TRENDS IN THE SEYCHELLES SEMI-INDUSTRIAL LONGLINE FISHERY

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SUMMARY

Feasibility study regarding the development of the semi-industrial fishery started in 1994 when experimental fishing trips were conducted by SFA's 18m Research Vessel (R/V), "Etelis". The trips and technical assistance, financed by "Association Thoniere" of the COI project were aimed to evaluate the potential for local investors to exploit large pelagic fish, especially swordfish in the Seychelles EEZ, by monofilament longline.

Following the interesting catch rates, commercial trips started in 1995. The longline operation systems used by the Seychellois longliners consists of monofilament mainline, which varies from 16 to 60 Km. The hooks are attached to leaders which vary from 9 to 46 meters (18m in average).

The average number of hooks used for each set has decreased from 814 to 440 in 2000. One light stick is used at intervals of every three leaders (50% of the cases). An average of 8 hooks per basket are used for each set and this number may slightly vary by vessel.

For 85% of the trips conducted, squid is used as bait, otherwise a combination of squid and mackerel is used. Most of the sets (75%) are made at night.

Logbook and landing data forms are received at SFA at a rate of 75 % and 96 % respectively. In 2000 around 16 % of the trips were sampled.

The data are entered in a Wintuna module system developed by the IOTC ex System Manager, in collaboration with the SFA's Industrial Fisheries Research Manager. The programme is developed in ACCESS.

Since the fishery started in 1995 we have been having an increasing trend in the number of vessels active (from 2 to 11 vessels). In 2000 fishing effort reached 400 000 hooks. This shows a decrease in fishing effort of 20% compared to 1999.

The total catch for 2000 was 380 MT, and 203 MT of swordfish were landed.

Catch rates accounted for 0.90 kg/hook in 2000, for all species whereas catch rates of swordfish was 0.48 kg/hook (around 18 fish / 1000 hooks).

The slight drop in the catch rates of swordfish observed from 1998 could be explained by the fact that some vessels have been targeting other species, notably sharks. Predation rate on swordfish accounted for 15% in 2000.

Species composition in 2000 were 52% swordfish, 9% Yellowfin tuna, 10% Bigeye tuna and 29 % of other species (notably sharks).

Length Frequency distribution of swordfish shows that the average length per year has remained quite stable (135 cm Fork Length).

INTRODUCTION

This background paper, to be presented at the IOTC Billfish WP, documents the trends in the Seychelles longline Semi-Industrial Fishery; analyses, and interprets the data collected on this fishery since it started in October 1995.

It shows the trends in fishing effort (fishing trips conducted, number of vessels active and hooks set), catches, catch by species and catch rates.

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1. FISHING GEAR AND FISHING OPERATION

The longline operation systems used by the local longliners are of US technology (Lindgren-Pitman). It consists of

monofilament mainline of approximately 4mm in diameter and an average length of 48km (varying from 16 to 60km).

Float lines (branchline or buoylines) used to fix floating buoys vary from 20 to 46 meters are clipped to the mainline by metallic snaps.

The hooks are attached to leaders which vary from 9 to 46 meters (18m in average).

The average number of hooks used for each set varies from 814 to 440. One light stick is used at intervals of every three leaders (50% of the cases). An average of 8 hooks per basket is used for each set. The fixing of leaders to the mainline and the baiting of hooks are conducted whilst setting.

For 85% of the trips conducted, squid is used as bait at 100%, otherwise a combination of squid and mackerel is used.

Most of the sets (75%) are made at night. Four to six hours are required for the setting.

The line is hauled after daybreak. The hauling-in operation of the drift longlines may lasts, depending on the catch, from 2 to 16 hours.

Once on the deck, the fish is processed; headed and gutted for most of them. For the Japanese, raw fish Sashimi market the fish is bled and stored in tanks (in the fish-hold of 0°C), containing seawater mixed with ice; this lowers the temperature of the fish. They are then wrapped in paper, packed in ice and stored. The non sashimi products are only stored on ice.

Length of trips and the number of sets made per trip depend on meteorological condition, the size of the vessel and the storage capacity. The 16m vessels conduct in average 7 sets per trip.

Higher capacity vessel may conduct up to 10 sets per trip.

I1. MONITORING OF THE FISHERY

Since the fishery started on a commercial basis a monitoring programme was set up by the SFA and the following information are collected:

11A . CATCH AND EFFO RT DATA

A log book system containing catch and effort forms are filled in by the captains ;

The following information are provided per set:

- the fishing position
- the physical parameters of the environment:
- wind speed and direction, current speed and direction, the state of the sea, the sea surface temperature
- the description of settings:
- starting and finishing setting time and position, the total number of hooks set, the length of the mainline and leaders, the number of lightsticks and the type of bait used.
- the description of haulings:
- starting and finishing hauling time
- the catch per species (estimated weight and number)
- the loss of catch due to predation:
- number of heads hauled by species and type of predation, and the estimated weight of fish eaten

11B. LANDING WEIGHT

Landing weight per species and by processing forms are recorded.

The information is provided by the ship owners, captains or processing plants. This data is used to correct the estimated catch provided on logbooks.

11C. LENGTH FREQUENC Y DATA

Length frequency data are recorded by fisheries technicians at the landing site. As the fish is processed on board (headed and gutted) prior to freezing, the main measurements taken are: Pectoral -Anal Fin Length for swordfish and the First dorsal - Anal fin length for yellowfin and bigeye tunas.

Other measurements and weight are taken on board the research vessel so as to calculate the conversion factors.

III. LOGBOOK RETURNS AND RELIABILITY OF DAT A

Year	Number of trips	Logbook coverage	Landing data coverage	Frequency of trips sampled
1995	8	100 %	100%	52%
1996	88	83 %	88 %	57%
1997	136	61 %	93%	22%
1998	112	74 %	88 %	23%
1999	146	84 %	99 %	13%
2000	153	75 %	96 %	16%

IV. DATA HANDLING AND ANALYSIS

Total landed catch

Landing data provided by the ship owners or processing plants are used to correct the estimated catches provided by the fishing captains on logbooks. The total catches are based on landing data, somehow when this information is not available, an averaged correcting factor calculated per year (of around 1.3) is used to correct the estimated catches.

Total Effort

The total number of sets made and hooks deployed can be calculated only when logbooks are available.

Vessels active and total trips conducted are calculated additionally from landing forms. The total number of hooks deployed per set can thus be extrapolated.

Catch rates

Catch rates are calculated only when logbook data is available, using the corrected catch for each trip.

Predation rates

The total number of fish eaten (predated heads hauled) by set are recorded. Occasionally, the estimated weight of the fish is provided but this information is not provided on a regular basis.

A percentage of the total catch loss by predation can thus be calculated.

Species Composition

Species composition of the total catch is calculated both from log sheets (estimated weight) and corrected from landing data. Somehow, for the tuna species, aggregated data are being provided by one processing plant.

V. FISHING RESULTS AND TRENDS IN THE FISHERY

THE FISHING CRAFTS STATISTICS

Table 1 below shows the specifications of the Semi-industrial vessels and their starting operation date.

Vessel Name	Length	GRT	Engine Power	Holding capacity (mt)	Starting operation date
R/v Etelis	18m	20t	165hp	10	1994
R/V L'Amitié	20m	30t	285hp	20	1995
Saint Cecile	18m		130hp	10	1995
Saint Anne	16m	20t	130hp	20	1995
Felicite	16m	20t	130hp	20	1996
Anonyme	16m	20t	130hp	20	1997
La Perle	16m	20t	130hp	20	1997
Etelis	18m	20t	165 hp	10	1998
Marsouin	14m	30t	240hp	15	1999
Picses	14m	30t	240hp	15	1999
Aquarius	14m	30t	240hp	15	2000
Saint Andre	23m		322hp	50	2000
Albacore	23m		322hp	50	2001

Table 1. Vessel Specification

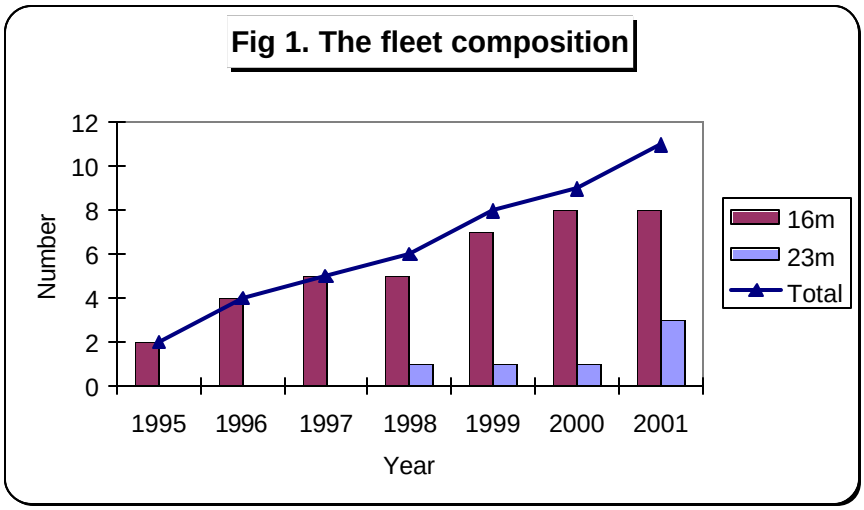
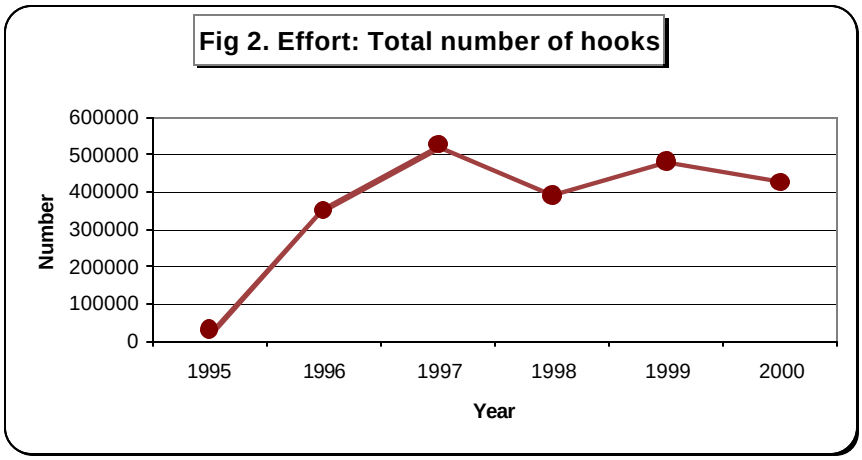
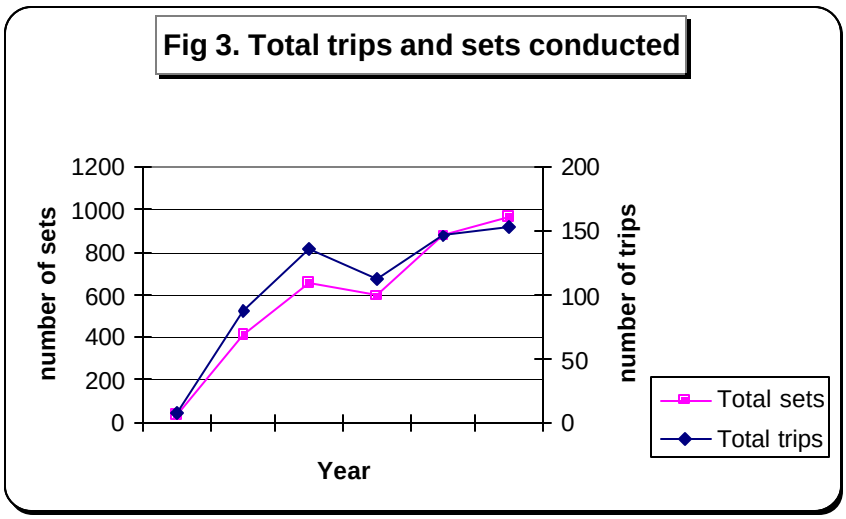


Figure 1 shows the fleet composition.

FISHING EFFORT





Figures 2 and 3 show the trends in the fishing effort (total hooks, vessels active and total sets) since the beginning of the fishery.

There has been an increase of 42 % in the total number of trips conducted from 1996 to 2000. The number of vessels has increased by 56%.

Total CATCHES

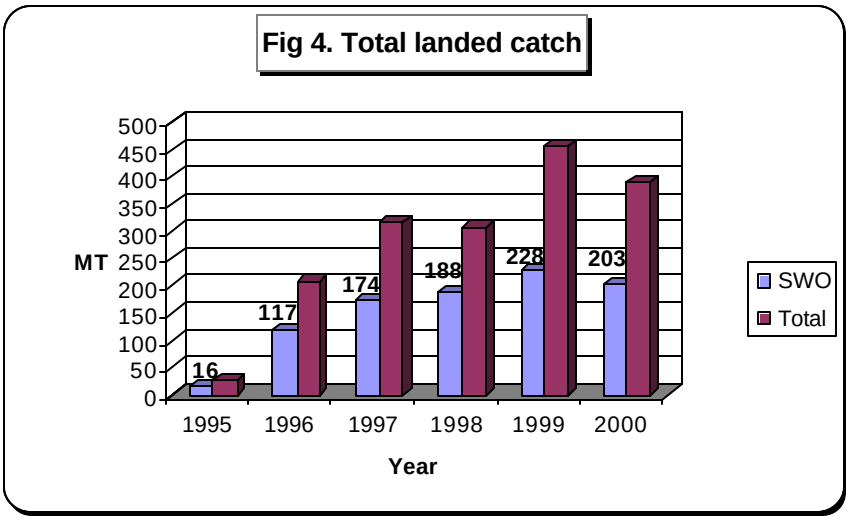


Figure 4 shows the trends in the total catches since the beginning of the fishery

The landing catch has increased by 46%.since the last 5 years. The drop in the total catch from 1999 to 2000 is due to the fact that the average number of hooks used per set in 2000 was reduced by 20% compared to 1999.

CATCH RATES

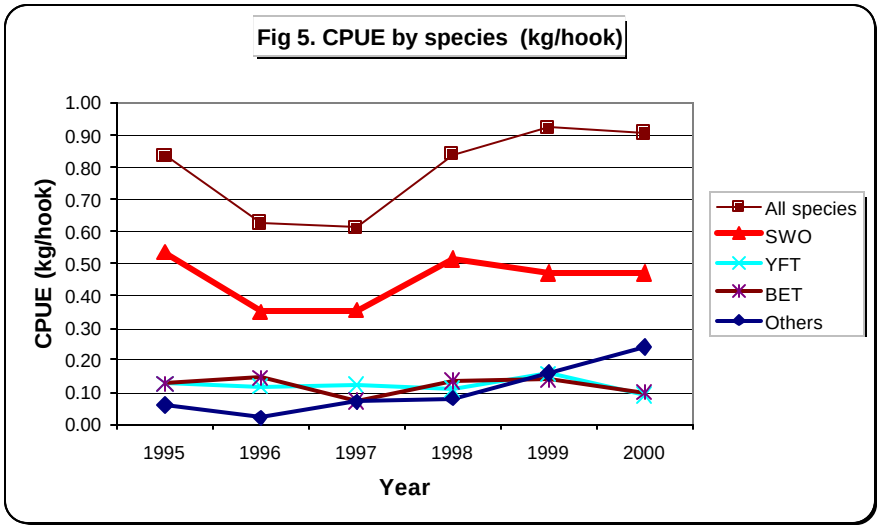


Figure 5 shows the trends in the catch rates by species

Since 1998 a slight drop in the catch rates of swordfish can be observed. This could be explained by the fact that some vessels have been targeting other species, notably sharks.

LOSS OF CATCH DUE TO PREDATION

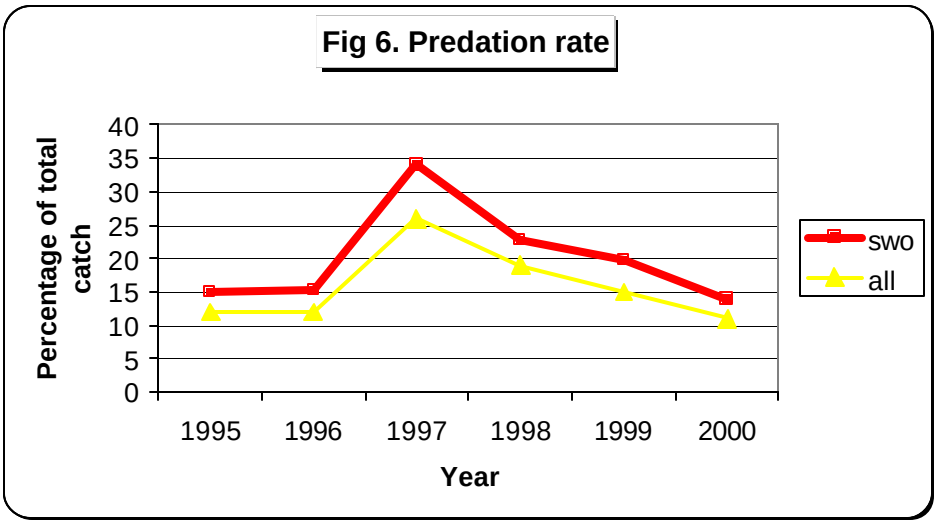


Figure 6 shows the predation rate of the total catches by year.

SPECIES COMPOSITION OF CATCHES.

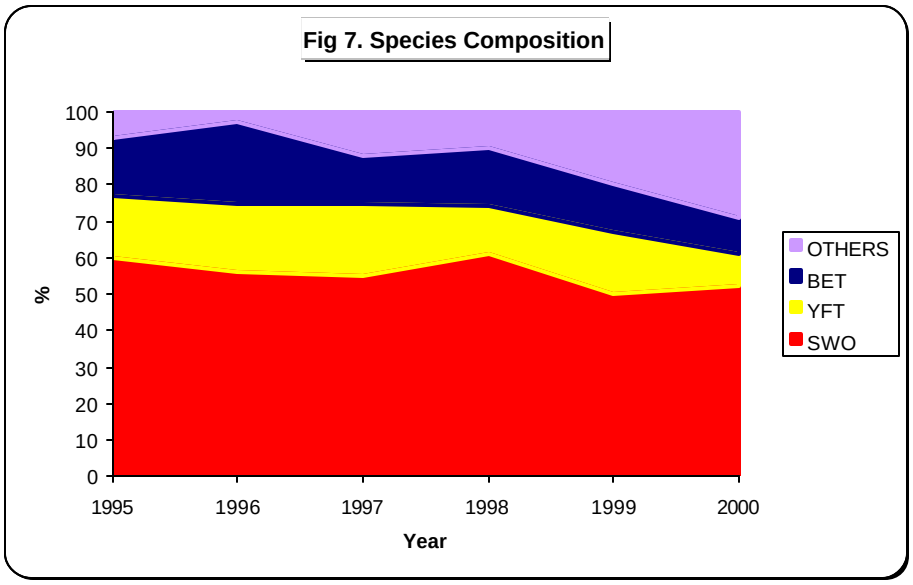


Figure 7 shows the trends in the species composition of catches

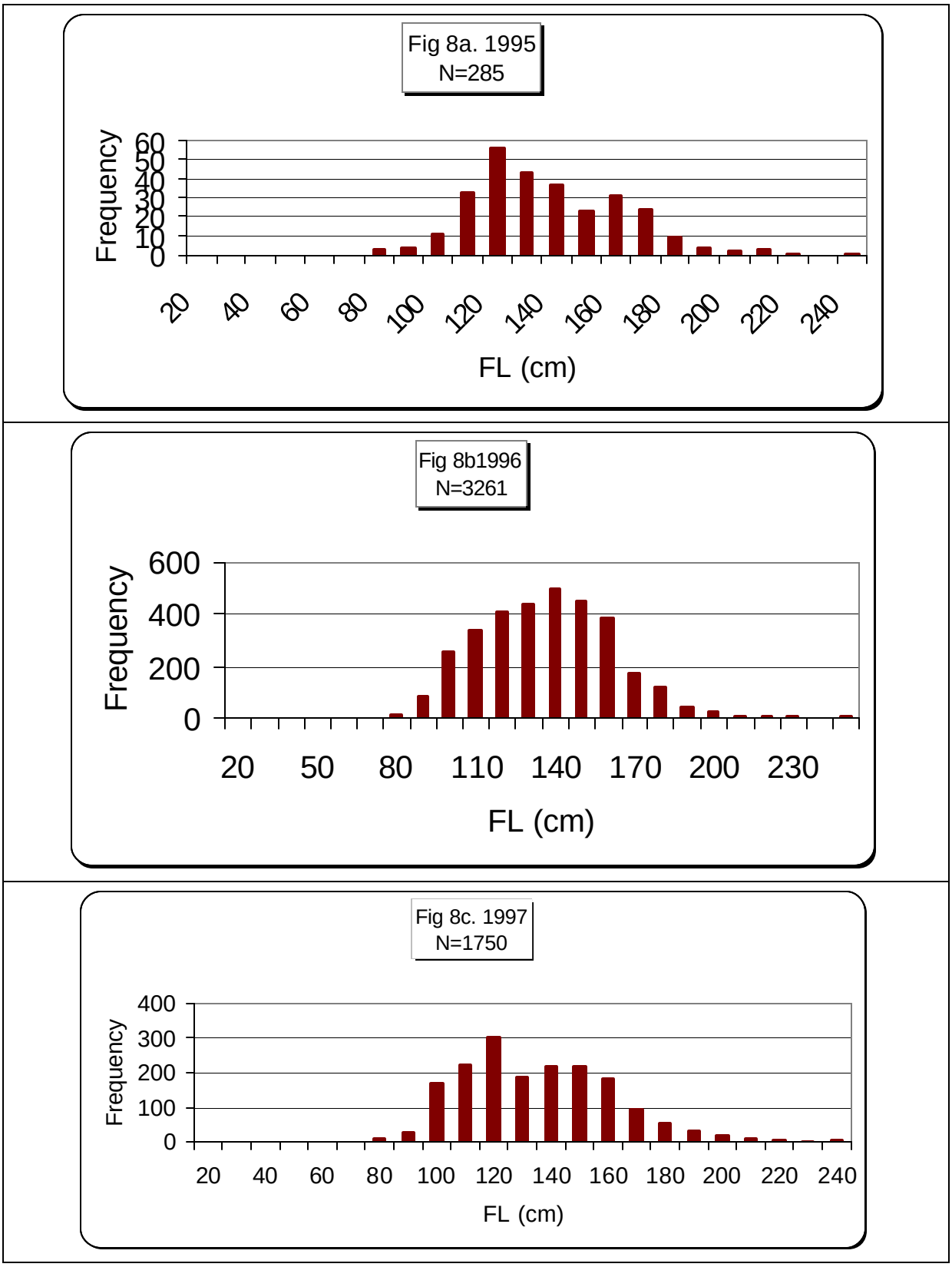
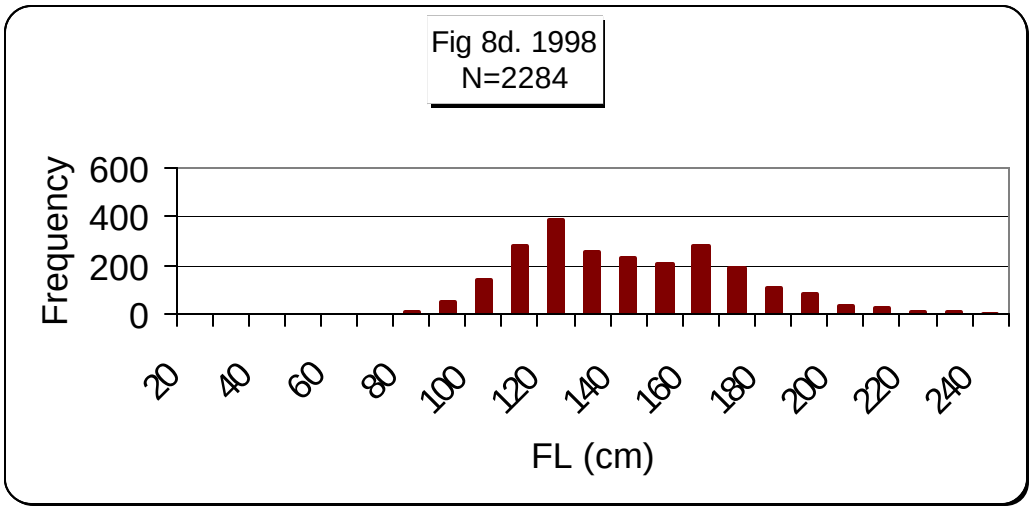
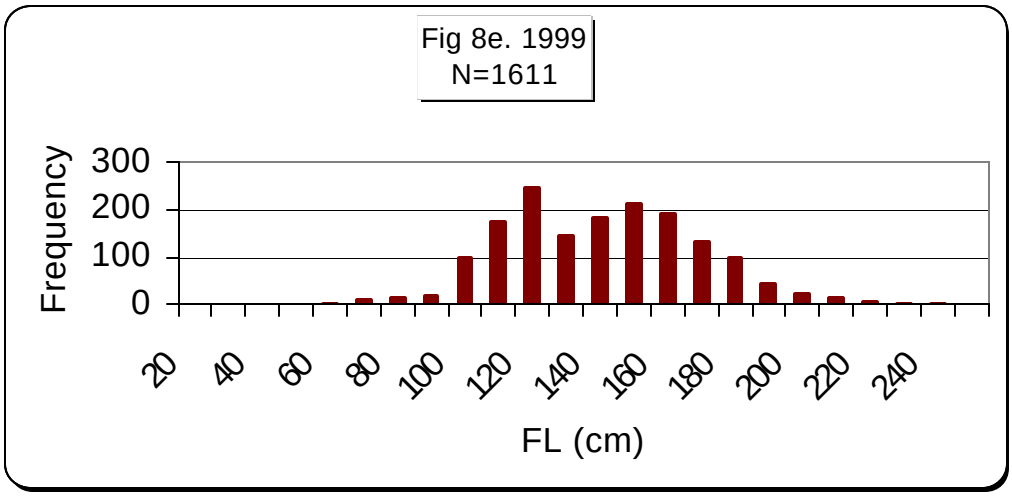
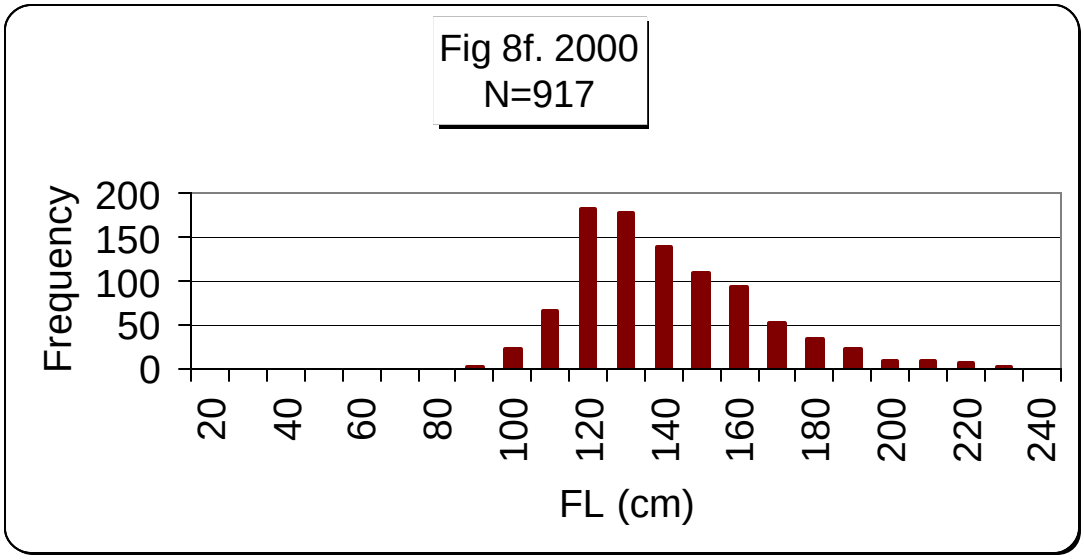


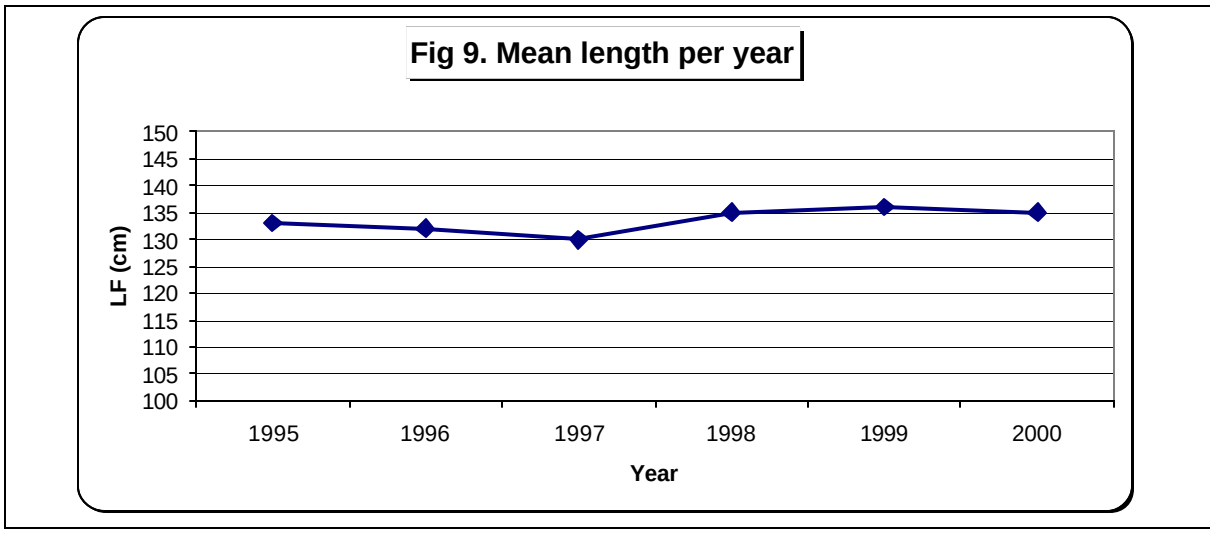
Fig 8a. 1995
N=285
Frequency
0
10
20
30
40
50
60
20
40
60
80
100
120
140
160
180
200
220
240
FL (cm)
Fig 8b1996
N=3261
Frequency
0
200
400
600
20
50
80
110
140
170
200
230
FL (cm)
Fig 8c. 1997
N=1750
Frequency
0
100
200
300
400
20
40
60
80
100
120
140
160
180
200
220
240
FL (cm)







Figures 8a to 8f show the length frequency distribution of swordfish (all sex) from 1995 to 200 and figure 9 shows the trends in the mean length per year.



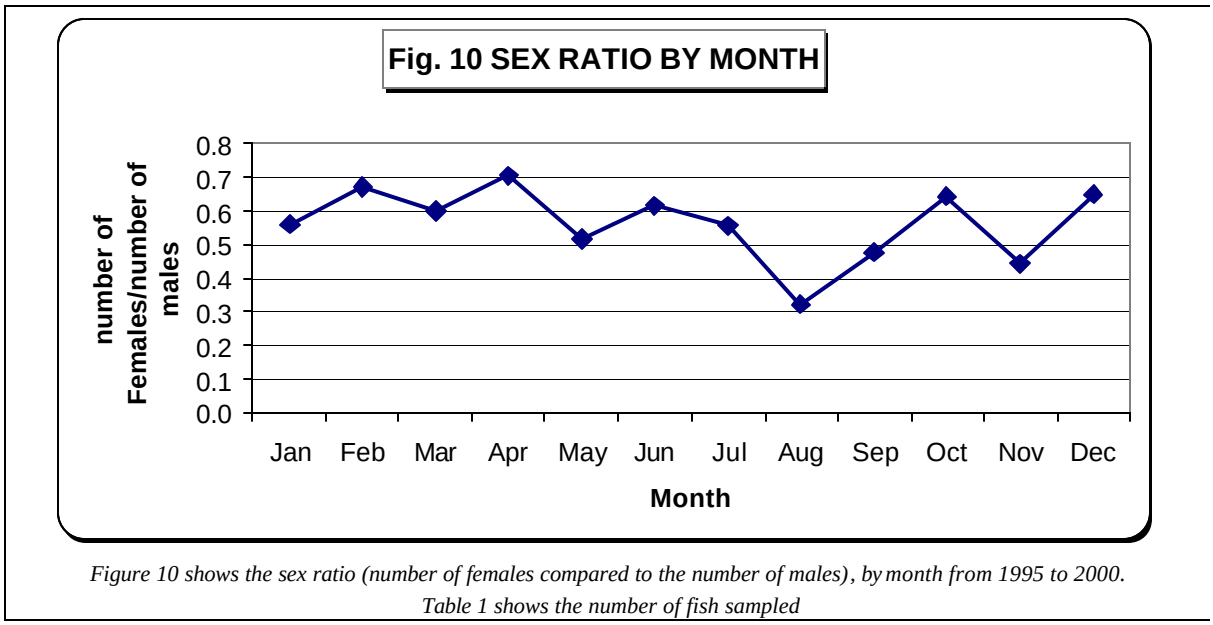
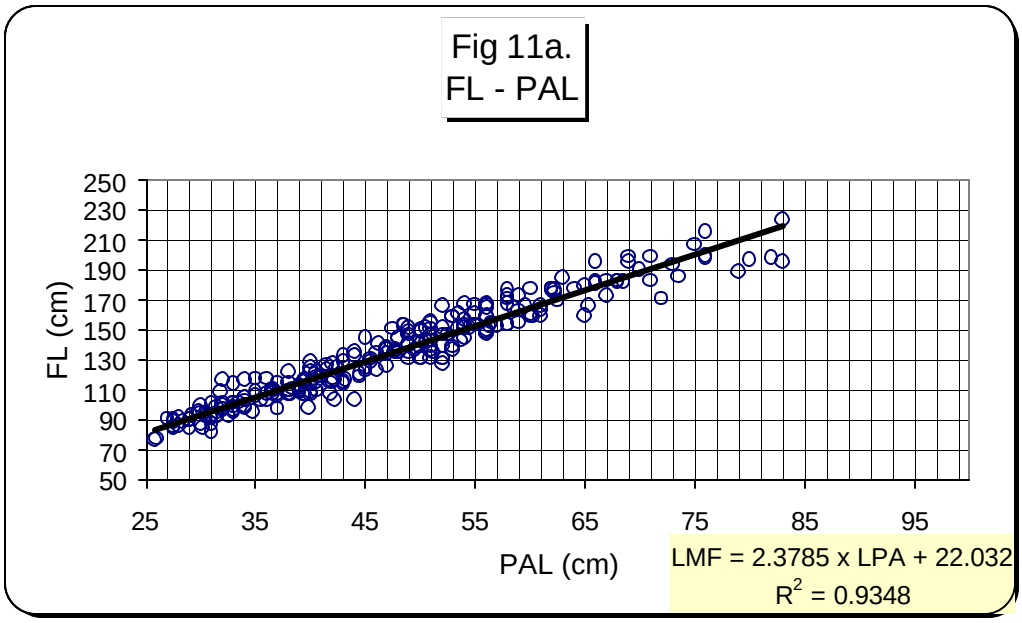


Figure 10 shows the sex ratio (number of females compared to the number of males), by month from 1995 to 2000.
Table 1 shows the number of fish sampled

8. Sex Ratio

Occasionally research technicians board the research vessel to gather biological information on the targeted species. The sex of the fish is identified, the maturity stage is noted and different measurements are taken before the fish is processed so as to establish the biometric relationships.

9. Biometric relationships



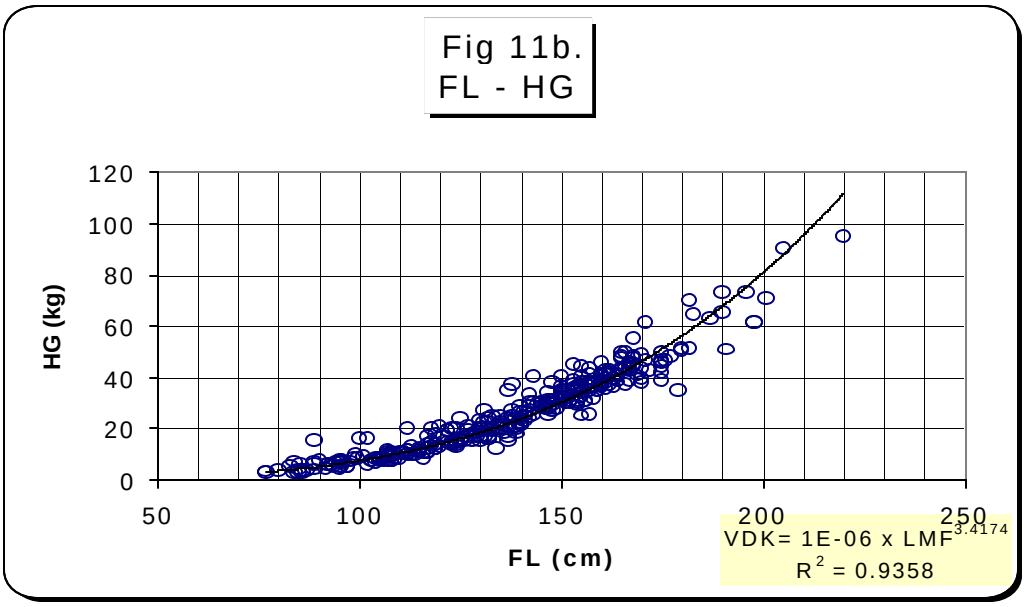


Figure 11a shows the relationship between the Fork Length (FL) – Pectoral Anal Length (PAL).
Figure 11b shows the relationship between the Fork Length (FL) and the Headed / gutted weight (HG) .

8a. Length Relations

N=254
PAL min = 26
PAL max = 83

8 b. Length – weight relationship

N=322
FL min = 76
FL max =220