ON THE PRELIMINARY HYDRO-BIOLOGICAL AND FISHERIES SURVEY OF ESTANCIA WATERS AND ITS APPROACHES IN NORTHERN ILOILO

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INTRODUCTION

The Visayan Sea has always been one of the most productive fishing grounds in the country. For the 10-year period from 1963 to 1973, there was a general increase in the production of sardines, herring and mackerels as shown in Table 1. This fishing area has been intensively fished by commercial fishing boats such as purse seiners, basnigans and trawlers.

In view of this, local fishermen in Estancia and adjoining areas claimed that they get smaller catch each year, and that they cannot compete with the more effective fishing gear of commercial fishing boats. This fact has been aggravated by the closure of the Visayan Sea to fishing five months each year.

The fishermen requested the Bureau of Fisheries and Aquatic Resources, through the Western Visayas College of Fisheries to conduct studies on the scientific basis of the closed season for sardines, herrings, and mackerels as embodied in the revised Fisheries Administrative Order No. 13.

The closed season for mature sardines, herrings, and mackerels or their larvae, fry or young known as lupoy, silinyasi or linatsay from November 15 to March 15 of each year in a portion of the Visayan Sea and adjoining waters was formulated before World War II. Since then no subsequent studies have been conducted to see if the conditions of the area have changed. Moreover, no analysis was

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made to determine if the rationale for the promulgation of FAO 13, as revised, which is to protect the spawners and the young of these species, was still valid 33 years after.

The possibility that the conditions existing 35 years ago has changed and that therefore the closed season may not be applicable anymore was cited by residents in the area.

The survey made on March 20-31, 1973, looked into the feasibility of amending or revoking FAO 13.

METHODOLOGY

The hydro-biological survey of Estancia waters and its approaches as well as the evaluation of its existing fishery condition were conducted on board the motor boats of the Concepcion School of Fisheries of Concepcion, Iloilo, and the Western Visayan College of Fisheries of Estancia, Iloilo.

Seven hydrological stations (Fig. 1) were occupied during the survey. At each station, surface water temperature was taken and recorded with the use of a reversing thermometer. Likewise, surface water samples were collected for salinity determination. With the use of a *Kitahara* type net with 29.0 cm diameter, 125.0 cm long and with a 0.11 cm mesh size, vertical tow of plankton collection was made at varying depths of 9, 10, 15, and 20 meters. Samples (water and plankton) collected were taken and analyzed at the Dagat-dagatan Laboratory in Malabon, Rizal.

Observations on the fish catch landed and sold at the local market were done daily. Representative fish species under study were taken as samples and were biologically analyzed in detail.

Observations on the catch of the sustenance fishermen were conducted at the known fishing villages.

Fishermen were asked about the existing fishing conditions in their localities and the effect of the revised FAO No. 13 on their livelihood.

Other observations such as the topography and type of substrates of the surveyed area, the fishing gear used around the area and other factors that could shed light on the objectives of the survey were all recorded.

RESULTS AND DISCUSSIONS

I. Hydrological Survey:

The results of the hydrological survey of Estancia waters and approaches are shown in Table II.

The highest salinity of 34.90 o/oo was recorded at Station VI. Average salinity of 34.85 o/oo was recorded for all stations. The temperature ranged from 26.2°C to 27.5°C and showed a difference of 1.3°C.

Table III shows the results of the plankton analyzed qualitatively. The samples collected from Stations I to VII were analyzed qualitatively and classified and grouped into two, namely:

A. Phytoplankton

1. Diatoms

This group of phytoplankton represented the most abundant organism in all the areas surveyed.

In their order of dominance, the Genera identified were Rhizosolenia, Chaetoceros, Thalassiotrix, Coscinodiscus, Eucampa, Bacteriastrum and Pleurosigma.

2. Dinoflagellates

Only two genera represented this group. They are the Ceratium, which was most abundant and present in all stations, and Noctiluca, which were very few and preent only in stations II, III and IV.

3. Foraminiferans

Among the foraminiferans, only Radiolaria was found in small traces in stations V and VI.

B. Zooplankton:

On the other hand, the zooplankton that were present in the samples were divided into the following:

1. Annelids

Traces of this group of zooplankton were found in stations III and V.

2. Copepods

This group consisted of Copepods, Nauplius, Calanus, Corycaeus and Micronetella. The copepods had the highest percentage of occurrence among the zooplankton groups analyzed. The copepods and nauplius were present in all stations, except in station IV.

3. Coelenterates

Only Medusae represented this group and traces were seen in stations II and IV.

4. Tunicates

The tunicate group is mainly composed of Oikopleura which were found in stations II, III, IV and VII.

5. Mollusks

Traces of tintinids and Creseis were found in stations I and III and in stations II, IV and VI, respectively.

6. Chaetognaths

Sagitta was the sole representative of this group of zooplankton and only a small amount was found in station III

7. Echinoderms

Echinopleuteus represented this group but only small traces were present in stations IV and V.

In addition to the above discussion on plankton composition, it would be worthwhile to mention that although stations II and V were all sampled at a depth of 20 m as shown in Table II, station III had 4.0 ml of plankton volume as compared to the collected volume of 2.0 ml 1.5 ml and 2.5 ml from stations II, IV and V, respectively.

However, it was noted that station V had the highest number of individual organisms counted and this can be explained by the high cell count of about 126,000 of Rhizosolenia

II. Fish Landing Observations and Market Sampling

Fish catches landed during the early mornings both from the town of Estancia and Concepcion were very small, especially the pelagic fish species such as sardines, herrings. mackerels, anchovies and roundscads.

Big-sized mullets, hairtails, crevalles, Spanish mackerels, barracudas and spotted rays were also seen at the fish landing. The "bid-

Table II. Hydrological Data of the Waters Off Estancia and Vicinities as Surveyed on March 24, 1973

Surface Water Salinity (ppm)	34.80 34.80 34.83 34.90 34.90
Vol. Depth Te	11:40am 1.5 10 26.2 12:52pm 2.0 20 25.9 1:35pm 4.0 20 26.6 2.24pm 1.5 20 26.6 2.58pm 2.5 20 27.4 3.50pm 1.0 15 27.4
Location 'Latitude 'Time	I 123°13'45" 11°27'00" 11:40am 1.5 10 II 123°13'45" 11°27'00" 12:52pm 2.0 20 III 123°18'17" 11°24'48" 1:35pm 4.0 20 IV 123°15'13' 11°22'15" 2.24pm 1.5 20 V 123°12'30" 11°20'30" 2.58pm 2.5 20 VI 123°09'30' 11°21'30" 3.50pm 1.0 15 VII 123°09'39" 11°24'37" 4.30pm 1.0 20

Table III. Plankton composition in number and percentage (%) of the waters off Estancia and vicinities March 24, 1973

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Chaetocerus	142,300	58.53	58.53,16,500	24.44	24.44.25,200	19.27	19.27 19,000	18,143	37,100)	14,470	7,200		7,200	11.760
Thalassiothrix	3,000	4.15	1,800	2.67	9,200	7.03	0000'9	5,555	27,300	10,648	1009	0.952	1,800	2,940
Coscinodiscus	2,400	3.32	5,100	7.55	3,200	2,45	5,200	4.814	4,200	1,639	1006	1,428	1009	0.980
Eucampia	1 2,1001	2.90	2,100	3.12	8,400	6.42	1,200	1,111	3,500	1,365	1,2001	1,904	1009	0,980
Bacteriastrum	3001	0.41	006	1,33	2,400	1,83	2,400	2,222	12,600	4.914	4,200	5.236	4,200	6.860
Pleurosigna	1 3001	0.41	1,200	1.78	400	0.31	800	0.741	4,900	1,911	1,2001	1,904		0.980
Leptocylindrus			1,200	1.78	2,000	1.53	8001	0.741	9,800	3.822	3,3001	6.664	3,600	5.880
Skeletonema	1 2,4001	3.32	1006	1.33	0. 1002	920	Saon, T	TILL .	7007	0.274				
Nitzschia		Page 1	a Topic	1881	800	0.61	• • •		3,500	1.365	1009	0.952	300	0.49
Planktoniella	1 2,400	3.32	1009	0.88	1004	0.31			•		3001	.924.0	•	

		1,470		5,390	
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Table III. C	Guinardia 1, Fragilaria Lauderia	Bidulphia 2. Dinoflagelates Ceratium	Noctilucs 3. Foraminiferans		Nauplius Calanus Coryceus Microsettela

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3. Coelenterates	Medusa	4. Tunicates	Oikopleura	5. Mollusks	Tintinids	Creseis	6. Chaetognaths	Sagitta	7. Crustaceans	Ostracod	Mysis	8. Echinoderm	Echinopleuteus	1	Percentage (%)
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ding system" also existed in these places. Sale of the catch was done by open bidding.

On March 27, Malangaban Island, a famous fishing village in the municipality of Concepcion was visited. There were about 1,000 people living in this place where fishing is the main source of livelihood. Here, most of the fishermen used largarete and there were about 70 largarete based and operated by local fishermen in the area.

During our visit, it was observed that the catch was very small as many big wooden boxes lay empty along the shore. The wooden boxes are used for brining the fish. A handful of the newly-brined fish (Sardinella perforata) was offered as sample. The gonads of the sampled fish were still maturing and developing (under stage III and IV, respectively) and the fish had an average length of 130 mm.

Barrio officials said that fishermen in their barrio transport their catch only in dried form to Concepcion, Estancia, and Iloilo City, and even to Manila.

Dried sardines or "tuyo", cost \$\mathbb{P}3.00 per kilo while dried fish fillet or "daing" of medium-sized mackerels and crevalle are sold by the piece at \$0.35 per piece or three pieces for \$1.00.

Market sampling was done during the morning and afternoon market time. It was observed that demersal fish species such as nemipterids, whiting, groupers, grunts, and slipmouths dominated the catch. Other marine products present were crabs (Neptunus pelagicus), shrimps, squids, and shell fishes (bivalves and gastropods).

Prices for fish, crabs and shrimps ranged from \$0.50 to \$1.00 per "tumpok" or bunch which is approximately 1/2 kilo. Big fishes that were filleted were also sold by "tumpok" or by the piece.

Shellfishes were sold either by the piece or "tumpok" and/or measured in tin cans or drinking glasses. For example, a glassful of shucked oysters sells for ₱0.25.

III. Fish Biology

As shown in Table IV a total of 184 specimens were analyzed biologically during the whole period of the survey. These samples were composed of 21 pieces of mackerels, 72 pieces of sardines and 91 pieces of herrings. Of the samples identified and analyzed, the mature fish, under stage V, were found only in herring, Harengula sp., and mackerel, Scomber japonicus, with an average length of 88.5

Table IV. Different fish species studied in detail

Fish Species	Visayan Name	Average length (mm)	'Average 'weight '(grams)	Stages of Naturity	Length	No. of
HERRINGS			:	T.		analyzed
Hereng a sp.	Namamse	88,5	7.18	III to V	1 81 161	83
Dussumierri sp.	Balatiyong or Malaubyas	132.0	15.05	not	1	11111111111
SARDINES	in mention		harren.	analyzed	127-138,	8
Sardinella perforata	Tabagak or Tamban yapad	130.8	20.3	I to IV	15-141	10
Sardinella longiceps	(Tamban lison		22.1	'I to IV	123-152	32
Sardinella sirm	Tamban or				State of	
Sardinella	Tamban tuloy		30.1	, I	155-157	2
fimbriata	'Tamban lira-'	124.9	15.12	_	101-142	17
Sardines fry	Lupoy or siliyasi	65.0	1.87	not analyzed	61-69	11
ACKERELS		:				
Scomber japoni	Aguma-a or Anduhau	231.0	108.01	IV & V	157-254	7
Rastrelliger brachyosoma	Aguma-a i	203.0	94.2	III & IV	159-211	5
Rastrelliger brachyosoma	Aguma-a	119.0	100000000000000000000000000000000000000	not analyzed.	132	4
R. tanagurta	Bolao	179.0	67.2		162-202	5

GRAND TOTAL

mm and 231 mm, respectively. Other species of the two groups ranged from the still immature to maturing, being under stages I to IV.

The four species of sardines namely Sardinella perforata, Sardinella longiceps, Sardinella fimbriata and Sardinella sirm showed no signs of mature eggs and sperm cells, although stage IV or nearly mature gonads were found in S. perforata with an average length of 130.8 mm and S. longiceps with 137 mm.

It is interesting to note that different stages of egg development were found in a single gonad of female sardines and herrings, a sign that the fish has a protracted period of spawning activity, perhaps spawning throughout the year with a peak in a certain month or season of the year. This has to be proven yet, based on the results of the future hydro-biological and fisheries survey to be undertaken

The gonads of the Rastrelliger brachysoma, Dussumierri sp., and in this locality. the sardine fry, "lupoy" or "silinyasi" samples were not examined because the entrails were already ruptured.

IV. Gear used in the locality

For the pelagic fish species, the gear used are basnig, purse seine

In the case of demersal fish species, they are caught with the and "largarete" (gill net). following gears, namely, commercial trawl, baby trawl, fish corral and hook and line.

V. Bottom topography and type of bottom

For the town of Estancia passing thru San Dionisio down to Concepcion, the type of bottom varied from sandy to sandy muddy and sandy rocky. The bottom along the shoreline was sandy muddy and sandy rocky, while those along the coasts of the different islands of Estancia, San Dionisio and Concepcion were observed to be sandy.

The bottom topography as revealed during low tide is gradual and always bare along the eulittoral zone, and becomes abrupt at a distance of about 1.0 mile from the sh reline.

VI. Other Observations

A group of commercial trawlers was seen beyond Colebra Island between 1418 hr and 1430 hr, during the hydro-biological survey around the area.

Fish corrals were set almost everywhere along the different islets and islands belonging to the municipality of Estancia such as Bayas Island, Luguingut Island, Sicogon Island, etc.

More than 10 fish shelters (Payao) made from bamboo poles and coconut leaves were seen set within Odiogan Bay between Pan de Azucar Island. The payaos were owned by different fishermen. These were used to lure the fish at night when the largarete is operated.

Around Concepcion Bay, there were about six tangkal or stationary lift nets, which were also operated at night with the use of light to attract the fish. Both demersal and pelagic fish species were caught with this kind of gear.

COMMENTS AND RECOMMENDATIONS

- 1. The result of this preliminary survey indicated that the species of fish such as sardines, herrings and mackerels do not mature at the same time. This finding is supported by the fact that the ova in the gonads of fishes examined showed that they were of different stages. It might be possible that these species of fish spawn throughout the year. However, since this is only a preliminary survey, we can not say with certainty that this is the case. In this connection, we would like to recommend that a one-year survey at three months interval be undertaken so that more conclusive findings may be made.
- 2. Since the fish species under study are considered to be the most important in the Visayan Sea and since the area is one of the most productive, it is recommended that the Bureau of Fisheries and Aquatic Resources coordinate with the scientific personnel of the fisheries schools in the region. We believe we can get the support and assistance of fisheries school personnel in as much as we are both working for the development of the area.

It is suggested further that fish landing survey and market observation be done by the biologists assigned to Region 6 (Iloilo City) at least once every two weeks. This survey should record the fluctuations and abundance of the prevailing fishery and data on the catch composition, the source and the gear used.

- 3. The Visayan Sea should be included among the priorities to be surveyed by the BFAR's R/V RESEARCHER for a more thorough and complete study of the hydrographic condition of the area. The new survey should set the hydrographic stations close to the navigable coastal areas.
- 4. In as much as the fish under study belongs to the pelagic group, the Technological Services Division of the Bureau of Fisheries and Aquatic Resources should have this area surveyed using modern nets and other fishing gear adapted to the pelagic species. Samples of the catch together with the other collected data should be given to the Fisheries Research Division for detailed study and analysis so that results may be correlated with the hydrographic data to be gathered by the R/V RESEARCHER. Better results could then be expected by adopting this procedure.

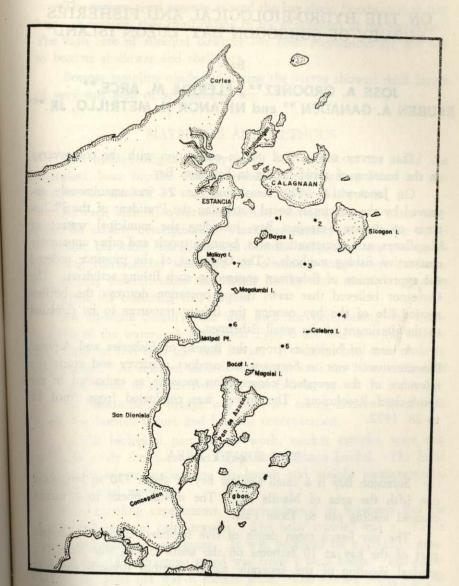


Figure 1. The survey area showing Estancia waters and vicinities.