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Preliminary results of a Exploratory Fishing targeting deep-water species off Uruguay

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ABSTRACT

A Pilot Action of Exploratory Fishing was carried out in the second half of 2001 by two Spanish bottom-longline commercial fishing vessels within the Uruguayan Economic Exclusive Zone (EEZ) targeting deep-water species. Trap fishing gears were also utilised as another alternative fishing gears.The main objective of the exploratory survey was to improve the knowledge of the distribution and the population structure of the species target of the survey: Groupers (*Epinephelus* spp.), Kingclip (*Genypterus blacodes*), Brazilian sandperch (*Pinguipes* spp.) and other accompanying species.

Some preliminary results of this exploratory survey are shown in this current work. Fishery and biological data were collected by scientific observers on board of the two vessels which took part in the exploratory fishing. The collected data were date, time, position, depth, SST, SBT, weather condition, catches, discards, length distributions, sex, maturity, stomach fullness… among others. Length distributions, sex ratio and maturity stage of the most abundant species in the catch are also shown.

Catch, effort and CPUE by area, gear and depth strata were analysed. Regarding bottom longline gear, the most abundant species were Dogfish shark (*Squalus sp*), Wreckfish (*Polyprion americanus*), Tope shark (*Galeorhinus galeus*) and Argentine hake (*Merluccius hubbsi*) in waters shallower than 200 m depth. Regarding Traps fishing gears, the most abundant species were crabs (Family Geryonidae) and Argentine conger (*Conger orbignyanus*).

Keywords: Exploratory fishing survey, deep-water species, catch, effort, SWAtlantic, bottom longline, traps.

INTRODUCTION

A Pilot Action of Experimental Fishing funded by the Financial Instrument for Fisheries Guidance (FIFG) was carried out in the Uruguayan shelf and slope during the second half of 2001. The development of this experimental fishing survey was supervised by the Instituto Español de Oceanografía (IEO, Spain) in coordination with the Instituto Nacional de Pesca (INAPE, Uruguay). Two Spanish bottom longliners (F/V "Nueva Flecha" and F/V "Ronsel") took part in the survey, operating in some specific areas according to the sample design made by INAPE.

The main objectives were to assess the possible economic profitability of a commercial fishery in the area; the determination of suitable characteristics of the fishing gears; and to know the potential yield of commercial fishing in those areas. The target species, already included in the former technical report made previously to the survey, were sandperches (*Pinguipes* spp and *Pseudopercis* spp), kingclip (*Genypterus blacodes*) groupers and sea bass (*Epinephelus* spp and *Acanthistius* spp).

MATERIAL AND METHODS

The Pilot Action was carried out under the supervision of the IEO Department of Distant Waters Fisheries based at the Oceanographic Centre in Vigo and INAPE from Montevideo. In every of the two vessels a Spanish scientific observer and an Uruguayan observer recorded the information on fishing activity and made up biological samples of the caught species. They also collected temperature and depth data. Some specific samples, such as otoliths, scales, etc, were also collected and properly labelled for analysis in the laboratory.

Bottom longline was the main fishing gear used during the survey, but also traps were tested. The characteristics of the longline were similar in both vessels. Several trials with different gear modifications were made to find the most accurate fishing method in relation to bottom substrate, currents, different marine species, etc.

The prospected area comprised among 36º 20´ and 34º 25´ S, and 55º 19´ and 51º 60´ W, with a depth range from 18 to 578 meters and between 12 and 200 nautical miles off Uruguayan coast. This zone included four prospected specific areas (Figure 1), in accordance with the survey design made by INAPE. The development of the survey was from July 5th to December 19th 2001.

Six depth strata were considered in order to analyse the results:

1	2	3	4	5	6
< 99 m	100 – 199 m	200 – 299 m	300 – 399 m	400 – 499 m	> 500 m

RESULTS

Effort by fishing gear, area, and depth strata.

Six fishing trips with a duration between 8 and 17 days, comprising a total of 303 hauls (Figure 2) were made. A total of 824,902 fishing units (FU) - fishhooks and traps – were used, of which 748,945 were recovered (Table 1). The traps were only used in 4% of hauls, representing 0.03% of FU. This gear was only used in area 1 and mainly in stratum 4.

Most of the effort was carried out in area 1 with a total of 241 hauls (longline and traps), and the use of 68% fishing units. The area 4 was the second in importance with 40 hauls and 24% of FU; 21 hauls and 8% of FU were carried out in area 2. Only 1 haul was made in area 3 with 0.3% of FU (Table 1, Figure 3).

Regarding number of fishing units by depth strata, strata 1 with 48% of FU and 99 hauls, and strata 2 with 41% of FU and 137 hauls and were the most important. However, in the area 1, where more effort was made, the higher effort was carried out in the stratum 2. (Table 1, Figure 3)

Catches by fishing gear, area and depth strata.

A total catch of 184,917 kg of the different species was obtained throughout the experimental fishing. The most important catches corresponded to dogfish shark, wreckfish, tope shark, argentine hake and blackbelly rosefish (Figure 4). The total catch of crab and a small part of argentine conger were made with traps (“nasas”); the remaining catch was obtained with bottom longline.

71.5% of total catch was caught in area 1. Wreckfish (36,118 kg), dogfish shark (31,404 kg), tope shark (17,395 kg), blackbelly rosefish (10,731 kg), argentine hake (10,273 kg), morwong (4,969 kg), Atlantic bonito (3,661 kg) and tilefish (3,183 kg) were the main species. 5.5% of total catch was fished in area 2 and the main species were argentine hake (4,586 kg), morwong (1,574 kg), common seabream (1,415 kg) and dogfish shark (1,003 kg). 22.8% of total catch was obtained in area 4, being tope shark (11,252 kg), argentine hake (9,655 kg), dogfish shark (7,465 kg), houndshark (6,510 kg) and stripped weakfish (3,010 kg) the most important species. Catches in area 3 were irrelevant (0.1%). The main species by area are shown in Figure 5.

Regarding catch by depth strata, the highest catch was obtained in strata 1 and 2 (46.3% and 46.1% respectively), meanwhile catch was negligible at depths higher than 500 m (strata 6); no haul was carried out in strata 5.

The highest catch in area 1 was in stratum 2, whereas in other areas, they were obtained in stratum 1 (Table 1).

The main species caught in stratum 1 were stripped weakfish (100%), sandperch “*semifasciata”* (98%), argentine hake (97%), houndshark (94%), kingclip (91%), common seabream (81%), morwong (75%), tope shark (54%) and blackbelly rosefish (48%). In strata 2 were namorado sandperch (95%), atlantic bonito (91%), wreckfish

(81%), tilefish (68%), and dogfish shark (63%). In stratum 6, only 70 kg of argentine conger were fished.

In figure 6, catches of the most important species in the first three strata are may be seen.

Yields (Catch Per Unit of Effort, CPUE)

The species which presented the highest yields were dogfish shark (*Squalus* sp), wreckfish (*Polyprion americanus*), tope shark (*Galeorhinus galeus*) and argentine hake (*Merluccius hubbsi*). Maps with yield (CPUE) by haul of these species are presented in Figures 7a,b,c and d respectively.

Considering the longline CPUE, area 1 (strata 2 and 1) showed the highest yields for all species, followed in importance by area 4 (strata 1). However, yields within the other areas were not low, possibly due to the little effort made there. (Table 1, Figure 8).

CPUE obtained with traps was considerable despite the little effort made with this gear (only in three depth strata of area 1). Yields of 973 gr/FU, and 2,480 gr/FU were obtained in strata 3 and 4 respectively (Table 1), which correspond practically to crab.

Length distributions and biological aspects

Size and biological samples (of 26 and 20 species respectively) were carried out. We should keep in mind that the sample could be biased due to discards of smaller individuals without commercial interest made by the sailors when picking up the fishhooks, with the purpose of speeding up their tasks. Samplings of all the species in all their distribution strata couldn't be made, so that in some species, length distributions in all strata are not presented. A total of 486 scale samples from 9 species, 170 stomachs from 5 species and 368 otoliths from 5 species were collected; individuals of several species were kept frozen for a later study in the laboratory of IEO in Vigo

Catch length distributions by depth strata of the main species are shown in Figure 9. In some species such as tope shark, wreckfish, dogfish shark, blackbelly rosefish and common seabream differences in the length distribution were found with a higher percentage of bigger sizes in deeper strata. However, this characteristic didn't appear in argentine hake.

Sex-ratio of some of the most important species in the catch are shown in Figure 10. A high percentage of females in argentine hake and stripped weakfish, and of males in houndshark can be observed.

Maturity by sex (Figure 11) showed different values depending on the species. In some species no mature individuals (morwong) or very few (kingclip, wreckfish) were found. Mature males prevailed in sharks, as well as mature females were most abundant in sandperch and blackbelly rosefish. Finally, some species showed similar maturity percentages for both sexes (stripped weakfish and argentine hake).

Length / weight relationships by sex of the main species are shown in Figure 12. These species did not show important differences between both sexes for the length - weight

relationship, except in dogfish and common seabream. The most similar pattern between males and females was found in argentine hake and kingclip.

CONCLUSIONS

According to the results obtained in this Pilot Action of Experimental Fishing, we can highlight the following conclusions:

- The most employed fishing gear was bottom longline, which was used in 290 of the 303 hauls and provided the highest captures (184,347 kgs in a total catch of 184,917 kgs).
- Bottom traps were also used, but their contribution to the total catch was very small (570 kgs) due to the few times they were used (13 hauls). Nevertheless, traps presented high yields (2,192 gr/FU), mainly of crabs.
- Fishing effort in area 1 was very much higher than in the other three areas (Figure 1): 80% of hauls were made in area 1 with 71.5% of the total catch (132,298 kg).
- The most caught species by bottom longline were dogfish shark (*Squalus* sp), wreckfish (*Polyprion americanus*), tope shark (*Galeorhinus galeus*) and argentine hake (*Merluccius hubbsi*).
- Bottom longline provided the majority of the catch, with the exception of crabs (534 kg) and a small part of argentine conger, that were caught by traps.
- The biggest catches by depth strata were obtained in strata 1 and 2 with 46.3% and 46.1% of the total catch respectively.
- The total yield of the survey (all species and gears) was 246.9 grams by fishing unit, which offers few possibilities of economic viability of a commercial fishery of these characteristics.
- The results showed null commercial possibilities of the objective species of the Pilot Action.

ACKNOWLEDGEMENTS

The authors thank to the observers, José A. Vila Pérez and Gorka Oar-Arteta, that carried out on board work and the collaboration of Longline Producing Organization of Riveira (ORPAL), as well as ship-owners and crews.

Table 1. Number of hauls, nº of fishhooks and traps, catch (green weight, kg) and yield (gr/FU)

LONGLINE

	Depth strata	No. hauls	No. fishhooks (recovered)	Catch (green weight, kg)	Yield (gr/FU)
Area 1	1	40	123.400	33.759	273,6
	2	133	300.604	84.468	281,0
	3	46	69.530	12.388	178,2
	4	6	10.926	1.044	95,5
	6	3	3.315	70	21,1
	Total area 1	***228***	***507.775***	***131.728***	***259,4***
Area 2	1	20	59.175	10.088	170,5
	2	1	2.450	50	20,4
	Total area 2	***21***	***61.6 25***	***10.138***	***164,5***
Area 3	1	1	1.900	240	126,4
	Total area 3	***1***	***1.900***	***240***	***126,4***
Area 4	1	38	172.825	41.526	240,3
	2	2	4.560	714	156,6
	Total area 4	***40***	***177.385***	***42.241***	***238,1***

TRAPS

	Depth strata	No. hauls	No. traps (recovered)	Catch (green weight, kg)	Yield (gr/FU)
Área 1	2	1	15	0	0
	3	2	30	29	973,3
	4	10	215	541	2 480,0
	Total traps	***13***	***260***	***570***	***2.192,3***

TOTAL (all gears and areas)	***303***	***748.945***	***184.917***	***246,9***

FU: Fishing Units

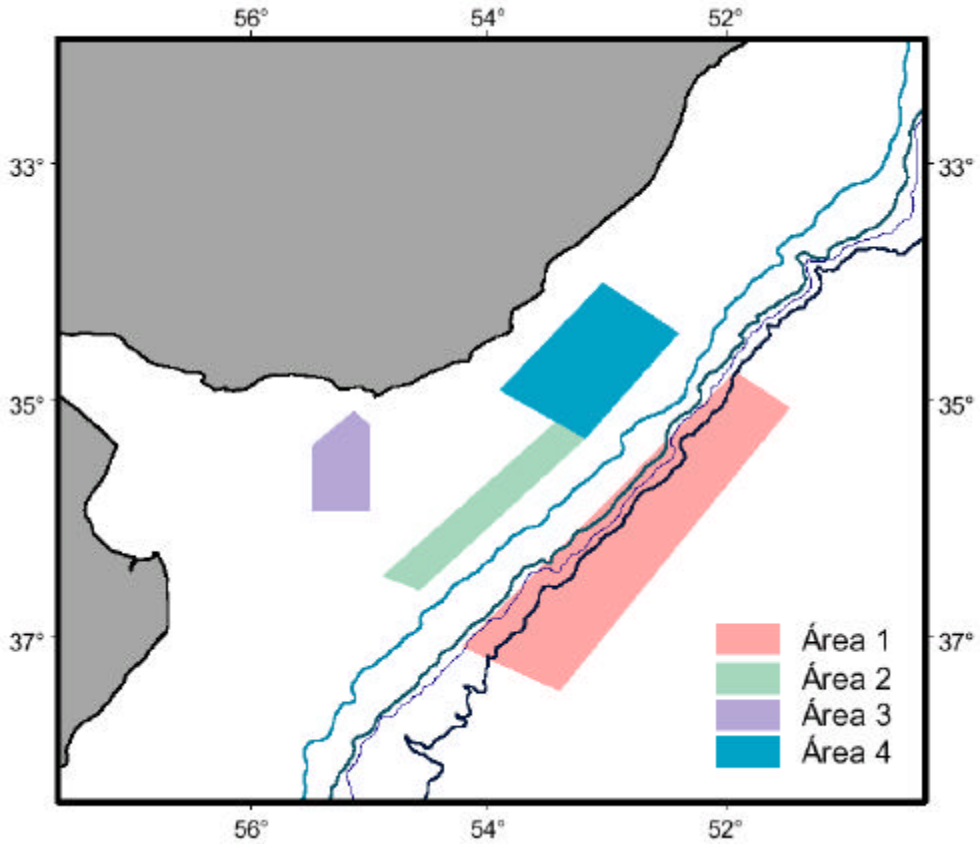


Figure 1. Prospected areas

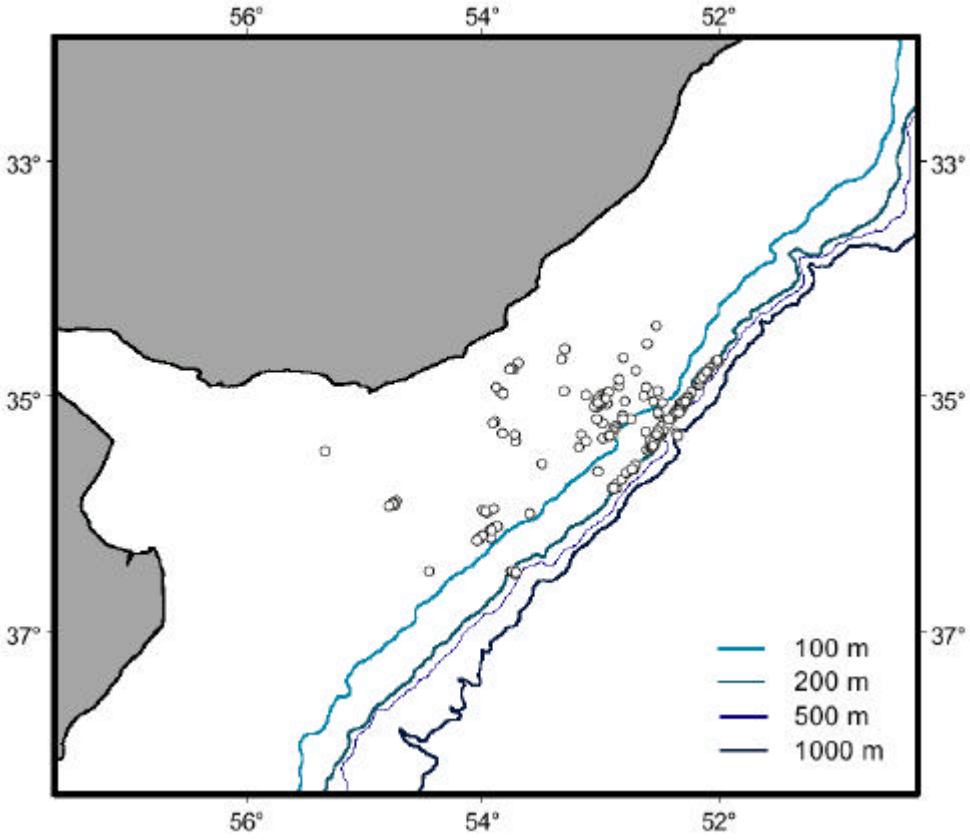


Figure 2. Geographical situation of the hauls

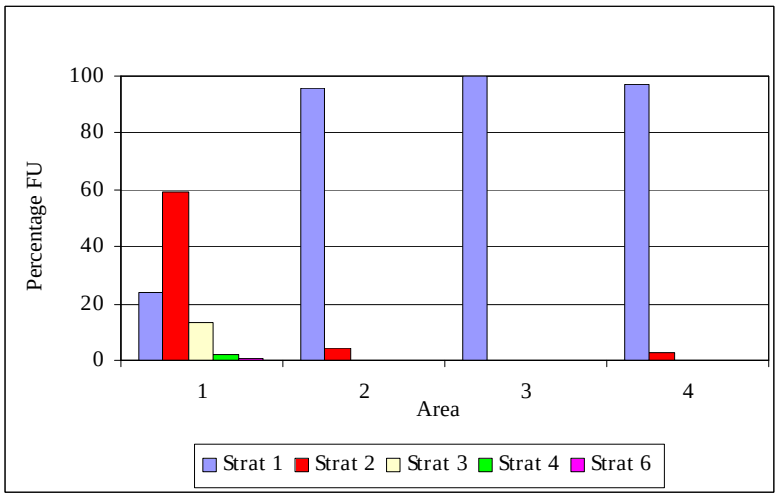


Figure 3. Percentage of fishing units, FU, (fishhooks and traps) by area and depth strata

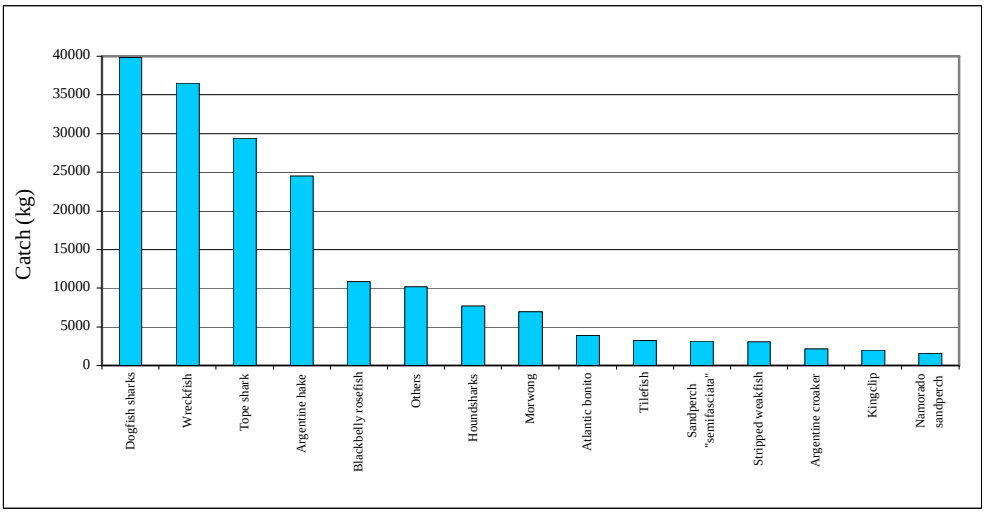


Figure 4. Total catch (kg) of main species

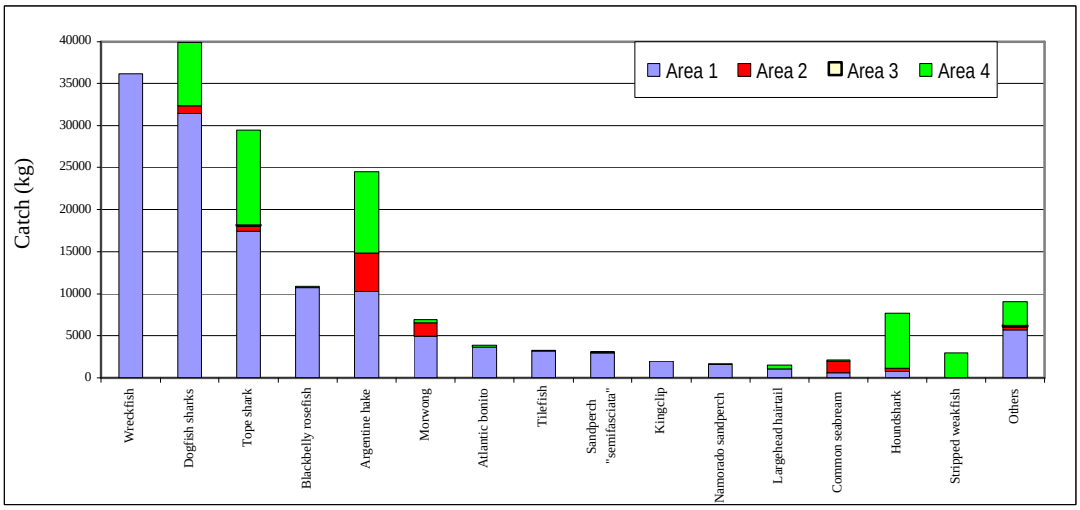


Figure 5. Catch (kg) of the most important species by prospected area

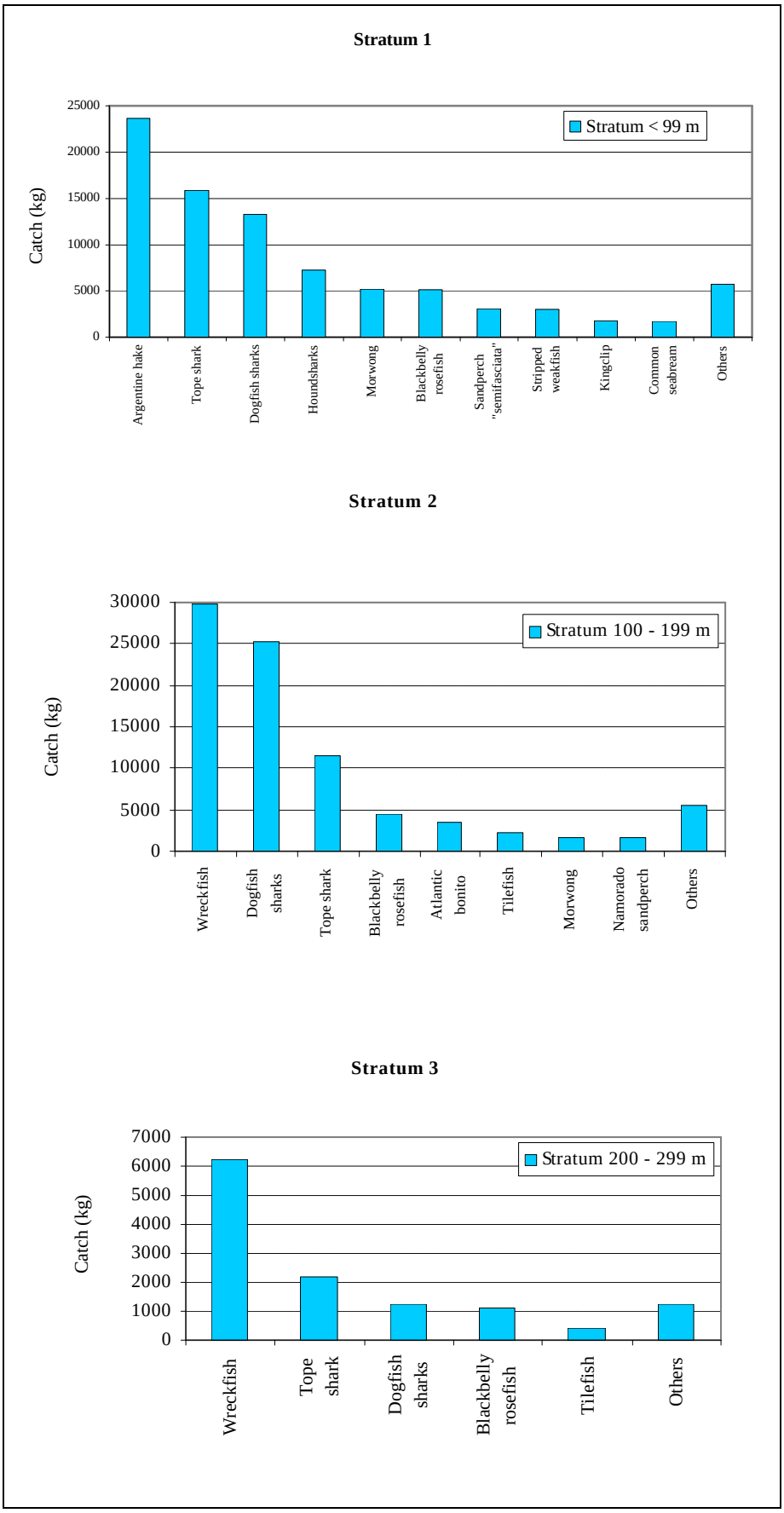


Figure 6. Catch (green weight, kg) of main species in first depth strata

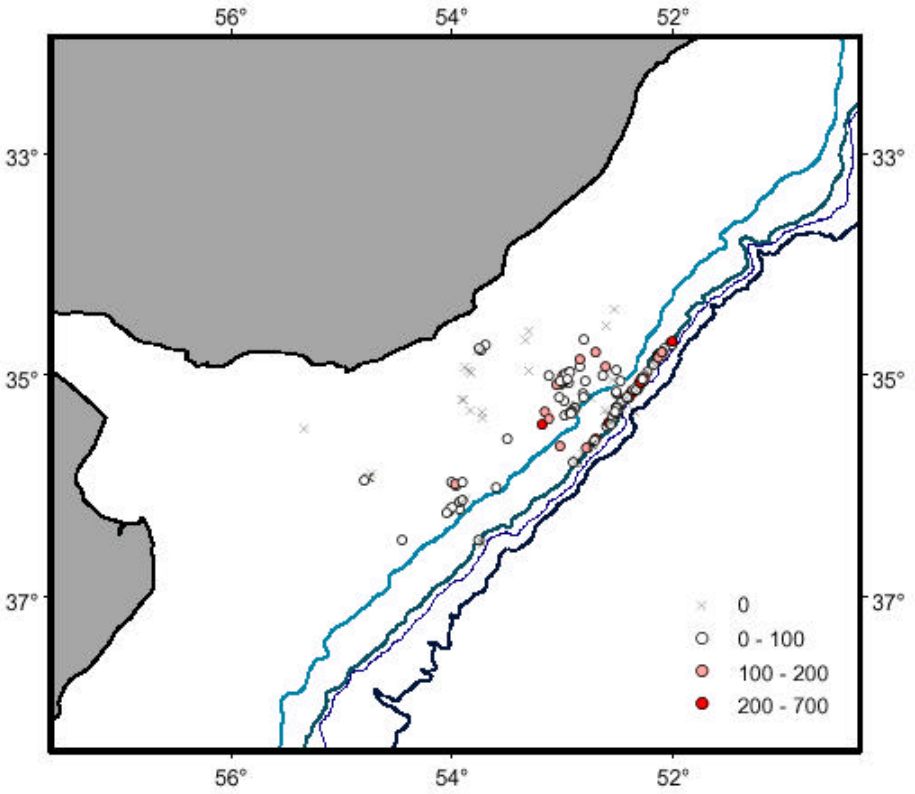


Figure 7a. Yield (gr/FU) of dogfish shark (*Squalus* sp)

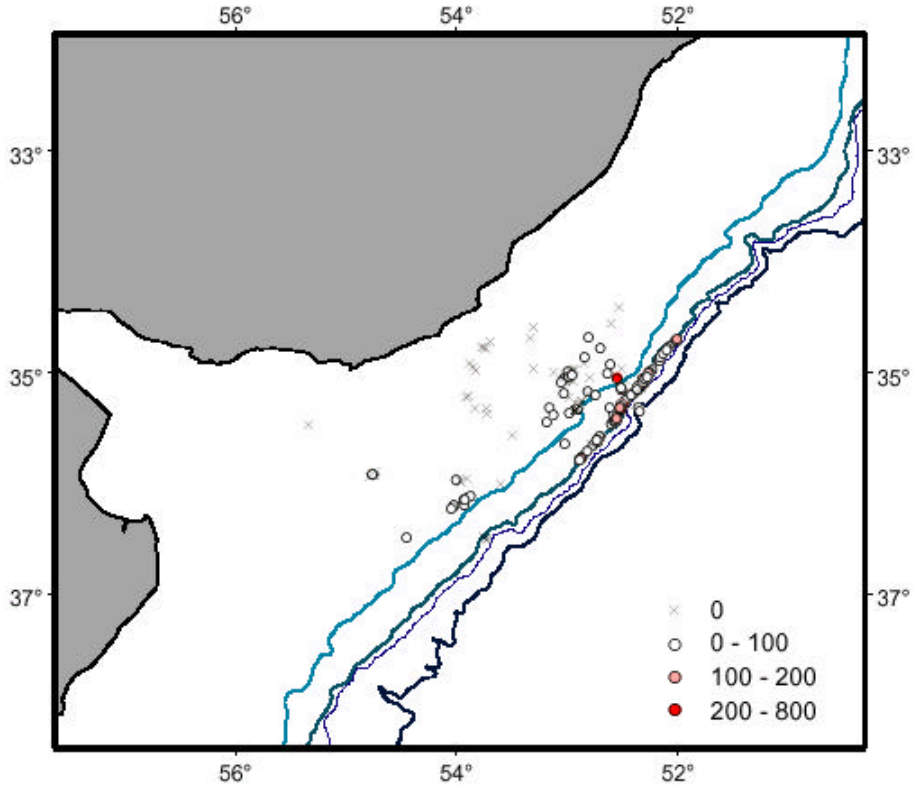


Figure 7b. Yield (gr/FU) of wreckfish (*Polyprion americanus*)

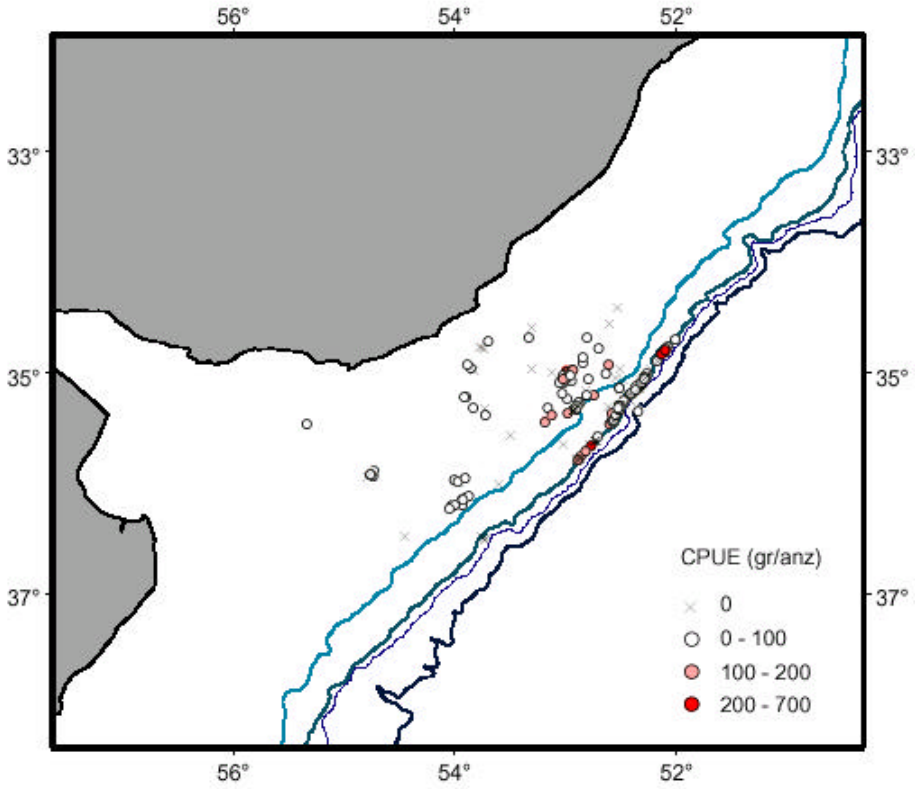


Figure 7c. Yield (gr/FU) of tope shark (*Galeorhinus galeus*)

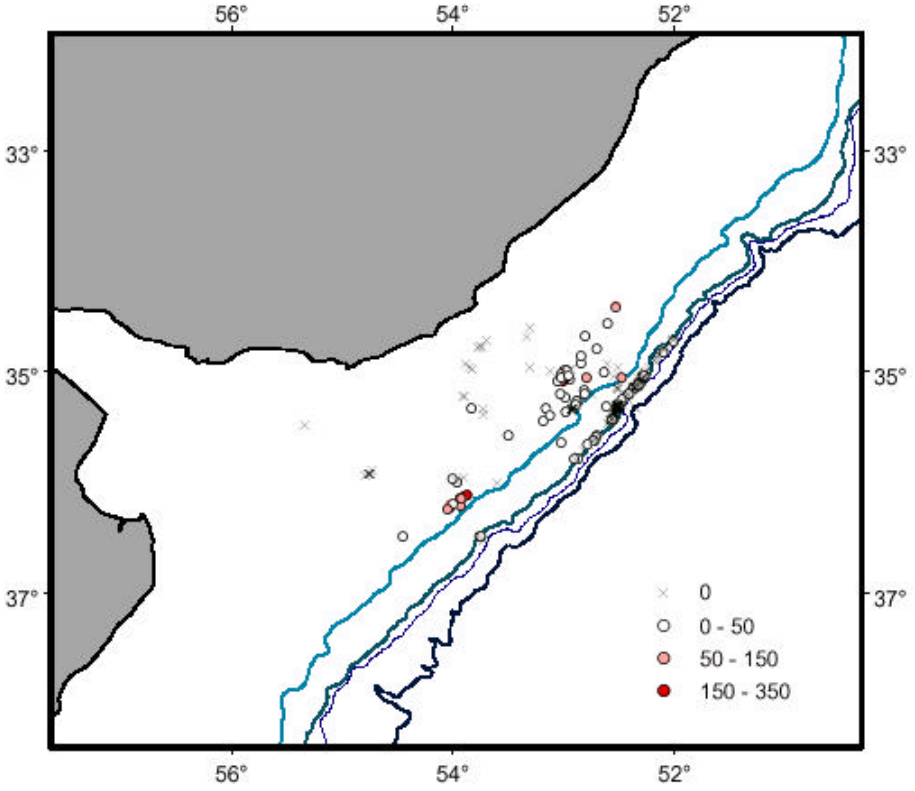


Figure 7d. Yield (gr/FU) of argentine hake (*Merluccius hubbsi*)

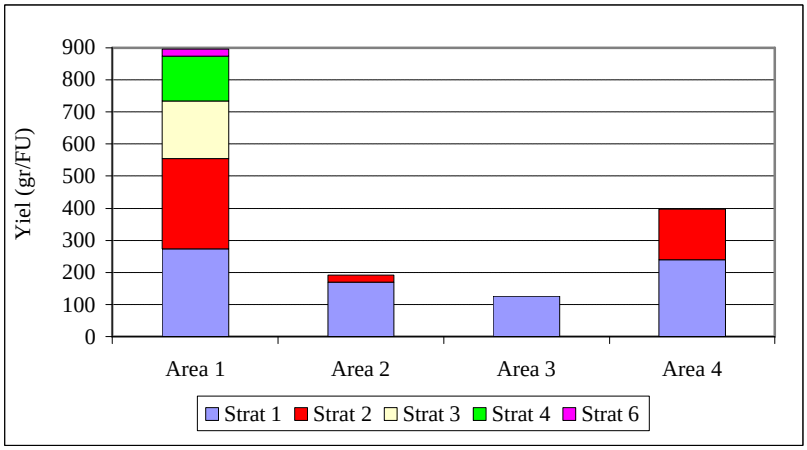


Figure 8. Yield (gr/FU) by area and depth strata (m)

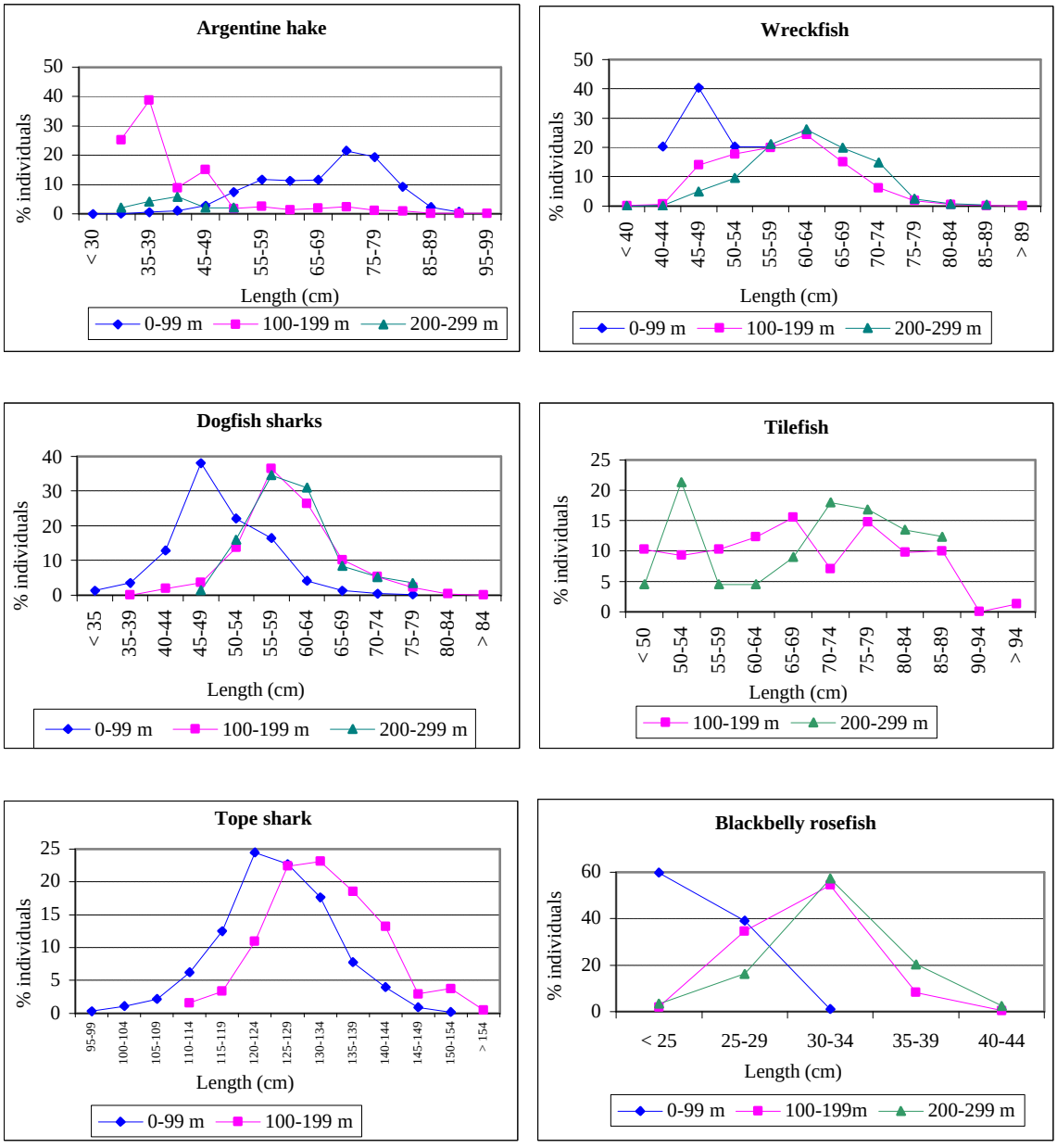
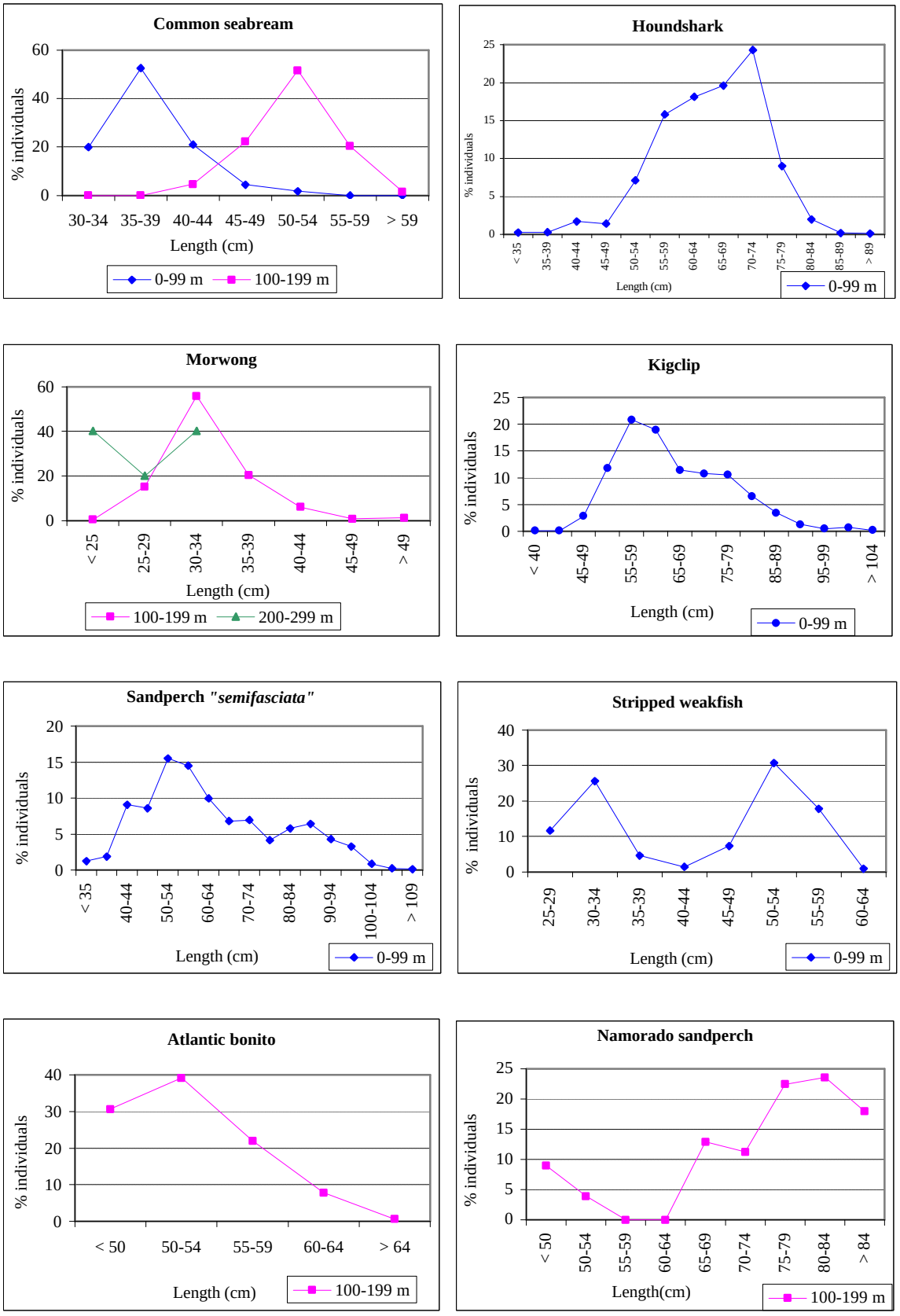


Figure 9. Length distribution by classes of 5 cm and depth strata (m) for main species



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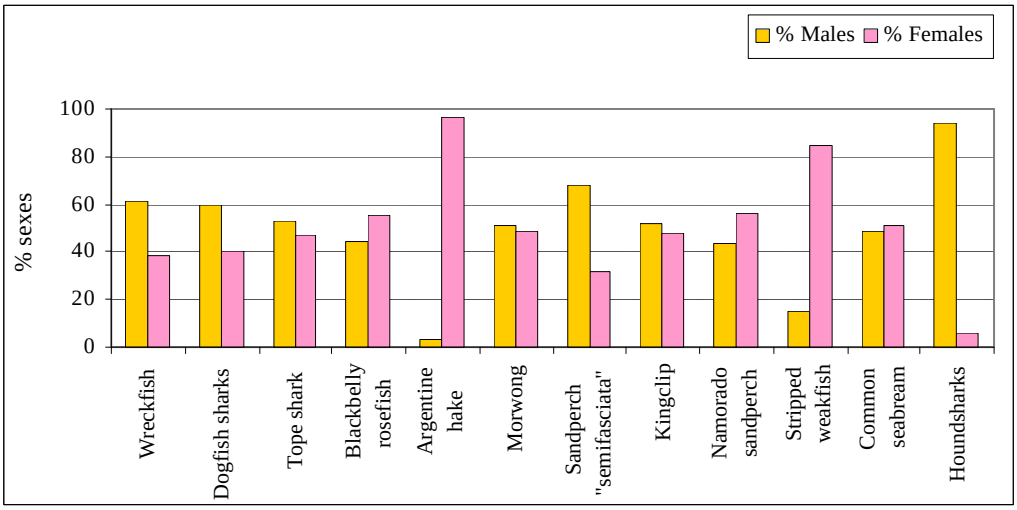


Figure 10. Percentage by sexes of main species

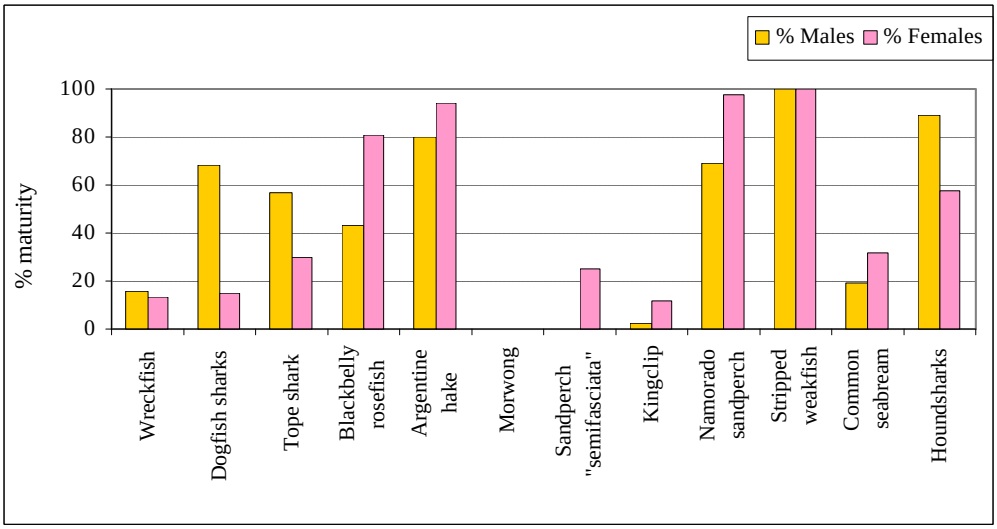


Figure 11. Percentage of maturity by sexes of main species

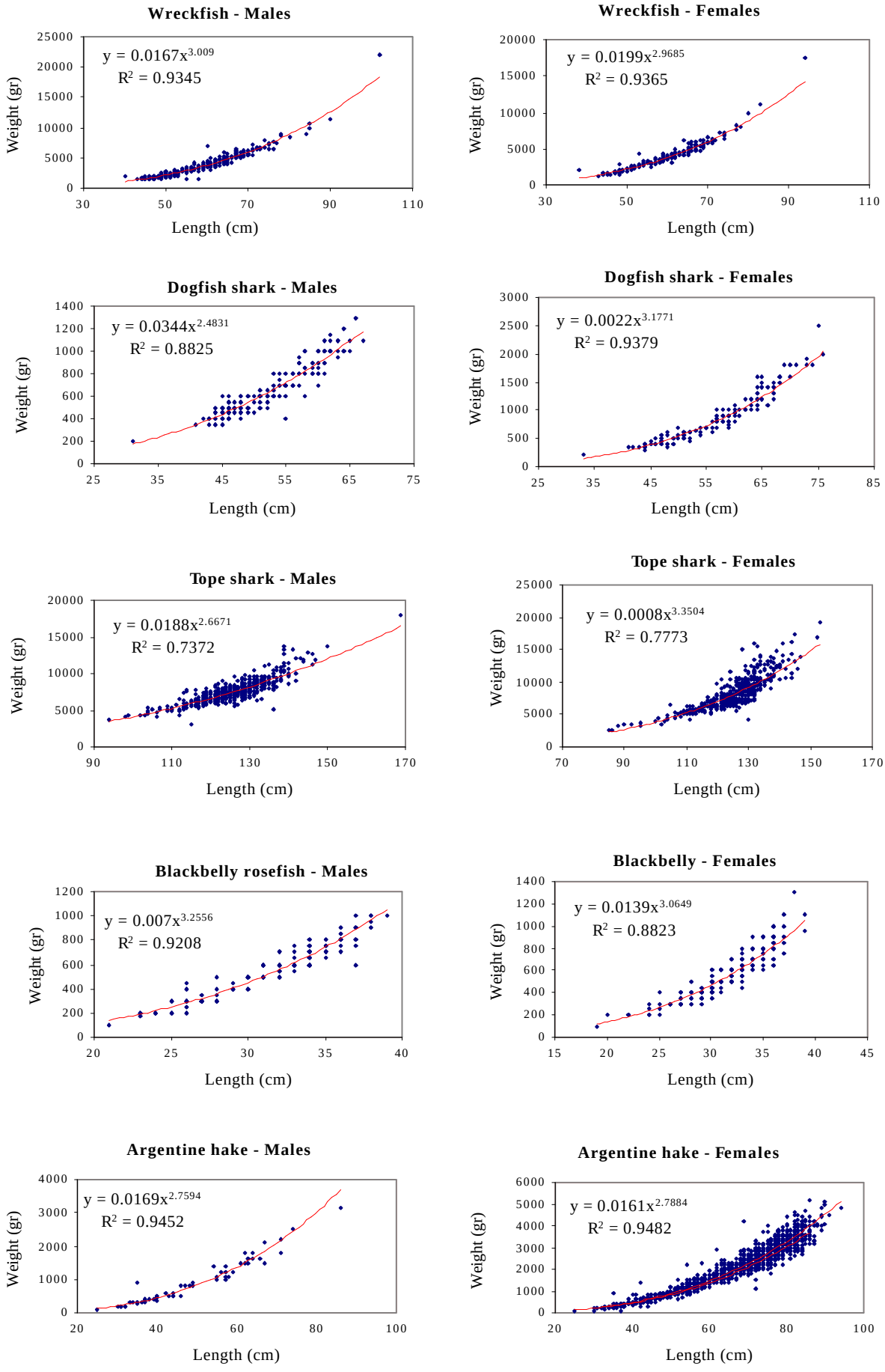
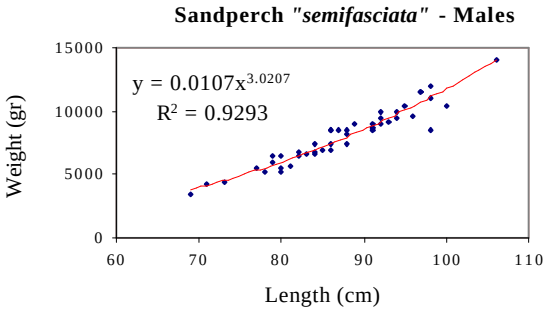
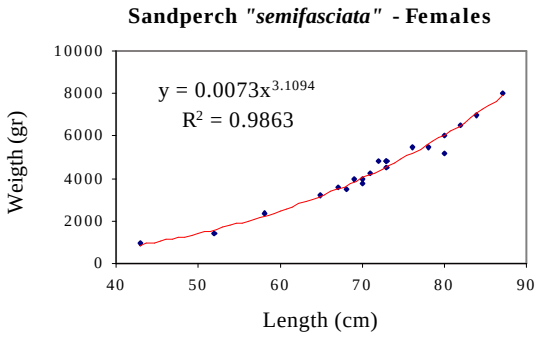
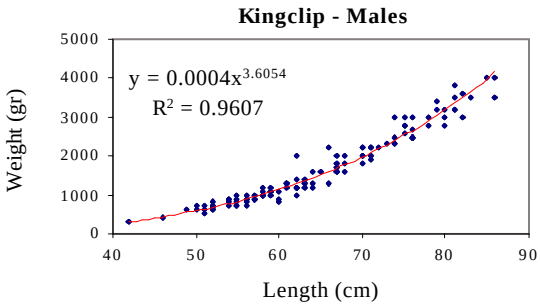
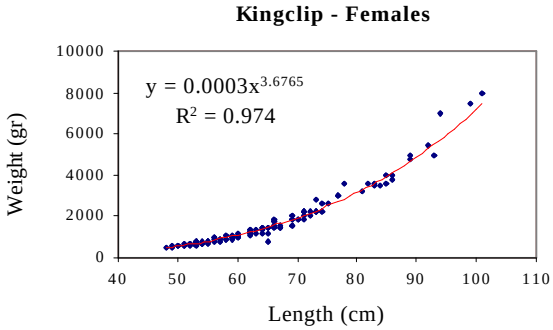


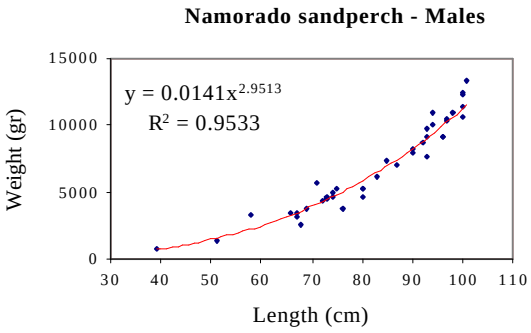
Figure 12. Length/weight relationship of main species

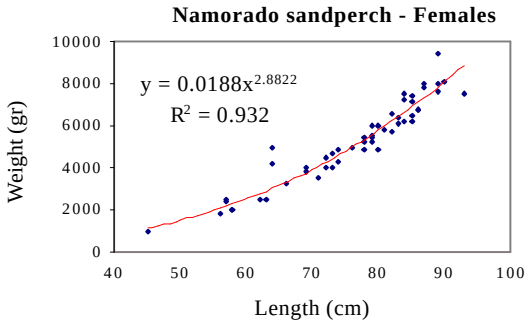


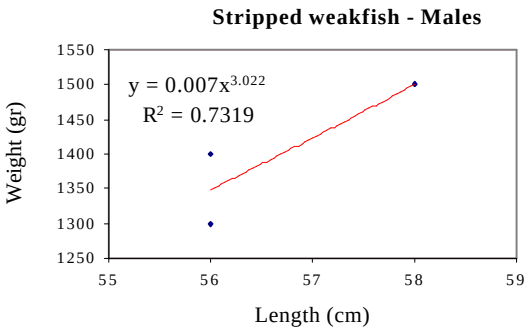












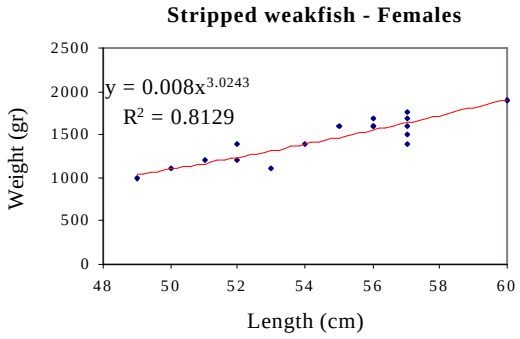
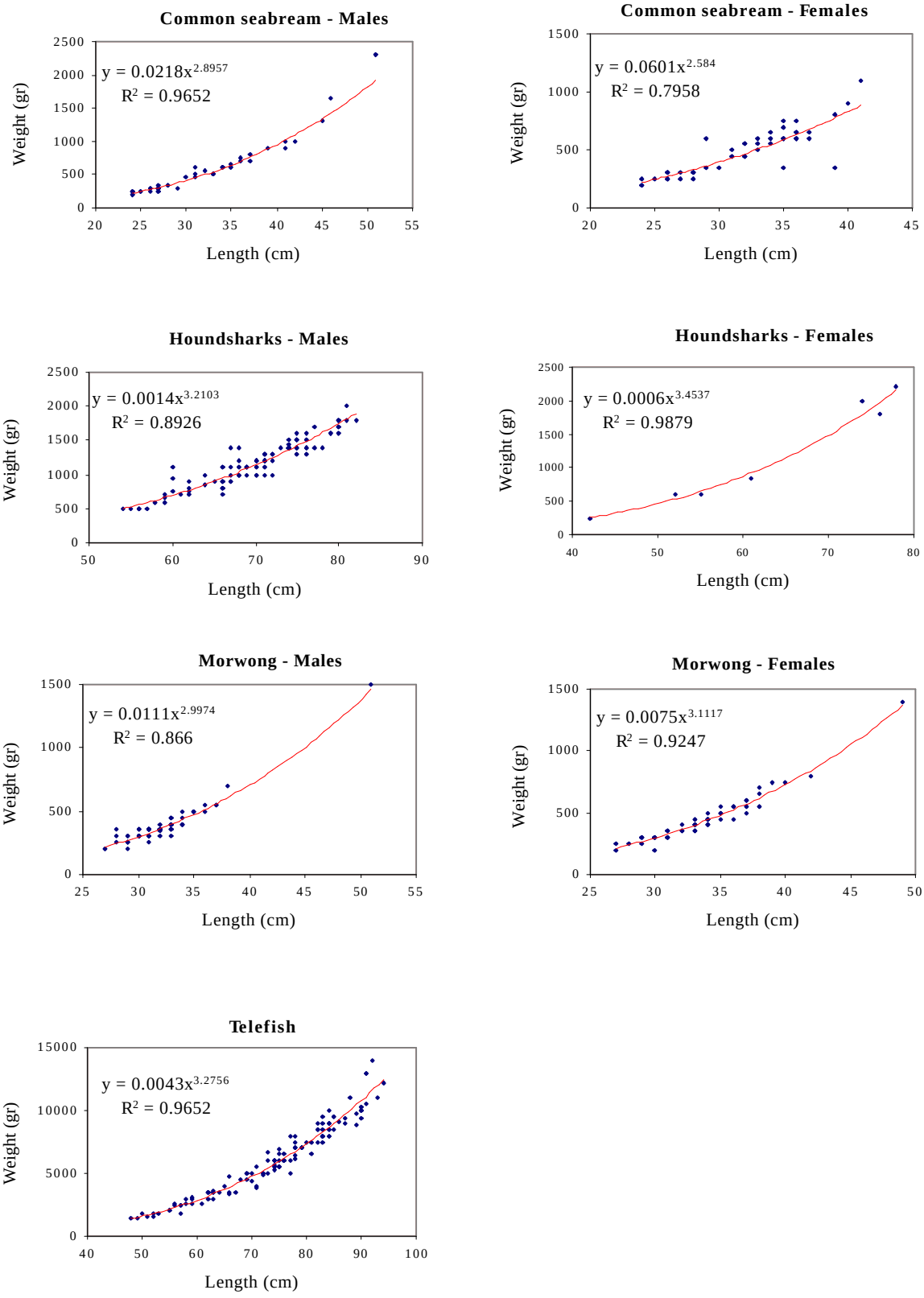


Figure 12 (cont.). Length/weight relationship of main species



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