

Shark and Ray Commercial Fisheries in Portugal (1986 – 2006)

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IPL

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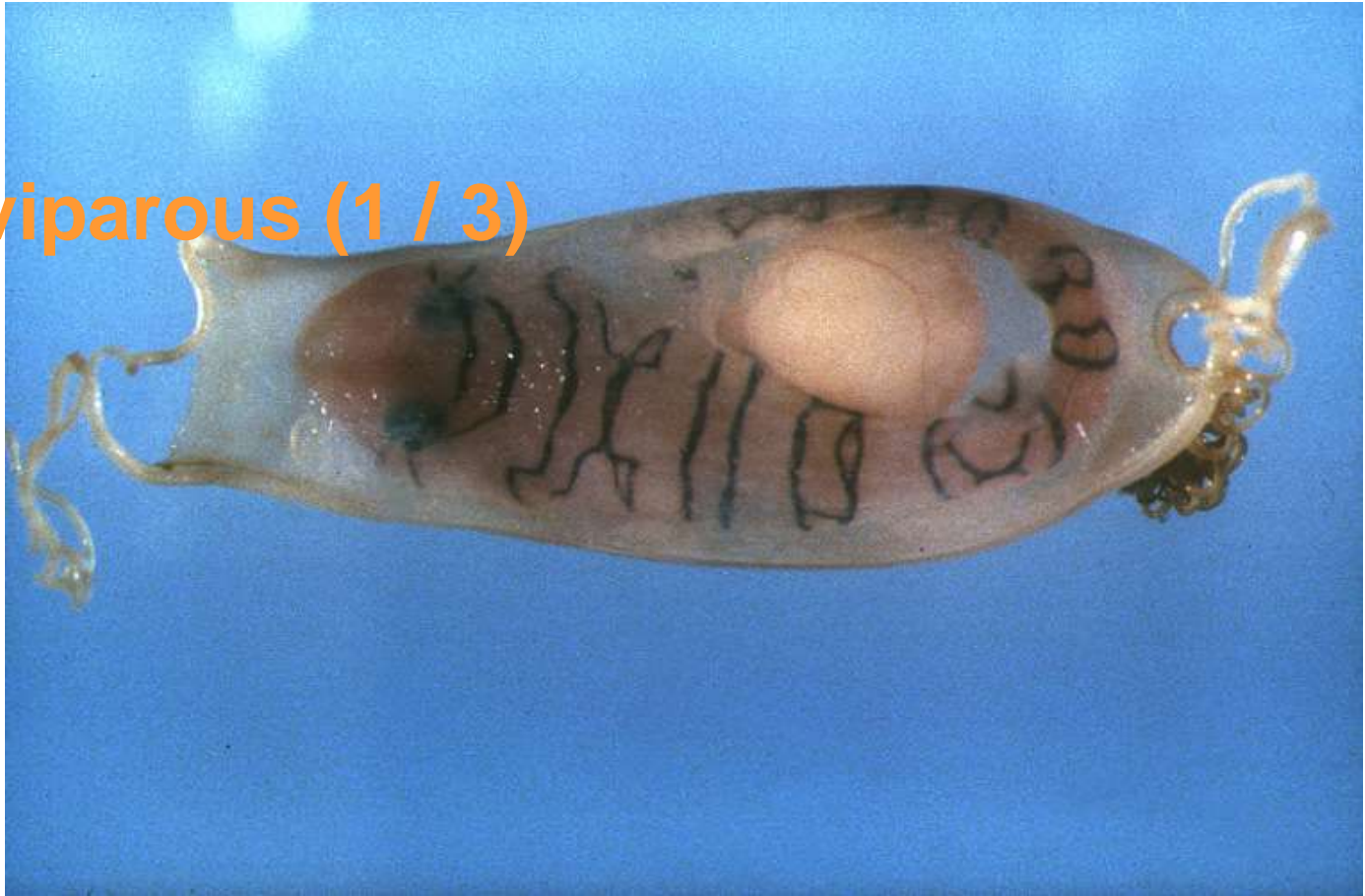


**Associação Portuguesa para o Estudo e Conservação de
Elasmobrânquios**

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Shark and ray reproduction

- Oviparous (1 / 3)



Shark and ray reproduction

- Viviparous (3 / 3)



Shark and ray reproduction

- Ovoviviparous (2 / 3)



Reproductive strategy (and other things) result in:

- Low fecundity
- Large, precocious young
- Slow growth
- Late maturity
- Long life
- Highly susceptible to over-fishing!



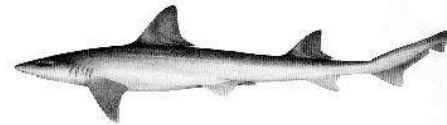
So, there are sharks in Portugal??

- Are you for real?!

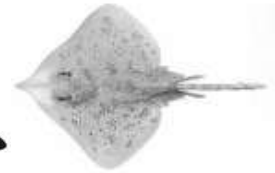
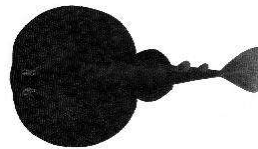


Sharks and rays in Portugal

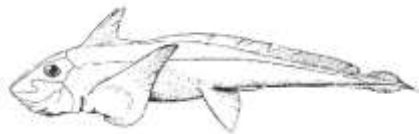
- 47 species of **sharks**



- 29 species of **rays**



- 3 species of **chimaeras**



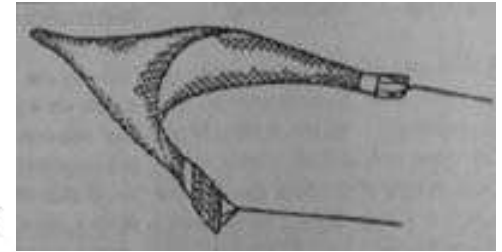
Sharks and rays in Portugal

- **Publications** – Antunes (1970), Correia et al. (1995), Viriato et al. (1996), Correia e Figueiredo (1997), Silva et al. (1998), Correia (1999), Correia (2001), Areitio et al. (2001), Sundström et al. (2001), Coelho & Erzini (2002), Young et al. (2002), Coelho et al. (2003), Gordon et al. (2003), Veríssimo et al. (2003), Correia & Smith (2004), Machado et al. (2004), Queiroz et al. (2005), Maia et al. (2006), Neiva et al. (2006) and Maia et al. (2007).
- **Reports, thesis** – Achenbach (1971), Marques (1978), Cunha (1987), Correia (1994), Machado (1996), Correia (1997), Oliveira (1998), Traguelho (1998), Frade (1999), Coelho (2000), Santos (2001), Veríssimo (2001), Rosa (2002), Branco (2003), Moura (2003), Maia (2004), Queiroz (2004), Severino (2004) and Neiva (2004).
- **Others** – Silva (1983, 1987, 1988), Melo et al. (1987), Melo & Silva (1990), Figueiredo & Correia (1996), Figueiredo et al. (1996a), Silva & Pereira (1998), Machado & Figueiredo (2000), Erzini et al. (2002) and Machado et al. (2003).

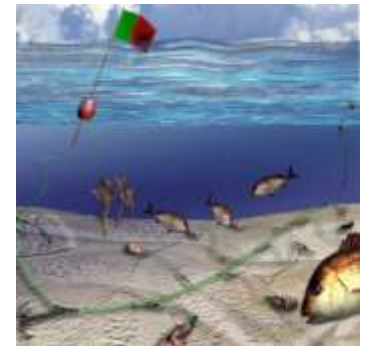


Sharks and rays in Portugal

- Fishing gear – **trawling**



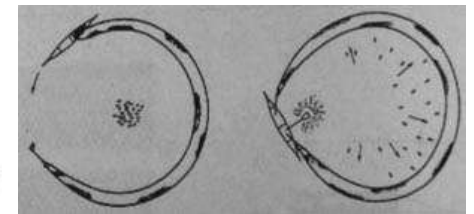
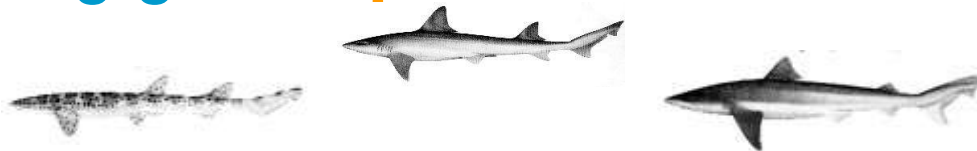
- Fishing gear – **surface longline**



- Fishing gear – **bottom longline**



- Fishing gear – **purse seine**



Methods

- *Direcção Geral das Pescas e Aquicultura* (Fisheries Board) – **get much data!**
- “Correia Lab.” - **analyse much data:**
 - **Year, month, port, species, weight, price**
 - **Sum “Species”, “Year” and “Port”**
 - **Correlate “Weight” and “Price” vs. Time**
 - **Investigate evolution of “Price”**



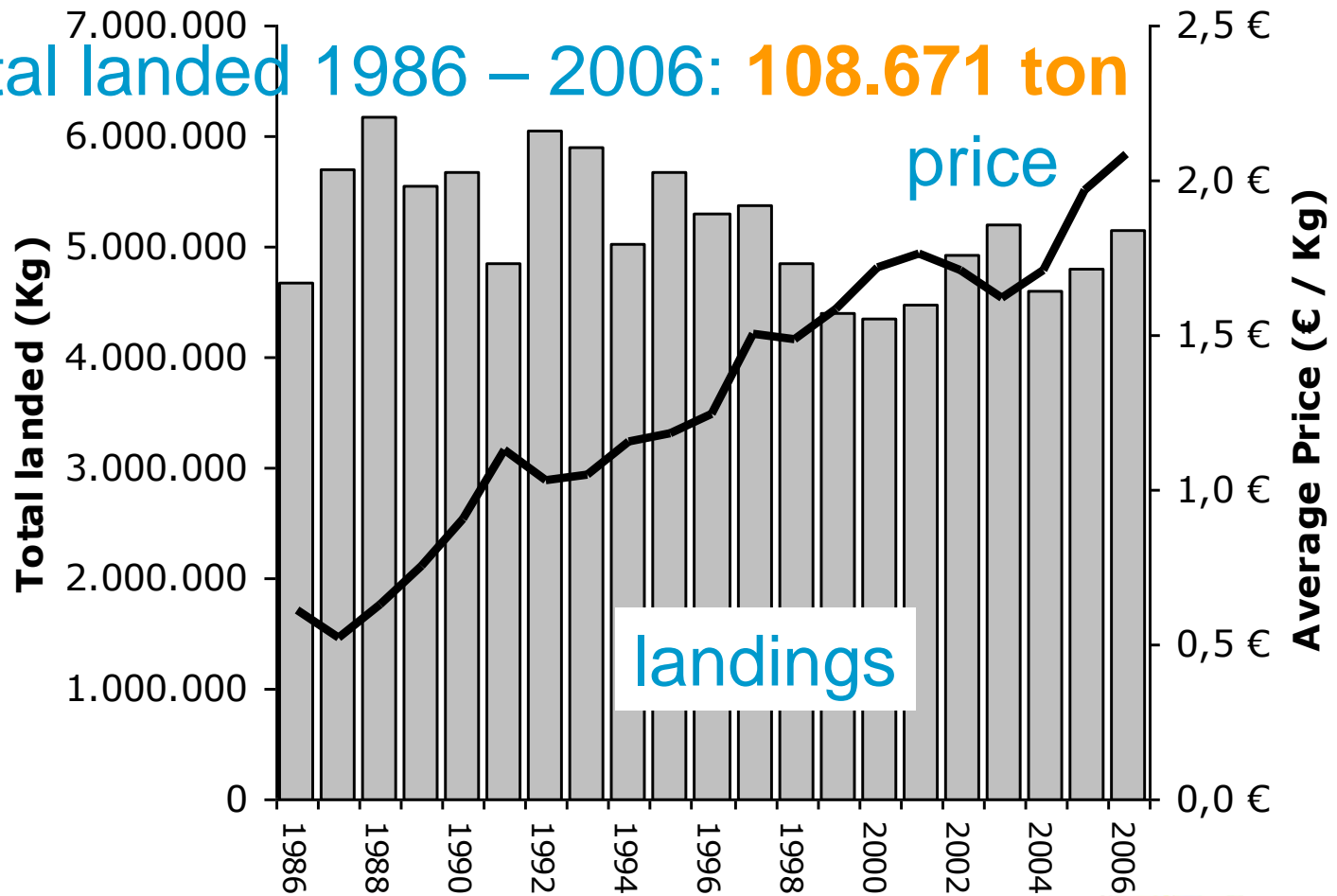
Methods – the raw data

- *Docapesca Sesimbra*



Results

- Total landed 1986 – 2006: **108.671 ton**



● Total landed 1986 – 2001: **82.704 ton**

Elasmobranch Landings for the Portuguese Commercial Fishery From 1986 to 2001

JOÃO P. S. CORREIA and MARK F. L. SMITH

Introduction

Fishing has been important to the livelihood of the Portuguese for centuries. Some coastal communities are almost totally dependent on fishing or related activities (DGPA, 1998). The nation's fishing grounds are delineated by an EEZ (Exclusive Economic Zone) of 1,700,000 km², encompassing both continental Portugal (with a coastline of 942 km) and two large insular regions surrounding the Azores and Madeira (DGPA, 1998).

Historically, fisheries have targeted elasmobranchs to supply the liver-oil or "squalene" market (Helts, 1988; Last

and Stevens, 1994). Elasmobranchs have also been landed, and in many cases discarded, as the bycatch of other fisheries (Berkeley and Campos, 1988; Stevens, 1992). More recently, however, elasmobranchs have been targeted specifically to provide a source of protein in the form of meat and fins (Cailliet and Bedford, 1983; Holts, 1988).

The life history of elasmobranchs is characterized by slow growth rates, late maturity, long gestation periods, and the production of a small number of offspring (Holden, 1973; Pratt and Casey, 1990). These characteristics are customarily coupled with a distinctive predatory behavior (Gruber, 1982). Elas-

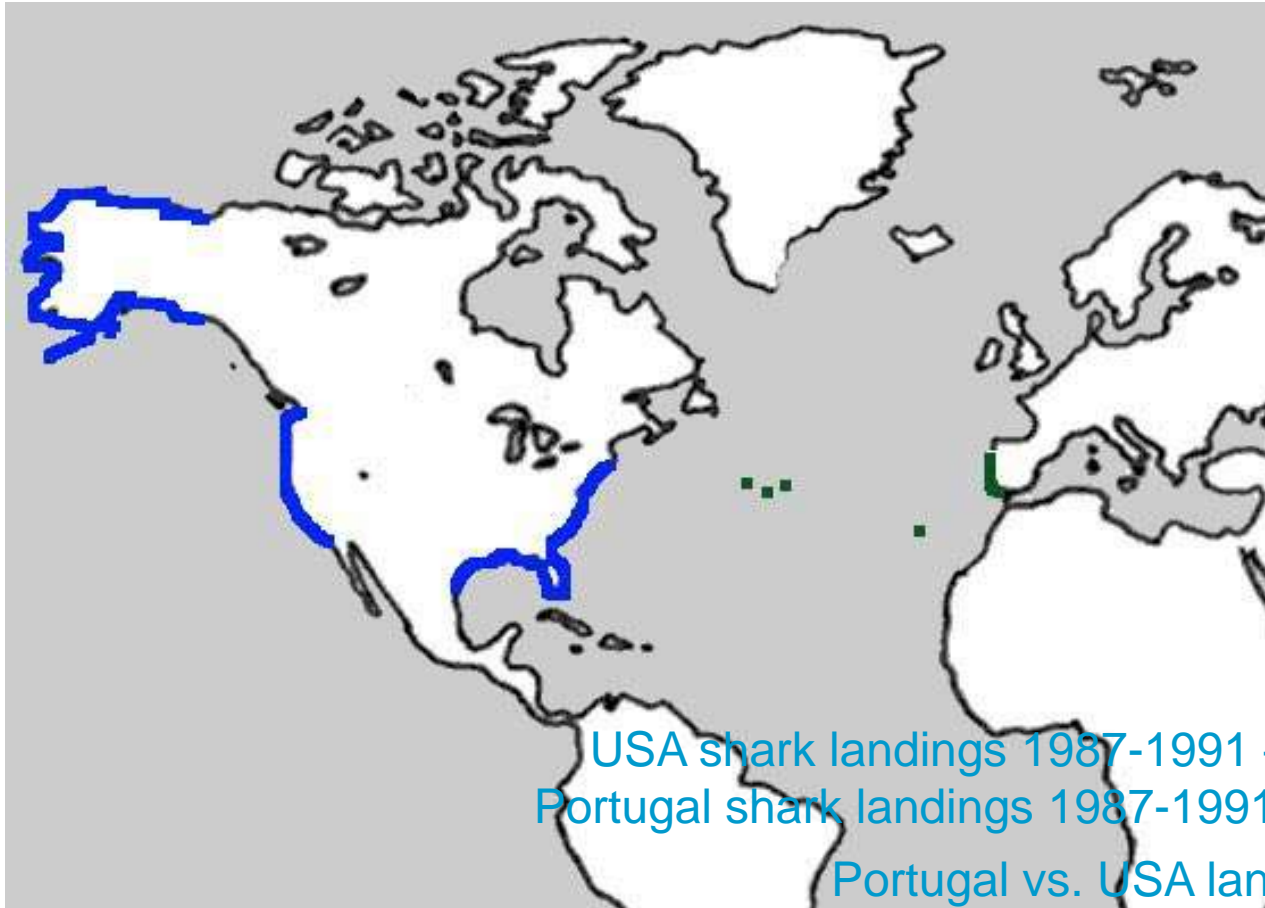
(i.e. oil, liver, etc.) and as the bycatch of an accelerated deep-sea teleost fishery (Nunes et al.¹). In 1985, the demand for shark by-products peaked (oil prices reached US\$4.00 – US\$5.00 per liter) and then declined from 1987 to 1999 (oil prices decreasing to less than US\$1.00 per liter) (Nunes et al.¹). During the same period, the demand for elasmobranch flesh steadily increased, and at present, this represents the principal elasmobranch product marketed in Portugal. The flesh of these fishes is sold for human consumption either directly (in the case of many species of Rajidae and Squalidae) or indirectly (i.e. processed into other food products) (Nunes et al.¹).



USA coastline – **20.000 km**

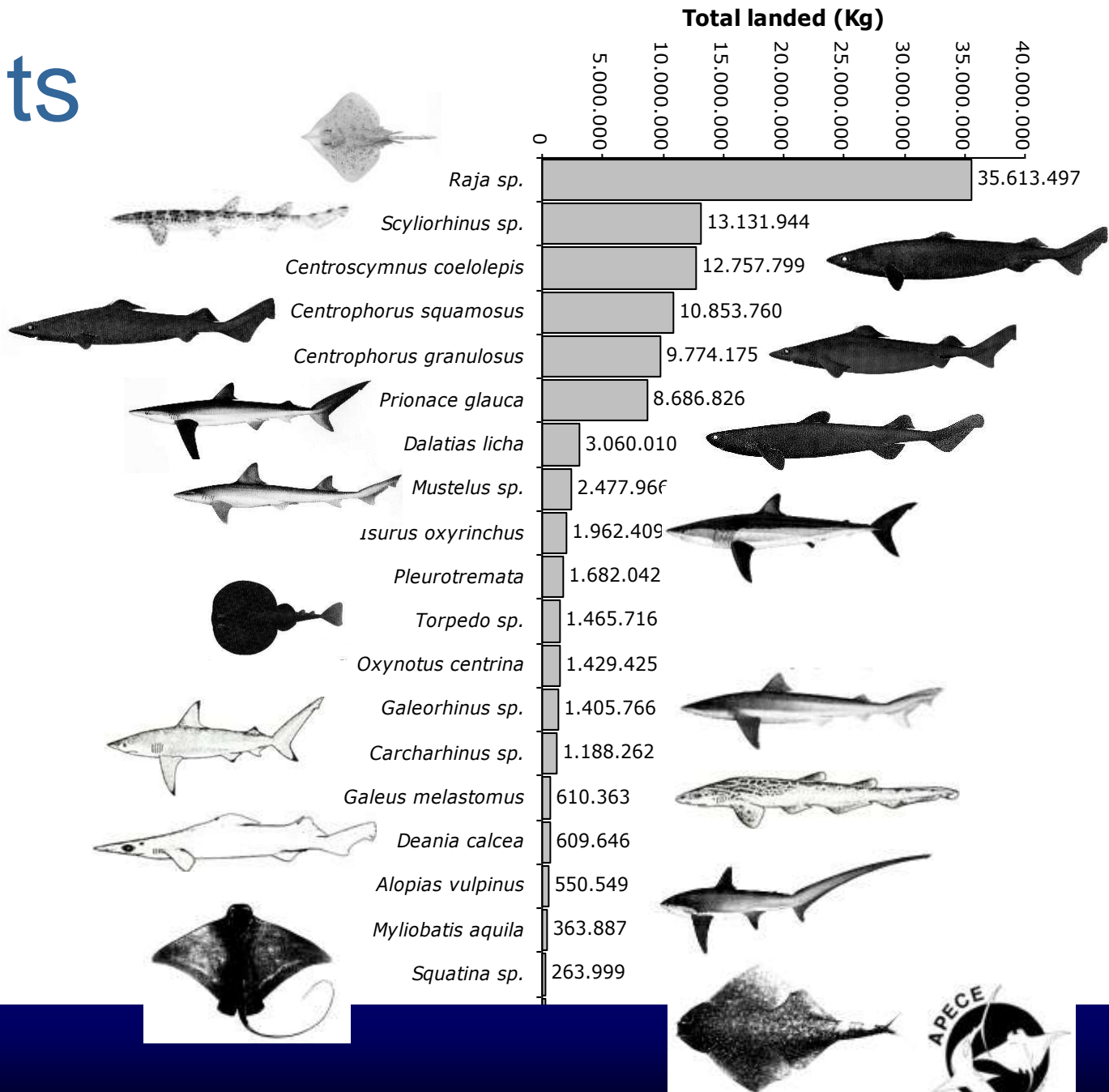
Portugal coastline – **1.800 km**

Portugal vs. USA coastline – **9%**



Results

Species



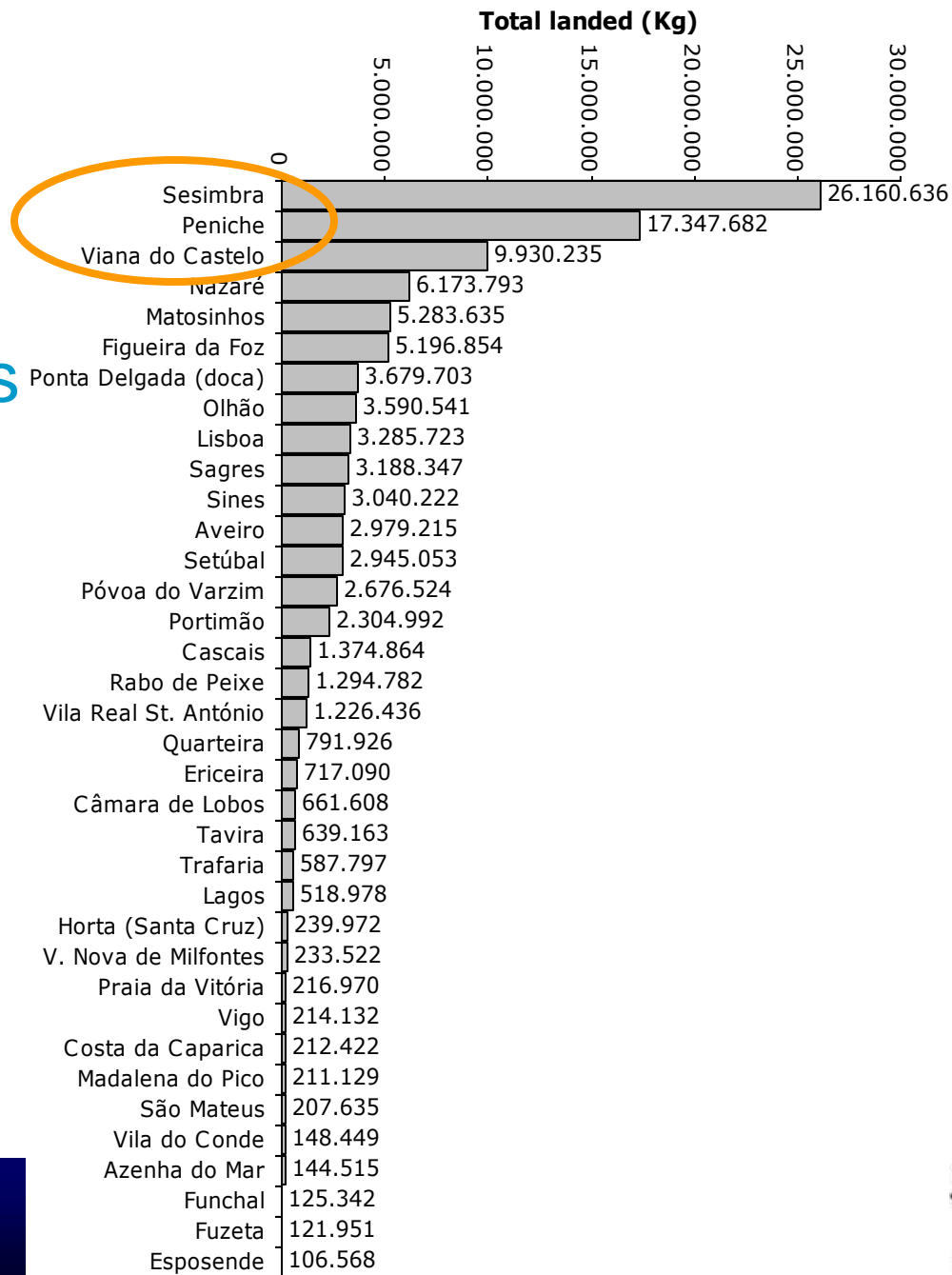
Species

- Dr. José Castro (N.M.F.S.)



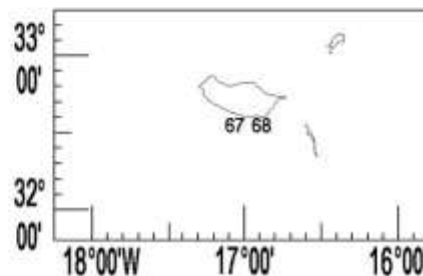
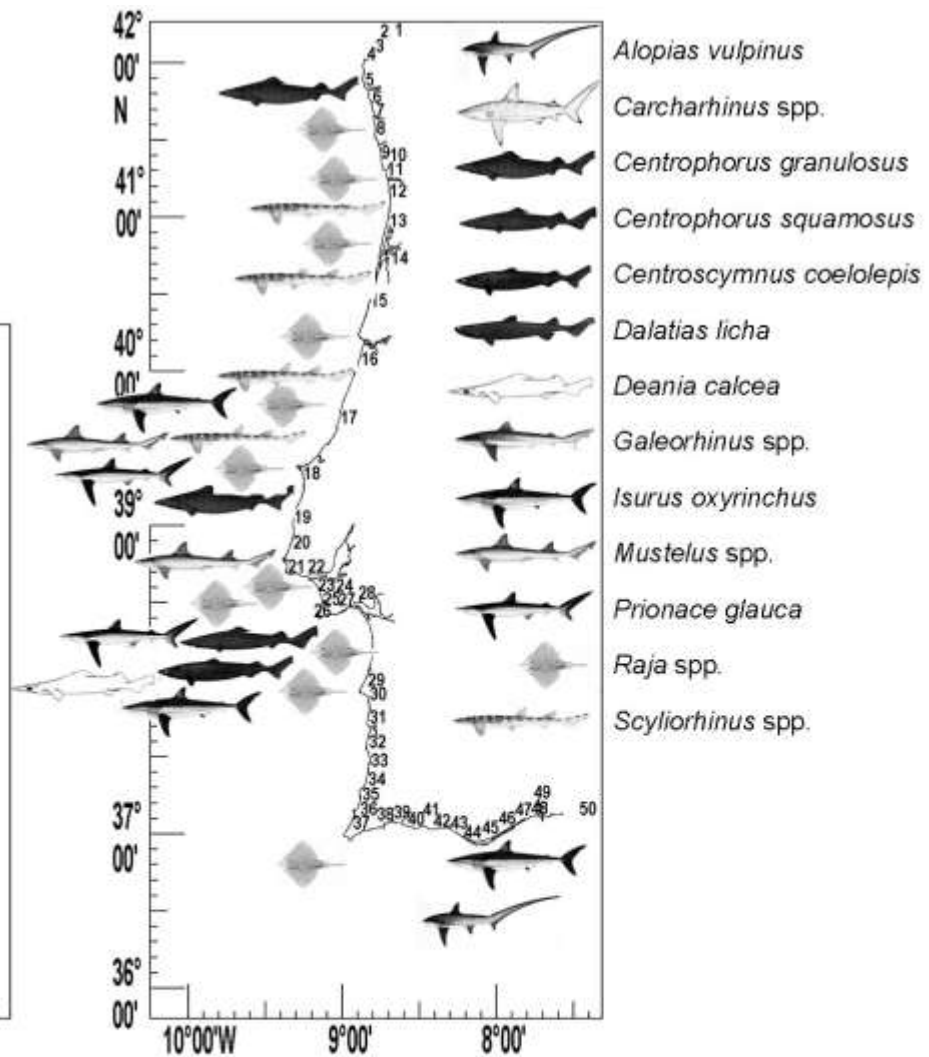
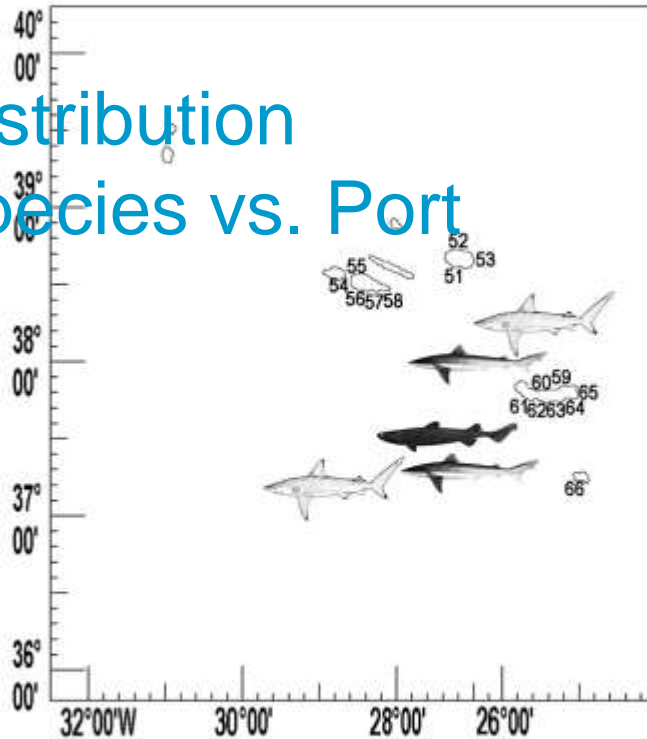
Results

Fishing Ports

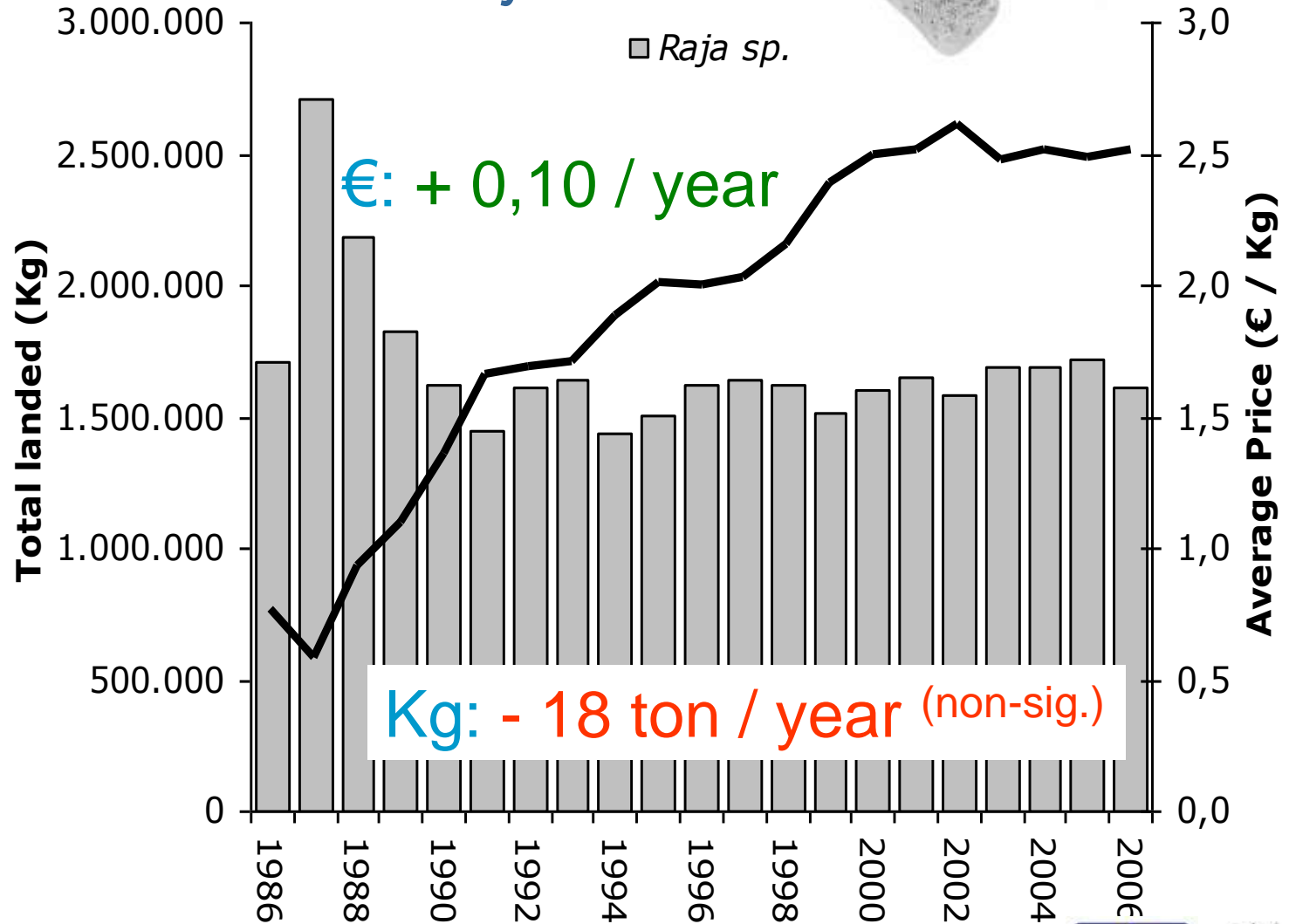


Results

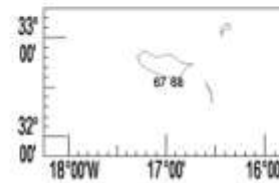
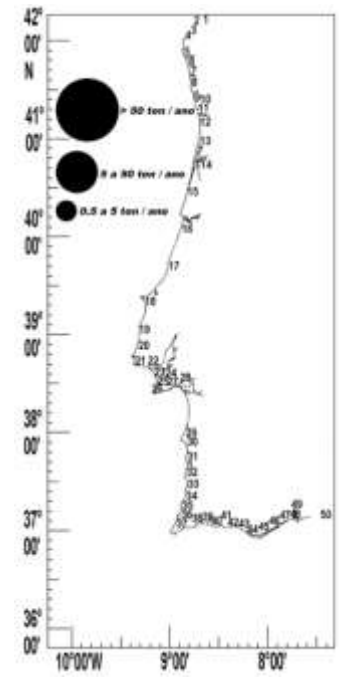
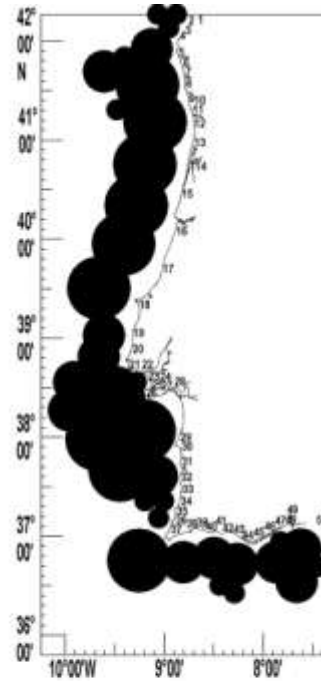
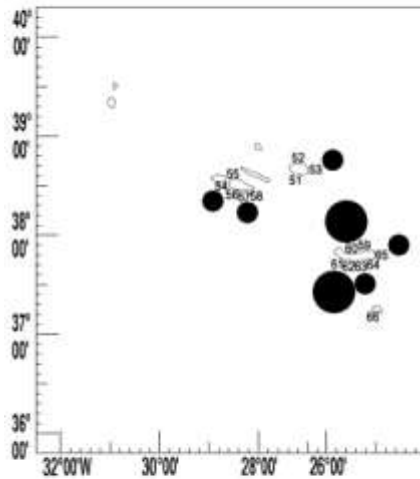
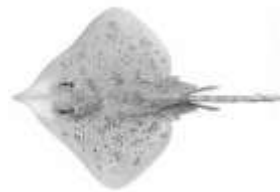
- Distribution Species vs. Port



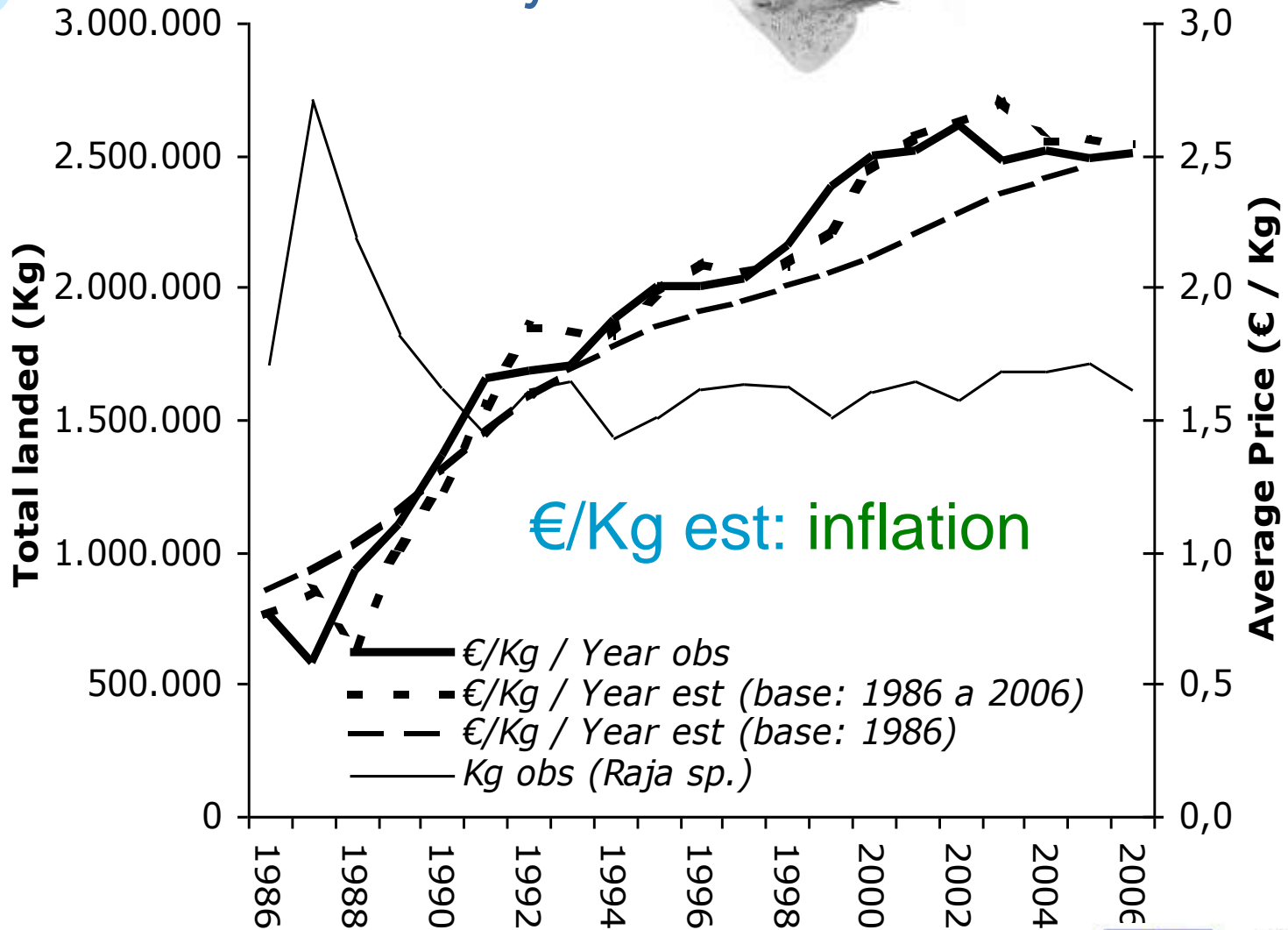
Skates – all *Raja*



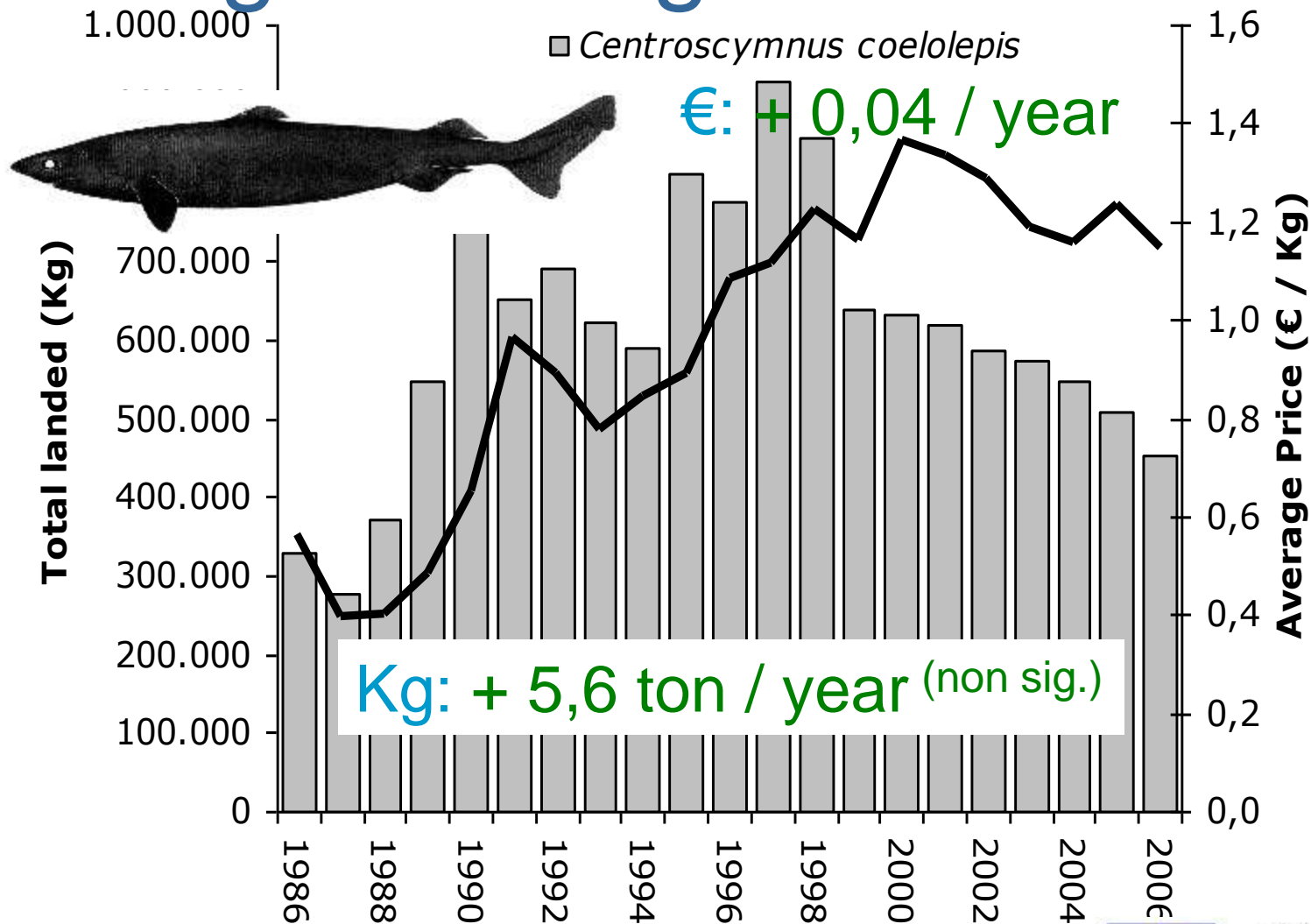
Skates – all *Raja*



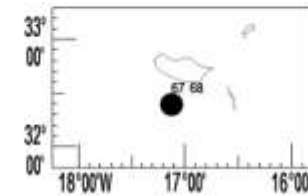
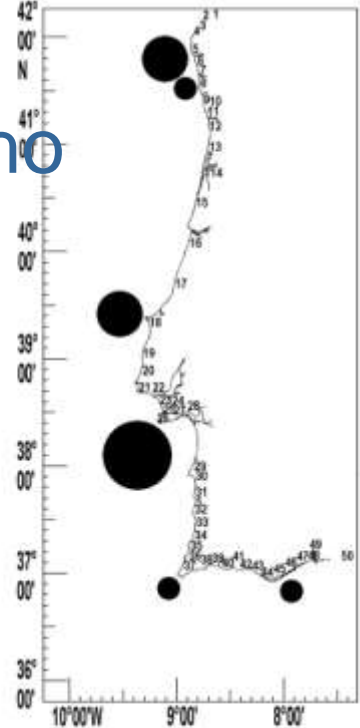
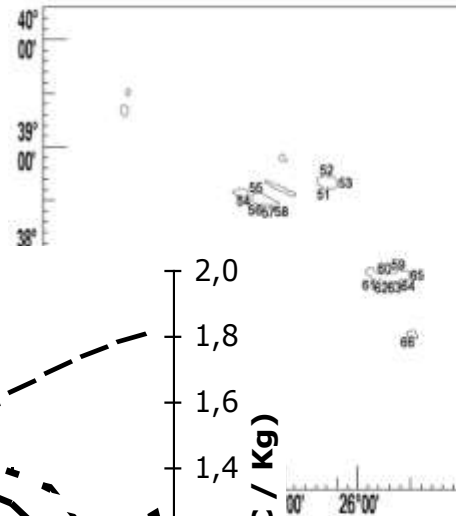
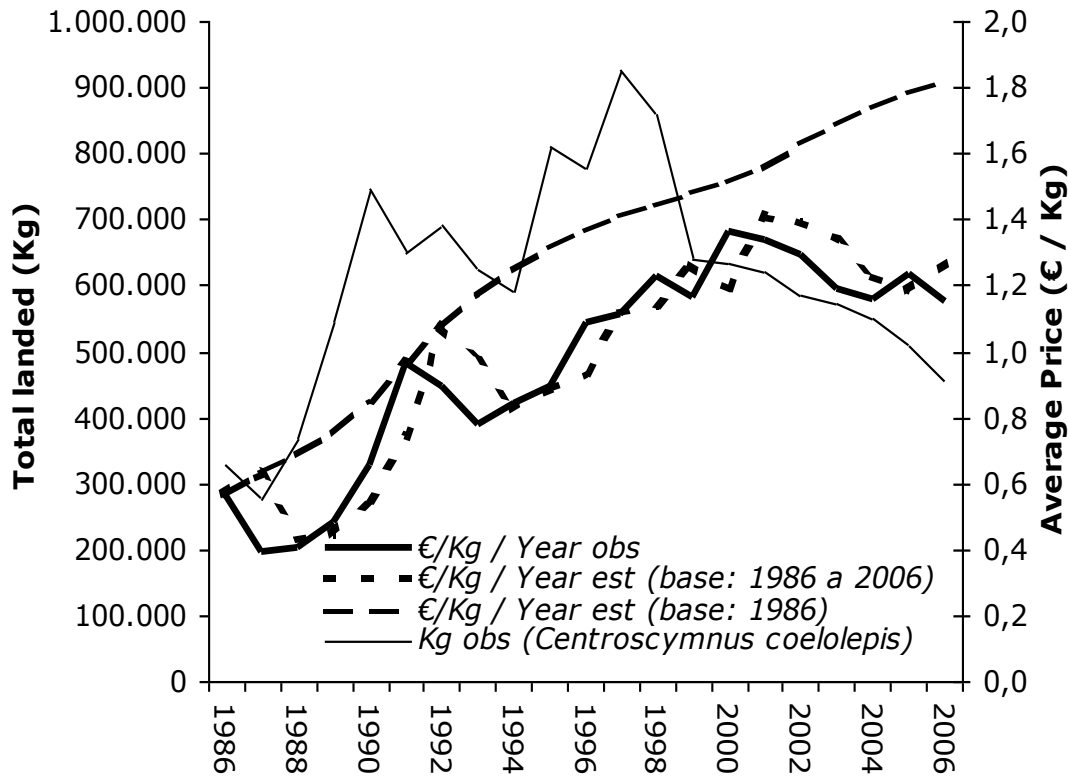
Skates – all *Raja*



Portuguese dogfish – Carochó



Portuguese dogfish - Carochão



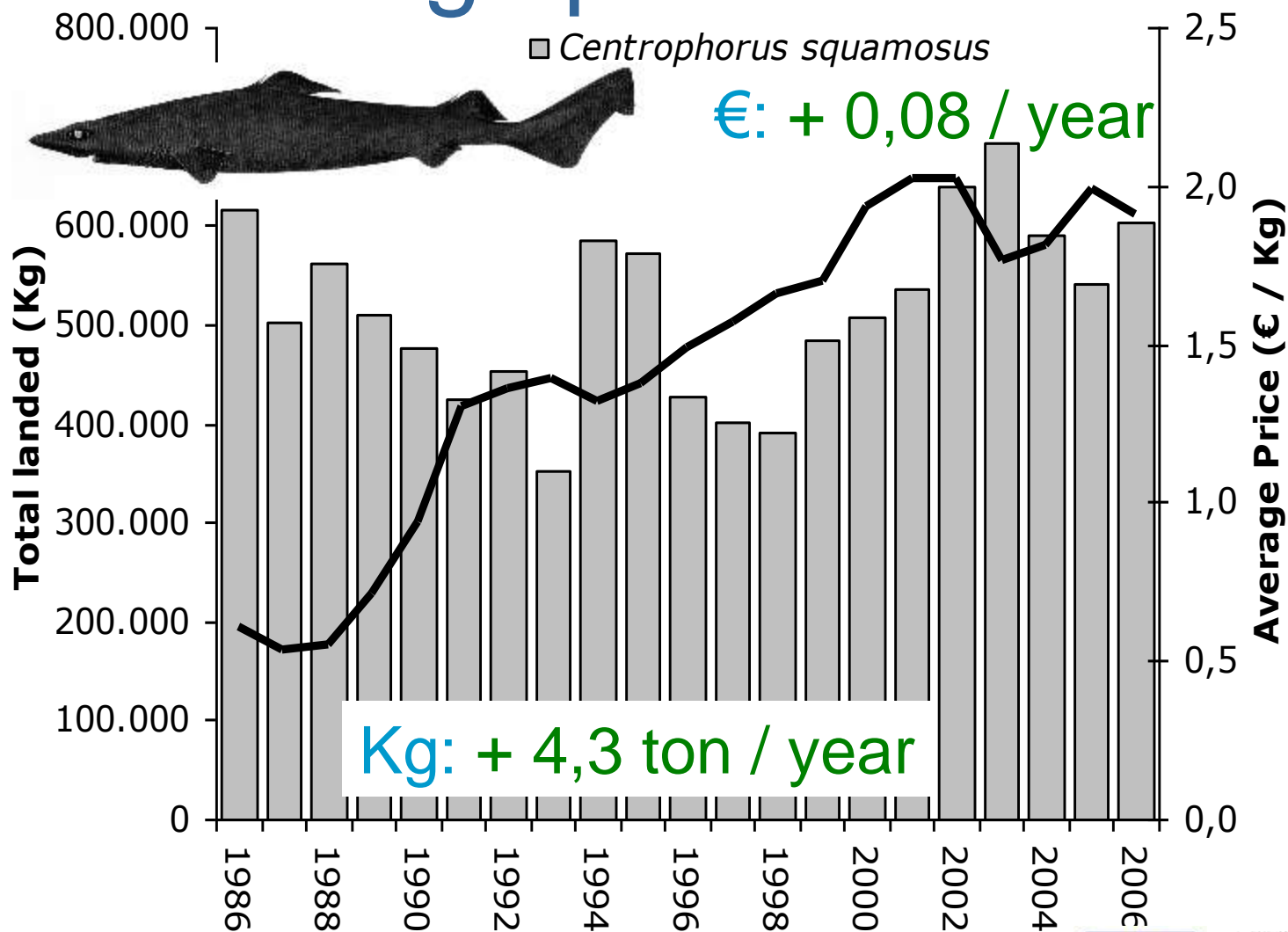
Portuguese dogfish - Carochó

(Viana do Castelo, May 2003)

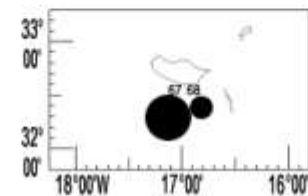
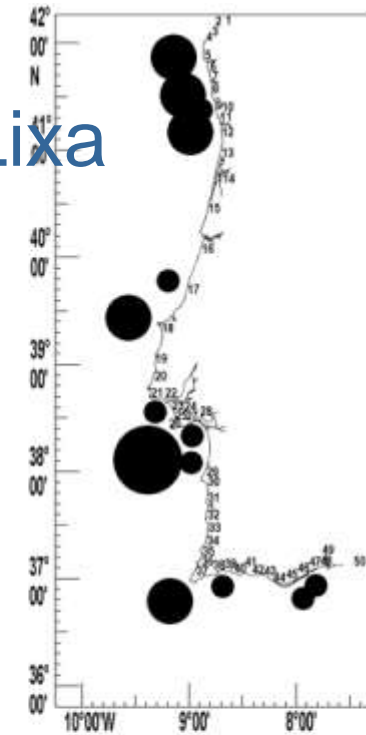
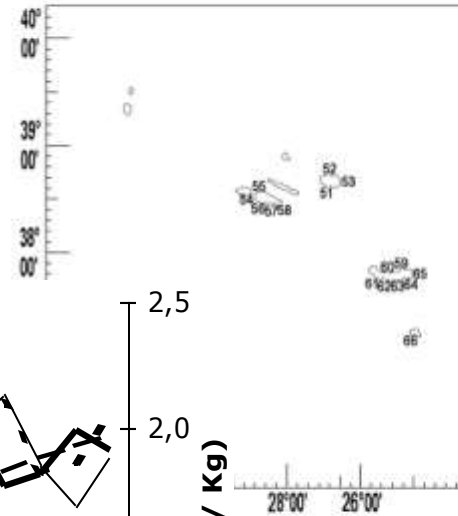
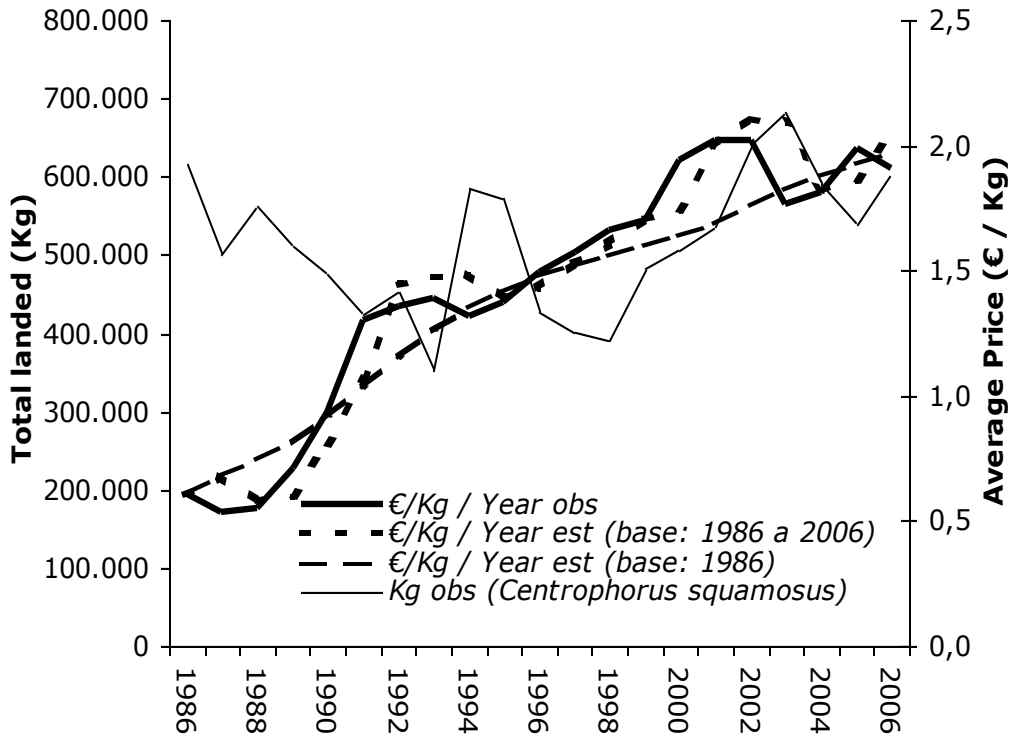


Vulnerable

Leafscale gulper shark – *Lixa*



Leafscale gulper shark - *Lixa*



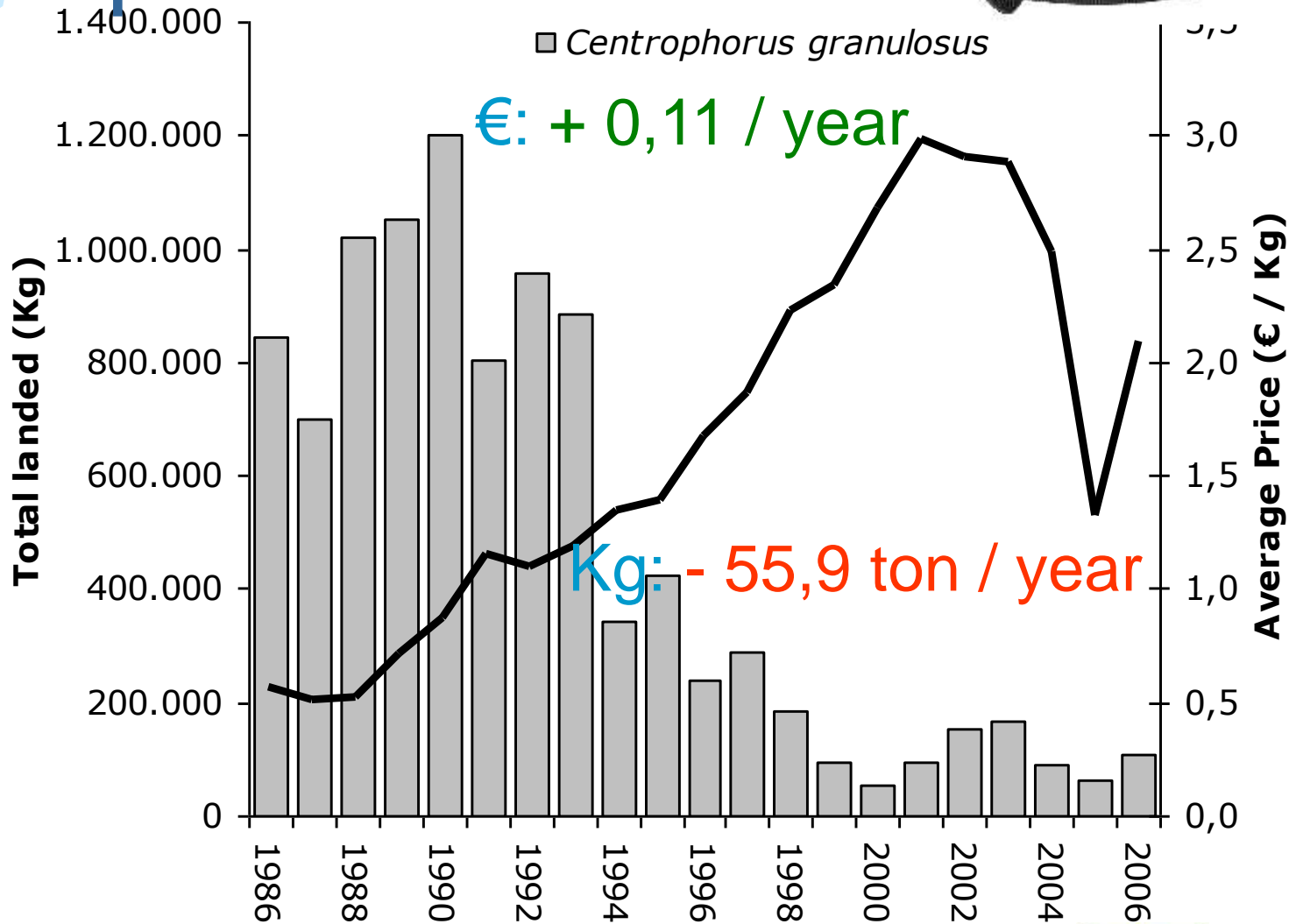
Leafscale gulper shark – *Lixa*

(R/V “Noruega”, July 1997)

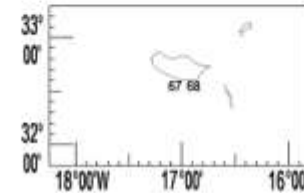
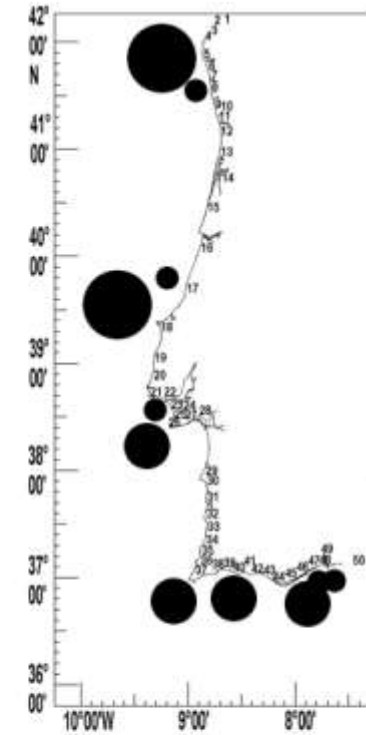
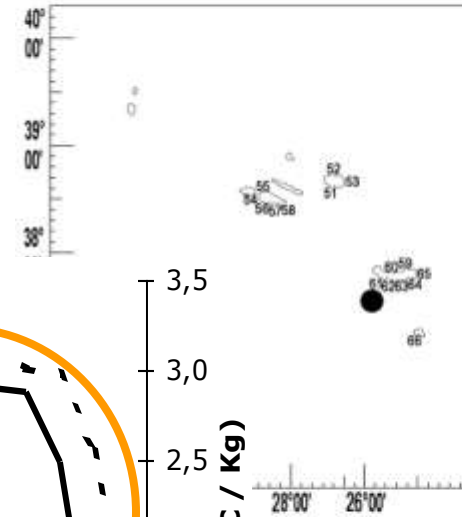
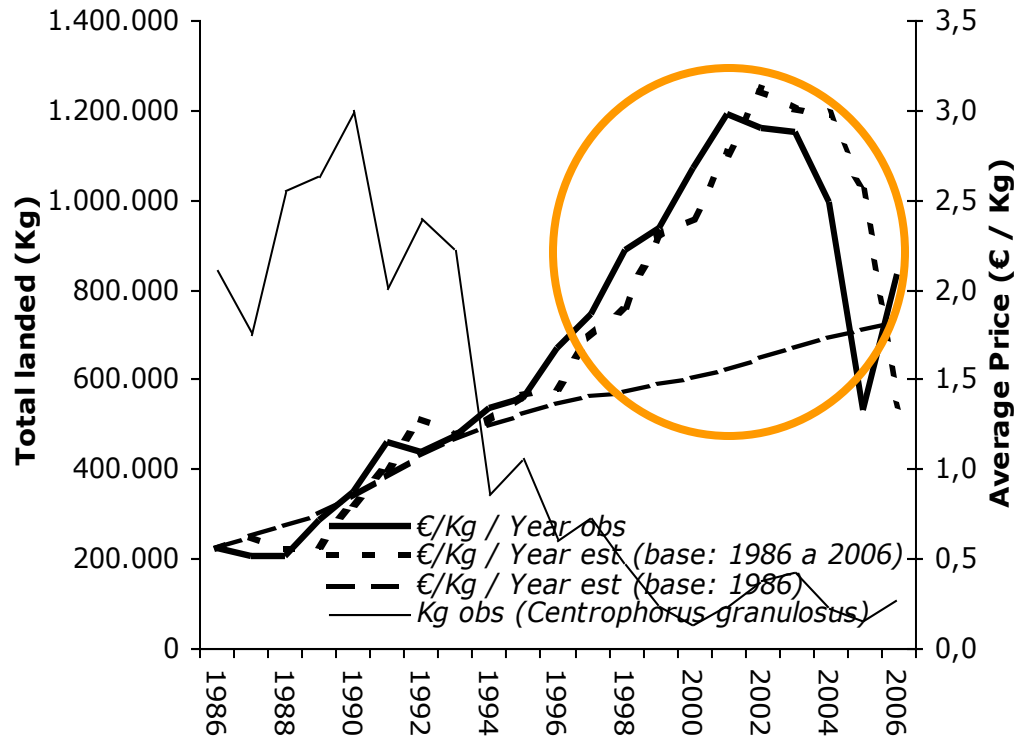


Gulper shark - Barroso

Vulnerable



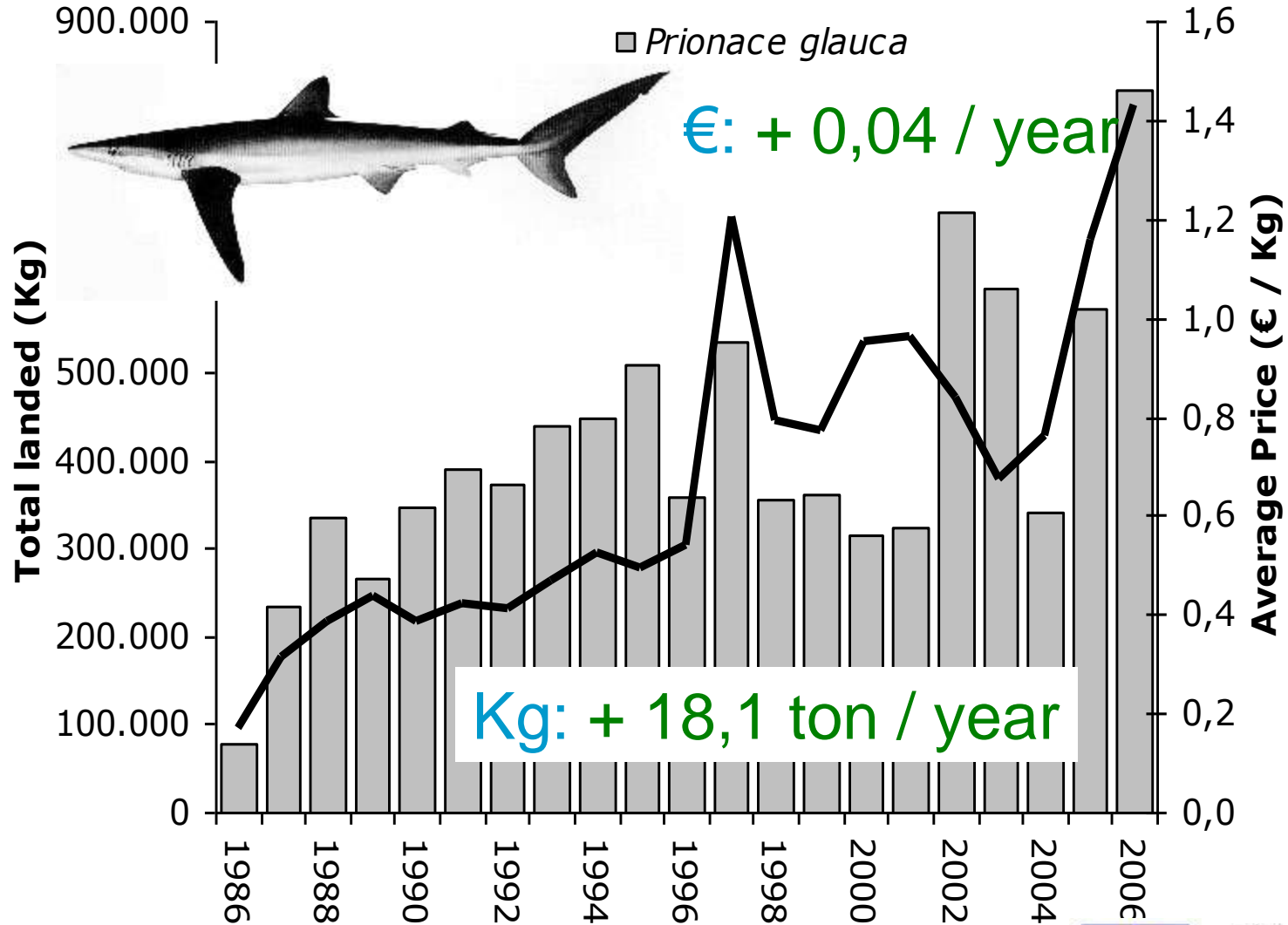
Gulper shark - Barroso



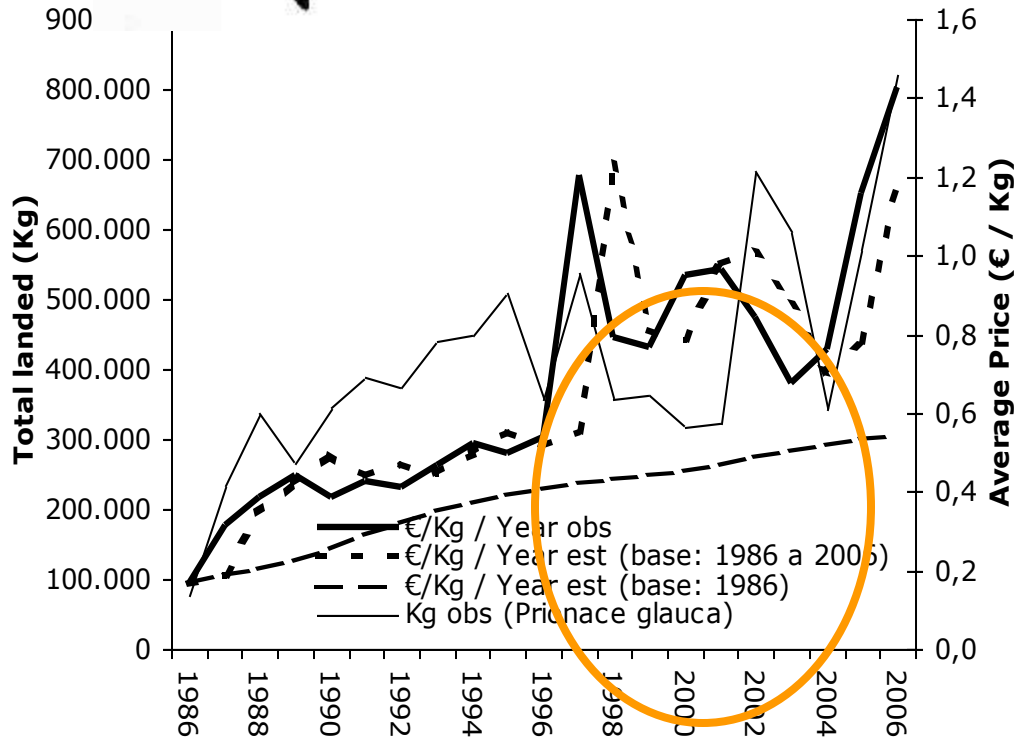
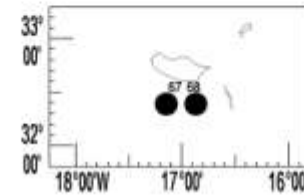
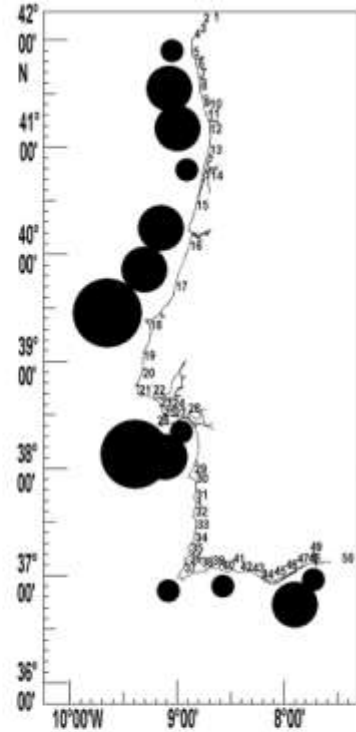
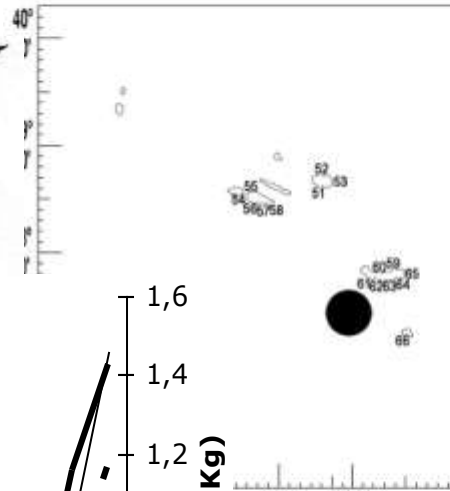
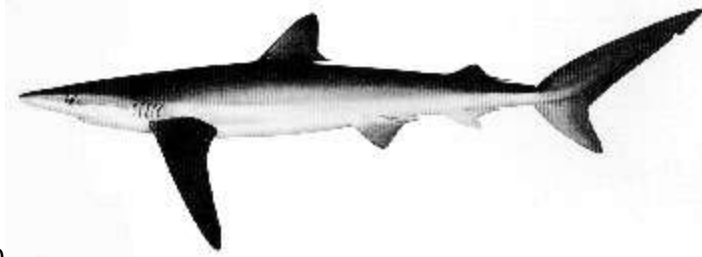
Gulper shark - Barroso (Sesimbra, March 2004)



Blue shark - Tintureira



Blue shark - Tintureira

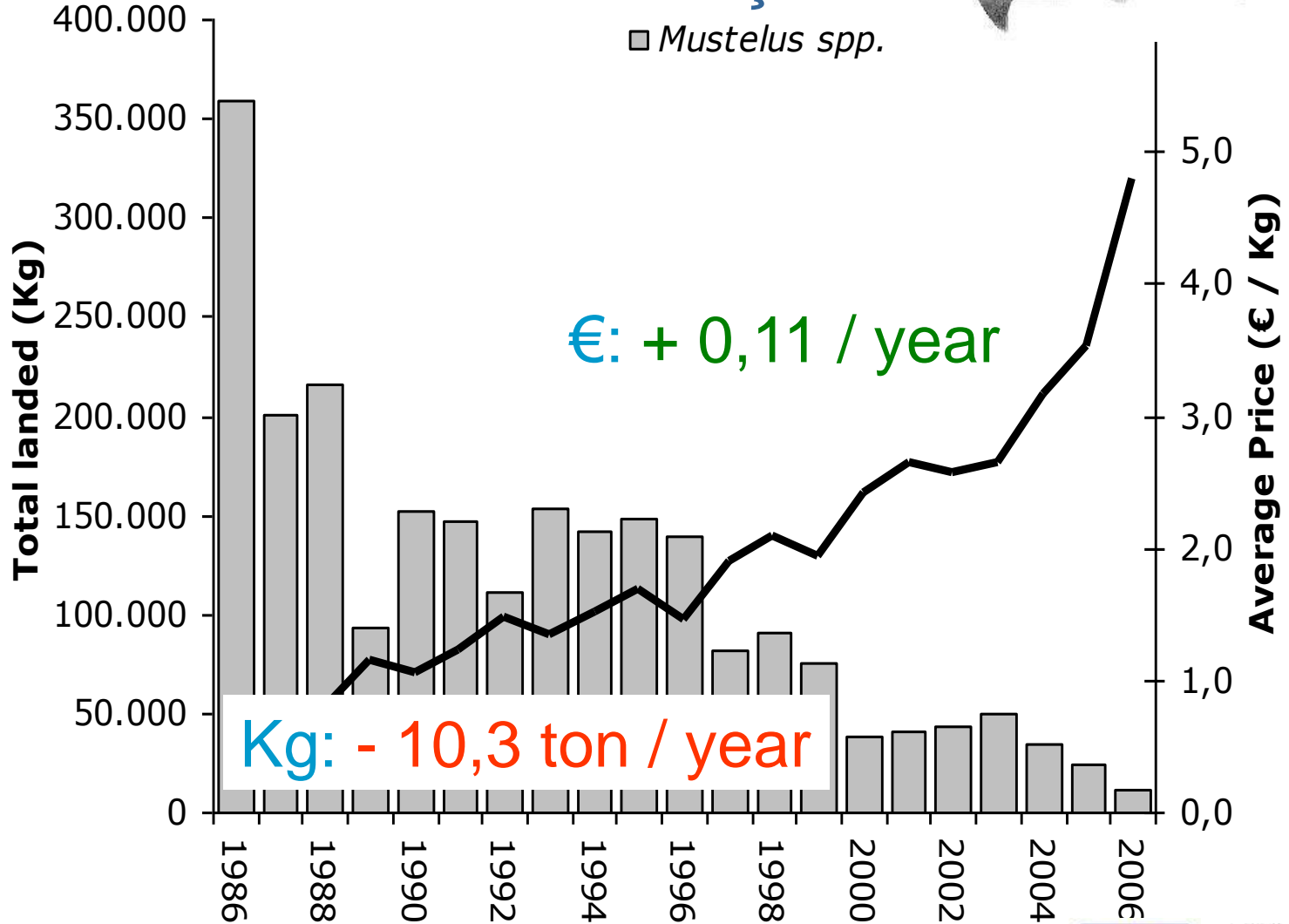


Blue shark – Tintureira (Nazaré, June 2003)

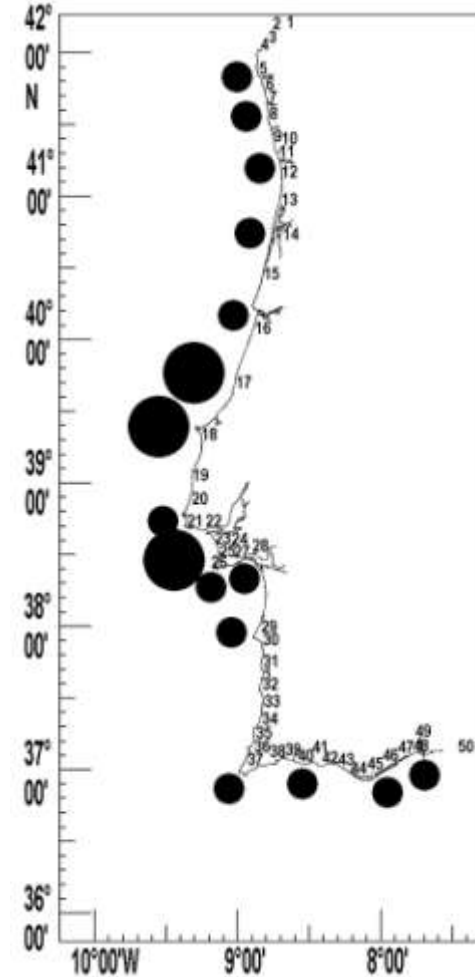
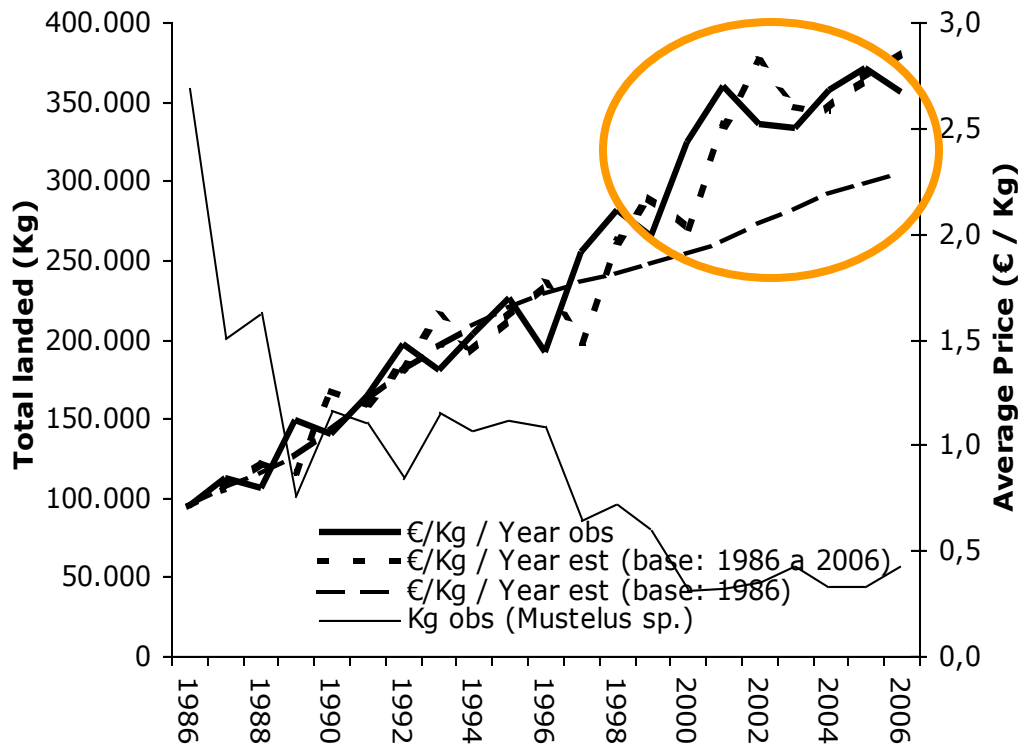
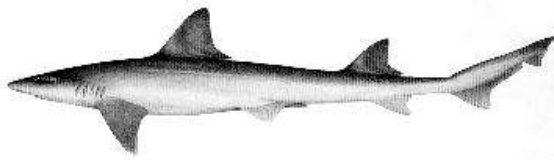


Smouthounds - Cações

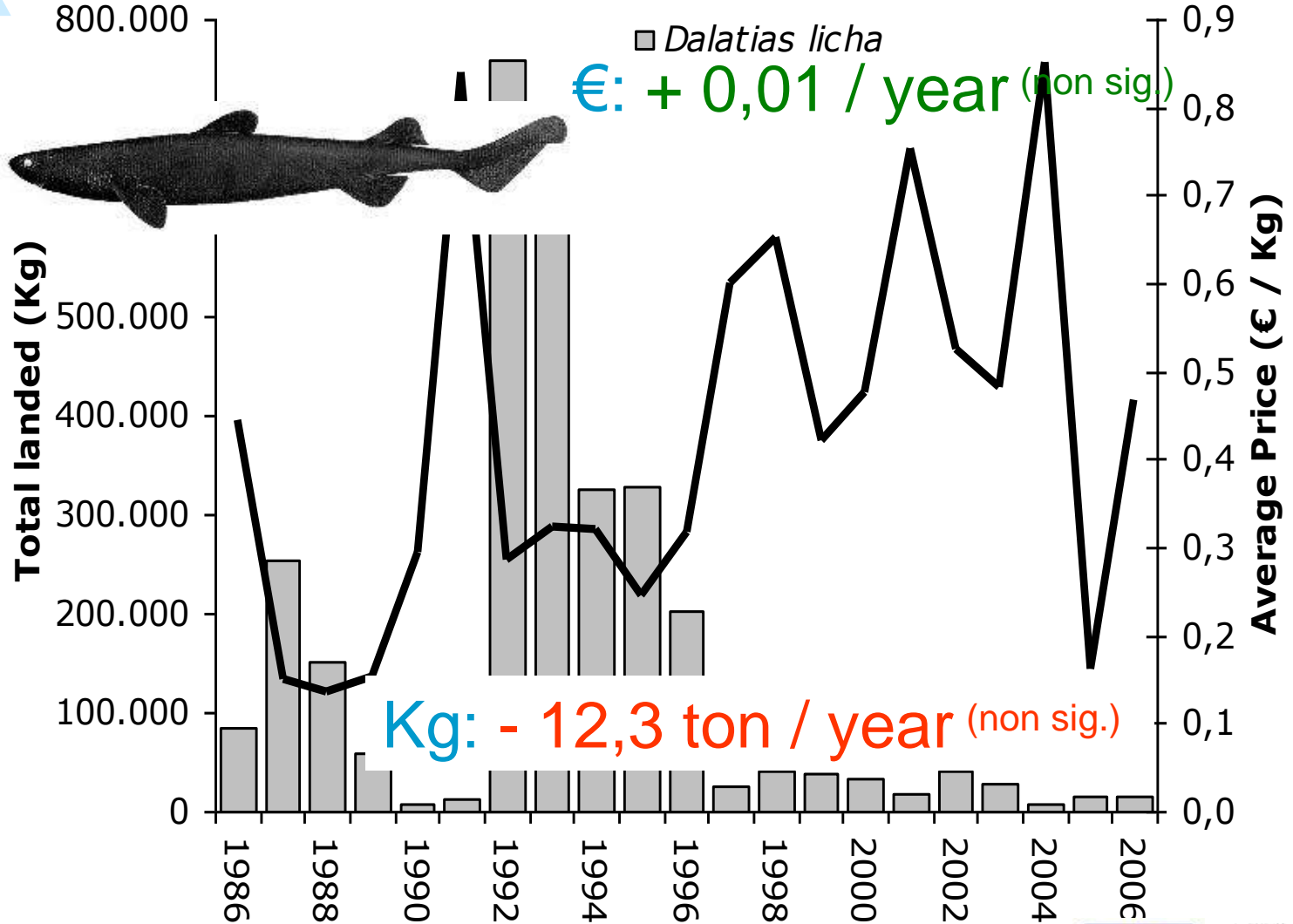
Least Concern



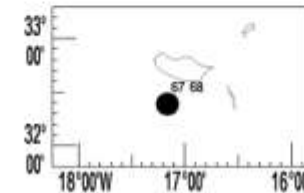
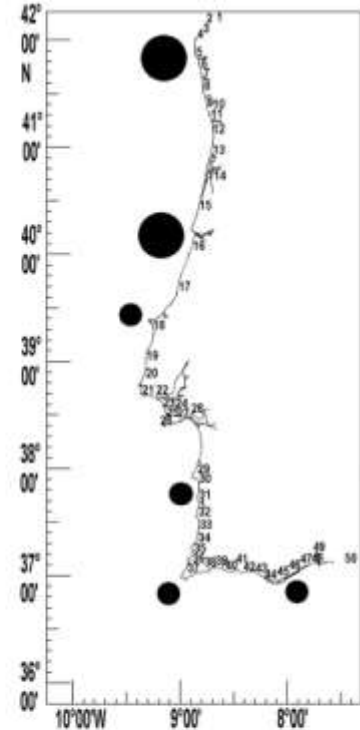
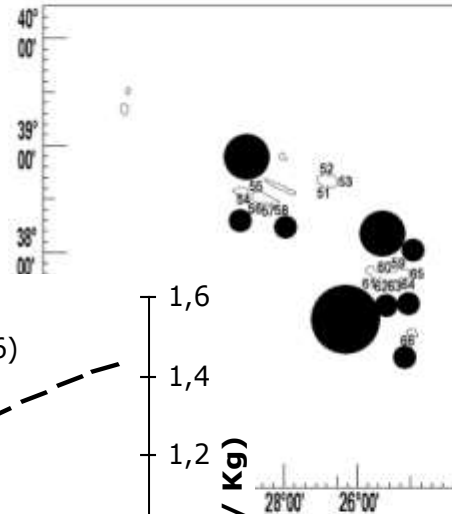
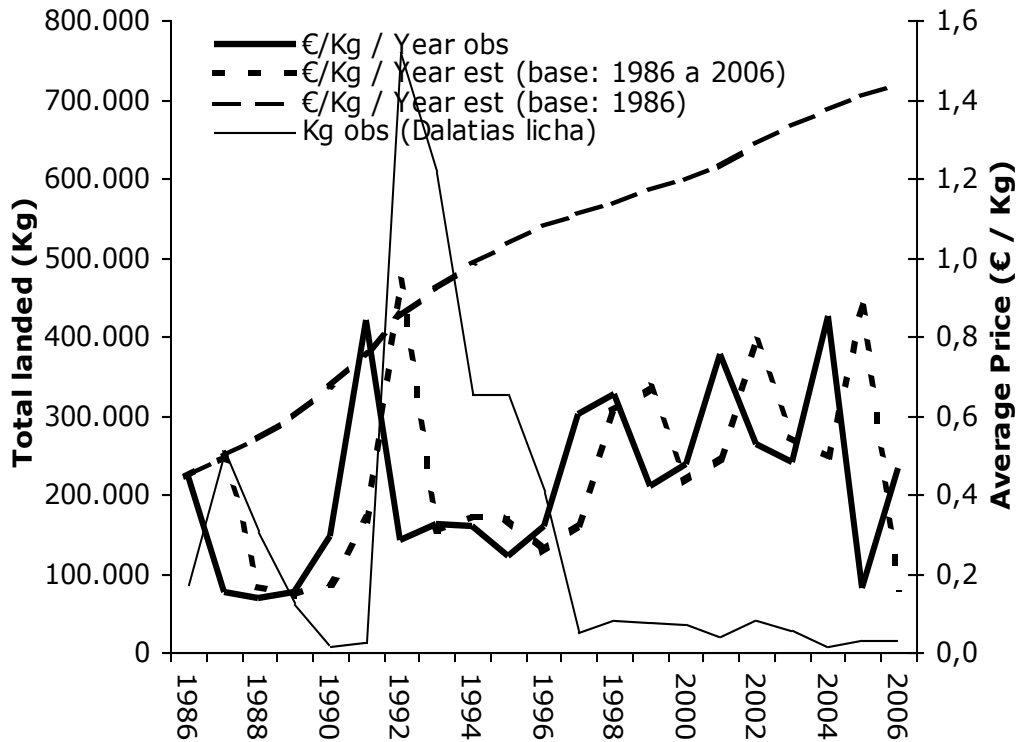
Smouthounds - Cações



Kitefin shark - Gata



Kitefin shark - Gata

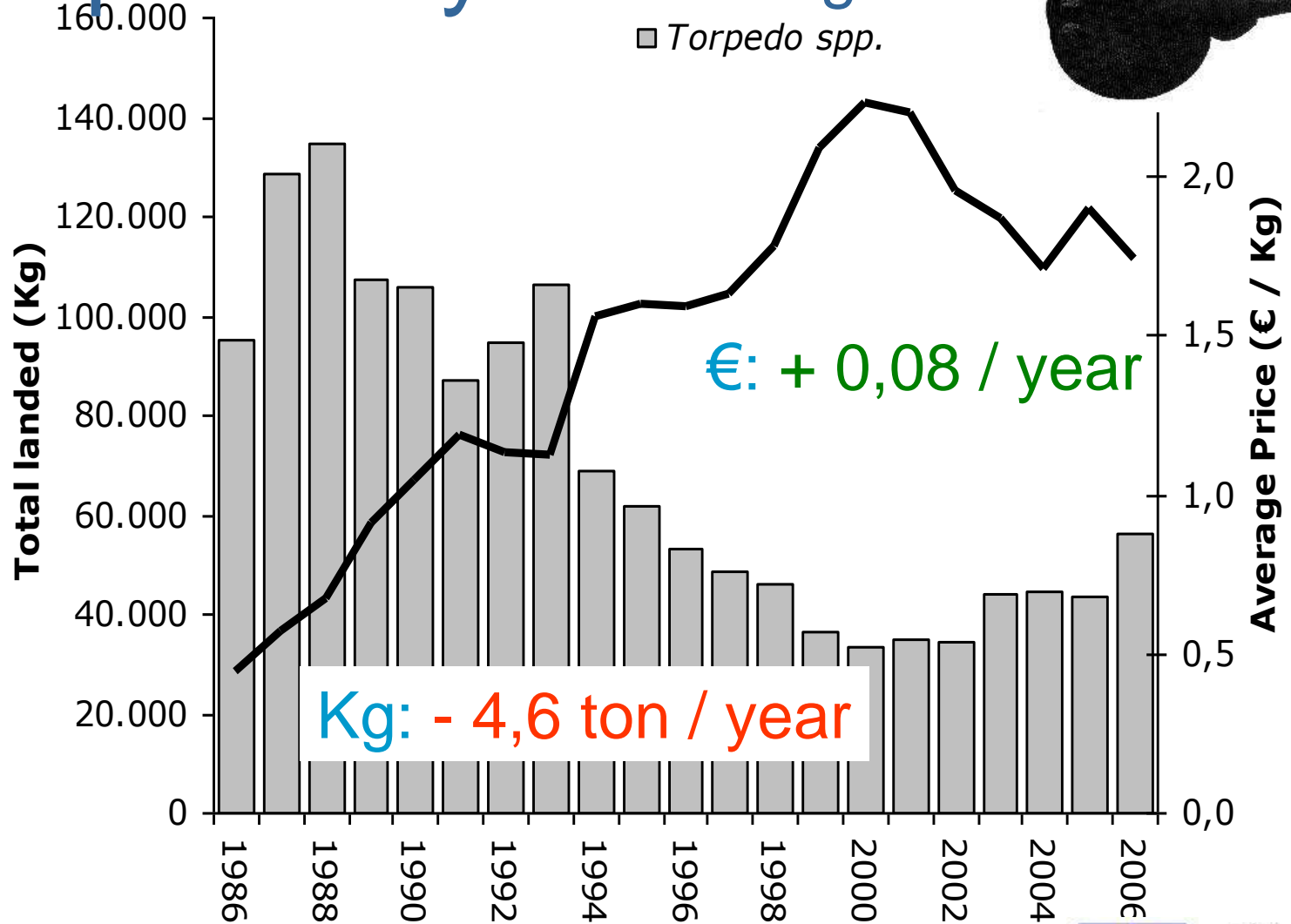
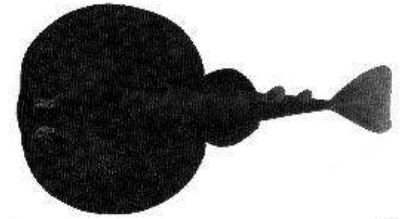


Kitefin shark - Gata (Sesimbra, January 2004)

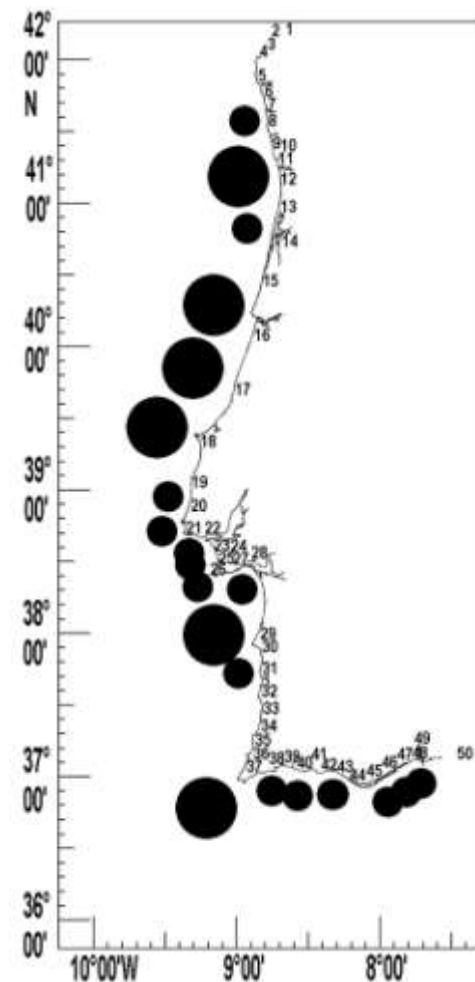
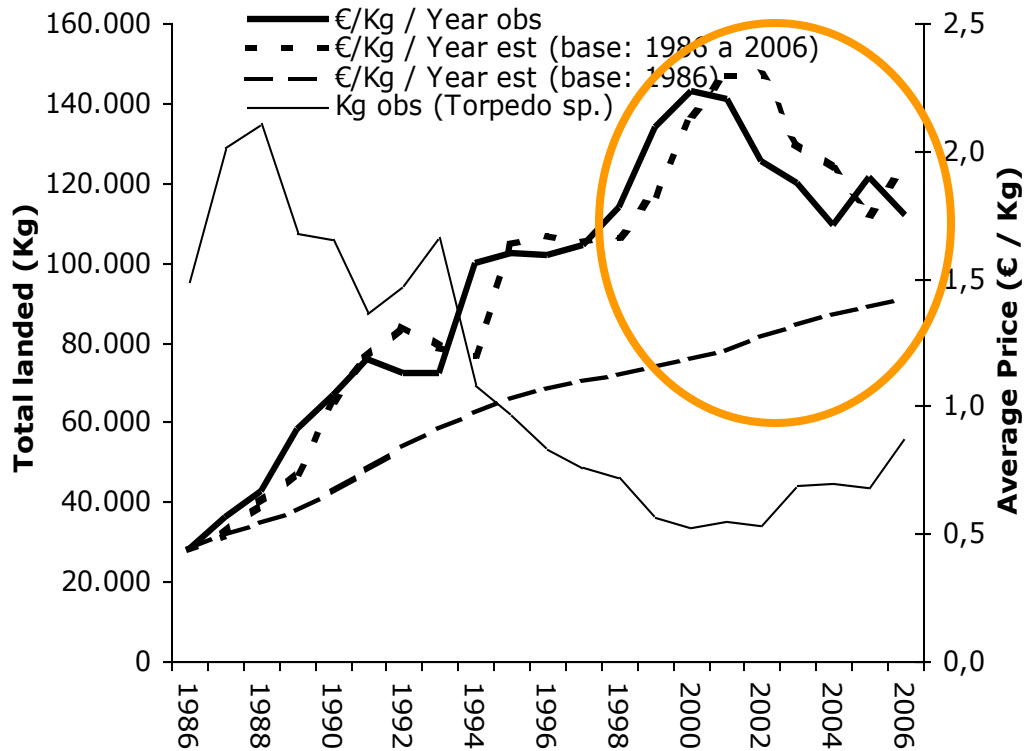
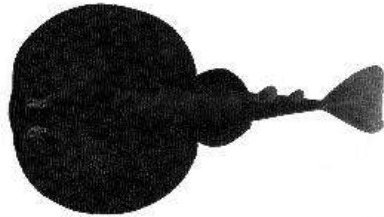


Torpedo rays - Tremelgas

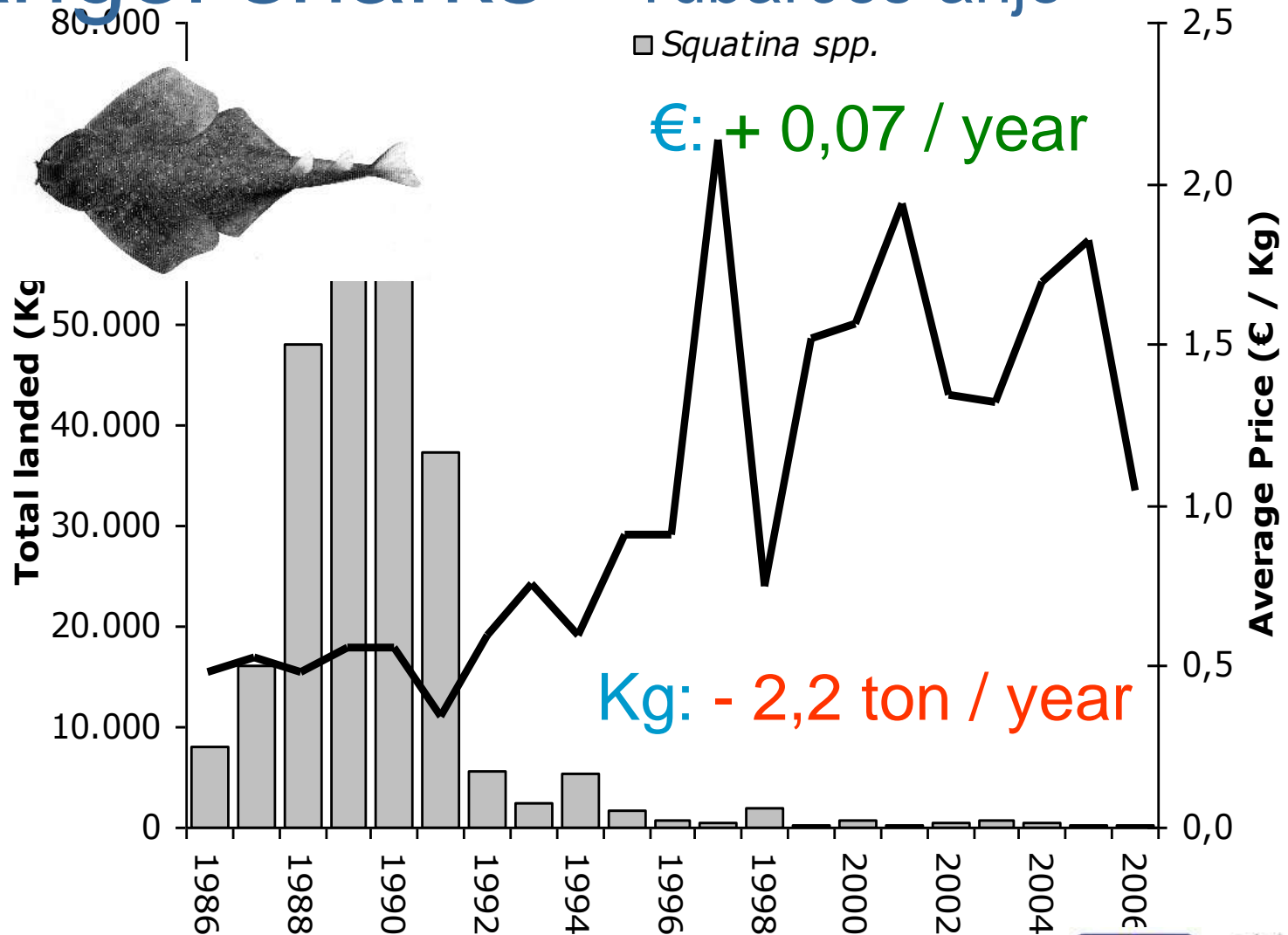
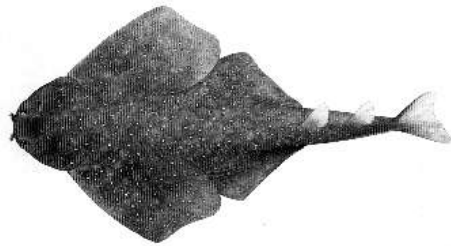
Not listed



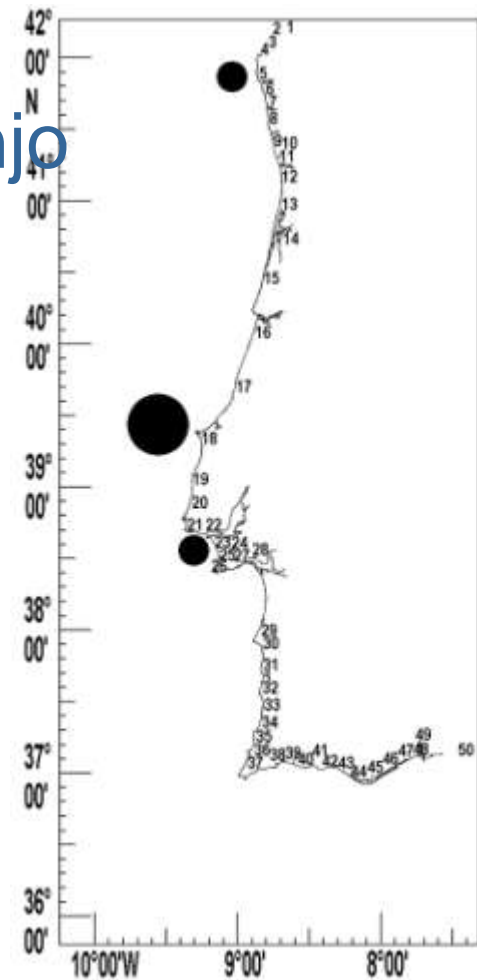
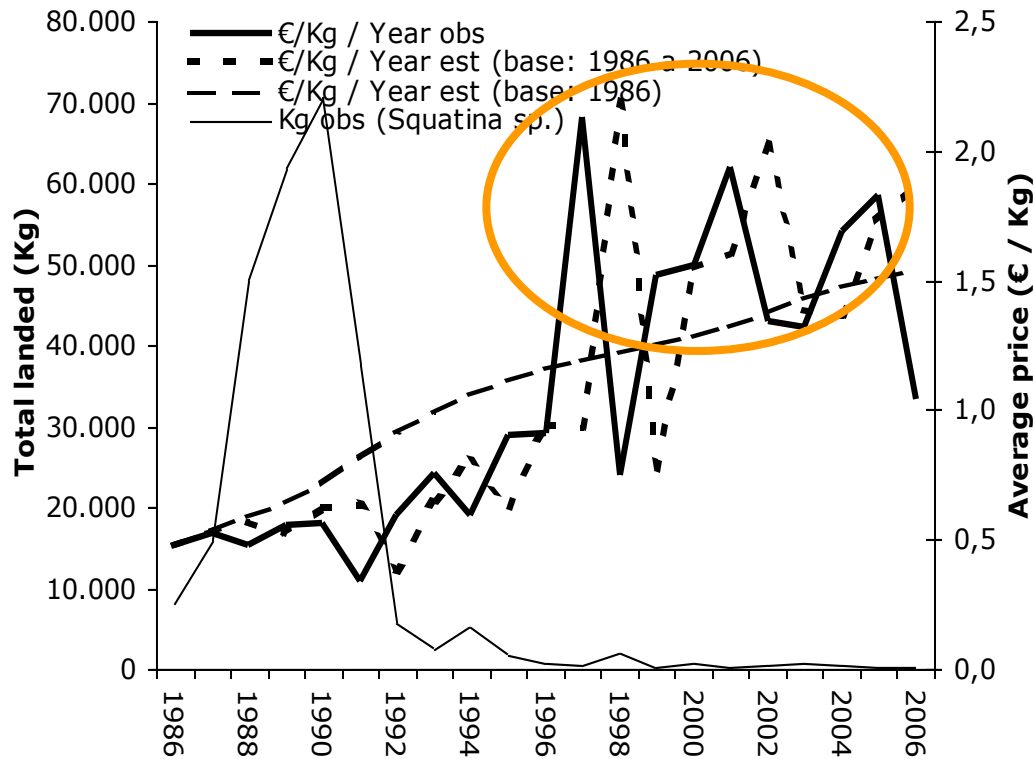
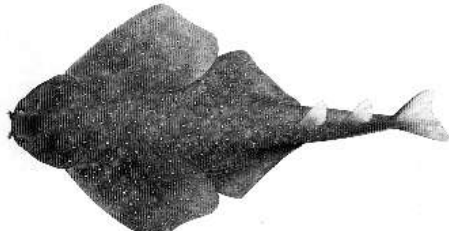
Torpedo rays - Tremelgas



Angel sharks – Tubarões-anjo



Angel sharks – Tubarões-anjo



Blackmouth catshark – Leitão

(R/V “Noruega” September 1996)



Sixgill shark – Tubarão-albafar

(Sesimbra 1997)



Shortfin mako – Anequim

(Peniche, August 2003)



Smooth hammerhead and Bigeye thresher – Martelo & Raposo (Olhão, September 2006)



Summary

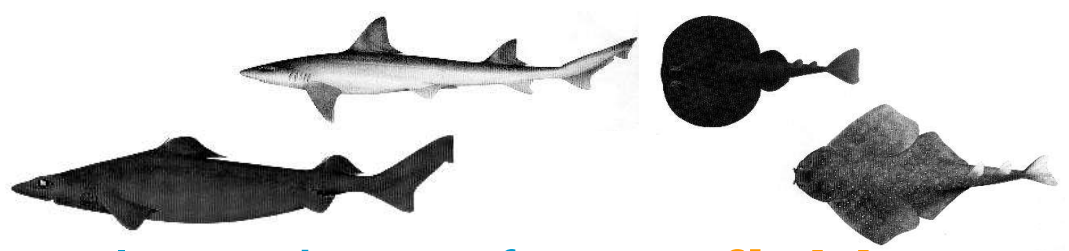
Category I – Kg ▼ € / Kg ▲

Category II – Kg ▲ € / Kg ▲

Category III – non sig.

Taxa	Kg	Euros	€ / Kg	Kg / year				€ / Kg / year				Category		
				Kg/year	n	r ²	F	€ / Kg / year	n	r ²	F	I	II	III
<i>Raja</i> sp.	35.613.497	65.437.179 €	1,84 €	-18.184	21	0,16	0,07	€ 0,10	21	0,90	0,00			III
<i>Scyliorhinus</i> sp.	13.131.944	6.501.215 €	0,50 €	10.492	21	0,00	0,00	€ 0,10	21	0,90	0,00		II	
<i>Centroscymnus coelolepis</i>	12.757.799	12.732.898 €	1,00 €	5.598	21	0,04	0,36	€ 0,04	21	0,78	0,00			III
<i>Centrophorus squamosus</i>	10.853.760	15.581.987 €	1,44 €	4.252	21	0,09	0,19	€ 0,08	21	0,88	0,00			III
<i>Centrophorus granulosus</i>	9.774.175	10.684.253 €	1,09 €	-55.874	21	0,76	0,00	€ 0,11	21	0,70	0,00	I		
<i>Prionace glauca</i>	8.686.826	6.564.840 €	0,76 €	18.059	21	0,47	0,00	€ 0,04	21	0,72	0,00		II	
<i>Dalatias licha</i>	3.060.010	920.923 €	0,30 €	-12.290	21	0,14	0,10	€ 0,01	21	0,17	0,06			III
<i>Mustelus</i> sp.	2.477.966	3.500.011 €	1,41 €	-10.335	21	0,69	0,00	€ 0,11	21	0,96	0,00	I		
<i>Isurus oxyrinchus</i>	1.962.409	7.026.383 €	3,58 €	8.987	21	0,32	0,01	€ 0,14	21	0,69	0,00		II	
<i>Pleurotremata</i>	1.682.042	1.170.323 €	0,70 €	-6.980	21	0,27	0,02	€ 0,02	21	0,03	0,42			III
<i>Torpedo</i> sp.	1.465.716	1.827.424 €	1,25 €	-4.581	21	0,74	0,00	€ 0,08	21	0,78	0,00	I		
<i>Oxynotus centrina</i>	1.429.425	1.085.259 €	0,76 €	3.720	21	0,17	0,06	€ 0,06	21	0,63	0,00			III
<i>Galeorhinus</i> sp.	1.405.766	1.951.285 €	1,39 €	-4.749	15	0,41	0,01	€ 0,03	15	0,28	0,04			III
<i>Carcharhinus</i> sp.	1.188.262	408.369 €	0,34 €	-17.009	0	0,46	0,01	€ 0,10	14	0,34	0,03			III
<i>Galeus melastomus</i>	610.363	346.949 €	0,57 €	1.366	21	0,53	0,00	€ 0,03	21	0,65	0,00		II	
<i>Deania calcea</i>	609.646	686.107 €	1,13 €	15.504	7	0,44	0,10	€ 0,03	7	0,14	0,41			III
<i>Atopias vulpinus</i>	550.549	541.608 €	0,98 €	609	21	0,02	0,50	€ 0,04	21	0,47	0,00			III
<i>Myliobatis aquila</i>	363.887	304.189 €	0,84 €	-242	21	0,06	0,27	€ 0,03	21	0,54	0,00			III
<i>Squatina</i> sp.	263.999	140.423 €	0,53 €	-2.174	21	0,38	0,00	€ 0,07	21	0,59	0,00	I		
<i>Sphyrna</i> sp.	222.002	227.894 €	1,03 €	-286	0	0,05	0,32	€ 0,02	21	0,19	0,05			III
<i>Squalus acanthias</i>	108.354	128.040 €	1,18 €	80	21	0,05	0,34	€ 0,07	21	0,36	0,00			III
Óleos	99.800	47.300 €	0,47 €	n.d.	2	n.d.	n.d.	n.d.	2	n.d.	n.d.			III
<i>Dasyatis</i> sp.	81.770	75.157 €	0,92 €	-299	21	0,15	0,08	-€ 0,01	21	0,07	0,23			III
<i>Gymnura altavela</i>	67.202	97.787 €	1,46 €	195	20	0,32	0,01	€ 0,01	20	0,02	0,51			III
<i>Hexanchus griseus</i>	60.751	25.461 €	0,42 €	217	21	0,21	0,04	n.d.	20	n.d.	n.d.			III
<i>Lamna nasus</i>	37.906	61.877 €	1,63 €	-38	21	0,04	0,37	€ 0,06	21	0,31	0,01			III
<i>Fígados</i>	37.813	16.775 €	0,44 €	n.d.	2	n.d.	n.d.	n.d.	2	n.d.	n.d.			III
<i>Somniosus microcephalus</i>	23.495	14.907 €	0,63 €	n.d.	12	n.d.	n.d.	n.d.	12	n.d.	n.d.			III
<i>Centroscymnus crepidater</i>	20.098	7.955 €	0,40 €	494	7	0,30	0,20	-€ 0,02	7	0,13	0,44			III
<i>Cetorhinus maximus</i>	13.444	4.115 €	0,31 €	34	20	0,13	0,12	€ 0,00	20	0,01	0,74			III
<i>Echinorhinus brucus</i>	7.010	5.677 €	0,81 €	n.d.	17	n.d.	n.d.	n.d.	17	n.d.	n.d.			III
<i>Etmopterus</i> spp.	2.508	2.904 €	1,16 €	-12	12	0,08	0,37	€ 0,05	12	0,13	0,24			III
<i>Heptranchias perlo</i>	334	372 €	1,12 €	n.d.	5	n.d.	n.d.	n.d.	5	n.d.	n.d.			III

Conclusion



- Some species show clear signs of **over-fishing**
- *Shark Action Plan* – **priority!**
- Biological sampling - **continue**
- Catch and Effort analysis – **declare CPUE** (diplomacy)



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