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THE BIOLOGY AND RELATIVE ABUNDANCE OF YELLOW-STRIPED CREVALLE, *Selaroides leptolepis* (Cuv. and Val.) IN MANILA BAY

By

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ABSTRACT

Some aspects of the biology of *Salay-salay batang* (*Selaroides leptolepis*), a common pelagic carangoid in Manila Bay, were studied from February 1981 to June 1982. The relative abundance of the species based on the total catches of the major-gears used in Manila Bay, namely: gill net, medium trawl, bag net, baby purse seine/ring net, and push net, is also discussed here.

Results show that the smallest fish measured was 3.0 cm and the biggest was 18.0 cm in total length; the most exploited sizes are between 10.0 cm and 15.0 cm in total length; the length and weight relationships of male and female fish did not differ much; three gonadal conditions were identified and were found to be overlapping at different length groups. Larger fishes were available regularly from the monthly catch of gill net but were caught occasionally by the other major gears.

INTRODUCTION

The crevalles or *salay-salay* are a group of small-sized and silvery carangoid fishes of which three distinct species are commonly found in the market, namely: *Caranx djedaba*, even-bellied crevalle or *salay-salay lalaki*; *Caranx kalla*, deep-bellied crevalle or *salay-salay aso*; and *Selaroides leptolepis*, yellow-striped crevalle or *salay-salay ginto*, *salay-salay batang* and *salay-salay habagat*.

From 1977 to 1981, the crevalles contributed an average of about 15,000 mt or 1.2% of the country's total fish production, approximately 5.4% of which is share of the crevalles production from Manila Bay (Table 1).

Table 1. Annual production of yellow-striped crevalle (*S. leptolepis*) in Manila Bay in relation to the total national fish production.

YEAR	Total Nat'l. Fish Production (mt)	Production of Crevalle			
		National mt	%	Manila Bay mt	%
1977	1,230,679	14,080	1.14	901	6.40
1978	1,281,722	16,528	1.29	179	1.08
1979	1,238,334	16,889	1.36	910	5.39
1980	1,250,883	15,325	1.23	977	6.37
1981	1,240,757	12,218	1.01	942	7.71
Average	:	15,008	1.2%	781.8	5.39%
Production	:	mt	:	mt	:

Source: Fisheries Statistics of the Philippines.

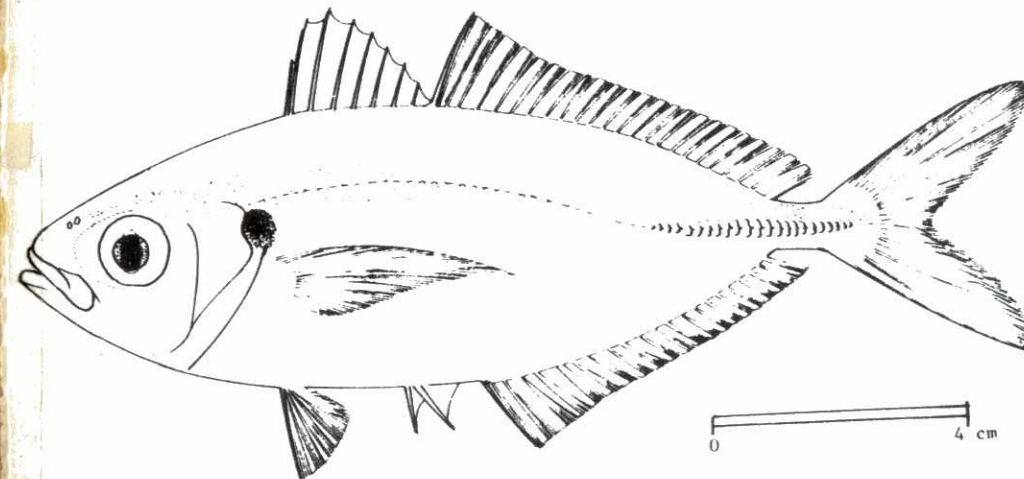


Fig.1 The yellow-striped crevalle (*Selaroides leptolepis*).

The crevalles are usually sold fresh, but the small-sized ones are sometimes dried and utilized for making "bagoong" and "patis".

Of the crevalles, the yellow-striped crevalle, *Selaroides leptolepis* (Fig. 1) is the most expensive as it does not easily spoil. It has characteristics, such as oblong body and golden yellow lateral band running from above the eye to the tail, which are similar to those of small *talakitok* of the genus *Caranx*.

In some of the artificial reefs established in different places of the country by the BFAR, the yellow-striped crevalles are seen occurring in schools and are normally associated with coral/reef fishes, as permanent residents thereof (Personal communication, 1981-1983). Not surprisingly, this species qualifies as a common fish component of big marine aquariums and oceanariums abroad (Ronquillo, personal communication).

Studies on *S. leptolepis* were done by Tandon (1961-1962) in India, and by Naiyanetr (1963) and Morsuwan (1970) in Thailand as cited by Arce (1981).

In the Philippines, Roxas and Agco (1941) and Herre (1953) all reported primarily on the systematic account of Philippine Carangidae. This was followed by a study in the Visayan Sea by Aprieto and Villosa (1977).

Arce (1981) reported on the abundance of the carangid fishes caught by trawl in the Visayan Sea with notes on their biology. Another study conducted by Villosa and Hermosa (1982) deals specifically on the sex ratio and sexual maturity of Samar Sea fishes which include this species.

In view of the importance of crevalles as food fish not only in Metropolitan Manila but all over the country, a knowledge on their abundance and biological characteristics, particularly the species *S. leptolepis*, is necessary to provide a basis for the conservation of this particular fishery as well as for the formulation of fishery management measures appropriate for Manila Bay.

MATERIALS AND METHODS

Fishing Operation and Fish Landing Observations

Four major fish landing centers around Manila Bay were established as sampling stations, namely: Hulugan, Tanza, Cavite; Pandawan, Rosario, Cavite; San Pascual, Hagonoy, Bulacan; and Abucay, Bataan (Fig. 2). These coastal areas were made also as points of reference for fishery surveys on board private fishing boats.

Monthly surveys for 10 days per month, spent about three days in each area, were conducted by two teams at the major landing/fishing areas in Manila Bay from February 1981 to June 1982. One team went to the landing centers to observe and record the catches (volume and fish species) of gill net, bag net, baby purse seine/ring net, medium trawl and push net. The other team boarded private fishing boats (bag net, medium trawler and push net) to observe the actual fishing operations, particularly to gather data on

the volume (kg) and catch composition per haul, location, and fishing effort, etc.

The areas where fishing operations of the major gears are conducted in Manila Bay are shown also in Fig. 2.

Catches of gill net, medium trawl, bag net, baby purse seine/ring net and push net were observed both at the landing centers and on board.

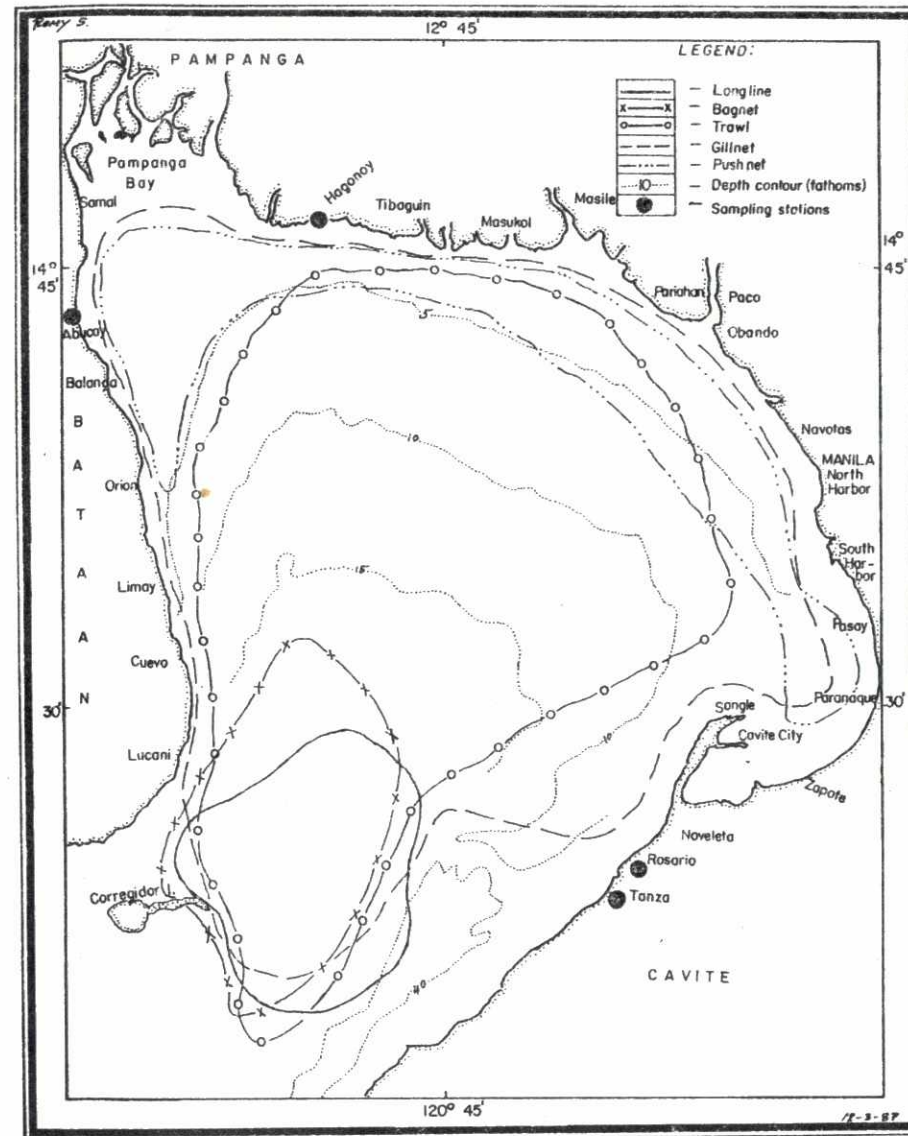


Fig. 2. Map of Manila Bay showing the area of exploitation of the major gears and sampling stations (fish landing centers).

Collection of Samples and Fish Measurements

Whenever possible, measurements of the fish (total length) were done as soon as the boats landed their catch and before the catches were auctioned. The specimens used for biological studies were taken from the samples that were collected both from the landing centers and from the catch of the fishing boats actually boarded.

Fish Biological Study

The specimens were brought to the laboratory still fresh for the detailed analysis. Total lengths (cm) and weights (g) of the individual samples were taken, after which they were dissected for determination of the sex and maturity stages.

The gonadal condition of the fish was determined, following the Heinicke-Naier's sexual maturity determination (Buckmann, 1929). Sexual maturity determination from Stages I to VI was used for both the male and female fish which were grouped into: immature, maturing and mature (Arce, 1981).

The data obtained from the biological parameters of the samples taken by "bottom set" gill net (being a selective gear) were treated separately from the biological data of the specimens caught by the other major gears (Simpson, per. comm.). The length data were grouped into 1-cm class intervals.

Length-Weight Relationship

To determine the length and weight relationship, the computed average total lengths with the corresponding average weights of the fish samples were fed in the mini computer hp Hewlett Packard - 85.

The formula used in the analysis of length-weight relationship of the yellow-striped crevalle was:

$$W = aL^b$$

where W is the weight; a, intercept and b, slope, both of which are constant; and L is the length.

This may be rewritten in a linear form:

$$\log W = a + b \log L$$

Relative Abundance

The relative abundance of the yellow-striped crevalle was obtained by taking the percentage share in relation to the total catch of the boats boarded and of the boat catch sampled and surveyed at the fish landing. In addition, the ratio between the number of boats that landed yellow-striped crevalle from the total units of boats present and sampled was recorded.

RESULTS AND DISCUSSION

Size Composition

A total of 1,145 individuals distributed as follow: 412 pieces from gill net; 360 pc from bag net, 203 pc from medium trawl, 146 pc from push net, and 24 pc from baby purse seine/ring net, were examined for monthly size composition.

Figure 3 shows the monthly size distribution of the yellow-striped crevalle caught by gill net from July 1981 to May 1982. The size range of the fish taken by the gill net is from 9 cm to 18 cm. Although gill net is a selective gear, it was observed that the yellow-striped crevalles that were sampled in May 1982 are smaller in size, ranging from 9 cm to 11 cm in total length.

The monthly size distribution of yellow-striped crevalle taken by different gears (non-selective) from February 1981 to June 1982 is shown in Figure 4. The size ranges of the samples vary greatly from 3 cm to 18 cm in total length, almost tallying with the Visayan Sea data obtained by Arce (1981) which ranged from 3.5 cm to 18.5 cm.

It can thus be deduced that smaller-sized fish are sampled during the early part of the year, particularly February and March for the non-selective gears and May for the selective gear. This may indicate that a new stock of fish is present in Manila Bay during this period and becomes available to different gears.

The size distribution of the catches of all the gears (selective and non-selective) does not vary appreciably during the rest of the months, which could mean that the fishery is receiving new recruits during most parts of year. The fish stay in the fishery not more than three months, after which they either get out of Manila Bay or are fished out.

The most exploited sizes of *S. leptolepis* are between 10 cm and 15 cm in total length.

Length-Weight Relationship

The length-weight data of 1,030 individuals of yellow-striped crevalle are shown in Table 4.

Length-weight relationships were obtained separately for male, female, and for juvenile and combined sexes. The conversion values obtained are as follows:

For all samples	
(Juvenile and combined sexes):	$W=0.0278 L^{2.699}$
	$r^2=0.995$
	$N = 1.030$
For male:	$W = 0.0208 L^{2.829}$
	$r^2 = 0.994$
	$N = 308$
For female:	$W = 0.0188 L^{2.861}$
	$r^2 = 0.998$
	$N = 335$

It was observed that there was only a very slight difference in the length and weight relationships of the male and female fish (fig. 5).

Sex Ratio and Maturity

Of the 553 specimens dissected for sex and maturity determination, 289 were males and 264 were females, giving a ratio of 1.09 males to a female. This result is almost the same as the finding of Arce (1981) for the Visayan Sea samples of 1.08 males to a female, and does not differ much from the finding of Viloso (1982) for the Samar Sea samples which was 1.24 male for every female. Tandon (1961), as quoted by Arce (1981), got a male to female ratio of 1:1.35; 1:1.57; and 1:2.18 in some places of India, although these ratios were observed during the spawning season.

Figures 6 a and 6 b show that the yellow-striped crevalles in Manila Bay are a mixture of immature, maturing and mature fish.

The samples taken by gill net are more of the maturing stage for both male fish (57%) and female (53%) fish. Almost equal percentages of immature (male, 20.31% and female, 25.85%) and mature (male, 22.65% and female, 21%) stages were obtained for both sexes.

From the catch of the rest of the non-selective major gears, the largest percentage of the specimens studied was in the immature stage for both sexes - male, 45.96% and female, 49.57%. The share of the maturing stage was still bigger, with the male at 36.02% and the female at 46.15%, while the percentage share of mature specimens was very much less with the male at 18% and the female at 4.27%.

It is noteworthy to mention that the gonads of the fish become discernible when the male and female fish reach 10 cm in total length.

It was noticed also that the female and male fish mature almost at the same size, 12 cm (TL) and 13 cm (TL), respectively.

Relative Abundance

Tables 2a to 2d show the share (kg and%) of yellow-striped crevalle from the total catch of the major gears, i.e., gill net, medium trawl (Norwegian), bag net baby purse seine/ring net and push net, observed at the landing centers.

Although the fish landing surveys in Hulugan were started late (July 1981), it was noted that *S. leptolepis* was available monthly in small quantities from the gill net catch. Its share ranged from 0.2% to 1.5% of the total catch. For a period of 2 to 3 days landing observations done monthly, the number of units of gill netters that had gone out fishing ranged from 81 to 300 units. Of these only 2 to 29 units had a catch of yellow-striped crevalle.

The majority of the medium trawlers landed their catch in San Pascual, Hagonoy, Bulacan. Compared with the gill net catch, the yellow-striped

crevalle was oftentimes absent from the catches of the medium trawlers. If present, however, there were only a few. There were 15 units of medium trawlers that were observed to have landed yellow-striped crevalle out of the 415 boats that were sampled during the period of survey. The share of *S. leptolepis* per boat catch ranged from less than 1% to 2.2% of the total catch.

Catches of bag net and baby purse seine/ring net are landed at the Rosario, Cavite fish landing center. Catches of baby purse seine/ring net are already mixed when landed by the service boat. From June to October yearly when Manila Bay is affected by the southwest monsoon season, fishing operations of these gears, especially the bag net, shift to Mercedes, Camarines Norte (off Lamon Bay). During the study period, therefore, catch data were available mostly during the northeast monsoon season (December to March) when fishing operations of bag net, baby purse seine and ring net in Manila Bay have normally resumed. The availability of yellow-striped crevalle from these gears was similar to its share from the trawl catches wherein the fish was not always present in the catch, as compared with the gill net.

Data gathered from fish landing surveys show that the percentage share of *S. leptolepis* from the catch of bag net ranges from below 1% to almost 65% of the total catch. Of the 506 units of bag net that were sampled during the period of survey, there were only about 88 units that landed *S. leptolepis*. Although only a few units of baby purse seine and ring net were landed/sampled, a higher percentage share of *S. leptolepis* was observed from the catch. The fish made up 40% of the total catch in February 1981 and had a 4.3% share in May 1982. From the total of 12 units that were landed/sampled during the period of survey, five units landed *S. leptolepis*.

Some 565 units of push nets were sampled in the fish landing of Abucay, Bataan. In March 1981, *S. leptolepis* was observed in the catch of three units of push net out of the 16 units that went out fishing. It had an average share of 16.9% of the total catch.

Table 3 shows the share of yellow-striped crevalle based on the total catch of boats actually boarded.

For the whole period of study, there were four units of medium trawl, one unit of push net, and one unit of basnigan from which on board observations were made and fish samples were taken.

From the total trawl catch, the share of *S. leptolepis* ranged from less than 1% to 5.4%. From the catches of bag net and push net, the species comprised 8.5% and 1.4%, respectively. It is interesting to note that the share of the yellow-striped crevalle based on the few fishing boats boarded was almost similar to that obtained from fish landing observations.

Distribution

Based on observations taken both on board fishing vessels and at landing sites, yellow-striped crevalles are present throughout the year but in small

Table 2a. Share of yellow-striped crevalle (*Selaroides leptolepis*) in the total catch of the gill net in Manila Bay (Cavite Side).

DATE	Catch in kilogram/percentage (%)			No. of boats observed	:No. of boats with <i>S. leptolepis</i> catch
	<i>S. leptolepis</i>	other species	total		
1981					
July	: 9.0(1.5%) :	583(98.5%):	592(100%):	117 :	19
September	: 5.0(0.5%) :	1,211(99.6%):	1,216(100%):	262 :	10
October	: 3.0(0.4%) :	898(99.6%):	901(100%):	171 :	17
November	: 4.0(0.6%) :	2,568(96.4%):	2,662(100%):	300 :	14
December	: 3.0(0.3%) :	1,165(99.7%):	1,168(100%):	125 :	15
1982					
January	: 16.0 (0.6%) :	2,965(99.4%):	2,981(100%):	225 :	14
February	: 4.0(0.2%) :	2,398(99.8%):	2,402(100%):	216 :	11
March	: 39.0(0.6%) :	6,957(99.4%):	6,996(100%):	203 :	29
May	: 1.0(0.2%) :	576(99.8%):	577(100%):	81 :	2

Table 2b. Share of yellow-striped crevalle (*Selaroides leptolepis*) in the total catch of the medium trawl (Norwegian) in Manila Bay (Bulacan side).

DATE	Catch of kilogram/percentage (%)			No. of boats observed	No. of boats with <i>S. leptolepis</i> catch
	<i>S. leptolepis</i>	other species	total		
1981					
February			5,521(100%):	10	
March	33.0(2.2%):	1,518(97.8%):	1,551(100%):	9	1
April			4,407(100%):	24	
June			1,590(100%):	6	
July			5,600(100%):	56	
September			29,793(100%):	87	
October			20,025(100%):	46	
November	4.0(0.1%):	6,840(99.9%):	6,844(100%):	18	1
December	1.0(0.7%):	155(99.3%):	156(100%):	1	1
1982					
January			3,300(100%):	9	
February			9,543(100%):	31	
March	33.0(0.4%):	8,646(99.6%):	8,679(100%):	40	5
April			10,080(100%):	38	
May	40.0(0.6%):	6,612(99.4%):	6,652(100%):	17	2
June	4.0(0.1%):	7,466(99.9%):	7,470(100%):	23	5

Table 2c. Share of yellow-striped crevalle (*Selaroides leptolepis*) from the total catch of the bagnet and the baby purse seine/ring net in Manila Bay (Cavite side).

DATE	Catch in kilogram/percentage (%)			No. of boats : observed :	No. of boats : with <i>S. leptolepis</i> : catch :
	<i>S. leptolepis</i>	other species	total		
1981					
February	360 (0.3%)	8,014 (95.7%)	8,374 (100%)	38	Bagnet — 36 RN/PS — 2
March	140 (40%)	210 (60%)	350 (100%)	2	Bagnet — 25
April	110 (1.5%)	7,243 (98.5%)	7,353 (100%)	30	Bagnet — 6
May	7,115 (64.4%)	3,928 (35.6%)	11,043 (100%)	56	Bagnet
June			670 (100%)	5	Bagnet
October			245 (100%)	1	Bagnet
November			1,628 (100%)	1	Bagnet
December	30 (0.6%)	4,971 (99.4%)	5,001 (100%)	43	Bagnet — 5
1982					
January			4,812 (100%)	92	Bagnet — 9
February	90 (0.3%)	28,164 (99.7%)	28,254 (100%)	71	Bagnet — 7
March	663 (12.02%)	4,851 (87.98%)	5,514 (100%)	50	Bagnet
April			17,293 (100%)	62	PS/RN — 3
May	60 (4.3%)	1,333 (95.70%)	1,393 (100%)	10	Bagnet
June			1,669 (100%)	10	Bagnet

DATE	Catch in kilogram/percentage (%)			No. of boats with <i>S. leptolepis</i>
	<i>S. leptolepis</i>	other species	total	
1981				
February	:	:	120 (100%) :	2
March	423 (16.9%) :	2,079 (83.1%) :	2,502 (100%) :	16
April	:	:	1,000 (100%) :	62
May	:	:	2,583 (100%) :	17
June	:	:	4,337 (100%) :	32
July	:	:	5,391 (100%) :	60
September	:	:	8,405 (100%) :	43
October	:	:	1,035 (100%) :	15
November	:	:	2,391 (100%) :	112
December	:	:	869 (100%) :	14
1982				
January	:	:	3,419 (100%) :	39
February	:	:	226 (100%) :	18
March	:	:	2,620 (100%) :	20
April	:	:	4,337 (100%) :	73
May	:	:	4,180 (100%) :	30
June	:	:	10,087 (100%) :	12

Table 2d. Share of yellow-striped crevalle (*Selaroides leptolepis*) from the total catch of the push net in Manila Bay (Bulacan side).

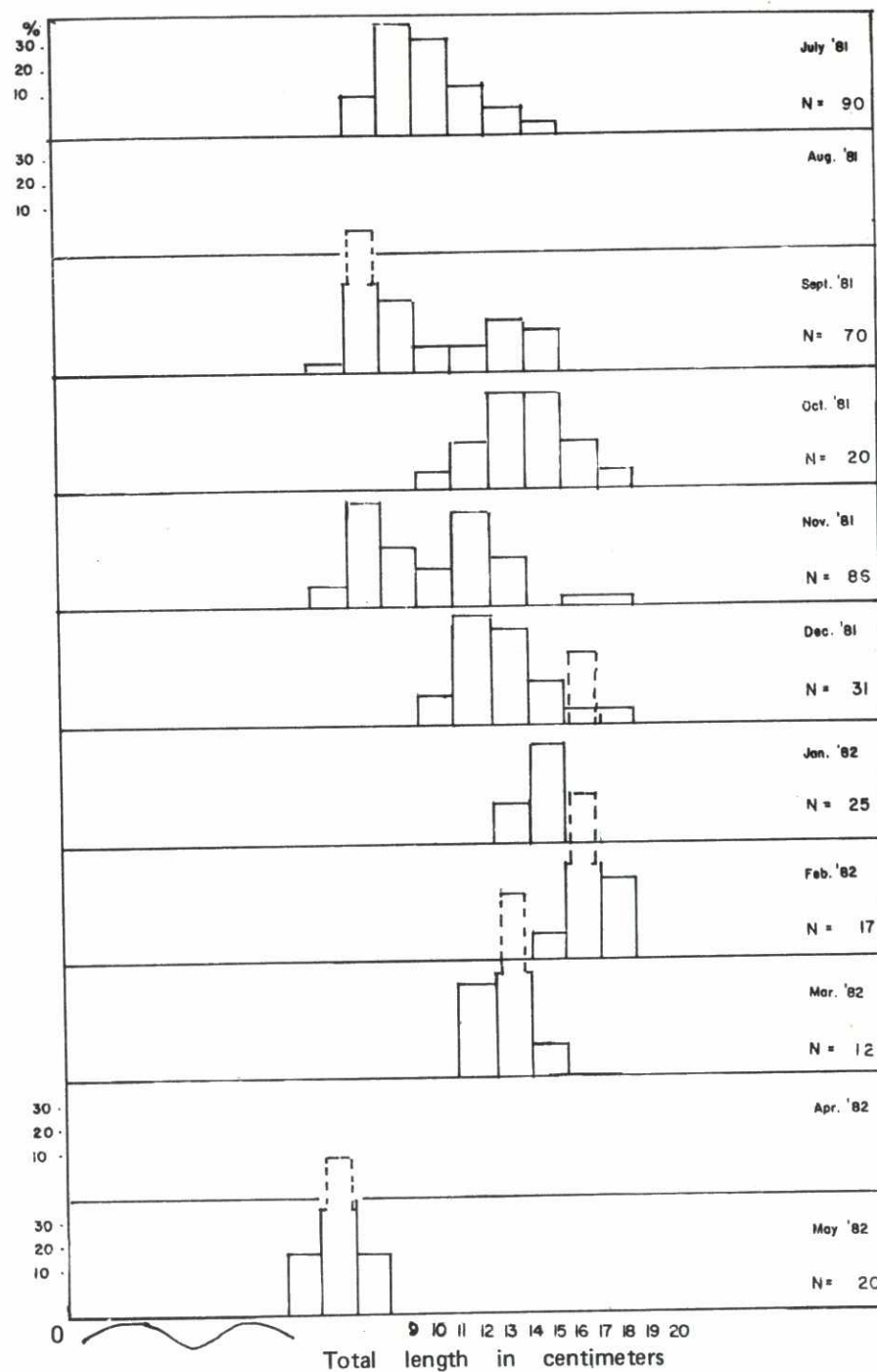


Fig. 3. Size composition of *Selaroides leptolepis* caught by gill net in Manila Bay, July 1981 to May 1982.

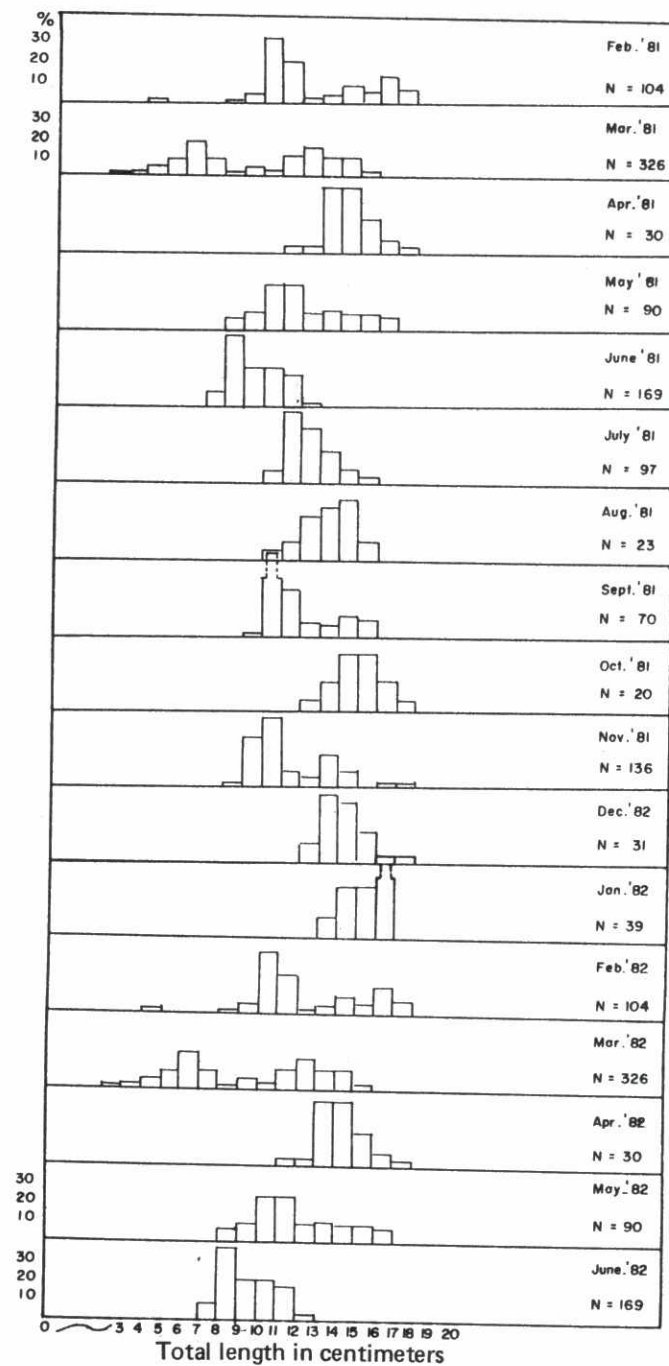


Fig. 4. Size composition of *Selaroides leptolepis* caught by non-selective gears (bag net, baby purse seine, baby ring net, trawl and push net) in Manila Bay from February 1981 to June 1982.

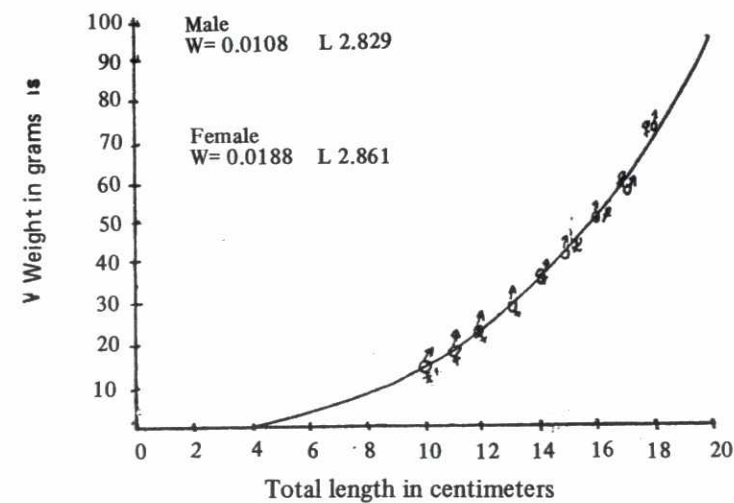
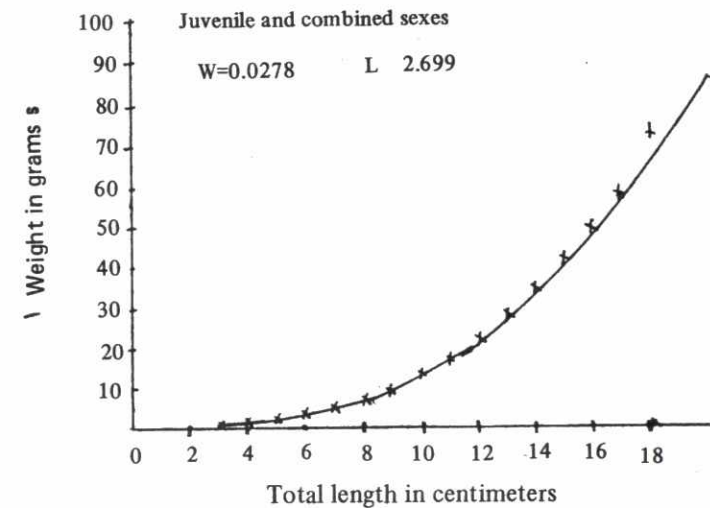


Fig. 5. Length-Weight Relationship of *Selaroides leptolepis* in Manila Bay.

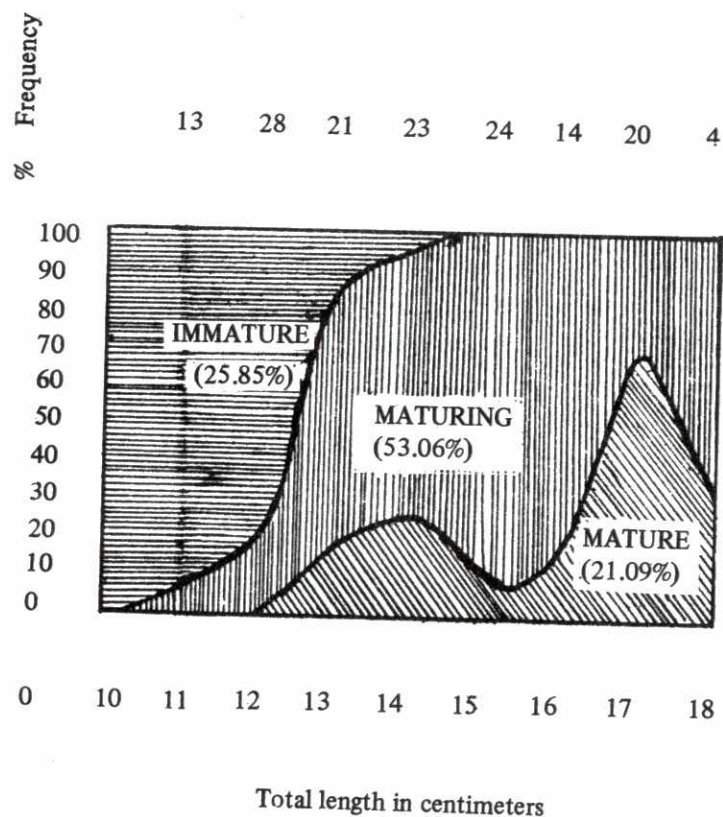
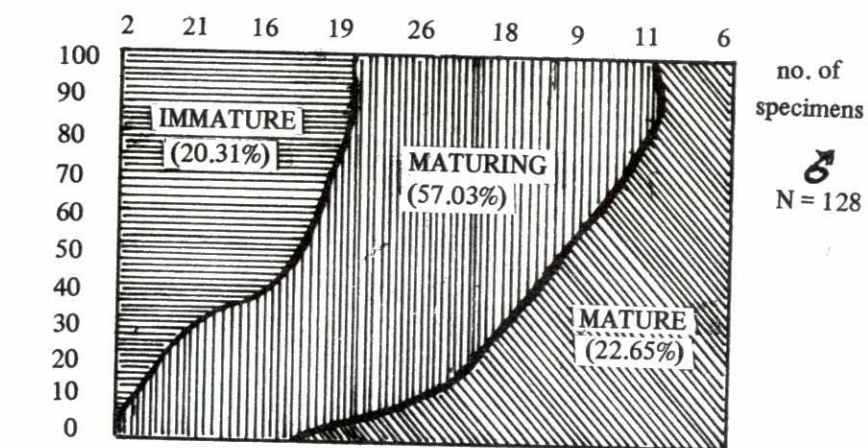


Fig. 6 a Size and gonadal maturity of male and female *S. leptolepis* caught by gill net in Manila Bay.

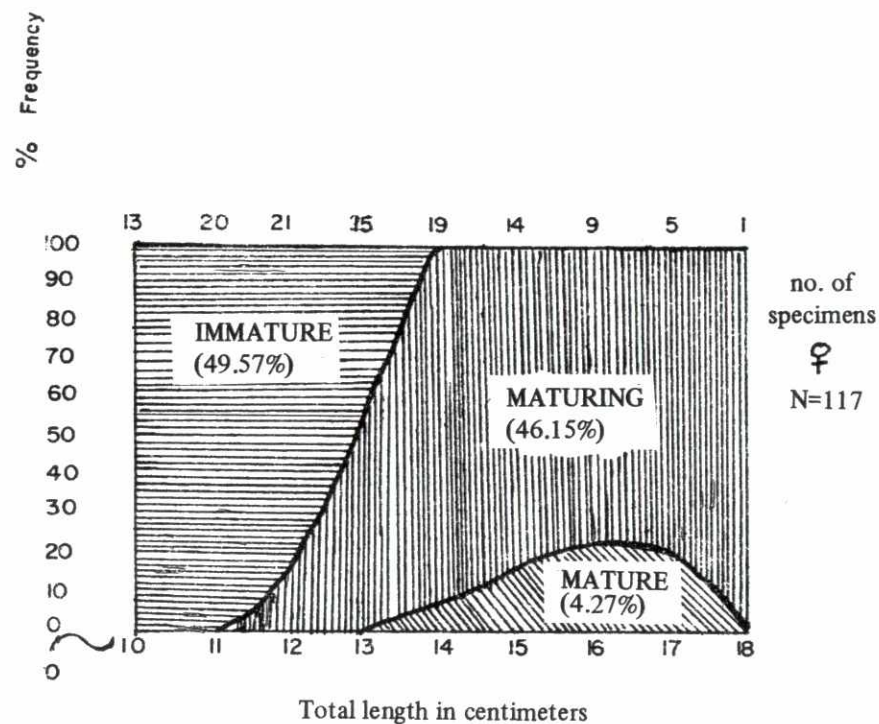
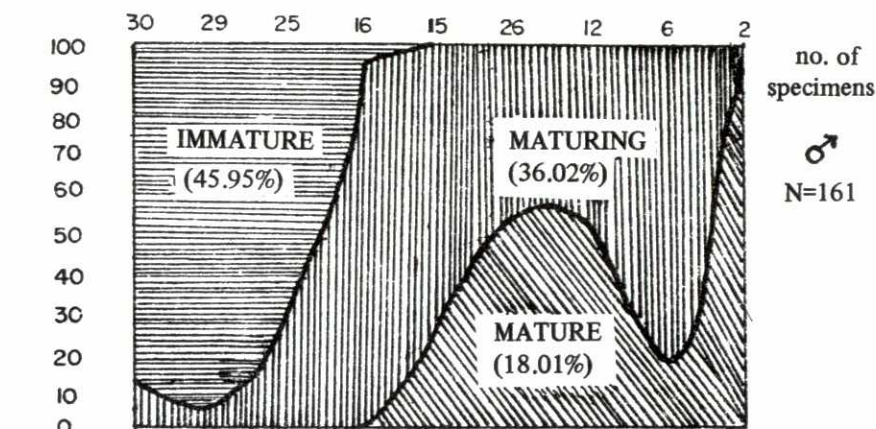


Fig. 6b Size and gonadal maturity of male and female *S. leptolepis* caught by major gears in Manila Bay.

Table 3. Catch/share of yellow-striped crevalle (*S. leptolepis*) in Manila Bay based on data obtained on board private fishing vessels.

Date	Kind of Boat	No. of Units	Total catch	Share of <i>S. leptolepis</i>
			kg	%
February 1981	medium trawl (Bulacan side)	1	66	3 : 5
March 1981	medium trawl (Bulacan side)	1	569	4 : 0.7
March 1981	Bagnet (Cavite side)	1	944	80 : 8.57
November 1981	medium trawl (Bataan side)	1	214	4 : 1.87
January 1982	Push net (Bulacan & Bataan side)	1	292	4 : 1.37
April 1982	medium trawl (Bulacan side)	1	294	16 : 5.44

Table 4. Length-weight data of *Selaroides leptolepis* caught by the major gears used in Manila Bay (February 1981-June 1982).

Total Length (cm)	Weight (un-determined sex)	Number	Weight δ	Number	Weight \varnothing	Number	Mean Weight (Combined samples)
3	0.65	2					0.65
4	1.06	5					1.06
5	2.36	19					2.36
6	3.33	29					3.33
7	4.36	60					4.36
8	6.17	41					6.17
9	8.77	73					8.77
10	11.99	59	14.05	22	14.53	13	13.52
11	16.37	78	16.14	51	17.09	52	16.53
12	22.11	20	22.92	55	23.26	71	22.76
13	22.0	1	28.96	46	29.96	39	26.97
14			35.54	41	35.74	59	35.64
15			42.69	24	43.05	47	42.67
16			50.69	24	49.78	25	50.23
17			57.48	14	59.22	24	58.35
18			73.28	7	69.72	5	71.50
Total Specimens	\bar{n} : 1,030	: 387	: 308	: 355			

quantities only in different areas of Manila Bay. They are available in the shallower part (4-10 m) of Manila Bay, particularly in the Bataan-Bulacan side in the early part of the year. However, its regular availability to gill net rather than to other major gears may be due to their frequency in deeper areas (about 15 m) at the mouth of Manila Bay than in any part of the Bay.

In the Visayan Sea, catch of a greater quantity of *S. leptolepis* was observed at 20 to 50 m depth, becoming less at a depth of 80 to 100 m (Arce, 1981).

SUMMARY

1. Yellow-striped crevalle is available in small quantity in Manila Bay. It is more available to gill net than to other major gears as it frequents deeper areas of about 15 m at the mouth of Manila Bay.
2. Sizes of the fish specimens examined vary from 3 cm to 18 cm. Smaller-sized fish are available during the early part of the year, particularly in February and March for non-selective gears, and May for the selective gears. The sizes, however, did not vary appreciably during the rest of the month. Of the total of 1,145 individuals measured, the more common sizes are between 10 cm and 15 cm in total length.
3. The length and weight data of 1,030 individuals show that there is a very slight difference in the length and weight relationship of the male and the female fish.
4. The 553 specimens examined for sex and maturity stages show a ratio of 1.09 male fish to a female fish and were in a mixture of immature, maturing, and mature stages of gonads. The samples taken by the gill net (selective gear) are more of the maturing stage for both male (57 percent) and female (53 percent) fish, while those from the catch of the non-selective gears, a bigger percentage was exhibited for the immature stage for both sexes, with the male at 45.96 percent and the female at 49.57 percent. Mature gonads have the smallest percentage share for the male and female fish taken by both selective and non-selective gears.

The gonads of yellow-striped crevalle become discernible when both sexes reach 10 cm in total length, and they mature at almost the same size, the female at 12 cm (TL) and the male at 13 cm (TL).

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