

Colucci

THE PHILIPPINE JOURNAL OF FISHERIES

VOL. 7

JULY-DECEMBER, 1959

No. 2

PLANKTON STUDIES IN MANILA BAY¹

STANDARDIZATION OF PLANKTON NETS AND PLANKTON VOLUMES

By I. A. RONQUILLO and E. BERNABE
Of the Bureau of Fisheries

INTRODUCTION

Studies on the plankton of Manila Bay were started in April 1957 and are being continued to the present as a part of the researches on the life history of fishes of commercial importance in Manila Bay.

Recently, in conjunction with the exploration for tuna of the M/V "Malasugui", plankton collections were made during the fishing trips for tuna. In addition, plankton collections were made on board a bagnet boat (basnigan) in Manila Bay, a fishing gear for pelagic fishes which is operated during the dark phase of the moon.

The present paper is based on data collected during the monthly hydrographic investigations of Manila Bay. It describes the catching power of plankton nets and conventional methods and techniques employed in the research work and a comparison of results based on two methods of determining quantities of plankton gathered.

¹ Presented as IPFC/C61/TECH 30 at 9th Session of the Indo-Pacific Fisheries Council, Karachi, Pakistan, 6-23 January 1961, and issued as IPFC Occasional Paper 61/7, July, 1961, 4 pp. 1 table, mineo.

PLANKTON NETS USED

The Hensen egg net and Petersen ring trawl net received from FAO-Rome were used during the first year of study. In addition, a Marutoku Type "B" net was used in the latter part of the study for comparison of results with the other two nets.

Given below are the descriptions of the gear used, stations visited, methods of collection, as well as the procedures in processing of the material collected.

1. Gear used:

- Hensen egg net—with a diameter of 75 cm. and area of 0.4185 m².
- Petersen ring trawl net—with a diameter of 100 cm. and an area of 0.7845 m².
- Marutoku Type "B" net—with a diameter of 45 cm. and an area of 0.159 m².

2. Collection stations:

Listed below are the stations occupied monthly and their corresponding depth:

Stations.....	A	B	C	D	E	1	12	16	55
Depth in meters.....	15	25	40	60	150	8	7	10	10

These stations were selected as representative from a series which were established at the beginning of the investigation. See fig. 1 for positions.

3. Hauling methods:

a. Vertical or oblique haul

In making vertical hauls by using the Hensen and Marutoku nets, the towing line with the sinker bearing the net is paid out slowly at a uniform speed. The length of the wire paid out is recorded on the meter wheel and the wire angle is noted when the net reaches the desired depth. The net is retrieved at a uniform speed or at slowest operational speed of which the water strained is approximately the same whether the net is towed vertically or obliquely.

At the end of each haul the net is washed down thoroughly, concentrating the catch into the bucket at

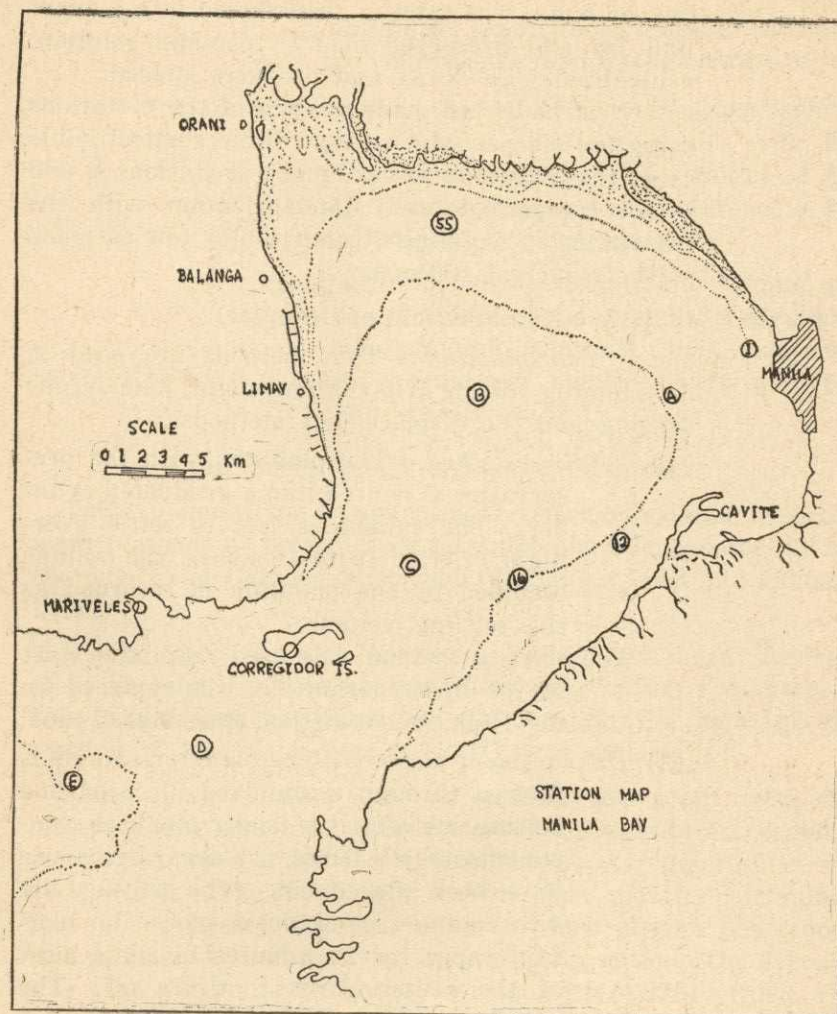


Figure 1. Showing portions of plankton stations in Manila Bay.

Station A—Depth—22 m. Long. 120° 53' 27" E Lat. 14° 34' 35" N	Station D—65 m. Long. 120° 30' 15" E Lat. 14° 18' 20" N	Station 12—16 m. Long. 120° 49' 36" E Lat. 14° 27' 38" N
Station B—25 m. Long. 120° 42' 46" E Lat. 14° 34' 48" N	Station E—150 m. Long. 120° 24' 40" E Lat. 14° 15' 54" N	Station 16—18 m. Long. 120° 44' 15" E Lat. 14° 24' 55" N
Station C—44 m. Long. 120° 40' 15" E Lat. 14° 25' 47" N	Station 1—9 m. Long. 120° 55' 33" E Lat. 14° 35' 45" N	Station 55—20 m. Long. 120° 39' 47" E Lat. 14° 42' 30" N

the cod end. The catch is transferred into a quart Ball jar and preserved in 4% formalin solution, neutralized with borax and properly labeled.

Three vertical hauls are made at each of the 9 stations using the Hensen egg net, and three vertical hauls using the Marutoku net are made at stations B and D for comparison and standardization with the Hensen net. A 10-minute horizontal tow is made at the principal stations.

4. *Catch analysis (Examination of samples):*

a. *Volumetric determination.*—Two methods are used in determining volume of plankton caught, namely, the settling and the displacement methods.

(1) *Settling method.*—The plankton with the preservative is poured into a graduated cylinder. The sample is left to settle overnight. After 15 to 16 hours, the volume occupied by the plankton is recorded as the settling volume.

The settling method was used from the start of the investigation but was replaced by the displacement method since March 1958.

(2) *Displacement method.*—The plankton sample is filtered through a standard piece of fine bolting silk after the larger plankton components as jelly fishes, fish eggs, and larvae have been picked out. The bolting silk with retained plankton is placed on blotting paper for 10 minutes to allow most of the preservatives to drain off. The sample together with the bolting silk is then placed into a graduated cylinder with a known volume of preservative (4% formalin solution). The increase in volume minus the volume of the silk (0.1 cc) gives the displacement volume of the plankton. The displacement volume of the larger plankton component is later added. The size of the graduated cylinder used in both methods depends upon the volume of the sample but in most cases a 25 cc.

or a 50 cc. graduated cylinder is used and the volumes are read to the nearest 0.1 cc.

(3) *Net weight.*—Before determining the displacement volume, the bolting silk with the plankton is weighed. The weight of the silk is subtracted and the difference is the net weight of the plankton.

In determining all these data the volume and the net weight of the three hauls are added together and averaged, then computed for volume per square meter and per cubic meter.

DISCUSSION OF RESULTS AND CONCLUSIONS

Table 1 shows the comparison of the Settling and Displacement methods of determining total net plankton volume during the months of October, November, December 1958 and January 1959.

During these months the mean settling and mean displacement in cubic centimeters were determined from the catch of the Hensen egg net from all stations and the ratio of the settling to the displacement (S/D) was determined.

Three methods were used in getting this value: first, the mean settling and mean displacement of the different stations per month were added and the S/D ratio was determined for each month. The mean ratio for the four months determined was 4.575; second, the S/D ratio for each station per month was determined, and also the mean monthly ratio. The average was then determined for the four months (4.875); third, the mean ratio for each station was determined for the four months and the average was taken (4.836). The grand mean (S/D) or conversion factor of 4.7423 was then determined.

Table 2 shows the comparison of density of catches of Hensen and Marutoku "B" net in Stations B and D from November 1958 to January 1960 together with their individual mean density from each station, the square of the sum, the standard deviation, the standard error of the mean and the standard error of the standard deviation. The volumes are determined by displacement.

TABLE 1.—The mean values between settling and displacement volume with the Hensen net by station and mean ratio per station to get the conversion factor-S/D.

Station	October, 1958		November		December		January, 1959		Ave. ratio Per station	Grand Mean R.	S. D.
	Ave. Settl.	Ave. Disp.	Ave. Settl.	Ave. Disp.	Ave. Settl.	Ave. Disp.	Ave. Settl.	Ave. Disp.			
1	4.5	1.3	46.6	10.8	10.2	1.8	9.5	1.0	5.6		
12	50.0	9.8	12.3	1.2	46.6	12.8	3.7	10.7	5.8		
16	42.0	8.0	57.0	16.0	35.0	7.8	4.5	11.3	4.2		
A	9.2	2.0	56.0	4.3	4.2	4.3	4.2	1.8	3.9		
Ac	10.5	2.0	68.3	17.0	6.8	1.1	6.2	3.3	5.75		
B	21.6	4.0	56.6	4.02	26.2	5.33	4.9	32.3	4.77		
Bc	6.8	1.8	56.6	14.8	23.4	5.8	3.04	35.0	4.75		
C	42.6	8.3	46.6	11.0	4.2	4.2	4.9	47.6	4.79		
55									4.2		
D			16.5	3.5	50.6	9.3	5.44	28.0	4.05		
E			360.1	87.3	203.0	44.93	38.0	67.2	5.34		
S	187.2	37.2	45.0	10.91	25.4	5.55	32.5	51.26	53.20		
X	23.4	4.65					31.25	6.72		4.897	
S/D Mean ratio		5:0		4:1		4:6		4:6			4.7423
S/S Mean individual ratio											
Conversion factor											

That the Marutoku "B" net may replace the Hensen net is determined by the fact that the density for both nets are not significantly different from each other ($P > 0.9$). Inasmuch as the Marutoku "B" net is smaller and easier to manage it may be worthwhile to consider the advisability of concentrating on the use of this net for future plankton work in this region requiring sampling thru the vertical water column.

TABLE 2.—Comparison in density of catches of Hensen and Marutoku type B nets in Station B and D. Volumes are determined by displacement.

Month	Station B		Station D	
	Hensen	Marutoku-B	Hensen	Marutoku-B
November 1958	2.80	4.6	1.14	1.50
December	3.08	1.0		
January, 1959	5.39	.91	0.79	
February	1.09	1.15	1.11	0.70
March	1.30	4.5	1.09	1.18
April	1.26		1.11	
May	0.84	1.36	1.0	0.90
June	0.70	1.45	2.60	
July	0.72	1.42	1.12	0.93
August	1.29	1.53	.95	1.11
September	1.10	1.09	1.12	1.35
October	1.13	1.21	1.13	1.50
November			1.30	1.30
December	1.00	1.02	0.99	0.80
January, 1960	1.18	1.1	1.14	1.31
\bar{X}	1.632 ± 0.111	1.646 ± 0.109	1.185 ± 0.264	1.143 ± 0.106
$S \times 2$	0.1637	0.1432	0.9115	0.1143
S	0.408 ± 0.079	0.3794 ± 0.077	0.954 ± 0.187	0.338 ± 0.075
$d(x_1 - x_2)$		0.014	0.042	
ed		0.2419	0.3328	
t		0.057	0.126	
P		—0.9	—0.9	