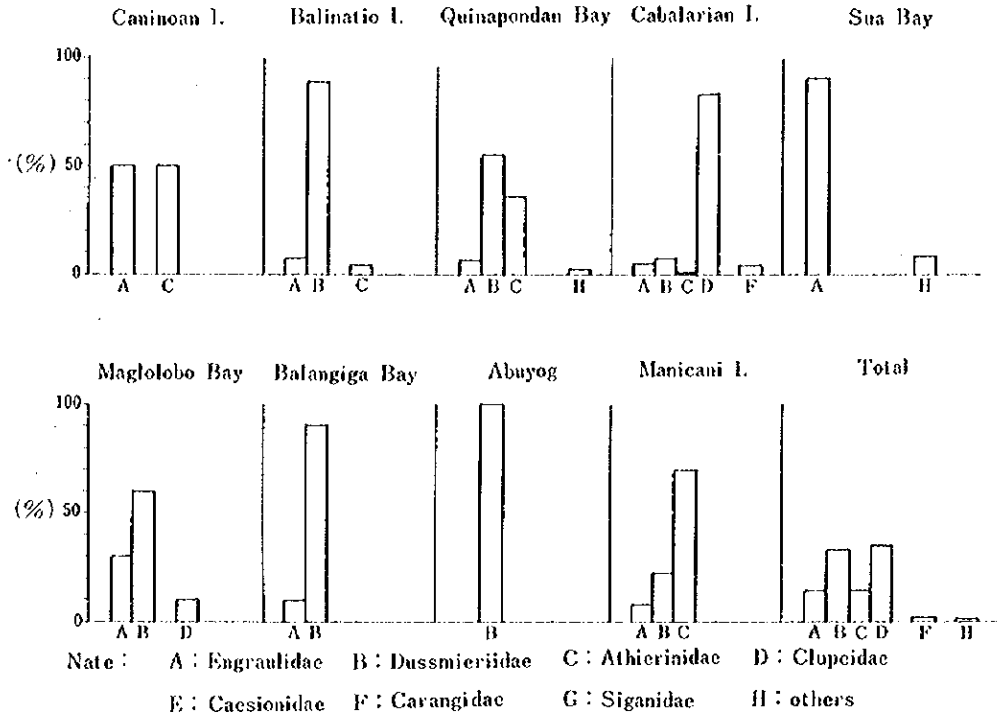



Fig. 16 Catch Composition of Bait Fishes by Fishing Grounds (Leyte Gulf Area)

### 1-2-3 Biological Survey

Figure 17 shows the distribution of body length of bait fishes by species.

1) Clupeidae

Out of Clupeidae, Sardinella sp. were caught most; Harengula sp. with others were caught a little; and the body length of Sardinella sp. ranged from 70 to 145 mm.

2) Dussumieriidae

Out of Dissumieriidae, Spratelloides delicaturus (Bennett) and S. japonicus (Houttuyn) were caught; the body length ranged from 30 to 70 mm (50 mm in mode) and from 25 to 70 mm (30 mm in mode) in the former and the latter, respectively; and the fry (white-

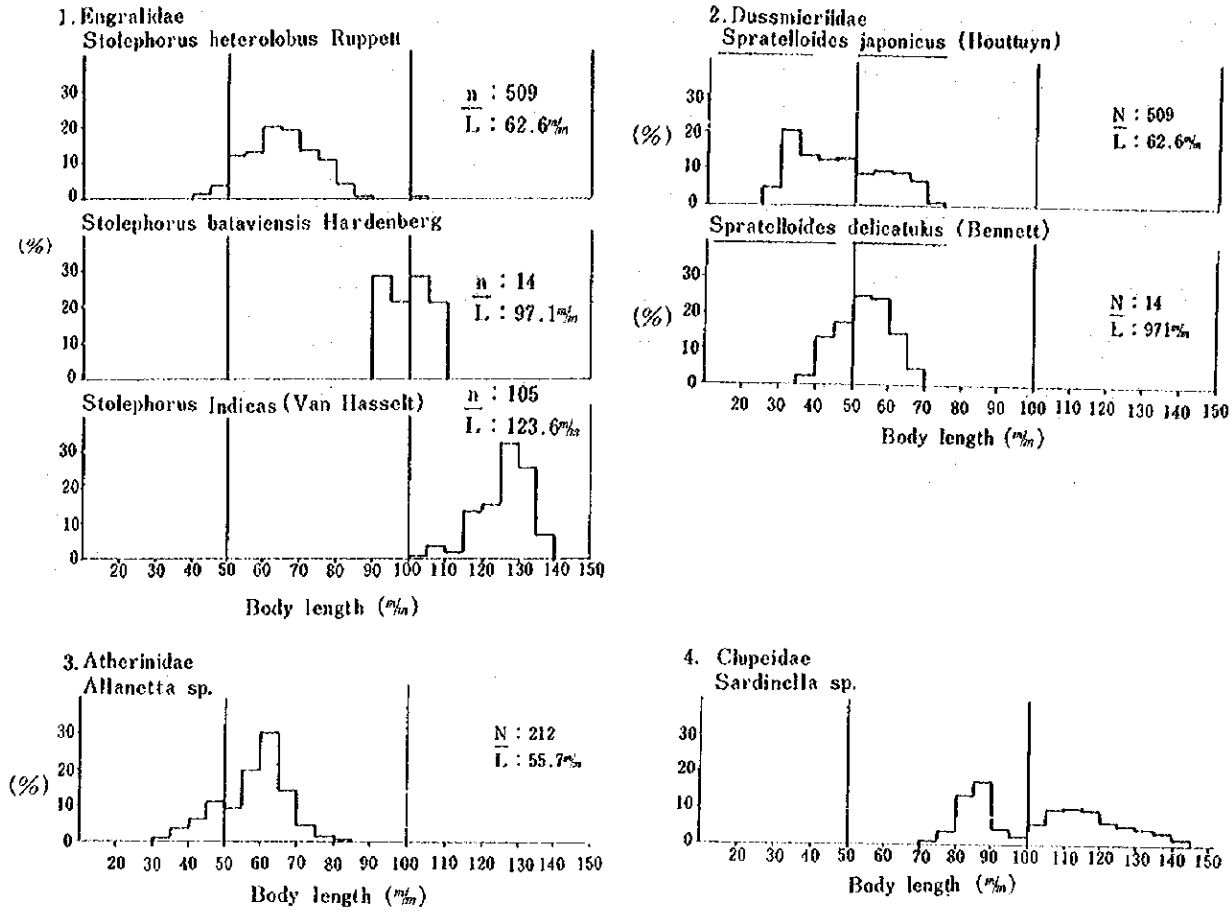



Fig. 17 Body Length Distribution (Leyte Gulf Area)

bait) were numerous on the whole.

Also, Dissumieria hasseltii Bleeker were found a little in catch.

3) Atherinidae

Out of Atherinidae, Allanetta sp., Pranesus pinguis (Lacepede) and Stenotherina temmincki (Bleeker), that were all accompanying fishes, were caught and the body length ranged from 30 to 85 mm.

4) Engraulidae

Out of Engraulidae, the following species were caught: Stolephorus heterolobus (Ruppell) as nucleus, S. indicas (Van Hassett) and S. bataviensis (Handenberg) were all accompanying fishes; the body length ranged from 40 to 110 mm in the first species, from 100 to 140 mm in the second and from 90 to 110 mm in the third; and it is characteristic that a lot of fry (whitebait) were caught in Stolephorus heterolobus (Rupell).

5) Others

Besides, a number of Selar crumenophthalmus (Bloch) belonging to Carangidae and a number of Rastrelliger kanagurta (Cuvier) belonging to Scombridae were caught a little.

### 1-2-4 Keeping Test of Bait Fishes

Table 10 and Figure 18 show the recording on keeping test of bait fishes in the area of Leyte Gulf and the site of bait pen established.

Table 10-- 1 Record of the Keeping Test of Bait Fishes (Leyte Gulf Area)

| Operation No. | Stick-held dip net fishing operation No.1~16 |
|---|---|
| Fishing ground | Leyte Gulf, Guiuan |
| Date of catching | Dec. 14~18, 1976 |
| Site of keeping test | 11° --05' 3N (South west off 125° -34, 2E Bali- natio Id.) |
| Distance from shore | 963m, 34m |
| Size of bait pen, Number | 4m×8 1 set |
| Date transferred to vessel | Dec. 18, 1976 |

Quantity of bait fishes for keeping test

| Species | Quantity | % | Remarks |
|---|---|---|---|
| DU | 11.7 Bkts | 93.6% | 1 Bkt =about 3kg |
| EN | 0.5 | 4.0 | |
| CL | 0.3 | 2.4 | |
| Total | 12.5 | | |

| Date | Hour | Remarks | Received | Died | Survived | Species | Water temp. |
|---|---|---|---|---|---|---|---|
| | | | Bkts | Bkts | Bkts | | ℃ |
| Dec. 14, 1976 | | Stick-held dip net fishing operation | 1.0 | — | 1.0 | DU | |
| 15 | | No. 1 | 4.0 | — | 5.0 | DU, CL, EN | |
| 〃 | 12 : 15 | 〃 No. 2, 3 No.1 Observation | — | 1.1 | 3.9 | DU escaped through the mesh | 28.7 |
| 16 | | Fishing operation No. 4 | 7.0 | — | 10.9 | DU, CL, EN | |
| 〃 | 13 : 30 | No. 2 Observation | — | 4.3 | 6.6 | DU | 30.7 |
| 17 | | Fishing operation No. 5, 6 | 0.5 | — | 7.1 | DU | |
| 〃 | 12 : 20 | No. 3 Observation | — | 6.1 | 1.0 | DU | |
| 18 | 10 : 40 | Finished observation, Transferred the bait fishes into the live bait well on board the survey vessel. | 12.5 | 11.5 | 1.0 | Survived fishes; EN about 38% DU 33〃 CL 19 Others 10〃 | |

Notes: 1) S.japonicus (Houtuyn) escaped through the meshes of bait pen because of their small body (30mm in average length) or fell dead.
2) Since the tidal current was rather rapid around the bait pen and it was difficult to secure the keeping material due to few catch in the neighborhood, the bait pens were transferred

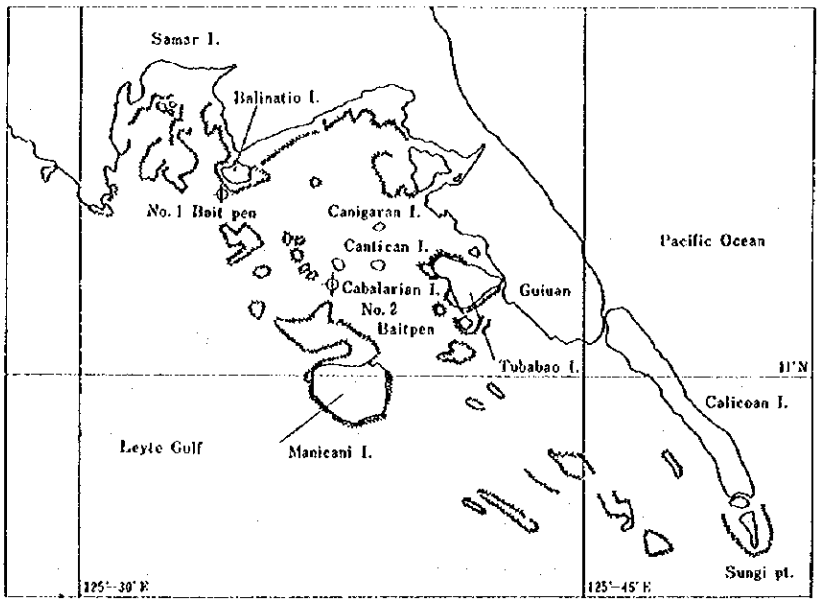



Fig. 18 Site of Bait Pen (Leyte Gulf Area)

Major fishing ground of bait fishes in the Guiuan area in the period of survey being taken into consideration, bait pen were set up near Balinatio Island.

Keeping test of bait fishes were carried out there from 14 December, 1976. During the baitfish keeping for 6 days, about 10 per cent only survived out of bait fishes charged to the bait pen. This is chiefly because (i) some amount of bait fishes escaped through the meshes of bait pen due to the small size in body length of Spratelloides japonicus (Houttuyn) and (ii) passing away of bait fishes charged died because of difficulty for the bait pen to maintain its

Table 10－2 Record on Keeping Test of Bait Fishes (Leyte Gulf Area)

| | |
|---|---|
| Operation No. | Stick-held dip net fishing operation No. 7～14 |
| Fishing ground | Leyte Gulf. Guiuan |
| Date of catching | Dec. 19～24, 1976 |
| Site of keeping test | 11°－02.3N West coast of 125°－37.5E Cabalarian Is. |
| Distance from shore Depth | 182m, 19m |
| Size of bait pen, Number | 4m×8 1set |
| Date transferred to vessel | 5 Dec. 29, 1976 |

Quantity of bait fishes for keeping test

| Species | Quantity Bkts | % | Remarks |
|---|---|---|---|
| Clupeidae(CL) | 43.5 | 66.5% | 1 Bkts about : 3kg |
| Dussumieriidae(DU) | 11.5 | 17.6 | |
| Engraulidae(EN) | 8.6 | 13.1 | |
| Atherinidae(AT) | 1.4 | 2.1 | |
| Others | 0.5 | 0.7 | |
| Total | 65.5 | 100 | |

| Date | Hour | Remarks | Received Bkts | Died Bkts | Survived Bkts | Species | Water temp. ℃ |
|---|---|---|---|---|---|---|---|
| Dec. 19. '76 | | Received from No. 1 bait pen | 1.0 | — | 1.0 | | |
| 〃 | | No. 7, 8, 9 on fishing operation | 50.0 | — | 51.0 | CL, DU, EN, others | |
| 20 | 10:00 | No. 1 observation | — | 20.4 | 30.6 | Died : CL | 27.8 |
| 21 | | No. 10, 11, 12 fishing operation | 7.5 | — | 38.1 | EN, DU | |
| 〃 | 08:55 | No. 2 observation | — | 6.6 | 31.5 | Died : CL, EN | 28.2 |
| 22 | | No. 13 fishing operation | 2.0 | — | 33.5 | AT, DU | |
| 〃 | 09:30 | No. 3 observation | — | 5.3 | 28.2 | Died : EN | 27.8 |
| 23 | 09:30 | No. 4 〃 | — | 10.1 | 18.1 | Died : CL, DU, EN | 27.6 |
| 24 | | No. 14 fishing operation (Finished charging bait fait fihes) | 5.0 | — | 23.1 | DU, EN, CL | |
| 〃 | 09:30 | No. 5 observation | — | 0.6 | 22.5 | Died : EN, DU | 27.8 |
| 25 | 09:20 | No. 6 〃 | — | 1.5 | 21.0 | Died : CL, EN | 27.8 |
| 26 | 09:50 | No. 7 〃 | — | 1.0 | 20.0 | Died : DU | 28.0 |
| 27 | 10:50 | No. 8 〃 | — | 0.5 | 19.5 | Died : EN, CL, (50% each) | 28.2 |
| 28 | 10:15 | No. 9 〃 | — | 0.5 | 19.0 | Died : CL (100%) | 27.5 |
| 29 | 09:00 | No. 10 〃 (Finished observation) | | 0.3 | 18.7 | Died : EN. | |
| 〃 | 13:00 | Transferred bait fishes to live bait well on board | | | | | |
| Total | | | 65.5 | 46.8 | 18.7 | | |

normal net behavior due to a somewhat rapid tidal currents around the bait pen site.

After that, the bait pen being transferred to off Cabalarian Island, the keeping test of bait fishes were continued. During the period for this test for which bait fishes were continuingly supplied into the bait pen the following were observed: (i) throughout all the species, a lot of bait fishes died within a whole day and night after they were charged (ii) a majority of Stolephorus heterolobus (Ruppell) charged fell dead in a week or so and (iii) some amount of fry of Spratelloides japonicus (Houttuyn), etc. was preyed upon by Rastrelliger hanagurta (Cuvier) chumming into the bait pen. A week or so after termination of bait fish supply, their survival rate showed about 80 per cent. The perseverance against keeping was confirmed mainly of sardinella sp. and Spratelloides delicaturus (Bennett).

Also, against the feed (assorted feed for bait fishes of skipjack) given during the keeping of bait fishes, the response of bait fishes in feed intake was confirmed from about three or four days after their charging. Afterwards, their active intake of feed was gradually sighted.

Both the keeping test of bait fishes in bait pen and in live bait well on board were carried out at the same time. Spratelloides japonicus (Houttuyn), Spratelloides delicaturus (Bennett), Stolephorus heterolobus (Ruppell) and Harengula sp. that were all caught on 24 December, showed about 33 per cent in survival rate after 6 days or so. Afterwards, Sardinella sp., Atherinidae sp. and Spratelloides delicaturus (Bennett) that were all charged from the bait pen, showed about 37 per cent in survival rate 10 days after charging and 13 per cent 20 days after (low survival rate on the whole), however, after that, the passing away of bait fishes was not sighted. Bait fishes which died during this period seems to have been adversely affected by turbid sea water while the survey vessel was staying at the ports of Tacloban and Davao.

Table 11 shows the recording on keeping test of bait fishes in live bait wells on board the survey vessel.

Running parallel with the observation on the baitfish keeping in bait pen, the following factors inside and outside the bait pen were measured: the water temperature, hydrogen ion concentration, dissolved oxygen, electrical conductivity, turbidity and transparency.

Figure 19 shows the measurement results.

In the second half of period for keeping bait fishes, it became impossible to fill up measuring apparatuses. As a result, all the items were unable to be measured.

The bait pen were transferred on 18 December.

Measurement of above-mentioned factors was made in the sea water surface layers of both 2 m and 10 m outside bait pen as well as the 2 m sea water layer inside it.

1) Water temperature

Water temperature varied in the range of 27 to 31°C, showing generally those suitable for bait fishes. While water temperature largely varied at the site of first bait pen established likely due to the tidal current, they maintained stability on the whole at the site of second bait pen established, showing 28°C or so on the whole. In a tendency of the

Table 11 Record on Keeping Test of Bait Fishes

| | |
|---|---|
| Operation No. | Stick-held dip net fishing operation No. 14 |
| Fishing ground | Leyte Guef, Guiuan |
| Date of catching | Dec. 24, 1976 |
| Site of keeping test | No. 1 live bait well on board 3.26m³ |
| Capacity of live bait well | 3.26 m³ |
| Date transferred to vessel | Dec. 24, 1976 |

Quantity of bait fishes for keeping test

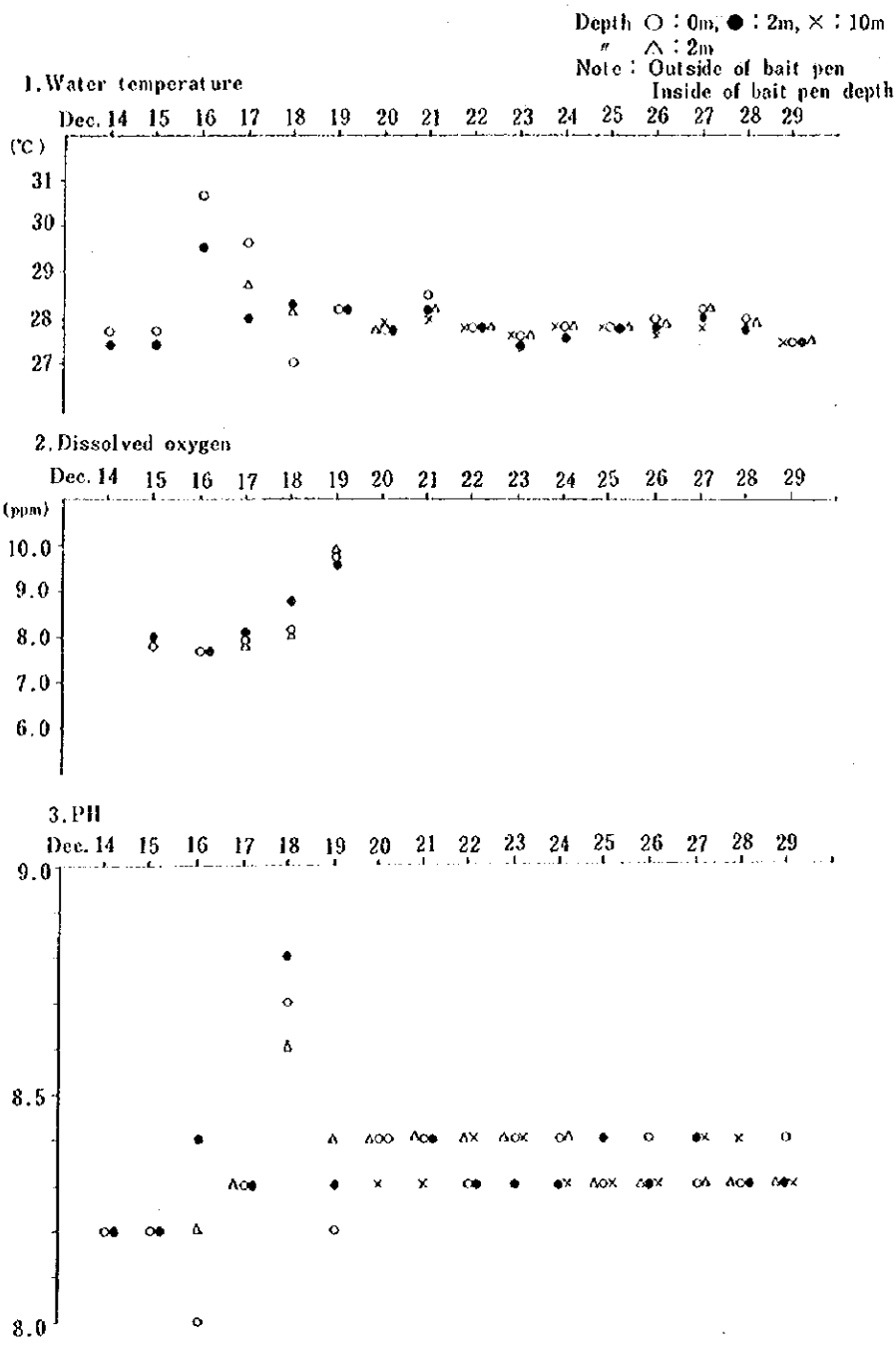
| Species | Quantity | % | Remarks |
|---|---|---|---|
| Dussumieriidae (DU) | 3.75Bkts | 16.7% | Bkts about; 3Kg |
| Engraulidae (EN) | 1.20 | 5.3 | |
| Clupeidae (CL) | 1.87 | 8.3 | |
| Atherinidae (AT) | 13.65 | 60.7 | |
| Others | 2.03 | 9.1 | |
| Total | 22.50 | | |

| Date | Hour | Remarks | Received | Died | Survived | Species | W. temp. |
|---|---|---|---|---|---|---|---|
| | | | Bkts | Bkts | Bkts | | ℃ |
| Dec. 24, '76 | 05:15 | No. 14 Fishing operation | 7.5 | — | 7.5 | Received : DU 70%, EN 20%, CL 10% | 27.1 |
| 〃 | 08:00 | No. 1 Observation | — | 0.5 | 7.0 | Died : EN, CL | 27.1 |
| 〃 | 16:00 | No. 2 〃 | — | 0.5 | 6.5 | Died : EN, DU | 27.0 |
| 25 | 08:00 | No. 3 〃 | — | 1.0 | 5.5 | Died : DU, EN, CL | 27.1 |
| 26 | 08:00 | No. 4 〃 | — | 1.0 | 4.5 | | 27.4 |
| 27 | 10:00 | No. 5 〃 | — | 1.0 | 3.5 | Died : EN | 27.5 |
| 28 | 08:00 | No. 6 〃 | — | 0.5 | 3.0 | Died : DU | 27.3 |
| 29 | 08:00 | No. 7 〃 | — | 0.5 | 2.5 | Ditto | 27.3 |
| 〃 | 13:00 | No. 8 〃 Received bait fishes from bait pen | 15.0 | 2.0 | 15.5 | Received : CL 86%, AT 7%, DU 3% | 27.3 |
| 30 | 12:00 | No. 9 Observation (Arr. Tacloban) | — | 2.5 | 13.0 | Died : DU, AT, CL | 28.3 |
| 31 | 08:00 | No. 10 〃 | — | 2.0 | 11.0 | Died : CL, DU (50% each) | 28.2 |
| Jan. 1, '77 | 12:00 | No. 11 〃 | — | 2.0 | 9.0 | Died : CL, DU, AT | 28.4 |
| 2 | 12:00 | No. 12 〃 (Lve. Tacloban) | — | 2.0 | 7.0 | Died : CL, DU (50% each) | 28.3 |
| 3 | 08:00 | No. 13 〃 | — | 0.5 | 6.5 | Died : CL | 28.2 |
| 4 | 08:00 | No. 14 〃 (Arr. Davao) | — | 0.5 | 6.0 | Died : CL, AT | 27.6 |
| 5 | 08:00 | No. 15 〃 | — | 0.3 | 5.7 | Died : CL | 26.9 |
| 6 | 08:00 | No. 16 〃 (Lve. Davao) | — | 0.2 | 5.5 | | 27.1 |
| 7 | 12:00 | No. 17 〃 | — | 0 | 5.5 | | 27.0 |
| 8 | 08:00 | No. 18 〃 | — | 0 | 5.5 | | 26.9 |
| 9 | 12:00 | No. 19 〃 (Arr. Davas) | — | 0 | 5.5 | | 26.8 |
| 10 | 08:00 | No. 20 〃 (Lve, Davao) | — | 0 | 5.5 | Survived : CL 45%, AT 40% DU 5%, others 10% | 26.4 |
| 11 | 08:00 | No. 21 〃 | — | 0.2 | 5.3 | Died : CL | 27.0 |
| 12 | 10:00 | No. 22 〃 | — | 0.5 | 4.8 | 〃 | 27.6 |
| 13 | 12:00 | No. 23 〃 | — | 0.5 | 4.3 | 〃 | 28.1 |
| 14 | 12:00 | No. 24 〃 | — | 0.5 | 3.8 | 〃 | 28.4 |
| 15 | 08:00 | No. 25 〃 | — | 0.5 | 3.3 | 〃 | 28.1 |
| 16 | 08:00 | No. 26 〃 | — | 0.3 | 3.0 | 〃 | 27.9 |
| 17 | 08:00 | No. 27 〃 | — | 0.5 | 2.5 | 〃 | 28.0 |
| 18 | 08:00 | No. 28 〃 | — | 0.5 | 2.0 | 〃 | 27.9 |
| 19 | 08:00 | No. 29 〃 | — | 0 | 2.0 | Survived : CL 20%, AT 30% DU 20%, others 20% | 27.9 |
| 20 | 08:00 | No. 30 〃 | — | 0 | 2.0 | | 27.9 |
| 21 | 08:00 | No. 31 〃 | — | 0 | 2.0 | | 28.0 |
| 22 | 12:00 | No. 32 〃 | — | 0 | 2.0 | | 28.1 |
| 23 | 08:00 | No. 33 〃 (Finished observation) | — | 0 | 2.0 | | 28.0 |
| Total | | | 22.5 | 20.5 | 2.0 | | |

comparison between each layer, water temperature were likely to be somewhat high in the surface layer, but there was not a great difference in temperature between this and the other layers.

2) Hydrogen ion concentration

Measured value of hydrogen ion concentration varied at the site of first bait pen; on the other hand, at the site of second bait pen maintained stability, not showing a great variation, i.e. pointing out a standard value of 8.3°C or so on the whole.



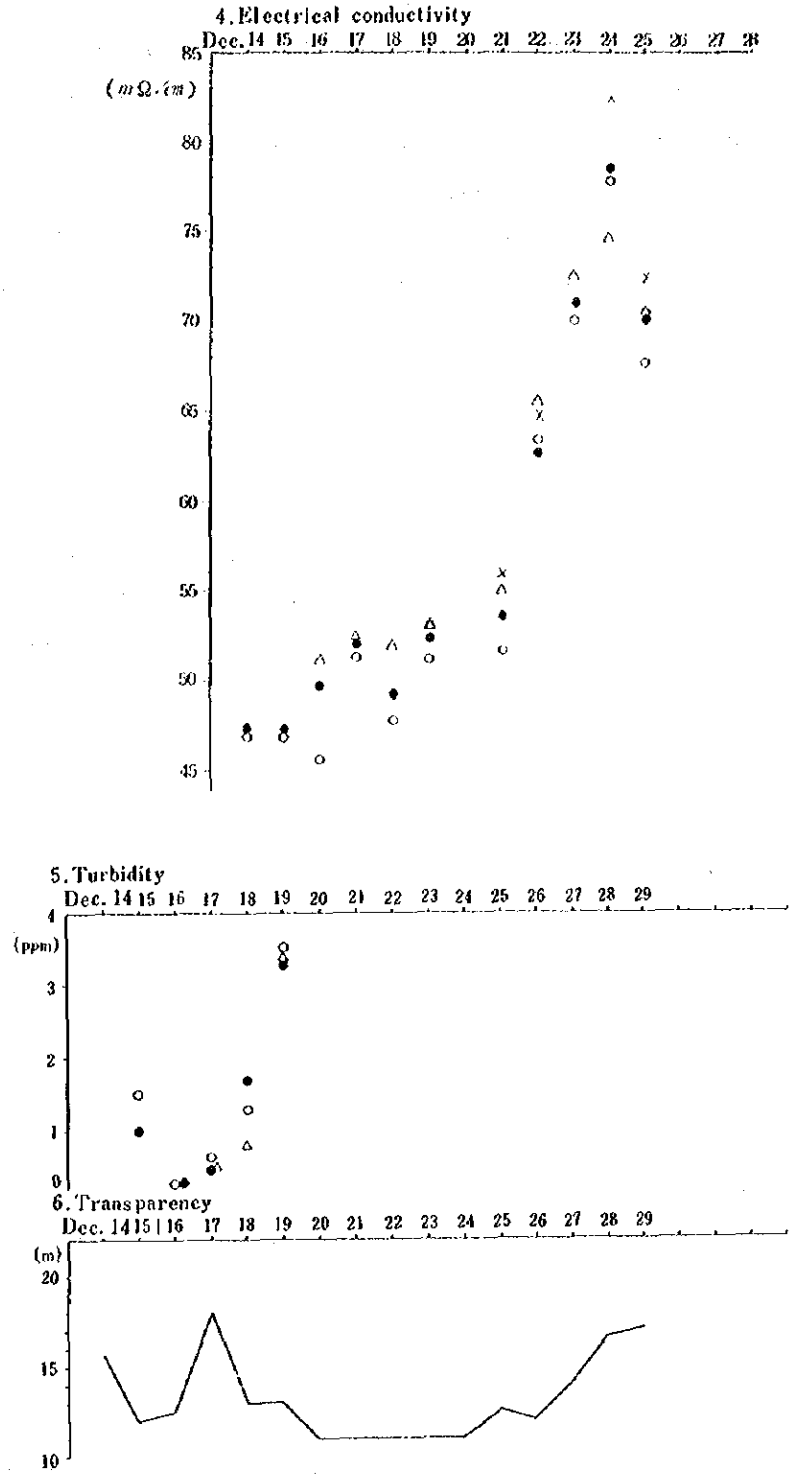



Fig. 19 Result of environmental survey of bait pen (Leyte Gulf Area)

3) Dissolved oxygen

Overall tendency in dissolved oxygen was not confirmed, because it became impossible to measure its amount after the establishment of the second bait pen.

4) Electrical conductivity

Electrical conductivity is largely affected by salinity and temperature. In this survey, the value of electrical conductivity subject to temperatures was not numerically analyzed, but the measurement was made for the tendency in salinity to be estimated indirectly by electrical conductivity.

Measured value varied in 45 to 83 mΩ/cm, showing clearly an influence of rainfalls. Its value, by depth, tended to be low (low salinity) in the surface layer and high (high salinity) in the bottom layer.

5) Turbidity

Turbidity measuring, too, became impossible after the setting up of the second bait pen. As a result, the overall tendency was not confirmed.

6) Transparency

Transparency value varied at the site of first bait pen set up, but it was rather low at the site of first bait pen set up in the first half of period, the influence of rainfalls being recognized, and it went on shifting rather high. Its influence on keeping of bait fishes were not overall recognized.

Overall conditions of the environment in bait pen were as the following: (i) as for the sea water in bait pen, there was a small difference in each factor between the surface and the lower layer and (ii) the sea water temperature in bait pen nearly indicated the intermediate value of respective ones in the surface and the 10 m layer outside the bait pen.

From the above conditions it is assumed that, the sea water in the bait pen stirred up with its upward and downward circulation caused by a movement of the sea water around the bait pen. This seemingly gave relief to the water quality variation in surface layer that resulted from the external factors such as the heavy rainfall and sunshine on the bait fishes charged, and most likely resulted in making up more stable of environmental conditions.

### 1-2-5 Aptitude of Bait Fish

Conditions necessary for fish species used as bait fish for skipjack pole-and-line fishing are as follows:

1) Inhabiting in abundance.
2) Catching is simply possible.
3) Size is proper. (about 5 ~ 10 cm in body length)
4) To have enough perseverance against the shock at catching, transporting and keeping in bait pen.
5) To have habits of making a crowding school, of not diving into depths, and of following the vessel at the time of bait scattering in skipjack fishing.

Major species as bait fish caught in the area of Leyte Gulf were as follows:

1) Clupeidae

Out of Clupeidae sp., a number of Sardinella sp. and a little of Harengla sp. accompanying were caught.

There were a number of Sardinella sp. of more than 100 mm in size, out of which some were somewhat too large as bait fish. Nevertheless, this species, actively moved in concentration, showed a strong perseverane against the keeping as bait fish.

2) Dussumieriidae

Although Spratelloides delicatulus (Bennett) and the fry of S. japonicus (Houttuyn) were caught out of Dussumieriidae, as there were lots of fry in S. japonicus (Houttuyn), there were lots of S. japonicus (Houttuyn) died earlier than expected, and, some escaped through the meshes of bait pen. Also, some bait fishes in bait pen were preyed upon by the fishes of large size such as Rastrelliger kanagurta (Cuvier) and Atherinidae sp. Scales of S. japonicus (Houttuyn) are apt to fall off, but, as regards both of these species and Spratelloides delicatulus (Bennett), these grown-up fish can be anticipated as bait fish.

3) Atherinidae

Allanetta sp. and Pranesus pinguis (Lacepede) were caught out of Atherinidae. Size of these species were suitable for bait fishes, and they had a few of cases in their damage resulting from their hard scales, strong perseverance against keeping and they did not dive into depths, although they swam actively.

On the other hand, these species were likely to run away and were not facile to be attracted; also, these fishes became a natural enemy when chummed in bait pen with other small size of fishes.

4) Engraulidae

Out of Engraulidae, Stolephorus heterolobus (Ruppell) were caught the most with a catch of S. bataviensis (Hardenberg) and S. indicus (Van Hasselt).

Fry of Stolephorus heterolobus (Ruppell) (whitebait) were numerous; and most of them died after their charging into bait pen. S. bataviensis (Hardenberg) were proper in size and had better perseverance against keeping, but they were poor in abundance. S. indicus (Van Hasselt) were somewhat large in size and fell dead at a high rate.

Species belonging to this family were overall high at death rate, because (i) they had weak scales and (ii) their body were likely to be injured at catching or transporting. Nevertheless, these species were good in a response to light and they had normally a tendency of being attracted toward light at around the time of day break, while they did not make up a large concentrated school.

Species as bait fish expected for in the area of Leyte Gulf were Sardinella sp., which were numerous in abundance and seemed to be most possible for use, followed by Spratelloides delicatulus (Bennett). As regards Stolephorus heterolobus (Ruppell) and S. japonicus (Houttuyn) as well, the grown up one are anticipated for use.

## 2. Area of Davao Gulf

### 2-1 Survey on Skipjack

#### 2-1-1 Environment of Fishing Ground

Table 12 indicates the observed value of weather, wind direction and force, and surface water temperature in the area of Davao on survey days for skipjack.

Table 12 Environmental Conditions of Skipjack Fishing Ground (Davao Gulf Area)

1. Weather

| Month / Weather | January | | February | | March | | Total | |
|---|---|---|---|---|---|---|---|---|
| | days | % | days | % | days | % | days | % |
| b c | 11 | 65 | 8 | 36 | 5 | 45 | 24 | 48 |
| c | 4 | 24 | 6 | 28 | 3 | 27 | 13 | 26 |
| o | 2 | 11 | 8 | 36 | 2 | 18 | 12 | 24 |
| r | | | | | 1 | 9 | 1 | 2 |
| Total | 17 | | 22 | | 11 | | 50 | |

Note : By noon observation

2. Water surface temperature

| Month / Water temperature ℃ | January | | February | | March | | Total | |
|---|---|---|---|---|---|---|---|---|
| | days | % | days | % | days | % | days | % |
| 26.1 ~26.5 | | | 1 | 5 | | | 1 | 2 |
| 26.6 ~27.0 | | | | | | | | |
| 27.1 ~27.5 | 1 | 6 | 6 | 27 | 2 | 18 | 9 | 18 |
| 27.6 ~28.0 | 3 | 18 | 10 | 45 | 5 | 45 | 18 | 36 |
| 28.1 ~28.5 | 6 | 35 | 4 | 18 | 3 | 27 | 13 | 26 |
| 28.6 ~29.0 | 6 | 35 | 1 | 5 | 1 | 9 | 8 | 16 |
| 29.1 ~29.5 | 1 | 6 | | | | | 1 | 2 |
| 29.6 ~30.0 | | | | | | | | |
| Total | 17 | | 22 | | 11 | | 50 | |

3. Wind direction

| Month / Wind direction | January | | February | | March | | Total | |
|---|---|---|---|---|---|---|---|---|
| | days | % | days | % | days | % | days | % |
| Calm | 1 | 6 | | | | | 1 | 2 |
| N | 5 | 28 | 9 | 40 | 1 | 9 | 15 | 30 |
| NNE | 1 | 6 | 4 | 18 | 5 | 45 | 10 | 20 |
| NE | 2 | 12 | 4 | 18 | | | 6 | 12 |
| ENE | | | 2 | 9 | | | 2 | 4 |
| E | 2 | 12 | 1 | 5 | | | 3 | 6 |
| ESE | 1 | 6 | | | | | 1 | 2 |
| SE | | | | | | | | |
| SSE | | | 1 | 5 | | | 1 | 2 |
| S | | | | | | | | |
| SSW | 1 | 6 | | | | | 1 | 2 |
| SW | | | | | | | | |
| WSW | | | | | | | | |
| W | | | 1 | 5 | | | 1 | 2 |
| WNW | 1 | 6 | | | 2 | 18 | 3 | 6 |
| NW | 2 | 12 | | | 1 | 9 | 3 | 6 |
| NNW | 1 | 6 | | | 2 | 18 | 3 | 6 |
| Total | 17 | | 22 | | 11 | | 50 | |

4. Wind force

| Month / Wind force | January | | February | | March | | Total | |
|---|---|---|---|---|---|---|---|---|
| | days | % | days | % | days | % | days | % |
| Calm | 1 | 6 | | | 1 | 9 | 2 | 40 |
| 1 | 9 | 52 | 2 | 9 | | | 11 | 22 |
| 2 | 4 | 24 | 5 | 23 | 4 | 37 | 13 | 26 |
| 3 | 2 | 12 | 8 | 36 | 3 | 27 | 13 | 26 |
| 4 | 1 | 6 | 5 | 23 | 3 | 27 | 9 | 18 |
| 5 | | | | | | | | |
| 6 | | | 2 | 9 | | | 2 | 40 |
| Total | 17 | | 22 | | 11 | | 50 | |

As for the weather, fine but cloudy, cloudy and overcast, respectively accounted for about 50 per cent; and a few of rainy days. During the survey period, the northerly wind of 3 to 5 in force was observed outside Davao Gulf, chiefly affected by the passing through of discontinuity line. Because of this, the skipjack fishing operations were impeded to some

extent, nevertheless, there were overall many calm days inside the Gulf.

Surface water temperatures were at the level of 28°C in average, varying from 26 to 29°C. That is, the temperatures tended to be somewhat low for skipjack fishing grounds.

Figures 20 and 21 show respectively the observation stations in the area of Davao Gulf and the vertical distribution of water temperature by BT observation in the waters of the Pacific side and inside of Davao Gulf.

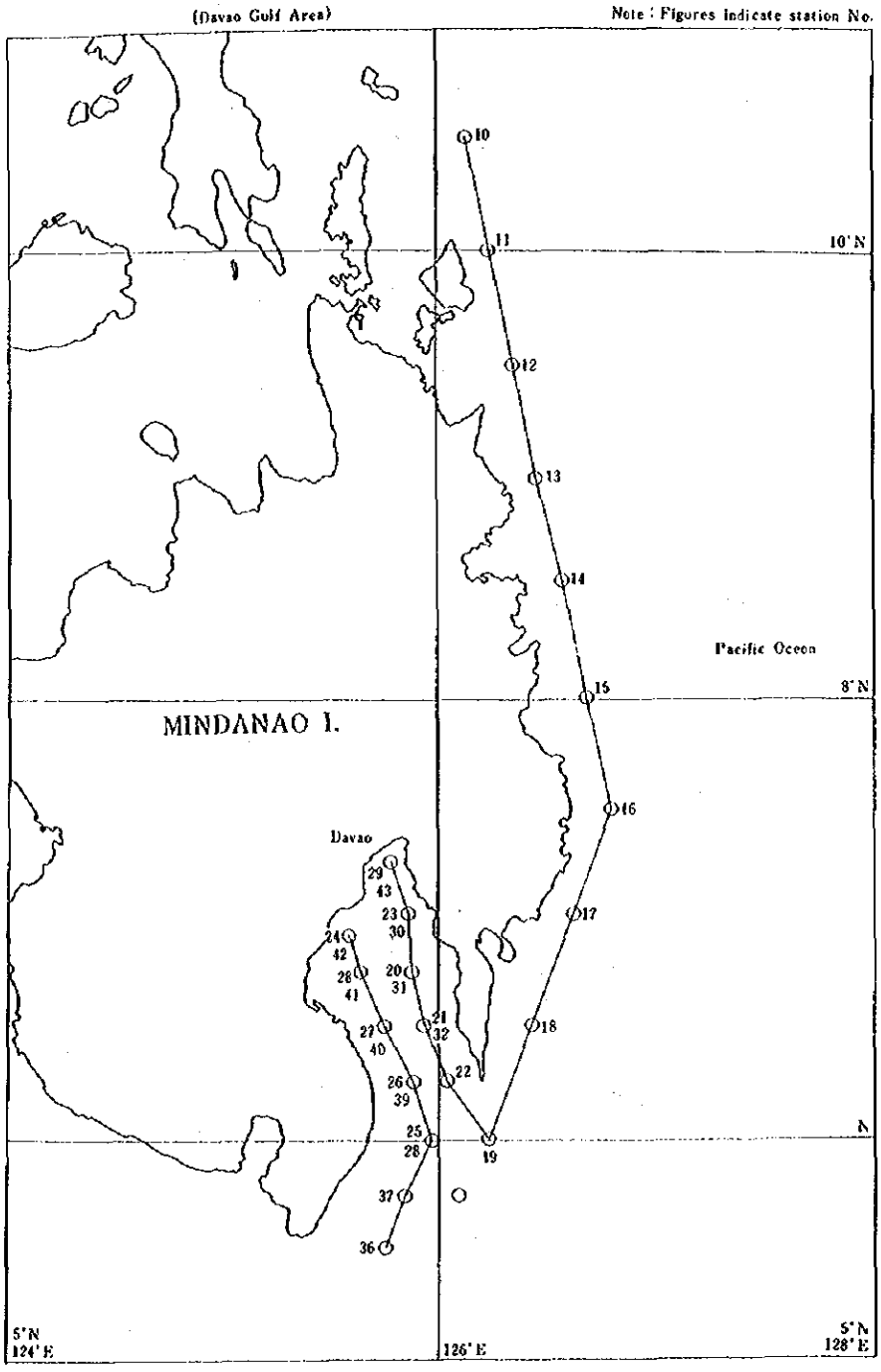
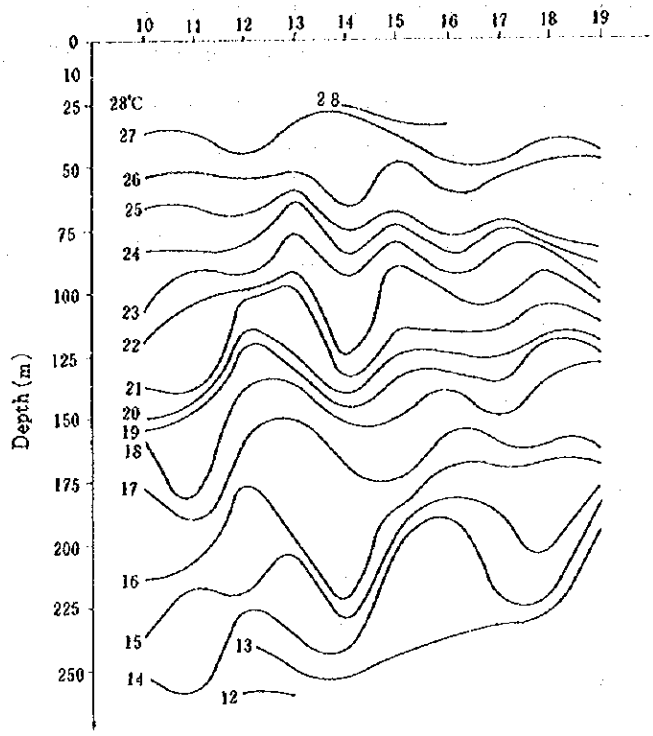
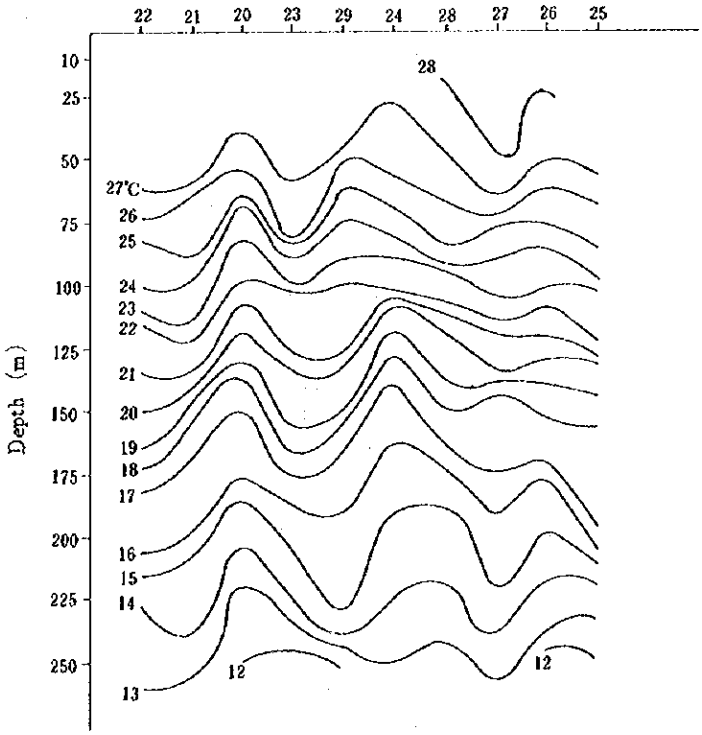



Fig. 20 Stations of Oceanographic Observation

1 . Pacific Ocean (Jan. 2~3, 1977)




St. No. 2. Davao Gulf (1) (Jan. 11~19, '77)



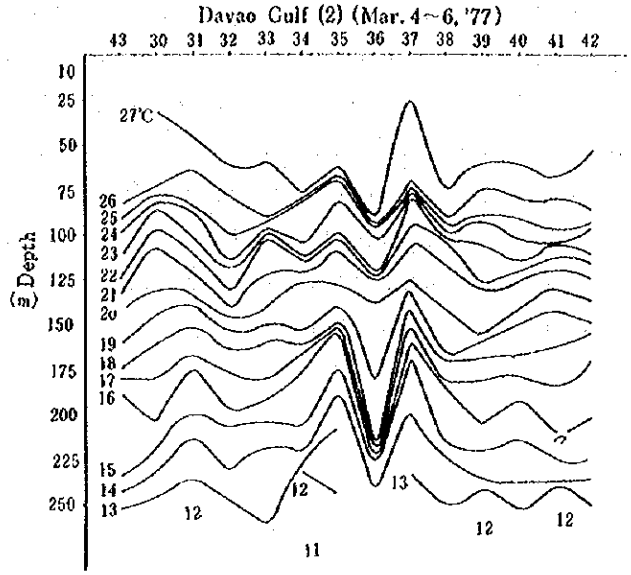



Fig. 21 Vertical Distribution of Water Temperature (Davao Gulf Area)

Although the thermocline in water temperature was not observed in January when survey was started to make in the area of Davao Gulf. However, at the observation made in March when the survey ended, the formation of water-temperature thermocline, though it was not distinct, was confirmed in the neighborhood of 70 to 100 m in depth in the offshore waters south of the entrance of Davao Gulf, and tendency was recognized that there might be the conditions of skipjack fishing grounds to be formed, under which fish schools float up.

Water color was observed as follows: (i) 2 to 4 in the coastal area inside and outside Davao Gulf, (ii) 1 to 2 in the offshore waters outside Davao Gulf and (iii) more than 4 in the coastal area of Davao Gulf which considered to have been affected by land water due to the rainfalls.

Transparency was observed as follows: (i) mostly 20 to 30 m and (ii) less than 20 m (comparatively low value) in the coastal area which considered to have been affected by land water.

This area corresponds to the area of Mindanao current (after branched off to south and north around Leyte Gulf from the end stream of the North Equatorial Current) running down southward along the east coast of Mindanao Island. In the offshore waters outside Davao Gulf, the SSW current of 2 or 3 knots was observed. Remarkable current rips with the said current and the coastal water was sighted around the offshore waters of about 10 sea miles off the coast.

### 2-1-2 Fishing Operation and Catch

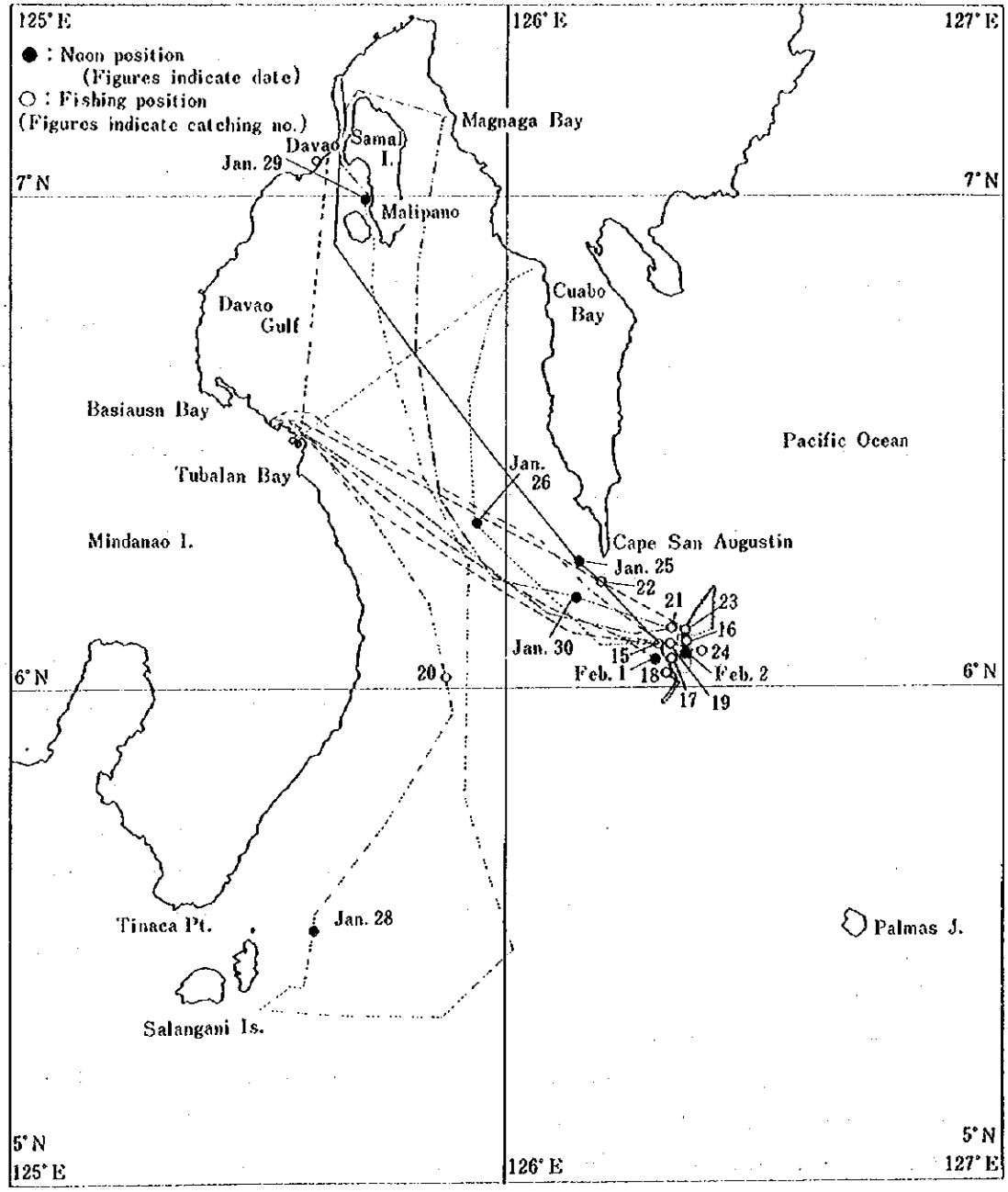
After the bait fishes as material of keeping tests were caught and charged in bait pen, the survey on skipjack in Davao Gulf was carried out on and after 25 January, 1977. In the 50 days of stay at fishing grounds, including 21 days of fishing operation, 71 schools of fish were

found out, and in the 63 times of effective operations, the following catches were obtained: 2,621.2 kg of skipjack, 832.3 kg of yellowfin, 641.7 kg of bonito and totalling of 4,095.2 kg.

Ocular observation for fish schools was carried out throughout the areas inside and outside Davao Gulf. In Davao Gulf, only a few of very small type of schools of bonito as nucleus were observed in the coastal area, and other schools hardly appeared there. This is why the fishing grounds were limited in the waters off the entrance of Davao Gulf.

Figure 22, Table 13 and Figure 23, respectively show the track chart on the skipjack survey in the area of Davao Gulf, the result of fishing operations and catches, and the catches by month.

(1) Jan. 25~Feb. 3. 1977



(2) (Feb. 4～10, 1977)

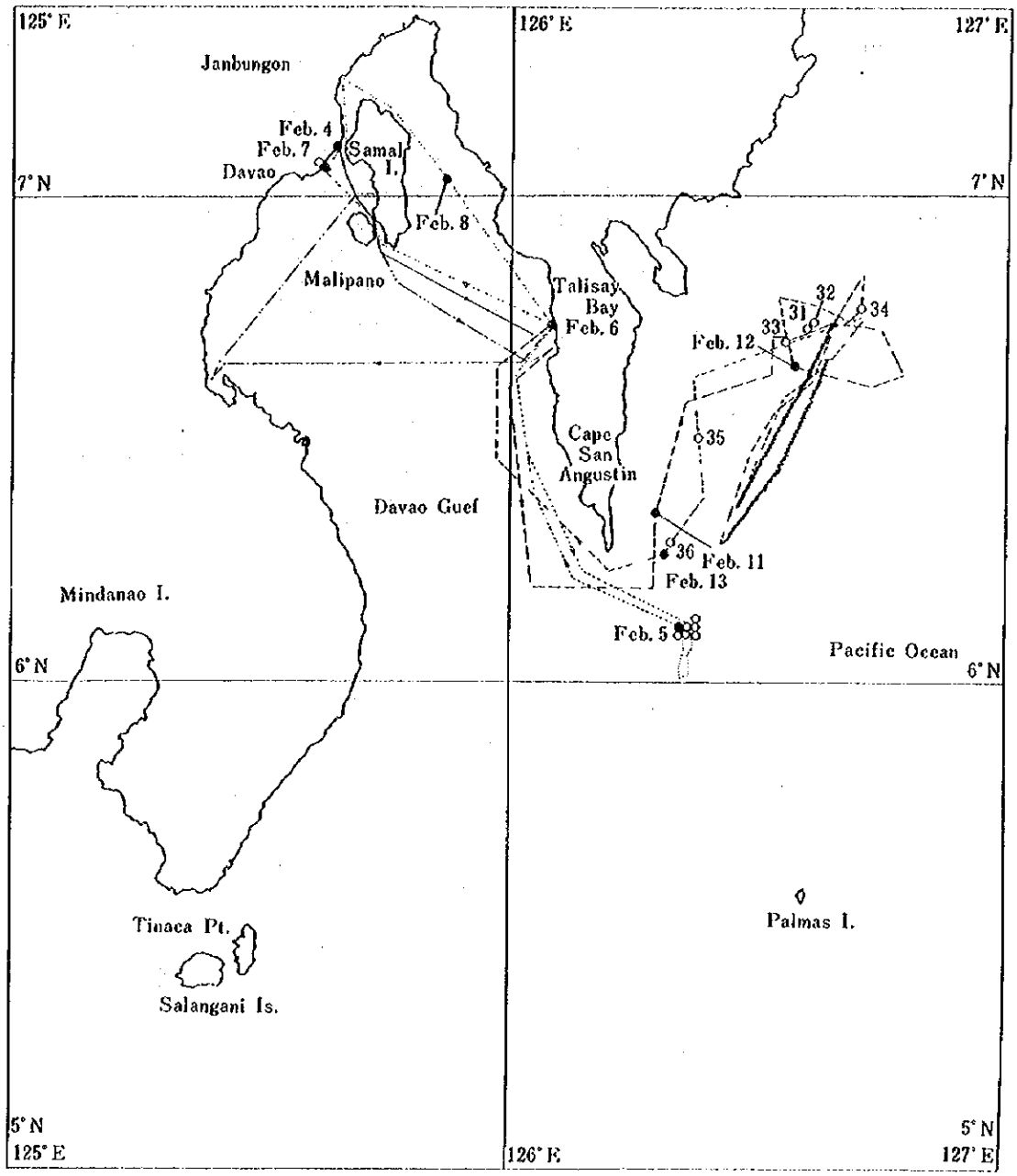
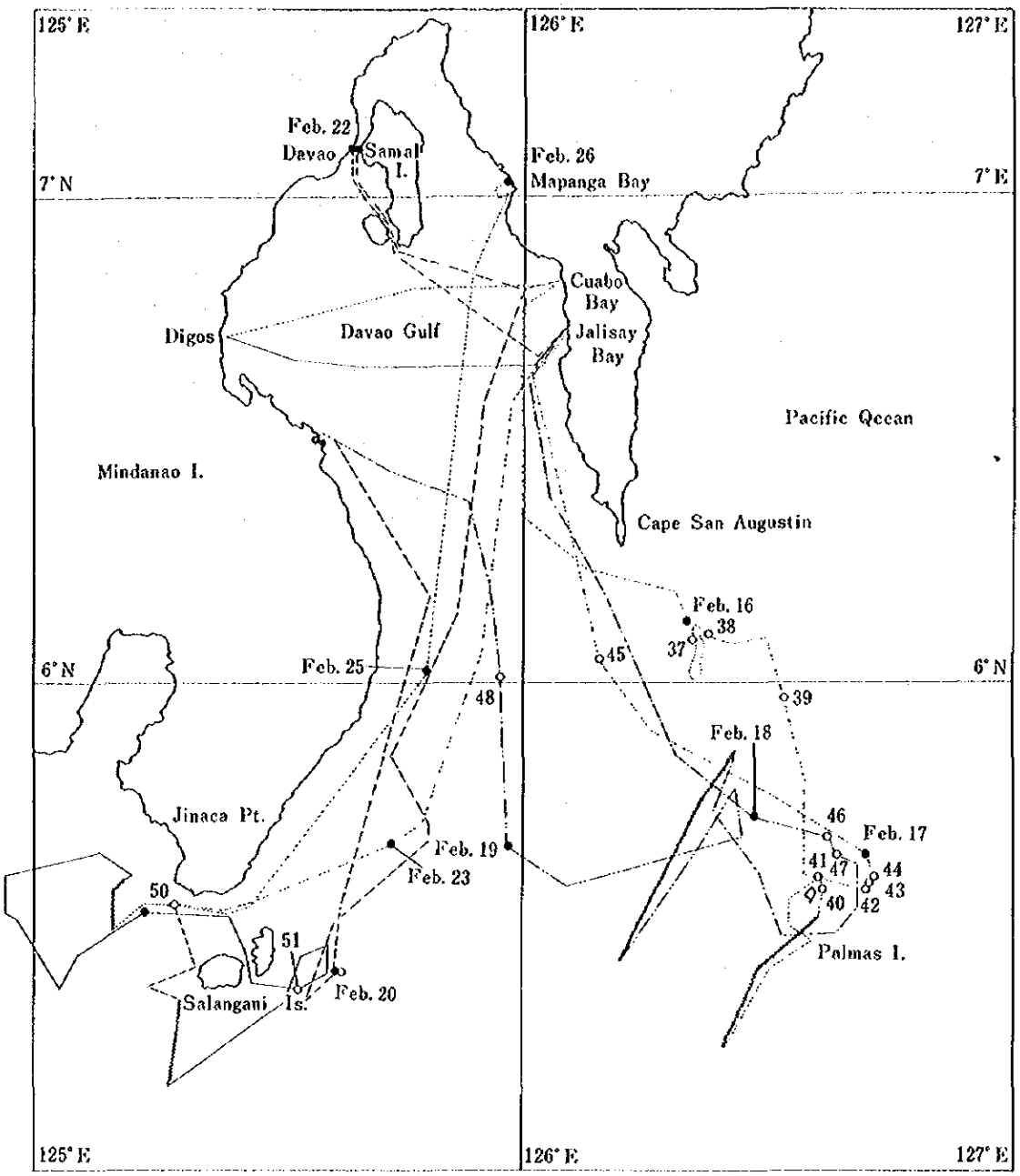
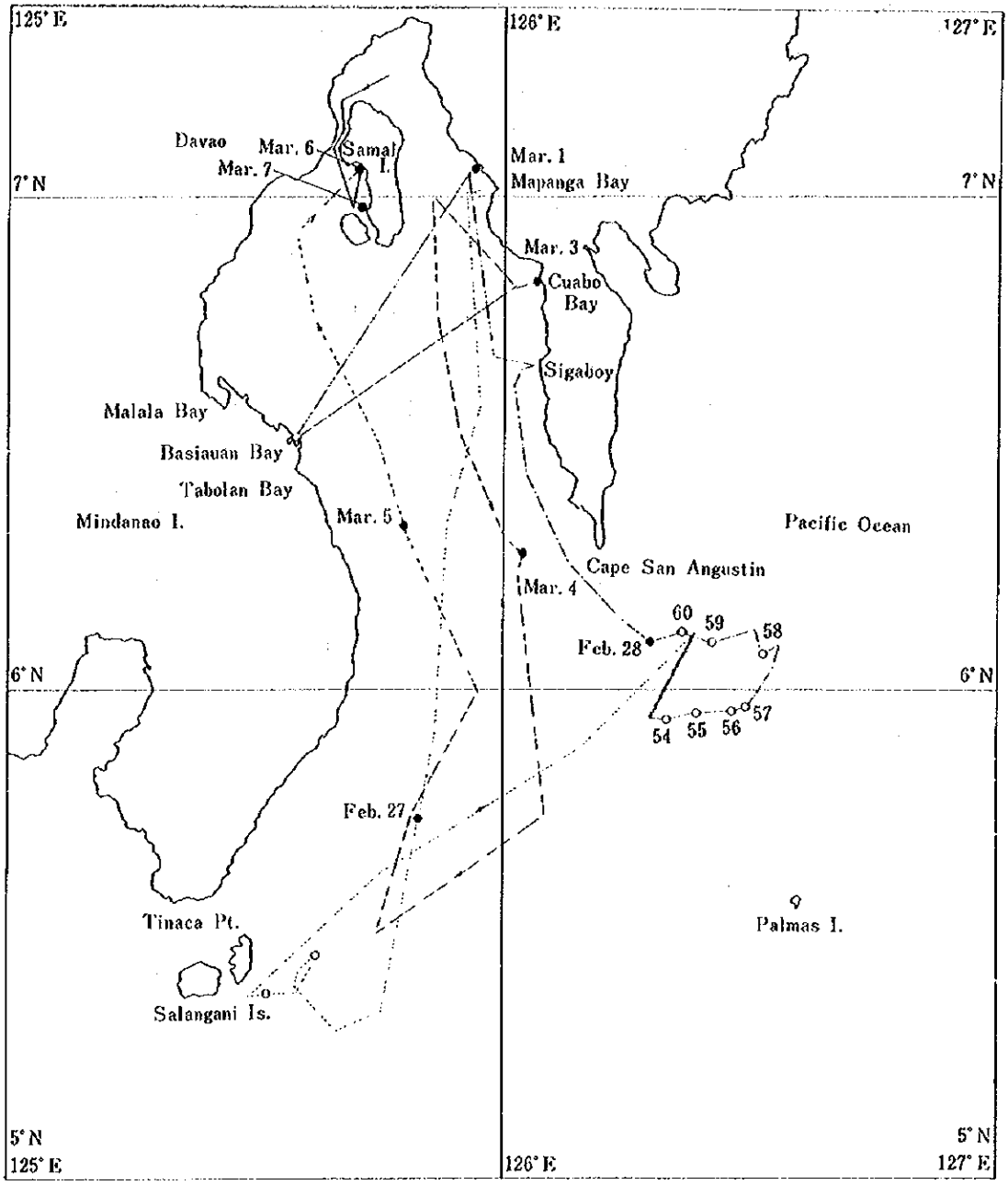



Fig. 22 Track Chart of Skipjack Survey (Davao Gulf Area)

(3) Feb. 11～26. 1977



(4) Feb. 27~Mar. 7. 1977



(5) Mar. 8~15. 1977

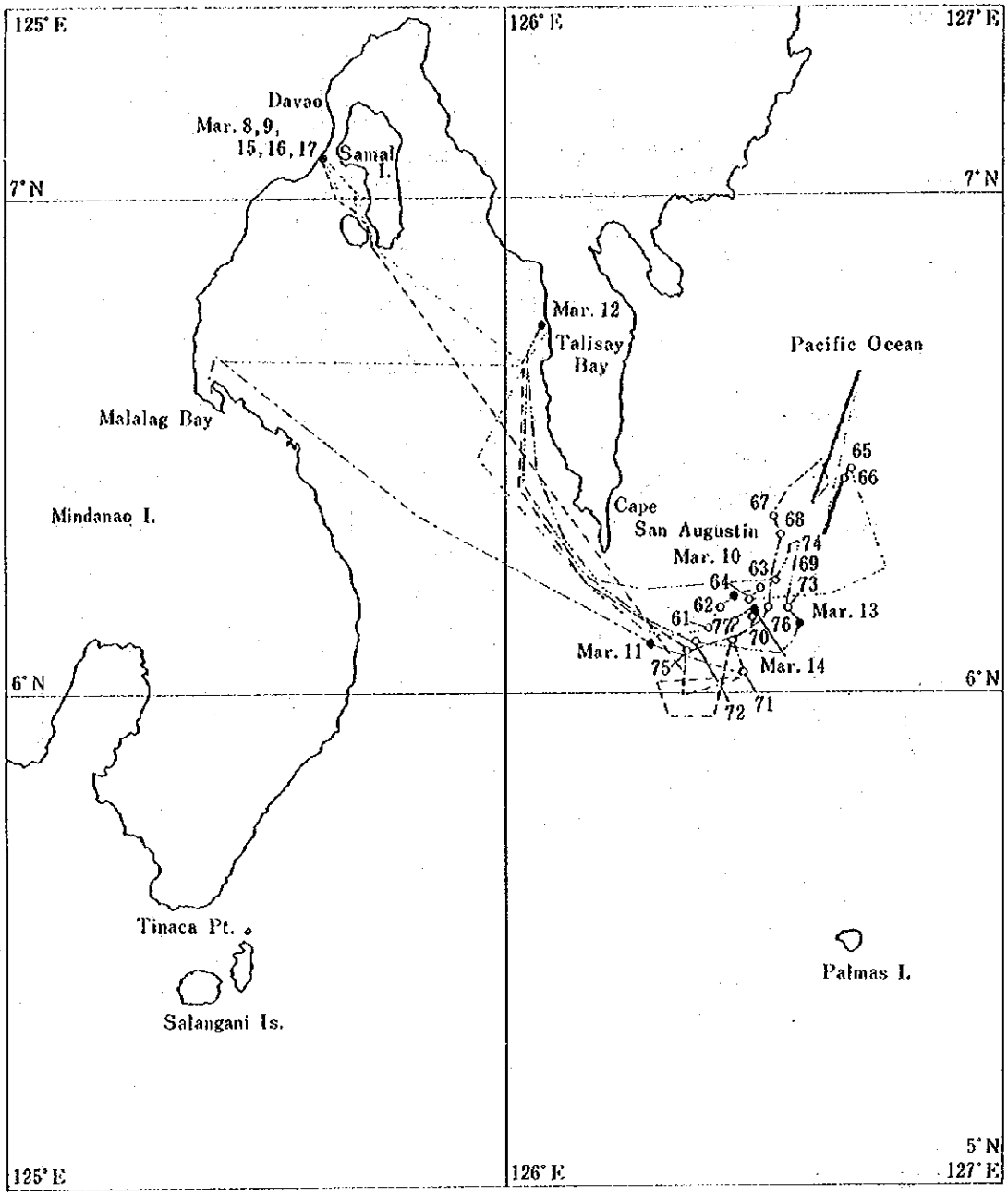


Table 13 Result of Skipjack Fishing Operation and Catch (Dovao Gulf Area)

| Month | | January | | | February | | | March | | | Totale | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of days staying in fishing ground | | 17 | | | 22 | | | 11 | | | 50 | | |
| Number of days on effective operation | | 4 | | | 13 | | | 4 | | | 21 | | |
| Number of fish schools observed | | 7 | | | 44 | | | 20 | | | 71 | | |
| Number of effective operation (Schools) | | 7 | | | 39 | | | 17 | | | 63 | | |
| ratio of effective operation | | 23.5 % | | | 59.1 % | | | 36.4 % | | | 42.0 % | | |
| Number of fish schools observed per day operation | | 0.41 | | | 2.00 | | | 1.82 | | | 1.42 | | |
| Number of effective operation per day operation | | 1.75 | | | 3.00 | | | 4.25 | | | 3.00 | | |
| ratio of effective operation | | 100 % | | | 88.6 % | | | 85.0 % | | | 88.7 % | | |
| Catch by species | | pcs | Kg | % | pcs | Kg | % | pcs | Kg | % | pcs | Kg | % |
| | Skipjack | 6 | 82 | 1.9 | 584 | 687.7 | 64.7 | 1,508 | 1,925.3 | 73.8 | 2,098 | 2,621.2 | 64.0 |
| | Yellowfin tuna | 21 | 159 | 3.8 | 123 | 184.3 | 17.3 | 401 | 632.1 | 24.2 | 545 | 832.3 | 20.3 |
| | Bonito | 481 | 399.8 | 94.3 | 212 | 191.3 | 18.0 | 65 | 50.6 | 2.0 | 758 | 641.7 | 15.7 |
| | Total | 508 | 423.9 | | 919 | 1,063.3 | | 1,974 | 2,608.0 | | 3,401 | 4,095.2 | |
| Catch per one day operation | | 127.0 | 106.0 | | 70.6 | 81.8 | | 493.5 | 652.0 | | 162.0 | 195.0 | |
| Catch pes one day operation and person | | | | | | | | | | | | | |
| Catch per one operation | | 12.7 | 10.6 | | 7.1 | 8.2 | | 49.4 | 65.2 | | 16.2 | 19.5 | |
| Catch per one operation and person | | 72.6 | 60.6 | | 23.6 | 27.3 | | 116.1 | 153.4 | | 54.0 | 65.0 | |
| | | 7.3 | 6.1 | | 2.4 | 2.7 | | 11.6 | 15.3 | | 5.4 | 6.5 | |
| Remavks | | | | | | | | | | | | | |

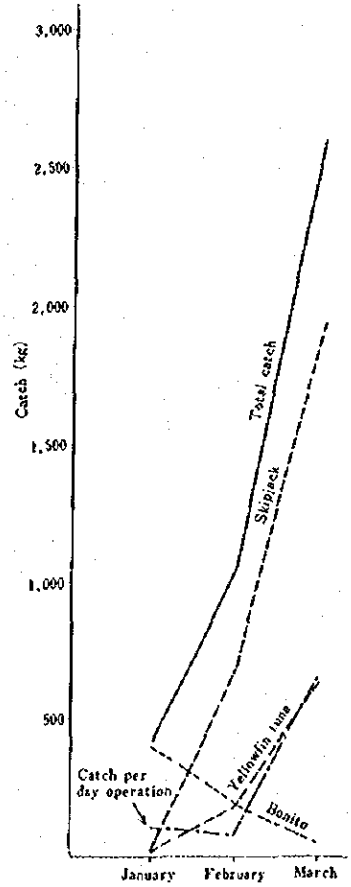



Fig. 23 Catch by Month (Davao Gulf Area)

Variation in the catch by month was as follows: (i) during January, there were overall a few of times in school appearance, except for the catch in bonito as nucleus mainly in the waters around bank of about 15 sea miles SSE from Cape San Augustin at the gulf entrance, (ii) during February, an ocular observation for fish schools covering the wide range of the waters northeastward and southwestward farther of the offshore waters mentioned in (i) resulted continuingly in a few of fish schools found out. Nevertheless, in the waters around Palmas Island in the southward, there was a catch of skipjack by small schools of skipjack as nucleus and (iii) during the period of late February to March, the small schools of skipjack as nucleus appeared in the offshore waters east of above-mentioned bank and east of Cape San Angustin and as a result, the catch increased.

### 2-1-3 Distribution and Behavior of Fish Schools

Figure 24 shows the catching ratio of skipjack and others by fishing grounds in the area of Davao Gulf.

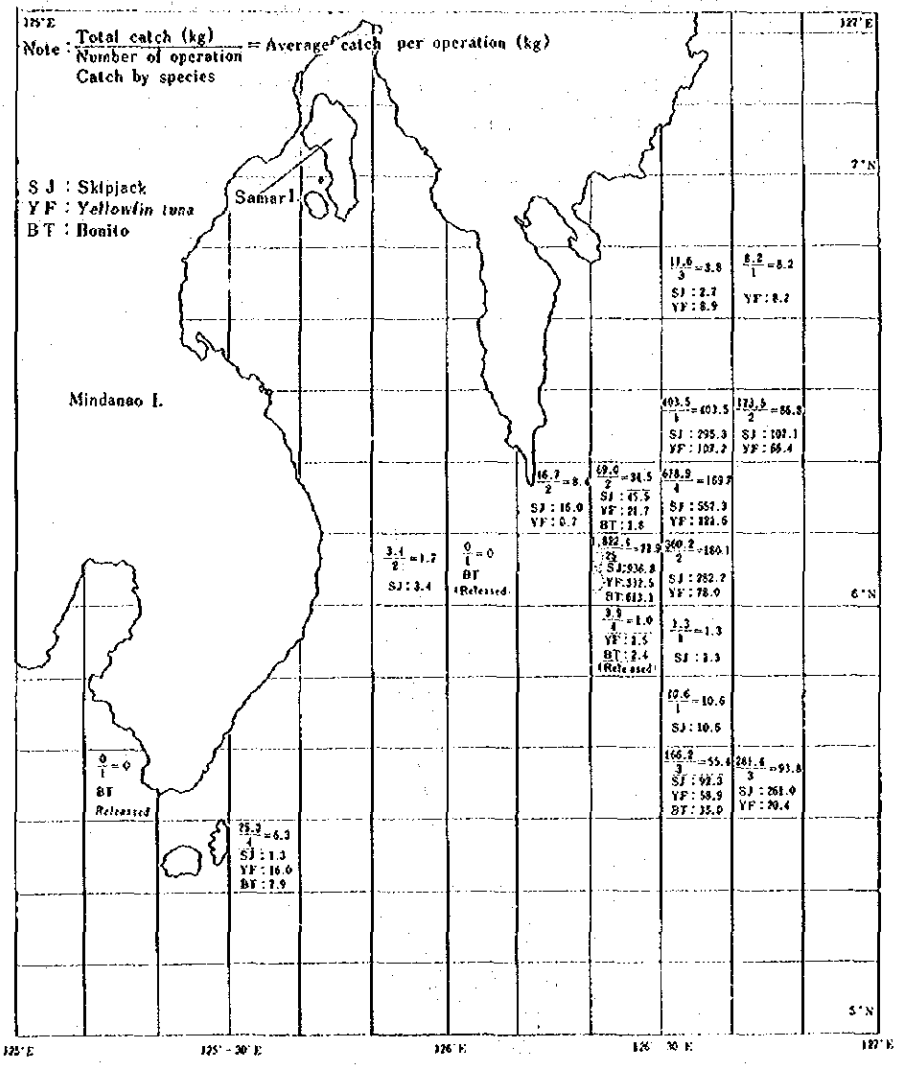



Fig. 24 Catch ratio by fishing grounds (Davao Gulf Area)

Finding out of fish schools and catch as a whole were prevailed in the offshore waters east of the entrance of Davao Gulf centering at 6°-30'N and 126°-30'E.

Catch composition by fish species, as Figure 25 shows, was 64% in skipjack, 20.3% in yellowfin and 15.7% in bonito.

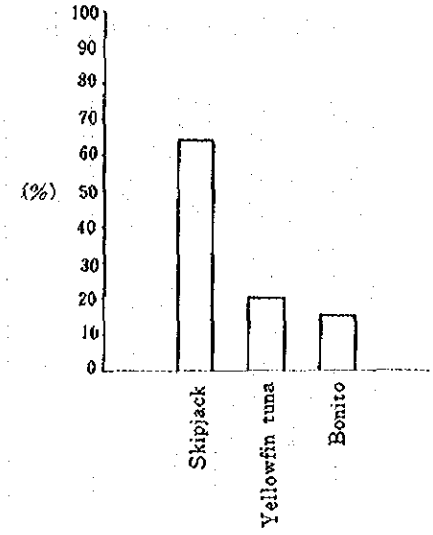



Fig 25 Catch Composition (Davao Gulf Area)

As regards to the fish schools by behavior, (i) skipjack schools were composed of birds-associate in 59% and plain school in 41% and (ii) yellowfin schools, of birds-associate in 57%, i.e. a majority, followed by log-associate schools in 30% or so. Also, the chumming school of skipjack and yellowfin was composed of birds-associate in the half, and, of plain schools and log-associate respectively in the half of the balance. Bonito consisted mostly of plain schools.

Table 14 Appearance of Fish Schools by Behavior (Davao Gulf Area)

unit : Nuwnber of School

| Type and status of fish school / Species | Plain school | | Bird associated | | Log associated | | Total | | Jumper | | Former | | Unknown (not jumped) | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % | | % | | % | | % | | % | | % | | % | | % |
| Skipjack | 7 | 41 | 10 | 59 | - | - | 17 | 100 | 11 | 65 | 1 | 6 | 5 | 29 | 17 | 100 |
| Yellowfin tuna | 1 | 14 | 4 | 57 | 2 | 29 | 7 | 100 | 5 | 71 | | | 2 | 29 | 7 | 100 |
| Skipjack and Yellowfin tuna | 4 | 27 | 7 | 47 | 4 | 26 | 15 | 100 | 11 | 73 | | | 4 | 27 | 15 | 100 |
| Bonito | 24 | 75 | 7 | 22 | 1 | 3 | 32 | 100 | 16 | 50 | | | 16 | 50 | 32 | 100 |
| Total | 36 | 51 | 28 | 39 | 7 | 10 | 71 | 100 | 43 | 61 | 1 | 1 | 27 | 38 | 71 | 100 |

Also, as regards to the fish schools by status, skipjack or yellowfin schools were made up of a majority of jumping ones; and bonito schools, of a half of jumping ones. One former school was observed in skipjack only, and breezer schools were not found out at all.

Fish schools were generally of small type, Bonito was considered to have been fixing schools, and skipjack or yellowfin schools as feeding migration schools.

Table 14 and Figure 26, respectively show the appearance of fish schools by behavior.

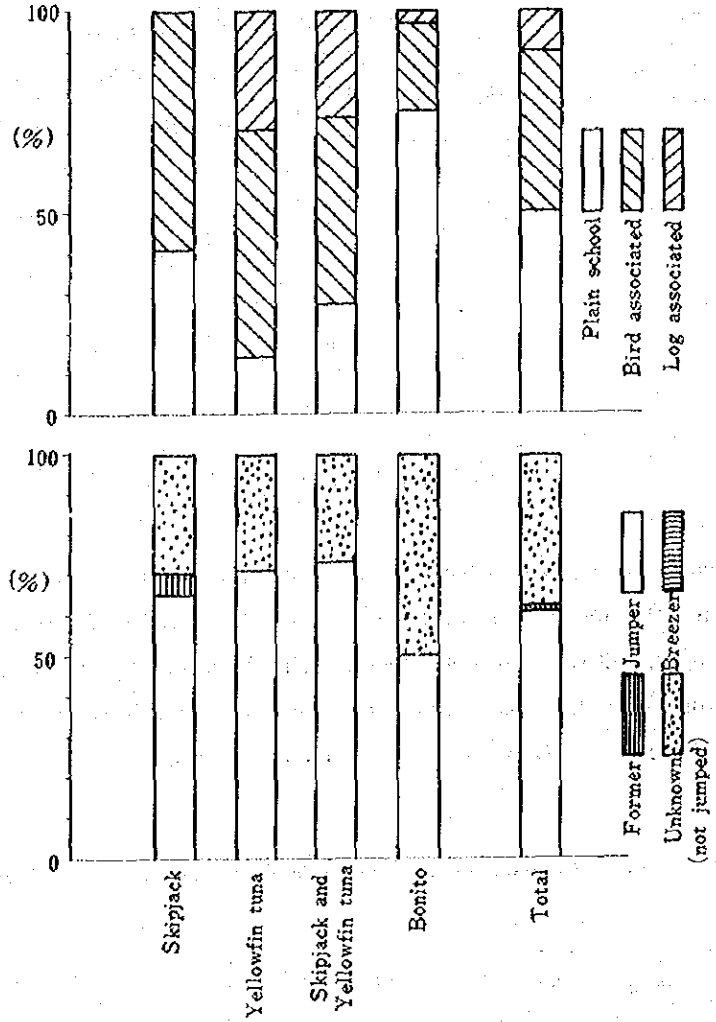



Fig. 26 Fish School Composition by Behavior
(Davao Gulf Area)

### 2-1-4 Biological Survey

Figures 27 and 28 show the distribution of fish body length and the relationship of body length and weight.

Body length ranged from 30 to 50 cm in skipjack, from 30 to 50 cm in yellowfin, and from 30 to 54 cm in bonito, whose respective species were about similar.

Body weight ranged from 0.8 to 25 kg (1.25 kg in average) in skipjack, from 0.3 to 2.1 kg (1.46 kg in average) in yellowfin and from 0.5 to 2.9 kg (divided into two modes of less than

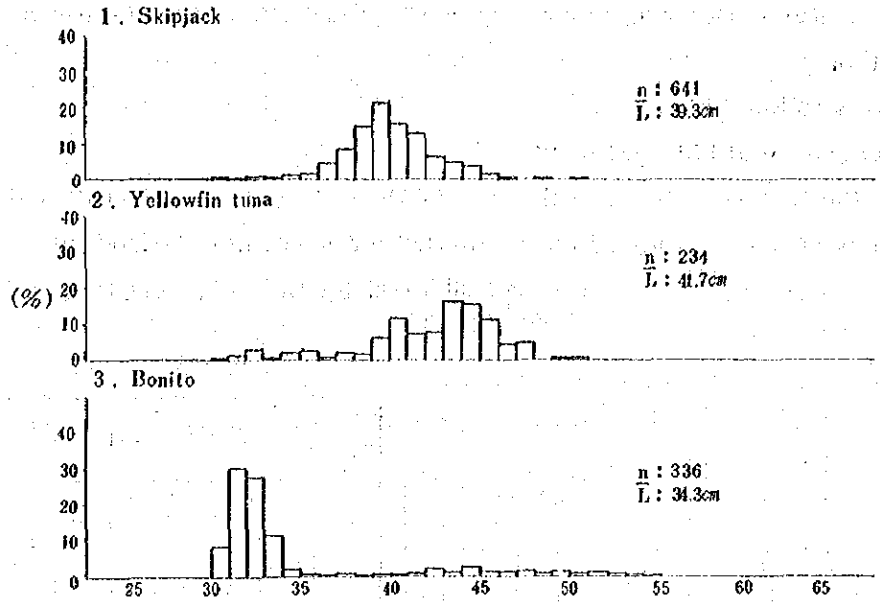



Fig. 27 Body Length Distribution (Davao Gulf Area)

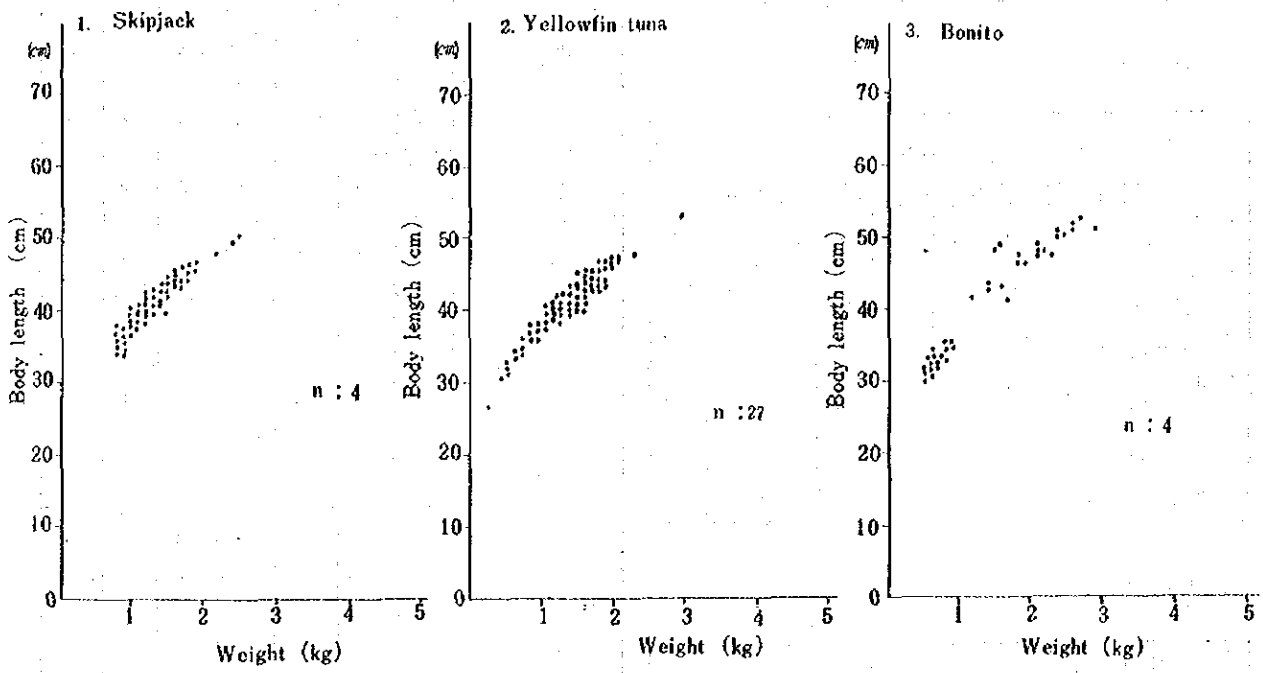



Fig 28 Body Length and Weight Relation (Davao Gulf Area)

1 kg and 2 kg or so) in bonito.

Small size fish prevailed throughout the whole species, and almost all of their sexual gonad were immature.

Stomach contents: most of skipjack stomachs were empty. A number of skipjack had scattered baits preyed upon. A lot of yellowfin had preyed upon young fish of mysis, Carangidae sp, or crustacea; also, lots of this species had preyed on scattered baits. Lots of

bonito had a half stomach of young crustacea and a few of bonito had preyed on scattered baits.

## 2-2 Survey on Bait Fishes

### 2-2-1 Environment of Fishing Ground

Survey on bait fishes in the area of Davao Gulf was conducted in the area of coastal waters and reef area around the intermediate or inner part of Davao Gulf.

Table 15 Environmental Conditions of Bait Fishing Ground (Davao Gulf Area)

1. Weather

| Month / Weather | January | | February | | March | | Total | |
|---|---|---|---|---|---|---|---|---|
| | days | % | days | % | days | % | days | % |
| bc | 17 | 80 | 13 | 57 | 8 | 61 | 38 | 66 |
| c | 1 | 5 | 4 | 17 | 2 | 15 | 7 | 12 |
| o | 1 | 5 | 3 | 13 | 2 | 15 | 6 | 11 |
| r | 2 | 10 | 3 | 13 | 1 | 8 | 6 | 11 |
| Total | 21 | | 23 | | 13 | | 57 | |

2. Water surface temperature

| 月別 / Water temperature ℃ | January | | February | | March | | Total | |
|---|---|---|---|---|---|---|---|---|
| | days | % | days | % | days | % | days | % |
| 26.1 ~26.5 | 2 | 10 | 1 | 4 | 2 | 15 | 5 | 9 |
| 26.6 ~27.0 | 4 | 19 | 2 | 9 | 3 | 23 | 9 | 16 |
| 27.1 ~27.5 | 7 | 33 | 6 | 26 | 6 | 46 | 19 | 33 |
| 27.6 ~28.0 | 4 | 19 | 9 | 39 | 1 | 8 | 14 | 25 |
| 28.1 ~28.5 | 4 | 19 | 5 | 22 | 1 | 8 | 10 | 18 |
| Total | 21 | | 23 | | 13 | | 57 | |

4. Wind force

| Month / Wind force | January | | February | | March | | Total | |
|---|---|---|---|---|---|---|---|---|
| | days | % | days | % | days | % | days | % |
| Calm | 10 | 47 | 6 | 26 | | | 16 | 28 |
| 1 | 9 | 43 | 11 | 48 | 10 | 77 | 30 | 53 |
| 2 | 2 | 10 | 2 | 9 | 2 | 15 | 6 | 10 |
| 3 | | | 4 | 17 | 1 | 8 | 5 | 9 |
| Total | 21 | | 23 | | 13 | | 57 | |

3. Wind direction

| Month / Wind direction | January | | February | | March | | Total | |
|---|---|---|---|---|---|---|---|---|
| | days | % | days | % | days | % | days | % |
| Calm | 10 | 48 | 6 | 26 | | | 16 | 28 |
| N | 1 | 5 | 3 | 13 | 4 | 30 | 8 | 14 |
| NNE | 1 | 5 | | | | | 1 | 2 |
| NE | 3 | 14 | 2 | 9 | 1 | 8 | 6 | 10 |
| ENE | | | 1 | 4 | 2 | 15 | 3 | 5 |
| E | 1 | 5 | 3 | 13 | 3 | 23 | 7 | 12 |
| ESE | | | 1 | 4 | 1 | 8 | 2 | 4 |
| SE | | | 2 | 9 | | | 2 | 4 |
| SSE | | | | | | | | |
| S | | | 1 | 4 | | | 1 | 2 |
| SSW | | | | | | | | |
| SW | 1 | 5 | | | 1 | 8 | 2 | 4 |
| WSW | | | | | | | | |
| W | | | 1 | 4 | | | 1 | 2 |
| WNW | | | | | | | | |
| NW | 3 | 14 | | | | | 3 | 5 |
| NNW | 1 | 5 | 3 | 13 | 1 | 8 | 5 | 8 |
| Total | 21 | | 23 | | 13 | | 57 | |

Coastal area in Davao Gulf was little affected by the northeasterly monsoon. As for the weather, the days of fine but cloudy/cloudy accounted for some 80%. The days of calm wind for some 30%, N or NE wind 1 to 2 in force for some 60%; and there was little difficulty on fishing operations.

Surface water temperature varied from 26 to 28°C. Average water temperatures were at the level of 27°C, which can be said to be about suitable for bait fish. Transparency was observed from 6 to 20 m, comparatively low tendency, and some low transparency was observed seemingly affected by land water locally.

Table 15 indicates the observed value of weather, wind direction and force, and surface water temperature at the time of fishing operation of bait fishes in Davao Gulf.

### 2-2-2 Fishing Operation and Catch

Figure 29, Table 16 and Figure 30 show the catching position of bait fishes in Davao Gulf, the result of bait fishing operation and catch, and, the catch by month, respectively.

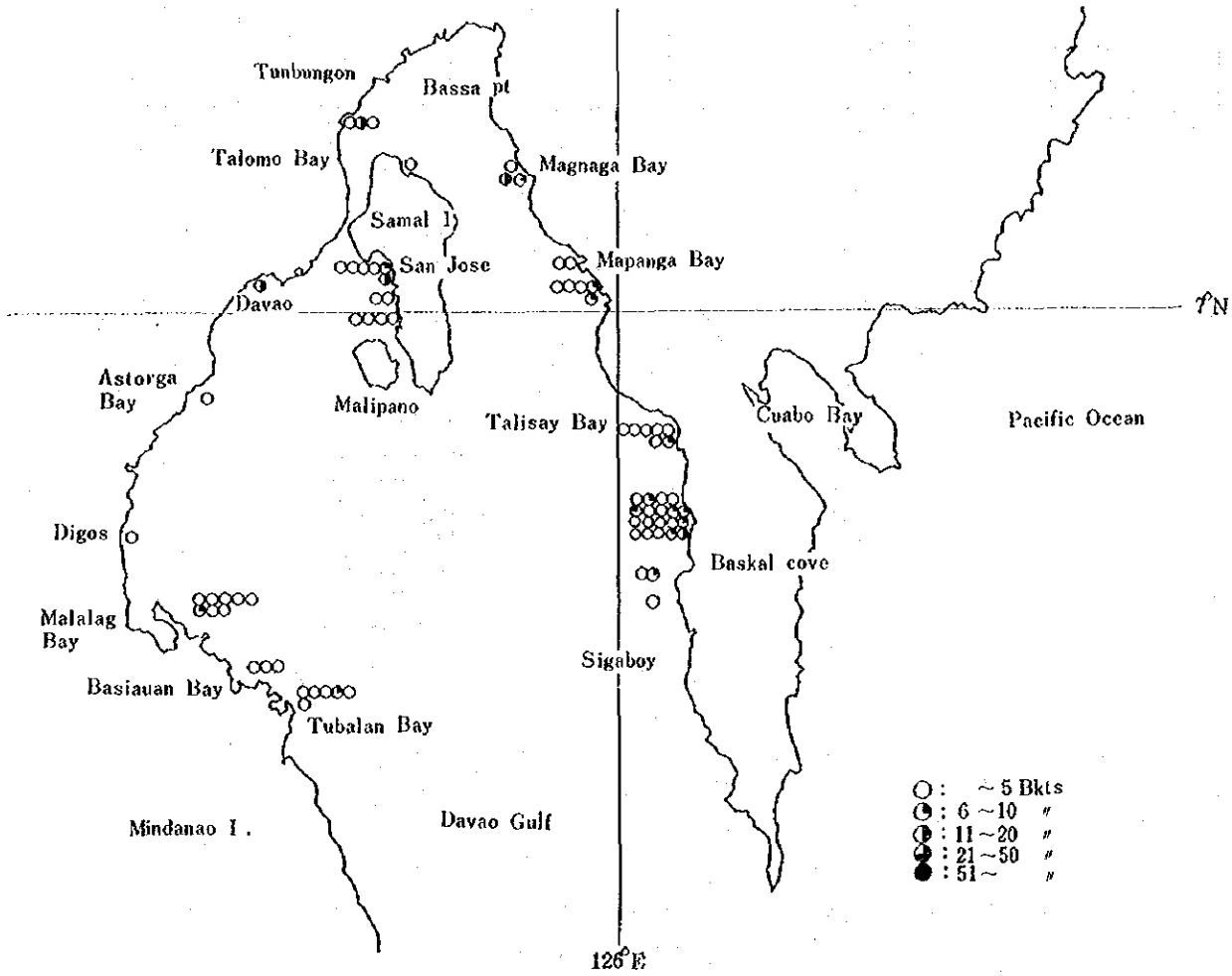



Fig. 29 Catching Position of Bait Fishing

Table. 16 Result of Bait Fishing Operation and Catch (Davao Gulf Area)

| Month | | January | | February | | March | | Total | |
|---|---|---|---|---|---|---|---|---|---|
| Number of days staying in fishing (A) | | 21 days | | 23 days | | 13 days | | 57 days | |
| Number of DAYS (B) | | 21 days | | 23 days | | 13 days | | 57 days | |
| Number of in operation (C) | | 26 times | | 30 times | | 19 " | | 75 times | |
| Effective ratio of operation (B/A) | | 100 % | | 100 % | | 100 % | | 100 % | |
| Number of operation per DAYS (C/B) | | 1.2 times | | 1.3 times | | 1.5 times | | 1.3 [0] | |
| Catch by Species | | Bkts | % | Bkts | % | Bkts | % | Bkts | % |
| | Engraulidae | 402.5 | 37.8 | 160.9 | 12.7 | 300.0 | 31.9 | 863.4 | 26.4 |
| | Dussmieriidae | 144.5 | 13.3 | 654.2 | 51.4 | 130.0 | 13.8 | 925.7 | 28.3 |
| | Athierinidae | 111.5 | 10.5 | 75.3 | 5.9 | 21.0 | 2.2 | 207.8 | 6.3 |
| | Clupeidae | 101.0 | 9.5 | 183.6 | 14.3 | 281.5 | 30.0 | 564.1 | 17.2 |
| | Caesiodae | — | — | 100.0 | 7.9 | 162.0 | 17.2 | 262.0 | 8.0 |
| | Caragidae | 0.1 0 | 0.1 | 2.5 | 2.0 | — | — | 2.6 0 | 0.7 |
| | Siganidae | 48.0 | 4.5 | — | — | — | — | 48.0 | 1.5 |
| | Others | 258.5 | 24.3 | 75.0 | 5.9 | 46.5 | 4.9 | 380.0 | 11.6 |
| | Total (E) | 1064 | | 1272 | | 941 | | 3277 | |
| Catch per day operation (E/B) | | 5.07 | | 5.53 | | 7.24 | | 5.75 | |
| Catch per operation (E/C) | | 4.09 | | 4.24 | | 4.95 | | 4.37 | |
| Remarks | | | | | | | | | |

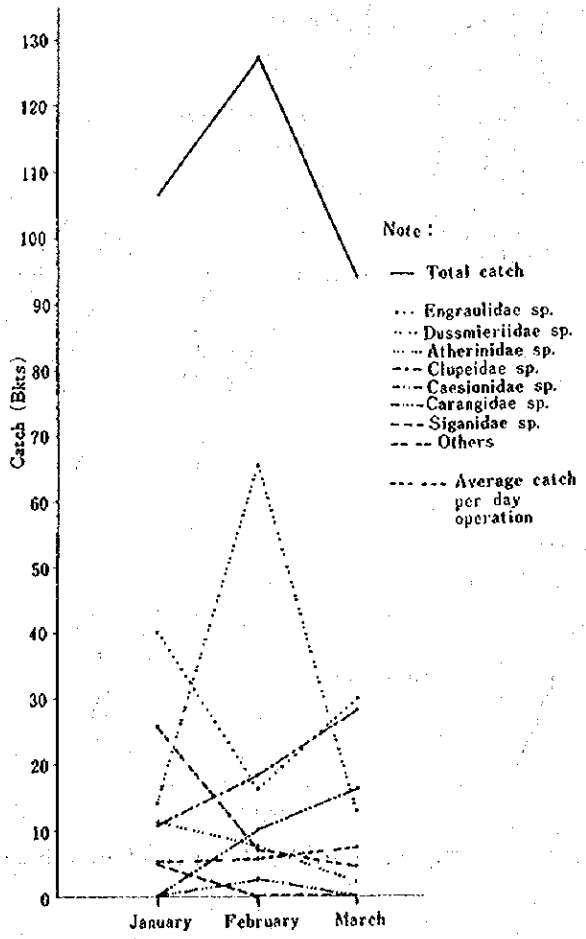



Fig. 30 Catch by Month (Davao Gulf Area)

In the 57 days of stay at fishing grounds including 50 days of fishing operations and 75 times of operations, the following results were obtained: a total catch of 327.7 basketfuls of bait fishes and about 4 basketfuls of average catch per operation.

As for the variation in catch by month, the catch per operation showed no big difference. However, in March, a tendency of some increase was observed in catch.

As for the catch by different fishing grounds, the catch in Talisay Bay was the most. Average catch per operation was the most in Talomo Bay, however, the species caught there was Myctophiformes sp. and died immediately after catching, so they were unable to be used as bait fish. If this catch is excluded, the catch in Talisay Bay meant the highest value.

Table 17, Figures 31 and 32 show the result of bait fishing by fishing grounds, the catch by fishing grounds and the catch composition of bait fishes by fishing grounds respectively.

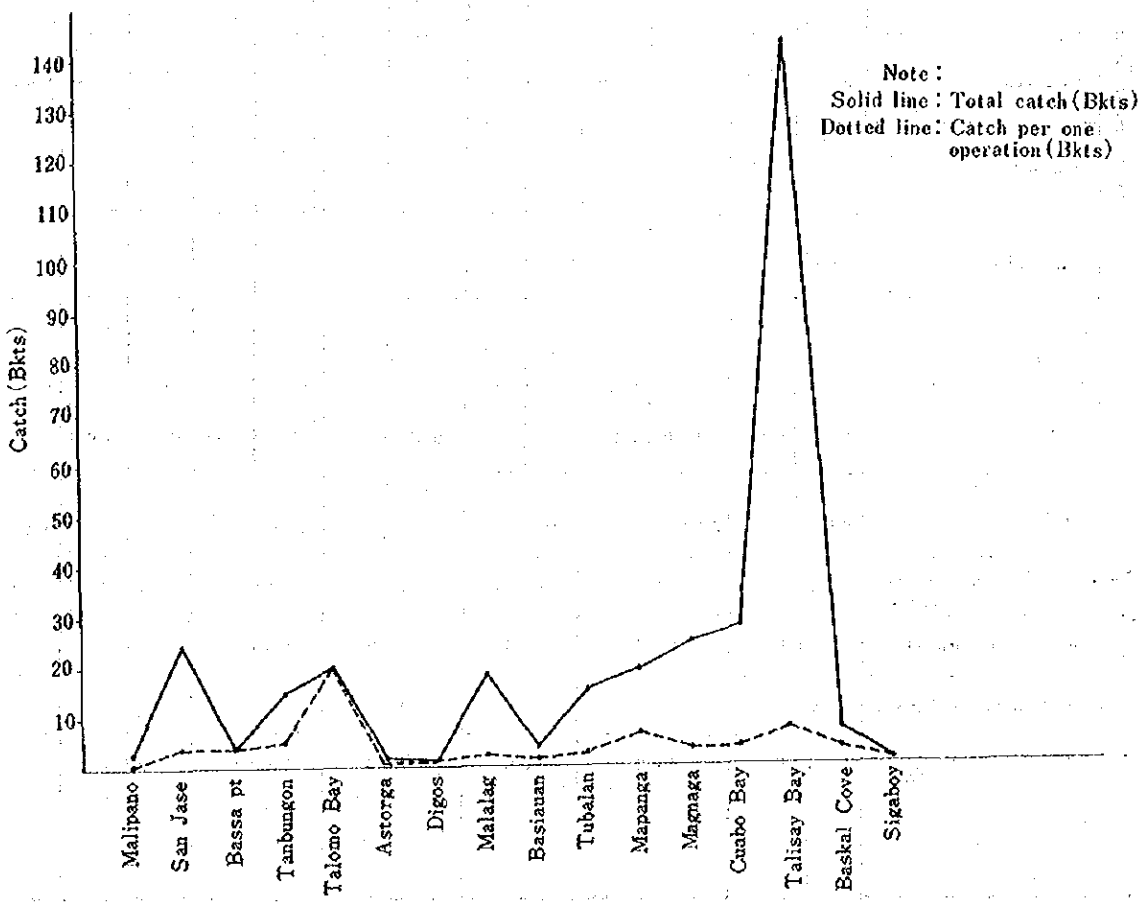


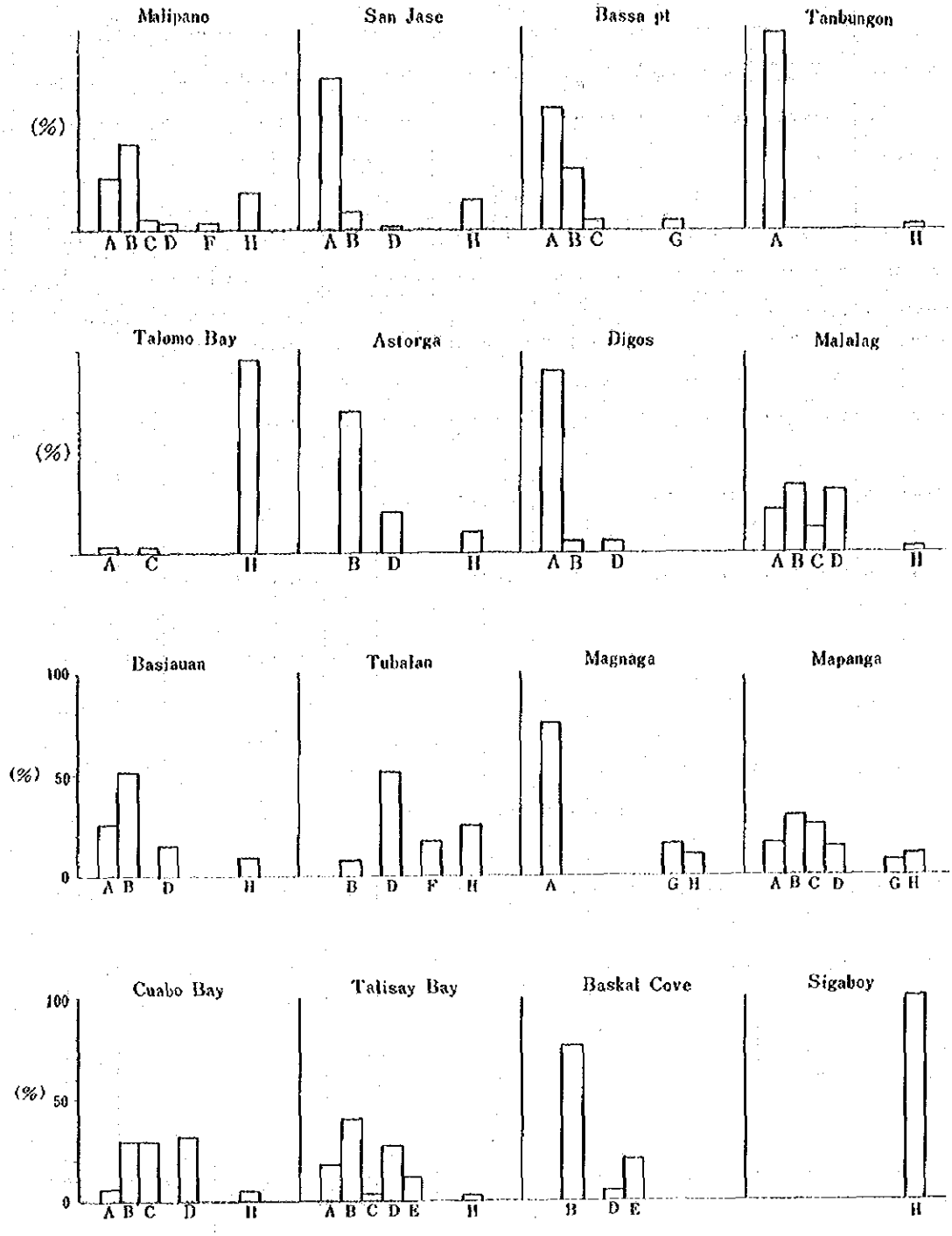

Fig.31 Catch of Bait Fishes by Fishing Grounds (Davao Gulf Area)

Species composition of the bait fishes caught in the area of Davao Gulf, the most were Sprotelloides delicaturus (Bennett) and Engraulidae sp. (mainly Stolephorus heterolobus (Ruppell), followed in order by Harengula sp., Caecionidae sp., Atherinidae sp. and others.

Tablo. 17 Result of Bait Fishing by Fishing Grounds (Davao Gulf Area)

| Fishing ground | | Malipano | | San Jose | | Bassa Pt | | Tunbungon | | Talomo Bay | | Astorga | | Digos | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Distance from shore | | 0.12~0.25 | | 0.1~0.2 | | 0.5 | | 0.6~0.6 | | 0.25 | | 0.3 | | 0.5 | |
| Depth | | 30~44 | | 30~37 | | 30 | | 30~37 | | 35 | | 34 | | 29 | |
| Sea bottom | | M, S, Co | | M, Co. | | Co. | | M | | M | | M | | M | |
| Transparency | | 15, 17 | | 12, 15 | | 14 | | 9, 12 | | 20 | | 12 | | 6 | |
| Water surface temperature | | 26.1~26.9 | | 26.0~27.9 | | 27.3 | | 26.6~27.9 | | 27.4 | | 27.0 | | 27.4 | |
| Catch by species (Bkts) | | (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % |
| | Engraulidae | 0.70 | 25.9 | 18.15 | 75.3 | 2.4 | 60.0 | 14.20 | 97.9 | 0.50 | 2.5 | | | 1.34 | 90.0 |
| | Dussmieriidae | 1.15 | 42.6 | 2.00 | 8.3 | 1.2 | 30.0 | | | | | 1.40 | 70.0 | 0.08 | 5.0 |
| | Athierinidae | 0.15 | 5.6 | | | 0.2 | 5.0 | | | 0.50 | 2.5 | | | | |
| | Clupeidae | 0.10 | 3.7 | 0.45 | 1.9 | | | | | | | 0.40 | 20.0 | 0.08 | 5.0 |
| | Caesiodae | | | | | | | | | | | | | | |
| | Carangidae | 0.10 | 3.7 | | | | | | | | | | | | |
| | Siganidae | | | | | 0.2 | 5.0 | | | | | | | | |
| | Others | 0.50 | 18.5 | 3.50 | 14.5 | | | 0.30 | 2.1 | 19.0 | 95.0 | 0.20 | 10.0 | | |
| | Total | 2.7 | | 24.1 | | 4.0 | | 14.5 | | 20.0 | | 2.0 | | 1.5 | |
| Number of days in operation (Times) | | 45 | | 5.0 | | 1 | | 2.5 | | 0.5 | | 1 | | 0.5 | |
| Catch per day operation(Bkts) | | 0.60 | | 4.80 | | 4.00 | | 5.80 | | 40.00 | | 2.00 | | 3.00 | |
| Number of operation (Times) | | 6 | | 6 | | 1 | | 3 | | 1 | | 1 | | 1 | |
| Catch per one operation (Bkts) | | 0.45 | | 4.02 | | 4.00 | | 4.83 | | 20.00 | | 2.00 | | 1.50 | |
| Remarks | | | | | | | | | | | | | | | |

| Malalag Bay | | Basiauan Bay | | Tubalan Bay | | Magnaga Bay | | Mapanga | | Cuabo Bay | | Talisay Bay | | Baskal Cove | | Sigaboy | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.12~0.45 | | 0.3~0.4 | | 0.12~0.2 | | 0.4~0.7 | | 0.18~0.7 | | 0.2~0.8 | | 0.28~0.5 | | 0.4 | | 0.3 | | — | |
| 28~45 | | 32~36 | | 30~42 | | 30~32 | | 31~33 | | 30~32 | | 25~30 | | 30 | | 30 | | — | |
| M | | M | | M, Co | | M | | M, S, Sh | | M | | M | | M | | M | | — | |
| 4~12 | | 6 | | 12, 14 | | 9, 11 | | 15, 17 | | 15~21 | | 8~12 | | 13 | | 10 | | — | |
| 27.9~28.7 | | 27.9~28.0 | | 27.4~28.1 | | 26.5~27.5 | | 26.9~27.8 | | 26.0~28.5 | | 28.2~27.2 | | 27.6, 28.1 | | 27.0 | | — | |
| (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % | (Bkts) | % |
| 3.90 | 21.2 | 1.00 | 25.0 | | | 14.10 | 74.2 | 3.85 | 15.8 | 1.35 | 5.0 | 2485 | 17.4 | | | | | 86.34 | 26.3 |
| 6.00 | 32.6 | 2.05 | 51.3 | 1.05 | 7.0 | | | 7.00 | 28.8 | 8.05 | 29.6 | 5689 | 40.0 | 5.70 | 76.0 | | | 92.57 | 28.2 |
| 2.20 | 12.0 | | | 0.20 | 1.3 | | | 5.90 | 24.3 | 8.05 | 29.6 | 358 | 2.5 | | | | | 20.78 | 6.3 |
| 5.70 | 31.0 | 0.60 | 15.0 | 7.60 | 50.7 | | | 3.40 | 14.0 | | | 37.78 | 26.5 | 0.30 | 4.0 | | | 56.41 | 17.2 |
| | | | | | | | | | | 8.50 | 31.3 | 1620 | 11.4 | 1.50 | 20.0 | | | 26.20 | 8.0 |
| | | | | 2.50 | 16.7 | | | | | | | | | | | | | 2.60 | 0.8 |
| | | | | | | 3.00 | 15.8 | 1.60 | 6.6 | | | | | | | | | 4.80 | 1.5 |
| 0.60 | 3.3 | 0.35 | 8.8 | 3.65 | 24.3 | 1.90 | 10.0 | 2.55 | 10.5 | 1.25 | 4.6 | 320 | 2.3 | | | 1.00 | 100 | 38.00 | 11.6 |
| 18.4 | | 4.0 | | 15.0 | | 19.0 | | 24.3 | | 27.2 | | 1425 | | 7.5 | | 1.0 | | 327.70 | |
| 6.5 | | 2 | | 5 | | 2 | | 4.5 | | 5.5 | | 14.0 | | 2 | | 0.5 | | 57 | |
| 283 | | 2.00 | | 3.00 | | 9.50 | | 5.40 | | 4.95 | | 10.18 | | 3.75 | | 2.00 | | 5.75 | |
| 8 | | 3 | | 6 | | 3 | | 7 | | 7 | | 19 | | 2 | | 1 | | 75 | |
| 2.30 | | 1.33 | | 2.50 | | 6.33 | | 3.47 | | 3.89 | | 7.5 | | 3.75 | | 1.00 | | 4.37 | |




Note : A : Engraulidae B : Dussmieriidae C : Athierinidae D : Clupeidae
E : Caesionidae F : Carangidae G : Siganidae H : Others

Fig.32 Catch Composition of Bait Fishes by Fishing Grounds (Davao Gulf Area)

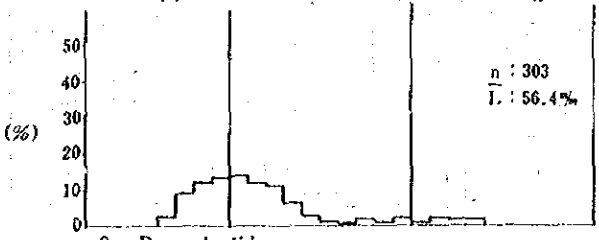
### 2-2-3 Biological Survey

Figure 33 shows the distribution of body length by species of bait fishes.

1. Engraulidae

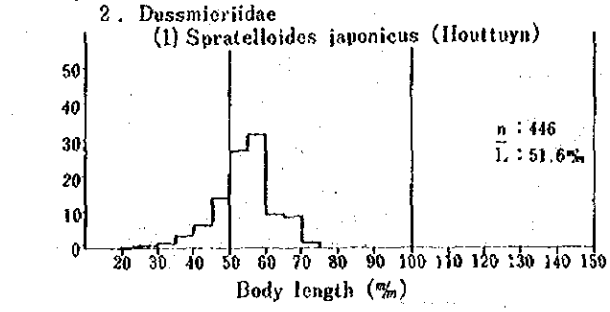
(1) Stolephorus heterolobus (Ruppell)


(2) Stolehorus bataviensis Hardenberg

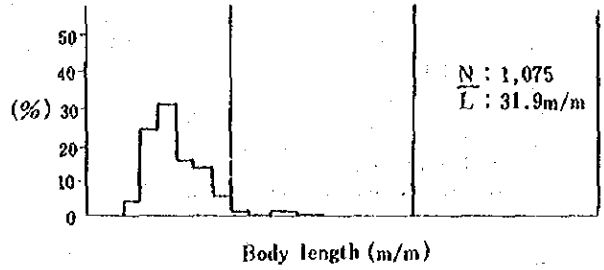



2. Dussmieriidae

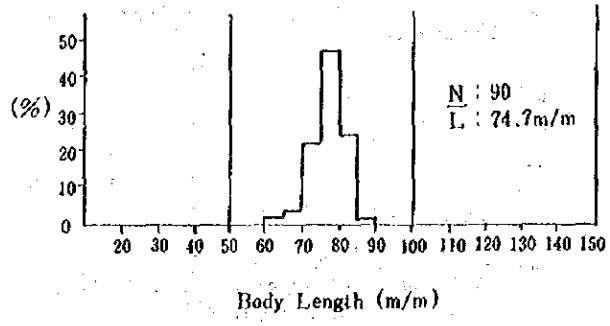
(1) Spratelloides japonicus (Houttuyn)




(2) Sprutelloides delicatulus (Bennett)




3. Dussumieria hasselti Bleeker



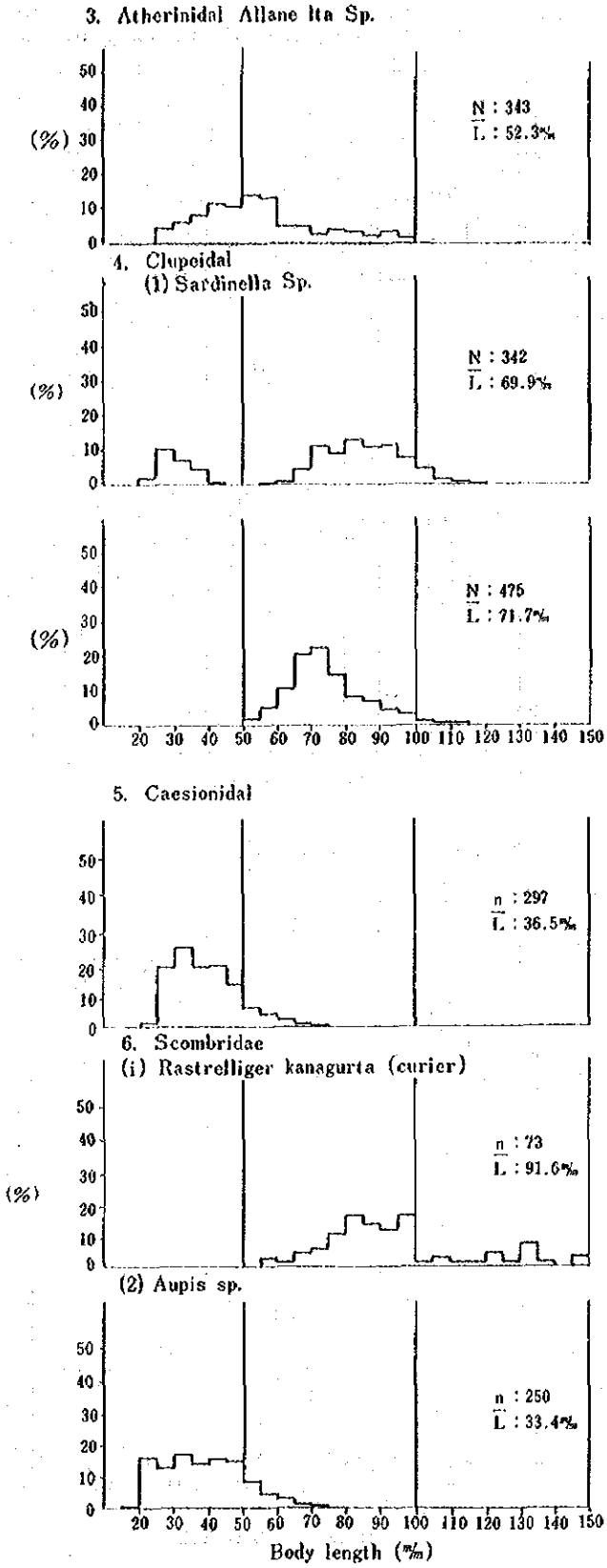



Fig. 33 Body Length Distribution (Davao Gulf Area)

1) Dussumieriidae

Out of Dussumieriidae, Sprotelloides delicaturus (Bennett) were caught the most, followed by S. japonicus (Houttuyn); and Dussumieria hasseltii (Bleeker) accompanying were caught to some extent.

Body length ranged from 15 to 75 mm in Sprotelloides delicaturus (Bennett) (30 mm or so in mode) and from 20 to 70 mm in S. japonicus (Houttuyn) (55 mm or so in mode). Lots of catch in small sized fry (whitebait) on the whole resembled the pattern in Leyte Gulf. Body length of Dussumieria hasseltii (Bleeker) ranged from 60 to 85 m (75 mm in mode).

2) Engraulidae

Out of Engraulidae, Stolephorus heterolobus (Ruppell) were caught most; Stolephorus bataviensis (Haremberg) were caught with others to some extent; and Stolephorus indicus (Van Hasselt) were hardly caught.

Body length ranged from 15 to 85 mm in Stolephorus heterolobus (Ruppell) (some 30 and 50 mm in mode) and from 30 to 115 mm in Stolephorus batariensis (Haremberg) (50 mm or so in mode). Lots of catch of fry of Stolephorus heterolobus (Ruppell) (whitebait) were similar to the pattern in Leyte Gulf.

3) Clupeidae

Out of Clupeidae, there was a catch of Sardinella sp., Havengula ovalis (Bennett) and others. Body length ranged from 20 to 115 mm in Sardinella sp., and the two divisions centering on 25 mm and 80 mm were confirmed in mode. Body length of Harengula sp. ranged from 50 to 110 mm (70 mm or so in mode).

4) Caecionidae

Out of Caecionidae, Caesico pisang (Bleeker) and others were caught; the body length ranged from 20 to 75 mm (30 mm or so in mode); but the catch was a little.

5) Others

Other species such as Atherinidae sp., Mullidae sp. and Scombridae sp., etc. were caught a little.

### 2-2-4 Keeping Test of Bait Fishes

Keeping test of bait fishes in the area of Davao Gulf were carried out, bait pen being established at the Malipano anchorage of Samar Island.

Since the catch of bait fishes was as poor as in Leyte Gulf, it was impossible to observe at one time the same species of bait fish in quantity enough for keeping test. Observation, therefore, was obliged to be made while the bait fishes caught being supplemented one after another into bait pen.

At first, a lot of bait fishes charged fell dead within a full day and night after their charging into bait pen because of their bodies' injury in the process of catching and charging them. Afterwards, the number of dead bait fishes decreased. One or two days after the termination

Table18 Record on Keeping Test of Bait Fishes

| | |
|---|---|
| Operation No. | Stick-held dip net fishing operation No.21~40 |
| Fishing ground | Davao Gulf |
| Date of catching | Jan, 7 ~22, 1977 |
| Site of keeping test | 0.7°~0.0'5 N (Malipano) 125°~43.3 E |
| Distance from shore Depth | 300m, 33m |
| Size of bait pen, Number | 4 m×8 1 set |
| Date transferred to vessel | Jan, 29, 1977. |

Quantity of bait fishes for keeping test

| Species | Quantity | % | Remarks |
|---|---|---|---|
| Engraulidae (EN) | 27.0 Bkts | 50.0% | /Bkts : about 3 kg |
| Dussumieriidae (DU) | 11.0 | 20.0 | |
| Atherinidae (AT) | 7.0 | 13.0 | |
| Clupeidae (CL) | 2.0 | 4.0 | |
| Others | 7.0 | 13.0 | |
| Total | 54.0 | | |

| Date | Hour | Remarks | Received | Died | Survived | Species | Water temp |
|---|---|---|---|---|---|---|---|
| | | | Bkts | Bkts | Bkts | | |
| Jan. 11. '77 | | No.21~25 fishing operation | 1.5 | — | 1.5 | EN, AT, CL, DU | |
| 〃 | 09:30 | No. 1 observation | — | — | 1.5 | | 27.3℃ |
| 〃 | 14:30 | No. 2 〃 | — | 0.5 | 1.0 | Died : EN, DU | |
| 12 | 09:00 | No. 3 〃 | — | 0.5 | 0.5 | 〃 | 27.9 |
| 13 | | No.26, 27 fishing operation | 5.5 | — | 6.0 | DU, AT, others | |
| 〃 | 09:00 | No. 4 observation | — | 2.0 | 4.0 | Died : DU | 27.9 |
| 14 | | No.28, 29 fishing operation | 5.5 | — | 9.5 | EN, DU, others | |
| 〃 | 14:15 | No. 5 observation | — | 2.5 | 7.0 | Died : EN, DU, CL, others | 28.2 |
| 15 | 15.15 | No. 6 〃 | — | 2.0 | 5.0 | Died : EN, DU | 28.8 |
| 16 | | No.30. 31 fishing operation | 5.5 | — | 10.5 | EN, DU, AT, CL. | |
| 〃 | 14:15 | No. 7 observation | — | 1.0 | 9.5 | Died : EN, CL. | 28.8 |
| 17 | | No.33 fishing operation | 1.0 | — | 10.5 | DU | |
| 〃 | 08:15 | No. 8 observation | — | 1.4 | 9.1 | Died : CL, EN, AT | |
| 〃 | 14:15 | No. 9 〃 | — | 0.5 | 8.6 | Died : DU | 29.1 |
| 18 | | No.34 fishing operation | 2.0 | — | 10.6 | DU, CL | |
| 〃 | 15:00 | No.11 observation | — | 1.3 | 9.3 | Died : DU, EN, CL, AT | |
| 19 | | No.35 fishing operation | 2.0 | — | 11.3 | EN, CL, others | |
| 〃 | 15:00 | No.12 observation | — | 1.2 | 10.1 | Died : DU, EN | 27.9 |
| 20 | | No.36. 37 fishing operation | 13.0 | — | 23.1 | EN, LE, others | |
| 〃 | 14:00 | No.13 observation | — | 6.0 | 17.1 | Died : EN, DU | 28.3 |
| 21 | | No.38 fishing operation | 8.0 | — | 25.1 | AT, LE, others | |
| 〃 | 14:30 | No.14 observation | — | 6.9 | 18.2 | Died : EN, CL, DU, AT | |
| 22 | | No.39, 40 fishing operation (Finished charging bait fishes) | 10.0 | — | 28.2 | EN | |
| 〃 | 08:00 | No.15 observation | — | 2.0 | 26.2 | Died : EN | 27.3 |
| 23 | 14:00 | No.16 〃 | — | 2.0 | 24.2 | 〃 | 28.5 |
| 24 | 14:00 | No.17 〃 | — | 1.0 | 23.2 | Died : EN, AT, others | 29.3 |
| 25 | 10:00 | No.18 〃 | — | 1.0 | 22.2 | Died : EN, DU, AT | 28.4 |
| 26 | 09:00 | No.19 〃 | — | — | 22.2 | | 28.0 |
| 27 | 09:30 | No.20 〃 | — | — | 22.2 | | 28.0 |
| 28 | 14:00 | No.21 〃 | — | — | 22.2 | | 28.6 |
| 29 | 07:50 | No.22 〃 (Finished observation) | — | — | 22.2 | | 28.0 |
| 〃 | | Transferred bait fishes to live bait well on board | | | | | |
| Total | | | 54.0 | 31.8 | | | |

of bait fish charging, dead bait fishes were not almost found; and the perseverance of bait fishes against the keeping were observed throughout each species.

However, as the keeping of bait fishes was completed to be made with several other species, the Rastrelliger kanagurta (Cuvier), Atherinidae sp., etc. preyed on the fry of Stolephorus heterolobus (Ruppell), S. japonicus (Houttuyn), etc., which was considered to have become one of the causes of low survival rates. It is, therefore, desirable to keep a single species.

A week or so after termination of bait fish charging, the survival rate was good as 78 per cent. Also, from about three or four days after charging, their intake response to feed given was observed. Afterwards, their preying on feed was becoming active gradually and their adaptability to the keeping was confirmed.

Table 18 and Figure 34 show respectively the record on the keeping test of bait fishes in bait pen and the site of bait pen established.

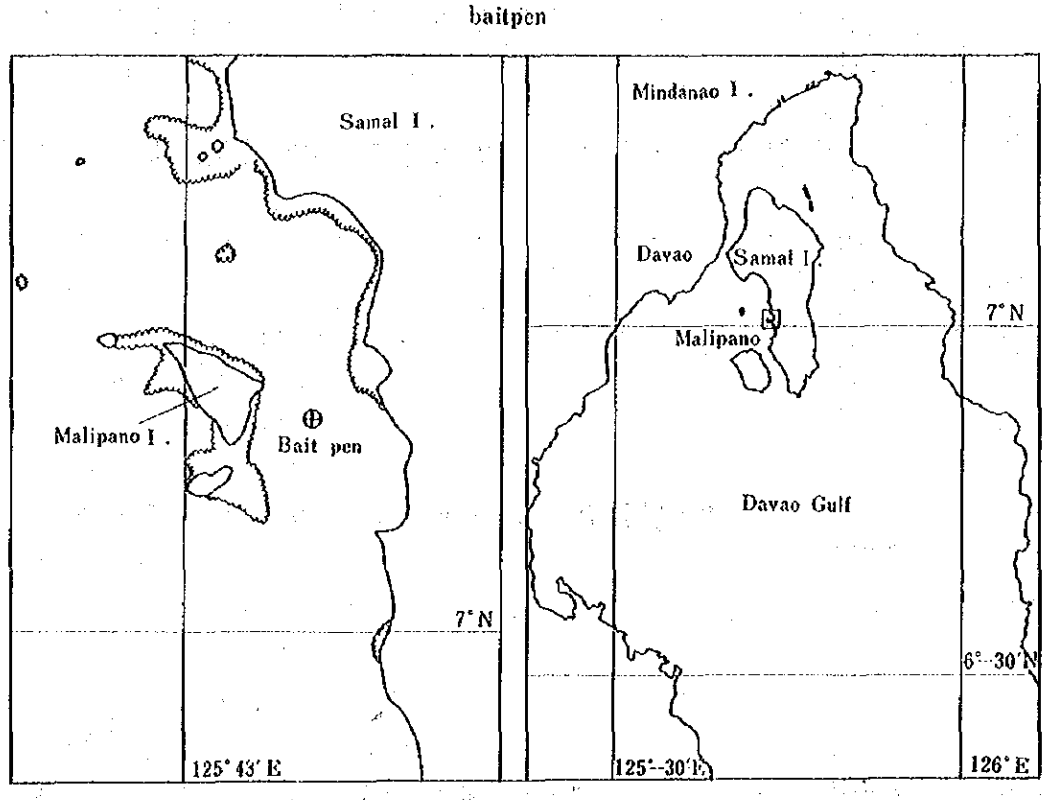


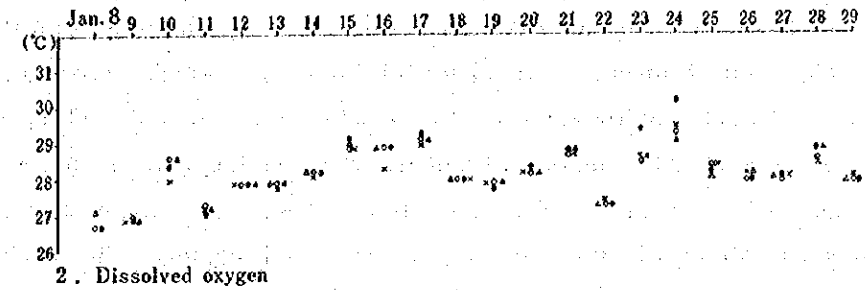

Fig.34 Site of Bait Pen (Davao Gulf Area)

Running parallel to the observation of keeping of bait fishes in bait pen, the value of following factors inside and outside bait pen was measured: the water temperature, hydrogen ion concentration, dissolved oxygen, electrical conductivity, turbidity and transparency.

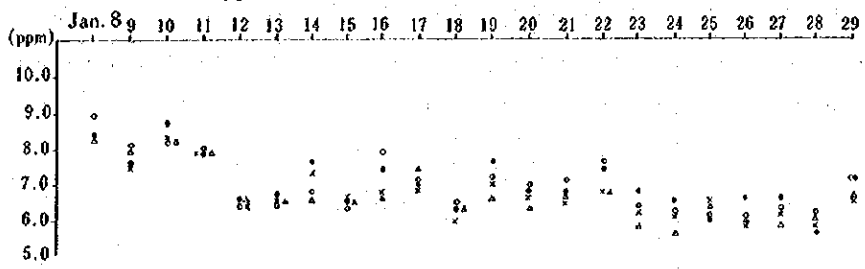
Figure 35 shows the reslut of environmental survey of bait pen.

Note : Outside of bait pen Depth
Inside of bait pen
○ : 0m, ● : 2m, × : 10m
△ : 2m

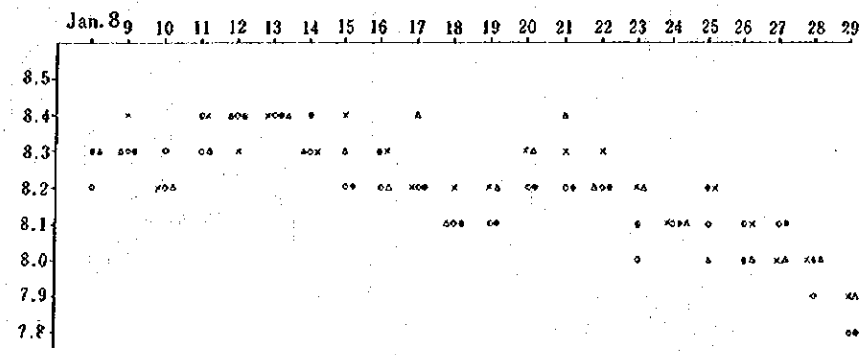
1 . Water temperature



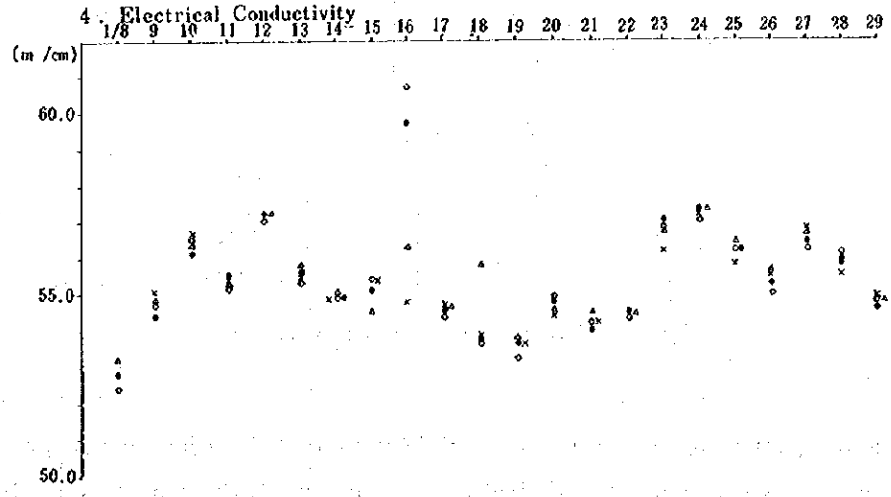

2 . Dissolved oxygen




3 . PH




4 . Electrical Conductivity



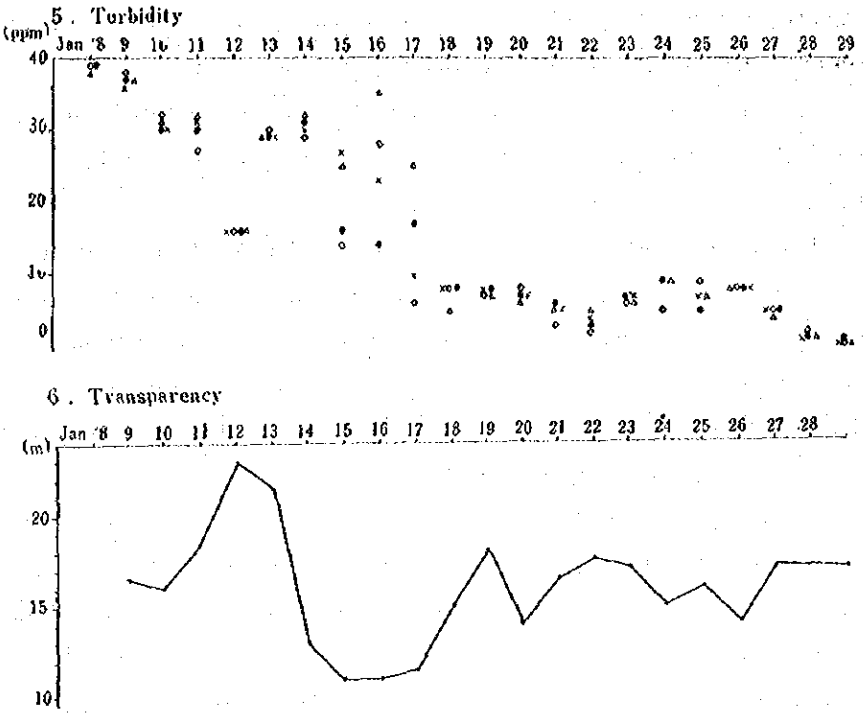



Fig.35 Result of Environmental Survey of Bait Pen(Davao Gulf Area)

1) Water temperature varied ranging from 27 to 29°C, which can be said to be almost proper for bait fishes. By depth, the temperature was the lowest in 10 m layer and high in the surface layer. Among the 2 m and the surface layer and the inside of bait pen, the temperatures differed very little.

2) Hydrogen ion concentration

PH value was between 7.8 and 8.4, which showed about a standard value. This factor was an item with a little variation, as compared with other factors.

3) Dissolved oxygen

Measured value ranged from 6.0 to 7.5 ppm in respective layers. Dissolved oxygen was at or around the saturation value.

As for the relationship between respective layers, the value tended to be high in the surface layer and low in the 10 m layer.

The value measured in bait pen indicated frequently the intermediate value of those of the surface and 10 m layers outside of bait pen. This was considered to be due to the sea water stirred up above and below in bait pen. Also, in the second half of the survey period, the dissolved oxygen of inside bait pen was lower in value than that in respective layers of outside. This is likely because oxygen was consumed by bait fishes with their keeping in this period.

4) Electrical conductivity

Electrical conductivity varied ranging 53 to 58 mΩ/cm, which clearly reflected by the

quantity of rainfall. That is to say, the measured value of electrical conductivity lowered on rainy day and rose in the days of successive fine weather.

Also, by depth, it tended to be low in surface layer (low salinity) and high in 10 m layer (high salinity); and it showed about the intermediate value of them inside of bait pen.

Out of the other items, the measured value of electrical conductivity rose at the lowering of turbidity, and its inverse relationship was clearly confirmed. That is, an interchange of clear, high-salinity ocean water and turbid, low-salinity land water was confirmed clearly.

5) Turbidity

Turbidity varied ranging from 1 to 40 ppm.

Balance by depth did not vary so much except for a certain period. Turbidity also showed a low and stable value on the whole in the second half of the survey period. In brief, the influence on baitfish keeping was not recognized on the whole.

6) Transparency

Transparency varied ranging from 11 to 24 m; although its close inverse relationship with turbidity was considered, very clear features were not confirmed in this survey.

After carrying out of keeping test in bait pen, keeping test were carried out in the live bait well on board the survey vessel.

After the charging of bait fishes, there were found lots of dead bait fishes within a full day and night in live bait well. This is because there were a number of fish bodies injured as the same with the case in bait pen, and likely because the factor due to an environmental change worked largely in the narrow live bait well. There were a number of Atherinidae sp., Harengula sp., etc. that were injured in the head, colliding with the enclosing walls of live bait well.

In the course of observing, the survival rate of bait fishes about one week after of termination of charging was about good as some 78%, excluding the following: (i) there were a lot of dead fry of Stolephorus heterolobus (Ruppell) after charging and (ii) the fry of S. japonicus (Houttuyn) fell dead within about one week.

To the feed given from the starting time of keeping, their intake response was confirmed from about two or three days after charging them. After that, they actively preyed upon feed and their adaptability to keeping was observed the same with the case in bait pen.

Table 19 indicates the record on the keeping test of bait fishes in live bait well on board the survey vessel.

Also, in parallel with the observation on baitfish keeping, the environmental factors of sea water inside and outside live bait well were measured the same with the case in bait pen.

Table 19 Record on Keeping Test of Bait Fishes (Davao Gulf Area)

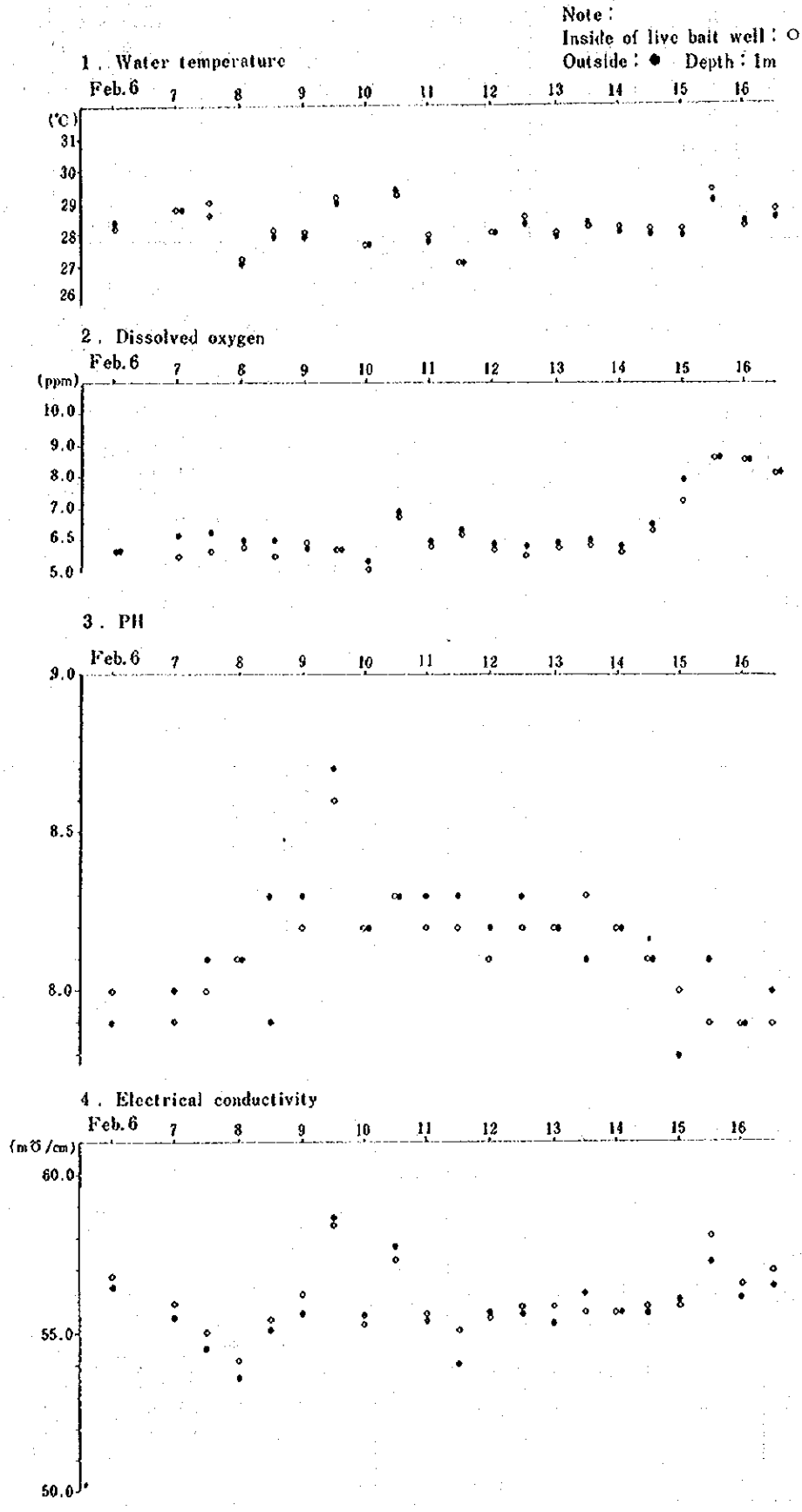
| Operation No. | Stick-held dip net fishing Operation No. 53~57 |
|---|---|
| Fishing ground | Davao Gulf |
| Date of catching | Feb. 5 ~ 7, 1977 |
| Site of keeping test | No. 3 live bait well on board |
| Capacity of live bait well | 3.60m³ |
| Date transferred to vessel | |

Quantity of bait fishes for keeping test

| Species | Quantity | % | Remarks |
|---|---|---|---|
| Engraulidae (EN) | 6.5Bkts | 38.3% | 1 Bkts : about 3 kg |
| Dussumieriidae (DU) | 6.5 | 38.3 | |
| Clupeidae (CL) | 4.0 | 23.5 | |
| Total | 17.0 | 100 | |

| Date | Hour | Remarks | Received | Died | Survived | Species | Water temp. |
|---|---|---|---|---|---|---|---|
| | | | Bkts | Bkts | Bkts | | |
| Feb. 6, '77 | | No. 53~55 fishing operation | 4.0 | — | 4.0 | Received : EN 3 Bkts (75%)<br>DU 1 〃 (25 〃) | °C |
| | 11:00 | No. 1 observation | — | 1.5 | 2.5 | Died : EN | 28.2 |
| 7 | | No. 56, 57 fishing operation (Finished charging bait fishes) | 13.0 | — | 15.5 | Received : EN 3.5Bkts (27%)<br>DU 5.5 〃 (42 〃)<br>CL 4.0 〃 (31 〃) | |
| 〃 | 10:30 | No. 2 observation | — | 2.5 | 13.0 | Died : CL, EN | 28.8 |
| 〃 | 17:00 | No. 3 〃 | — | 4.0 | 9.0 | Died : CL, EN, DU | 29.0 |
| 8 | 10:00 | No. 4 〃 | — | 3.0 | 6.0 | 〃 | 27.2 |
| 〃 | 17:00 | No. 5 〃 | — | 0.5 | 5.5 | 〃 | 28.1 |
| 9 | 07:00 | No. 6 〃 | — | 0.5 | 5.0 | 〃 | 28.0 |
| 〃 | 17:00 | No. 7 〃 | — | 0.5 | 4.5 | Died : CL, DU, EN | 29.1 |
| 10 | 10:00 | No. 8 〃 | — | 0.3 | 4.2 | Died : EN | 27.6 |
| 〃 | 16:30 | No. 9 〃 | — | 0.2 | 4.0 | Died : EN, DU | 29.2 |
| 11 | 10:00 | No. 10 〃 | — | 0.2 | 3.8 | Died : DU, EN | 27.9 |
| 〃 | 16:30 | No. 11 〃 | — | 0.1 | 3.7 | 〃 | 27.0 |
| 12 | 08:00 | No. 12 〃 | — | 0.1 | 3.6 | 〃 | 27.9 |
| 〃 | 16:00 | No. 13 〃 | — | 0.1 | 3.5 | | 28.4 |
| 13 | 08:00 | No. 14 〃 | — | 0 | 3.5 | | 27.9 |
| 〃 | 16:00 | No. 15 〃 | — | 0 | 3.5 | | 28.1 |
| 14 | 09:00 | No. 16 〃 | — | 0 | 3.5 | | 28.1 |
| 〃 | 16:00 | No. 17 〃 | — | 0 | 3.5 | | 27.9 |
| 15 | 10:00 | No. 18 〃 | — | 0 | 3.5 | | 28.0 |
| 〃 | 16:00 | No. 19 〃 | — | 0 | 3.5 | | 29.2 |
| 16 | 10:00 | No. 20 〃 | — | 0 | 3.5 | | 28.1 |
| 〃 | 16:00 | No. 21 〃 (Finished observation) | — | 0 | 3.5 | Survived :<br>EN 2.2Bkts (62.9%)<br>DU 0.7 〃 (20 〃)<br>CL 0.3 〃 ( 8.6 〃)<br>others 0.3 〃 ( 8.6 〃) | 28.6 |
| Total | | | 17.0 | 13.5 | 3.5 | | |

Figure 36 shows the measured results.



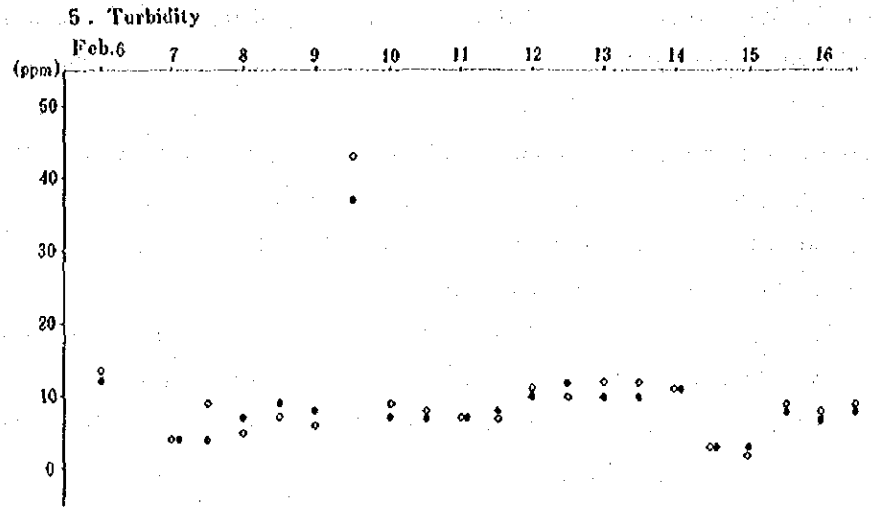



Fig.36 Result of Environmental Survey of Live Bait Well (Davao Gulf Area)

1) Water temperature

Water temperature varied ranging from 27 to 29°C. As the inside of live bait well was under the compulsory circulation system of sea water, water was being taken in from overboard all the time. Water temperature inside live bait well were not very different from those at overboard. However, as a whole, the former tended to be somewhat higher than the latter.

2) Hydrogen ion concentration

PH value varied in the range of 7.9 to 8.7 as standard value or thereabout. Particularly, a constant difference was not confirmed between at overboard and inside of live bait well.

3) Dissolved oxygen

Value of dissolved oxygen varied ranging from 5 to 8.5 ppm; its value tended to be generally lower in the live bait well than at overboard, which is considered to have resluted from consumption of oxygen by bait fishes; this can also be said to be dependent on the quantity of bait fish as well. In brief, its big difference was not observed in this measurement. Also, its big influence on bait fishes was not confirmed.

4) Electrical conductivity

The measured value of electrical conductivity varied ranging from 53 to 58 mΩ/cm. This variation was due to a difference by the areas where the survey vessel stayed. Value of electrical conductivity tended to be higher at inside live bait well than at overboard, but it was not high clearly. Tendency in salinity variation estimated by this was not remarkably confirmed.

5) Turbidity

Turbidity varied in the range of 10 ppm or thereabouts. Variation in turbidity, like in the case of electrical conductivity was due to a difference by the areas where the survey

vessel stayed. Also, a clear difference of it was not observed between at overboard and inside of live bait well.

2-2-5 Aptitude of Bait Fish

By major fish species caught in the area of Davao Gulf, their features were as follows:

1) Dussumieriidae

Out of Dussumieriidae, Spratelloides delicatulus (Bennett) were caught the most, followed by a number of S. japonicus (Houttuyn).

Size of fish body was generally small; and particularly the fry of S. japonicus (Houttuyn) (whitebait) died early and were not proper as bait fish.

Nevertheless, the perseverance of the fish grown up more than 50 mm against for keeping was confirmed.

Dussumieria hasseltii (Bleeker) were mostly not caught in abundance.

2) Engraulidae

Out of Engraulidae, Stolephorus heterolobus (Ruppell) were caught the most; and S. batabiensis (Hardenberg) were caught with others.

Although a lot of fry (whitebait) were found in Stolephorus heterolobus (Ruppell) similarly to the pattern of Leyte Gulf, Stolephorus heterolobus (Ruppell) that grew up more than 50 mm in body length and S. bataviensis (Hardenberg) were confirmed to have a perseverance against the keeping. Therefore, the use of them as bait fish can be expected.

Also, a number of these species scattered as bait were found in the stomach of skipjack.

3) Clupeidae

Out of Clupeidae, Sardinella sp. and Harengula ovalis (Bennett) were caught, their size in body length being about proper for bait fish. Also, their perseverance against the keeping was strong. Also, some of these species were found out in the stomach contents of skipjack. As a result, their aptitude as bait fish is considered to be great.

4) Others

Other species caught in addition to the above-mentioned three species were those belonging to the following families: Atherinidae, Caecionidae, Carangidae, Scombridae, etc.; but catch was a little.

However, the availability of species belonging to Carangidae and Scombridae can be expected for in Davao Gulf; and, as their perseverance against the keeping was strong, it can be considered that the use of their young fish is hopeful enough. However, their grown-up of more than some extent in size are too large for bait fish and if they are chummed with other smaller size species in bait pen, the former may become a natural enemy to prey on the latter, on which attention has to be payed.

## IV. Observation

### 1. Survey on Skipjack

Although the appearance of skipjack and yellowfin schools during the period of this survey throughout the areas of Leyte Gulf and Davao Gulf numbered a few and the catch thereof, too, ended in a poor harvest, it is impossible to judge the whole of skipjack fishing in locality from the findings of this survey in the area and period limited.

The school population of the skipjack and yellowfin in the waters of Philippine Islands has not been clarified. Nevertheless, except bonitos sp. of which young fishes were caught during this survey period, it is considered that fishing season and fishing ground of skipjack and yellowfin in these area seems to be formed by their feeding migration with relations of the oceanographical conditions and the growing-up conditions of bait fish. It is also considered that this survey period corresponded to the off fishing season in Leyte Gulf as well as to the period of the off fishing season to the beginning of migrating of fish schools in Davao Gulf.

In order to confirm a seasonal variation in catch and to judge the overall conditions throughout the year, it is necessary to compare the findings of this survey with those of another survey conducted in different season and to study them by using an overall information based upon those findings. In the near future, therefore, it is necessary to conduct another survey in different season by all means. With respect to the catching of skipjack by pole-and-line fishing in locality, there seems to be no technical problems in particular. However, as regards to the oceanographical conditions under which it seems difficult for fish schools to float up because of no water temperature thermocline or its indistinctness, the practical application of artificial driftwood (such similar application was seen in locality) would be effective.

### 2. Survey on Bait Fishes

For the skipjack pole-and-line fishing, live bait fishes must ensurely be provided.

In this survey as well, the catching of bait fishes and the keeping test of bait fishes were conducted in parallel with the skipjack survey.

In both areas of Leyte Gulf and Davao Gulf, the results in catch were the low-toned and unsatisfactory. However, the distribution of the fish species capable of being used as bait fish of skipjack fishing was confirmed and a prospect has lively been obtained that catching bait fishes by method of stick-held dip net with light is effective.

In order to clarify these fish species having a growing-up cycle during the comparatively short period, it is necessary to study the catching stability of them, on the whole, observing their periodical variation. Fish catch was in a low tone during the present survey.

Nevertheless, judging from the fact that the local fishery for sardines and Carangidae sp. is in operation, it can be considered that there exists a possibility of securing bait fishes.

Also, in order for bait fish to be supplied constantly, it is essential to keep bait fishes alive.

In this survey, as it was difficult to secure the adequate quantity of bait fishes as testing material, it was unable to make observation on the keeping tests of bait fishes under satisfactory conditions. It is, therefore, difficult to conclude its possibility. Nevertheless, as for the both areas of Leyte Gulf and Davao Gulf, it is considered that the following prospects were obtained: (i) suitable sites are available there in the suitable environmental conditions under which bait pen can be established for keeping of bait fishes and (ii) although under the limited conditions, the keeping of bait fishes in bait pen was technically possible.

Furthermore, it is considered that the fishing season and growing-up condition of bait fishes together with the oceanographical conditions in the survey areas have great relations with the fishing season when skipjack come round. From this point of view, another survey in different season is necessary by all means in the future.

# Annex Tables and Photos

Annex table 1.

Record of Noon Position

| Date | Noon position | | Weather | Wind direction | Wind force | Air pressure (mb) | Air temperature | Sea temperature | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | Latitude | Longitude | | | | | | | |
| Nov. 15, '76 | Kurihama | | | | | | | | 1 2:0 0 Left from Kurihama for Manila |
| 16 | 33°-33.0N | 136°-02.0E | b c | NNW | 3 | 1029.5 | 16.6 | 20.4 | |
| 17 | 31°-48.0N | 132°-09.0E | o | SE | 4 | 1018.5 | 20.4 | 24.4 | |
| 18 | 29°-37.0N | 130°-54.0E | o | NW | 5 | 1017.0 | 20.0 | 24.2 | |
| 19 | 26°-21.0N | 128°-17.0E | o | NE | 4 | 1019.5 | 24.2 | 24.9 | |
| 20 | 23°-50.0N | 124°-44.0E | o | NE | 4 | 1016.0 | 25.0 | 24.8 | |
| 21 | 20°-28.0N | 122°-08.0E | o | NNE | 7 | 1015.5 | 23.2 | 26.7 | Passed Balintan strait, Proceeded into South China Sea |
| 22 | 17°-15.0N | 120°-03.5E | c | NNE | 5 | 1012.5 | 29.4 | 28.4 | |
| 23 | Manila | | c | NW | 2 | 1010.5 | 27.3 | | Arrived at outer harbour of Manila<br>1 0:3 9 Moored at Pier No. 13 of Manila |
| 24 | 〃 | | c | NW | 2 | 1010.5 | 27.5 | | 1 2:3 0 Manila Harbour |
| 25 | 〃 | | r | Calm | | 1010.0 | 27.5 | | 〃 |
| 26 | 〃 | | c | SW | 1 | 1010.0 | 28.0 | | 〃 |
| 27 | 〃 | | c | NE | 2 | 1007.0 | 28.0 | | 〃 |
| 28 | 〃 | | b c | SW | 2 | 1010.3 | 30.7 | | 〃 |
| 29 | 〃 | | b c | SW | 2 | 1010.0 | 30.0 | | 〃 |
| 30 | 〃 | | c | NE | 2 | 1010.0 | 29.0 | | 〃 |
| Dec. 1, '76 | 〃 | | r | NE | 2 | 1009.8 | 27.5 | | 〃 |
| 2 | 〃 | | o | SW | 2 | 1010.5 | 28.5 | | 〃 |
| 3 | 〃 | | o | W | 2 | 1008.0 | 29.8 | | 〃 |
| 4 | 〃 | | c | W | 2 | 1008.5 | 30.5 | | 〃 |
| 5 | 〃 | | r | NE | 2 | 1007.0 | 27.0 | | 〃 |
| 6 | 〃 | | r | SW | 4 | 1008.0 | 25.0 | | 〃 |
| 7 | 〃 | | o | NW | 3 | 1009.5 | 28.5 | | 1 5:1 5 Left from Manila for Tacloban |
| 8 | 12°-49.5N | 122°-45.5E | c | NNE | 3 | 1008.0 | 25.0 | 25.2 | |
| 9 | 12°-09.6N | 125°-38.6E | o | N | 3 | 1009.0 | 24.2 | 27.6 | 2 3:3 0 Anchored at San Pedro Bay |
| 10 | Tacloban | | r | WNW | 3 | 1009.5 | 25.0 | | 0 9:0 0 Arrived at Tacloban |
| 11 | 〃 | | r | NW | 2 | 1011.0 | 27.5 | | Anchored at Tacloban |
| 12 | 11°-01.5N | 125°-24.4E | b c | ESE | 2 | 1013.5 | 28.0 | 28.5 | 0 8:0 0 Left from Tacloban 4:3 0 Arrived at Guiuan |
| 13 | 11°-01.1N | 125°-42.2E | b c | NE | 3 | 1013.0 | 28.0 | 28.0 | Bait fish survey |
| 14 | 11°-02.5N | 125°-39.3E | c | NE | 3 | 1011.0 | 28.1 | 28.0 | 〃 |
| 15 | 11°-05.3N | 125°-34.2E | b c | E | 3 | 1012.3 | 27.9 | 27.9 | 〃 |

| Date | Noon position | | Weather | Wind direction | Wind force | Air pressure (mb) | Air temperature | Sea temperature | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | Latitude | Longitude | | | | | | | |
| Dec. 16, '76 | 11°-05.3N | 125°-34.9E | b c | ENE | 3 | 1013.0 | 28.8 | 28.6 | Bait fish survey |
| 17 | 11°-06.6N | 125°-33.6E | o | NE | 4 | 1012.0 | 28.0 | 28.0 | 〃 |
| 18 | 11°-05.3N | 125°-34.2E | o | NE | 3 | 1010.5 | 28.3 | 27.8 | 〃 |
| 19 | 11°-02.7N | 125°-37.3E | c | E | 4 | 1010.0 | 26.8 | 27.7 | 〃 |
| 20 | 10°-59.0N | 125°-40.0E | o | SE | 3 | 1011.5 | 24.6 | 27.3 | 〃 |
| 21 | 11°-02.4N | 125°-38.5E | b c | NE | 4 | 1010.0 | 28.0 | 27.4 | 〃 |
| 22 | Tacloban | | r | Calm | | 1010.0 | 25.9 | 27.5 | 1 2:0 0 Arrived at Tacloban, ship's supply |
| 23 | 〃 | | r | 〃 | | 1009.0 | 26.8 | 28.4 | 1 2:0 0 Left from Tacloban Bait fish survey |
| 24 | 10°-50.4N | 125°-53.7E | o | N | 3 | 1009.5 | 27.4 | 27.6 | Skipjack survey 〃 |
| 25 | 10°-38.0N | 125°-36.2E | r | NW | 4 | 1007.4 | 26.6 | 26.4 | 〃 〃 |
| 26 | 10°-49.7N | 126°-00.0E | b c | ESE | 3 | 1009.5 | 28.0 | 27.9 | 〃 〃 |
| 27 | 10°-33.7N | 125°-46.2E | b c | ENE | 3 | 1010.2 | 28.6 | 27.4 | 〃 〃 |
| 28 | 10°-27.2N | 125°-24.2E | b c | NE | 3 | 1010.0 | 27.3 | 27.0 | 〃 〃 |
| 29 | 11°-02.8N | 125°-39.3E | o | E | 4 | 1008.0 | 27.4 | 27.4 | 〃 〃 |
| 30 | 10°-51.8N | 126°-14.0E | o | E | 5 | 1009.0 | 28.0 | 27.7 | 〃 2 2:5 5 Drifted at San Pedro Bay |
| 31 | | | c | ESE | 2 | 1009.2 | 29.4 | 29.0 | 0 8:1 5 Anchored at Tacloban |
| Jan. 1, '77 | 〃 | | b c | SE | 1 | 1008.5 | 29.3 | 28.4 | Arrived at Tacloban |
| 2 | 11°-06.0N | 125°-08.7E | b c | SSE | 3 | 1011.0 | 27.0 | 27.3 | 1 0:0 5 Left from Tacloban for Davo |
| 3 | 08°-04.8N | 126°-39.3E | c | N | 1 | 1011.9 | 28.0 | 28.4 | Skipjack schools ocular observation, Oceans graphic observation |
| 4 | Davao | | c | N | 3 | 1009.9 | 27.6 | 27.9 | 0 8:0 5 Arrived at Davao outer harbour |
| 5 | 〃 | | c | NE | 2 | 1010.0 | 29.4 | 26.8 | Anchored at Davao |
| 6 | 〃 | | c | NE | 1 | 1009.5 | 28.4 | 26.8 | 1 2:3 0 Left from Davao 13:50 Arrived at Malipano anchorage |
| 7 | 07°-00.3N | 125°-43.3E | o | N | 2 | 1009.5 | 25.0 | 26.1 | Anchored at Malipano anchorage Bait fish survey |
| 8 | 07°-00.8N | 125°-43.3E | r | Calm | | 1011.0 | 24.4 | 26.0 | 〃 〃 |
| 9 | Davao | | b c | NNE | 2 | 1009.5 | 28.5 | 27.0 | 1 0:3 0 Left from Malipano 11:45 Arrived at Davao |
| 10 | 06°-59.7N | 125°-43.3E | b c | SW | 1 | 1008.7 | 28.9 | 27.9 | 0 9:3 0 Left from Davao 11:40 Anchored at Malipano Bait fish survey |
| 11 | 06°-26.0N | 125°-57.8E | c | WNW | 1 | 1008.0 | 27.6 | 28.1 | Left from Davao, Anchored at Malipano |
| 12 | 07°-00.5N | 125°-43.3E | b c | S | 1 | 1008.0 | 28.7 | 28.4 | 〃 |
| 13 | 06°-22.0N | 125°-47.5E | b c | ESE | 1 | 1008.5 | 28.1 | 29.0 | Oceanographic observation, Bait fish survey |
| 14 | 07°-02.4N | 125°-32.5E | o | SE | 1 | 1009.0 | 28.6 | 28.0 | 〃 〃 |
| 15 | 06°-52.2N | 125°-25.9E | b c | N | 1 | 1009.4 | 28.8 | 27.9 | 〃 〃 |

| Date | Noon position | | Weather | Wind direction | Wind force | Air pressure (mb) | Air temperature | Sea temperature | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | Latitude | Longitude | | | | | | | |
| Jan. 16, '77 | 06°-50'N | 125°-34'E | bc | N | 1 | 1010.0 | 28.4 | 28.4 | Bait fish survey |
| 27 | 07°-00'N | 125°-43'E | bc | NW | 1 | 1009.5 | 30.1 | 29.3 | 〃 |
| 28 | 06°-54'N | 125°-28'E | bc | NE | 3 | 1009.0 | 28.3 | 28.8 | 〃 |
| 29 | 07°-09'N | 125°-52'E | c | NW | 2 | 1010.0 | 28.3 | 27.5 | 〃 |
| 30 | 06°-59'N | 125°-53'E | o | NNW | 3 | 1010.0 | 27.0 | 27.8 | 〃 |
| 31 | 07°-14'N | 125°-39'E | o | NNE | 2 | 1009.3 | 28.0 | 27.6 | 〃 |
| 22 | Davao | | o | ENE | 1 | 1009.5 | 27.9 | 27.2 | 1 0:1 5 Arrived at Davao, ship's supply |
| 23 | 07°-00'N | 125°-43'E | bc | SSW | 1 | 1009.9 | 28.3 | 28.4 | 1 0:4 5 Left from Davao Bait fish survey |
| 24 | 07°-14'N | 126°-39'E | bc | E | 1 | 1009.0 | 28.6 | 28.3 | 〃 〃 |
| 25 | 06°-15'N | 126°-08'E | bc | Calm | | 1009.5 | 28.2 | 28.7 | Skipjack survey |
| 26 | 06°-20'N | 125°-56'E | bc | N | 1 | 1010.0 | 28.0 | 28.9 | 〃 Bait fish survey |
| 27 | 06°-30'N | 125°-24'E | bc | E | 2 | 1009.0 | 28.1 | 28.7 | 〃 |
| 28 | 05°-30'N | 125°-36'E | c | NE | 4 | 1008.5 | 27.6 | 28.9 | Skipjack survey |
| 29 | 07°-00'N | 125°-43'E | c | NW | 2 | 1009.5 | 28.3 | 28.3 | Bait fish survey |
| 30 | 06°-11'N | 126°-08'E | bc | N | 2 | 1009.0 | 27.8 | 28.2 | Skipjack survey 〃 |
| 31 | 06°-31'N | 125°-31'E | o | NNE | 1 | 1009.8 | 27.5 | 28.5 | 〃 |
| Feb. 1, '77 | 06°-03'N | 126°-20'E | c | N | 3 | 1010.2 | 27.5 | 27.9 | Skipjack survey 〃 |
| 2 | 06°-03'N | 126°-21'E | o | W | 2 | 1008.8 | 25.3 | 27.6 | 〃 〃 |
| 3 | Davao | | bc | ENE | 2 | 1008.0 | 28.3 | 27.9 | 0 9:1 0 Arrived at Davao, Ship's supply |
| 4 | 〃 | | bc | NE | 1 | 1009.8 | 28.0 | 27.5 | 1 3:0 5 Left foom Davao Bait fish survey |
| 5 | 06°-06'N | 126°-20'E | c | N | 3 | 1008.0 | 26.4 | 27.8 | Skipjack survey 〃 |
| 6 | 06°-44'N | 126°-05'E | bc | WNW | 3 | 1008.3 | 28.2 | 28.4 | 〃 |
| 7 | Davao | | bc | E | 2 | 1008.0 | 27.9 | 28.3 | 1 0:0 0 Arrived at Davao 17 : 10 Left from Davao Bait fish |
| 8 | 06°-02'N | 125°-52'E | o | SSE | 1 | 1011.5 | 24.0 | 27.3 | Bait fish survey survey |
| 9 | 06°-35'N | 125°-26'E | bc | ENE | 3 | 1009.8 | 28.4 | 28.6 | 〃 |
| 10 | 06°-00'N | 125°-42'E | c | N | 3 | 1010.8 | 28.3 | 27.8 | 〃 |
| 11 | 06°-21'N | 126°-17'E | c | NNE | 3 | 1010.0 | 27.2 | 27.7 | Skipjack srvey |
| 12 | 06°-38'N | 126°-34'E | bc | N | 3 | 1010.0 | 27.2 | 28.2 | 〃 |
| 13 | 06°-16'N | 126°-18'E | o | NE | 4 | 1010.7 | 26.9 | 26.3 | 〃 Bait fish survey |
| 14 | 06°-44'N | 125°-23'E | c | NE | 2 | 1009.5 | 28.9 | 28.9 | 〃 |
| 15 | 06°-49'N | 126°-04'E | bc | SW | 2 | 1008.5 | 28.2 | 28.3 | 〃 |

| Date | Noon position | | Weather | Wind direction | Wind force | Air pressure (mb) | Air temperature | Sea temperature | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | Latitude | Longitude | | | | | | | |
| Feb. 16, '77 | 06°-07'N | 126°-19'E | bc | N | 2 | 1009.8 | 28.0 | 28.5 | Skipjack survey |
| 17 | 05°-39'N | 126°-42'E | o | NNE | 2 | 1011.0 | 27.5 | 27.7 | 〃 Bait fish survey |
| 18 | 05°-43'N | 126°-28'E | o | N | 3 | 1012.2 | 26.9 | 27.7 | 〃 |
| 19 | 05°-40'N | 125°-58'E | c | N | 4 | 1009.1 | 27.1 | 27.7 | 〃 Bait fish susvey |
| 20 | 05°-25'N | 125°-36'E | o | NE | 6 | 1009.0 | 25.3 | 27.3 | 〃 |
| 21 | Davao | | o | NE | 2 | 1010.5 | 25.5 | | Bait fish survey 1 1 : 4 5 Arrived at Davao |
| 22 | 〃 | | bc | N | 3 | 1011.0 | 29.6 | 28.2 | 1 6:5 5 Left from Davao Bait fish survey |
| 23 | 05°-40'N | 125°-43'E | o | NNE | 4 | 1012.0 | 26.8 | 27.4 | Skipjack survey |
| 24 | 05°-32'N | 125°-14'E | o | NE | 6 | 1010.0 | 29.3 | 28.2 | 〃 |
| 25 | 06°-01'N | 125°-48'E | bc | NNE | 4 | 1011.8 | 28.0 | 27.5 | 〃 Bait fish survey |
| 26 | 07°-01'N | 125°-58'E | o | W | 2 | 1012.3 | 26.3 | 26.4 | |
| 27 | 05°-44'N | 125°-49'E | c | N | 4 | 1010.0 | 29.4 | 27.5 | Skipjack survey |
| 28 | 06°-06'N | 126°-18'E | bc | N | 3 | 1010.0 | 27.3 | 27.8 | 〃 Bait fish survey |
| Mar. 1, '77 | 07°-03'N | 125°-56'E | bc | WNW | 2 | 1009.2 | 28.6 | 28.2 | 〃 |
| 2 | 06°-30'N | 125°-34'E | bc | NNW | 1 | 1009.4 | 28.8 | 28.7 | 〃 |
| 3 | 06°-49'N | 126°-04'E | bc | WNW | 2 | 1010.5 | 28.0 | 28.4 | 〃 |
| 4 | 06°-16'N | 126°-02'E | bc | N | 2 | 1012.0 | 28.3 | 28.0 | 〃 Oceanographic observation, Bait fish survey |
| 5 | 06°-19'N | 125°-47'E | bc | NNW | 4 | 1011.8 | 26.7 | 27.5 | 〃 〃 〃 |
| 6 | 07°-02'N | 125°-42'E | r | N | 3 | 1013.5 | 24.7 | 26.6 | 〃 〃 |
| 7 | 06°-59'N | 125°-43'E | o | NNW | 2 | 1013.5 | 26.9 | 27.2 | Bait fish survey |
| 8 | Davao | | bc | NE | 2 | 1012.5 | 27.8 | 28.0 | 〃 |
| 9 | 〃 | | o | NNE | 3 | 1012.5 | 28.7 | 28.2 | 1 2:1 0 Left from Davao, Skipjack survey, Bait fish survey |
| 10 | 06°-11'N | 126°-27'E | c | NNE | 4 | 1013.0 | 27.3 | 27.7 | 〃 〃 |
| 11 | 06°-06'N | 126°-17'E | c | NNE | 3 | 1013.0 | 26.9 | 27.7 | 〃 〃 |
| 12 | 06°-44'N | 126°-05'E | o | NW | 2 | 1014.0 | 27.4 | 27.9 | 〃 〃 |
| 13 | 06°-08'N | 126°-34'E | r | NNE | 4 | 1013.2 | 23.8 | 27.4 | 〃 〃 |
| 14 | 06°-10'N | 126°-29'E | c | NNE | 3 | 1013.2 | 27.8 | 27.8 | 〃 〃 |
| 15 | Davao | | c | NE | 2 | 1011.0 | 27.5 | | 1 1:0 0 Arrived at Davao |
| 16 | 〃 | | bc | NE | 2 | 1012.0 | 28.9 | | |
| 17 | 〃 | | bc | ESE | 2 | 1014.0 | 28.7 | | |
| 18 | 06°-51'N | 125°-42'E | bc | SE | 2 | 1013.8 | 28.5 | 28.4 | 1 0:1 5 Left from Davao for Japan |

| Date | Noon position | | Weather | Wind direction | Wind force | Air pressure (mb) | Air temperature | Sea temperature | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | Latitude | Longitude | | | | | | | |
| Mar. 19, '77 | 08°-24'N | 126°-30'E | bc | NNE | 3 | 1012.5 | 27.6 | 28.0 | Underway for Japan |
| 20 | 11°-41'N | 125°-42'E | bc | NW | 2 | 1013.0 | 25.9 | 27.5 | 〃 |
| 21 | 15°-10'N | 126°-19'E | bc | NE | 5 | 1015.0 | 26.7 | 26.6 | 〃 |
| 22 | 19°-02'N | 126°-48'E | bc | NE | 5 | 1017.5 | 25.0 | 25.1 | 〃 |
| 23 | 22°-58'N | 127°-05'E | bc | ESE | 3 | 1020.0 | 25.3 | 23.9 | 〃 |
| 24 | 26°-01'N | 127°-41'E | o | N | 5 | 1027.0 | 16.5 | 21.4 | 〃 |
| 25 | 28°-16'N | 130°-05.5'E | bc | NNW | 3 | 1026.5 | 15.2 | 20.3 | 〃 |
| 26 | 31°-00.5'N | 131°-25.0'E | bc | SW | 4 | 1022.0 | 19.3 | 18.6 | 〃 |
| 27 | 33°-00.0'N | 133°-51.5'E | bc | WNW | 7 | 1014.3 | 17.8 | 18.9 | 〃 |
| 28 | 34°-00.0'N | 136°-41.5'E | b | N | 3 | 1022.0 | 11.7 | 16.2 | 〃 |
| 29 | 35°-20.5'N | 139°-45.0'E | c | NNE | 3 | 1029.0 | 8.2 | 11.0 | 15:20 Arrived at Tokyo |
| 30 | Tokyo | | r | SSW | 2 | 1022.5 | 14.7 | | |
| 31 | 〃 | | | | | | | | |

Annex table 2.

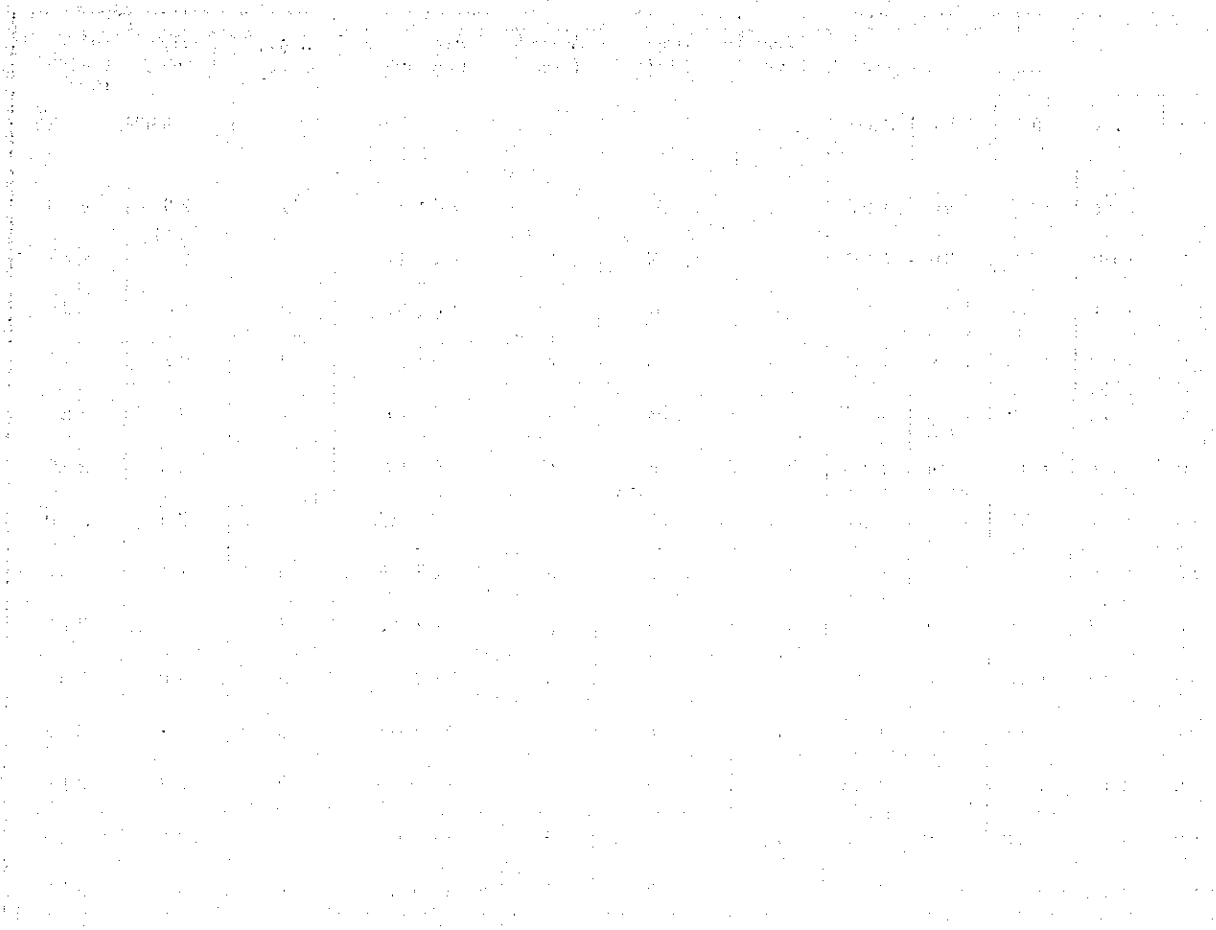
Record of Oceanographic Observation

| No. | Date | Haur | Position | | Water temperature (℃) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Latitude | Longitude | (Dep.) 0 m | 25 | 50 | 75 | 100 | 125 |
| 1 | Dec. 9. '76 | 09:35 | 12°-30.0N | 125°-30.0E | 27.8 | 27.7 | 27.7 | 27.3 | 25.3 | 23.6 |
| 2 | 〃 | 13:00 | 12°-00.0N | 125°-42.4E | 27.9 | 27.8 | 27.7 | 26.1 | 24.4 | 22.0 |
| 3 | 〃 | 15:35 | 11°-30.0N | 125°-48.8E | 27.9 | 27.8 | 27.6 | 26.0 | 23.5 | 22.0 |
| 4 | 〃 | 18:00 | 11°-00.0N | 125°-00.0E | 27.7 | 27.5 | 27.0 | 26.5 | 24.9 | 23.3 |
| 5 | 14. | 09:00 | 11°-02.5N | 125°-39.3E | 28.3 | 28.3 | Dep. 30 m | – | – | – |
| 6 | 29. | 11:30 | 10°-56.5N | 125°-36.0E | 27.4 | 27.3 | 27.0 | 26.9 | Dep. 85 m | – |
| 7 | Jan. 2. '77 | 13:10 | 11°-00.0N | 125°-17.4E | 27.7 | 27.6 | 27.3 | Dep. 70 m | – | – |
| 8 | 〃 | 15:00 | 10°-45.0N | 125°-25.0E | 27.9 | 27.8 | 27.7 | 27.5 | 27.2 | Dep. 115 m |
| 9 | 〃 | 18:15 | 10°-34.8N | 125°-45.0E | 27.8 | 27.1 | 26.1 | Dep. 50 m | – | – |
| 10 | 〃 | 21:20 | 10°-30.0N | 125°-08.0E | 28.0 | 27.9 | 26.2 | 23.8 | 22.5 | 20.6 |
| 11 | 3. | 00:30 | 10°-00.0N | 125°-13.0E | 27.9 | 27.8 | 26.1 | 24.6 | 22.2 | 20.5 |
| 12 | 〃 | 04:00 | 09°-30.0N | 125°-20.0E | 27.9 | 27.8 | 26.6 | 24.7 | 21.6 | 18.4 |
| 13 | 〃 | 06:50 | 09°-00.0N | 125°-27.0E | 27.8 | 27.5 | 26.1 | 23.2 | 20.8 | 19.6 |
| 14 | 〃 | 09:45 | 08°-30.0N | 125°-33.0E | 28.0 | 28.0 | 26.1 | 25.0 | 22.8 | 22.0 |
| 15 | 〃 | 12:40 | 08°-00.0N | 125°-40.0E | 28.4 | 28.2 | 25.8 | 23.7 | 21.5 | 20.2 |
| 16 | 〃 | 15:10 | 07°-30.0N | 125°-47.0E | 28.2 | 28.1 | 27.1 | 25.4 | 22.5 | 20.1 |
| 17 | 〃 | 17:40 | 07°-00.0N | 125°-39.2E | 27.9 | 27.9 | 26.7 | 24.9 | 22.3 | 20.2 |
| 18 | 〃 | 20:25 | 06°-30.0N | 125°-25.0E | 27.6 | 27.2 | 26.1 | 25.1 | 21.1 | 18.6 |
| 19 | 〃 | 23:15 | 06°-00.0N | 125°-14.0E | 27.8 | 27.4 | 25.9 | 25.2 | 23.0 | 18.8 |
| 20 | 11. | 09:45 | 06°-45.0N | 125°-52.0E | 27.7 | 27.6 | 26.4 | 23.5 | 21.8 | 19.2 |
| 21 | 〃 | 11:30 | 06°-30.0N | 125°-55.5E | 28.1 | 27.8 | 27.0 | 25.3 | 24.0 | 21.8 |
| 22 | 〃 | 13:20 | 06°-15.5N | 125°-02.0E | 28.0 | 28.0 | 27.9 | 25.8 | 24.0 | 21.0 |
| 23 | 12. | 07:10 | 07°-04.0N | 125°-51.7E | 27.7 | 27.5 | 27.1 | 26.6 | 23.0 | 21.1 |
| 24 | 〃 | 09:35 | 06°-54.9N | 125°-34.8E | 27.6 | 27.0 | 26.3 | 24.2 | 22.1 | 18.4 |
| 25 | 13. | 09:30 | 06°-01.0N | 125°-59.5E | 28.1 | 27.7 | 27.4 | 25.3 | 23.3 | 21.3 |
| 26 | 〃 | 11:05 | 06°-15.0N | 125°-52.0E | 28.1 | 27.8 | 27.1 | 25.2 | 23.2 | 20.2 |
| 27 | 〃 | 12:55 | 06°-30.0N | 125°-45.0E | 28.9 | 28.3 | 28.0 | 25.2 | 23.5 | 20.7 |
| 28 | 〃 | 14:40 | 06°-45.0N | 125°-38.0E | 28.4 | 27.8 | 26.7 | 25.6 | 22.5 | 19.9 |
| 29 | 19. | 11:05 | 07°-15.0N | 125°-46.0E | 27.8 | 27.4 | 26.0 | 24.0 | 22.1 | 21.4 |

| | | | | | Wea-ther | Wind direc-tion | Wind force | Air pressure (mb) | Water color | Trans-parency (m) | Air tempera-ture (℃) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 150 | 175 | 200 | 225 | 250 | | | | | | | |
| 21.6 | 19.8 | 18.2 | 16.8 | 15.2 | o | N | 3 | 1010.0 | 2 | 27 | 27.3 |
| 20.5 | 19.1 | 18.0 | 16.4 | 15.3 | o | NNW | 3 | 1007.2 | 2 | 26 | 25.7 |
| 20.4 | 17.5 | 16.3 | 15.5 | 14.6 | r | N | 1 | 1007.8 | 3 | 21 | 23.7 |
| 19.9 | 17.9 | 17.4 | 15.8 | 12.4 | o | N | 2 | 1009.0 | — | — | 25.0 |
| — | — | — | — | — | c | NE | 3 | 1013.0 | 4 | 10 | 27.5 |
| — | — | — | — | — | o | ENE | 4 | 1008.9 | 2 | 22 | 28.4 |
| — | — | — | — | — | bc | ESE | 3 | 1010.0 | 2 | 35 | 27.5 |
| — | — | — | — | — | bc | ESE | 3 | 1009.2 | 2 | 31 | 27.7 |
| — | — | — | — | — | bc | ESE | 1 | 1011.0 | — | — | 27.6 |
| 19.2 | 16.1 | 15.5 | 15.0 | 13.1 | bc | ESE | 1 | 1012.5 | — | — | 27.1 |
| 18.2 | 18.2 | 16.2 | 14.8 | 14.6 | bc | ESE | 2 | 1011.0 | — | — | 27.3 |
| 17.6 | 16.2 | 15.2 | 14.2 | 12.4 | c | SW | 1 | 1011.0 | — | — | 26.5 |
| 17.0 | 17.0 | 15.1 | 14.5 | 12.1 | c | W | 1 | 1012.5 | 3 | 21 | 26.6 |
| 18.4 | 16.7 | 16.7 | 15.5 | 13.5 | bc | N | 1 | 1011.8 | 3 | 27 | 27.8 |
| 18.2 | 17.5 | 14.9 | 13.4 | 13.0 | bc | NNW | 2 | 1009.9 | 2 | 27 | 27.7 |
| 17.3 | 15.9 | 13.8 | 13.6 | 12.1 | bc | NNW | 3 | 1009.3 | 2 | 26 | 28.5 |
| 18.0 | 15.7 | 14.3 | 13.3 | 12.3 | c | NNE | 3 | 1009.5 | — | — | 28.0 |
| 17.2 | 15.8 | 15.5 | 13.8 | 12.3 | o | NE | 3 | 1011.0 | — | — | 27.8 |
| 17.2 | 15.2 | 12.6 | 11.5 | 10.6 | o | NE | 3 | 1011.5 | — | — | 27.0 |
| 17.3 | 16.2 | 14.3 | 13.0 | 12.2 | o | NE | 1 | 1009.5 | 3 | 28 | 26.9 |
| 18.6 | 16.9 | 15.8 | 14.6 | 13.3 | c | WNW | 1 | 1008.4 | 3 | 26 | 27.5 |
| 18.9 | 16.5 | 15.2 | 13.3 | 12.3 | o | Calm | | 1007.0 | 3 | 29 | 27.6 |
| 19.4 | 17.5 | 15.1 | 14.0 | 12.7 | c | Calm | | 1010.0 | 3 | 30 | 27.0 |
| 16.9 | 15.5 | 14.6 | 14.0 | 13.0 | bc | Calm | | 1009.5 | 3 | 28 | 27.6 |
| 18.3 | 17.2 | 16.7 | 13.3 | 11.8 | bc | S | 2 | 1010.0 | 2 | 30 | 28.0 |
| 18.3 | 16.5 | 15.0 | 13.7 | 12.0 | bc | S | 1 | 1009.5 | 2 | 39 | 28.0 |
| 17.7 | 17.0 | 15.8 | 15.0 | 13.5 | bc | ESE | 1 | 1006.5 | 2 | 32 | 28.5 |
| 18.5 | 15.6 | 14.4 | 13.6 | 12.6 | bc | ESE | 2 | 1006.0 | 3 | 25 | 31.0 |
| 19.1 | 16.4 | 15.8 | 15.1 | 12.3 | bc | NE | 2 | 1010.2 | 6 | 13 | 27.5 |

| No. | Date | Hour | Position | | Water temperature (℃) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lapipude | Longitude | (Dep.) 0m | 25 | 50 | 75 | 100 | 125 |
| 30 | Mar. 4, '77 | 07:15 | 06°-59.7N | 125°-51.5E | 27.2 | 27.2 | 26.7 | 25.6 | 21.5 | 20.4 |
| 31 | 〃 | 08:50 | 06°-44.3N | 125°-52.0E | 27.3 | 27.3 | 26.6 | 25.6 | 23.2 | 20.5 |
| 32 | 〃 | 10:25 | 06°-30.0N | 125°-55.0E | 27.8 | 27.6 | 27.2 | 26.4 | 25.0 | 22.6 |
| 33 | 〃 | 12:15 | 06°-15.0N | 126°-02.0E | 27.9 | 27.6 | 27.5 | 26.7 | 23.0 | 20.7 |
| 34 | 〃 | 14:15 | 06°-00.0N | 126°-12.3E | 27.9 | 27.6 | 27.5 | 27.1 | 24.3 | 20.2 |
| 35 | 〃 | 15:45 | 05°-44.0N | 126°-05.0E | 27.7 | 27.2 | 27.2 | 24.7 | 23.0 | 20.5 |
| 36 | 〃 | 17:50 | 05°-30.0N | 125°-45.0E | 27.1 | 27.0 | 27.0 | 27.0 | 24.3 | 21.0 |
| 37 | 5 | 06:10 | 05°-45.0N | 125°-50.0E | 27.1 | 27.0 | 26.9 | 25.0 | 21.9 | 20.3 |
| 38 | 〃 | 09:15 | 06°-00.0N | 125°-57.0E | 27.4 | 27.3 | 27.1 | 27.0 | 23.5 | 20.5 |
| 39 | 〃 | 11:15 | 06°-15.0N | 125°-50.0E | 27.6 | 27.5 | 27.4 | 26.0 | 23.7 | 22.0 |
| 40 | 〃 | 13:25 | 06°-30.0N | 125°-45.0E | 27.6 | 27.5 | 27.5 | 26.2 | 24.2 | 21.1 |
| 41 | 〃 | 15:20 | 06°-45.8N | 125°-37.0E | 27.5 | 27.3 | 27.3 | 26.2 | 24.8 | 20.5 |
| 42 | 〃 | 16:35 | 06°-55.7N | 125°-34.4E | 27.5 | 27.3 | 27.1 | 26.4 | 23.5 | 20.7 |
| 43 | 6 | 06:50 | 07°-15.0N | 125°-46.0E | 26.8 | 27.8 | 26.7 | 26.4 | 24.0 | 22.0 |

| 150 | 175 | 200 | 225 | 250 | Weather | Wind direction | Wind force | Air pressure (mb) | Water color | Transparency (m) | Air temperature (℃) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 18.8 | 17.1 | 16.6 | 14.6 | 12.8 | o | NW | 4 | 1012.5 | 4 | 26 | 26.0 |
| 18.1 | 16.0 | 15.0 | 13.6 | 12.0 | o | N | 4 | 1014.0 | 3 | 23 | 27.5 |
| 19.5 | 17.1 | 15.7 | 14.3 | 12.8 | o | N | 4 | 1013.3 | 3 | 20 | 27.8 |
| 19.0 | 17.2 | 15.3 | 13.8 | 13.3 | c | N | 3 | 1012.0 | 2 | 24 | 27.6 |
| 19.2 | 16.5 | 15.3 | 13.3 | 11.7 | c | NNW | 3 | 1010.0 | 2 | 23 | 28.3 |
| 18.0 | 15.1 | 13.5 | 12.6 | 11.8 | bc | N | 3 | 1009.8 | 2 | 30 | 27.9 |
| 19.5 | 19.1 | 18.5 | 15.0 | 13.7 | bc | NE | 3 | 1009.7 | 3 | 20 | 27.0 |
| 17.2 | 14.9 | 14.0 | 13.2 | 12.7 | bc | NNE | 5 | 1012.5 | 3 | 16 | 26.2 |
| 19.3 | 17.6 | 15.4 | 14.0 | 13.0 | bc | N | 5 | 1014.0 | 2 | 23 | 26.6 |
| 10.3 | 17.2 | 16.3 | 14.2 | 12.5 | bc | N | 4 | 1012.0 | 3 | 20 | 26.7 |
| 19.2 | 17.2 | 15.8 | 14.6 | 13.2 | bc | N | 4 | 1010.8 | 3 | 21 | 28.2 |
| 18.9 | 17.4 | 16.4 | 15.0 | 12.3 | bc | N | 4 | 1009.0 | 3 | 22 | 28.4 |
| 19.0 | 16.6 | 16.2 | 15.0 | 13.1 | bc | N | 4 | 1010.2 | 4 | 15 | 27.5 |
| 19.5 | 17.4 | 15.3 | 15.0 | 13.6 | o | N | 3 | 1013.0 | 5 | 15 | 23.7 |



# Annex table 3.

## Record of Ocular Observation and Fishing Operation for Skipjack and Others

Remarks :

| | | | |
|---|---|---|---|
| S J | : Skipjack | E N | : Engraulidae sp. |
| Y F | : Yellowfin tuna | C L | : Clupeidae sp. |
| B T | : Bonito | A T | : Atherinidae sp. |
| P S | : Plain school | D U | : Dussmieriidae sp. |
| B A | : Birds associated | C A | : Carangidae sp. |
| L A | : Log associated | S C | : Scombridae sp. |
| F O | : Former | C E | : Caesionidae sp. |
| B R | : Breezer | S I | : Siganidae sp. |
| J M | : Jumper | L E | : Leiognathidae sp. |
| L | : Large | | |
| M | : Medium | | |
| S | : Small | | |

(Leyte Gulf Area)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| School No. | | 1 | | 2 | | 3 | | 4 | | 5 | |
| Catching No. | | 1 | | 2 | | 3 | | 4 | | | |
| Date | | Dec. 24, '76 | | Dec. 24 | | Dec. 24 | | Dec. 25 | | Dec. 25 | |
| Moon age | | 2.9 | | 2.9 | | 2.9 | | 3.9 | | 3.9 | |
| Hour | Located | | | 12 : 40 | | | | | | 10 : 15 | |
| | Chummed | | | 12 : 45 | | | | | | | |
| | Catched | 10:45 | | 12:45~13:05 | | 15:15~15:30 | | 07:10~07:13 | | | |
| Position | Latitude | 10°-52'4N | | 10°-48'6N | | 10°-38'0N | | 10°-31'5N | | 10°-22'0N | |
| | Longitude | 125°-45'0E | | 126°-0.0'5E | | 125°-50'8E | | 125°-54'5E | | 125°-49'0E | |
| Fish school | Species | BT | | YF | | SJ | | BT | | SJ | |
| | Type | PS | | LA | | PS | | PS | | BA(100) | |
| | Status | | | | | | | | | JM | |
| | Size | | | S | | S | | | | S | |
| | Swiming direction | | | | | | | | | | |
| Weather | | bc | | o | | o | | r | | c | |
| Wind direction & force | | N－4 | | N－3 | | NNW－4 | | NW－3 | | NW－4 | |
| Air temperature | | 27.2 | | 27.4 | | 27.2 | | 26.0 | | 25.4 | |
| Air pressure | | 1009.5 | | 1009.0 | | 1007.8 | | 1008.8 | | 1008.5 | |
| Water temperature | | 27.1 | | 27.5 | | 26.7 | | 25.8 | | 26.8 | |
| Wave | | 3 | | 3 | | 3 | | 3 | | 4 | |
| Swell | | 2 | | 3 | | 2 | | 3 | | 3 | |
| Water color | | 2 | | 2 | | 2 | | 4 | | 4 | |
| Cath by species | SJ | pcs | kg | pcs | kg | pcs 1 | kg 3.2 | pcs | kg | pcs | kg |
| | YE | | | 4 | 5.9 | | | | | | |
| | BT | 1 | 1.7 | | | | | 1 | 0.8 | | |
| | Total | 1 | 1.7 | 4 | 5.9 | 1 | 3.2 | 1 | 0.8 | — | — |
| Bait fish used | | | | EN | | | | | | | |
| Remarks | | Trolling | | Trolling | | Trolling | | Trolling | | | |

| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|
| | 5 | 6 | 7 | 8 | 9 | 10 |
| Dec. 25 | Dec. 26 | Dec. 26 | Dec. 27 | Dec. 27 | Dec. 29 | Dec. 30 |
| 3.9 | 4.9 | 4.9 | 5.9 | 5.9 | 7.9 | 8.9 |
| 10:40 | 09:00 | 10:05 | 13:05 | 13:35 | | |
| | 09:05 | 10:10~10:20 | | 13:50~14:15 | | |
| | 09:05~09:30 | 10:10~10:25 | 13:20~13:30 | | 11:45 | 09:15 |
| 10°-23.5N | 11°-04.8N | 11°-00.5N | 10°-37.6N | 10°-42.7N | 10°-57.5N | 10°-52.3N |
| 125°-46.4E | 125°-53.0E | 125°-57.5E | 125°-32.0E | 125°-27.2E | 125°-37.5E | 126°-02.3E |
| YF | YF | YF | BT | SJ | BT | SJ |
| BA(10) | LA<br>BA(5) | BA(4) | BA(25) | BA(50) | PS | BA(10) |
| JM | | | JM | JM | | |
| S | S | S | S | S | | |
| | | | NW | | | |
| c | bc | bc | bc | bc | o | o |
| NW—4 | E—3 | ESE—3 | ENE—3 | ENE—4 | NE—4 | E—5 |
| 25.4 | 28.0 | 28.0 | 28.0 | 27.8 | 28.3 | 27.7 |
| 1008.5 | 1010.5 | 1010.4 | 1009.0 | 1008.8 | 1009.0 | 1010.2 |
| 26.9 | 27.8 | 27.8 | 28.0 | 27.9 | 27.5 | 27.9 |
| 4 | 3 | 3 | 3 | 3 | 3 | 4 |
| 3 | 3 | 3 | 1 | 1 | 1 | 2 |
| 4 | 2 | | 3 | 3 | 2 | 2 |
| pcs kg | pcs kg | pcs kg | pcs kg | pcs kg | pcs kg | pcs kg |
| | | 1 1.0 | | | | 1 0.4 |
| | 3. 6.3 | 18 17.0 | | | | |
| | | | 1 2.3 | | 1 0.4 | |
| — — | 3 6.3 | 18 18.0 | 1 2.3 | — — | 1 0.4 | 1 0.4 |
| | DU | DU | | AT, DU | | |
| | | | Trolling | Trolling,<br>(Released) | Trolling | Trolling |

| School No. | | 13 | | 14 | | 15 | | 16 | | 17 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching No. | | 11 | | 12 | | 13 | | | | | |
| Date | | Dec. 30 | | Dec. 30 | | Dec. 30 | | Jan. 2, '77 | | Jan. 2 | |
| Moon age | | 8.9 | | 8.9 | | 8.9 | | 11.9 | | 11.9 | |
| Hour | Located | 11:30 | | | | | | 15:50 | | 16:30 | |
| | Chummed | 11:50~12:00 | | | | | | | | | |
| | Catched | 11:45 | | 15:00 | | 15:30 | | | | | |
| Position | Latitude | 10°-51'.8N | | 10°-51'.5N | | 10°-48'.0N | | 10°-41'.5N | | 10°-41'.0N | |
| | Longitude | 126°-14'.0E | | 126°-07'.4E | | 126°-06'.0E | | 125°-31'.5E | | 125°-35'.5E | |
| Fish school | Species | YF | | SJ | | YF | | SJ, YF | | BT | |
| | Type | LA | | PS | | PS | | PS | | PS | |
| | Status | | | | | | | JM | | BR, JM | |
| | Size | S | | | | | | S | | S | |
| | Swiming direction | | | | | | | | | | |
| Weather | | o | | c | | o | | bc | | bc | |
| Wind direction & force | | E-5 | | E-5 | | E-5 | | ESE-3 | | ESE-3 | |
| Air temperature | | 28.0 | | 28.0 | | 28.0 | | 27.6 | | 28.0 | |
| Air pressure | | 1009.0 | | 1009.0 | | 1008.0 | | 1009.6 | | 1010.0 | |
| Water temperature | | 27.7 | | 27.8 | | 28.1 | | 27.8 | | 27.6 | |
| Wave | | 4 | | 4 | | 4 | | 2 | | 2 | |
| Swell | | 2 | | 2 | | 2 | | 1 | | 1 | |
| Water color | | 2 | | 2 | | 2 | | 2 | | 2 | |
| Cath by species | | pcs | kg | pcs | kg | pcs | kg | pcs | kg | pcs | kg |
| | SJ | | | 1 | 0.7 | | | | | | |
| | YE | 1 | 1.6 | | | 1 | 0.9 | | | | |
| | BT | | | | | | | | | | |
| | Total | 1 | 1.6 | 1 | 0.7 | 1 | 0.9 | — | — | — | — |
| Bait fish used | | | | | | | | | | | |
| Remarks | | Trolling | | Trolling | | Trolling | | | | | |

(Davao Gulf Area)

| | | | | | | |
|---|---|---|---|---|---|---|
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Jan. 2 | Jan. 25 | Jan. 25 | Jan. 25 | Jan. 25 | Jan. 26 | Jan. 28 |
| 11.9 | 5.4 | 5.4 | 5.4 | 5.4 | 6.4 | 8.4 |
| | | | | | 08:40 | |
| | | 13:45～13:51 | | | 08:45～09:05 | |
| 16:55 | 13:30 | 〃 | 14:12 | 15:20 | 〃 | 08:32 |
| 10°-40.0N | 06°-05.2N | 06°-05.8N | 06°-03.2N | 06°-02.2N | 06°-05.7N | 06°-01.5N |
| 125°-37.4E | 126°-20.0E | 126°-21.3E | 126°-21.0E | 126°-18.8E | 126°-20.5E | 125°-52.6E |
| BT | BT | BT, SJ, YF | BT | BT | YF | SJ |
| PS | PS | LA | PS | PS | LA | PS |
| S | | S | | | S | |
| bc | o | c | o | c | c | c |
| ESE-3 | ENE-2 | ENE-2 | ENE-1 | ESE-2 | NE-2 | NE-3 |
| 27.3 | 25.3 | 25.8 | 26.3 | 26.2 | 28.0 | 29.3 |
| 1010.0 | 1008.0 | 1008.0 | 1008.0 | 1007.2 | 1011.5 | 1010.5 |
| 27.6 | 27.7 | 27.7 | 27.7 | 28.3 | 27.6 | 28.8 |
| 2 | 2 | 2 | 1 | 1 | 1 | 2 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 3 |

| pcs | kg | pcs | kg | pcs | kg | pcs | kg | pcs | kg | pcs | kg | pcs | kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 1.4 | | | | | | | 1 | 2.2 |
| | | | | 1 | 1.0 | | | | | 20 | 14.9 | | |
| 1 | 0.5 | 3 | 4.6 | 1 | 2.3 | 1 | 1.7 | 5 | 14.4 | | | | |
| 1 | 0.5 | 3 | 4.6 | 3 | 4.7 | 1 | 1.7 | 5 | 14.4 | 20 | 14.9 | 1 | 2.2 |
| | | | | | | | | | | | | | |
| Trolling | | Trolling | | | | Trolling | | Trolling | | | | Trolling | |

| School No. | | 25 | | 26 | | 27 | | 28 | | 29 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching No. | | 21 | | 22 | | 23 | | 24 | | 25 | |
| Date | | Jan. 30 | | Feb. 1 | | Feb. 1 | | Feb. 2, '77 | | Feb. 5 | |
| Moon age | | 10.4 | | 12.4 | | 12.4 | | 13.4 | | 16.4 | |
| Hour | Located | 13:45 | | | | 12:20 | | 11:35 | | | |
| | Chummed | 13:50~17:00 | | | | 12:50~13:40 | | 11:40~12:00 | | | |
| | Catched | 13:45~17:00 | | 10:12 | | 12:47~13:40 | | 11:35~12:00 | | 09:25 | |
| Position | Latitude | 06°-06'0N | | 06°-13'0N | | 06°-06'5N | | 06°-03'5N | | 06°-05'7N | |
| | Longitude | 126°-20'5E | | 126°-11'3E | | 126°-21'3E | | 126°-21'0E | | 126°-20'0E | |
| Fish school | Species | BT, SJ | | YF | | SJ, BT | | BT, YF | | BT | |
| | Type | BA(3) | | PS | | PS | | BA(3) | | PS | |
| | Status | JM | | | | JM | | JM | | | |
| | Size | S | | | | S | | S | | S | |
| | Swiming direction | | | | | | | | | | |
| Weather | | bc | | o | | c | | o | | o | |
| Wind direction & force | | ENE-3 | | N-2 | | N-4 | | W-2 | | N-3 | |
| Air temperature | | 28.0 | | 27.0 | | 27.2 | | 25.3 | | 25.1 | |
| Air pressure | | 1007.0 | | 1010.0 | | 1008.0 | | 1008.8 | | 1009.5 | |
| Water temperature | | 27.9 | | 27.5 | | 27.9 | | 27.6 | | 27.7 | |
| Wave | | 2 | | 2 | | 2 | | 2 | | 3 | |
| Swell | | 1 | | 1 | | 1 | | 1 | | 1 | |
| Water color | | 1 | | 2 | | 1 | | 1 | | 1 | |
| Cath by species | | pcs | kg | pcs | kg | pcs | kg | pcs | kg | pcs | kg |
| | SJ | 4 | 4.6 | | | 1 | 0.5 | | | | |
| | YE | | | 1 | 0.7 | 1 | 0.7 | 1 | 0.7 | | |
| | BT | 471 | 376.8 | | | 59 | 35.3 | 4 | 31.6 | 6 | 7.8 |
| | Total | 475 | 381.4 | 1 | 0.7 | 61 | 36.5 | 5 | 32.3 | 6 | 7.8 |
| Bait fish used | | DU, CE, AT, SI | | | | CL, EN, DU | | CL, DU | | | |
| Remarks | | | | Trolling | | | | | | Trolling | |

| 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|---|---|---|---|---|---|---|
| 26 | 27 | 28 | 29 | 30 | 31 | 32 |
| Feb. 5 | Feb. 5 | Feb. 5 | Feb. 5 | Feb. 5 | Feb. 11 | Feb. 12 |
| 16.4 | 16.4 | 16.4 | 16.4 | 16.4 | | |
| | | | | | 16:00 | 06:45 |
| | 10:32~10:36 | 10:47~10:55 | 11:27~11:33 | 11:52~11:55 | | 06:52~07:05 |
| 10:05 | 10:32~10:36 | 10:45~10:55 | 11:25~11:33 | 11:52 | | 06:55~07:05 |
| 06°-07.0N | 06°-06.5N | 06°-06.8N | 06°-06.0N | 06°-06.6N | 06°-42.5N | 06°-44.5N |
| 126°-22.0E | 126°-21.3E | 126°-21.3E | 126°-21.2E | 126°-21.5E | 126°-31.7E | 126°-36.3E |
| BT | SJ, BT | SJ, BT | BT | BT | SJ | YF |
| PS | PS | PS | PS | PS | PS | LA |
| | | JM | | | | JM |
| S | S | S | S | S | S | S |
| c | o | r | c | c | o | c |
| N-3 | N-3 | N-4 | N-4 | N-3 | NE-3 | WNW-2 |
| 26.0 | 25.5 | 26.0 | 26.0 | 26.4 | 27.0 | 26.4 |
| 1009.5 | 1009.0 | 1009.0 | 1008.5 | 1008.0 | 1008.5 | 1011.0 |
| 27.7 | 27.7 | 27.7 | 27.7 | 27.8 | 27.0 | 27.5 |
| 3 | 3 | 3 | 3 | 2 | 3 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 5 | 2 |

| pcs | kg | pcs | kg | pcs | kg | pcs | kg | pcs | kg | pcs | kg | pcs | kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2.0 | 2 | 5.4 | | | | | | | 11 | 8.9 |
| 2 | 1.4 | 4 | 10.7 | 10 | 25.0 | 46 | 26.8 | 2 | 6.9 | | | | |
| 2 | 1.4 | 5 | 12.7 | 12 | 30.4 | 46 | 26.8 | 2 | 6.9 | -- | — | 11 | 8.9 |
| | | DU, EN | | 〃 | | 〃 | | 〃 | | | | | |
| Trolling | | | | | | | | Trolling | | Trolling Released | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| School No. | | 37 | 38 | 39 | 40 | 41 |
| Catching No. | | 33 | | 34 | 35 | 36 |
| Date | | Feb. 12 | Feb. 12 | Feb. 12 | Feb. 13 | Feb. 13 |
| Moon age | | 23.4 | 23.4 | 23.4 | 24.4 | 24.4 |
| Hour | Located | 07:45 | 08:30 | 14:50 | | 11:15 |
| | Chummed | 08:20~08:22 | 08:50~08:55 | 15:00~15:07 | 10:13~10:15 | 11:25~11:50 |
| | Catched | 08:20 | | 15:00~15:05 | 10:12 | 11:25~11:50 |
| Position | Latitude | 06°-42.3N | 06°-43.0N | 06°-46.1N | 06°-30.3N | 06°-17.3N |
| | Longitude | 126°-33.2E | 126°-34.2E | 126°-42.4E | 126°-22.8E | 126°-18.8E |
| Fish school | Species | SJ | SJ | SJ | SJ | SJ |
| | Type | BA(1) | BA(4) | BA(2) | PS | BA(10) |
| | Status | JM | JM | | JM | JM |
| | Size | S | S | S | S | S |
| | Swiming direction | | | | | |
| Weather | | bc | bc | bc | o | o |
| Wind direction & force | | W-1 | W-1 | NE-3 | NE-4 | NE-4 |
| Air temperature | | 26.2 | 26.6 | 27.9 | 27.8 | 26.9 |
| Air pressure | | 1011.5 | 1011.6 | 1008.0 | 1012.0 | 1011.0 |
| Water temperature | | 27.8 | 27.8 | 28.2 | 27.4 | 26.6 |
| Wave | | 1 | 1 | 2 | 3 | 3 |
| Swell | | 1 | 1 | 1 | 2 | 2 |
| Water color | | 2 | 2 | 2 | 3 | 5 |
| Cath by species | SJ | 1 pcs / 2.7 kg | pcs / kg | 4 pcs / 8.2 kg | 2 pcs / 3.1 kg | 9 pcs / 16.0 kg |
| | YF | | | | | |
| | BT | | | | | |
| | Total | 1 / 2.7 | — / — | 4 / 8.2 | 2 / 3.1 | 9 / 16.0 |
| Bait fish used | | | | | | |
| Remarks | | Trolling | | | Trolling | |

| 42 | 43 | 44 | 45 | 46 | 47 | 48 |
|---|---|---|---|---|---|---|
| | 37 | 38 | 39 | 40 | 41 | 42 |
| Feb. 15 | Feb. 16 | Feb. 16 | Feb. 16 | Feb. 16 | Feb. 17 | Feb. 17 |
| 26.4 | 27.4 | 27.4 | 27.4 | 27.4 | 28.4 | 28.4 |
| 10:45 | | | | 16:50 | 06:35 | 08:40 |
| | | 12:35～12:50 | 14:45～14:48 | 17:10～17:25 | 06:40～07:05 | 08:43～09:05 |
| | 12:15 | 12:35～12:52 | 14:45 | 17:10～17:26 | 06:40～07:05 | 08:45～09:05 |
| 06°-49.0N | 06°-05.5N | 06°-05.8N | 05°-58.0N | 05°-35.0N | 05°-35.5N | 05°-34.8N |
| 126°-02.5E | 126°-20.5E | 126°-22.5E | 126°-32.0E | 126°-36.3E | 126°-36.1E | 126°-42.0E |
| SJ | BT | BT | SJ | YF | BT | SJ, YF |
| PS | PS | PS | PS | BA(2) | BA(1) | PS |
| JM | | | JM | JM | JM | JM |
| S | S | S | S | S | S | S |
| bc | bc | bc | bc | c | c | c |
| SW－2 | N－2 | N－3 | NE－3 | NNE－3 | NNE－3 | NNE－2 |
| 28.2 | 28.0 | 28.8 | 28.3 | 27.5 | 27.3 | 27.7 |
| 1008.5 | 1009.0 | 1009.1 | 1007.8 | 1008.8 | 1010.0 | 1012.0 |
| 28.3 | 28.5 | 28.5 | 28.3 | 28.0 | 27.7 | 27.7 |
| 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| | 1 | 1 | 1 | 1 | 1 | 1 |
| 4 | 1 | 1 | 1 | 1 | 1 | 1 |
| pcs kg | pcs kg | pcs kg | pcs kg | pcs kg | pcs kg | pcs kg |
| | 6 3.9 | | 1 1.3 | 1 6.5 | | 197 198.6 |
| | | | | | | 4 3.8 |
| | | 27 17.9 | | | 7 15.0 | |
| — — | 6 3.9 | 27 17.9 | 1 1.3 | 1 6.5 | 7 15.0 | 201 202.4 |
| | | | | | DU, EN' | 〃 |
| | Trolling | | Trolling | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| School No. | | 49 | 50 | 51 | 52 | 53 |
| Catching No. | | 43 | 44 | 45 | | 46 |
| Date | | Feb. 17 | Feb. 17 | Feb. 17 | Feb. 18 | Feb. 18 |
| Moon age | | 28.4 | 28.4 | 28.4 | 29.4 | 29.4 |
| Hour | Located | 09:15 | 09:58 | 16:13 | 07:55 | 12:30 |
| | Chummed | 09:20~09:25 | 10:02~10:20 | 16:13~16:15 | | 12:50~12:55 |
| | Catched | 09:20~09:25 | 10:03~10:20 | 16:13 | | 12:50 |
| Position | Latitude | 05°-35.8N | 05°-35.7N | 06°-02.5N | 06°-19.5N | 05°-41.0N |
| | Longitude | 126°-43.0E | 126°-42.8E | 126°-09.2E | 126°-04.5E | 126°-37.2E |
| Fish school | Species | SJ, YF | SJ, YF | BT | BT | SJ |
| | Type | PS | PS | PS | PS | BA(20) |
| | Status | JM | JM | JM | JM | JM |
| | Size | S | S | S | S | S |
| | Swiming direction | | | | | |
| Weather | | o | o | c | o | o |
| Wind direction & force | | NNE-2 | NNE-2 | Calm | NNE-1 | NNE-2 |
| Air temperature | | 27.7 | 27.5 | 28.0 | 25.5 | 26.3 |
| Air pressure | | 1012.2 | 1012.5 | 1009.0 | 1013.0 | 1010.0 |
| Water temperature | | 27.8 | 27.8 | 28.4 | 26.9 | 27.6 |
| Wave | | 1 | 1 | 0 | 0 | 1 |
| Swell | | 1 | 1 | 0 | 0 | 1 |
| Water color | | 1 | 1 | 1 | 4 | 1 |
| Cath by species | | pcs / kg | pcs / kg | pcs / kg | pcs / kg | pcs / kg |
| | SJ | 13 / 13.1 | 41 / 49.3 | | | 8 / 10.6 |
| | YE | 1 / 1.0 | 10 / 15.6 | | | |
| | BT | | | | | |
| | Total | 14 / 14.1 | 51 / 64.9 | — / — | — / — | 8 / 10.6 |
| Bait fish used | | DU, EN | | | | |
| Remarks | | | | Trolling (Released) | | Trolling |

| | | | | | | |
|---|---|---|---|---|---|---|
| 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 47 | 48 | 49 | | | 50 | 51 |
| Feb. 18 | Feb. 19 | Feb. 20 | Feb. 21 | Feb. 23 | Feb. 23 | Feb. 24 |
| 29.4 | 0.8 | 1.8 | 2.8 | 4.8 | 4.8 | 5.8 |
| 13:20 | 14:15 | 11:45 | 07:35 | 15:00 | 15:25 | 08:00 |
| 13:25～13:45 | 14:15～14:20 | 12:01～12:02 | | 15:05～15:10 | 15:35～15:45 | 08:05～08:35 |
| 13:25～13:45 | 14:15 | 12:00～12:01 | | | | 08:05～08:35 |
| 05°-38.8N | 06°-00.8N | 05°-25.0N | 06°-56.5N | 05°-32.5N | 05°-32.8N | 05°-22.7N |
| 126°-38.2E | 125°-56.8E | 125°-36.0E | 125°-43.6E | 125°-20.5E | 125°-17.3E | 125°-32.3E |
| SJ, YF | SJ | SJ, YF | SJ, BT | SJ, BT | BT | YF, BT |
| BA(20) | PS | BA(25) | BA(30) | BA(15) | BA(30) | LA |
| JM | | | JM | FO | JM | JM |
| S | S | S | S | S | S | S |
| o | o | o | r | o | o | e |
| NNE－2 | N－4 | NE－5 | N－2 | NNE－4 | ENE－2 | NE－5 |
| 26.3 | 27.1 | 25.3 | 23.0 | 28.0 | 28.0 | 26.5 |
| 1010.0 | 1007.5 | 1009.0 | 1012.0 | 1010.5 | 1010.5 | 1012.5 |
| 27.8 | 27.8 | 27.3 | 26.8 | 27.6 | 27.7 | 26.9 |
| 1 | 3 | 4 | 1 | 3 | 1 | 4 |
| 1 | 2 | 2 | 0 | 1 | 0 | 1 |
| 1 | 3 | 3 | 4 | 4 | 4 | 3 |
| pcs kg | pcs kg | pcs kg | pcs kg | pcs kg | pcs kg | pcs kg |
| 65 92.3 | 2 1.2 | 1 1.3 | | | | |
| 33 52.4 | | 2 3.2 | | | | 1 2.0 |
| | | | | | | 4 6.0 |
| 98 144.7 | 2 1.2 | 3 4.5 | — — | — — | — — | 5 8.0 |
| | AT, DU | | | | | CE, SC |
| | Trolling | | | | Trolling (Released) | |

| School No. | | 61 | 62 | 63 | 64 | 65 |
|---|---|---|---|---|---|---|
| Catching No. | | 52 | 53 | 54 | 55 | 56 |
| Date | | Feb. 27 | Feb. 27 | Feb. 28 | Feb. 28 | Feb. 28 |
| Moon age | | 8.8 | 8.8 | 9.8 | 9.8 | 9.8 |
| Hour | Located | 15:50 | | | | |
| | Chummed | 15:55~16:07 | | | | |
| | Catched | 15:55~16:07 | 17:20 | 05:55~06:05 | 06:30 | 07:00 |
| Position | Latitude | 05°-27.5N | 05°-23.0N | 05°-56.6N | 05°-57.2N | 05°-57.5N |
| | Longitude | 125°-37.0E | 125°-31.2E | 126°-19.8E | 126°-23.0E | 126°-28.0E |
| Fish school | Species | YF | BT | BT | BT | BT |
| | Type | BA(7) | PS | PS | PS | PS |
| | Status | JM | | | JM | JM |
| | Size | S | S | S | S | S |
| | Swiming direction | | | | | |
| Weather | | bc | o | r | o | o |
| Wind direction & force | | NE-4 | NE-4 | N-3 | N-3 | NNE-3 |
| Air temperature | | 27.5 | 27.5 | 25.5 | 26.2 | 26.5 |
| Air pressure | | 1008.5 | 1009.0 | 1010.0 | 1010.5 | 1009.5 |
| Water temperature | | 27.5 | 27.1 | 27.3 | 27.1 | 27.3 |
| Wave | | 3 | 3 | 2 | 2 | 2 |
| Swell | | 1 | 1 | 1 | 1 | 1 |
| Water color | | 2 | 2 | 1 | 1 | 1 |
| Cath by species | | pcs / kg | pcs / kg | pcs / kg | pcs / kg | pcs / kg |
| | SJ | | | | | |
| | YF | 5 / 10.8 | | | | |
| | BT | | 2 / 1.9 | 3 / 1.5 | | |
| | Total | 5 / 10.8 | 2 / 1.9 | 3 / 1.5 | — / — | — / — |
| Bait fish used | | DU, EN, SC | | | | |
| Remarks | | | Trolling | Trolling | Trolling (Releasd) | Trolling (Released) |

| | | | | | | |
|---|---|---|---|---|---|---|
| 66 | 67 | 68 | 69 | 70 | 71 | 72 |
| 57 | 58 | 59 | 60 | | | |
| Feb. 28 | Feb. 28 | Feb. 28 | Feb. 28 | Mar. 6 | Mar. 6 | Mar. 7 |
| 9.8 | 9.8 | 9.8 | 9.8 | 15.8 | 15.8 | 16.8 |
| | 08:20 | | | 08:00 | 12:00 | 11:30 |
| | 08:40~10:00 | | | | | |
| 07:15 | 08:42~10:00 | 11:06 | 11:30 | | | |
| 05°-58.0N | 06°-04.5N | 06°-05.5N | 06°-06.0N | 07°-10.8N | 07°-03.0N | 06°-59.5N |
| 126°-29.0E | 126°-31.3E | 126°-25.5E | 126°-22.7E | 125°-40.0E | 126°-42.4E | 125°-42.5E |
| BT | SJ, YF | BT, SJ | SJ | BT | YF | YF |
| PS | BA(10) | PS | PS | BA(50) | BA(60) | BA(20) |
| JM | JM | | | JM | JM | JM |
| S | M | | | | | |
| o | c | bc | bc | o | r | o |
| NNE-3 | NNE-3 | NNE-3 | N-3 | N-3 | N-3 | NNW-2 |
| 26.5 | 28.2 | 27.1 | 26.5 | 24.3 | 24.7 | 26.9 |
| 1009.5 | 1011.8 | 1010.5 | 1010.5 | 1012.0 | 1013.5 | 1013.5 |
| 27.3 | 27.7 | 27.7 | 27.8 | 26.8 | 26.6 | 27.2 |
| 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 4 | 4 | 3 |
| pcs kg | pcs kg | pcs kg | pcs kg | pcs kg | pcs kg | pcs kg |
| | 234 280.8 | 1 0.7 | 1 0.6 | | | |
| | 52 78.0 | | | | | |
| 4 2.4 | | 2 1.1 | | | | |
| 4 2.4 | 286 358.8 | 3 1.8 | 1 0.6 | — — | — — | — — |
| | | | | | | |
| Trolling | | Trolling | Trolling | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| School No. | | 73 | | 74 | | 75 | | 76 | | 77 | |
| Catching No. | | 61 | | 62 | | 63 | | 64 | | 65 | |
| Date | | 52.Mar.10 0 | | 52.Mar.10.0 | | 52 Mar.10 0 | | 52.Mar.10 0 | | 52.Mar.10 0 | |
| Moon age | | 19.8 | | 19.8 | | 19.8 | | 19.8 | | 19.8 | |
| Hour | Located | | | 11:05 | | 12:20 | | 12:35 | | 16:15 | |
| | Chummed | | | 11:30~11:45 | | 12:26~12:30 | | 12:40~13:00 | | 16:30~17:20 | |
| | Catched | 10:50 | | 11:45 | | 12:25~12:30 | | 12:40~13:00 | | 16:30~17:20 | |
| Position | Latitude | 06°-07.7N | | 06°-10.7N | | 06°-12.8N | | 06°-11.2N | | 06°-27.0N | |
| | Longitude | 126°-24.1E | | 126°-26.0E | | 126°-30.8E | | 126°-29.0E | | 126°-41.5E | |
| Fish school | Species | BT | | BT | | SJ | | SJ, YF | | SJ, YF | |
| | Type | BA(1) | | BA(15) | | BA(3) | | LA | | LA, BA(10) | |
| | Status | JM | | JM | | JM | | JM | | JM | |
| | Size | | | | | | | | | S | |
| | Swiming direction | | | | | | | | | | |
| Weather | | bc | | c | | c | | c | | c | |
| Wind direction & force | | NE-4 | | NNE-4 | | NNE-4 | | NNE-3 | | NNE-4 | |
| Air temperature | | 27.3 | | 27.3 | | 27.4 | | 27.4 | | 28.0 | |
| Air pressure | | 1013.8 | | 1013.0 | | 1012.8 | | 1012.6 | | 1011.8 | |
| Water temperature | | 27.5 | | 27.7 | | 27.8 | | 27.8 | | 27.9 | |
| Wave | | 3 | | 3 | | 3 | | 3 | | 3 | |
| Swell | | 2 | | 2 | | 2 | | 2 | | 2 | |
| Water color | | 1 | | 2 | | 1 | | 1 | | 2 | |
| Cath by species | | pcs | kg | pcs | kg | pcs | kg | pcs | kg | pcs | kg |
| | SJ | | | | | 21 | 27.8 | 36 | 45.5 | 8 | 10.9 |
| | YF | | | | | | | 14 | 21.7 | 24 | 32.8 |
| | BT | 3 | 1.6 | 1 | 0.9 | | | 1 | 0.9 | | |
| | Total | 3 | 1.6 | 1 | 0.9 | 21 | 27.8 | 51 | 68.1 | 32 | 43.7 |
| Bait fish used | | | | | | CL, EN | | CL, EN | | CL, EN | |
| Remarks | | Trolling | | Trolling | | | | | | | |

| 78 | 79 | 80 | 81 | 82 | 83 | 84 |
|---|---|---|---|---|---|---|
| 66 | 67 | 68 | 69 | 70 | 71 | 72 |
| Mar. 10 | Mar. 11 | Mar. 11 | Mar. 11 | Mar. 11 | Mar. 11 | Mar. 13 |
| 19.8 | 20.8 | 20.8 | 20.8 | 20.8 | 20.8 | 22.8 |
| 17:30 | 06:50 | | 08:15 | | 10:00 | |
| 17:45~18:00 | 07:15~07:30 | | 08:30~09:10 | | 10:12~10:45 | |
| 17:45~18:00 | 07:15~07:30 | 07:45 | 08:30~09:10 | 09:55 | 10:12~10:45 | 10:20 |
| 06°-25.8N | 06°-21.0N | 06°-19.0N | 06°-10.2N | 06°-06.0N | 06°-02.5N | 06°-06.0N |
| 126°-39.8E | 126°-32.3E | 126°-32.7E | 126°-30.5E | 126°-27.0E | 126°-28.0E | 126°-22.6E |
| SJ, YF | SJ, YF | SJ, YF | SJ, YF | BT | SJ, YF | BT |
| LA, BA | BA(10) | PS | BA(15) | PS | BA(6) | PS |
| JM | JM | | JM | | JM | |
| S | S | S | M | S | M | |
| | S | | S | | | |
| bc | o | o | o | o | o | e |
| NNE-4 | NNE-3 | NNE-3 | NNE-3 | NNE-3 | NNE-3 | NNE-3 |
| 27.3 | 26.3 | 26.4 | 27.6 | 27.1 | 26.9 | 26.5 |
| 1012.0 | 1014.0 | 1014.0 | 1014.0 | 1014.1 | 1013.5 | 1014.0 |
| 27.5 | 27.3 | 27.5 | 27.6 | 27.6 | 27.5 | 27.3 |
| 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 3 | 3 | 3 | 2 | 2 | 2 |
| pcs kg | pcs kg | pcs kg | pcs kg | pcs kg | pcs kg | pcs kg |
| 74 96.2 | 237 296.3 | 1 1.7 | 122 152.5 | | 714 892.5 | |
| 24 33.6 | 67 107.2 | 2 2.6 | 29 46.4 | | 197 315.2 | |
| | | | | 3 1.8 | | 1 0.6 |
| 98 129.8 | 304 403.5 | 3 4.3 | 151 198.9 | 3 1.8 | 911 1,207.7 | 1 0.6 |
| SL, EN | SL, EN | | SL, EN | | CL, EN | |
| | | Trolling | | | Trolling | Trolling |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| School No. | | 85 | | 86 | | 87 | | 88 | | 89 |
| Catching No. | | 73 | | 74 | | 75 | | 76 | | 77 |
| Date | | Mar. 13 | | Mar. 13 | | Mar. 14 | | Mar. 14 | | Mar. 14 |
| Moon age | | 22.8 | | 22.8 | | 23.8 | | 23.8 | | 23.8 |
| Hour | Located | 12:12 | | 14:00 | | | | 11:30 | | 13:45 |
| | Chummed | 12:28~12:32 | | 14:05~14:30 | | 10:05~10:10 | | 11:50~11:53 | | 14:00~14:05 |
| | Catched | 12:28~12:32 | | 14:05~14:30 | | 10:05~10:20 | | 11:50~11:53 | | 14:00~14:05 |
| Position | Latitude | 06°-10.0N | | 06°-13.3N | | 06°-05.5N | | 06°-09.5N | | 06°-08.8N |
| | Longitude | 126°-33.0E | | 126°-31.2E | | 126°-21.5E | | 126°-29.0E | | 126°-27.3E |
| Fish school | Species | SJ | | SJ, YF | | BT | | SJ | | BT |
| | Type | BA(5) | | BA(2) | | PS | | BA(10) | | BA(8) |
| | Status | JM | | | | | | JM | | JM |
| | Size | S | | S | | S | | S | | S |
| | Swiming direction | | | | | | | | | |
| Weather | | c | | bc | | o | | c | | c |
| Wind direction & force | | NNE-3 | | NNE-4 | | NNE-3 | | NNE-3 | | NNE-3 |
| Air temperature | | 25.0 | | 27.5 | | 28.0 | | 27.8 | | 28.1 |
| Water temperature | | 1012.5 | | 1011.5 | | 1014.5 | | 1013.2 | | 1011.5 |
| Air pressure | | 27.4 | | 27.7 | | 27.7 | | 27.8 | | 28.2 |
| Wave | | 3 | | 3 | | 2 | | 3 | | 2 |
| Swell | | 1 | | 1 | | 1 | | 1 | | 1 |
| Water color | | 2 | | 2 | | 2 | | 2 | | 2 |
| Cath by species | | pcs | kg | pcs | kg | pcs | kg | pcs | kg | pcs kg |
| | SJ | 1 | 1.4 | 276 | 375.3 | | | 18 | 25.2 | |
| | YF | | | 44 | 72.6 | | | | | |
| | BT | | | | | 44 | 36.4 | | | 12 8.4 |
| | Total | 1 | 1.4 | 320 | 447.9 | 44 | 36.4 | 18 | 25.2 | 12 8.4 |
| Bait fish used | | | | CL | | | | AT, LE | | 〃 |
| Remarks | | Trolling | | | | | | | | |

Annex table 4.

Body Length Distribution of Skipjack and Others

1. Leyte Gulf Area

| (1) Skipjack (Katsuwonus pelamis) | | | (2) Yellowfin tuna (Thunnus albacores) | | | (3) Bonito (Euthynnus affinis) | | |
|---|---|---|---|---|---|---|---|---|
| Date | Dec. 24~30, 1976 | | Date | Dec. 24~30, 1976 | | Date | 51.12.24 ~ 12.30 | |
| Catching Number | 3 , 6 , 10 , 12 | | Catching Number | 2 , 5 , 6 , 10 , 11 | | Catching Number | 9 , 14 | |
| Range of fork length | pcs | % | Range of fork length | pcs | % | Range of fork length | pcs | % |
| 29(cm) | 1 | 25.0 | 29 (cm) | | | 29(cm) | 1 | 50 |
| 30 | | | 30 | | | 30 | 1 | 50 |
| 31 | | | 31 | | | | | |
| 32 | | | 32 | 1 | 3.7 | | | |
| 33 | 1 | 25.0 | 33 | | | | | |
| 34 | | | 34 | | | | | |
| 35 | | | 35 | 3 | 11.1 | | | |
| 36 | | | 36 | 1 | 3.7 | | | |
| 37 | | | 37 | 4 | 14.8 | | | |
| 38 | | | 38 | 6 | 22.2 | | | |
| 39 | 1 | 25.0 | 39 | 5 | 18.5 | | | |
| 40 | | | 40 | | | | | |
| 41 | | | 41 | 1 | 3.7 | | | |
| 42 | | | 42 | | | | | |
| 43 | | | 43 | 2 | 7.4 | | | |
| 44 | | | 44 | 2 | 7.4 | | | |
| 45 | | | 45 | | | | | |
| 46 | | | 46 | 1 | 3.7 | | | |
| 47 | | | 47 | | | | | |
| 48 | | | 48 | | | | | |
| 49 | | | 49 | | | | | |
| 50 | | | 50 | | | | | |
| 51 | | | 51 | | | | | |
| 52 | | | 52 | | | | | |
| 53 | | | 53 | | | | | |
| 54 | 1 | 25.0 | 54 | | | | | |
| 55 | | | 55 | | | | | |
| | | | 56 | | | | | |
| | | | 57 | | | | | |
| | | | 58 | | | | | |
| | | | 59 | 1 | 3.7 | | | |
| | | | 60 | | | | | |
| N | 4 | | N | 27 | | N | 2 | |
| $\tilde{x}$ | 38.8 | | $\tilde{x}$ | 39.4 | | $\tilde{x}$ | 29.5 | |

2. Davao Gulf Area

(1) Skipjack (Katsuwonus pelamis

| Date | Feb. 13,'77 | | Feb. 18 | | Feb. 18 | | Feb. 28 | | Mar. 10 | | Mar. 11 | | Mar. 11 | | Mar. 13 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching number | 35, 36 | | 42 | | 47 | | 58 | | 63, 64 | | 67 | | 69 | | 74 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 30 (cm) | | | 5 | 2.7 | | | | | | | | | | | | | 5 | 0.8 |
| 31 | | | 4 | 2.2 | | | | | | | | | | | | | 4 | 0.6 |
| 32 | | | 5 | 2.7 | | | | | | | | | | | | | 5 | 0.8 |
| 33 | | | 4 | 2.2 | | | | | | | | | | | | | 4 | 0.6 |
| 34 | | | 6 | 3.2 | | | 1 | 0.9 | | | | | | | | | 7 | 1.1 |
| 35 | | | 10 | 5.4 | | | 2 | 1.9 | | | | | | | | | 12 | 1.9 |
| 36 | | | 25 | 13.5 | | | 1 | 0.9 | | | 4 | 6.4 | | | | | 30 | 4.7 |
| 37 | | | 27 | 14.6 | | | 9 | 8.3 | 2 | 3.6 | 9 | 14.3 | 2 | 2.9 | 5 | 6.6 | 54 | 8.4 |
| 38 | | | 32 | 17.3 | 2 | 2.7 | 19 | 17.6 | 8 | 14.3 | 15 | 23.8 | 10 | 14.5 | 9 | 11.8 | 95 | 14.8 |
| 39 | | | 28 | 15.1 | 11 | 16.1 | 28 | 25.9 | 18 | 32.1 | 19 | 30.2 | 19 | 27.6 | 14 | 18.4 | 137 | 21.4 |
| 40 | 1 | 9.1 | 13 | 7.0 | 19 | 26.0 | 24 | 22.3 | 9 | 16.1 | 8 | 12.7 | 13 | 18.8 | 11 | 14.5 | 98 | 15.3 |
| 41 | 1 | 9.1 | 9 | 4.9 | 14 | 19.2 | 17 | 15.7 | 10 | 17.9 | 5 | 7.9 | 11 | 15.9 | 16 | 21.1 | 83 | 12.9 |
| 42 | | | 6 | 3.2 | 7 | 9.6 | 4 | 3.7 | 4 | 7.1 | 1 | 1.6 | 9 | 13.0 | 11 | 15 | 42 | 6.6 |
| 43 | 1 | 9.1 | 7 | 3.8 | 11 | 15.1 | 1 | 0.9 | 4 | 7.1 | 1 | 1.6 | 3 | 4.4 | 4 | 5.3 | 32 | 4.9 |
| 44 | 3 | 27.3 | 3 | 1.6 | 5 | 6.9 | 1 | 0.9 | 1 | 1.8 | | | 2 | 2.9 | 3 | 3.9 | 18 | 2.8 |
| 45 | 2 | 18.2 | 1 | 0.5 | 3 | 4.1 | 1 | 0.9 | | | 1 | 1.6 | | | 3 | 3.9 | 11 | 1.7 |
| 46 | 1 | 9.1 | | | 1 | 1.4 | | | | | | | | | | | 2 | 0.3 |
| 47 | | | | | | | | | | | | | | | | | | |
| 48 | 1 | 9.1 | | | | | | | | | | | | | | | 1 | 0.2 |
| 49 | | | | | | | | | | | | | | | | | | |
| 50 | 1 | 9.1 | | | | | | | | | | | | | | | 1 | 0.2 |
| 51 | | | | | | | | | | | | | | | | | | |
| 52 | | | | | | | | | | | | | | | | | | |
| 53 | | | | | | | | | | | | | | | | | | |
| 54 | | | | | | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | | | | | | |
| N | 11 | | 185 | | 73 | | 108 | | 56 | | 63 | | 69 | | 76 | | 641 | |
| $\bar{X}$ | 44.5 | | 37.5 | | 41.2 | | 39.3 | | 39.9 | | 38.8 | | 40.0 | | 40.4 | | 39.3 | |

(2) Yellowfin tuna (Thunnus albacores)

| Date | Jan. 26,'77 | | Feb. 12, | | Feb. 18 | | Feb. 28 | | Mar. 10 | | Mar. 11 | | Mar. 13 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching number | 23 | | 32 | | 47 | | 58 | | 64 | | 71 | | 74 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 30 (cm) | 1 | 5.0 | | | | | | | | | | | | | 1 | 0.4 |
| 31 | 2 | 10.0 | 1 | 9.1 | | | | | | | | | | | 3 | 1.3 |
| 32 | 7 | 35.0 | | | | | | | | | | | | | 7 | 3.0 |
| 33 | 1 | 5.0 | 4 | 36.4 | | | | | | | | | | | 1 | 0.4 |
| 34 | 1 | 5.0 | 4 | 36.4 | | | | | | | | | | | 6 | 2.1 |
| 35 | 2 | 10.0 | 4 | 18.2 | | | | | | | | | | | 6 | 2.6 |
| 36 | | | 2 | | | | | | | | | | | | 2 | 0.9 |
| 37 | 3 | 15.0 | | | | | 2 | 3.6 | | | | | | | 5 | 2.1 |
| 38 | 2 | 10.0 | | | | | 2 | 3.6 | | | | | | | 4 | 1.7 |
| 39 | 1 | 5.0 | | | | | 5 | 9.1 | 1 | 7.7 | 7 | 13.4 | 1 | 2.4 | 15 | 6.4 |
| 40 | | | | | | | 7 | 12.7 | 3 | 23.1 | 11 | 21.2 | 6 | 14.6 | 27 | 11.5 |
| 41 | | | | | | | 4 | 7.3 | 1 | 7.7 | 8 | 15.4 | 4 | 9.8 | 17 | 7.3 |
| 42 | | | | | 1 | 2.4 | 5 | 9.1 | 1 | 7.7 | 3 | 5.8 | 8 | 19.5 | 18 | 7.7 |
| 43 | | | | | 8 | 19.1 | 9 | 16.4 | 5 | 38.5 | 6 | 11.5 | 10 | 24.5 | 38 | 16.2 |
| 44 | | | | | 17 | 40.5 | 10 | 18.2 | 1 | 7.7 | 3 | 5.8 | 5 | 12.2 | 36 | 15.4 |
| 45 | | | | | 9 | 21.4 | 4 | 7.3 | | | 7 | 13.4 | 6 | 14.6 | 26 | 11.1 |
| 46 | | | | | 3 | 7.1 | 4 | 7.3 | 1 | 7.7 | 2 | 3.9 | | | 10 | 4.3 |
| 47 | | | | | 2 | 4.8 | 3 | 5.5 | | | 5 | 9.6 | 1 | 2.4 | 11 | 4.7 |
| 48 | | | | | | | | | | | | | | | | |
| 49 | | | | | 1 | 2.4 | | | | | | | | | 1 | 0.4 |
| 50 | | | | | 1 | 2.4 | | | | | | | | | 1 | 0.4 |
| 51 | | | | | | | | | | | | | | | | |
| 52 | | | | | | | | | | | | | | | | |
| 53 | | | | | | | | | | | | | | | | |
| 54 | | | | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | | | | |
| N | 20 | | 11 | | 42 | | 55 | | 13 | | 52 | | 41 | | 234 | |
| $\bar{X}$ | 34.0 | | 34.5 | | 44.5 | | 42.4 | | 42.1 | | 42.3 | | 42.6 | | 41.7 | |

(3) Bonito (Euthynus affinis)

| Date | Jan. 30, '77 | | Feb. 1 | | Feb. 2 | | Feb. 5 | | Feb. 6 | | Feb. 16 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching number | 21 | | 23 | | 24 | | 25 ~ 28 | | 29 | | 38 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 30 (cm) | 17 | 11.3 | 5 | 8.6 | 2 | 5.9 | | | 2 | 4.1 | 2 | 7.4 | 28 | 8.3 |
| 31 | 43 | 28.7 | 23 | 39.6 | 7 | 20.6 | | | 22 | 44.9 | 7 | 25.9 | 102 | 30.4 |
| 32 | 35 | 23.3 | 27 | 46.6 | 9 | 26.6 | | | 14 | 28.6 | 8 | 29.6 | 93 | 27.7 |
| 33 | 10 | 6.7 | 3 | 5.2 | 7 | 20.6 | | | 9 | 18.4 | 9 | 33.3 | 38 | 11.3 |
| 34 | 2 | 1.3 | | | 2 | 5.9 | | | 2 | 4.1 | 1 | 3.7 | 7 | 2.1 |
| 35 | 1 | 0.7 | | | 1 | 2.9 | | | | | | | 2 | 0.6 |
| 36 | 1 | 0.7 | | | | | | | | | | | 1 | 0.3 |
| 37 | 2 | 1.3 | | | | | | | | | | | 2 | 0.6 |
| 38 | 1 | 0.7 | | | | | | | | | | | 1 | 0.3 |
| 39 | 2 | 1.3 | | | | | | | | | | | 2 | 0.6 |
| 40 | 1 | 0.7 | | | | | | | | | | | 1 | 0.3 |
| 41 | | | | | 2 | 5.9 | | | | | | | 2 | 0.6 |
| 42 | 6 | 4.0 | | | | | 1 | 5.6 | | | | | 7 | 2.1 |
| 43 | 3 | 2.0 | | | 1 | 2.9 | 1 | 5.6 | | | | | 5 | 1.5 |
| 44 | 8 | 5.3 | | | | | 1 | 5.6 | | | | | 9 | 2.7 |
| 45 | 5 | 3.3 | | | | | | | | | | | 5 | 1.5 |
| 46 | 2 | 1.3 | | | | | 3 | 16.7 | | | | | 5 | 1.5 |
| 47 | 1 | 0.7 | | | | | 5 | 27.8 | | | | | 6 | 1.8 |
| 48 | 2 | 1.3 | | | | | 1 | 5.6 | | | | | 3 | 0.9 |
| 49 | 3 | 2.0 | | | | | 2 | 11.1 | | | | | 5 | 1.5 |
| 50 | 1 | 0.7 | | | 1 | 2.9 | 1 | 5.6 | | | | | 3 | 0.9 |
| 51 | 2 | 1.3 | | | 1 | 2.9 | 1 | 5.6 | | | | | 4 | 1.2 |
| 52 | 2 | 1.3 | | | 1 | 2.9 | | | | | | | 3 | 0.9 |
| 53 | | | | | | | 1 | 5.6 | | | | | 1 | 0.3 |
| 54 | | | | | | | 1 | 5.6 | | | | | 1 | 0.3 |
| 55 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| N | 150 | | 58 | | 34 | | 18 | | 49 | | 27 | | 336 | |
| $\bar{X}$ | 35.1 | | 31.6 | | 34.8 | | 47.5 | | 31.7 | | 32.0 | | 34.3 | |

# Annex table 5.

# Biological Survey of Skipjack and Others

A : Inmature
B : Maturing
C : Matured
D : Spawned
E : Empty
F : Half filled
G : Full
H : Reversed
I : Digested
J : Half digested
K : Species identifiable

S T : Stolephorus sp.
C L : Clupeidae sp.
A T : Atherinidae sp.
D U : Dussmieriidae sp.
C A : Carangidae sp.
S C : Scombridae sp.
C E : Caesionidae sp.
S I : Siganidae sp.
L E : Leiognathidae sp.
C R : Crustacea
S Q : Squid
O C : Octopus
G L : Globe fish

(1) Skipjack (Katsuwonus pelamis)

| Catching No. | Date | Fish No. | Body length (fork length) (cm) | Weight (kg) | Sex | Gonard weight (g) | Maturing A | B | C | D | Stomach contents E | F | G | H | I | J | K | Remarks | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Dec. 24, '76 | 1 | 54.6 | 3.2 | ♀ | 3.5 | | ○ | | | | ○ | | | | | ○ | CR | |
| 6 | 26 | 1 | 39.0 | 1.0 | ♀ | 7.3 | ○ | | | | | | | | | | ○ | CR | |
| 21 | 30 | 1 | 31.8 | 0.6 | ♀ | 2.5 | ○ | | | | ○ | | | | | | | | |
| 〃 | 〃 | 2 | 30.0 | 0.5 | ♂ | 1.5 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 3 | 54.8 | 3.0 | ♀ | 74.5 | | ○ | | | ○ | | | | | | | | |
| 〃 | 〃 | 4 | 30.0 | 0.5 | ♀ | 3.0 | ○ | | | | ○ | | | | | | | | |
| 23 | Feb. 1 | 1 | 31.8 | 0.5 | ♂ | 1.5 | | | | | ○ | | | | | | | | |
| 28 | 5 | 1 | 55.0 | 3.4 | ♀ | 60.0 | | ○ | | | | ○ | | | | | ○ | CR, CL, SC | (chopped) |
| 〃 | 〃 | 2 | 47.5 | 2.0 | ♀ | 40.0 | | ○ | | | | | ○ | | | | ○ | 〃 | (〃) |
| 35 | 13 | 1 | 44.0 | 1.5 | ♂ | 13.5 | | | | | ○ | | | | | | | | |
| 36 | 〃 | 1 | 46.2 | 1.9 | ♀ | 27.5 | | ○ | | | | | ○ | | | | | DU, CE, AT, ST | (〃) |
| 〃 | 〃 | 2 | 44.3 | 1.8 | ♀ | 9.0 | | ○ | | | | | ○ | | | | | 〃 | (〃) |
| 〃 | 〃 | 3 | 44.2 | 1.5 | ♂ | 5.5 | | | | | | | ○ | | | | | 〃 | (〃) |
| 〃 | 〃 | 4 | 45.1 | 1.7 | ♂ | 11.0 | | | | | | | ○ | | | | | 〃 | (〃) |
| 〃 | 〃 | 5 | 41.8 | 1.3 | ♂ | 4.3 | | | | | | | ○ | | | | | 〃 | (〃) |
| 42 | 17 | 1 | 47.7 | 0.8 | ♂ | 1.5 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 2 | 45.8 | 0.8 | ♂ | 1.3 | | | | | | ○ | | | ○ | | | | |
| 〃 | 〃 | 3 | 47.7 | 0.8 | ♂ | 1.0 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 4 | 51.0 | 1.1 | ♂ | 1.0 | | | | | | ○ | | | | ○ | | DU | |
| 〃 | 〃 | 5 | 50.0 | 1.1 | ♀ | 4.0 | ○ | | | | | ○ | | | | ○ | | AT | |
| 〃 | 〃 | 6 | 47.4 | 1.0 | ♀ | 3.8 | ○ | | | | ○ | | | | | | | | |
| 〃 | 〃 | 7 | 49.4 | 1.2 | ♀ | 3.8 | ○ | | | | | ○ | | | | | ○ | DU, AT | |
| 〃 | 〃 | 8 | 49.5 | 1.2 | ♂ | 1.3 | | | | | | ○ | | | | | ○ | CL, AT, DU | |
| 〃 | 〃 | 9 | 48.0 | 0.9 | ♀ | 2.7 | ○ | | | | ○ | | | | | | | | |
| 〃 | 〃 | 10 | 49.5 | 1.1 | ♂ | 1.2 | | | | | | ○ | | | | | ○ | AT | |
| 47 | 18 | 1 | 50.6 | 1.3 | ♂ | 2.0 | | | | | | | ○ | | | | ○ | DU | (〃) |
| 〃 | 〃 | 2 | 55.4 | 1.7 | ♀ | 8.0 | ○ | | | | | | ○ | | | | ○ | DU | (〃) |
| 〃 | 〃 | 3 | 49.8 | 1.3 | ♂ | 2.7 | | | | | | | ○ | | | | ○ | DU | (〃) |
| 〃 | 〃 | 4 | 51.1 | 1.2 | ♀ | 5.5 | ○ | | | | ○ | | | | | | | | |
| 〃 | 〃 | 5 | 53.8 | 1.4 | ♀ | 8.0 | ○ | | | | ○ | | | | | | | | |
| 58 | 28 | 1 | 40.0 | 1.2 | ♀ | 4.5 | ○ | | | | | ○ | | | | | ○ | SC | (〃) |
| 〃 | 〃 | 2 | 41.7 | 1.3 | ♀ | 6.2 | ○ | | | | | ○ | | | | | ○ | SC | (〃) |
| 〃 | 〃 | 3 | 41.0 | 1.3 | ♂ | 1.5 | | | | | | ○ | | | | ○ | | CL | |
| 〃 | 〃 | 4 | 40.0 | 1.2 | ♀ | 5.0 | ○ | | | | | | ○ | | | ○ | | DU | |
| 〃 | 〃 | 5 | 39.2 | 1.1 | ♀ | 2.0 | ○ | | | | ○ | | | | | | | | |
| 〃 | 〃 | 6 | 42.0 | 1.4 | ♂ | 1.0 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 7 | 39.2 | 1.1 | ♂ | 2.0 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 8 | 40.3 | 1.2 | ♂ | 2.0 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 9 | 41.0 | 1.1 | ♀ | 4.0 | ○ | | | | ○ | | | | | | | | |
| 〃 | 〃 | 10 | 38.4 | 1.1 | ♂ | 1.0 | | | | | ○ | | | | | | | | |

| Catching No. | Date | Fish No. | Body length (fork length) (cm) | Weight (kg) | Sex | Gonard weight (g) | Maturing A | B | C | D | Stomach contents E | F | G | H | I | J | K | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63 | Mar. 10, '77 | 1 | 42.2 | 1.4 | ♀ | 7.0 | ○ | | | | | ○ | | | | ○ | | CR |
| 〃 | 〃 | 2 | 40.0 | 1.2 | ♀ | 5.4 | ○ | | | | | ○ | | | | | | CL, ST (chummed bait) |
| 〃 | 〃 | 3 | 38.5 | 1.2 | ♂ | 1.3 | | | | | ○ | | | | | | | |
| 〃 | 〃 | 4 | 40.0 | 1.3 | ♀ | 3.8 | ○ | | | | | ○ | | | | ○ | | LE, CL |
| 〃 | 〃 | 5 | 39.8 | 1.3 | ♂ | 0.9 | | | | | | | ○ | | | | | CL, DU, ST (〃) |
| 〃 | 〃 | 6 | 39.0 | 1.1 | ♂ | 1.0 | | | | | ○ | | | | | | | |
| 〃 | 〃 | 7 | 40.0 | 1.3 | ♀ | 5.0 | | | | | | ○ | | | | ○ | | ST, CL |
| 〃 | 〃 | 8 | 38.4 | 1.1 | ♀ | 3.6 | | | | | ○ | | | | | | | |
| 〃 | 〃 | 9 | 41.0 | 1.3 | ♀ | 5.7 | | | | | | ○ | | | | ○ | | CL |
| 〃 | 〃 | 10 | 45.0 | 1.8 | ♀ | 10.4 | | | | | ○ | | | | | | | |
| 67 | Mar. 11 | 1 | 38.4 | 1.2 | ♂ | 4.0 | | | | | ○ | | | | | | | |
| 〃 | 〃 | 2 | 37.8 | 1.2 | ♀ | 2.6 | ○ | | | | | ○ | | | | | | ST (〃) |
| 〃 | 〃 | 3 | 39.6 | 1.2 | ♂ | 1.2 | | | | | | | ○ | | | | | CL, ST (〃) |
| 〃 | 〃 | 4 | 39.2 | 1.0 | ♂ | 1.7 | | | | | ○ | | | | | | | |
| 〃 | 〃 | 5 | 43.2 | 1.5 | ♀ | 2.5 | ○ | | | | | ○ | | | | ○ | | ST |
| 69 | 11 | 1 | 43.7 | 1.6 | ♂ | 3.8 | | | | | | ○ | | | | ○ | | CR |
| 〃 | 〃 | 2 | 44.4 | 1.6 | ♂ | 2.0 | | | | | | ○ | | | | | | CL, ST (〃) |
| 〃 | 〃 | 3 | 44.5 | 1.6 | ♀ | 6.0 | ○ | | | | | | ○ | | | | | CL, ST (〃) |
| 〃 | 〃 | 4 | 42.0 | 1.4 | ♂ | 2.0 | | | | | | ○ | | | | | | ST (〃) |
| 〃 | 〃 | 5 | 40.3 | 1.2 | ♂ | 1.8 | | | | | ○ | | | | | | | |
| 74 | 13 | 1 | 40.2 | 1.3 | ♀ | 3.4 | ○ | | | | ○ | | | | | | | |
| 〃 | 〃 | 2 | 41.5 | 1.3 | ♂ | 1.2 | | | | | | ○ | | | | ○ | | CL (〃) |
| 〃 | 〃 | 3 | 41.8 | 1.4 | ♀ | 5.0 | ○ | | | | | ○ | | | | | | CL (〃) |
| 〃 | 〃 | 4 | 41.0 | 1.3 | ♂ | 1.2 | | | | | | ○ | | | | ○ | | ST |
| 〃 | 〃 | 5 | 44.4 | 1.6 | ♂ | 4.7 | | | | | | ○ | | | | | | AT (〃) |
| 〃 | 〃 | 6 | 42.3 | 1.6 | ♂ | 2.0 | | | | | | ○ | | | | ○ | | ST |
| 〃 | 〃 | 7 | 43.3 | 1.6 | ♀ | 13.0 | | ○ | | | | ○ | | | | | | ST |
| 〃 | 〃 | 8 | 42.0 | 1.5 | ♀ | 10.5 | | ○ | | | ○ | | | | | | | |
| 〃 | 〃 | 9 | 38.6 | 1.2 | ♀ | 2.6 | ○ | | | | ○ | | | | | | | |
| 〃 | 〃 | 10 | 39.4 | 1.1 | ♀ | 3.4 | ○ | | | | ○ | | | | | | | |

(2) Yellowfin tuna (Thunnus albacores)

| Catching No. | Date | Fish No. | Body length (fork length) (cm) | Weight (kg) | Sex | Gonard weight (g) | Maturing A | B | C | D | Stomach contents E | F | G | H | I | J | K | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Dec. 24, '76 | 1 | 46.5 | 1.7 | ♂ | 1.3 | | | | | | | ○ | | | ○ | | CR |
| 〃 | 〃 | 2 | 43.5 | 1.5 | ♂ | 1.2 | | | | | | | ○ | | | ○ | | CR |
| 〃 | 〃 | 3 | 43.0 | 1.5 | ♂ | 1.2 | | | | | | | ○ | | | ○ | | CR |
| 〃 | 〃 | 4 | 41.5 | 1.2 | ♂ | 1.1 | | | | | | ○ | | | ○ | | | |
| 5 | 26 | 1 | 44.0 | 1.6 | ? | 1.0 | | | | | | ○ | | | ○ | | | |
| 〃 | 〃 | 2 | 37.8 | 1.0 | ? | 1.2 | | | | | | ○ | | | ○ | | | |
| 〃 | 〃 | 3 | 59.0 | 3.7 | ♂ | 3.5 | | | | | | ○ | | | ○ | | | |
| 6 | 〃 | 1 | 39.0 | 1.1 | ? | 1.1 | | | | | | | | | ○ | | | |
| 〃 | 〃 | 2 | 32.6 | 0.6 | ? | 0.8 | | | | | | | | | ○ | | | |
| 〃 | 〃 | 3 | 38.6 | 1.0 | ♂ | 1.2 | | | | | | | | | ○ | | | |
| 〃 | 〃 | 4 | 39.4 | 1.1 | ♀ | 1.3 | ○ | | | | | | ○ | | | ○ | | CR |
| 〃 | 〃 | 5 | 38.0 | 1.0 | ? | 1.6 | | | | | | | ○ | | | ○ | | CR, CA |
| 〃 | 〃 | 6 | 39.0 | 1.0 | ♂ | 1.2 | | | | | | | ○ | | | ○ | | 〃 〃 |
| 〃 | 〃 | 7 | 37.0 | 1.0 | ♂ | 1.0 | | | | | | ○ | | | | ○ | | 〃 〃 |
| 〃 | 〃 | 8 | 37.5 | 1.0 | ♂ | 1.5 | | | | | | ○ | | | | ○ | | 〃 〃 |
| 〃 | 〃 | 9 | 37.8 | 1.0 | ? | 0.7 | | | | | | ○ | | | | ○ | | 〃 SQ |
| 〃 | 〃 | 10 | 38.8 | 1.1 | ? | 1.2 | | | | | | | ○ | | | ○ | | 〃 , CA |
| 〃 | 〃 | 11 | 39.0 | 1.2 | ♂ | 1.3 | | | | | | | ○ | | | ○ | | 〃 〃 |
| 〃 | 〃 | 12 | 35.5 | 0.8 | ? | 1.0 | | | | | | ○ | | | | ○ | | CA |
| 〃 | 〃 | 13 | 36.5 | 0.9 | ? | 1.2 | | | | | | | ○ | | | ○ | | 〃 , CR |
| 〃 | 〃 | 14 | 35.0 | 0.6 | ♂ | 1.5 | | | | | | ○ | | | | ○ | | CR |
| 〃 | 〃 | 15 | 39.4 | 1.0 | ? | 1.0 | | | | | | ○ | | | | ○ | | 〃 |
| 〃 | 〃 | 16 | 38.0 | 1.1 | ? | 1.7 | | | | | | ○ | | | | ○ | | 〃 |
| 〃 | 〃 | 17 | 38.0 | 0.9 | ? | 1.8 | | | | | | ○ | | | | ○ | | 〃 |
| 〃 | 〃 | 18 | 35.2 | 0.8 | ? | 1.2 | | | | | | ○ | | | | ○ | | 〃 |
| 10 | 30 | 1 | 44.6 | 1.6 | ♂ | 1.2 | | | | | | ○ | | | | ○ | | CR, OC |
| 22 | Feb. 1, '77. | 1 | 33.0 | 0.7 | ♂ | 1.0 | | | | | ○ | | | | | | | |
| 32 | 12 | 1 | 34.3 | 0.8 | ♂ | 1.0 | | | | | | ○ | | | | ○ | | CR |
| 〃 | 〃 | 2 | 31.4 | 0.6 | ♂ | 0.8 | | | | | ○ | | | | | | | |
| 〃 | 〃 | 3 | 35.2 | 0.8 | ♀ | 0.9 | ○ | | | | | ○ | | | | ○ | | CR |
| 〃 | 〃 | 4 | 35.4 | 0.8 | ♀ | 0.7 | ○ | | | | | ○ | | | | ○ | | 〃 |
| 〃 | 〃 | 5 | 36.8 | 1.0 | ♂ | 1.0 | | | | | | ○ | | | | | ○ | AT |
| 〃 | 〃 | 6 | 35.6 | 0.8 | ♀ | 1.2 | ○ | | | | | ○ | | | | ○ | | CR |
| 〃 | 〃 | 7 | 35.7 | 0.9 | ♀ | 1.3 | ○ | | | | | ○ | | | | ○ | | 〃 |
| 〃 | 〃 | 8 | 34.0 | 0.7 | ♂ | 1.0 | | | | | | ○ | | | | ○ | | 〃 |
| 47 | 18 | 1 | 53.3 | 1.7 | ♂ | 1.0 | | | | | | ○ | | | | ○ | | |
| 〃 | 〃 | 2 | 54.1 | 1.8 | ♂ | 1.3 | | | | | | ○ | | | | | ○ | DU (chummed bait) |
| 〃 | 〃 | 3 | 54.5 | 1.8 | ♂ | 1.2 | | | | | | ○ | | | | | ○ | DU (〃) |
| 〃 | 〃 | 4 | 53.8 | 1.6 | ♀ | 2.2 | ○ | | | | | ○ | | | ○ | | | |
| 〃 | 〃 | 5 | 53.4 | 1.6 | ♀ | 2.0 | ○ | | | | | | ○ | | | | ○ | DU (〃) |

| Catching No. | Date | Fish No. | Body length (fork length) (cm) | Weight (kg) | Sex | Gonard weight (g) | Maturing A | B | C | D | Stomach contents E | F | G | H | I | J | K | Remarks | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 | Feb. 27. | 1 | 49.4 | 2.4 | ♂ | 3.5 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 2 | 37.8 | 1.1 | ♀ | 1.7 | ○ | | | | | ○ | | | | ○ | | CR | |
| 〃 | 〃 | 3 | 49.5 | 2.5 | ♀ | 3.0 | ○ | | | | | | ○ | | | ○ | | small fish | |
| 〃 | 〃 | 4 | 48.7 | 2.2 | ♂ | 1.5 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 5 | 50.6 | 2.6 | ♂ | 2.0 | | | | | ○ | | | | | | | | |
| 58 | 28 | 1 | 44.0 | 1.5 | ♂ | 1.5 | | | | | | ○ | | | | ○ | | SI, GL | |
| 〃 | 〃 | 2 | 39.9 | 1.2 | ♂ | 1.0 | | | | | | ○ | | | | ○ | | CR, CL | (chummed bait) |
| 〃 | 〃 | 3 | 47.3 | 2.3 | ♀ | 2.0 | ○ | | | | | | ○ | | | ○ | | CR | |
| 〃 | 〃 | 4 | 45.0 | 1.8 | ♂ | 2.0 | | | | | | ○ | | | ○ | | | | |
| 〃 | 〃 | 5 | 46.2 | 1.9 | ♂ | 2.0 | | | | | | ○ | | | | ○ | | CR, GL | |
| 〃 | 〃 | 6 | 40.0 | 1.3 | ♂ | 1.0 | | | | | | ○ | | | | ○ | | small fish | |
| 〃 | 〃 | 7 | 42.0 | 1.5 | ♂ | 1.3 | | | | | | ○ | | | ○ | | | 〃 | |
| 〃 | 〃 | 8 | 44.1 | 1.7 | ♀ | 3.0 | | | | | | ○ | | | ○ | | | 〃 | |
| 〃 | 〃 | 9 | 44.3 | 1.8 | ♀ | 3.0 | | | | | | ○ | | | | ○ | | CR | |
| 〃 | 〃 | 10 | 39.0 | 1.2 | ♂ | 0.8 | | | | | | ○ | | | | ○ | ○ | CR, DU | (〃) |
| 67 | Mar. 11 | 1 | 42.2 | 1.6 | ♂ | 2.5 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 2 | 41.3 | 1.3 | ♀ | 2.0 | | | | | | | ○ | | | | ○ | ST | (〃) |
| 〃 | 〃 | 3 | 45.1 | 1.8 | ♂ | 1.6 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 4 | 40.9 | 1.2 | ♂ | 1.8 | | | | | | ○ | | | | ○ | | ST | |
| 〃 | 〃 | 5 | 47.6 | 2.3 | ♀ | 2.1 | | | | | ○ | | | | | | | | |
| 69 | 11 | 1 | 47.0 | 2.0 | ♀ | 1.8 | ○ | | | | ○ | | | | | | | | |
| 〃 | 〃 | 2 | 43.3 | 1.6 | ♂ | 0.5 | | | | | | ○ | | | | ○ | | CL | |
| 〃 | 〃 | 3 | 43.2 | 1.6 | ♀ | 1.4 | ○ | | | | | ○ | | | | | ○ | ST | (〃) |
| 〃 | 〃 | 4 | 45.8 | 1.8 | ♀ | 1.3 | ○ | | | | | ○ | | | | | ○ | ST | (〃) |
| 〃 | 〃 | 5 | 40.9 | 1.6 | ♂ | 1.0 | | | | | | ○ | | | ○ | | | CR | |
| 74 | 13 | 1 | 44.5 | 1.7 | ♀ | 2.0 | ○ | | | | | ○ | | | | ○ | | CR | |
| 〃 | 〃 | 2 | 44.6 | 1.8 | ♂ | 1.0 | | | | | | ○ | | | | | ○ | CL, ST | (〃) |
| 〃 | 〃 | 3 | 42.9 | 1.7 | ♂ | 1.0 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 4 | 40.1 | 1.3 | ♂ | 0.7 | | | | | | | ○ | | | | ○ | CL, ST | (〃) |
| 〃 | 〃 | 5 | 41.2 | 1.4 | ♂ | 0.9 | | | | | | | ○ | | | | ○ | ST, SI, CE | (〃) |
| 〃 | 〃 | 6 | 40.6 | 1.5 | ♀ | 1.4 | ○ | | | | | ○ | | | | | ○ | SI | (〃) |
| 〃 | 〃 | 7 | 45.6 | 1.8 | ♂ | 2.4 | | | | | | ○ | | | | ○ | | CL, CR | |
| 〃 | 〃 | 8 | 45.9 | 1.8 | ♂ | 2.0 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 9 | 42.6 | 1.4 | ♂ | 1.1 | | | | | | ○ | | | | | ○ | CL, ST | (〃) |
| 〃 | 〃 | 10 | 45.0 | 1.5 | ♂ | 1.4 | | | | | | ○ | | | | | ○ | CL | (〃) |

(3) Bonito (Euthynnus affinis)

| Catching No. | Date | Fish No. | Body length (fork length) (cm) | Weight (kg) | Sex | Gonard weight (g) | Maturing A | B | C | D | Stomach contents E | F | G | H | I | J | K | Remarks | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | Dec. 29, '76 | 1 | 29.4 | 0.4 | ? | 0.6 | | | | | ○ | | | | | | | | |
| 21 | Jan. 30, '77 | 1 | 50.0 | 2.4 | ♀ | 117.0 | | ○ | | | ○ | | | | | | | | |
| 〃 | 〃 | 2 | 43.4 | 1.5 | ♀ | 30.0 | | ○ | | | ○ | | | | | | | | |
| 〃 | 〃 | 3 | 34.9 | 1.6 | ♀ | 31.0 | | ○ | | | | ○ | | | | ○ | | CR | |
| 〃 | 〃 | 4 | 21.5 | 0.6 | ♂ | 2.0 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 5 | 21.8 | 0.6 | ♂ | 2.0 | | | | | | ○ | | | | | | DU | |
| 〃 | 〃 | 6 | 48.1 | 2.1 | ♂ | 54.0 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 7 | 52.0 | 2.6 | ♂ | 83.0 | | | | | | | ○ | | | ○ | | ST, CR | |
| 〃 | 〃 | 8 | 50.4 | 2.6 | ♀ | 90.0 | | ○ | | | | ○ | | | | | | CR | |
| 〃 | 〃 | 9 | 63.1 | 4.9 | ♀ | 165.0 | | ○ | | | | | ○ | | | | | CA, ST | |
| 〃 | 〃 | 10 | 21.6 | 0.6 | ♂ | 1.5 | | | | | | | ○ | | | | | CA | |
| 23 | Feb. 1, 1 | 1 | 31.1 | 0.7 | ♂ | 1.5 | | | | | | ○ | | | | | ○ | CL | |
| 〃 | 〃 | 2 | 32.1 | 0.7 | ♂ | 1.3 | | | | | | ○ | | | | | ○ | CL, SQ | |
| 〃 | 〃 | 3 | 32.1 | 0.7 | ♀ | 2.0 | ○ | | | | | ○ | | | | | | CL | |
| 〃 | 〃 | 4 | 32.4 | 0.7 | ♂ | 1.0 | | | | | | | ○ | | | | ○ | CL, SQ | |
| 〃 | 〃 | 5 | 32.5 | 0.7 | ♂ | 1.0 | | | | | | ○ | | | | | | | |
| 〃 | 〃 | 6 | 32.3 | 0.6 | ♀ | 3.0 | ○ | | | | | | ○ | | | | | CL | |
| 〃 | 〃 | 7 | 32.6 | 0.7 | ♂ | 1.5 | | | | | | ○ | | | | | | CR | |
| 〃 | 〃 | 8 | 32.2 | 0.7 | ♀ | 2.5 | ○ | | | | | ○ | | | | | | 〃 | |
| 〃 | 〃 | 9 | 31.8 | 0.7 | ♂ | 1.3 | | | | | | ○ | | | | | | 〃 | |
| 〃 | 〃 | 10 | 32.2 | 0.7 | ♂ | 1.5 | | | | | | ○ | | | | | | 〃 | |
| 26 | 5 | 1 | 34.8 | 0.7 | ♀ | 3.0 | ○ | | | | | ○ | | | | ○ | | 〃 | |
| 27 | 〃 | 1 | 53.6 | 2.8 | ♂ | 45.0 | | | | | ○ | | | | | ○ | | 〃 | |
| 〃 | 〃 | 2 | 49.8 | 2.3 | ♂ | 82.0 | | | | | | | | | | ○ | | 〃 | |
| 〃 | 〃 | 3 | 57.1 | 3.6 | ♂ | 88.0 | | | | | | ○ | | | | ○ | | 〃 | |
| 〃 | 〃 | 4 | 46.3 | 2.0 | ♂ | 54.0 | | | | | | | ○ | | | ○ | | 〃 | |
| 28 | 〃 | 1 | 42.6 | 1.4 | ♂ | 55.0 | | | | | ○ | | | | | | | | |
| 〃 | 〃 | 2 | 48.0 | 2.2 | ♀ | 60.0 | | ○ | | | | | ○ | | | | ○ | CL, ST | (chummed bait) |
| 〃 | 〃 | 3 | 46.8 | 1.9 | ♀ | 90.0 | | ○ | | | | | ○ | | | ○ | | | |
| 〃 | 〃 | 4 | 48.4 | 2.1 | ♀ | 100.0 | | ○ | | | | | ○ | | | | | ST, CL | (〃) |
| 37 | 16 | 1 | 33.0 | 0.7 | ♂ | 0.6 | | | | | | ○ | | | | ○ | | CR | |
| 〃 | 〃 | 2 | 32.4 | 0.7 | ♀ | 1.3 | ○ | | | | | ○ | | | | ○ | | 〃 | |
| 〃 | 〃 | 3 | 32.0 | 0.6 | ♂ | 0.7 | | | | | | ○ | | | | ○ | | 〃 | |
| 〃 | 〃 | 4 | 33.0 | 0.6 | ♂ | 0.8 | | | | | | ○ | | | | ○ | | 〃 | |
| 〃 | 〃 | 5 | 35.0 | 0.7 | ♂ | 0.5 | | | | | | ○ | | | | ○ | | 〃 | |
| 〃 | 〃 | 6 | 32.0 | 0.6 | ♀ | 0.8 | ○ | | | | | ○ | | | | ○ | | ST, CA | |
| 38 | 〃 | 1 | 33.5 | 0.6 | ♀ | 2.5 | ○ | | | | | ○ | | | | ○ | | ST, CR | |
| 〃 | 〃 | 2 | 32.2 | 0.7 | ♀ | 1.8 | ○ | | | | | ○ | | | | ○ | | CR | |
| 〃 | 〃 | 3 | 32.4 | 0.7 | ♀ | 2.0 | ○ | | | | | ○ | | | | ○ | | 〃 | |
| 〃 | 〃 | 4 | 32.8 | 0.7 | ♀ | 1.6 | ○ | | | | | ○ | | | | ○ | | 〃 | |

## Annex table 6.

## Body Length and Weight Relationship of Skipjack and Others

B.L. : Body lenghth (fork length)
B.W. : Body weight

1. Leyte Gulf Area

(1) Skipjack (Katsuwonus pelamis)

| Date | Dec. 24~30, '76 | |
|---|---|---|
| Catching No. | 3,6,10,12 | |
| | B.L. | B.W. |
| | cm | kg |
| | 54.6 | 3.2 |
| | 39.0 | 1.0 |
| | 29.5 | 0.35 |
| | 33.4 | 0.65 |
| | N: 4 | |
| | $\bar{L}$: 39.1 | $\bar{W}$: 1.30 |

(2) Yellowfin tuna (Thunnus albacores)

| Date | Dec. 24~30, '76 | |
|---|---|---|
| Catching No. | 2,5,6,10,11 | |
| | B.L. | B.W. |
| | cm | kg |
| | 46.5 | 1.7 |
| | 43.5 | 1.5 |
| | 43.0 | 1.5 |
| | 41.5 | 1.2 |
| | 44.0 | 1.6 |
| | 37.8 | 1.0 |
| | 59.0 | 3.7 |
| | 39.0 | 1.1 |
| | 32.6 | 0.6 |
| | 38.6 | 1.0 |
| | 39.4 | 1.1 |
| | 38.0 | 1.0 |
| | 39.0 | 1.0 |
| | 37.0 | 1.0 |
| | 37.5 | 1.0 |
| | 37.8 | 1.0 |
| | 38.8 | 1.1 |
| | 39.0 | 1.2 |
| | 35.5 | 0.8 |
| | 36.5 | 0.9 |
| | 35.0 | 0.6 |
| | 39.4 | 1.0 |
| | 38.0 | 1.1 |
| | 38.0 | 0.9 |
| | 35.2 | 0.8 |
| | 44.6 | 1.6 |
| | 38.0 | 0.94 |
| | N: 27 | |
| | $\bar{L}$: 39.7 | $\bar{W}$: 1.18 |

(3) Bonito (Euthynnus affinis)

| Date | Dec. 29, '76, Jan 2, '77 | |
|---|---|---|
| Catching No. | 9, 14 | |
| | B.L. | B.W. |
| | cm | kg |
| | 29.4 | 0.4 |
| | 30.4 | 0.48 |
| | N: 2 | |
| | $\bar{L}$: 29.9 | $\bar{W}$: 0.44 |

2. Davao Gulf Area

(1) Skipjack (Katsuwonus pelamis)

| Date | Feb. 13, '77 | | Feb. 17. | | | | Feb. 17 | | | | Feb. 18 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching No. | 35, 36 | | 42 | | | | 44 | | | | 47 | |
| | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. |
| | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg |
| | 44.0 | 1.5 | 37.7 | 0.8 | 34.8 | 0.9 | 35.8 | 0.8 | | | 39.8 | 1.2 |
| | 43.8 | 1.6 | 38.0 | 0.9 | 40.0 | 1.3 | 40.0 | 1.1 | | | 41.0 | 1.4 |
| | 46.2 | 1.9 | 35.8 | 0.8 | 38.3 | 1.0 | 39.0 | 1.1 | | | 44.0 | 1.7 |
| | 44.3 | 1.8 | 37.7 | 0.8 | 37.8 | 0.9 | 39.5 | 1.1 | | | 40.9 | 1.3 |
| | 44.2 | 1.5 | 41.0 | 1.1 | 36.6 | 0.9 | 39.5 | 1.1 | | | 43.4 | 1.5 |
| | 45.1 | 1.7 | 40.0 | 1.1 | 39.0 | 1.0 | 39.5 | 1.1 | | | 39.9 | 1.2 |
| | 41.8 | 1.3 | 37.4 | 1.0 | 37.0 | 0.9 | 41.6 | 1.3 | | | 42.7 | 1.5 |
| | 50.8 | 2.5 | 39.4 | 1.2 | 37.3 | 0.9 | 39.0 | 1.2 | | | 41.9 | 1.4 |
| | 45.0 | 1.8 | 39.5 | 1.2 | 39.8 | 1.3 | 36.5 | 0.9 | | | 46.5 | 1.8 |
| | 48.0 | 2.2 | 39.5 | 1.1 | 36.3 | 0.9 | 41.0 | 1.4 | | | 44.9 | 1.7 |
| | 40.9 | 1.3 | 37.8 | 1.0 | 35.7 | 0.8 | 38.4 | 1.0 | | | 41.2 | 1.3 |
| | | | 36.6 | 0.9 | 36.1 | 0.9 | 40.0 | 1.3 | | | 41.9 | 1.5 |
| | | | 43.0 | 1.5 | 36.3 | 1.0 | 42.3 | 1.4 | | | 44.0 | 1.5 |
| | | | 39.0 | 1.2 | 43.1 | 1.5 | 40.1 | 1.1 | | | 43.9 | 1.6 |
| | | | 36.0 | 0.8 | 40.6 | 1.1 | 38.0 | 0.9 | | | 45.5 | 1.7 |
| | | | 38.5 | 1.2 | 43.4 | 1.6 | 37.6 | 0.9 | | | 40.4 | 1.3 |
| | | | 36.1 | 0.9 | 39.7 | 1.2 | 31.3 | 0.6 | | | 41.8 | 1.5 |
| | | | 37.5 | 1.0 | 36.9 | 0.9 | 37.5 | 1.0 | | | 41.1 | 1.3 |
| | | | 36.5 | 1.0 | 39.3 | 1.1 | 43.5 | 1.5 | | | 40.7 | 1.3 |
| | | | 35.0 | 0.8 | 37.1 | 0.9 | 49.6 | 2.4 | | | 40.2 | 1.2 |
| | | | 38.9 | 1.2 | 45.4 | 1.6 | 39.6 | 1.1 | | | 43.0 | 1.5 |
| | | | 37.1 | 0.8 | 44.0 | 1.5 | 37.9 | 1.0 | | | 44.5 | 1.8 |
| | | | 39.1 | 1.1 | 38.2 | 1.0 | 36.6 | 0.9 | | | 41.2 | 1.4 |
| | | | 37.1 | 0.9 | 37.2 | 0.9 | 42.5 | 1.2 | | | 43.5 | 1.5 |
| | | | 39.8 | 1.3 | 38.3 | 1.1 | 39.9 | 1.1 | | | 41.1 | 1.2 |
| | | | 37.9 | 0.8 | | | 43.7 | 1.6 | | | 41.2 | 1.3 |
| | | | 41.3 | 1.2 | | | 39.4 | 1.0 | | | 41.2 | 1.3 |
| | | | 36.8 | 0.9 | | | 41.8 | 1.3 | | | 39.8 | 1.2 |
| | | | 39.1 | 1.2 | | | 43.1 | 1.5 | | | 39.9 | 1.1 |
| | | | 29.0 | 0.5 | | | 40.4 | 1.3 | | | 40.9 | 1.4 |
| | | | 37.1 | 1.0 | | | 41.9 | 1.3 | | | 39.2 | 1.1 |
| | | | 39.3 | 1.2 | | | 39.9 | 1.2 | | | 43.4 | 1.6 |
| | | | 36.1 | 0.8 | | | 37.0 | 1.0 | | | 42.0 | 1.4 |
| | | | 38.0 | 0.8 | | | 44.0 | 1.5 | | | 39.5 | 1.5 |
| | | | 39.3 | 1.1 | | | 44.7 | 1.6 | | | 45.2 | 1.8 |
| | | | 34.4 | 0.8 | | | 39.4 | 1.2 | | | 39.6 | 1.3 |
| | | | 33.9 | 0.9 | | | 43.1 | 1.5 | | | 40.9 | 1.2 |
| | | | 39.8 | 1.2 | | | 39.0 | 1.1 | | | 41.4 | 1.4 |
| | | | 36.9 | 0.9 | | | 40.4 | 1.2 | | | 38.9 | 1.2 |
| | | | 37.8 | 1.0 | | | 41.9 | 1.4 | | | 41.7 | 1.4 |
| N: 11 | | | 40.0 | 1.1 | N: 67 | | 38.4 | 1.1 | N: 41 | | 41.8 | 1.3 |
| $\bar{L}$: 44.9 | $\bar{W}$: 1.74 | | 37.6 | 1.0 | $\bar{L}$: 38.3 | $\bar{W}$: 1.01 | | | $\bar{L}$: 40.1 | $\bar{W}$: 1.20 | 44.0 | 1.8 |

| Date | Feb. 18, '77 | | Feb. 28, | | | | Mar. 10 | | | | Mar. 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching No. | 4 7 | | 5 8 | | | | 6 3 , 6 4 | | | | 6 7 | |
| | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. |
| | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg |
| | | | 40.0 | 1.2 | 39.4 | 1.1 | 42.2 | 1.4 | 41.1 | 1.2 | 38.4 | 1.2 |
| | | | 41.7 | 1.3 | 40.7 | 1.5 | 40.0 | 1.2 | 39.9 | 1.3 | 37.8 | 1.2 |
| | | | 41.0 | 1.3 | 39.0 | 1.1 | 38.5 | 1.2 | 39.4 | 1.1 | 39.6 | 1.2 |
| | | | 40.0 | 1.2 | 40.1 | 1.1 | 40.0 | 1.3 | 42.9 | 1.5 | 39.2 | 1.0 |
| | | | 39.2 | 1.1 | 40.3 | 1.1 | 39.8 | 1.3 | 39.2 | 1.1 | 43.2 | 1.5 |
| | | | 42.0 | 1.4 | 38.2 | 1.0 | 39.0 | 1.1 | 41.0 | 1.4 | 39.2 | 1.0 |
| | | | 39.2 | 1.1 | 39.8 | 1.2 | 40.0 | 1.3 | 39.4 | 1.2 | 38.0 | 1.0 |
| | | | 40.3 | 1.2 | 40.2 | 1.2 | 38.4 | 1.1 | 39.1 | 1.1 | 39.9 | 1.2 |
| | | | 41.0 | 1.1 | 45.3 | 1.8 | 41.0 | 1.3 | 40.7 | 1.1 | 40.0 | 1.1 |
| | | | 38.4 | 1.1 | 42.0 | 1.3 | 45.0 | 1.8 | 42.2 | 1.3 | 40.2 | 1.3 |
| | | | 39.5 | 1.1 | 37.8 | 1.0 | 41.0 | 1.3 | 39.2 | 1.2 | 39.2 | 1.1 |
| | | | 40.0 | 1.1 | 40.0 | 1.1 | 43.2 | 1.5 | 40.2 | 1.2 | 38.5 | 1.0 |
| | | | 39.0 | 1.2 | 39.4 | 1.2 | 38.6 | 1.2 | 37.6 | 1.1 | 39.7 | 1.2 |
| | | | 41.2 | 1.3 | 38.6 | 1.2 | 43.5 | 1.6 | 38.4 | 1.4 | 37.3 | 1.1 |
| | | | 39.4 | 1.1 | 41.5 | 1.4 | 42.7 | 1.4 | | | 39.6 | 1.3 |
| | | | 39.2 | 1.1 | 40.5 | 1.2 | 41.5 | 1.3 | | | 39.8 | 1.3 |
| | | | 38.7 | 1.1 | 35.6 | 0.9 | 41.0 | 1.4 | | | 40.5 | 1.4 |
| | | | 40.4 | 1.3 | 43.2 | 1.4 | 39.8 | 1.3 | | | 39.2 | 1.3 |
| | | | 40.6 | 1.3 | 39.0 | 1.3 | 41.5 | 1.4 | | | 43.0 | 1.5 |
| | | | 39.7 | 1.1 | 41.8 | 1.3 | 41.6 | 1.3 | | | 40.4 | 1.2 |
| | | | 42.0 | 1.4 | 40.0 | 1.2 | 39.7 | 1.1 | | | 38.2 | 1.1 |
| | | | 38.0 | 1.0 | 38.1 | 1.2 | 40.9 | 1.1 | | | 37.3 | 1.1 |
| | | | 41.8 | 1.5 | 40.0 | 1.2 | 38.0 | 1.1 | | | 39.2 | 1.2 |
| | | | 40.0 | 1.0 | 39.5 | 1.1 | 39.6 | 1.2 | | | 38.7 | 1.2 |
| | | | 42.7 | 1.3 | 39.9 | 1.1 | 39.6 | 1.4 | | | 39.8 | 1.3 |
| | | | 41.0 | 1.2 | 40.0 | 1.1 | 41.6 | 1.3 | | | 37.8 | 1.2 |
| | | | 41.0 | 1.3 | 38.0 | 1.0 | 39.0 | 1.4 | | | 43.7 | 1.6 |
| | | | 39.6 | 1.1 | 39.0 | 1.1 | 38.5 | 1.2 | | | 44.4 | 1.6 |
| | | | 41.6 | 1.3 | 41.7 | 1.3 | 38.1 | 1.3 | | | 44.5 | 1.6 |
| | | | 40.2 | 1.2 | 39.5 | 1.1 | 41.1 | 1.3 | | | 42.0 | 1.4 |
| | | | 40.6 | 1.4 | 41.0 | 1.2 | 40.3 | 1.2 | | | 40.3 | 1.2 |
| | | | 41.2 | 1.2 | 39.4 | 1.2 | 40.1 | 1.3 | | | | |
| | | | 40.0 | 1.2 | 41.0 | 1.2 | 43.6 | 1.5 | | | | |
| | | | 38.9 | 1.0 | 40.8 | 1.2 | 41.1 | 1.4 | | | | |
| | | | 38.5 | 1.1 | 41.2 | 1.3 | 41.6 | 1.3 | | | | |
| | | | 39.7 | 1.2 | 39.7 | 1.0 | 41.7 | 1.4 | | | | |
| | | | 37.2 | 0.9 | | | 39.6 | 1.3 | | | | |
| | | | 38.6 | 1.0 | | | 41.0 | 1.3 | | | | |
| | | | 40.0 | 1.0 | | | 38.9 | 1.1 | | | | |
| | | | 39.2 | 1.1 | | | 39.5 | 1.2 | | | | |
| | | | 44.3 | 1.6 | | | 39.1 | 1.3 | | | | |
| N: 42 | | | 39.2 | 1.2 | N: 79 | | 43.6 | 1.6 | N: 57 | | N: 31 | |
| $\bar{L}$: 41.9 | $\bar{W}$: 1.42 | | 40.7 | 1.3 | $\bar{L}$: 40.1 | $\bar{W}$: 1.18 | 40.0 | 1.1 | $\bar{L}$: 40.4 | $\bar{W}$: 1.29 | $\bar{L}$: 40.0 | $\bar{W}$: 1.25 |

(2) Yellowfin tuna (Thunus albacoras)

| Date | Mar. 13, '77 | | | | Total | | Jan. 29, '77 | | Feb. 12 | | Feb. 17 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching No. | 74 | | | | | | 19 | | 32 | | 42, 44 | |
| | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. |
| | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg |
| | 40.2 | 1.3 | 41.8 | 1.5 | | | 39.0 | 1.1 | 34.3 | 0.8 | 35.0 | 0.8 |
| | 41.5 | 1.3 | 39.7 | 1.4 | | | 32.0 | 0.6 | 31.4 | 0.6 | 37.5 | 0.9 |
| | 41.8 | 1.4 | 40.5 | 1.2 | | | 35.0 | 0.8 | 34.6 | 0.8 | 37.4 | 1.0 |
| | 41.0 | 1.3 | 40.8 | 1.3 | | | 38.5 | 1.1 | 35.2 | 0.8 | 38.4 | 1.1 |
| | 44.4 | 1.6 | 37.4 | 1.1 | | | 35.5 | 0.8 | 35.4 | 0.8 | 42.1 | 1.6 |
| | 42.3 | 1.6 | 42.8 | 1.5 | | | 33.0 | 0.7 | 34.8 | 0.8 | 43.9 | 1.6 |
| | 43.3 | 1.6 | 41.0 | 1.4 | | | 37.0 | 1.0 | 36.4 | 1.0 | 42.7 | 1.4 |
| | 42.0 | 1.5 | 38.9 | 1.2 | | | 32.0 | 0.6 | 36.8 | 0.9 | 43.0 | 1.5 |
| | 38.6 | 1.2 | 40.0 | 1.3 | | | 37.0 | 0.9 | 35.6 | 0.8 | 42.1 | 1.2 |
| | 39.4 | 1.1 | 45.9 | 1.9 | | | 37.0 | 1.0 | 35.7 | 0.9 | 43.9 | 1.6 |
| | 44.2 | 1.6 | 41.4 | 1.4 | | | 33.0 | 0.7 | 34.0 | 0.7 | 42.8 | 1.6 |
| | 40.0 | 1.4 | 37.3 | 1.0 | | | 31.5 | 0.6 | | | 43.1 | 1.6 |
| | 42.7 | 1.6 | 41.2 | 1.3 | | | 32.0 | 0.6 | | | 44.8 | 1.7 |
| | 42.9 | 1.3 | 40.0 | 1.1 | | | 32.0 | 0.6 | | | 45.5 | 1.9 |
| | 41.0 | 1.3 | 42.1 | 1.5 | | | 27.0 | 0.3 | | | | |
| | 41.0 | 1.4 | 41.4 | 1.4 | | | 33.0 | 0.6 | | | | |
| | 39.2 | 1.1 | 42.0 | 1.4 | | | 38.0 | 1.0 | | | | |
| | 40.1 | 1.1 | 38.6 | 1.1 | | | 33.0 | 0.7 | | | | |
| | 41.3 | 1.3 | 42.1 | 1.6 | | | 34.0 | 0.7 | | | | |
| | 42.3 | 1.3 | | | | | 30.5 | 0.5 | | | | |
| | 38.8 | 1.3 | | | | | | | | | | |
| | 43.1 | 1.6 | | | | | | | | | | |
| | 41.0 | 1.4 | | | | | | | | | | |
| | 39.1 | 1.2 | | | | | | | | | | |
| | 40.2 | 1.3 | | | | | | | | | | |
| | 39.3 | 1.2 | | | | | | | | | | |
| | 42.1 | 1.5 | | | | | | | | | | |
| | 39.2 | 1.3 | | | | | | | | | | |
| | 39.6 | 1.3 | | | | | | | | | | |
| | 39.0 | 1.1 | | | | | | | | | | |
| | 43.5 | 1.7 | | | | | | | | | | |
| | 43.7 | 1.4 | | | | | | | | | | |
| | 41.0 | 1.4 | | | | | | | | | | |
| | 41.0 | 1.4 | | | | | | | | | | |
| | 39.0 | 1.1 | | | | | | | | | | |
| | 41.2 | 1.4 | | | | | | | | | | |
| | 41.5 | 1.4 | | | | | | | | | | |
| | 41.4 | 1.2 | | | | | | | | | | |
| | 40.2 | 1.4 | | | | | | | | | | |
| | 39.2 | 1.2 | | | | | | | | | | |
| | 46.3 | 1.7 | | | | | | | | | | |
| | 41.3 | 1.3 | N: 62 | | N: 390 | | N: 20 | | N: 11 | | N: 14 | |
| | 42.3 | 1.6 | $\bar{L}$: 41.07 | $\bar{W}$: 1.36 | $\bar{L}$: 40.28 | $\bar{W}$: 1.25 | $\bar{L}$: 34.0 | $\bar{W}$: 0.75 | $\bar{L}$: 34.9 | $\bar{W}$: 0.81 | $\bar{L}$: 41.6 | $\bar{W}$: 1.39 |

| Date | Feb. 18 | | Feb. 28 | | | | Mar. 10 | | Mar. 11, | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching No. | 47 | | 58 | | | | 64 | | 67, 69 | | | |
| | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. |
| | cm | kg | cm | kg | cm | kg | cm | kg | cm | cm | cm | kg |
| | 42.9 | 1.4 | 44.0 | 1.5 | 46.6 | 1.9 | 43.7 | 1.8 | 42.2 | 1.6 | 39.7 | 1.3 |
| | 42.2 | 1.4 | 39.9 | 1.2 | 43.1 | 1.6 | 40.0 | 1.5 | 41.3 | 1.3 | 47.0 | 2.0 |
| | 42.1 | 1.4 | 47.3 | 1.3 | 39.2 | 1.3 | 44.2 | 1.7 | 46.1 | 1.8 | 40.5 | 1.3 |
| | 44.5 | 1.6 | 45.0 | 1.8 | 40.0 | 1.2 | 42.9 | 1.7 | 40.9 | 1.2 | 47.0 | 2.0 |
| | 41.7 | 1.4 | 46.2 | 1.9 | 39.8 | 1.6 | 39.8 | 1.4 | 47.6 | 2.3 | 43.3 | 1.6 |
| | 43.5 | 1.6 | 40.0 | 1.3 | 44.3 | 1.8 | 46.9 | 1.8 | 45.2 | 1.8 | 43.2 | 1.6 |
| | 44.3 | 1.7 | 42.0 | 1.5 | 44.0 | 1.9 | 43.0 | 1.6 | 41.2 | 1.4 | 45.8 | 1.8 |
| | 44.8 | 1.6 | 44.1 | 1.7 | 37.7 | 1.1 | 43.4 | 1.7 | 39.4 | 1.4 | 40.9 | 1.6 |
| | 42.2 | 1.5 | 44.3 | 1.8 | 37.3 | 1.0 | 40.1 | 1.3 | 41.5 | 1.6 | | |
| | 42.9 | 1.4 | 39.0 | 1.2 | | | 43.4 | 1.7 | 41.4 | 1.4 | | |
| | 44.2 | 1.6 | 43.4 | 1.7 | | | 44.0 | 1.7 | 42.9 | 1.3 | | |
| | 43.4 | 1.4 | 44.5 | 1.8 | | | 41.1 | 1.3 | 46.2 | 2.0 | | |
| | 42.5 | 1.5 | 44.2 | 1.7 | | | 40.5 | 1.3 | 44.4 | 1.9 | | |
| | 45.3 | 1.6 | 40.4 | 1.2 | | | 40.2 | 1.2 | 41.2 | 1.4 | | |
| | 44.2 | 1.7 | 44.2 | 1.8 | | | | | 45.3 | 1.6 | | |
| | 43.6 | 1.5 | 45.1 | 1.7 | | | | | 45.0 | 1.7 | | |
| | 43.2 | 1.6 | 42.7 | 1.6 | | | | | 43.0 | 1.6 | | |
| | 43.4 | 1.6 | 42.3 | 1.7 | | | | | 45.1 | 1.8 | | |
| | 42.5 | 1.4 | 45.3 | 1.7 | | | | | 43.2 | 1.6 | | |
| | 43.5 | 1.6 | 46.5 | 1.0 | | | | | 40.3 | 1.1 | | |
| | 42.3 | 1.5 | 41.0 | 1.5 | | | | | 43.7 | 1.7 | | |
| | 43.1 | 1.6 | 41.0 | 1.4 | | | | | 44.4 | 1.8 | | |
| | 42.7 | 1.5 | 43.6 | 1.8 | | | | | 43.3 | 1.7 | | |
| | 43.6 | 1.8 | 43.4 | 1.9 | | | | | 47.2 | 2.0 | | |
| | 46.1 | 1.9 | 38.0 | 1.1 | | | | | 39.6 | 1.2 | | |
| | 43.5 | 1.6 | 42.8 | 1.8 | | | | | 47.2 | 2.1 | | |
| | 43.4 | 1.6 | 41.0 | 1.2 | | | | | 44.0 | 1.7 | | |
| | 45.3 | 1.9 | 45.8 | 1.9 | | | | | 45.2 | 1.7 | | |
| | 43.2 | 1.6 | 41.7 | 1.3 | | | | | 39.9 | 1.3 | | |
| | 45.5 | 1.7 | 40.2 | 1.4 | | | | | 47.0 | 2.1 | | |
| | 45.9 | 1.8 | 44.3 | 1.7 | | | | | 44.0 | 1.8 | | |
| | 44.6 | 1.8 | 44.0 | 1.7 | | | | | 40.2 | 1.4 | | |
| | 44.0 | 1.6 | 43.3 | 1.6 | | | | | 40.2 | 1.4 | | |
| | | | 41.7 | 1.4 | | | | | 40.9 | 1.5 | | |
| | | | 39.2 | 1.1 | | | | | 40.2 | 1.4 | | |
| | | | 39.2 | 1.2 | | | | | 41.0 | 1.4 | | |
| | | | 38.4 | 1.3 | | | | | 42.2 | 1.6 | | |
| | | | 40.8 | 1.4 | | | | | 39.5 | 1.3 | | |
| | | | 43.0 | 1.6 | | | | | 40.8 | 1.3 | | |
| | | | 42.5 | 1.5 | | | | | 41.8 | 1.6 | | |
| | | | 43.7 | 1.7 | | | | | 41.1 | 1.5 | | |
| N: 33 | | | 43.5 | 1.6 | N: 52 | | N: 14 | | 40.9 | 1.5 | N: 51 | |
| $\bar{L}$: 43.6 | $\bar{W}$: 1.59 | | 44.4 | 1.6 | $\bar{L}$: 42.5 | $\bar{W}$: 1.56 | $\bar{L}$: 42.3 | $\bar{W}$: 1.55 | 40.2 | 1.3 | $\bar{L}$: 42.8 | $\bar{W}$: 1.59 |

(3) Bonito (Euthunnus affinis)

| Date | Mar. 13 | | Total | | Jan. 30, '77 | | | | Feb. 1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching No. | 7 4 | | | | 2 1 | | | | 2 3 | | | |
| | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W |
| | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg |
| | 44.5 | 1.7 | | | 50.0 | 2.4 | 32.0 | 0.6 | 31.0 | 0.65 | 32.3 | 0.7 |
| | 44.6 | 1.8 | | | 43.4 | 1.5 | 32.0 | 0.6 | 32.0 | 0.7 | 31.1 | 0.6 |
| | 42.9 | 1.7 | | | 44.9 | 1.6 | 32.0 | 0.5 | 32.1 | 0.7 | 31.4 | 0.6 |
| | 40.1 | 1.3 | | | 31.5 | 0.6 | 31.4 | 0.6 | 32.4 | 0.7 | 31.3 | 0.7 |
| | 41.2 | 1.4 | | | 31.8 | 0.55 | 32.5 | 0.6 | 32.5 | 0.7 | 31.0 | 0.6 |
| | 40.6 | 1.5 | | | 31.6 | 0.6 | 31.3 | 0.5 | 32.3 | 0.6 | 31.4 | 0.7 |
| | 45.6 | 1.8 | | | 33.8 | 0.65 | 30.3 | 0.5 | 32.6 | 0.65 | 30.1 | 0.5 |
| | 45.9 | 1.8 | | | 33.2 | 0.65 | 30.9 | 0.6 | 32.2 | 0.7 | 32.0 | 0.6 |
| | 42.6 | 1.4 | | | 32.4 | 0.6 | 31.4 | 0.6 | 31.8 | 0.7 | 31.1 | 0.6 |
| | 45.0 | 1.5 | | | 31.2 | 0.55 | 31.4 | 0.5 | 32.2 | 0.7 | 32.3 | 0.7 |
| | 43.6 | 1.9 | | | 32.2 | 0.7 | 32.5 | 0.7 | 31.1 | 0.5 | 31.2 | 0.6 |
| | 46.0 | 1.9 | | | 33.2 | 0.65 | 32.9 | 0.8 | 32.4 | 0.6 | 31.0 | 0.6 |
| | 43.0 | 1.6 | | | 32.8 | 0.65 | 30.9 | 0.5 | 32.1 | 0.6 | 29.2 | 0.45 |
| | 47.2 | 2.0 | | | 32.8 | 0.6 | 31.8 | 0.6 | 31.0 | 0.6 | 32.3 | 0.7 |
| | 45.0 | 1.8 | | | 32.8 | 0.75 | 33.1 | 0.7 | 31.3 | 0.6 | 32.0 | 0.5 |
| | 44.0 | 1.7 | | | 34.2 | 0.8 | 31.0 | 0.5 | 32.3 | 0.7 | | |
| | 44.1 | 1.8 | | | 31.2 | 0.6 | 32.6 | 0.6 | 31.4 | 0.7 | | |
| | 42.5 | 1.6 | | | 32.0 | 0.6 | 31.1 | 0.5 | 31.1 | 0.6 | | |
| | 43.1 | 1.7 | | | 32.6 | 0.65 | 31.1 | 0.6 | 32.0 | 0.6 | | |
| | 43.3 | 1.6 | | | 48.1 | 2.1 | 30.9 | 0.6 | 31.2 | 0.6 | | |
| | 42.6 | 1.4 | | | 52.0 | 2.6 | | | 31.1 | 0.6 | | |
| | 42.0 | 1.4 | | | 50.4 | 2.5 | | | 33.0 | 0.7 | | |
| | 43.5 | 1.8 | | | 63.1 | 4.9 | | | 33.0 | 0.6 | | |
| | 39.5 | 1.4 | | | 31.3 | 0.6 | | | 32.1 | 0.6 | | |
| | 43.5 | 1.7 | | | 31.0 | 0.5 | | | 31.4 | 0.6 | | |
| | | | | | 33.5 | 0.6 | | | 31.0 | 0.6 | | |
| | | | | | 30.5 | 0.5 | | | 32.1 | 0.65 | | |
| | | | | | 30.6 | 0.6 | | | 32.0 | 0.6 | | |
| | | | | | 31.0 | 0.5 | | | 31.2 | 0.5 | | |
| | | | | | 32.1 | 0.6 | | | 31.4 | 0.6 | | |
| | | | | | 31.6 | 0.6 | | | 32.2 | 0.5 | | |
| | | | | | 31.2 | 0.5 | | | 30.2 | 0.5 | | |
| | | | | | 31.4 | 0.6 | | | 32.4 | 0.6 | | |
| | | | | | 31.8 | 0.7 | | | 32.0 | 0.55 | | |
| | | | | | 30.5 | 0.6 | | | 32.0 | 0.55 | | |
| | | | | | 31.4 | 0.6 | | | 31.2 | 0.5 | | |
| | | | | | 32.3 | 0.6 | | | 33.1 | 0.7 | | |
| | | | | | 30.7 | 0.5 | | | 32.2 | 0.6 | | |
| | | | | | 31.2 | 0.5 | | | 32.1 | 0.6 | | |
| | | | | | 31.6 | 0.6 | | | 31.0 | 0.5 | | |
| | | | | | 31.5 | 0.6 | | | 30.3 | 0.6 | | |
| N: 25 | | N: 220 | | | 30.7 | 0.5 | N: 63 | | 30.3 | 0.6 | N: 58 | |
| $\bar{L}$: 43.4 | $\bar{W}$: 1.65 | $\bar{L}$: 41.4 | $\bar{W}$: 1.46 | | 31.1 | 0.5 | $\bar{L}$: 33.8 | $\bar{W}$: 0.81 | 31.3 | 0.6 | $\bar{L}$: 31.6 | $\bar{W}$: 0.61 |

| Date | Feb. 2 | | Feb. 5 | | Feb. 5, | | | | Feb. 16 | | Mar. 10 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catching No. | 24 | | 28 | | 29 | | | | 38 | | 61, 62, 64 | | | |
| | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.L. | B.W. | B.W. | B.L. |
| | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg | cm | kg |
| | 5 2.4 | 2.7 | 4 2.6 | 1.4 | 3 1.3 | 0.6 | 3 1.0 | 0.5 | 3 3.5 | 0.6 | 3 1.6 | 0.6 | | |
| | 5 1.0 | 2.9 | 4 8.0 | 2.2 | 3 2.0 | 0.5 | 3 2.5 | 0.5 5 | 3 2.2 | 0.7 | 3 1.0 | 0.5 | | |
| | 4 3.4 | 1.6 | 4 6.8 | 1.9 | 3 3.0 | 0.6 | | | 3 2.4 | 0.7 | 3 0.9 | 0.5 | | |
| | 5 0.4 | 2.4 | 4 8.4 | 2.1 | 3 2.3 | 0.6 | | | 3 2.8 | 0.7 | 3 5.2 | 0.9 | | |
| | 4 1.2 | 1.2 | 5 1.3 | 2.6 | 3 2.0 | 0.6 | | | 3 3.0 | 0.7 | 3 5.0 | 0.9 | | |
| | 3 5.3 | 0.8 | 4 7.2 | 2.1 | 3 3.3 | 0.6 5 | | | 3 3.4 | 0.7 | | | | |
| | 3 3.0 | 0.7 | 4 7.8 | 2.3 | 3 2.0 | 0.6 | | | 3 3.0 | 0.7 | | | | |
| | 3 4.3 | 0.7 | 4 7.2 | 1.8 | 3 2.8 | 0.6 5 | | | 3 3.6 | 0.7 | | | | |
| | 3 2.2 | 0.7 | 4 6.0 | 1.8 | 3 2.0 | 0.5 | | | 3 3.6 | 0.7 | | | | |
| | 4 1.0 | 1.7 | 4 3.3 | 1.4 | 3 1.0 | 0.5 5 | | | 3 2.0 | 0.6 | | | | |
| | 3 2.3 | 0.8 | | | 3 2.5 | 0.6 5 | | | 3 3.8 | 0.8 | | | | |
| | 3 3.0 | 0.7 | | | 3 1.6 | 0.6 | | | 3 1.7 | 0.7 | | | | |
| | 3 3.1 | 0.8 | | | 3 3.0 | 0.6 5 | | | 3 1.8 | 0.7 | | | | |
| | 3 2.3 | 0.7 | | | 3 1.9 | 0.6 | | | 3 1.5 | 0.6 | | | | |
| | 3 3.0 | 0.8 | | | 3 2.0 | 0.5 5 | | | 3 1.4 | 0.6 | | | | |
| | 3 2.4 | 0.8 | | | 3 1.6 | 0.6 | | | 3 2.0 | 0.6 | | | | |
| | 3 3.0 | 0.7 | | | 3 2.3 | 0.5 5 | | | 3 1.4 | 0.6 | | | | |
| | 3 2.3 | 0.7 | | | 3 1.6 | 0.5 | | | 3 3.5 | 0.8 | | | | |
| | 3 1.0 | 0.6 | | | 3 1.5 | 0.5 | | | 3 2.0 | 0.6 | | | | |
| | 3 1.2 | 0.6 | | | 3 2.6 | 0.6 | | | 3 1.8 | 0.6 | | | | |
| | 3 3.1 | 0.7 | | | 3 1.3 | 0.6 | | | 3 2.6 | 0.7 | | | | |
| | 3 2.2 | 0.6 | | | 3 1.5 | 0.5 | | | 3 2.8 | 0.7 | | | | |
| | 3 0.4 | 0.7 | | | 3 1.9 | 0.5 5 | | | 3 4.0 | 0.7 | | | | |
| | 3 1.4 | 0.7 | | | 3 1.2 | 0.6 | | | 3 0.0 | 0.5 | | | | |
| | 3 1.0 | 0.6 | | | 3 3.7 | 0.6 | | | 3 0.2 | 0.6 | | | | |
| | 3 1.3 | 0.6 | | | 3 2.4 | 0.7 | | | 3 3.0 | 0.6 | | | | |
| | 3 0.2 | 0.6 | | | 3 2.7 | 0.6 | | | 3 2.6 | 0.6 | | | | |
| | 3 2.2 | 0.6 | | | 3 4.0 | 0.6 | | | 3 1.8 | 0.6 | | | | |
| | 3 2.1 | 0.6 | | | 3 2.6 | 0.6 | | | | | | | | |
| | 3 1.0 | 0.6 | | | 3 3.0 | 0.6 | | | | | | | | |
| | 3 1.4 | 0.6 | | | 3 1.8 | 0.6 | | | | | | | | |
| | 3 2.2 | 0.6 | | | 3 4.0 | 0.6 | | | | | | | | |
| | 3 3.3 | 0.7 | | | 3 0.5 | 0.5 | | | | | | | | |
| | 3 4.2 | 0.8 | | | 3 1.0 | 0.5 | | | | | | | | |
| | | | | | 3 5.0 | 0.7 | | | | | | | | |
| | | | | | 3 1.7 | 0.5 | | | | | | | | |
| | | | | | 3 2.5 | 0.6 | | | | | | | | |
| | | | | | 3 1.3 | 0.5 5 | | | | | | | | |
| | | | | | 3 2.8 | 0.5 5 | | | | | | | | |
| | | | | | 3 1.7 | 0.6 | | | | | | | | |
| | | | | | 3 1.6 | 0.5 5 | | | | | | | | |
| N: 34 | | | N: 10 | | 3 1.6 | 0.6 | N: 45 | | N: 28 | | N: 5 | | N: 243 | |
| $\bar{L}$: 34.8 | $\bar{W}$: 0.93 | | $\bar{L}$: 46.9 | $\bar{W}$: 1.96 | 3 3.5 | 0.6 | $\bar{L}$: 32.2 | $\bar{W}$: 0.58 | $\bar{L}$: 32.4 | $\bar{W}$: 0.66 | $\bar{L}$: 32.7 | $\bar{W}$: 0.68 | $\bar{L}$: 33.5 | $\bar{W}$: 0.75 |

## Annex table 7.

# Record of Bait Fishing

Note :

Current : 0 ……Slack
1 ……Week
2 ……Middle
3 ……Stronger
4 ……Strongest

Status of fish gathered : 0 ……Nothing
1 ……Rare
2 ……Average
3 ……Plenty
4 ……More plenty

Leyte Gulf Area)

| Operation No. | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Date | | Dec.14, '76 | Dec.15 | Dec.15 | Dec.16 | Dec.17 |
| Moon age | | 21.4 | 22.4 | 23.4 | 24.4 | 25.4 |
| Position | Latitude | 11°-02'5N | 11°-05'3N | 11°-05'7N | 11°-05'7N | 11°-05'3N |
| | Longitude | 125°-39'3E | 125°-34'2E | 125°-35'9E | 125°-35'9E | 125°-34'9E |
| Distance from shore (Mile) | | 1.4 | 0.45 | 1.0 | 1.0 | 0.5 |
| Bottom material | | S | S | S | S | S |
| Depth (m) | | 23 | 34 | 29 | 29 | 31 |
| Transparency (m) | | 10 | 12 | 12 | 12 | 13 |
| Water surface temperature (℃) | | 27.6 | 27.8 | 28.1 | 28.1 | 27.7 |
| Air temperature (℃) | | 26.4 | 26.0 | 28.0 | 27.1 | 26.7 |
| Air pressure (mb) | | 1011.0 | 1011.1 | 1013.2 | 1011.8 | 1010.5 |
| Weather | | bc | bc | bc | bc | bc |
| Wind direction | | N | ENE | ENE | NE | NE |
| Wind force | | 3 | 2 | 3 | 2 | 2 |
| Current | | 0 | 0 | SW-1 | SSW-1 | SW-1 |
| Fish attraction | | 1 | 1 | 2 | 1 | 0 |
| Operation hour | | 03:40~03:55 | 03:20~03:40 | 22:35~22:50 | 04:05~04:20 | 04:55~05:10 |
| Fishing method | | Stick-held dip net | 〃 | 〃 | 〃 | 〃 |
| Catch (Basketfuls) | | 1.0 Bkts % | 4.0 Bkts % | 2.0 Bkts % | 5.0 Bkts % | 0.5 Bkts % |
| 1 | Engraulidae | | | | 0.5 10 | 0.3 60 |
| 2 | Dussumieriidae | 1.0 100 | 3.5 90 | 2.0 100 | 4.5 90 | 0.2 40 |
| 3 | Atherinidae | | | | | |
| 4 | Clupeidae | | 0.5 10 | | | |
| 5 | Caesionidae | | | | | |
| 6 | Carangidae | | | | | |
| 7 | Siganidae | | | | | |
| 8 | Others | | | | | |
| Description | Record on fish finder | — | — | Thick in 5 to 20m | Somewhat thick in 7 to 15m | In belt dotted thin in 10m |
| | Net style | Good | Good | Good | Good | irregulas |
| | Others | S. japonicus (Houtuyn) mostly escaped, through the meshes of stick-held dip net at net hauling because of their smallness. (Off Caninoan Is.) | Some of Athlernidae accompanying were caught. (Off Balinatio Is.) | S. japonicus (Houtuyn) escaped from the bottom of net. S. japonicus (Houtuyn) sank down because of the menace of Carangidae. (Off Balinatio Is.) | Arhiernidae ran away before attracted into nets because of the menace of Carangidae. (Off Balinatio Is.) | Net Shape became flat because of the rapid, tidal current. (Off Balinatio Is.) |

| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|
| Dec. 12 | Dec.18 | Dec.19 | Dec.19 | Dec.20 | Dec.20 | Dec.21 |
| 26.4 | 26.4 | 27.4 | 27.4 | 28.4 | 28.4 | 29.4 |
| 11°-06.6N | 11°-06.6N | 11°-02.7N | 11°-02.7N | 11°-02.7N | 11°-02.7N | 11°-05.8N |
| 125°-33.6E | 125°-33.6E | 125°-37.3E | 125°-37.3E | 125°-37.3E | 125°-37.3E | 125°-28.1E |
| 0.6 | 0.6 | 0.35 | 0.35 | 0.35 | 0.35 | 0.65 |
| M | M | S | S | S | S | M |
| 23 | 23 | 25 | 25 | 25 | 25 | 30 |
| 13 | 13 | 13 | 13 | 12 | 12 | 14 |
| 27.7 | 27.5 | 27.5 | 27.4 | 27.2 | 25.8 | 26.8 |
| 26.1 | 26.9 | 27.0 | 27.0 | 24.0 | 27.3 | 25.2 |
| 1011.2 | 1009.3 | 1008.9 | 1008.5 | 1009.2 | 1008.0 | 1009.4 |
| r | o | bc | bc | r | r | o |
| NE | NNE | ENE | ENE | NE | NE | N |
| 4 | 3 | 2 | 3 | 3 | 4 | 1 |
| SSW-1 | 0 | 0 | WSW-1 | 0 | SSW-1 | 0 |
| 1 | 0 | 1 | 2 | 1 | 0 | 1 |
| 22:25~22:45 | 03:40~04:05 | 01:20~01:55 | 05:10~05:45 | 02:05~02:30 | 05:05~05:20 | 04:35~05:00 |
| 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| 5.0 Bkts % | 0.3 Bkts % | 1.0 Bkts % | 3.50 Bkts % | 3.0 Bkts % | 0 Bkts % | 5.5 Bkts % |
| 0.5 10 | 0.03 10 | 22 20 | | | | 5.0 90 |
| 4.3 85 | 0.27 90 | 1.1 10 | | 2.7 90 | | |
| | | | | 0.3 10 | | |
| | | 7.1 65 | 33.3 95 | | | |
| | | 0.6 5 | 1.7 5 | | | |
| 0.2 5 | | | | | | 0.5 10 |
| Dotted thin reflection in 10 to 15m | Thin reflection | Dotted thin reflection in 5 to 10m | — | — | — | Dotted thin in 10 to 15m |
| Good | Good | Good | Somewhat bad | Good | Somewhat bad | Good |
| (Off Quinapondan Bay) | (Off Quinapondan Bay) | Squid and Carangidae accompanying were caught. (Off Cabalalian Is.) | Net shape became flat because of the tidal current (Off Cabalalian Is.) | (off Cabalalian Is.) | (Ditto) | Land water flowed in because of rainfalls. Water color changed to yellow. Water temperature fell down. (Sua Bay) |

| Operation No. | | 13 | | 14 | | 15 | | 16 | | 17 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | Dec.21, '76 | | Dec.24 | | Dec.26 | | Dec.27 | | Dec.28 | |
| Moon age | | 29.4 | | 2.9 | | 4.9 | | 5.9 | | 6.9 | |
| Position | Latitude | 11°-02.4N | | 11°-06.1N | | 11°-06.4N | | 11°-05.7N | | 10°-43.3N | |
| | Longitude | 125°-38.5E | | 125°-21.7E | | 125°-23.2E | | 125°-31.3E | | 125°-03.7E | |
| Distance from shore (Mile) | | 0.35 | | 0.3 | | 0.8 | | 0.4 | | 0.3 | |
| Bottom material | | S | | M | | M | | S, M | | M | |
| Depth (m) | | 23 | | 31 | | 23.5 | | 36 | | 23 | |
| Transparency (m) | | 10 | | 11 | | 7 | | 11 | | 10 | |
| Water surface temperature (℃) | | 26.9 | | 27.1 | | 26.9 | | 27.2 | | 27.2 | |
| Air temperature (℃) | | 26.4 | | 23.7 | | 25.0 | | 25.1 | | 25.3 | |
| Air pressure (mb) | | 1011.1 | | 1008.9 | | 1007.9 | | 1010.0 | | 1010.0 | |
| Weather | | c | | bc | | bc | | bc | | o | |
| Wind direction | | NE | | Calm | | ENE | | NNE | | NNE | |
| Wind force | | 4 | | | | 2 | | 2 | | 2 | |
| Current | | 0 | | 0 | | SW-1 | | SSW-1 | | 0 | |
| Fish attraction | | 0 | | 2 | | 1 | | 1 | | 1 | |
| Operation hour | | 20:35~20:55 | | 04:45~05:20 | | 02:55~03:15 | | 01:15~01:35 | | 01:15~01:40 | |
| Fishing method | | Stick-held dip net | | 〃 | | 〃 | | 〃 | | 〃 | |
| Catch (Basket fuls) | | 2.5 Bkts | % | 18.0 Bkts | % | 4.0 Bkts | % | 3.0 Bkts | % | 2.0 Bkts | % |
| 1 | Engraulidae | 0.75 | 30 | 5.4 | 30 | 0.4 | 10 | | | | |
| 2 | Dussumieriidae | | | 10.8 | 60 | 3.6 | 90 | | | 2.0 | 100 |
| 3 | Atherinidae | 1.75 | 70 | | | | | 3.0 | 100 | | |
| 4 | Clupeidae | | | 1.8 | 10 | | | | | | |
| 5 | Caesionidae | | | | | | | | | | |
| 6 | Carangidae | | | | | | | | | | |
| 7 | Siganidae | | | | | | | | | | |
| 8 | Others | | | | | | | | | | |
| Description | Record on fish finder | Dotted thin in 5 to 10m | | Somewhat thick in belt in 10 to 15m | | Dotted thin around 10m | | Thick in belt in 5 to 10m | | Thick in belt around 5m | |
| | Net style | irregulas | | Good | | Good | | Good | | Good | |
| | Others | (Off Cabalalian Is.) | | A majority of Stelephorus heterolobus (Ruppell) perrshed after caught. (3 basketfuls) ((Maglolobo Bay) | | Lots of squid accompanying were caught (Balangiga Bay) | | Bait fish excaped from the entrance of net. (Quinapondan Bay) | | (Off Abuyog) | |

| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|
| Dec.28, '76 | Dec.29 | Dec.30 | Jan.7, '77 | Jan.8 | Jan.10 | Jan.11 |
| 6.9 | 7.9 | 8.9 | 16.9 | 17.9 | 19.9 | 20.9 |
| 11°-00.1N | 11°-00.1N | 11°-00.3N | 07°-00.8N | 07°-00.5N | 06°-59.7N | 06°-59.7N |
| 125°-41.0E | 125°-41.0E | 125°-40.7E | 125°-43.3E | 125°-43.3E | 125°-43.3E | 125°-43.3E |
| 1.4 | 1.4 | 1.3 | 0.12 | 0.12 | 0.2 | 0.2 |
| S | S | S | M | Co., S, M | Co | Co |
| 27.6 | 27.5 | 28 | 32 | 30 | 44 | 32 |
| 12 | 12 | 12 | 15 | 15 | 15 | 15 |
| 27.4 | 27.3 | 27.2 | 26.5 | 26.1 | 26.9 | 26.6 |
| 26.6 | 27.4 | 26.6 | 25.0 | 23.7 | 26.4 | 25.0 |
| 1010.8 | 1008.0 | 1008.0 | 1010.0 | 1009.8 | 1008.6 | 1007.4 |
| bc | bc | bc | bc | bc | bc | bc |
| E | ENE | ESE | Calm | Calm | Calm | Calm |
| 1 | 2 | 2 | | | | |
| WSW-1 | 0 | W-1 | 0 | 0 | S-1 | 0 |
| 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| 21:30~22:00 | 02:50~03:25 | 04:10~04:35 | 23:00~23:25 | 23:30~24:00 | 20:00~20:25 | 02:45~03:10 |
| 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| 6.0 Bkts % | 8.0 Bkts % | 4.0 Bkts % | 0.5 Bkts % | 0.2 Bkts % | 0.5 Bkts % | 0.4 Bkts % |
| 0.6 10 | 0.8 10 | | | | | 0.1 |
| | 2.4 30 | 1.6 40 | 0.45 90 | 0.1 50 | 0.4 80 | 0.2 |
| 5.4 90 | 4.8 60 | 2.4 60 | 0.05 10 | | | 0.1 |
| | | | | 0.1 50 | | |
| | | | | | 0.1 20 | |
| Dotted thin in 5 to 10m | Dotted thin in 5m | 〃 | Dotted thin in 10m | Somewhat thick in belt in 10m (likely Rastneliger Kanagurta (Cuvier) | Almost none | Almost none |
| Good | Good | irregulas | Good | Good | Good | Good |
| (Off Manicani Is.) | (Off Manicani Is.) | (Ditto) | (Malipano) | (Ditto) | (South off Malipano) | (Ditto) |

| Operation No. | | 25 | | 26 | | 27 | | 28 | | 29 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | Jan.11, '77 | | Jan.11 | | Jan.12 | | Jan.13 | | Jan.14 | |
| Moon age | | 20.9 | | 20.9 | | 21.9 | | 22.9 | | 23.9 | |
| Position | Latitude | 06°-59.7 N | | 06°-49.8 N | | 06°-49.8 N | | 07°-02.8 N | | 07°-02.7 N | |
| | Longitude | 125°-43.3 E | | 126°-04.2 E | | 126°-04.2 E | | 125°-43.0 E | | 125°-43.0 E | |
| Distance from shore (Mile) | | 0.2 | | 0.25 | | 0.25 | | 0.2 | | 0.2 | |
| Bottom material | | Co | | M | | M | | Co | | Co | |
| Depth (m) | | 32 | | 32 | | 32 | | 30 | | 30 | |
| Transparency (m) | | 15 | | 17 | | 17 | | 15 | | 15 | |
| Water surface temperature (℃) | | 26.6 | | 27.7 | | 27.5 | | 27.9 | | 27.4 | |
| Air temperature (℃) | | 25.1 | | 26.8 | | 26.0 | | 27.6 | | 25.2 | |
| Air pressure (mb) | | 1009.0 | | 1008.4 | | 1008.0 | | 1009.5 | | 1009.0 | |
| Weather | | bc | | bc | | bc | | bc | | o | |
| Wind direction / Wind force | | Calm | | Calm | | Calm | | Calm | | Calm | |
| Current | | W-1 | | 0 | | 0 | | 0 | | 0 | |
| Fish attraction | | 2 | | 2 | | 1 | | 1 | | 1 | |
| Operation hour | | 05:10~05:45 | | 23:10~23:45 | | 04:15~04:40 | | 21:55~23:25 | | 04:35~05:00 | |
| Fishing method | | Stick-held dip net | | 〃 | | 〃 | | 〃 | | 〃 | |
| Catch (Basketfuls) | | 0.1 Bkts | % | 4.5 Bkts | % | 1.2 Bkts | % | 6.0 Bkts | % | 4.0 Bkts | % |
| 1 | Engraulidae | 0.1 | 100 | | | 0.6 | 50 | 3.0 | 50 | 2.0 | 50 |
| 2 | Dussumieriidae | | | 2.0 | 45 | 0.6 | 50 | | | 2.0 | 50 |
| 3 | Atherinidae | | | 2.5 | 55 | | | | | | |
| 4 | Clupeidae | | | | | | | | | | |
| 5 | Caesionidae | | | | | | | | | | |
| 6 | Carangidae | | | | | | | | | | |
| 7 | Siganidae | | | | | | | | | | |
| 8 | Others | | | | | | | 3.0 | 50 | | |
| Description | Record on fish finder | | | Dotted thin around | | Almost none | | Thin in 5 to 10m | | Thin | |
| | Net style | Good | | Good | | Good | | Good | | Good | |
| | Others | Sardinella sp. ran away | | | | Fry of Engraulidae. | | Fry of Engraulidae. | | | |
| | | (Ditto) | | (Cuabo Bay) | | (Ditto) | | (Off San Jose) | | (Ditto) | |

| 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|---|---|---|---|---|---|---|
| Jan.15, '77 | Jan.15 | Jan.16 | Jan.17 | Jan.18 | Jan.19 | Jan.20 |
| 24.9 | 25.9 | 25.9 | 26.9 | 27.9 | 28.9 | 0.4 |
| 07°-02.4 N | 06°-35.2 N | 06°-35.2 N | 06°-36.3 N | 06°-35.8 N | 06°-54.0 N | 07°-09.8 N |
| 125°-32.5 E | 125°-25.9 E | 125°-25.9 E | 125°-25.5 E | 125°-26.3 E | 125°-28.3 E | 125°-52.9 E |
| 0.25 | 0.3 | 0.3 | 0.45 | 0.3 | 0.3 | 0.5 |
| M | M | M | M | M | M | M |
| 35 | 28 | 28 | 45 | 30 | 34 | 30 |
| 20 | 9 | 9 | 12 | 12 | 12 | 11 |
| 27.4 | 28.7 | 28.1 | 27.9 | 28.4 | 27.0 | 26.7 |
| 24.6 | 27.2 | 25.0 | 27.0 | 24.2 | 22.6 | 23.8 |
| 1009.0 | 1010.0 | 1009.0 | 1009.2 | 1009.4 | 1009.5 | 1010.0 |
| bc | bc | r | bc | r | bc | bc |
| Calm | Calm | Calm | NE 1 | E 1 | NNE 1 | NW 1 |
| 0 | 0 | 0 | 0 | 0 | SW-1 | N-1 |
| 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| 04:35~05:15 | 21:00~21:35 | 04:45~05:20 | 04:20~04:50 | 04:15~04:45 | 04:20~04:50 | 00:10~00:45 |
| 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| 20.0 Bkts % | 6.0 Bkts % | 4.0 Bkts % | 1.0 Bkts % | 2.0 Bkts % | 2.0 Bkts % | 6.0 Bkts % |
| 0.5 2.5 | 1.8 30 | 1.2 30 | | | | 2.4 40 |
| | 2.4 40 | | 1.0 100 | 1.8 90 | 1.4 70 | |
| 0.5 2.5 | 1.8 30 | 0.4 10 | | | | |
| | | 2.0 50 | | 0.2 10 | 0.4 20 | |
| | | | | | | 3.0 50 |
| 19.0 95 | | 0.4 10 | | | 0.2 10 | 0.6 10 |
| Dotted thin in 10m | thick in belt in 5 to 10m | Ditto | Dotted thin around 10m | large around 10m | Thin | Dotted thin around 10m |
| Good | Good | Good | irregulas | Good | irregulas | Good |
| Myctophiforms sp.died soon after caught. | | | Bait fish ran away from the entrance of net. | | | |
| (Talomo Bay) | (Malalag Bay) | (Ditto) | (Ditto) | (Ditto) | (Off Astorga) | (Malalage Bay) |

| Operation No. | | 37 | 38 | 39 | 40 | 41 |
|---|---|---|---|---|---|---|
| Date | | Jan.20, '77 | Jan.21 | Jan.21 | Jan.22 | Jan.24 |
| Moon age | | 0.4 | 1.4 | 1.4 | 2.4 | 4.4 |
| Position | Latitude | 07°-09'8N | 07°-02'0N | 07°-14'4N | 07°-14'4N | 07°-10'8N |
| | Longitude | 125°-52'9E | 125°-58'0E | 125°-39'6E | 125°-39'6E | 125°-44'2E |
| Distance from shore (Mile) | | 0.5 | 0.24 | 0.6 | 0.6 | 0.5 |
| Bottom material | | M | S, Sh | M | M | Co |
| Depth (m) | | 30 | 31 | 35 | 37 | 30 |
| Transparency (m) | | 11 | 17 | 9 | 9 | 14 |
| Water surface temperature (℃) | | 26.5 | 27.4 | 26.8 | 26.6 | 27.3 |
| Air temperature (℃) | | 23.4 | 24.5 | 23.4 | 22.8 | 25.9 |
| Air pressure (mb) | | 1010.2 | 1009.1 | 1010.0 | 1009.0 | 1009.5 |
| Weather | | bc | bc | bc | bc | bc |
| Wind direction | | NE | Calm | N | NNW | NW |
| Wind force | | 1 | | 1 | 1 | 2 |
| Current | | N-1 | NW-1 | SE-1 | SE-1 | E-1 |
| Fish attraction | | 1 | 1 | 1 | 1 | 1 |
| Operation hour | | 04:25~04:55 | 04:00~04:30 | 23:50~00:20 | 04:20~04:50 | 04:20~04:35 |
| Fishing method | | Stick-held dip net | 〃 | 〃 | 〃 | 〃 |
| Catch (Basketfuls) | | 11.0 Bkts % | 8.0 Bkts % | 1.5 Bkts % | 11.0 Bkts % | 4.0 Bkts % |
| 1 | Engraulidae | 9.9 90 | | 1.4 90 | 11.0 100 | 2.4 60 |
| 2 | Dussumieridae | | | | | 1.2 30 |
| 3 | Atherinidae | | 5.6 70 | | | 0.2 5 |
| 4 | Clupeidae | | | | | |
| 5 | Caesionidae | | | | | |
| 6 | Carangidae | | | | | |
| 7 | Siganidae | | 1.6 20 | | | 0.2 5 |
| 8 | Others | 1.1 10 | 0.8 10 | 0.1 10 | | |
| Description | Record on fish finder | Dotted thin in belt in 5 to 10m | Dotted thin around 7m, Thin around 20m | Dotted thin in belt 5 to 20m, Thin in 25m | Dotted thin in belt 5 to 10m | — |
| | Net style | Good | irregulas | Good | Good | Good |
| | Others | Small sized Engraulidae, Others : fry of Mullidae. | Others : fry of Mullidae. | Others : Leiognathidae sp. and globefish. | | |
| | | (Magnaga Bay) | (Mapanga Bay) | (Tanbungon) | (Ditto) | (South off Bassa Pt) |

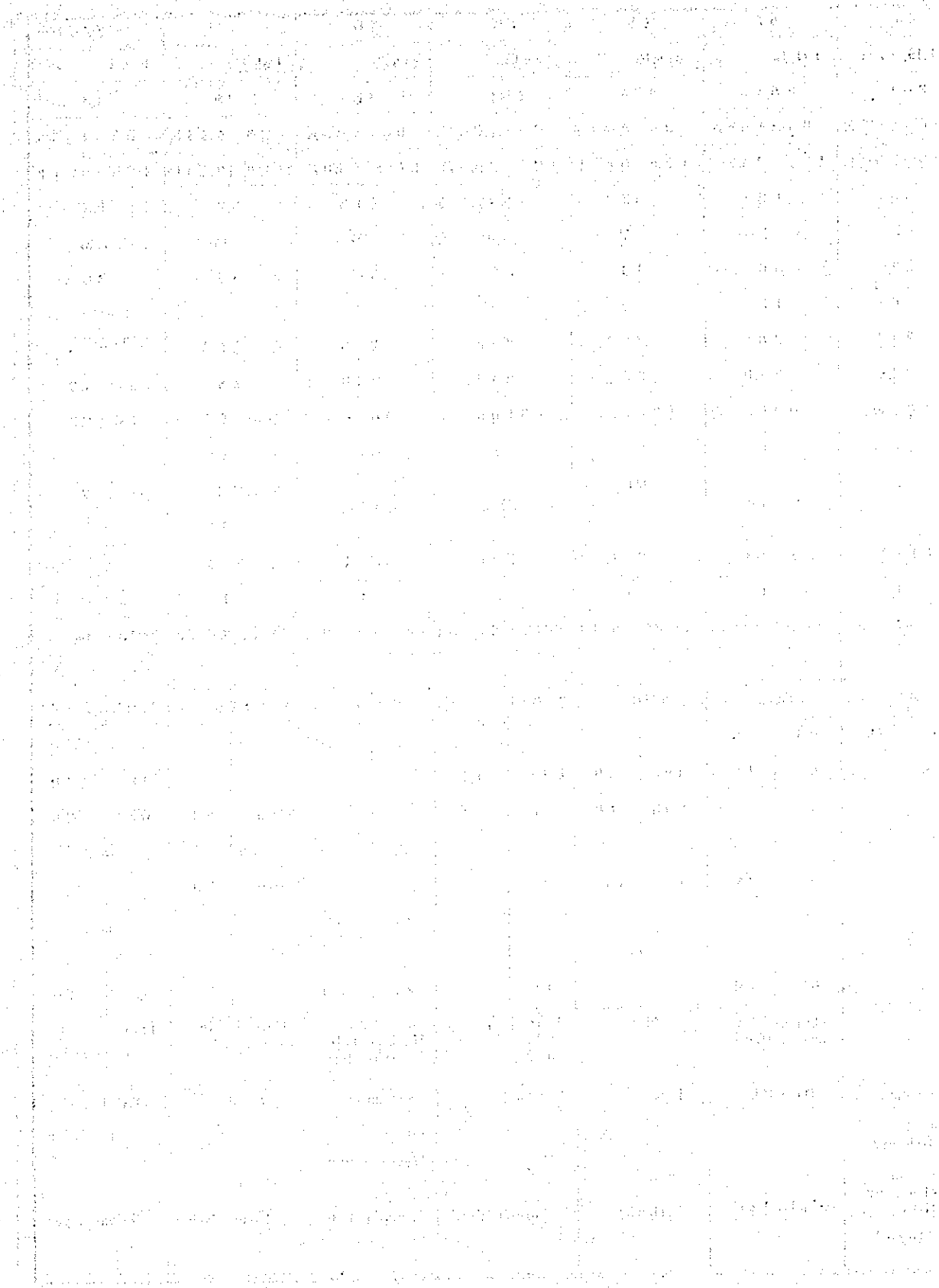
| 42 | 43 | 44 | 45 | 46 | 47 | 48 |
|---|---|---|---|---|---|---|
| Jan.25, '77 | Jan.27 | Jan.28 | Jan.30 | Jan.31 | Feb.1 | Feb.1 |
| 6.4 | 7.4 | 8.4 | 10.4 | 11.4 | 12.4 | 12.4 |
| 07°-14.5 N | 06°-51.1 N | 06°-30.3 N | 07°-09.8 N | 06°-30.5 N | 06°-31.7 N | 06°-31.7 N |
| 125°-39.6 E | 126°-03.6 E | 125°-24.1 E | 125°-52.6 E | 125°-34.0 E | 125°-31.6 E | 125°-31.6 E |
| 0.5 | 0.8 | 0.1 | 0.7 | 0.2 | 0.3 | 0.3 |
| M | M | M | M | M | M | M |
| 30 | 32 | 36 | 32 | 42 | 35 | 35 |
| 12 | 16 | 14 | 9 | | 6 | 6 |
| 27.9 | 28.3 | 27.8 | 27.5 | 28.1 | 27.9 | 28.0 |
| 24.5 | 26.2 | 24.8 | 23.4 | 26.6 | 25.5 | 25.6 |
| 1010.0 | 1008.0 | 1008.8 | 1009.0 | 1007.2 | 1009.0 | 1008.1 |
| bc | bc | c | bc | bc | c | c |
| N | NE | NW | NE | SW | N | N |
| 1 | 2 | 1 | 1 | 1 | 3 | 3 |
| 0 | SW-1 | E-1 | S-1 | SE-1 | 0 | S-1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 04:25~04:45 | 04:40~05:00 | 04:10~04:25 | 04:25~04:50 | 04:25~04:45 | 01:55~02:20 | 05:06~05:20 |
| 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| 2.0 Bkts % | 0.5 Bkts % | 6.0 Bkts % | 2.0 Bkts % | 2.0 Bkts % | 0.5 Bkts % | 1.5 Bkts % |
| 1.8 90 | 0.25 50 | | 1.8 90 | | 0.25 50 | 0.15 10 |
| | | | | 0.6 30 | 0.25 50 | 0.6 40 |
| | | 6.0 100 | | 1.4 70 | | 0.6 40 |
| 0.2 10 | 0.25 50 | | 0.2 10 | | | 0.15 10 |
| | Dotted thick in belt 5 to 20m Thick in belt around 30m | Dotted thin in belt 5 to 15m | Dotted thin around 10m | Dotted thin in 5 to 10m | Thick in belt in 5 to 10m | |
| irregulas | irregulas | irregulas | irregulas | Good | irregulas | irregulas |
| (Off Tanbungon) | Bait fish ran away due to the menace of Scombridae (Cuabo Bay) | (Port Tubalan) | Fry of Engraulidae (Magnaga Bay) | (Tubalan Bay) | (Basiauan Bay) | Bait fish ran away because of the storm and shark approached (Ditto) |

| Operation No. | | 49 | 50 | 51 | 52 | 53 |
|---|---|---|---|---|---|---|
| Date | | Feb. 2, '77 | Feb. 3 | Feb. 4 | Feb. 5 | Feb. 5 |
| Moon age | | 13.4 | 14.4 | 15.4 | 16.4 | 16.4 |
| Position | Latitude | 06°-31.7 N | 06°-30.5 N | 06°-44.4 N | 06°-44.4 N | 06°-44.5 N |
| | Longitude | 125°-31.5 E | 125°-34.0 E | 126°-05.2 E | 126°-05.2 E | 126°-05.1 E |
| Distance from shore (Mile) | | 0.4 | 0.2 | 0.45 | 0.45 | 0.4 |
| Bottom material | | M | M | M | M | M |
| Depth (m) | | 32 | 35 | 27.5 | 27 | 27 |
| Transparency (m) | | — | — | 11 | 11 | 12 |
| Water surface temperature (℃) | | 28.0 | 27.4 | 28.2 | 27.9 | 27.9 |
| Air temperature (℃) | | 26.4 | 24.0 | 26.0 | 24.5 | 27.9 |
| Air pressure (mb) | | 1008.0 | 1007.9 | 1010.0 | 1009.0 | 1009.0 |
| Weather | | c | o | bc | bc | bc |
| Wind direction | | N | NNW | NNW | NE | NE |
| Wind force | | 1 | 1 | 3 | 1 | 3 |
| Current | | 0 | 0 | SW-1 | SW-1 | N-1 |
| Fish attraction | | 1 | 0 | 1 | 1 | 1 |
| Operation hour | | 04:50~05:50 | 04:45~05:10 | 23:10~23:35 | 02:35~02:55 | 21:45~22:05 |
| Fishing method | | Stick-held dip net | 〃 | 〃 | 〃 | 〃 |
| Catch (Basketfuls) | | 2.0Bkts % | 0.5Bkts | 4.5Bkts % | 2.5Bkts % | 1.0Bkts |
| 1 | Engraulidae | 0.6 30 | | | 1.25 50 | 0.3 30 |
| 2 | Dussumieriidae | 1.2 60 | | 1.8 40 | 1.25 50 | 0.7 70 |
| 3 | *Atherinidae* | | | | | |
| 4 | Clupeidae | | | 2.7 60 | | |
| 5 | Caesionidae | | | | | |
| 6 | Carangidae | | | | | |
| 7 | Siganidae | | | | | |
| 8 | Others | 0.2 10 | 0.5 | | | |
| Description | Record on fish finder | | Thin | Dotted thin & large reflection in 5 to 10m, thick in bett' in 10 to 20m | Thin in belt in belt around 10m | In belt around 10 to 20m |
| | Net style | Good | irregulas | Good | Good | irregulas |
| | Others | (Ditto) | (Tubalan Bay) | Sardinela sp. (some 15cm in body length) (Talisay Bay) | (Ditto) | (Ditto) |

| 54 | 55 | 56 | 57 | 58 | 59 | 60 |
|---|---|---|---|---|---|---|
| Feb. 6, '77 | Feb. 6 | Feb. 6 | Feb. 7 | Feb. 8 | Feb. 9 | Feb. 9 |
| 17.4 | 17.4 | 17.4 | 18.4 | 19.4 | 20.4 | 20.4 |
| 06°-44.5 N | 06°-44.5 N | 06°-44.3 N | 06°-44.3 N | 06°-44.4 N | 06°-44.4 N | 06°-35.2 N |
| 126°-05.1 E | 126°-05.1 E | 126°-05.2 E | 126°-05.2 E | 126°-05.2 E | 126°-05.2 E | 125°-25.9 E |
| 0.4 | 0.4 | 0.3 | 0.3 | 0.4 | 0.4 | 0.2 |
| M | M | M | M | M | M | M |
| 27 | 27 | 27 | 27 | 25 | 2.5 | 28 |
| 12 | 12 | 8 | 8 | | | 4 |
| 27.8 | 27.7 | 27.8 | 27.9 | 27.4 | 27.4 | 28.0 |
| 27.9 | 27.9 | 28.1 | 25.2 | 23.6 | 23.8 | 27.9 |
| 1008.8 | 1008.1 | 1009.9 | 1009.8 | 1011.5 | 1009.5 | 1011.1 |
| bc | bc | o | r | c | c | bc |
| E | NNE | E | Calm | Calm | ENE | NE |
| 3 | 2 | 2 | | | 1 | 3 |
| 0 | S-1 | | SE-1 | SW-1 | NE-1 | SW-1 |
| 1 | 1 | 1 | 1 | 2 | 1 | 0 |
| 01:20~01:45 | 04:50~05:10 | 21:25~21:50 | 04:55~05:15 | 22:25~22:50 | 04:45~05:05 | 22:55~23:10 |
| 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| 2.5 Bkts % | 0.5 Bkts % | 7.0 Bkts % | 6.0 Bkts % | 8.0 Bkts % | 1.0 Bkts % | 0.2 Bkts |
| 2.25 90 | 0.5 100 | | 3.6 60 | | | |
| 0.25 90 | | 3.5 50 | | 4.0 50 | 0.5 50 | |
| | | 3.5 50 | 2.4 40 | 4.0 50 | 0.5 50 | |
| | | | | | | 0.2 100 |
| Thick in belt in 7 to 10m | Thick in belt around 5 to 10, 22 | Dotted thin around 5m Stratiformly thick in belt around 10m | | Dotted thin around 5 to 10m Stratiform around 25m | | Dotted thin around 7m Cloud-like around 20m |
| Good | irregulas | Somewhat bad | irregulas | Good | Good | irregulas |
| (Ditto) | (Tolisay Bay) | Sardinella sp., Sprotellnides delicaturus (Bennett), Harengula sp. (Ditto) | (Ditto) | (Ditto) | (Ditto) | (Malalag Bay) |

| Operation No. | | 61 | 62 | 63 | 64 | 65 |
|---|---|---|---|---|---|---|
| Date | | Feb.10, '77 | Feb.11 | Feb.12 | Feb.13 | Feb.14 |
| Moon age | | 21.4 | 22.4 | 22.4 | 24.2 | 25.4 |
| Position | Latitude | 06°-36.2N | 06°-41.6N | 06°-41.6N | 06°-43.6N | 06°-43.6N |
| | Longitude | 125°-26.1E | 126°-04.7E | 126°-04.7E | 126°-05.1E | 126°-05.1E |
| Distance from shore (Mile) | | 0.25 | 0.4 | 0.4 | 0.28 | 0.28 |
| Bottom material | | M | M | M | M | M |
| Depth | | 32 | 30 | 30 | 28 | 28 |
| Transparency | | | 13 | 13 | 12 | 12 |
| Water surface temperature | | 28.0 | 28.1 | 27.6 | 27.6 | 27.2 |
| Air temperature | | 26.9 | 26.0 | 26.0 | 25.5 | 27.2 |
| Air pressure | | 1010.0 | 1010.3 | 1009.5 | 1010.9 | 1009.0 |
| Weather | | bc | bc | c | bc | bc |
| Wind direction | | SE | S | Calm | SE | E |
| Wind force | | 1 | 1 | | 1 | 1 |
| Current | | W-1 | W-1 | S-1 | SW-1 | S-1 |
| Fish attraction | | 0 | 1 | 1 | 1 | 2 |
| Operation hour | | 04:50~05:05 | 00:00~00:25 | 04:40~05:05 | 21:55~22:15 | 04:45~05:10 |
| Fishing method | | Stick-held dip net | 〃 | 〃 | 〃 | 〃 |
| Catch (Basketfuls) | | 1.0 Bkts % | 6.0 Bkts % | 1.5 Bkts % | 5.5 Bkts % | 8.0 Bkts % |
| 1 | Engraulidae | 0.6 60 | | | | |
| 2 | Dussumieriidae | | 5.7 95 | | 4.94 90 | 7.2 90 |
| 3 | Atherinidae | | | | 0.28 5 | |
| 4 | Clupeidae | 0.4 40 | 0.3 5 | | 0.28 5 | |
| 5 | Caesionidae | | | 1.5 100 | | |
| 6 | Carangidae | | | | | |
| 7 | Siganidae | | | | | |
| 8 | Others | | | | | 0.8 10 |
| Description | Record on fish finder | Thin | Dotted thin 5, 10m | Dotted thin in 5, 10m | Dotted thin in belt 5 to 10m | |
| | Net style | Good | irregulas | Good | irregulas | irregulas |
| | Others | (Ditto) | S. japonicus (Houtuyn), Sprotellnides delicaturus (Bennett) Harengua sp. (Baskal Cove) | Bait fish died after charged into live bait well. Coesionidae sp. (Ditto) | (Talisay Bay) | (Ditto) |

| 66 | 67 | 68 | 69 | 70 | 71 | 72 |
|---|---|---|---|---|---|---|
| Feb.15, '77 | Feb.15 | Feb.16 | Feb.18 | Feb.20 | Feb.21 | Feb.23 |
| 26.4 | 26.4 | 27.4 | 29.4 | 1.8 | 2.8 | 4.8 |
| 06°-44.7 N | 06°-49.9 N | 06°-49.9 N | 06°-43.6 N | 06°-30.5 N | 06°-49.3 N | 06°-43.5 N |
| 125°-23.5 E | 126°-04.2 E | 126°-04.2 E | 126°-05.0 E | 125°-34.0 E | 126°-04.3 E | 126°-05.1 E |
| 0.5 | 0.27 | 0.27 | 0.37 | 0.12 | 0.2 | 0.3 |
| M | M | M | M | M | M | M |
| 29 | 30 | 30 | 30 | 30 | 30 | 30 |
| 6 | 15 | 15 | – | – | – | – |
| 27.4 | 28.5 | 28.2 | 27.9 | 27.8 | 26.0 | 27.5 |
| 24.6 | 27.0 | 26.0 | 24.4 | 24.8 | 23.7 | 24.2 |
| 1007.6• | 1009.5 | 1007.2 | 1010.6 | 1009.0 | 1010.7 | 1012.0 |
| bc | bc | bc | r | bc | r | o |
| W 2 | Calm | NE 1 | Calm | Calm | ESE 1 | NNW 2 |
| SE-1 | SW-1 | S-1 | S-1 | SE-1 | S-1 | – |
| 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| 04:25~04:50 | 23:25~23:55 | 04:45~05:10 | 04:30~05:00 | 04:25~04:45 | 04:30~04:55 | 04:35~04:55 |
| 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| 1.5 Bkts % | 5.0 Bkts % | 5.5 Bkts % | 22.0 Bkts % | 5.0 Bkts % | 10.0 Bkts % | 3.0 Bkts % |
| 1.34 90 | 0.5 10 | | | | | 0.9 30 |
| 0.08 5 | 0.5 10 | 4.95 90 | 19.8 90 | | | 1.2 40 |
| | | 0.55 10 | 1.1 5 | | 5.0 50 | 0.6 20 |
| 0.08 5 | | | | | | |
| | 3.5 70 | | | | 5.0 50 | |
| | | | | 25 50 | | |
| | 0.5 10 | | 1.1 5 | 25 50 | | 0.3 10 |
| 〃 | Thin in belt around 10m | Thin | Dotted thin in belt 6 to 20m | Somewhat thick in belt in 10 to 20m | Dotted thin around 10m | Thin |
| irregulas | irregulas | irregulas | Good | irregulas | Good | Good |
| A lot of bait fish were died because of the chumming jellyfish. (Digos) | (Cuabo Bay) | (Ditto) | (Talisay Bay) | Others : Myctophiforms sp. (Port Tubalan) | (Cuabo Bay) | (Talisay Bay) |



Annex table 8.

## Body Length Distribution of Bait Fishes

Leyte Gulf Area

1.

(1) Engraulidae Engraulidae

Stolephorus Stolephorus sp.

| Fishing ground | Babatlo I. | | Oulapandan | | Cavaralian I. | | Sua Bay | | Caninoan I. | | Maglolobo Bay | | Balangiga Bay | | Abuyag | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Dec. 16, '76 | | Dec. 18 | | Dec. 19 | | Dec. 21 | | Dec. 21 | | Dec. 24 | | Dec. 24 | | Dec. 28 | | | |
| Operation No. | 3, 4 | | 6, 7 | | 8 | | 12 | | 13 | | 14 | | 15 | | 17 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15‰ | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | 2 | 18 | | | | | | | 4 | 34 | 6 | 12 |
| 45 | | | | | | | 3 | 27 | 6 | 222 | | | | | 11 | 93 | 20 | 39 |
| 50 | 4 | 75 | | | | | 8 | 71 | | | 1 | 32 | 1 | 18 | 48 | 407 | 62 | 122 |
| 55 | 19 | 359 | 1 | 22 | 5 | 76 | 7 | 63 | 5 | 185 | | | 1 | 18 | 28 | 237 | 66 | 130 |
| 60 | 27 | 509 | 23 | 511 | 26 | 384 | 13 | 116 | 1 | 37 | 3 | 97 | 2 | 35 | 7 | 59 | 102 | 200 |
| 65 | 3 | 57 | 18 | 400 | 30 | 454 | 14 | 125 | 2 | 74 | 8 | 258 | 14 | 246 | 10 | 85 | 99 | 195 |
| 70 | | | 2 | 44 | 5 | 76 | 15 | 134 | 5 | 185 | 6 | 193 | 30 | 526 | 6 | 51 | 69 | 135 |
| 75 | | | 1 | 22 | | | 35 | 312 | 5 | 185 | 3 | 97 | 8 | 140 | 4 | 34 | 56 | 110 |
| 80 | | | | | | | 15 | 134 | 3 | 111 | 3 | 97 | 1 | 18 | | | 22 | 43 |
| 85 | | | | | | | | | | | 2 | 65 | | | | | 2 | 04 |
| 90 | | | | | | | | | | | 1 | 32 | | | | | 1 | 02 |
| 95 | | | | | | | | | | | 1 | 32 | | | | | 1 | 02 |
| 100 | | | | | | | | | | | 2 | 65 | | | | | 2 | 04 |
| 105 | | | | | | | | | | | 1 | 32 | | | | | 1 | 02 |
| 110 | | | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | | | |
| N | 53 | | 45 | | 66 | | 112 | | 27 | | 31 | | 57 | | 118 | | 509 | |
| $\bar{X}$ | 577 | | 626 | | 626 | | 675 | | 620 | | 740 | | 687 | | 541 | | 626 | |

Stolephorus batavicusis Hardenberg

| Fishing ground | Caninoan I. | | Abuyog | | Total | |
|---|---|---|---|---|---|---|
| Date | Dec. 21, '76 | | Dec. 28 | | | |
| Operation No. | 13 | | 17 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % |
| 15‰ | | | | | | |
| 20 | | | | | | |
| 25 | | | | | | |
| 30 | | | | | | |
| 35 | | | | | | |
| 40 | | | | | | |
| 45 | | | | | | |
| 50 | | | | | | |
| 55 | | | | | | |
| 60 | | | | | | |
| 65 | | | | | | |
| 70 | | | | | | |
| 75 | | | | | | |
| 80 | | | | | | |
| 85 | | | | | | |
| 90 | | | 4 | 334 | 4 | 286 |
| 95 | | | 3 | 250 | 3 | 214 |
| 100 | 3 | 600 | 1 | 83 | 4 | 286 |
| 105 | 2 | 400 | 1 | 83 | 3 | 214 |
| 110 | | | | | | |
| 115 | | | | | | |
| 120 | | | | | | |
| 125 | | | | | | |
| 130 | | | | | | |
| 135 | | | | | | |
| 140 | | | | | | |
| N | 5 | | 9 | | 14 | |
| $\bar{X}$ | 1020 | | 944 | | 971 | |

Stolephorus indicus(Van Hasselt)

| Fishing ground | Sua Bay | | Maglolobo Bay | | Total | |
|---|---|---|---|---|---|---|
| Date | Dec. 21, '76 | | Dec. 24 | | | |
| Operation No. | 12 | | 14 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % |
| 15‰ | | | | | | |
| 20 | | | | | | |
| 25 | | | | | | |
| 30 | | | | | | |
| 35 | | | | | | |
| 40 | | | | | | |
| 45 | | | | | | |
| 50 | | | | | | |
| 55 | | | | | | |
| 60 | | | | | | |
| 65 | | | | | | |
| 70 | | | | | | |
| 75 | | | | | | |
| 80 | | | | | | |
| 85 | | | | | | |
| 90 | | | | | | |
| 95 | | | | | | |
| 100 | 1 | 37 | | | 1 | 09 |
| 105 | 4 | 148 | | | 4 | 38 |
| 110 | 2 | 74 | | | 2 | 19 |
| 115 | 11 | 407 | 3 | 38 | 14 | 133 |
| 120 | 3 | 111 | 13 | 167 | 16 | 152 |
| 125 | 4 | 148 | 30 | 385 | 34 | 329 |
| 130 | 1 | 37 | 26 | 333 | 27 | 257 |
| 135 | 1 | 37 | 6 | 77 | 7 | 67 |
| 140 | | | | | | |
| N | 27 | | 78 | | 105 | |
| $\bar{X}$ | 1159 | | 1262 | | 1236 | |

(2) Dussmieriidae

Spratelloides japonicus (Houttuyn)

| Fishing ground | Cantican I. | | Balinatio I. | | " | | " | | Quinapondan | | Cabalatlan I. | | Sua Bay | | Magolobo Bay | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Dec. 14, '76 | | Dec. 15 | | Dec. 16 | | Dec. 17 | | Dec. 18 | | Dec. 19 | | Dec. 21 | | Dec. 24 | | | |
| Operation No | 1 | | 2 | | 3, 4 | | 5 | | 6, 7 | | 8 | | 12 | | 14 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15‰ | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | |
| 25 | 9 | 17.3 | 1 | 1.8 | | | | | 9 | 10.0 | | | 10 | 10.7 | 3 | 2.9 | 32 | 4.9 |
| 30 | 23 | 44.2 | 14 | 25.9 | 8 | 12.3 | 7 | 8.1 | 23 | 25.6 | | | 44 | 47.3 | 16 | 15.5 | 135 | 20.6 |
| 35 | 11 | 21.1 | 10 | 18.5 | 3 | 4.6 | 12 | 13.9 | 13 | 10.4 | 4 | 3.5 | 19 | 20.4 | 19 | 18.4 | 91 | 13.8 |
| 40 | 5 | 9.6 | 8 | 14.8 | 12 | 18.5 | 11 | 12.8 | 5 | 5.6 | 8 | 7.1 | 9 | 9.7 | 25 | 24.3 | 83 | 12.7 |
| 45 | 2 | 3.9 | 14 | 25.9 | 9 | 13.8 | 10 | 11.6 | 9 | 10.0 | 9 | 8.0 | 10 | 10.7 | 21 | 20.4 | 84 | 12.8 |
| 50 | 2 | 3.9 | 3 | 5.6 | 9 | 13.8 | 15 | 17.4 | 6 | 6.7 | 7 | 6.2 | 1 | 1.1 | 16 | 14.6 | 58 | 8.7 |
| 55 | | | 4 | 7.4 | 8 | 12.3 | 14 | 16.3 | 7 | 7.8 | 25 | 22.1 | | | 4 | 3.9 | 62 | 9.5 |
| 60 | | | | | 11 | 16.9 | 10 | 11.6 | 10 | 11.0 | 30 | 26.5 | | | | | 61 | 9.3 |
| 65 | | | | | 4 | 6.2 | 6 | 7.0 | 7 | 7.8 | 28 | 24.8 | | | | | 45 | 6.9 |
| 70 | | | | | 1 | 1.5 | 1 | 1.2 | 1 | 1.1 | 2 | 1.8 | | | | | 5 | 0.8 |
| 75 | | | | | | | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | | | | | | | |
| 85 | | | | | | | | | | | | | | | | | | |
| 90 | | | | | | | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | | | |
| N | 52 | | 54 | | 65 | | 86 | | 90 | | 113 | | 93 | | 103 | | 656 | |
| $\bar{X}$ | 325 | | 392 | | 478 | | 476 | | 420 | | 562 | | 333 | | 405 | | 433 | |

Spratelloides delicatulus (Bennett)

| Fishing ground | Balinatio I | | Maglolobo Bay | | Total | |
|---|---|---|---|---|---|---|
| Date | Dec. 17, '76 | | Dec. 24 | | | |
| Operation No | 5 | | 14 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % |
| 15‰ | | | | | | |
| 20 | | | | | | |
| 25 | | | | | | |
| 30 | 1 | 1.0 | | | 1 | 0.5 |
| 35 | 2 | 2.0 | 2 | 2.1 | 4 | 2.1 |
| 40 | 9 | 9.0 | 16 | 17.4 | 25 | 13.0 |
| 45 | 14 | 14.0 | 19 | 20.7 | 33 | 17.2 |
| 50 | 22 | 22.0 | 25 | 27.2 | 47 | 24.5 |
| 55 | 29 | 29.0 | 17 | 18.5 | 46 | 24.0 |
| 60 | 16 | 16.0 | 11 | 12.0 | 27 | 14.1 |
| 65 | 7 | 7.0 | 2 | 2.1 | 9 | 4.7 |
| 70 | | | | | | |
| 75 | | | | | | |
| 80 | | | | | | |
| 85 | | | | | | |
| 90 | | | | | | |
| 95 | | | | | | |
| 100 | | | | | | |
| 105 | | | | | | |
| 110 | | | | | | |
| 115 | | | | | | |
| 120 | | | | | | |
| 125 | | | | | | |
| 130 | | | | | | |
| 135 | | | | | | |
| 140 | | | | | | |
| N | 100 | | 92 | | 192 | |
| $\bar{X}$ | 520 | | 493 | | 507 | |

(3) Atherinidae

Allanetta sp.

| Fishing ground | Sua Bay | | Caninoan I. | | Quinapondan | | Total | |
|---|---|---|---|---|---|---|---|---|
| Date | Dec. 21, '76 | | Dec. 21, | | Dec. 27, | | | |
| Operation No | 12 | | 13 | | 16 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % |
| 15‰ | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | 1 | 1.2 | 1 | 0.5 |
| 35 | | | | | 7 | 8.5 | 7 | 3.3 |
| 40 | | | | | 13 | 15.9 | 13 | 6.1 |
| 45 | 4 | 3.8 | | | 19 | 23.2 | 23 | 10.8 |
| 50 | 10 | 9.6 | 4 | 15.4 | 5 | 6.1 | 19 | 9.0 |
| 55 | 31 | 29.8 | 6 | 23.1 | 5 | 6.1 | 42 | 19.8 |
| 60 | 34 | 32.7 | 7 | 27.0 | 23 | 28.0 | 64 | 30.2 |
| 65 | 17 | 16.4 | 4 | 15.4 | 9 | 11.0 | 30 | 14.1 |
| 70 | 8 | 7.7 | 1 | 3.8 | | | 9 | 4.3 |
| 75 | | | 3 | 11.5 | | | 3 | 1.4 |
| 80 | | | 1 | 3.8 | | | 1 | 0.5 |
| 85 | | | | | | | | |
| 90 | | | | | | | | |
| 95 | | | | | | | | |
| 100 | | | | | | | | |
| 105 | | | | | | | | |
| 110 | | | | | | | | |
| 115 | | | | | | | | |
| 120 | | | | | | | | |
| 125 | | | | | | | | |
| 130 | | | | | | | | |
| 135 | | | | | | | | |
| 140 | | | | | | | | |
| N | 104 | | 26 | | 82 | | 212 | |
| $\bar{X}$ | 585 | | 609 | | 507 | | 557 | |

(4) Clupeidae

Sardinella sp.

| Fishing ground | Balinatio I | | Quingapondan | | Cabalalian I | | Total | |
|---|---|---|---|---|---|---|---|---|
| Date | Dec. 15, '76 | | Dec. 18 | | Dec. 19 | | | |
| Operation No | 2 | | 6, 7 | | 9 | | | |
| Size of fish length | pcs | % | pcs | % | pcs | % | pcs | % |
| 15% | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |
| 40 | | | | | | | | |
| 45 | | | | | | | | |
| 50 | | | | | | | | |
| 55 | | | | | | | | |
| 60 | | | | | | | | |
| 65 | | | | | | | | |
| 70 | 4 | 5.1 | | | | | 4 | 1.0 |
| 75 | 10 | 13.0 | | | 5 | 1.7 | 15 | 3.8 |
| 80 | 30 | 39.0 | 2 | 10.0 | 23 | 7.6 | 55 | 13.7 |
| 85 | 20 | 26.0 | 6 | 30.0 | 43 | 14.2 | 69 | 17.3 |
| 90 | | | 3 | 15.0 | 15 | 4.9 | 18 | 4.5 |
| 95 | | | 1 | 5.0 | 8 | 2.7 | 9 | 2.3 |
| 100 | 1 | 1.3 | 2 | 10.0 | 21 | 7.0 | 24 | 6.0 |
| 105 | 2 | 2.6 | | | 38 | 12.6 | 40 | 10.0 |
| 110 | 2 | 2.6 | 1 | 5.0 | 38 | 12.6 | 41 | 10.2 |
| 115 | 1 | 1.3 | | | 38 | 12.6 | 39 | 9.8 |
| 120 | 2 | 2.6 | | | 23 | 7.6 | 25 | 6.3 |
| 125 | 1 | 1.3 | | | 20 | 6.6 | 21 | 5.3 |
| 130 | | | | | 18 | 5.9 | 18 | 4.5 |
| 135 | 3 | 3.9 | 1 | 5.0 | 10 | 3.3 | 14 | 3.5 |
| 140 | 1 | 1.3 | 4 | 20.0 | 2 | 0.7 | 7 | 1.8 |
| N | 77 | | 20 | | 302 | | 399 | |
| $\bar{X}$ | 868 | | 1020 | | 1055 | | 1017 | |

2. Davao Gulf

(1) Engraulidae

Stolephorus heterolobus (Ruppell)

| Fishing ground | Malipano | | " | | Cuabo Bay | | San Jose | | Malalag Bay | | " | | Astorga | | Magsaga Bay | | Mapanga Bay | | Bassa pt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Jan. 8, '77 | | Jan. 11 | | Jan. 11 | | Jan. 13 | | Jan. 16 | | Jan. 17 | | Jan. 19 | | Jan. 20 | | Jan. 21 | | Jan. 24 | |
| Operation No | 22 | | 23, 24, 25 | | 26 | | 28 | | 32 | | 33 | | 35 | | 36, 37 | | 38 | | 41 | |
| Size of fish length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15% | | | | | 1 | 1.2 | | | | | | | | | | | | | | |
| 20 | 4 | 22.2 | 7 | 8.1 | 2 | 2.4 | | | | | | | | | 5 | 2.2 | 2 | 6.7 | | |
| 25 | 6 | 33.3 | 34 | 39.5 | 10 | 12.0 | 24 | 29.3 | 1 | 0.8 | | | | | 51 | 22.1 | 2 | 6.7 | | |
| 30 | 8 | 44.4 | 25 | 29.1 | 19 | 22.6 | 55 | 67.1 | 12 | 10.3 | 6 | 9.4 | | | 98 | 42.6 | 3 | 10.0 | | |
| 35 | | | 17 | 19.8 | 27 | 32.1 | 3 | 3.7 | 10 | 8.5 | 20 | 31.2 | 12 | 13.6 | 54 | 23.5 | 6 | 20.0 | 6 | 8.6 |
| 40 | | | 3 | 3.5 | 11 | 13.1 | | | 21 | 17.6 | 25 | 39.0 | 35 | 39.8 | 10 | 4.4 | 9 | 30.0 | 22 | 31.4 |
| 45 | | | | | 11 | 13.1 | | | 31 | 26.5 | 9 | 14.0 | 36 | 40.9 | 6 | 2.6 | 7 | 23.3 | 27 | 38.6 |
| 50 | | | | | 1 | 1.2 | | | 19 | 16.2 | 2 | 3.1 | 3 | 3.4 | 4 | 1.7 | 1 | 3.3 | 7 | 10.0 |
| 55 | | | | | 2 | 2.3 | | | 10 | 8.6 | 1 | 1.6 | | | 1 | 0.4 | | | 5 | 7.1 |
| 60 | | | | | | | | | 10 | 8.6 | | | 1 | 1.1 | 1 | 0.4 | | | 3 | 4.3 |
| 65 | | | | | | | | | | | 1 | 1.6 | 1 | 1.1 | | | | | | |
| 70 | | | | | | | | | 3 | 2.5 | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | | | | | | | | | |
| 85 | | | | | | | | | | | | | | | | | | | | |
| 90 | | | | | | | | | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | | | | | |
| N | 18 | | 86 | | 84 | | 82 | | 117 | | 64 | | 88 | | 230 | | 30 | | 70 | |
| $\bar{X}$ | 26.1 | | 285 | | 347 | | 287 | | 449 | | 39.1 | | 422 | | 312 | | 372 | | 444 | |

| Fishing ground | Tanbungon | | Ouabo Bay | | Magnaga Bay | | Talisay Bay | | 〃 | | 〃 | | Digos | | Mapanga Bay | | Talisay Bay | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Jan. 25, '77 | | Jan. 27 | | Jan. 30 | | Feb. 5 | | Feb. 6 | | Feb. 2 | | Feb. 15 | | Feb. 26 | | Mar. 9 | | | |
| Operation No | 42 | | 43 | | 45 | | 52 | | 54 | | 57 | | 66 | | 75 | | 88 | | | |
| Interval Body length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15% | | | | | | | | | | | | | | | | | | | 1 | 0.1 |
| 20 | | | | | 5 | 4.6 | | | | | | | | | | | | | 25 | 1.5 |
| 25 | | | | | 47 | 43.1 | | | 2 | 1.7 | | | | | 8 | 5.7 | | | 185 | 11.0 |
| 30 | 18 | 32.7 | 1 | 2.1 | 33 | 30.3 | | | 4 | 3.5 | | | 1 | 1.2 | 37 | 26.2 | | | 320 | 19.1 |
| 35 | 24 | 43.6 | 10 | 20.1 | 16 | 14.7 | 11 | 10.7 | 46 | 39.7 | 1 | 2.7 | 11 | 13.8 | 28 | 19.9 | | | 302 | 18.0 |
| 40 | 11 | 20.0 | 18 | 36.7 | 7 | 6.4 | 33 | 32.0 | 36 | 31.0 | 1 | 2.7 | 32 | 40.0 | 23 | 16.3 | 1 | 0.9 | 298 | 17.8 |
| 45 | 2 | 3.7 | 9 | 18.4 | 1 | 0.9 | 31 | 30.1 | 19 | 16.4 | 5 | 13.5 | 21 | 26.3 | 26 | 18.4 | 7 | 6.0 | 248 | 14.8 |
| 50 | | | 9 | 18.4 | | | 10 | 9.7 | 5 | 4.3 | 6 | 16.2 | 9 | 11.3 | 9 | 6.4 | 10 | 8.6 | 95 | 5.7 |
| 55 | | | 2 | 4.2 | | | 9 | 8.7 | 2 | 1.7 | 5 | 13.5 | 4 | 5.0 | 2 | 1.4 | 20 | 17.2 | 63 | 3.8 |
| 60 | | | | | | | 3 | 2.9 | 1 | 0.9 | 7 | 18.9 | | | 4 | 2.8 | 19 | 16.5 | 49 | 2.9 |
| 65 | | | | | | | 4 | 3.9 | 1 | 0.9 | 8 | 21.6 | 1 | 1.2 | 2 | 1.4 | 23 | 19.8 | 41 | 2.5 |
| 70 | | | | | | | 1 | 1.0 | | | 2 | 5.4 | 1 | 1.2 | 2 | 1.4 | 26 | 22.4 | 35 | 2.1 |
| 75 | | | | | | | 1 | 1.0 | | | 1 | 2.7 | | | | | 7 | 6.0 | 9 | 0.5 |
| 80 | | | | | | | | | | | 1 | 2.7 | | | | | 2 | 1.7 | 3 | 0.2 |
| 85 | | | | | | | | | | | | | | | | | 1 | 0.9 | 1 | 0.1 |
| 90 | | | | | | | | | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | | | | | |
| N | 55 | | 49 | | 109 | | 103 | | 116 | | 37 | | 80 | | 141 | | 116 | | 1675 | |
| $\bar{X}$ | 365 | | 42.1 | | 32.6 | | 44.7 | | 38.8 | | 57.0 | | 43.1 | | 38.7 | | 61.9 | | 39.2 | |

Stolephorus bataviensis Hardenburg

| Fishing ground | Basiauan Bay | | Talisay Bay | | San Jose | | 〃 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| Date | Feb. 1 | | Feb. 7 | | Mar. 6 | | Mar. 7 | | | |
| Operation No | 47 | | 57 | | 84 | | 86 | | | |
| Interval Body length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15% | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 30 | | | | | 4 | 4.1 | 4 | 3.4 | 8 | 2.6 |
| 35 | | | | | 19 | 19.4 | 9 | 7.7 | 28 | 9.2 |
| 40 | | | 1 | 2.2 | 22 | 22.5 | 14 | 12.0 | 37 | 12.2 |
| 45 | | | 2 | 4.4 | 24 | 24.4 | 15 | 12.8 | 41 | 13.5 |
| 50 | | | 6 | 13.0 | 16 | 16.3 | 21 | 17.9 | 43 | 14.2 |
| 55 | | | 9 | 19.6 | 8 | 8.2 | 20 | 17.1 | 37 | 12.2 |
| 60 | | | 12 | 26.1 | 4 | 4.1 | 20 | 17.1 | 36 | 11.9 |
| 65 | | | 7 | 15.2 | 1 | 1.0 | 12 | 10.3 | 20 | 6.6 |
| 70 | | | 7 | 15.2 | | | 2 | 2.6 | 9 | 3.0 |
| 75 | 2 | 4.8 | 2 | 4.4 | | | | | 4 | 1.3 |
| 80 | 3 | 7.1 | | | | | | | 3 | 1.0 |
| 85 | 6 | 14.3 | | | | | | | 6 | 2.0 |
| 90 | 2 | 4.8 | | | | | | | 2 | 0.7 |
| 95 | 7 | 16.6 | | | | | | | 7 | 2.3 |
| 100 | 3 | 7.1 | | | | | | | 3 | 1.0 |
| 105 | 7 | 16.7 | | | | | | | 7 | 2.3 |
| 110 | 6 | 14.3 | | | | | | | 6 | 2.0 |
| 115 | 6 | 14.3 | | | | | | | 6 | 2.0 |
| 120 | | | | | | | | | | |
| 125 | | | | | | | | | | |
| 130 | | | | | | | | | | |
| 135 | | | | | | | | | | |
| 140 | | | | | | | | | | |
| N | 42 | | 46 | | 98 | | 117 | | 303 | |
| $\bar{X}$ | 98.3 | | 59.6 | | 43.8 | | 50.8 | | 56.4 | |

(2) Dussmieriidae

Spratelloides japonicus (Houttuyn)

| Fishing ground | Talisay Bay | | 〃 | | Baskal cove | | Mapanga Bay | | Talisay Bay | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Feb. 5, '77 | | Feb. 9, | | Feb. 11, | | Feb. 26, | | Mar. 10, | | | |
| Operation No | 52 | | 59 | | 62 | | 75 | | 89 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15% | | | | | | | | | | | | |
| 20 | | | 1 | 0.6 | | | | | | | 1 | 0.2 |
| 25 | | | 3 | 1.9 | | | | | | | 3 | 0.7 |
| 30 | | | 6 | 3.8 | | | | | | | 6 | 1.4 |
| 35 | | | 13 | 8.2 | | | | | 3 | 7.7 | 16 | 3.6 |
| 40 | | | 23 | 14.6 | | | | | 5 | 12.8 | 28 | 6.3 |
| 45 | 2 | 3.0 | 36 | 22.8 | 14 | 16.9 | | | 11 | 28.2 | 63 | 14.1 |
| 50 | 18 | 27.3 | 51 | 32.3 | 35 | 42.2 | 9 | 9.0 | 8 | 20.5 | 121 | 27.1 |
| 55 | 36 | 54.6 | 21 | 13.3 | 30 | 36.1 | 23 | 23.0 | 9 | 23.1 | 119 | 26.7 |
| 60 | 10 | 15.1 | 3 | 1.9 | 4 | 4.8 | 23 | 23.0 | 3 | 7.7 | 43 | 9.6 |
| 65 | | | 1 | 0.6 | | | 38 | 38.0 | | | 39 | 8.7 |
| 70 | | | | | | | 7 | 9.0 | | | 7 | 1.6 |
| 75 | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | |
| 85 | | | | | | | | | | | | |
| 90 | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | |
| N | 66 | | 158 | | 83 | | 100 | | 39 | | 446 | |
| X̄ | 54.1 | | 45.7 | | 51.4 | | 60.6 | | 48.1 | | 51.5 | |

Spratelloides delicatulus (Bennett)

| Fishing ground | Malipano | | 〃 | | Cuabo Bay | | Matalag Bay | | 〃 | | Bassa pt | | Talisay Bay | | Cuabo Bay | | Talisay Bay | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Jan. 8, '77 | | Jan. 11 | | Jan. 11 | | Jan. 17 | | Jan. 18 | | Jan. 24 | | Feb. 6 | | Feb. 16 | | Feb. 18 | | | |
| Operation No | 21, 22 | | 23, 24, 25 | | 26 | | 33 | | 34 | | 41 | | 53 | | 68 | | 69 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15% | | | 2 | 1.8 | 1 | 0.5 | | | | | | | | | | | | | 3 | 0.3 |
| 20 | 9 | 3.9 | 16 | 14.0 | 26 | 14.0 | | | | | | | | | | | | | 51 | 4.7 |
| 25 | 78 | 33.5 | 36 | 31.5 | 84 | 45.2 | 1 | 1.1 | 2 | 2.0 | 35 | 35.3 | 25 | 30.1 | | | | | 261 | 24.3 |
| 30 | 105 | 45.1 | 37 | 32.4 | 41 | 22.0 | 23 | 25.3 | 10 | 10.1 | 56 | 56.6 | 42 | 50.6 | 22 | 23.4 | | | 336 | 31.3 |
| 35 | 27 | 11.6 | 11 | 9.6 | 9 | 4.8 | 36 | 39.6 | 29 | 29.3 | 8 | 8.1 | 8 | 9.6 | 46 | 48.9 | 2 | 2.6 | 176 | 16.3 |
| 40 | 2 | 0.9 | 3 | 2.6 | 16 | 8.6 | 30 | 32.9 | 42 | 42.4 | | | 2 | 2.4 | 16 | 17.0 | 38 | 50.0 | 149 | 13.8 |
| 45 | 4 | 1.7 | 4 | 3.5 | 8 | 4.3 | | | 10 | 10.1 | | | 6 | 7.2 | 8 | 8.5 | 29 | 38.2 | 69 | 6.4 |
| 50 | | | 5 | 4.4 | 1 | 0.5 | 1 | 1.1 | 1 | 1.0 | | | | | 2 | 2.1 | 4 | 5.3 | 14 | 1.3 |
| 55 | 1 | 0.4 | | | | | | | 5 | 5.1 | | | | | | | 1 | 1.3 | 7 | 0.7 |
| 60 | 1 | 0.4 | | | | | | | | | | | | | | | 1 | 1.3 | 2 | 0.2 |
| 65 | 4 | 1.7 | | | | | | | | | | | | | | | 1 | 1.3 | 5 | 0.5 |
| 70 | 1 | 0.4 | | | | | | | | | | | | | | | | | 1 | 0.1 |
| 75 | 1 | 0.4 | | | | | | | | | | | | | | | | | 1 | 0.1 |
| 80 | | | | | | | | | | | | | | | | | | | | |
| 85 | | | | | | | | | | | | | | | | | | | | |
| 90 | | | | | | | | | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | | | | | |
| N | 233 | | 114 | | 186 | | 91 | | 99 | | 99 | | 83 | | 94 | | 76 | | 1075 | |
| X̄ | 30.0 | | 28.9 | | 28.1 | | 35.4 | | 38.4 | | 28.6 | | 30.3 | | 36.9 | | 43.1 | | 31.9 | |

Dussumieria hasseltii Bleeker

| Fishing ground | Talisay Bay | |
|---|---|---|
| Date | Mar. 10, '77 | |
| Operation No | 89 | |
| Range of fork length | pcs | % |
| 15 | | |
| 20 | | |
| 25 | | |
| 30 | | |
| 35 | | |
| 40 | | |
| 45 | | |
| 50 | | |
| 55 | | |
| 60 | 1 | 1.1 |
| 65 | 3 | 3.3 |
| 70 | 20 | 22.2 |
| 75 | 43 | 47.8 |
| 80 | 22 | 24.4 |
| 85 | 1 | 1.1 |
| 90 | | |
| 95 | | |
| 100 | | |
| 105 | | |
| 110 | | |
| 115 | | |
| 120 | | |
| 125 | | |
| 130 | | |
| 135 | | |
| 140 | | |
| | | |
| N | 90 | |
| $\bar{X}$ | 74.7 | |

(3) Atherinidae

Allanetta sp

| Fishing ground | Cuabo Bay | | Malalag Bay | | Magnaga Bay | | Talisay Bay | | Cuabo Bay | | 〃 | | Talisay Bay | | 〃 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Jan. 31, '77 | | Jan. 17 | | Jan. 21 | | Feb. 7 | | Feb. 16 | | Feb. 21 | | Mar. 13 | | Mar. 14 | | | |
| Operation No | 26 | | 33 | | 36 | | 57 | | 68 | | 71 | | 91 | | 95 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15 | | | | | | | | | | | | | | | | | | |
| 20 | | | 1 | 2.8 | | | | | | | | | | | | | 1 | 0.3 |
| 25 | 1 | 3.3 | 14 | 40.0 | 2 | 8.0 | | | | | | | | | | | 17 | 4.9 |
| 30 | 2 | 6.4 | 12 | 34.3 | | | | | 3 | 4.1 | | | 4 | 9.8 | | | 21 | 6.1 |
| 35 | 1 | 3.3 | 4 | 11.4 | 2 | 8.0 | | | 20 | 27.0 | | | 2 | 4.9 | | | 29 | 8.5 |
| 40 | | | | | 1 | 4.0 | | | 31 | 41.9 | 3 | 6.8 | 6 | 14.6 | | | 41 | 11.9 |
| 45 | 2 | 6.4 | 1 | 2.8 | 1 | 4.0 | | | 7 | 9.5 | 8 | 18.2 | 16 | 39.0 | 3 | 5.4 | 38 | 11.1 |
| 50 | 2 | 6.4 | | | 3 | 12.0 | 5 | 13.5 | 10 | 13.5 | 12 | 27.3 | 8 | 19.5 | 9 | 16.1 | 49 | 14.3 |
| 55 | 2 | 6.4 | 2 | 5.6 | 2 | 8.0 | 7 | 18.9 | 2 | 2.7 | 14 | 31.8 | 5 | 12.2 | 13 | 23.2 | 47 | 13.7 |
| 60 | 1 | 3.3 | | | 4 | 16.0 | 5 | 13.5 | 1 | 1.4 | 3 | 6.8 | | | 4 | 7.1 | 18 | 5.3 |
| 65 | 7 | 22.4 | 1 | 2.8 | 7 | 28.0 | 1 | 2.7 | | | 1 | 2.3 | | | 1 | 1.8 | 18 | 5.3 |
| 70 | 3 | 9.7 | | | 2 | 8.0 | 2 | 5.4 | | | | | | | 3 | 5.4 | 10 | 2.9 |
| 75 | 3 | 9.7 | | | | | 7 | 18.9 | | | 2 | 4.6 | | | 2 | 3.6 | 14 | 4.1 |
| 80 | 4 | 12.9 | | | 1 | 4.0 | 3 | 8.1 | | | 1 | 2.3 | | | 4 | 7.1 | 13 | 3.8 |
| 85 | | | | | | | 4 | 10.8 | | | | | | | 5 | 8.9 | 9 | 2.6 |
| 90 | 1 | 3.3 | | | | | 3 | 8.1 | | | | | | | 8 | 14.3 | 12 | 3.5 |
| 95 | 2 | 6.4 | | | | | | | | | | | | | 4 | 7.1 | 6 | 1.8 |
| 100 | | | | | | | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| N | 31 | | 35 | | 25 | | 37 | | 74 | | 44 | | 41 | | 56 | | 343 | |
| $\bar{X}$ | 63.5 | | 31.1 | | 55.2 | | 68.0 | | 40.7 | | 52.8 | | 44.5 | | 68.0 | | 52.3 | |

(4) Clupeidae

Sardinella sp.

| Fishing ground | Malipano | | Cuabo Bay | | San Jose | | Malalag Bay | | Tubalan | | 〃 | | Mapanga Bay | | Malalag Bay | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Jan. 8, '77 | | Jan. 11 | | Jan. 14 | | Jan. 16 | | Jan. 28 | | Jan. 31 | | Feb. 25 | | Mar. 12 | | | |
| Operation No | 22 | | 26 | | 29 | | 32 | | 44 | | 46 | | 73 | | 91 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15‰ | | | | | | | | | | | | | | | | | | |
| 20 | | | | | 6 | 12.5 | | | | | | | | | | | 6 | 1.8 |
| 25 | | | 13 | 40.6 | 22 | 45.8 | | | | | | | | | | | 35 | 10.2 |
| 30 | | | 10 | 31.3 | 13 | 27.1 | | | | | | | | | | | 23 | 6.7 |
| 35 | | | 8 | 25.0 | 7 | 14.6 | | | | | | | | | | | 15 | 4.4 |
| 40 | | | 1 | 3.1 | | | | | | | | | | | | | 1 | 0.3 |
| 45 | | | | | | | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | | | | | |
| 55 | | | | | | | 1 | 2.8 | | | | | | | | | 1 | 0.3 |
| 60 | | | | | | | 1 | 2.8 | | | 2 | 2.9 | | | | | 3 | 0.9 |
| 65 | 1 | 4.3 | | | | | 3 | 8.3 | 1 | 1.8 | 10 | 14.3 | | | | | 15 | 4.4 |
| 70 | 12 | 52.2 | | | | | 2 | 5.5 | 2 | 3.6 | 20 | 28.6 | | | 2 | 6.3 | 38 | 11.1 |
| 75 | 8 | 34.8 | | | | | 2 | 5.5 | 1 | 1.8 | 12 | 17.1 | | | 7 | 21.9 | 30 | 8.8 |
| 80 | 2 | 8.7 | | | | | 8 | 22.2 | 6 | 10.9 | 15 | 21.4 | 3 | 6.5 | 10 | 31.3 | 44 | 12.9 |
| 85 | | | | | | | 6 | 16.6 | 11 | 20.0 | 6 | 8.6 | 6 | 13.0 | 9 | 28.1 | 38 | 11.1 |
| 90 | | | | | | | 8 | 22.2 | 17 | 30.9 | 5 | 7.1 | 10 | 21.7 | 1 | 3.1 | 41 | 11.9 |
| 95 | | | | | | | 2 | 5.5 | 14 | 25.5 | | | 11 | 23.9 | | | 27 | 7.9 |
| 100 | | | | | | | 1 | 2.8 | 3 | 5.5 | | | 12 | 26.1 | 1 | 3.1 | 17 | 4.9 |
| 105 | | | | | | | 1 | 2.8 | | | | | 4 | 8.7 | | | 5 | 1.5 |
| 110 | | | | | | | 1 | 2.8 | | | | | | | 1 | 3.1 | 2 | 0.6 |
| 115 | | | | | | | | | | | | | | | 1 | 3.1 | 1 | 0.3 |
| 120 | | | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | | | |
| N | 23 | | 32 | | 48 | | 36 | | 55 | | 70 | | 46 | | 32 | | 342 | |
| $\bar{X}$ | 724 | | 295 | | 272 | | 826 | | 883 | | 747 | | 938 | | 827 | | 699 | |

Harengula sp.

| Fishing ground | Talisay Bay | | 〃 | | Mapanga Bay | | San Jose | | Talisay Bay | | Malalag Bay | | Talisay Bay | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Feb. 9, '77 | | Feb. 8 | | Feb. 25 | | Mar. 7 | | Mar. 9 | | Mar. 12 | | Mar. 13 | | | |
| Operation No | 59 | | 58 | | 73 | | 86 | | 88 | | 91 | | 93 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15‰ | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | |
| 50 | 8 | 9.3 | | | | | | | | | 1 | 4.0 | | | 9 | 1.9 |
| 55 | 8 | 9.3 | 3 | 2.5 | | | | | 10 | 7.3 | 1 | 4.0 | 2 | 5.4 | 24 | 5.1 |
| 60 | 15 | 17.4 | 12 | 9.8 | | | | | 21 | 15.2 | | | 3 | 8.1 | 51 | 10.7 |
| 65 | 15 | 17.4 | 32 | 26.2 | | | | | 40 | 28.9 | 2 | 8.0 | 8 | 21.6 | 97 | 20.4 |
| 70 | 19 | 22.1 | 37 | 30.3 | | | 4 | 12.9 | 31 | 22.5 | 4 | 16.0 | 11 | 29.7 | 106 | 22.3 |
| 75 | 8 | 9.3 | 23 | 18.9 | 3 | 8.3 | 7 | 22.6 | 17 | 12.3 | 7 | 28.0 | 5 | 13.5 | 70 | 14.7 |
| 80 | 7 | 8.1 | 3 | 2.5 | 6 | 16.7 | 5 | 16.1 | 11 | 8.0 | 7 | 28.0 | 1 | 2.7 | 40 | 8.4 |
| 85 | 4 | 4.7 | 4 | 3.3 | 7 | 19.4 | 7 | 22.6 | 6 | 4.4 | 3 | 12.0 | 2 | 5.4 | 33 | 7.0 |
| 90 | 2 | 2.3 | 1 | 0.8 | 11 | 30.6 | 4 | 12.9 | 1 | 0.7 | | | 1 | 2.7 | 20 | 4.2 |
| 95 | | | | | 7 | 19.4 | 4 | 12.9 | 1 | 0.7 | | | 3 | 8.1 | 15 | 3.2 |
| 100 | | | 4 | 3.3 | 2 | 5.6 | | | | | | | | | 6 | 1.3 |
| 105 | | | 1 | 0.8 | | | | | | | | | 1 | 2.7 | 2 | 0.4 |
| 110 | | | 2 | 1.6 | | | | | | | | | | | 2 | 0.4 |
| 115 | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | |
| N | 86 | | 122 | | 36 | | 31 | | 138 | | 25 | | 37 | | 475 | |
| $\bar{X}$ | 666 | | 711 | | 876 | | 819 | | 683 | | 730 | | 726 | | 717 | |

(5) Caesionidae

Caesio pisang Bleeker

| Fishing ground | Baskal cove | | Cuabo Bay | | " | | Talispy Bay | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| Date | Feb. 11, '77 | | Feb. 15 | | Feb. 21 | | Mar. 13 | | | |
| Operation No | 63 | | 67 | | 71 | | 93 | | | |
| Range of fish length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15% | | | | | | | | | | |
| 20 | 3 | 29 | | | | | | | 3 | 10 |
| 25 | 49 | 480 | 2 | 26 | | | | | 51 | 172 |
| 30 | 38 | 373 | 30 | 390 | | | | | 68 | 229 |
| 35 | 12 | 118 | 32 | 416 | 6 | 97 | 1 | 18 | 51 | 172 |
| 40 | | | 12 | 156 | 27 | 436 | 13 | 231 | 52 | 175 |
| 45 | | | 1 | 13 | 20 | 323 | 15 | 268 | 36 | 121 |
| 50 | | | | | 9 | 145 | 7 | 125 | 16 | 54 |
| 55 | | | | | | | 11 | 196 | 11 | 37 |
| 60 | | | | | | | 6 | 107 | 6 | 20 |
| 65 | | | | | | | 2 | 36 | 2 | 07 |
| 70 | | | | | | | | | | |
| 75 | | | | | | | 1 | 18 | 1 | 03 |
| 80 | | | | | | | | | | |
| 85 | | | | | | | | | | |
| 90 | | | | | | | | | | |
| 95 | | | | | | | | | | |
| 100 | | | | | | | | | | |
| 105 | | | | | | | | | | |
| 100 | | | | | | | | | | |
| 115 | | | | | | | | | | |
| 120 | | | | | | | | | | |
| 125 | | | | | | | | | | |
| 130 | | | | | | | | | | |
| 135 | | | | | | | | | | |
| 140 | | | | | | | | | | |
| | | | | | | | | | | |
| N | 102 | | 77 | | 62 | | 56 | | 297 | |
| $\bar{X}$ | 279 | | 337 | | 426 | | 491 | | 365 | |

6. Scombridae

Rastrelliger kanagurta (Cuvier)

| Fishing ground | Malalag Bay | | Tubalan | | San Jose | | Total | |
|---|---|---|---|---|---|---|---|---|
| Date | Jan. 16, '77 | | Feb. 20 | | Mar. 7 | | | |
| Operation No | 32 | | 70 | | 86 | | | |
| Range of fish length | pcs | % | pcs | % | pcs | % | pcs | % |
| 15% | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |
| 40 | | | | | | | | |
| 45 | | | | | | | | |
| 50 | | | | | | | | |
| 55 | | | 2 | 42 | | | 2 | 27 |
| 60 | | | 1 | 21 | | | 1 | 14 |
| 65 | | | 3 | 63 | | | 3 | 41 |
| 70 | | | 4 | 83 | | | 4 | 55 |
| 75 | | | 5 | 104 | 2 | 200 | 7 | 96 |
| 80 | 1 | 67 | 9 | 188 | 1 | 100 | 11 | 150 |
| 85 | | | 9 | 188 | | | 9 | 123 |
| 90 | | | 6 | 125 | 2 | 200 | 8 | 110 |
| 95 | | | 8 | 167 | 3 | 300 | 11 | 150 |
| 100 | | | | | 1 | 100 | 1 | 14 |
| 105 | | | 1 | 21 | 1 | 100 | 2 | 27 |
| 110 | 1 | 67 | | | | | 1 | 14 |
| 115 | 1 | 67 | | | | | 1 | 14 |
| 120 | 3 | 200 | | | | | 3 | 41 |
| 125 | 1 | 67 | | | | | 1 | 14 |
| 130 | 5 | 333 | | | | | 5 | 69 |
| 135 | 1 | 67 | | | | | 1 | 14 |
| 140 | | | | | | | | |
| 145 | 2 | 133 | | | | | 2 | 27 |
| N | 15 | | 48 | | 10 | | 73 | |
| $\bar{X}$ | 1260 | | 815 | | 900 | | 916 | |

*Auxis sp.*

| Fishing ground | Malipano | | San Jose | | Astorga | | Magnaga Bay | | Mapanga Bay | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Jan. 11, '77 | | Jan. 13 | | Jan. 19 | | Jan. 20 | | Jan. 21 | | | |
| Operation No | 24, 25 | | 28 | | 35 | | 36 | | 38 | | | |
| Range of fork length | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % | pcs | % |
| 15 | | | 1 | 20 | | | | | | | 1 | 04 |
| 20 | 10 | 345 | 26 | 510 | 1 | 20 | | | | | 37 | 148 |
| 25 | 15 | 517 | 9 | 176 | 1 | 20 | 2 | 39 | 3 | 44 | 30 | 120 |
| 30 | 3 | 103 | 13 | 255 | 9 | 184 | 2 | 39 | 12 | 176 | 39 | 156 |
| 35 | | | 1 | 20 | 16 | 327 | 7 | 137 | 8 | 118 | 32 | 128 |
| 40 | 1 | 35 | 1 | 20 | 12 | 245 | 8 | 157 | 12 | 176 | 36 | 144 |
| 45 | | | | | 5 | 102 | 15 | 294 | 14 | 206 | 34 | 136 |
| 50 | | | | | 3 | 61 | 11 | 216 | 5 | 74 | 19 | 76 |
| 55 | | | | | 1 | 20 | 2 | 39 | 7 | 103 | 10 | 40 |
| 60 | | | | | 1 | 20 | 2 | 39 | 4 | 59 | 7 | 28 |
| 65 | | | | | | | 1 | 20 | 2 | 29 | 3 | 12 |
| 70 | | | | | | | 1 | 20 | 1 | 15 | 2 | 08 |
| 75 | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | |
| 85 | | | | | | | | | | | | |
| 90 | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| N | 29 | | 51 | | 49 | | 51 | | 68 | | 250 | |
| $\bar{X}$ | 24.3 | | 240 | | 376 | | 444 | | 426 | | 334 | |

Annex table 9.

Record of Environmental Survey on Keeping Test of Bait Fishes

1. Leyte Gulf Area (Bait pen)

| Date | our | Place, Depth | m | Water temp. ℃ | PH | Dissolved oxygen ppm | Electrical conductivity mℓ/cm | Turbidity ppm | Trans-parency m | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| Dec. 15, '76 | 12:15 | Outside of bait pen | 0 | 28.7 | 8.2 | 7.8 | 46.8 | 15 | 12 | Leyte Gulf |
| | | 〃 | 2 | 28.4 | 8.2 | 8.0 | 47.1 | 10 | | (Guiuan) |
| | | 〃 | 10 | | | | | | | |
| | | Inside | 2 | 28.7 | | | | | | |
| 16 | 12:35 | Outside | 0 | 30.7 | 8.0 | 7.7 | 65.5 | 3 | 13 | Ditto |
| | | 〃 | 2 | 29.6 | 8.4 | 7.7 | 49.7 | 3 | | |
| | | 〃 | 10 | | | | | | | |
| | | Inside | 2 | 30.7 | 8.2 | | | | | |
| 17 | 12:20 | Outside | 0 | 29.7 | 8.3 | 8.0 | 51.3 | 6 | 18 | 〃 |
| | | 〃 | 2 | 28.0 | 8.3 | 8.1 | 52.0 | 5 | | |
| | | 〃 | 10 | | | | | | | |
| | | Inside | 2 | 28.8 | 8.3 | 7.9 | 52.4 | 5 | | |
| 18 | 10:00 | Outside | 0 | 27.0 | 8.7 | 8.2 | 47.7 | 13 | 13 | 〃 |
| | | 〃 | 2 | 28.3 | 8.8 | 8.8 | 49.2 | 17 | | |
| | | 〃 | 10 | | | | | | | |
| | | Inside | 2 | 28.2 | 8.6 | 8.1 | 51.9 | 8 | | |
| 19 | 13:00 | Outside | 0 | 28.2 | 8.2 | 9.8 | 51.2 | 35 | 13 | 〃 |
| | | 〃 | 2 | 28.2 | 8.3 | 9.7 | 52.4 | 33 | | |
| | | 〃 | 10 | | | | | | | |
| | | Inside | 2 | 28.2 | 8.4 | 9.9 | 52.4 | 34 | | |
| 20 | 10:00 | Outside | 0 | 27.8 | 8.4 | | | | 11 | 〃 |
| | | 〃 | 2 | 27.8 | 8.4 | | | | | |
| | | 〃 | 10 | 27.9 | 8.3 | | | | | |
| | | Inside | 2 | 27.8 | 8.4 | | | | | |
| 21 | 08:55 | Outside | 0 | 28.5 | 8.4 | | 51.5 | | 11 | 〃 |
| | | 〃 | 2 | 28.2 | 8.4 | | 53.5 | | | |
| | | 〃 | 10 | 28.0 | 8.3 | | 56.0 | | | |
| | | Inside | 2 | 28.2 | 8.4 | | 55.0 | | | |
| 22 | 09:20 | Outside | 0 | 27.8 | 8.3 | | 63.3 | | 11 | 〃 |
| | | 〃 | 2 | 27.8 | 8.3 | | 62.6 | | | |
| | | 〃 | 10 | 27.8 | 8.4 | | 64.7 | | | |
| | | Inside | 2 | 27.8 | 8.4 | | 65.5 | | | |
| 23 | 09:30 | Outside | 0 | 27.6 | 8.4 | | 70.0 | | 11 | 〃 |
| | | 〃 | 2 | 27.5 | 8.3 | | 71.0 | | | |
| | | 〃 | 10 | 27.6 | 8.4 | | 72.0 | | | |
| | | Inside | 2 | 27.6 | 8.4 | | 71.5 | | | |
| 24 | 09:30 | Outside | 0 | 27.8 | 8.4 | | 77.8 | | 11 | 〃 |
| | | 〃 | 2 | 27.6 | 8.3 | | 78.5 | | | |
| | | 〃 | 10 | 27.8 | 8.3 | | 82.5 | | | |
| | | Inside | 2 | 27.8 | 8.4 | | 74.5 | | | |

| Date | Hour | Place, Depth | | Water temp | PH | Dissolved oxygen | Electrical conductivity | Turbidity | Transparency | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | m | ℃ | | ppm | mΩ/cm | ppm | m | |
| Dec. 25, '76 | 09:20 | Outside | 0 | 27.8 | 8.3 | | | | 13 | Leyte Gulf |
| | | 〃 | 2 | 27.8 | 8.4 | | | | | ( Guiuan ) |
| | | 〃 | 10 | 27.8 | 8.3 | | | | | |
| | | Inside | 2 | 27.8 | 8.3 | | | | | |
| 26 | 09:50 | Outside | 0 | 28.0 | 8.4 | | | | 12 | Ditto |
| | | 〃 | 2 | 27.9 | 8.3 | | | | | |
| | | 〃 | 10 | 27.8 | 8.3 | | | | | |
| | | Inside | 2 | 27.9 | 8.3 | | | | | |
| 27 | 10:50 | Outside | 0 | 28.2 | 8.3 | | | | 14 | 〃 |
| | | 〃 | 2 | 28.1 | 8.4 | | | | | |
| | | 〃 | 10 | 27.8 | 8.4 | | | | | |
| | | Inside | 2 | 28.2 | 8.3 | | | | | |
| 28 | 10:15 | Outside | 0 | 28.0 | 8.3 | | | | 17 | 〃 |
| | | 〃 | 2 | 27.8 | 8.3 | | | | | |
| | | 〃 | 10 | 27.9 | 8.4 | | | | | |
| | | Inside | 2 | 27.9 | 8.3 | | | | | |
| 29 | 09:00 | Outside | 0 | 27.5 | 8.4 | | | | 17 | 〃 |
| | | 〃 | 2 | 27.5 | 8.3 | | | | | |
| | | 〃 | 10 | 27.5 | 8.3 | | | | | |
| | | Inside | 2 | 27.5 | 8.3 | | | | | |

2. Davao Gulf Area (Bait pen)

| Date | Hour | Place, Depth | | Water temp | PH | Dissolved oxygen | Electrical conductivity | Turbidity | Transparency | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | m | ℃ | | ppm | m℧/cm | ppm | m | |
| Jan. 8, '77 | 10:10 | Outside | 0 | 26.7 | 8.2 | 8.9 | 52.4 | 39 | -- | Davao Gulf |
| | | 〃 | 2 | 26.7 | 8.3 | 8.4 | 52.8 | 39 | | (Malipano) |
| | | 〃 | 10 | | | | | | | |
| | | Inside | 2 | 27.1 | 8.3 | 8.3 | 53.2 | 38 | | |
| 9 | 09:50 | Outside | 0 | 27.0 | 8.3 | 8.1 | 54.7 | 38 | 17 | 〃 |
| | | 〃 | 2 | 26.9 | 8.3 | 7.7 | 54.4 | 37 | | |
| | | 〃 | 10 | 26.9 | 8.4 | 7.5 | 55.1 | 36 | | |
| | | Inside | 2 | 26.9 | 8.3 | 7.9 | 54.8 | 37 | | |
| 10 | 13:30 | Outside | 0 | 28.6 | 8.2 | 8.2 | 56.5 | 32 | 16 | 〃 |
| | | 〃 | 2 | 28.4 | 8.3 | 8.7 | 56.1 | 30 | | |
| | | 〃 | 10 | 28.0 | 8.2 | 8.3 | 56.7 | 30 | | |
| | | Inside | 2 | 28.6 | 8.2 | 8.2 | 56.4 | 31 | | |
| 11 | 09:30 | Outside | 0 | 27.3 | 8.3 | 8.0 | 55.2 | 27 | 19 | 〃 |
| | | 〃 | 2 | 27.1 | 8.4 | 7.9 | 55.5 | 30 | | |
| | | 〃 | 10 | 27.1 | 8.4 | 7.9 | 55.4 | 31 | | |
| | | Inside | 2 | 27.2 | 8.3 | 7.9 | 55.3 | 32 | | |
| 12 | 09:00 | Outside | 0 | 27.9 | 8.4 | 6.4 | 57.0 | 16 | 23 | 〃 |
| | | 〃 | 2 | 27.9 | 8.4 | 6.6 | 57.2 | 16 | | |
| | | 〃 | 10 | 27.9 | 8.3 | 6.4 | 57.1 | 16 | | |
| | | Inside | 2 | 27.9 | 8.4 | 6.6 | 57.2 | 16 | | |
| 13 | 09:00 | Outside | 0 | 27.9 | 8.4 | 6.4 | 55.3 | 30 | 22 | 〃 |
| | | 〃 | 2 | 27.9 | 8.4 | 6.7 | 55.6 | 29 | | |
| | | 〃 | 10 | 27.8 | 8.4 | 6.5 | 55.4 | 29 | | |
| | | Inside | 2 | 27.9 | 8.4 | 6.5 | 55.8 | 29 | | |
| 14 | 14:15 | Outside | 0 | 28.2 | 8.3 | 6.8 | 54.9 | 29 | 13 | 〃 |
| | | 〃 | 2 | 28.2 | 8.4 | 7.6 | 54.9 | 31 | | |
| | | 〃 | 10 | 28.1 | 8.4 | 7.3 | 54.9 | 30 | | |
| | | Inside | 2 | 28.2 | 8.3 | 6.6 | 55.0 | 32 | | |
| 15 | 14:15 | Outside | 0 | 28.9 | 8.2 | 6.3 | 55.4 | 14 | 11 | 〃 |
| | | 〃 | 2 | 29.1 | 8.2 | 6.5 | 55.1 | 16 | | |
| | | 〃 | 10 | 28.9 | 8.4 | 6.6 | 55.4 | 27 | | |
| | | Inside | 2 | 29.0 | 8.3 | 6.5 | 54.5 | 25 | | |
| 16 | 14:15 | Outside | 0 | 28.8 | 8.2 | 7.9 | 60.7 | 28 | 11 | 〃 |
| | | 〃 | 2 | 28.8 | 8.3 | 7.4 | 59.7 | 14 | | |
| | | 〃 | 10 | 28.3 | 8.3 | 5.8 | 54.8 | 23 | | |
| | | Inside | 2 | 28.8 | 8.2 | 5.6 | 56.3 | 35 | | |
| 17 | 14:15 | Outside | 0 | 29.1 | 8.2 | 7.1 | 54.3 | 6 | 12 | 〃 |
| | | 〃 | 2 | 29.2 | 8.2 | 7.0 | 54.5 | 17 | | |
| | | 〃 | 10 | 29.0 | 8.2 | 6.9 | 54.6 | 10 | | |
| | | Inside | 2 | 29.1 | 8.4 | 7.4 | 54.6 | 25 | | |
| 18 | 08:35 | Outside | 0 | 28.0 | 8.1 | 6.5 | 53.6 | 8 | 15 | 〃 |
| | | 〃 | 2 | 28.0 | 8.1 | 6.3 | 53.7 | 8 | | |
| | | 〃 | 10 | 28.0 | 8.2 | 6.0 | 53.8 | 8 | | |
| | | Inside | 2 | 28.0 | 8.1 | 6.3 | 55.8 | 5 | | |

| Date | Hour | Place, Depth | m | Water temp ℃ | PH | Dissolved oxygen ppm | Electrical conductivity m℧/cm | Turbidity ppm | Transparency m | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| Jan. 19, '77 | 08:10 | Outside | 0 | 27.9 | 8.1 | 7.2 | 53.2 | 7 | 18 | Davao Gulf (Malipano) |
| | | 〃 | 2 | 27.8 | 8.1 | 7.6 | 53.6 | 8 | | |
| | | 〃 | 10 | 27.9 | 8.2 | 7.0 | 53.6 | 8 | | |
| | | Inside | 2 | 27.9 | 8.2 | 6.6 | 53.7 | 7 | | |
| 20 | 14:00 | Outside | 0 | 28.3 | 8.2 | 7.0 | 54.9 | 8 | 14 | 〃 |
| | | 〃 | 2 | 28.3 | 8.2 | 6.8 | 54.8 | 7 | | |
| | | 〃 | 10 | 28.2 | 8.3 | 6.7 | 54.4 | 7 | | |
| | | Inside | 2 | 28.2 | 8.3 | 6.3 | 54.5 | 6 | | |
| 21 | 08:45 | Outside | 0 | 28.7 | 8.2 | 7.1 | 54.2 | 3 | 17 | 〃 |
| | | 〃 | 2 | 28.8 | 8.2 | 6.8 | 54.0 | 6 | | |
| | | 〃 | 10 | 28.7 | 8.4 | 6.5 | 54.2 | 5 | | |
| | | Inside | 2 | 28.8 | 8.3 | 6.6 | 54.5 | 5 | | |
| 22 | 08:40 | Outside | 0 | 27.3 | 8.2 | 7.6 | 54.3 | 2 | 18 | 〃 |
| | | 〃 | 2 | 27.3 | 8.2 | 7.4 | 54.5 | 3 | | |
| | | 〃 | 10 | 27.4 | 8.3 | 6.8 | 54.4 | 4 | | |
| | | Inside | 2 | 27.3 | 8.2 | 6.8 | 54.4 | 5 | | |
| 23 | 14:00 | Outside | 0 | 28.5 | 8.0 | 6.4 | 56.8 | 6 | 17 | 〃 |
| | | 〃 | 2 | 29.4 | 8.1 | 6.8 | 57.0 | 7 | | |
| | | 〃 | 10 | 28.6 | 8.2 | 6.2 | 56.2 | 7 | | |
| | | Inside | 2 | 28.6 | 8.2 | 5.8 | 56.7 | 6 | | |
| 24 | 14:00 | Outside | 0 | 29.3 | 8.1 | 6.2 | 57.0 | 5 | 15 | 〃 |
| | | 〃 | 2 | 30.2 | 8.1 | 6.5 | 57.3 | 9 | | |
| | | 〃 | 10 | 29.5 | 8.1 | 6.1 | 57.2 | 5 | | |
| | | Inside | 2 | 29.1 | 8.1 | 5.6 | 57.3 | 9 | | |
| 25 | 10:00 | Outside | 0 | 28.4 | 8.1 | 6.1 | 56.2 | 9 | 16 | 〃 |
| | | 〃 | 2 | 28.3 | 8.2 | 6.0 | 56.2 | 5 | | |
| | | 〃 | 10 | 28.4 | 8.2 | 6.5 | 55.8 | 7 | | |
| | | Inside | 2 | 28.2 | 8.0 | 6.4 | 56.4 | 7 | | |
| 26 | 09:00 | Outside | 0 | 28.0 | 8.1 | 6.1 | 55.0 | 8 | 14 | 〃 |
| | | 〃 | 2 | 28.0 | 8.0 | 6.6 | 55.3 | 8 | | |
| | | 〃 | 10 | 28.2 | 8.1 | 5.8 | 55.5 | 8 | | |
| | | Inside | 2 | 28.2 | 8.0 | 6.0 | 55.6 | 8 | | |
| 27 | 09:30 | Outside | 0 | 28.1 | 8.1 | 6.3 | 56.2 | 5 | | 〃 |
| | | 〃 | 2 | 28.1 | 8.1 | 6.6 | 56.4 | 5 | 17 | |
| | | 〃 | 10 | 28.1 | 8.0 | 6.1 | 56.8 | 5 | | |
| | | Inside | 2 | 28.1 | 8.0 | 5.8 | 56.7 | 4 | | |
| 28 | 09:00 | Outside | 0 | 28.6 | 7.9 | 6.2 | 56.1 | 2 | | 〃 |
| | | 〃 | 2 | 28.9 | 8.0 | 5.6 | 55.8 | 1 | 13 | |
| | | 〃 | 10 | 28.5 | 8.0 | 5.8 | 55.5 | 1 | | |
| | | Inside | 2 | 28.9 | 8.0 | 6.0 | 55.9 | 1 | | |
| 29 | 07:50 | Outside | 0 | 28.0 | 7.8 | 7.1 | 54.8 | 1 | 17 | 〃 |
| | | 〃 | 2 | 28.0 | 7.8 | 7.1 | 54.6 | 2 | | |
| | | 〃 | 10 | 28.1 | 7.9 | 6.5 | 54.9 | 1 | | |
| | | Inside | 2 | 28.0 | 7.9 | 6.6 | 54.3 | 1 | | |

4. Davao Gulf Area(Live bait well)

| Date | Hour | Place | Water temp ℃ | PH | Dissolved OXYGEN ppm | Electrical conductivity m℧/cm | Turbidity ppm | Remarks |
|---|---|---|---|---|---|---|---|---|
| Feb. 6, '77 | 11:00 | Inside | 28.2 | 8.0 | 5.7 | 56.8 | 13 | Talisay Bay |
| | | Outside | 28.4 | 7.9 | 5.7 | 56.4 | 12 | |
| 7 | 10:30 | Inside | 28.8 | 7.9 | 5.5 | 55.9 | 4 | Davao port |
| | | Outside | 28.8 | 8.0 | 6.2 | 55.5 | 4 | |
| 〃 | 17:00 | Inside | 29.0 | 8.0 | 5.7 | 55.0 | 9 | Tanbungon |
| | | Outside | 28.6 | 8.1 | 6.3 | 54.5 | 4 | |
| 8 | 10:00 | Inside | 27.2 | 8.1 | 5.8 | 54.1 | 5 | 〃 |
| | | Outside | 27.1 | 8.1 | 6.0 | 53.6 | 7 | |
| 〃 | 17:00 | Inside | 28.1 | 8.3 | 5.5 | 55.4 | 7 | Talisay Bay |
| | | Outside | 27.9 | 7.9 | 6.0 | 55.1 | 9 | |
| 9 | 07:00 | Inside | 28.0 | 8.2 | 5.9 | 56.2 | 6 | Davao Gulf |
| | | Outside | 27.9 | 8.3 | 5.8 | 55.6 | 8 | |
| 〃 | 17:00 | Inside | 29.1 | 8.6 | 5.7 | 58.4 | 43 | Malalag Bay |
| | | Outside | 28.9 | 8.7 | 5.7 | 58.6 | 37 | |
| 10 | 10:00 | Inside | 27.6 | 8.2 | 5.1 | 55.3 | 9 | Malipano |
| | | Outside | 27.6 | 8.2 | 5.3 | 55.6 | 7 | |
| 〃 | 16:30 | Inside | 29.2 | 8.3 | 6.8 | 57.3 | 8 | 〃 |
| | | Outside | 29.3 | 8.3 | 6.9 | 56.7 | 7 | |
| 11 | 10:00 | Inside | 27.9 | 8.2 | 5.8 | 55.6 | 7 | off Davao Gulf |
| | | Outside | 27.7 | 8.3 | 6.0 | 55.4 | 7 | |
| 〃 | 16:30 | Inside | 27.0 | 8.2 | 6.2 | 55.1 | 7 | 〃 |
| | | Outside | 27.0 | 8.3 | 6.3 | 54.0 | 8 | |
| 12 | 08:00 | Inside | 27.9 | 8.1 | 5.7 | 55.5 | 11 | 〃 |
| | | Outside | 27.9 | 8.2 | 5.9 | 55.6 | 10 | |
| 〃 | 16:00 | Inside | 28.4 | 8.2 | 5.5 | 55.8 | 10 | 〃 |
| | | Outside | 28.2 | 8.3 | 5.8 | 55.6 | 12 | |
| 13 | 08:00 | Inside | 27.9 | 8.2 | 5.8 | 55.8 | 10 | 〃 |
| | | Outside | 27.8 | 8.2 | 5.9 | 55.3 | 12 | |
| 〃 | 16:00 | Inside | 28.1 | 8.3 | 5.8 | 55.6 | 12 | Davao Gulf |
| | | Outside | 28.2 | 8.1 | 6.0 | 56.2 | 10 | |
| 14 | 09:00 | Inside | 28.1 | 8.2 | 5.6 | 55.6 | 11 | 〃 |
| | | Outside | 27.9 | 8.2 | 5.8 | 55.6 | 11 | |
| 〃 | 16:00 | Inside | 28.0 | 8.1 | 6.3 | 55.8 | 3 | 〃 |
| | | Outside | 27.9 | 8.1 | 6.5 | 55.6 | 3 | |
| 15 | 10:00 | Inside | 28.0 | 8.0 | 7.2 | 55.8 | 2 | 〃 |
| | | Outside | 27.8 | 7.8 | 7.9 | 56.0 | 3 | |
| 〃 | 16:00 | Inside | 29.2 | 7.9 | 8.6 | 58.0 | 9 | Cuabo Bay |
| | | Outside | 28.9 | 8.1 | 8.6 | 57.2 | 8 | |
| 16 | 10:00 | Inside | 28.1 | 7.9 | 8.5 | 56.5 | 8 | Davao Gulf |
| | | Outside | 28.2 | 7.9 | 8.5 | 56.1 | 7 | |
| 〃 | 16:00 | | 28.6 | 7.9 | 8.1 | 56.9 | 9 | off Davao Gulf |
| | | Outside | 28.3 | 8.0 | 8.1 | 56.4 | 8 | |

Annex table 10.

List of Bait Fishes Appeared

List of bait fishes appeared

| | Scientific name | Leyte Gulf | Davao Gulf |
|---|---|---|---|
| 1. | Dussumieriidae | | |
| 1) | Spratelloides delicaturus (Bennett) | + | + |
| 2) | S. japonicus (Houttuyn) | (+) | (+) |
| 3) | Dussumieria hasseltii Bleeker | (+) | (+) |
| 2. | Clupeidae | | |
| 4) | Harengula ovalis (Bennett) | (+) | + |
| 5) | H. bispilonotus (Bleeker) | (+) | |
| 6) | Sardinella clupeoides (Bleeker) | + | + |
| 7) | S. sirm (Walbaum) | ++ | (+) |
| 8) | S. gibbossa (Bleeker) | + | + |
| 9) | S. melanura (Cuvier) | (+) | (+) |
| 3. | Engraulidae | | |
| 10) | Stolephorus buccaneeri Strasburg | | (+) |
| 11) | S. heterolobus (Rüppell) | ++ | ++ |
| 12) | S indicus (Van Hasselt) | (+) | (+) |
| 13) | S. bataviensis Hardenberg | + | + |
| 14) | Thrissina baelama (Forsskal) | (+) | (+) |
| 4. | Atherinidae | | |
| 15) | Allanetta forsakali (Rüppel) | + | + |
| 16) | A. valenciennei (Bleeker) | ++ | ++ |
| 17) | Stenatherina temmincki (Bleeker) | + | + |
| 18) | Pranesus pinguis (Lacépède) | + | ++ |
| 5. | Scombridae | | |
| 19) | Rastrelliger canagurta (Cuvier) | + | ++ |
| 20) | Auxis sp. | | ++ |
| 21) | Euthynnus affinis (Cantor) | | (+) |
| 22) | Thynnus sp. | | (+) |

| Scientificname | Leyte Gulf | Dovao Gulf |
|---|---|---|
| 6. Carangidae | | |
| 23) Decapterus macrosoma Bleeker | (+) | (+) |
| 24) D. sp. | (+) | (+) |
| 25) Selar crumenophthalmus (Bloch) | (+) | (+) |
| 26) S. boops (Cuvier) | (+) | (+) |
| 7. Leiognathidae | | |
| 27) Leiognathus elongatus Smith et Pope | (+) | (+) |
| 28) L. bindus (Valenciennes) | + | + |
| 8. Pempheridae | | |
| 29) Parapriacanthus beryciformes Franz | (+) | (+) |
| 9. Mullidae | | |
| 30) Mullidae Sp. | ++ | ++ |
| 10. Apogonidae | | |
| 31) Archamia fucata (Cantor) | + | + |
| 32) A. zosterophora (Bleeker) | + | + |
| 33) Apogon fraenatus Valenciennes | (+) | (+) |
| 34) Rhabdamia cypselura (Max Weber) | + | + |
| 11. Caesionidae | | |
| 35) Caesio pisang Bleeker | + | (+) |
| 36) C. caerulaureus Lacépède | (+) | (+) |
| 37) C. gymnopterus (Bleeker) | | (+) |

Note : Ranks of appearance

(+) : Very rare : appeared one station only

\+ : Rare : 〃 less than five stations

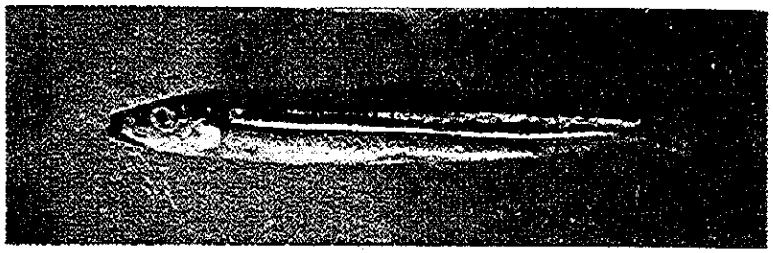
\+ + : Common : 〃 more than sis stations

Photo 1.

Main Species of Bait Fish

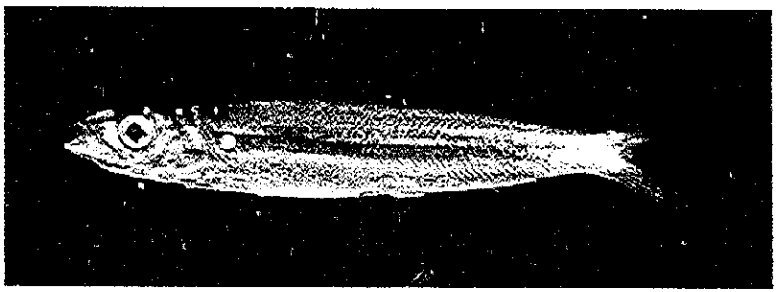
## 1) Dussumieridae

Spratelloides delicaturus (Bennett)



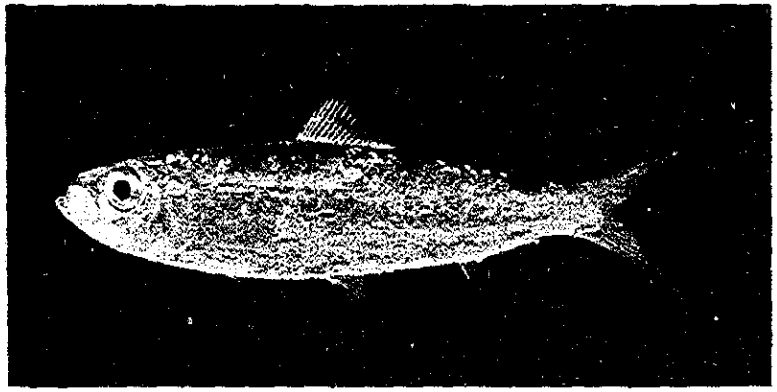
Spratelloides japonicus (Houttuyn)



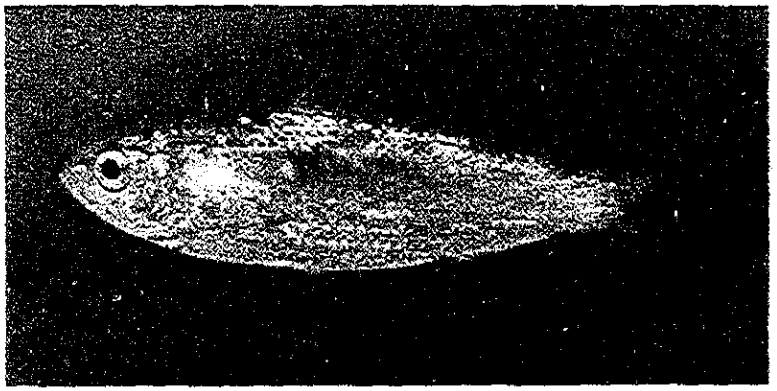


Dussumieria hasselti Bleeker

2) Clupeidae

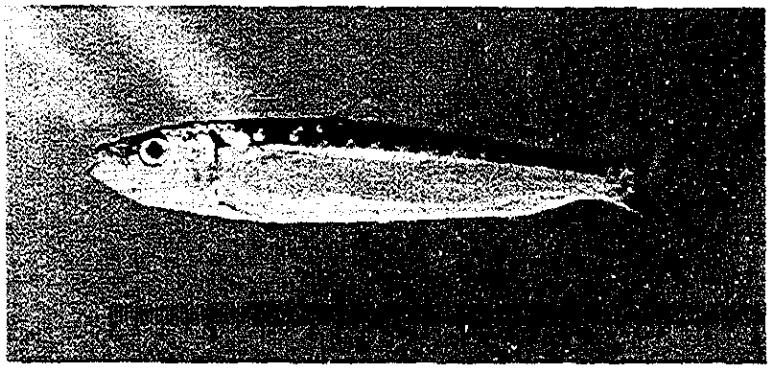


Harengula ovalis (Bennett)

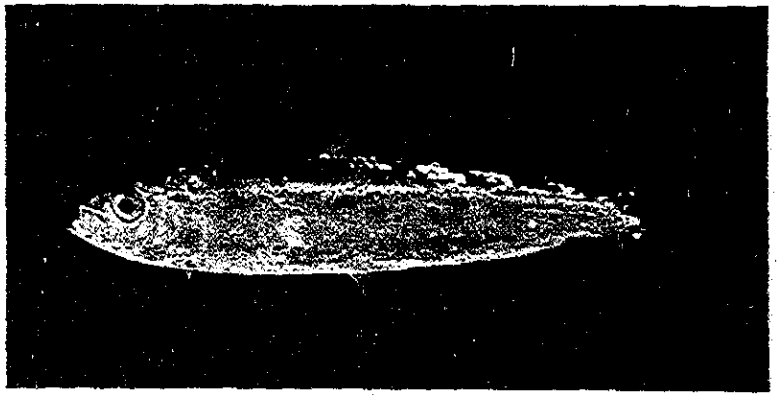


Harengula bispilonotus (Bleeker)



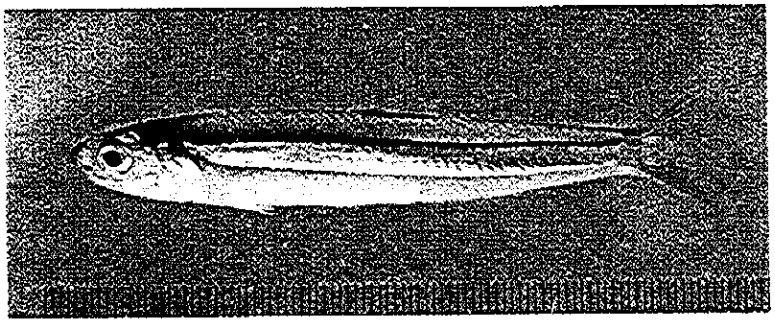


Sardinella sirm (Walbaum)

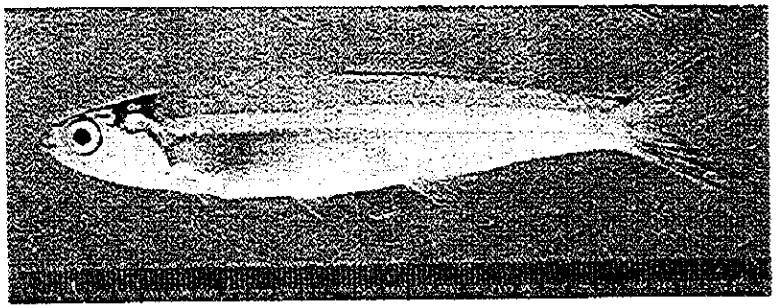


Sardinella melanura (Cuvier)

3) Engraulidae

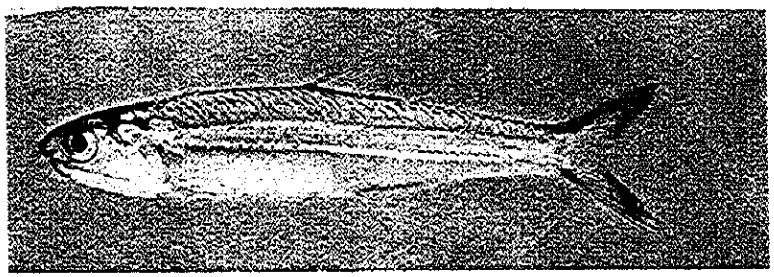


Stolephorus heterolobus (Ruppell)

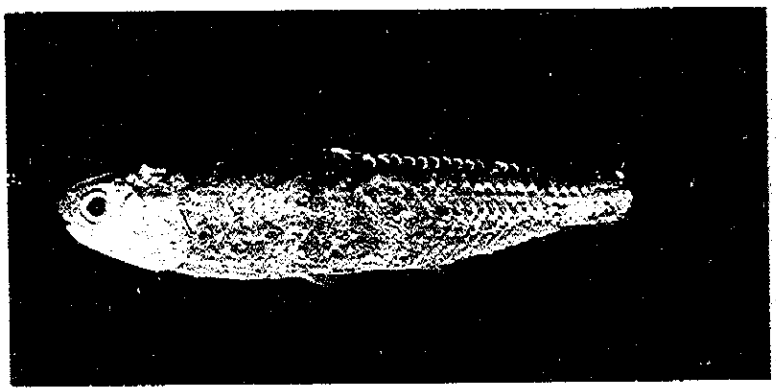


Stolephorus indicus (Van Hasselt)



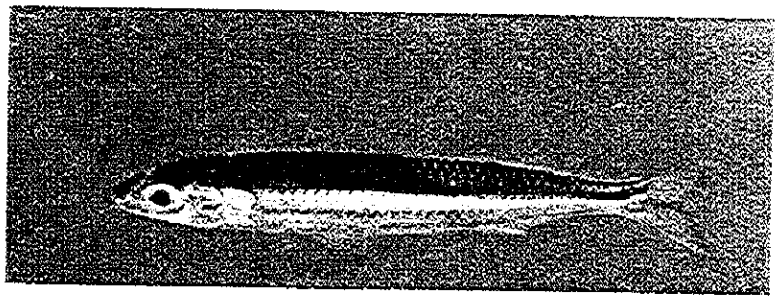


Stolephorus bataviensis Hardenberg

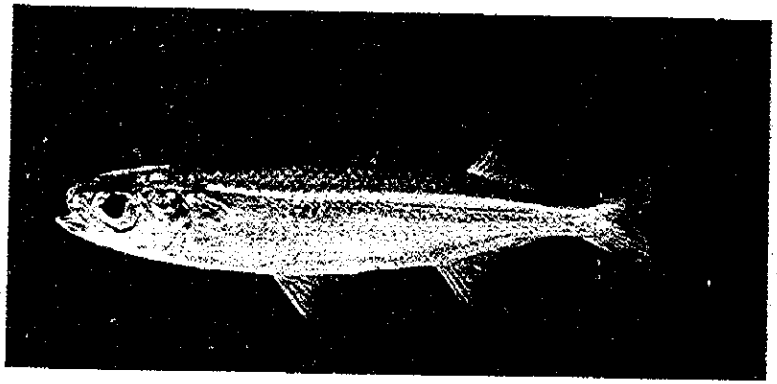


Thrissina baelama (Forsskal)

4) Atherinidae

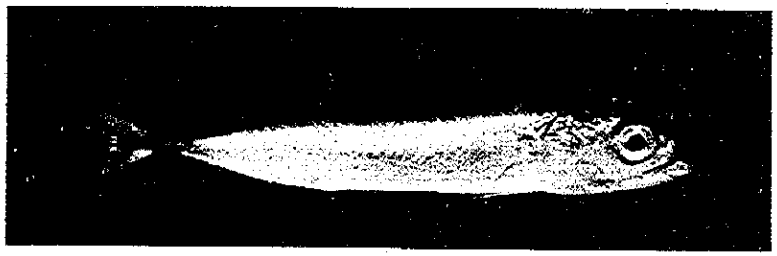


Stenatherina temmincki (Bleeker)

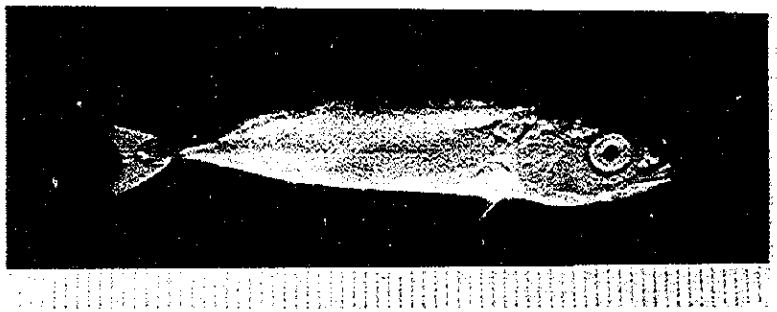


Pranesus pinguis (Lacepede)

## 5) Scombridae

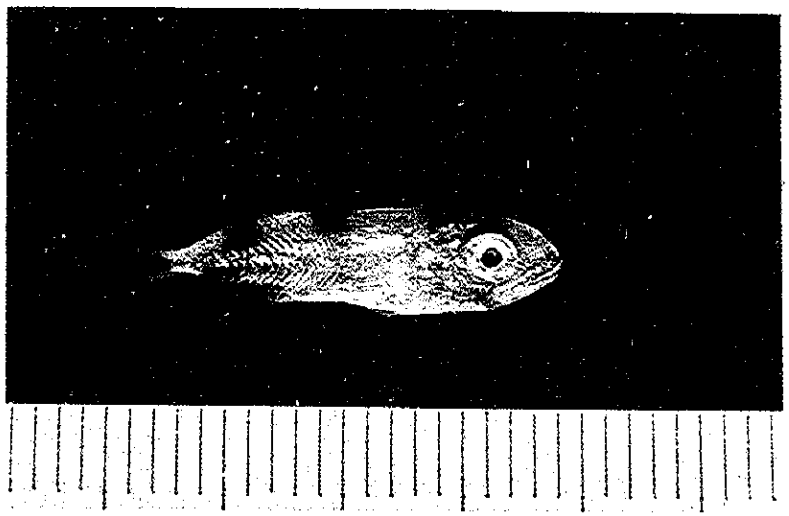


Auxis sp.



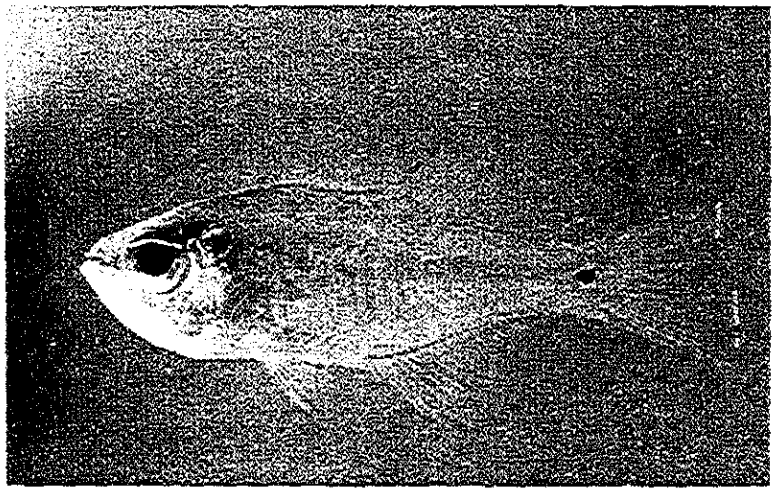
Euthynnus affinis (Cantor)



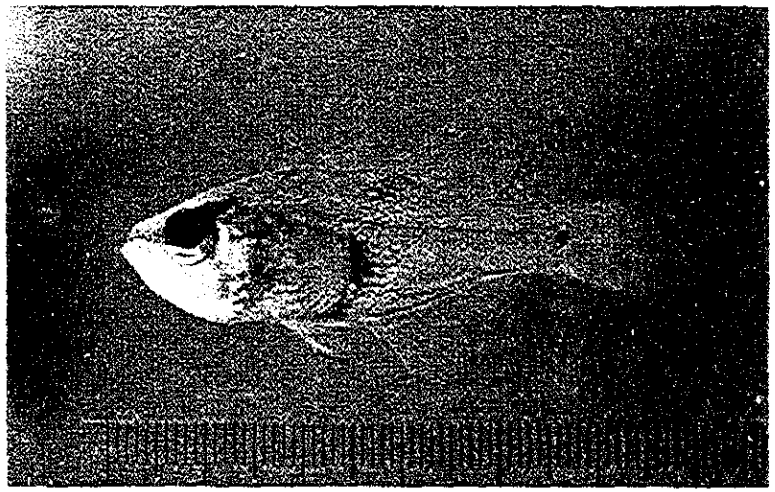


Thynnus sp.

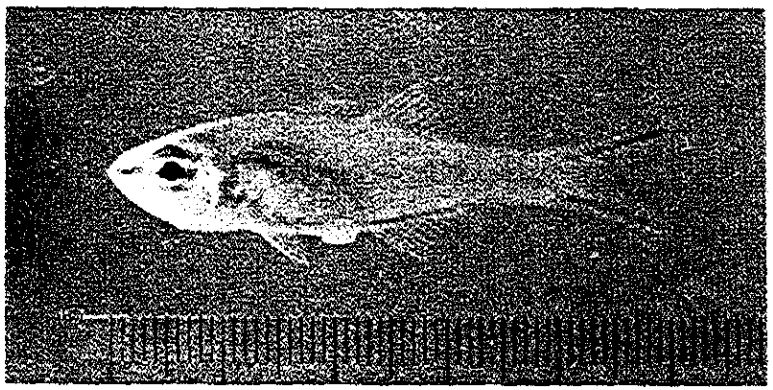
6) Apogonidae



Archamia fucata (Cantor)

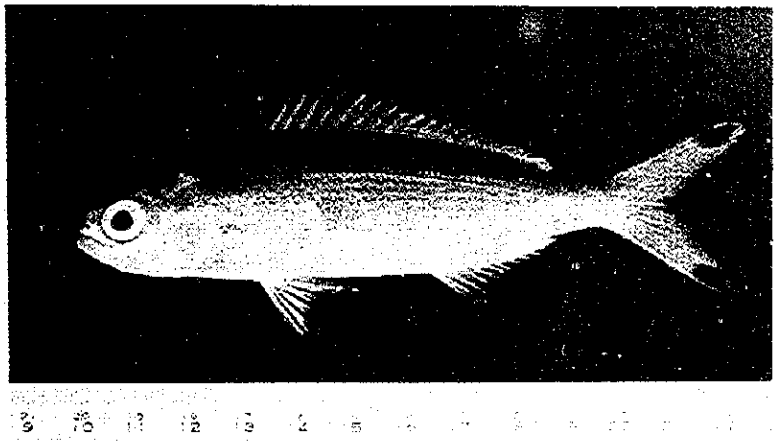


Archamia zosterophora (Bleeker)

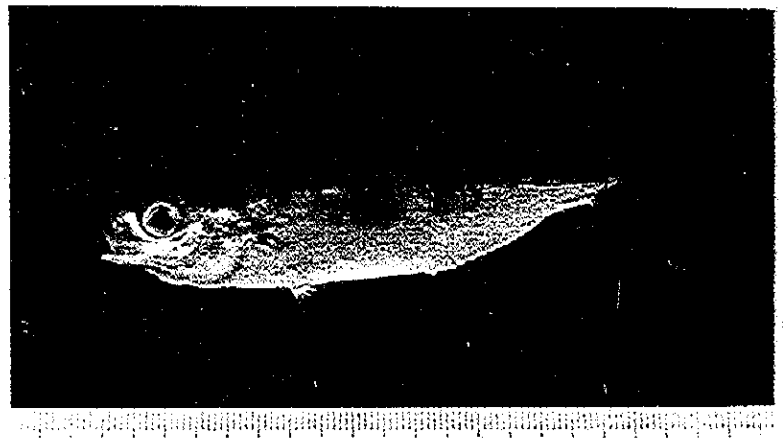


Rhabdamia cypselura (Max Weber)

## 7) Caesionidae

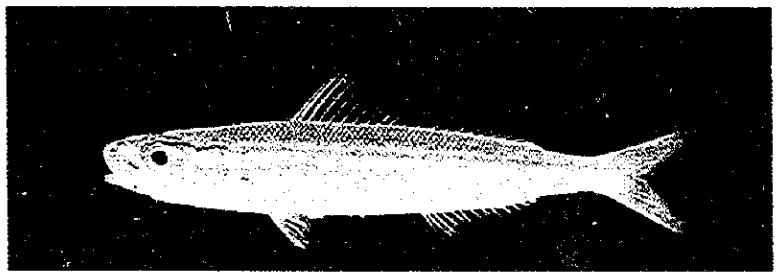


Caesio pisang Bleeker



Caesio caerulaureus Lacepede



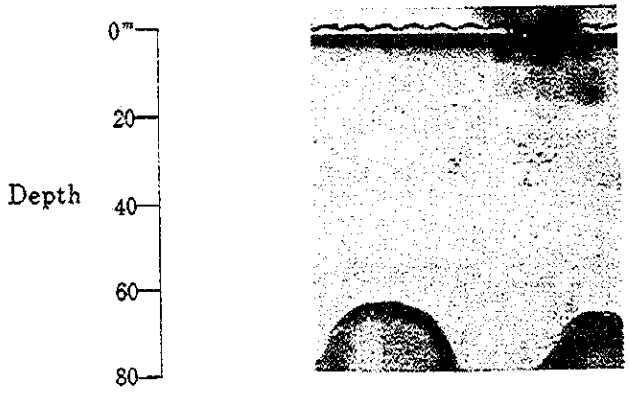


Caesio gymnopterus (Bleeker)

Photo 2.

Record of Fish Schools by Fish Finder

1)

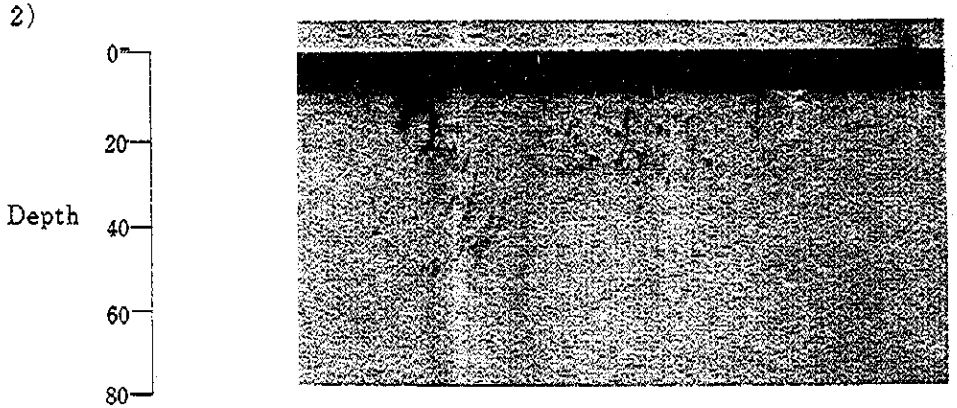



Jan. 30, 1977 Operation No.21 Bonito

Catch 381.4kg Average fish bady

length : Bonito 35.1cm

2)



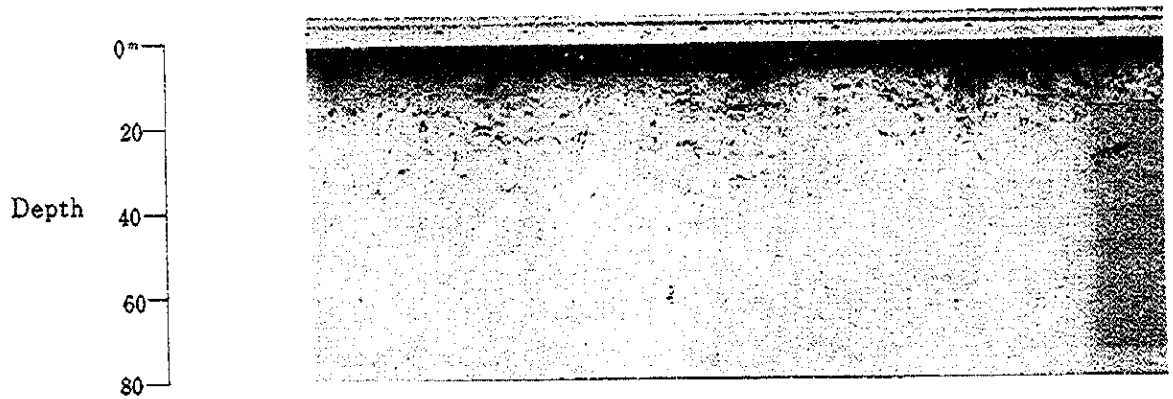

Mar. 11, 1977 Operation No. 71 Skipjack, Yellawfin tuna

Catch 1,207.7kg Average fish body length : skipjack 40.0cm,

Yellowfin tuna 42.3cm



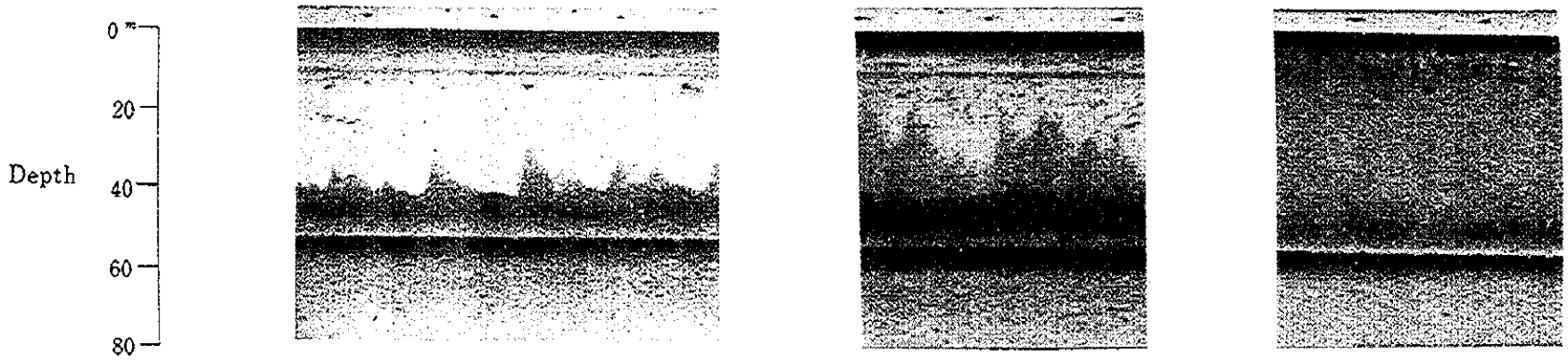
3)



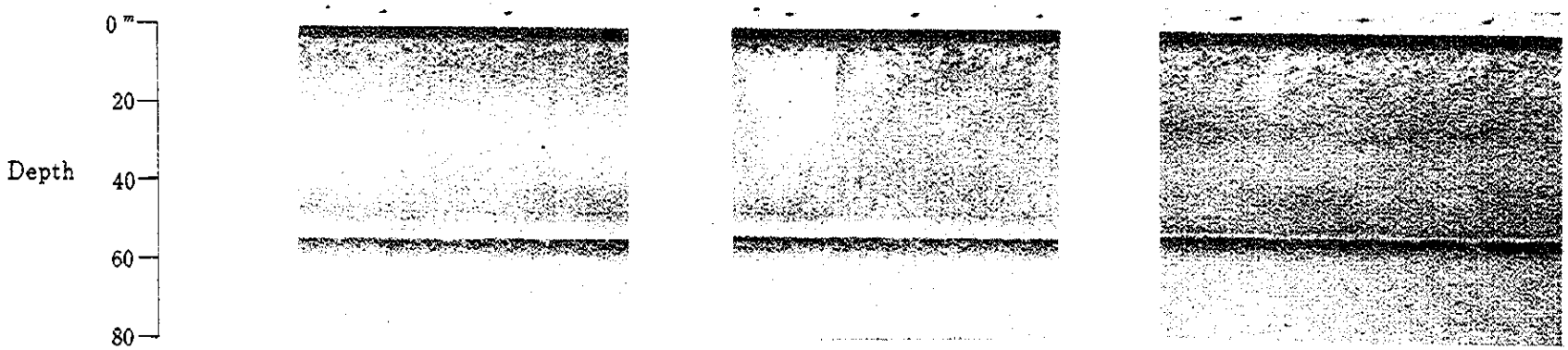

Mar. 13, 1977 Operation No. 74 Skipjack Catch 447,9kg

Average fish body length : skipjack 40.4cm, Yellawfin tuna 42.6cm

4)



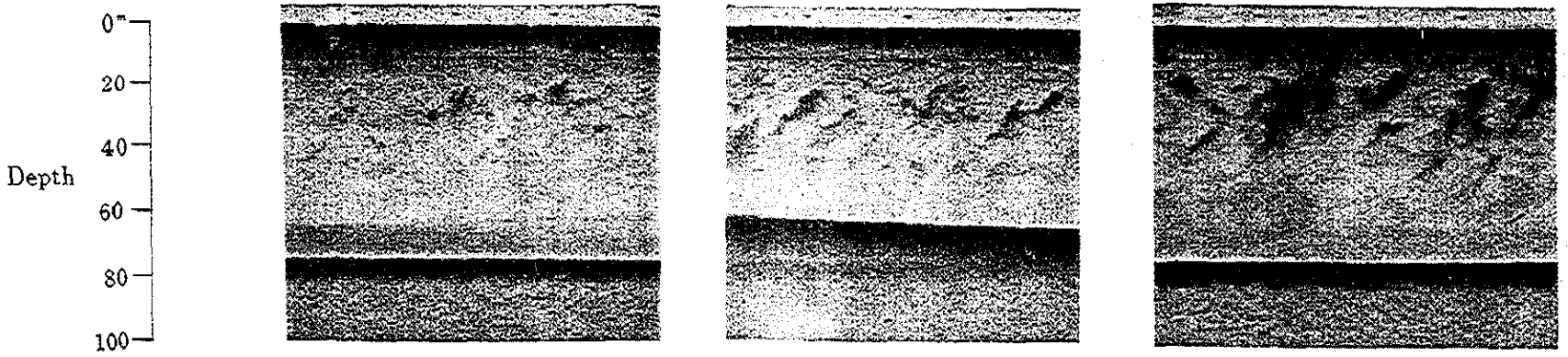

① 18 : 00　② 19 : 00　③ 20 : 00



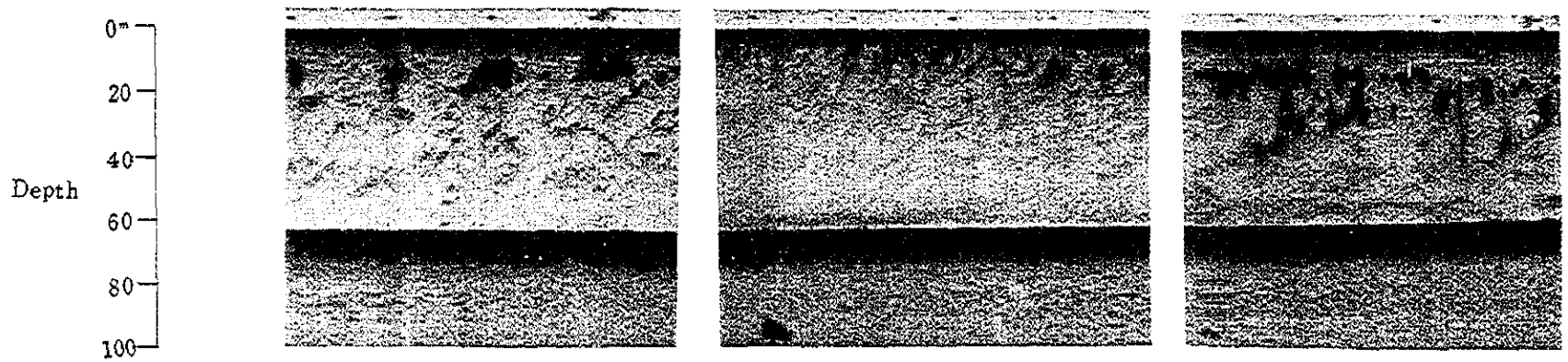

④ 21 : 00　⑤ 22 : 00　⑥ 23 : 00

Mar. 9, 1977　Operation No.88　Stolephorus sp.,Sardinella sp.

5)




① 19 : 00　② 20 : 00　③ 21 : 00




④ 22 : 00　⑤ 23 : 00　⑥ 24 : 00

Mar. 11, 1977　Operation No.90　Sardinella sp.