RELIMINARY OBSERVATIONS ON THE OTTER TRAWL FISHERY OF MANILA BAY

by

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ABSTRACT

This paper is a preliminary report covering the first three year period from 1957 to 1959 based primarily on the data gathered by the staff of the section of Hydrology and Fisheries Biology in a program to re-evaluate the trawl fishery in Manila Bay.

It was found that there has been a slight increase in the number of fishing vessels which operated in Manila Bay during the period under review with a resulting decrease in the total average catch. There has been noted also a direct correlation between the boats operating in the Bay and the prevailing seasons of the year.

It is believed that Manila Bay trawl fishery nas reached its maximum development and this led to a change of gear for catching pelagic fish outside Manila Bay, i.e., basnigan and the introduction of twin-engines in larger trawlers to enable them to catch more pelagic species. Analysis of the catch of four fishing vessels representing typical size grounds support the foregoing conclusion.

INTRODUCTION

The major net fisheries of Manila Bay are of three types: the otter trawl, the baby trawl, and the basnigan (bagnet) fisheries.

Early in 1957, the Section of Hydrology and Fisheries Biology, trough the assistance of Dr. K. Tiews, UNTAB, Fisheries Officer, (Tiews, 1962),

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started a program of reevaluating the trawl fishery to determine the condition of the fishery and compare the results previously obtained, Warfel and Manacop (1950). Observations on the otter trawl fishery of Manila Bay have yielded some noteworthy results and are being continued to the present.

This report is based on the results of the study during the first 3-year period from 1957 to 1959. A total of 66 fishing trips, aboard 35 commercial vessels, were undertaken by the members of the technical staff of the Hydrology and Fisheries Biology Section who joined these fishing trips fort-nightly for 3 to 5 days. Data collected from these fishing cruises had been used in this paper.

The otter trawls are normally operated in the deeper parts of not less than 7 fathoms in Manila Bay. They use nets of the converted beam trawl type and are called the mestizo type. The mesh size of the cod ends of the nets ranges from 1 to 1½ inches with the nets themselves measuring from 50 to 65 feet on the head rope. Recently, with the introduction of twin-engine trawlers in Manila Bay, this type of net has proved most effective.

For our study, observations on the following were made: size and power of fishing vessels, the catch composition, total catch landed, analysis of the monthly catches, recent improvements in the otter trawl, and the catching ability of different sizes of trawling vessels. Surface and bottom water samples are taken for salinity and phosphate studies, and data on temperature are recorded during the hauling of nets. This portion of the study will be discussed in the final report.

SIZE AND POWER OF FISHING VESSELS

The otter trawl fleet operating in Manila Bay in 1957 consisted of 50 trawlers operating monthly on the average with a total of 604 boat-months operating during the year. There has been a slight increase in the number of vessels in the fishery, increasing the boat-months per year correspondingly (see Table I). Each trawler is of the launch type which was originally a war-salvaged tugboat, a "W and T" or a "PT" boat converted for trawling. In 1958-59 the twin engine was introduced into some trawlers. This increased the cruising speed from 3 to 4 knots per hour. In 1960 this was widely accepted and adopted by the industry.

The engine now commonly used is a 125 H.P. Grey Marine with a normal towing speed of 1½ to 2 knots. A great number of trawlers now locally constructed are vessels of sampan type. All the vessels used for this study ranged from 32 to 65 gross tons.

Table I

Number of Otter Trawlers Operating in Manila Bay

Year	Average number of boats operating monthly	Total Number of boat-months per year
1957	50	604
1958	53	637
1959	56	669

CATCH COMPOSITION

The catch of the trawlers consist of a great variety of fish numbering over 100 species representing more than 30 families, so that a detailed sorting is not possible. The catches are roughly sorted into groups depending mostly on size. The fish are sorted and placed in wooden trays in single layers and iced. The types of catches follow:

1. Hoya - consisting of first class fish (pomadasids, lutjanids, carangids, groupers, etc.)
2. Halo - consisting of second class fish (nemipterids, and goat fishes, etc.)
3. Samot - consisting of third class fish (mojarras, small hairtails, etc.)
4. Sapsap - slipmouths of several species.
5. Kalaso - lizard fishes of several species.
6. Hipon - shrimps of several species.
7. Pusit - squids.

For purposes of this study, however, sorting was done in six categories, namely: (1) hoya (2) shrimp (3) squid (4) slipmouth (5) lizard fish, Saurida and (6) miscellaneous. Figure 1 shows the monthly breakdown of catches in kilograms per 10-hour drag in per cent for the years 1957-59 based on two trips per months.

1. Hoya - Perusal of the data based on the catches separated into six categories seem to indicate that for the 3-year period under review, the catch in 1959 has a high percentage of the first class fish hoya forming from 35% to 41% of the total catch.

Normally during the 1957 to 1958 period, this group fluctuated from 22% to 37% except in April when a higher percentage (57%) was recorded. It was noted also that there is a higher catch of this group during the start of the dry season (October-November) probably indicating a larger concentration of the larger fishes in the deeper water preparatory to migration outside of Manila Bay.

2. Shrimp - It appears that the shrimp resource has dwindled greatly in 1959. The catch of shrimps is closely associated and highly correlated with the rainy season. While the shrimp catch in 1957 was from 8.5% to 14.7% and highest in August, it was between 7.5% to 32.5% in 1958, the highest in July. It also has the highest percentage yield of a single group during the month.

However in 1959, the shrimp catch dwindled to as low as 1.5%. The lowest then was during the month of August. It appears that during this year, the percentage of shrimp caught during the dry season was highest in October (7.7%) than during the rainy season contrary to what has been observed in the two preceding years.

3. Squid - Small quantities of squids are caught by trawl and in 1957, the months of August and September showed a percentage of squid catch, 8% and 9% respectively.

In 1958, the catch during the first half of the year was nil except in February. The highest was during the months of July and August. During 1959 the squid catch was high most of the year, the highest in October. The lowest was in June. From these data, it appears that squid is a sporadic visitor of the Bay probably entering the Bay in shoals depending upon the available food supply of species on which they depend upon as food. Although it is expected that as a pelagic species it should be more abundant during the summer months when the salinity is high, the fact that during some year the maximum catches occurred during the months of low water salinity shows, that the presence of squid in the Bay depends more upon the available food supply and/or prevailing water currents carrying food organisms.

4. Slipmouth - In 1957, a high percentage of slipmouths, mostly *Leiognathus*, was recorded during the months of March, May, August, November, and December, followed alternately by months of low catches. During 1958, the highest catches were made in March, June and November, and in 1959 the highest catches were made in January, April, August, September, November and December. The data on *Leiognathus* catches show the importance of this group as the mainstay of the trawl fishery in Manila Bay. A definite trend is noted in which appears a cycle of high and low catches showing variable availability of the group which may run much lower than ¼ to ½ of the peak

of the cycle. As has been shown by analysis of the catch composition of the trawl by species of *Leiognathus* (Tiews and Caces-Borja, 1959) definite species may become predominant for one period and disappear totally from the catch after reaching a peak of abundance only to be replaced by another species which may then become dominant a few months later. Perusal of the months when *Leiognathus* species was predominant in the catch shows no correlation with the rainy or dry season. More studies are needed to determine the causes of variation in availability.

5. Lizard fish, Saurida - This is one of the most important groups of fish taken by otter trawls, the catch being high during the dry season from 16.7% to 26.2% and decreasing during the wet season. In 1958, while the catch was also high during the first half of the year and dwindled slowly during the second half, a very high average (29%) was recorded for the month of September which is the highest for the group during the period under review. In 1959, there appears to be a great decrease in the number of lizard fishes available and except for the catch in March (15.2%) and in June (17.1%) the percentage composition of the lizard fishes was in most cases below 10% and just above 1% during October and November indicating a great decrease in the lizard fish population.

6. Miscellaneous - The great bulk of the catch consisting of small sizes of the various species available to trawlers are classified under this group. In almost all months of the year throughout the period under review this group forms a big portion of the catch. In 1957, for example, for 8 months during the year, the catch percentage fluctuated from 46.4% in July to 24.6% in November whereas in 1958, for 10 months during the year, the catch was from 24% in July to 55.9% in December. In 1959, for 10 months of the year, the group formed the dominant catch of the total landings. This volume of catch indicates that the miscellaneous group taken by trawling in Manila Bay, is really a form of industrial fishery for fish meal comprising about 1/3 to almost ½ of the total catch. Nevertheless, only a small percentage of this group is converted into fish meal because the majority of the catch is sold in the public market or if in poor condition of preservation, it is sold for the manufacture of fish sauce.

CATCH LANDED

Table II shows the average monthly landings of otter trawlers in Manila Bay for the three-year period based on the average catches of vessels which had been accompanied by our research team during the fishing operations. A definite trend of decrease in the catch per hour has been noted from the start of the study in 1957 which was 16.16 kgs per hour drag to 12.15 kgs in 1959. This may be attributed to the increase in the number of fishing units which operated from 1957 to 1959.

Table II

Average Landings of Otter Trawls in Manila Bay in 1957-59

Year	Catch Rate Per Hour	Average Monthly Landings	Annual Average Landings
1957	16.16 kgs	546,176 kgs	6,554,116 kgs
1958	13.32 "	509,066 "	6,108,798 "
1959	12.15 "	506,658 "	6,079,903 "

The average monthly and annual landings which are related to the number of boats in operation show a downward trend in the average catch in 1959 indicating that the fishery has probably reached its maximum development, such that putting more fishing vessels into the fishery has not increased but rather decreased the annual average landings of the previous year.

Because of this development, in 1960 there has been an exodus of trawlers to operate outside Manila Bay.

ANALYSIS OF MONTHLY CATCH

Table III shows a comparison of the monthly landings of all trawlers operating in Manila Bay for the 3-year period. It may be noted that there are more trawlers in operation during the second half of the year than during the first half. This may be explained as follows:

During the first half of the year during the Northeast monsoon season, many trawlers fish outside of Manila Bay going to the southern fishing grounds because of favorable weather conditions allowing them to fish farther. During the later part of the year, however, the Southwest monsoon prevents the fishing vessels from fishing outside Manila. It will be noted, however, that the higher average catch per vessel is made during the months of October and November when the SW monsoon season has just ended, bringing with it rain which has contributed a great amount of run-off thereby adding to the fertility of the bay waters. This higher catch between the monsoon season may also be explained by the inefficient trawling operations during the SW monsoon season and when the typhoons are most prevalent so that trawling becomes difficult. It is interesting to note that the lowest average catch are made on December, January and February, which are the coolest months of the year. However, larger and better fish hoya are caught during the same period. Whether the water temperature has an effect on the availability of bottom fish in the Bay has not yet been established. However, immediately after the onset of the

dry warm months, March, April and May, the average catch per vessel increased much more than the average catch during the cooler months of the year. The average catch of 9,000 kilos during the rainy months of the year, i.e., from June to September, appears to be fairly uniform.

Table III

Computed Monthly Trawl Landings in Manila Bay
As Average from the Three Year Data, (1957-59)

Year	Average Number of Boats Operating per Month	Monthly Average Catch per Boat in kgs	Computed Average Monthly Landings of all Trawlers
January	49	7,867	382,632 kgs
February	48	6,814	322,233 "
March	47	10,786	505,382 "
April	50	10,730	543,689 "
May	60	10,225	620,027 "
June	48	9,034	432,917 "
July	53	9,191	480,068 "
August	51	9,908	501,959 "
September	57	9,482	534,202 "
October	58	12,638	713,125 "
November	58	12,269	719,688 "
December	59	8,033	491,685 "
Overall Average	53	9,748	520,633 kgs

RECENT CHANGES IN THE MANILA BAY FISHERY

After 1959, many boat owners noted that a decreasing amount of catch per unit effort was apparent. This led to changes in the fishery of Manila Bay in the following direction:

1. a modification of trawling power of vessels by installing an extra engine thereby increasing the towing power twine.

2. a total abandonement of the gear for basnigan, bagnet and light fishery, a better and more lucrative gear suited for pelagic fishing in northern Palawan waters.

It has been noted that the otter trawlers in Manila Bay and basnigan vessels operating in northern Palawan primarily financed by the Navotas-Malabon fishing community at the suburbs of Manila. Very recently, the upsurge not only in the size of vessels, number of units and carrying capacity of the bagnet gear may be correlated with the decrease of otter trawlers operating in Manila Bay.

The introduction, therefore, of the twin-engine otter trawlers in 1960 was a success, for pelagic fish species, which used to be caught only sporadically, such as roundscad, *Decapterus*, chub mackerel, *Rastrelliger*, gizzard shads, *Anadontostoma chacunda*, and sardines, *Sardinella* formed a major catch of the trawlers, and preliminary results showed that there is an apparent increase in the catch rate to 13.7 kgs per hour in 1960. At the moment, therefore, there is a trend for the conversion of single-engine to twin-engine trawlers.

Since then there has been a consistent increase in the quantity of pelagic fishes taken by trawlers indicating the success in the use of more power in otter trawls to enable them to catch more pelagic species. Inasmuch as more speed has a tendency to raise the net off the ground the catch of shrimps has dwindled during the period.

CATCHING ABILITY OF FOUR OTTER TRAWLERS OF DIFFERENT SIZES OPERATING IN MANILA BAY WATERS

A comparative study of four otter trawlers was conducted to determine the catching ability of each size group. These vessels represent various types of the majority of otter trawlers operating in Manila Bay. Table IV shows the fishing vessels selected for this purpose.

Table IV

Comparison of Four Types of Otter Trawlers
Used in Manila Bay

Name of Boat	Weight (Gross Tons)	Length (Meters)	Horse Power	Engine Type
1. Ildefonso I	18.77	17.15	80	Kinoshita
2. Ildefonso IV	48.37	29.59	80	Kobe
3. Leonor V	60.43	20.44	160	Superior
4. Dona Luisa D	83.85	22.0	325	Atlas Imperial

The representative fishing vessels selected were of varying engine power. The M/V Ildefonso I and the M/V Ildefonso IV are equipped with slow-speed, heavy duty engines; whereas the M/V Leonor V and the M/V Dona Luisa D are equipped with high-speed, heavy duty engines.

All these fishing boats use the commercial otter trawl net of the mestizo type, with a size of 65 to 80 feet on the head-rope. The mesh size on the cod end of their net varies from 1 to 1.5 inches.

Fig. 2 shows the superiority of M/V Dona Luisa D in the catching ability test over the other fishing boats under study. Owing to its powerful engine, it can attain a faster towing speed. This boat is quite efficient in catching the more elusive, bigger and fast-swimming pelagic species, but not so efficient in catching shrimps, squids, and other mud-burrowing species. The catching ability of the M/V Leonor V is similar to M/V Dona Luisa D, although not so powerful as the latter. On the other hand, the slow-towing fishing vessels as the M/V Ildefonso I and the M/V Ildefonso IV can hardly get the more elusive, pelagic, fat-swimming species, but are quite efficient in catching shrimps, squids and mud-burrowing fish, i.e., flatfishes, turbots, lizard fishes, etc.

From this comparative study, the following observations were noted:

1. The faster the towing speed of the fishing vessel, the more efficient it is in catching the pelagic species, as *Rastrelliger*, *Decapterus* sp., etc. and the fast-swimming species, as the leather jacket *Scomberoides*, barracuda *Sphyraena*, porgy *Lethrinus* etc.

2. On the other hand, the slow-towing fishing vessels, are more efficient in catching shrimps, squids, and mud-burrowing fish or slow-moving species, as the lizard fishes, turbots, soles, etc., because the net can scrape the sea bottom better.

From these observations, the fishermen learned to adjust or select the type of engine suitable for the fishing ground, depending on the species commonly available in the area.

REFERENCES

Tiews, K. (1958). A Report to the Government of the Philippines on marine fishery resources. Phil. Jour. Fish., 6(1): 107-216.

---------- and P. Caces-Boria (1959). On the Availability of Fish of the Family LEIOGNATHIDAE Lacepede in Manila Bay and San Miguel Bay and on their accessibility to controversial fishing gear. Phil. Jour. Fish., 7(1): 59-87.

Warfel, W.E. and P.R. Manacop (1950). Otter Trawl Explorations in Philippine waters. U.S. Fish & Wildlife Service, Res. Rep. 25: 49 pp., 33 tables, 16 figs.

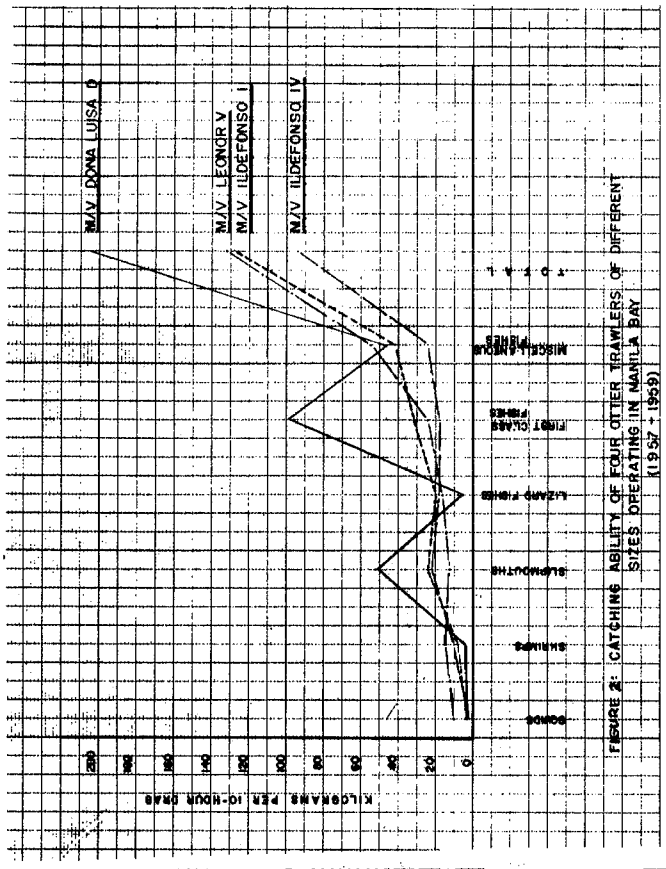

FIGURE 2: CATCHING ABILITY OF FOUR OTTER TRAWLERS OF DIFFERENT SIZES OPERATING IN MANILA BAY (1957 - 1959)

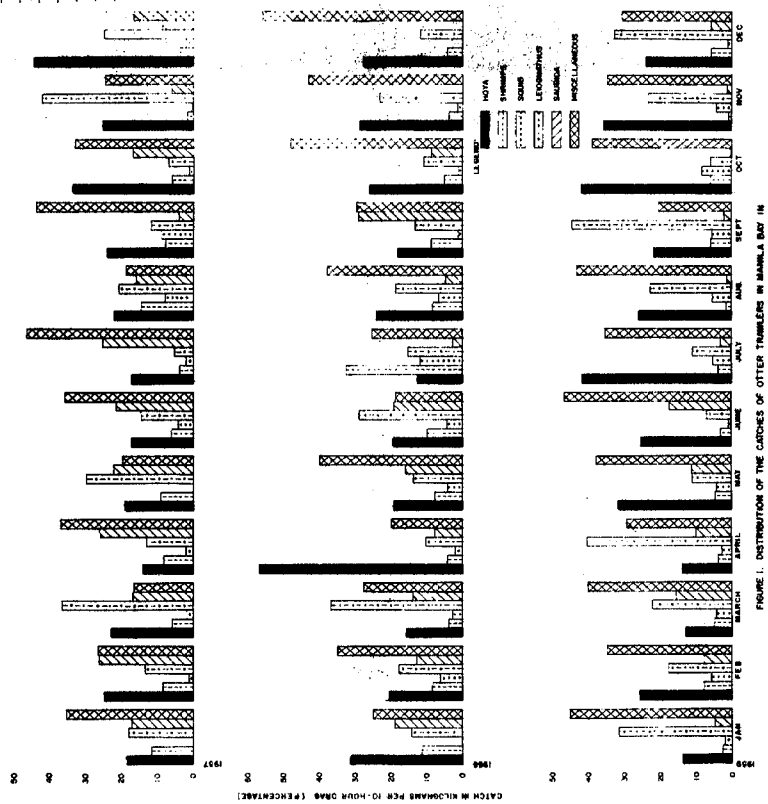

FIGURE 1. DISTRIBUTION OF THE CATCHES OF OTTER TRAWLERS IN MANILA BAY IN KILOGRAMS PER 10 - HOUR DRAG FROM 1957 - 1959 IN PERCENT.