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**Distribution and relative abundance of demersal
fishes from beam trawl surveys in the
eastern English Channel (ICES division VIId) and the
southern North Sea (ICES division IVc) 1993-2001**

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1. EASTERN ENGLISH CHANNEL FISHERIES

ICES division VIIId supports important fisheries for demersal and pelagic finfish and shellfish.

Most of the otter trawlers in the area are French, and these fisheries land cod *Gadus morhua*, whiting *Merlangius merlangus*, lemon sole *Microstomus kitt*, sole *Solea solea*, and skates and rays (Rajidae). The offshore fleet also undertakes a winter fishery that lands a major part of plaice catch (*Pleuronectes platessa*).

The beam trawl fishery in the eastern English Channel involves offshore vessels from Belgium and the UK. Both fleets mainly target sole but take significant amount of plaice as by-catch. Other species landed include rays, anglerfish (*Lophius piscatorius*), brill *Scophthalmus rhombus* and turbot *S. maximus*.

A large proportion of this area lies within the 12-mile coastal zone, and is exploited by small-scale fisheries. These fisheries are often undertaken by small inshore boats that deploy a variety of gears, including otter trawls or fixed nets (especially trammel nets). Targeted species include cod, bass *Dicentrarchus labrax*, grey mullet (Mugilidae), sole, plaice and rays. Other non-quota species, such as black bream *Spondylus cantharus* and red mullet *Mullus surmuletus*, are becoming increasingly important in local areas.

There are also important fisheries for shellfish, notably scallop *Pecten maximus* and oyster *Ostrea edulis*, and pot fisheries for edible crab *Cancer pagurus*, lobster *Homarus gammarus* and whelk *Buccinum undatum*. Fisheries for cuttlefish *Sepia officinalis* and spider crab *Maja squinado* have increased in recent years.

Pelagic trawl fisheries target herring *Clupea harengus* in the winter, during their spawning season, but also land mackerel *Scomber scombrus*, horse mackerel *Trachurus trachurus* and sprat *Sprattus sprattus*. The fisheries of the area were described by Pawson *et al.* (2002), and Tétard and Boon *et al.* (1995).

Table 1 shows the landings (all gears combined) of demersal finfish and shellfish by UK vessels landing into England and Wales. The data covers the period 1993 to 2001, and covers the most commercially important species for ICES division VIIId.

2. HISTORY OF THE SURVEY

Fisheries science is dependent upon accurate fisheries and biological data to assess the status of fish stocks. In addition to landings information and biological data collected from commercial landings, it is also necessary to collect fishery-independent data describing the distribution and relative abundance of fishes, including juveniles, and further biological sampling of commercial species. This is achieved by conducting standardised scientific surveys of the relevant fish stocks and areas. CEFAS conducts surveys around the coast of England and Wales using a variety of fishing gears, to collect fisheries-independent indices of stock abundance. These data are integrated into the stock assessments carried out under the auspices of ICES (International Council for Exploration of the Sea) Assessment Working Groups. See www.ices.dk for more information.

The CEFAS eastern English Channel beam trawl survey has taken place every summer since 1989, and covers the eastern English Channel (ICES division VIIId) and parts of the southern North Sea (IVc). The survey was initially designed to provide abundance indices for pre-recruit (1 and 2 year old) plaice and sole, while also providing abundance and length data for all species caught, and age and other biological data for commercially important species. *RV CORYSTES* has been used for all the surveys. Due to minor inconsistencies in the sampling grid before 1993, this report only uses data from 1993 onwards, during which time the position of sampling stations and tow length have been most consistent.

Whereas this report focuses on data collected from the English Channel, data for the southern North Sea are included in the Appendix.

3. CURRENT SURVEY OBJECTIVES

The primary objectives of the eastern English Channel beam trawl survey are to (a) carry out a 4 m beam-trawl survey of groundfish to i) obtain fisheries independent data on the distribution and abundance of commercial flatfish species, and ii) derive age compositions of sole and plaice for use in the assessment of stock size; and (b) to collect biological data, including maturity and weight at age, for sole, plaice, lemon sole and other

Table 1. Demersal and shellfish landings from all gears, by UK vessels landing into England and Wales from 1993-2001

Species	1993			1994			1995		
	Weight (tonnes)	Value (£1000s)	Price per kg (£/kg)	Weight (tonnes)	Value (£1000s)	Price per kg (£/kg)	Weight (tonnes)	Value (£1000s)	Price per kg (£/kg)
Anglerfish	67	118	1.76	44	78	1.80	47	82	1.75
Brill	56	217	3.90	52	228	4.37	68	250	3.69
Bass	99	666	6.71	233	1187	5.08	273	1418	5.18
Cod	522	690	1.32	264	348	1.32	331	400	1.21
Conger eel	9	8	0.86	4	3	0.89	4	4	0.96
Dab	83	28	0.34	51	22	0.43	35	16	0.46
Spurdog	39	31	0.80	39	25	0.63	27	14	0.53
Flounder	67	16	0.24	77	15	0.20	38	8	0.21
Haddock	0	0	0.80	1	2	1.22	2	1	0.92
Hake	1	2	1.79	5	15	3.19	3	9	3.40
John dory	3	8	2.62	3	10	3.04	2	8	3.47
Lemon sole	67	177	2.66	89	254	2.84	148	427	2.88
Ling	10	6	0.66	12	8	0.66	10	5	0.52
Megrim	1	1	1.45	6	16	2.55	7	20	2.64
Red mullet	14	79	5.49	9	55	6.10	55	242	4.40
Plaice	1037	1245	1.20	920	1132	1.23	746	928	1.24
Saithe	1	1	0.73	1	1	0.75	0	0	0.64
Pollock	134	95	0.71	67	47	0.71	46	32	0.70
Sole	578	2717	4.70	656	2964	4.52	640	3111	4.86
Sand sole	3	6	2.13	3	7	2.36	3	6	2.12
Turbot	35	187	5.36	26	150	5.69	34	200	5.90
Whiting	320	173	0.54	262	135	0.51	276	131	0.48
Witch	0	0	0.86	0	0	0.84	0	0	1.11
Mixed demersal	77	45	0.58	226	148	0.66	219	142	0.65
Mixed gurnards	80	26	0.33	69	34	0.50	53	20	0.38
Mixed mullets	39	25	0.64	79	81	1.02	114	113	0.99
Dogfish, hounds and sharks	79	56	0.71	80	45	0.56	88	36	0.41
Skates and rays	198	161	0.81	153	138	0.90	139	122	0.88
Total demersal landings	3618	6786		3434	7148		3408	7748	
Clams	246	292	1.19	36	118	3.24	134	268	2.01
Cockles	1	0	0.35	1	1	0.44	1	0	0.50
Edible crab	1118	1201	1.07	1839	1910	1.04	1973	2138	1.08
Loster	131	1072	8.21	145	1345	9.25	168	1531	9.12
Mussels	306	161	0.53	797	464	0.58	2200	1430	0.65
Oyster	348	402	1.16	468	824	1.76	482	767	1.59
Periwinkles	63	25	0.40	6	2	0.37	49	24	0.50
Scallops	394	545	1.38	743	1063	1.43	797	1092	1.37
Spider crab	111	109	0.99	587	515	0.88	1237	973	0.79
Whelk	105	22	0.21	70	19	0.28	270	76	0.28
Squid	93	228	2.47	71	227	3.21	79	209	2.63
Total shellfish landings	2914	4057		4764	6488		7388	8508	

Table 1. continued: Demersal and shellfish landings from all gears, by UK vessels landing into England and Wales from 1993-2001

Species	1996			1997			1998		
	Weight (tonnes)	Value (£1000s)	Price per kg (£/kg)	Weight (tonnes)	Value (£1000s)	Price per kg (£/kg)	Weight (tonnes)	Value (£1000s)	Price per kg (£/kg)
Anglerfish	49	88	1.79	44	79	1.79	23	46	1.98
Brill	74	333	4.51	59	255	4.33	61	256	4.19
Bass	229	1245	5.44	252	1394	5.52	232	1264	5.45
Cod	409	462	1.13	475	549	1.16	616	706	1.15
Conger eel	6	6	0.89	8	7	0.86	8	7	0.87
Dab	45	24	0.53	51	25	0.49	48	25	0.52
Spurdog	19	10	0.55	16	9	0.58	54	34	0.63
Flounder	39	8	0.21	60	11	0.18	45	10	0.21
Haddock	1	1	1.08	2	2	1.10	0	0	0.81
Hake	1	2	2.99	1	4	3.01	1	1	2.25
John dory	1	3	3.95	1	4	3.64	1	3	3.36
Lemon sole	207	586	2.83	108	297	2.75	91	284	3.14
Ling	9	4	0.46	7	4	0.59	7	4	0.63
Megrim	4	10	2.53	1	2	2.02	1	1	1.27
Red mullet	26	101	3.95	33	122	3.65	75	209	2.79
Plaice	830	1132	1.36	1055	1391	1.32	688	955	1.39
Saithe	0	0	0.68	0	0	0.71	1	1	0.76
Pollock	26	18	0.69	25	19	0.77	46	34	0.75
Sole	857	4687	5.47	908	5458	6.01	800	5529	6.91
Sand sole	4	7	1.95	5	10	1.91	4	8	2.15
Turbot	34	214	6.31	22	160	7.33	23	165	7.01
Whiting	188	85	0.45	143	69	0.48	178	80	0.45
Witch	0	0	1.04	0	0	0.71	0	0	0.97
Mixed demersal	113	61	0.54	61	34	0.56	102	59	0.57
Mixed gurnards	32	16	0.49	45	20	0.45	53	20	0.37
Mixed mullets	49	41	0.85	82	73	0.89	68	64	0.95
Dogfish, hounds and sharks	120	42	0.35	117	39	0.33	196	86	0.44
Skates and rays	147	136	0.92	159	162	1.02	169	159	0.94
Total demersal landings	3519	9324		3740	10200		3224	9764	
Clams	12	67	5.44	75	150	2.00	14	52	3.72
Cockles	2	1	0.48	1	1	1.48	29	18	0.62
Edible crab	1320	1674	1.27	1554	1698	1.09	1325	1459	1.10
Loster	94	978	10.36	100	881	8.80	117	1104	9.46
Mussels	900	585	0.65	700	455	0.65	620	217	0.35
Oyster	504	834	1.65	483	691	1.43	1019	1205	1.18
Periwinkles	1	0	0.50	1	1	0.70	2	1	0.82
Scallops	786	1039	1.32	597	698	1.17	1315	1604	1.22
Spider crab	575	489	0.85	652	532	0.82	537	434	0.81
Whelk	1376	524	0.38	632	212	0.34	470	144	0.31
Squid	26	67	2.52	62	168	2.68	75	192	2.57
Total shellfish landings	5596	6259		4858	5487		5522	6431	

Table 1. continued: Demersal and shellfish landings from all gears, by UK vessels landing into England and Wales from 1993-2001

Species	1999			2000			2001		
	Weight (tonnes)	Value (£1000s)	Price per kg (£/kg)	Weight (tonnes)	Value (£1000s)	Price per kg (£/kg)	Weight (tonnes)	Value (£1000s)	Price per kg (£/kg)
Anglerfish	9	21	2.31	6	15	2.56	10	22	2.20
Brill	44	196	4.42	64	296	4.62	67	306	4.57
Bass	257	1409	5.48	164	863	5.26	159	800	5.04
Cod	453	565	1.25	384	550	1.43	248	389	1.57
Conger eel	7	6	0.80	20	15	0.76	21	17	0.80
Dab	45	23	0.50	35	16	0.46	41	19	0.47
Spurdog	26	28	1.05	61	49	0.81	48	30	0.62
Flounder	29	5	0.17	39	8	0.19	25	5	0.20
Haddock	0	0	1.53	0	0	1.89	0	1	1.09
Hake	0	0	1.91	0	1	2.01	0	1	2.47
John dory	1	4	3.06	2	6	3.23	2	8	3.87
Lemon sole	89	270	3.04	121	428	3.54	185	665	3.59
Ling	1	1	0.76	2	2	0.80	2	1	0.84
Megrim	0	1	2.21	0	0	2.33	0	0	2.06
Red mullet	37	71	1.91	52	155	2.98	34	147	4.31
Plaice	736	1042	1.42	746	985	1.32	658	1008	1.53
Saithe	0	0	0.82	0	0	0.72	0	0	0.87
Pollock	27	20	0.74	21	16	0.79	25	20	0.81
Sole	768	5230	6.81	620	3704	5.97	821	4902	5.97
Sand sole	1	3	2.28	4	10	2.59	3	8	2.95
Turbot	21	134	6.40	29	202	6.90	29	210	7.16
Whiting	131	56	0.42	115	64	0.56	132	84	0.63
Witch	0	0	0.97	0	0	0.51	0	0	0.92
Mixed demersal	93	56	0.61	12	4	0.32	13	3	0.19
Mixed gurnards	44	15	0.34	65	22	0.33	81	32	0.39
Mulletts	110	172	1.57	45	40	0.88	46	39	0.85
Dogfish, hounds and sharks	168	66	0.39	176	87	0.49	77	47	0.61
Skates and rays	168	162	0.96	165	163	0.99	165	159	0.96
Total demersal landings	2931	9327		2607	7450		2653	8717	
Clams	107	210	1.95	6	8	1.24	73	144	1.95
Cockles	40	26	0.65	0	0	1.06	107	70	0.66
Edible crab	1121	1313	1.17	799	1033	1.29	775	916	1.18
Loster	122	1149	9.40	95	1015	10.71	118	1304	11.09
Mussels	594	558	0.94	950	261	0.27	235	94	0.40
Oyster	680	646	0.95	451	460	1.02	603	738	1.23
Periwinkles	1	1	1.02	4	3	0.81	12	11	0.87
Scallops	2440	2940	1.21	1600	2411	1.51	976	1608	1.65
Spider crab	184	141	0.77	145	126	0.87	145	82	0.56
Whelk	813	244	0.30	1553	556	0.36	2131	848	0.40
Squid	63	157	2.51	40	120	3.00	54	185	3.46
Total shellfish landings	6165	7385		5642	5994		5228	5999	

commercially important species. The epibenthic by-catch from these catches has been quantified since 1997 (e.g. Kaiser *et al.*, 1999; Ellis and Rogers, 2000), and these surveys are also used to collect biological samples in support of other CEFAS projects and training courses.

4. SURVEY METHODS

The standard gear used is a 4 m beam trawl with chain mat, flip up rope, and a 40 mm codend liner to retain small fish. The gear is towed at 4 knots (over the ground) for 30 minutes, averaging 2 nautical miles per tow. Fishing is only carried out in daylight, shooting after sunrise and hauling no later than sunset, as the vertical distribution of some species is known to vary

diurnally. The gear was described and illustrated by Kaiser and Spencer (1994).

Once on board the catch is sorted to species level, with the exception of small gobies and sandeels, which are identified to genus. Species were identified according to Wheeler (1969) and Whitehead *et al.* (1986). Plaice, sole, dab, and elasmobranchs are sorted by sex, all fish categories weighed, and total lengths are measured to the nearest full centimetre below. Area-stratified samples of selected species are sampled for weight, length, sex, maturity, and otoliths or scales removed for ageing. The extent of sampling carried out by species is detailed in Table 2.

Table 2. Sampling protocols for commercial and non-commercial fish and shellfish

Higher taxa	Scientific name	Common name	Total catch				Biological sample				
			Number	Biomass	Length	Sex	Length	Weight	Sex	Maturity	Age
Gadiformes	<i>Gadus morhua</i>	Cod	✓	✓	✓	-	✓	✓	✓	✓	✓
	<i>Melanogrammus aeglefinus</i> §	Haddock	✓	✓	✓	-	✓	✓	✓	✓	✓
	<i>Merlangius merlangus</i>	Whiting	✓	✓	✓	-	✓	✓	✓	✓	✓
	<i>Merluccius merluccius</i> §	Hake	✓	✓	✓	-	✓	✓	✓	✓	✓
Lophiiformes	<i>Lophius piscatorius</i>	Monkfish	✓	✓	✓	-	✓	✓	✓	✓	✓
	<i>Lophius budegassa</i> §	Black bellied angler	✓	✓	✓	-	✓	✓	✓	✓	✓
Perciformes	<i>Dicentrarchus labrax</i>	European sea bass	✓	✓	✓	-	✓	✓	✓	✓	✓
Pleuronectiformes	<i>Lepidorhombus whiffiagonis</i> §	Megrim	✓	✓	✓	✓	✓	✓	✓	✓	✓
	<i>Scophthalmus maximus</i>	Turbot	✓	✓	✓	-	✓	✓	✓	✓	✓
	<i>Scophthalmus rhombus</i>	Brill	✓	✓	✓	-	✓	✓	✓	✓	✓
	<i>Glyptocephalus cynoglossus</i> §	Witch	✓	✓	✓	-	✓	-	-	-	-
	<i>Limanda limanda</i> #	Dab	✓	✓	✓	✓	✓	✓	✓	✓	✓
	<i>Microstomus kitt</i>	Lemon sole	✓	✓	✓	-	✓	✓	✓	✓	✓
	<i>Pleuronectes platessa</i>	Plaice	✓	✓	✓	✓	✓	✓	✓	✓	✓
	<i>Solea solea</i>	Sole	✓	✓	✓	✓	✓	✓	✓	✓	✓
Others	Sharks and dogfishes		✓	✓	✓	✓	-	-	-	-	-
	Skates and rays†		✓	✓	✓	✓	✓	✓	✓	✓	-
	Other fin fish		✓	✓	✓	-	-	-	-	-	-
Shellfish	<i>Homarus gammarus</i>	European Lobster	✓	✓	✓	✓	✓	-	-	-	-
	<i>Nephrops norvegicus</i> §	Nephrops	✓	✓	✓	✓	✓	-	-	-	-
	<i>Maia squinado</i>	Spiny spider crab	✓	✓	-	✓	-	-	-	-	-
	<i>Cancer pagurus</i>	Edible crab	✓	✓	✓	✓	✓	-	-	-	-
	<i>Pecten maximus</i>	Scallop	✓	✓	-	-	-	-	-	-	-
	<i>Sepiolo</i> spp. and <i>Rossia</i> spp.*	Cuttlefish	✓	✓	-	-	-	-	-	-	-
	<i>Sepia</i> spp.*	Cuttlefish	✓	✓	-	-	-	-	-	-	-
	Octopodidae*	Octopus	✓	✓	-	-	-	-	-	-	-
Loliginidae*	Squid	✓	✓	-	-	-	-	-	-	-	

Biological samples taken from 2000 onwards.

† Biological samples taken from 2001 onwards.

* Identified to species level.

§ Not typically recorded in division VIIId

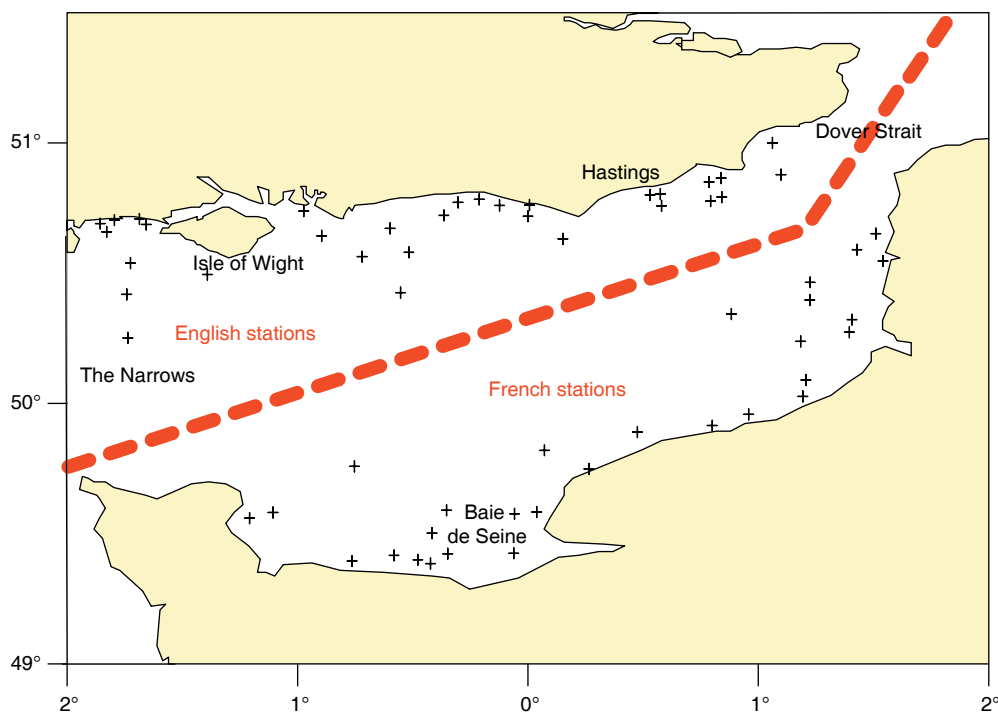


Figure 1. Eastern English Channel, with sectors and fixed sampling stations indicated, and locations mentioned in the text

To account for possible population differences within ICES division VIIId, biological samples are taken from 2 sectors (Figure 1). These are i) the English side of the Channel and ii) the French side of the Channel. Commercial species have length-stratified otolith targets for any combination of sector, sex and depth band.

In all 60 stations were consistently fished in area VIIId in the period 1993–2001 (Figure 1), although the presence of static fishing gear, etc., may have prevented the sampling of certain stations. Additional stations were sampled prior to 1993, but as these stations are not currently fished, they are excluded from this report.

5. PHYSICAL CHARACTERISTICS OF THE AREA

5.1 Depth

The primary bathymetric feature of ICES Division VIIId is a trench running through the centre of the Channel (Figure 2). It is approximately 70 m deep at its maximum depth, but becomes increasingly shallow in the eastern areas. This trench may play an important role for the demersal fish stocks in the area, and stocks from the English and French sides may have different biological characteristics (e.g. growth rates). The remaining area is relatively shallow, with the depth increasing from east to west, and with distance from land.

5.2 Circulation

During the summer the surface water flows into the eastern English Channel from the western English Channel, and out into the southern North Sea. This leads to a general west to east flow that creates a clockwise gyre in the Baie de Seine. In winter the flow changes to a large west to east flow on the French side of the channel, with a smaller east to west flow on the English side. The tidal current speed is relatively high, with the maximum speed varying between 2 and 4 knots. The areas with the greatest tidal currents are the Dover Strait and the ‘narrows’ (the area between the Cherbourg Peninsula and the Isle of Wight).

5.3 Temperature

The water temperature of the eastern English Channel is closely linked to its bathymetry, with the warmest waters found in the shallows in summer, and in the deeper areas in winter (Figure 4). The shallow inshore water has the largest seasonal variation, with the surface temperature ranging between approx 20°C in the summer to approx 6°C in the winter, and the bottom temperature ranging from approx 18°C in summer to 7°C in winter. The deeper eastern English Channel waters are kept relatively warm by the water masses entering the eastern English Channel from the west, which derive from the continuation of the Gulf Stream. This flow is stronger in winter, and there is thus less variation in temperature, from approximately 16°C in summer to 10°C in winter.

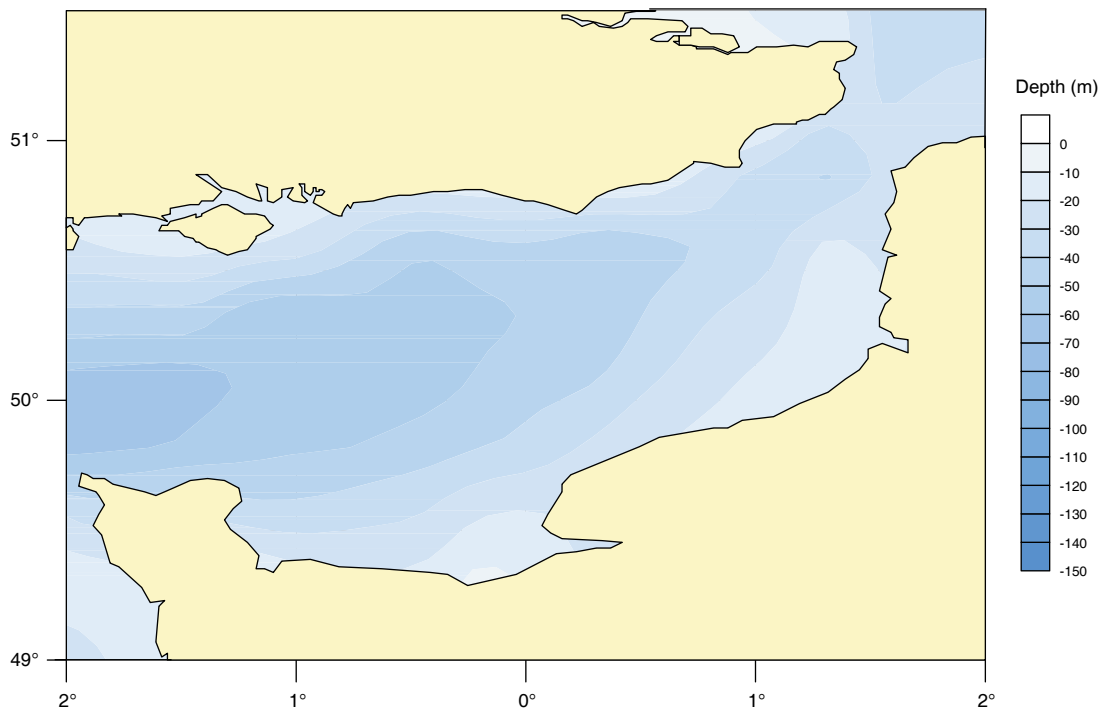


Figure 2. Bathymetry of the eastern English Channel Channel

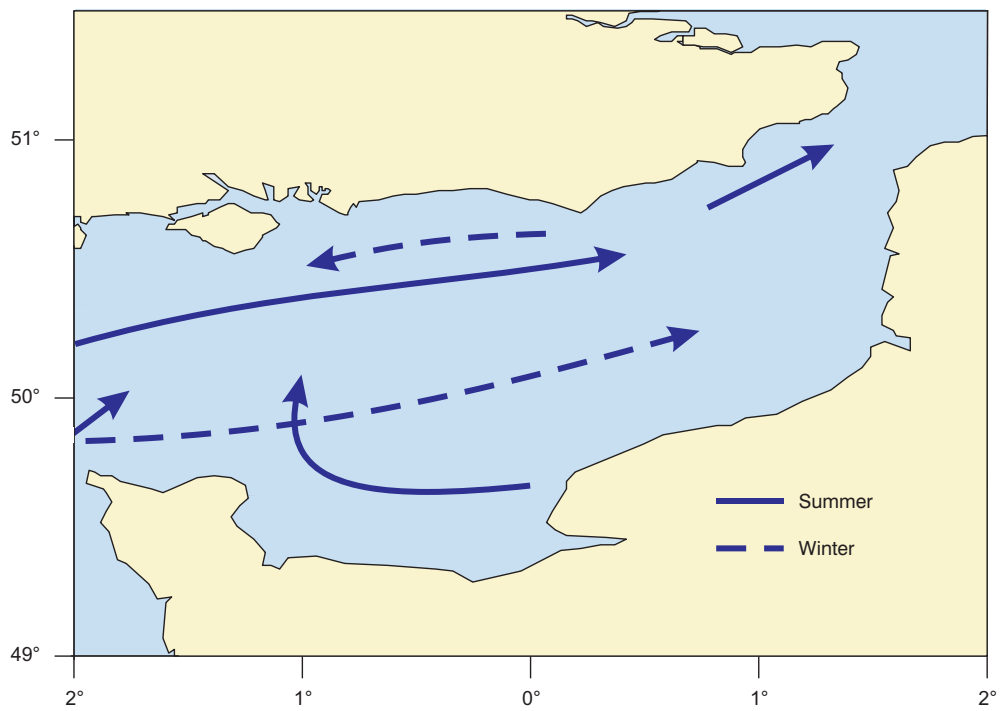


Figure 3. Near surface water circulation. Adapted from Lee and Ramster (1981)

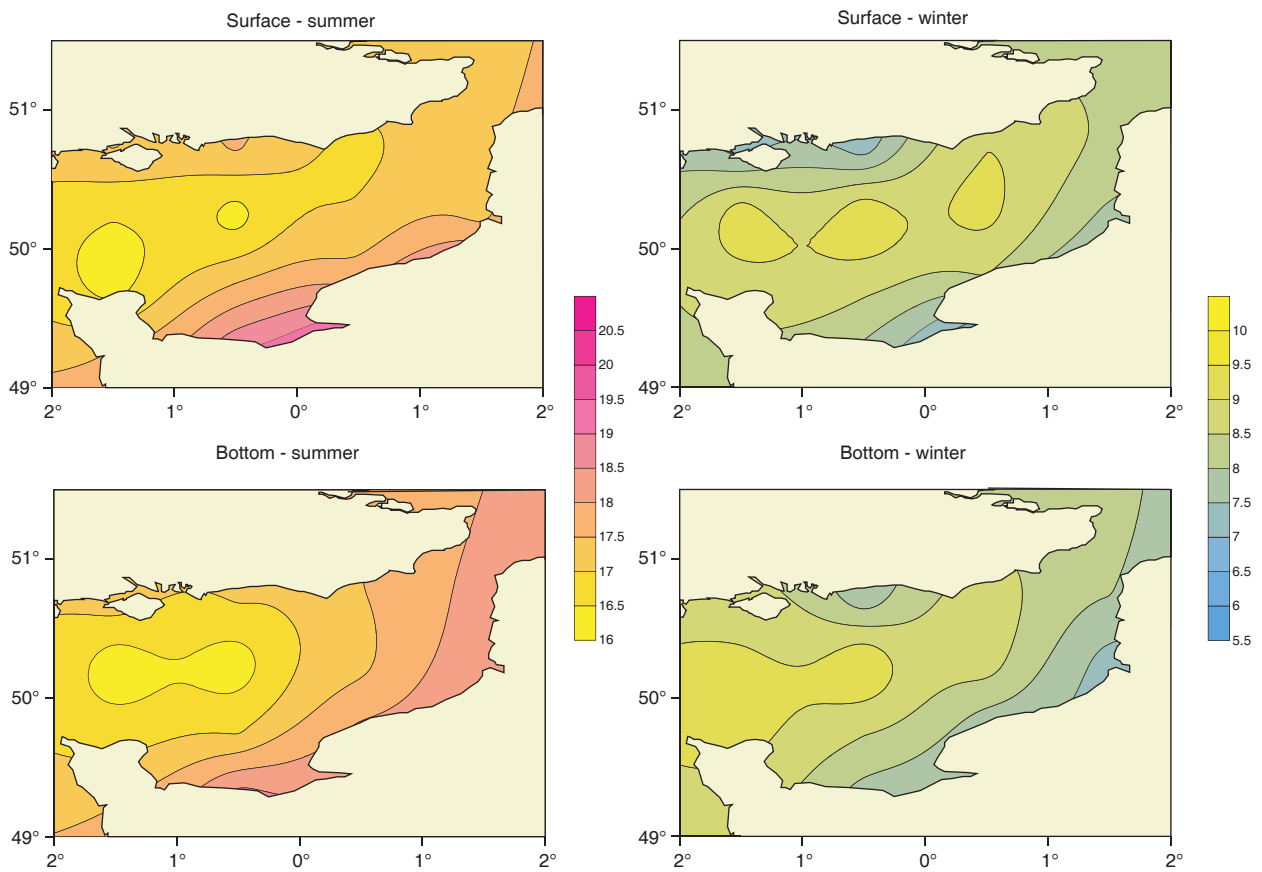


Figure 4. Average near bottom and near surface temperature (1993–2001) for summer (August) and winter (January). Data supplied by ICES

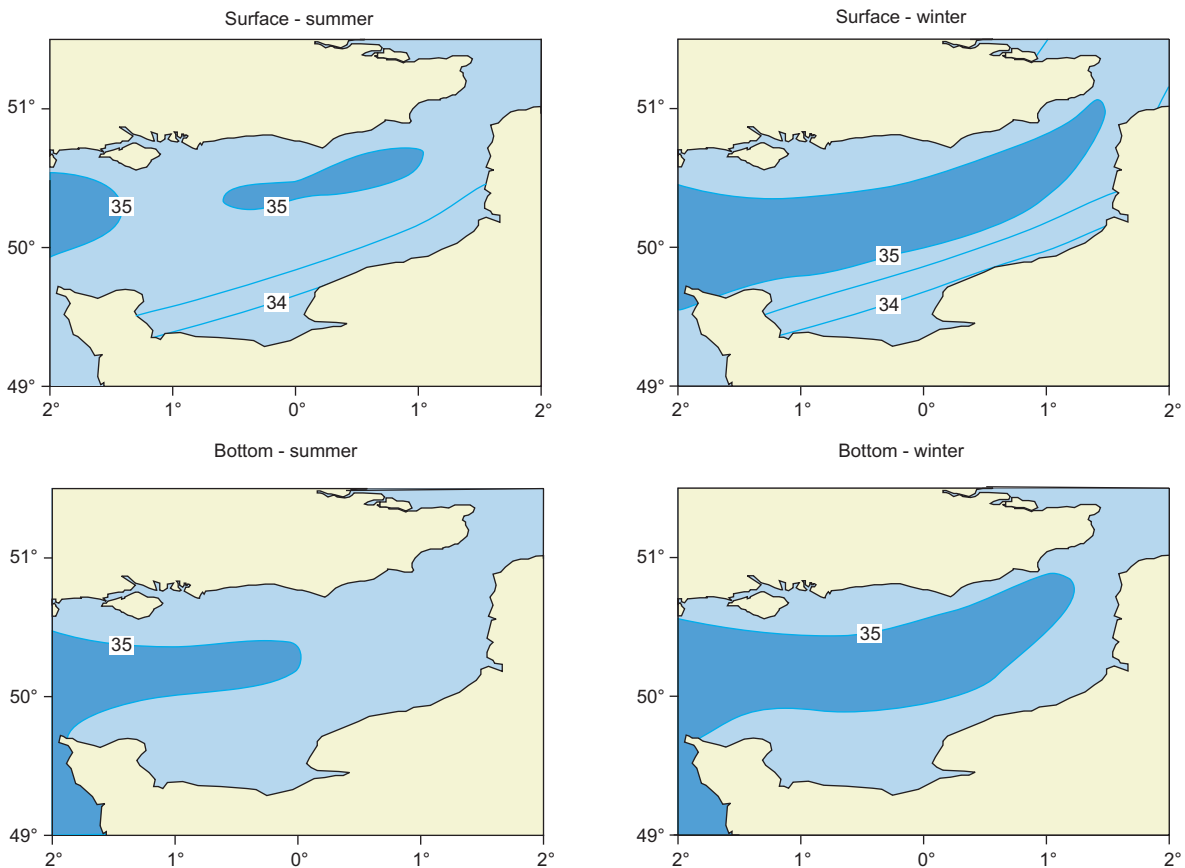


Figure 5. Average near bottom and near surface salinity for summer and winter. Adapted from Lee and Ramster (1981)

5.4 Salinity

Saline North Atlantic water pushing through the Channel produces a west-to-east plume of higher salinity water in the middle of the channel. River runoff from both England and France maintain marginally less saline waters near to their coastlines (Figure 5). The salinity of this area is fairly homogeneous throughout the year, with slightly higher salinities in the deeper areas.

5.5 Sediment type

The distribution of many marine fishes is closely linked to both bathymetry and sediment type. The eastern English Channel (Figure 6) contains a range

of sediments and this allows a great variety of species to inhabit the area. The inshore sediments contain areas of sand and sandy mud, and these are important grounds for sole and plaice, as they are known nursery grounds. Areas of coarser gravely sediments can be found mid-channel, inshore of the Isle of Wight, in the Dover Straits and along areas of the French coast. These habitats are more important for scallops, dogfish and red gurnard. For further information on the benthic ecology of the area, see Holme (1966), Kaiser *et al.* (1999) and Ellis and Rogers (2000). The area also contains several areas that are subject to aggregate extraction, including areas off the English coast (e.g. Hastings, Isle of Wight) and French coast (e.g. Dieppe) (Desprez, 2000).

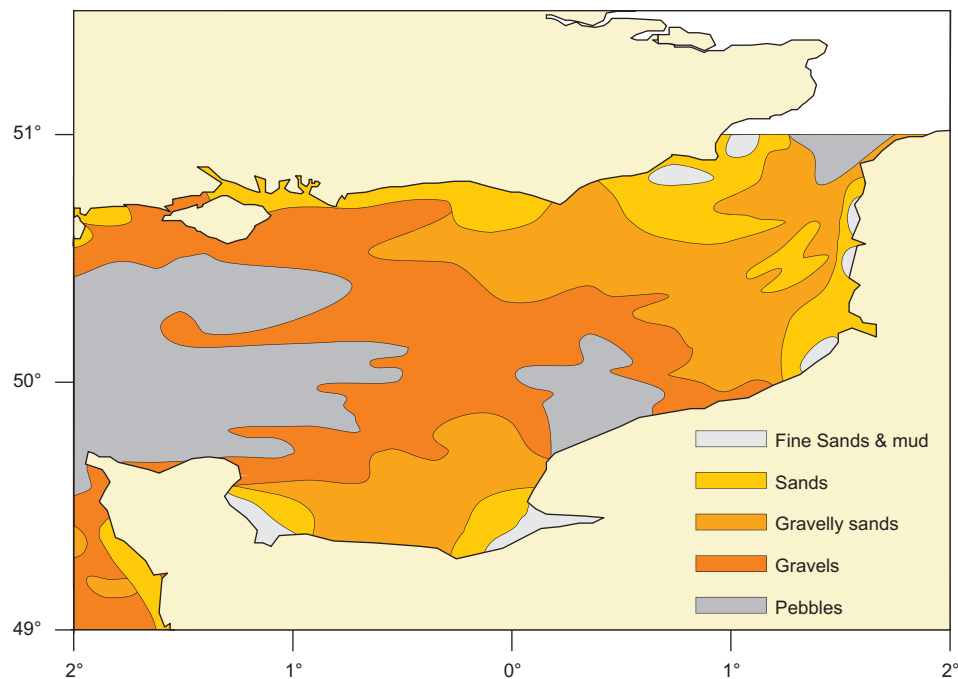


Figure 6. *Distribution of major sediment types in the eastern English Channel*

Table 3. Species recorded by the surveys

Latin name	Common name	Number	% abundance	Weight in kg	% of total weight
<i>Callionymus lyra</i>	Common dragonet	39246	31.57	1017.648	13.53
<i>Buglossidium luteum</i>	Solenette	22117	17.79	321.396	4.27
<i>Trisopterus luscus</i>	Bib	11371	9.15	231.34	3.08
<i>Limanda limanda</i>	Dab	10083	8.11	468.38	6.23
<i>Pleuronectes platessa</i>	European plaice	8890	7.15	2037.256	27.09
<i>Trisopterus minutus</i>	Poor cod	8086	6.50	167.192	2.22
<i>Solea solea</i>	Sole	6252	5.03	859.667	11.43
<i>Agonus cataphractus</i>	Pogge	4814	3.87	45.122	0.60
<i>Arnoglossus laterna</i>	Scald fish	1585	1.27	29.171	0.39
<i>Echiichthys vipera</i>	Lesser weever fish	1436	1.15	27.546	0.37
<i>Microchirus variegatus</i>	Thickback sole	1359	1.09	47.431	0.63
<i>Aspitrigla cuculus</i>	Red gurnard	1170	0.94	170.186	2.26
Gobiidae	Gobies	1027	0.83	1.433	0.02
<i>Platichthys flesus</i>	Flounder	861	0.69	252.104	3.35
<i>Raja clavata</i>	Thornback ray	692	0.56	250.004	3.32
<i>Trigla lucerna</i>	Tub gurnard	525	0.42	90.369	1.20
<i>Scyliorhinus canicula</i>	Lesser spotted dogfish	509	0.41	268.1	3.56
<i>Gobius niger</i>	Black goby	420	0.34	3.806	0.05
<i>Trigloporus lastoviza</i>	Streaked gurnard	402	0.32	55.358	0.74
<i>Microstomus kitt</i>	Lemon sole	395	0.32	88.638	1.18
<i>Solea lascaris</i>	Sand sole	300	0.24	37.49	0.50
<i>Hyperoplus immaculatus</i>	Immaculate sandeel	286	0.23	1.104	0.01
<i>Merlangius merlangus</i>	Whiting	209	0.17	15.792	0.21
<i>Scophthalmus rhombus</i>	Brill	198	0.16	110.948	1.48
<i>Spondyliosoma cantharus</i>	Black seabream	169	0.14	4.187	0.06
<i>Trachinus draco</i>	Greater weever fish	146	0.12	12.567	0.17
<i>Raja montagui</i>	Spotted ray	134	0.11	50.567	0.67
Ammodytidae	Sandeels	128	0.10	4.611	0.06
<i>Blennius ocellaris</i>	Butterfly blenny	123	0.10	2.302	0.03
<i>Callionymus reticulatus</i>	Reticulate dragonet	94	0.08	0.419	0.01
<i>Eutrigla gurnardus</i>	Grey gurnard	91	0.07	4.387	0.06
<i>Ctenolabrus rupestris</i>	Goldsinny	79	0.06	2.756	0.04
<i>Syngnathus acus</i>	Great pipefish	79	0.06	1.679	0.02
<i>Mustelus asterias</i>	Starry smooth hound	77	0.06	21.907	0.29
<i>Zeugopterus punctatus</i>	Topknot	73	0.06	1.7	0.02
<i>Trachurus trachurus</i>	Horse mackerel	70	0.06	5.6	0.07
<i>Scophthalmus maximus</i>	Turbot	70	0.06	63.035	0.84
<i>Labrus bergylta</i>	Ballan wrasse	63	0.05	25.843	0.34
<i>Hyperoplus lanceolatus</i>	Great sandeel	53	0.04	592.565	7.88
<i>Mullus surmuletus</i>	Red mullet	45	0.04	3.634	0.05

Table 3. continued: Species recorded by the surveys

Latin name	Common name	Number	% abundance	Weight in kg	% of total weight
<i>Crenilabrus melops</i>	Corkwing	43	0.03	0.592	0.01
<i>Diplecogaster bimaculata</i>	Two spotted clingfish	42	0.03	0.053	+
<i>Raja undulata</i>	Undulate ray	42	0.03	18.811	0.25
<i>Zeus faber</i>	John dory	38	0.03	8.787	0.12
<i>Pomatoschistus pictus</i>	Painted goby	37	0.03	0.066	+
<i>Sardina pilchardus</i>	Pilchard	33	0.03	0.05	+
<i>Phrynorhombus regius</i>	Ekstroms topknot	32	0.03	0.523	0.01
<i>Labrus mixtus</i>	Cuckoo wrasse	29	0.02	2.259	0.03
<i>Dicentrarchus labrax</i>	European seabass	27	0.02	13.474	0.18
<i>Raja microocellata</i>	Smalleyed ray	26	0.02	26.017	0.35
<i>Taurulus bubalis</i>	Sea scorpion	26	0.02	0.248	+
<i>Gobius paganellus</i>	Rock goby	24	0.02	0.113	+
<i>Raja brachyura</i>	Blonde ray	22	0.02	9.851	0.13
<i>Phrynorhombus norvegicus</i>	Norwegian topknot	19	0.02	0.146	+
<i>Ciliata mustela</i>	Five bearded rockling	16	0.01	0.086	+
<i>Pholis gunnellus</i>	Butter fish	15	0.01	6.341	0.08
<i>Gadus morhua</i>	Cod	15	0.01	13.732	0.18
<i>Belone belone</i>	Garfish	12	0.01	0.06	+
<i>Hippocampus hippocampus</i>	Short snouted sea horse	11	0.01	0.164	+
<i>Anguilla anguilla</i>	European eel	10	0.01	3.582	0.05
<i>Enchelyopus cimbrius</i>	Four bearded rockling	10	0.01	1.448	0.02
<i>Clupea harengus</i>	Herring	10	0.01	0.105	+
<i>Sprattus sprattus</i>	Sprat	8	0.01	0.013	+
<i>Labridae</i>	Wrasses	8	0.01	0.465	0.01
<i>Scomber scombrus</i>	European mackerel	7	0.01	1.78	0.02
<i>Callionymus maculatus</i>	Spotted dragonet	7	0.01	0.63	0.01
<i>Clupeidae</i>	Clupeids	5	+	0.025	+
<i>Parablennius gattorugine</i>	Tompot blenny	4	+	0.113	+
<i>Scyliorhinus stellaris</i>	Nurse hound	3	+	5.081	0.07
<i>Cyclopterus lumpus</i>	Lumpsucker	3	+	0.02	+
<i>Lophius piscatorius</i>	Anglerfish	3	+	1.412	0.02
<i>Gaidropsarus vulgaris</i>	Three bearded rockling	3	+	0.202	+
<i>Myoxocephalus scorpius</i>	Bullrout	2	+	0.058	+
<i>Squalus acanthias</i>	Spurdog	2	+	9.38	0.12
<i>Gobius gasteveni</i>	Steven's goby	2	+	0.109	+
<i>Buena jeffreysii</i>	Jeffreys goby	2	+	0.086	+
<i>Syngnathus rostellatus</i>	Nilssons pipefish	2	+	0.007	+
<i>Chirolophis ascanii</i>	Yarrels blenny	2	+	0.06	+
<i>Leucoraja naevus</i>	Cuckoo ray	1	+	0.005	+
<i>Liparis liparis</i>	Sea snail	1	+	0.001	+
<i>Gasterosteus aculeatus</i>	Three spined stickleback	1	+	0.001	+

6. SPECIES RECORDED BY THE SURVEY

More than 80 species of marine fish were recorded during CEFAS beam trawl surveys of the eastern English Channel from 1993 to 2001. The numbers and weights of the species caught are described in Table 3.

7. SPECIES DISTRIBUTIONS

This report presents the data describing catches of the major fish and selected commercial shellfish species from ICES Division VIIId. Data cover the period 1993 to 2001, during which time the position of sampling stations and tow length have been consistent.

More detailed analyses are presented for sole and plaice, owing to their commercial importance in the eastern English Channel. Data for the English and French sides are treated separately for plaice and sole. This division (illustrated in Figure 1) is necessary as differences in growth rate and other life history parameters are known to occur.

Analyses for plaice and sole provide:

- (a) The mean numbers of fish (by age) caught per 30 min tow at core stations.
- (b) The mean number of fish (all ages) caught per 30 min tow at core stations.
- (c) The mean number of fish caught (by age) per year, from a 30 min tow.
- (d) The mean catch weight of fish from a 30 min tow.
- (e) Length-frequency (by age) for i) English, and ii) French sides of the Channel.
- (f) Mean length at age for i) English, and ii) French sides of the Channel.
- (g) Mean weight at length for i) English, and ii) French sides of the Channel.
- (h) Proportion of male and female fish mature at length for i) English, and ii) French sides of the Channel.

Information for other species is restricted to:

- (a) The mean number of fish caught per 30 min tow at core stations.
- (b) The mean catch weight of fish from a 30 min tow.
- (c) Length frequency distributions.

For spider crab *Maia squinado* the mean number of fish (1994 to 2001) per 30 min tow at core stations are shown.

The distribution of scallop *Pecten maximus* shows the total number caught from 1993 to 2001.

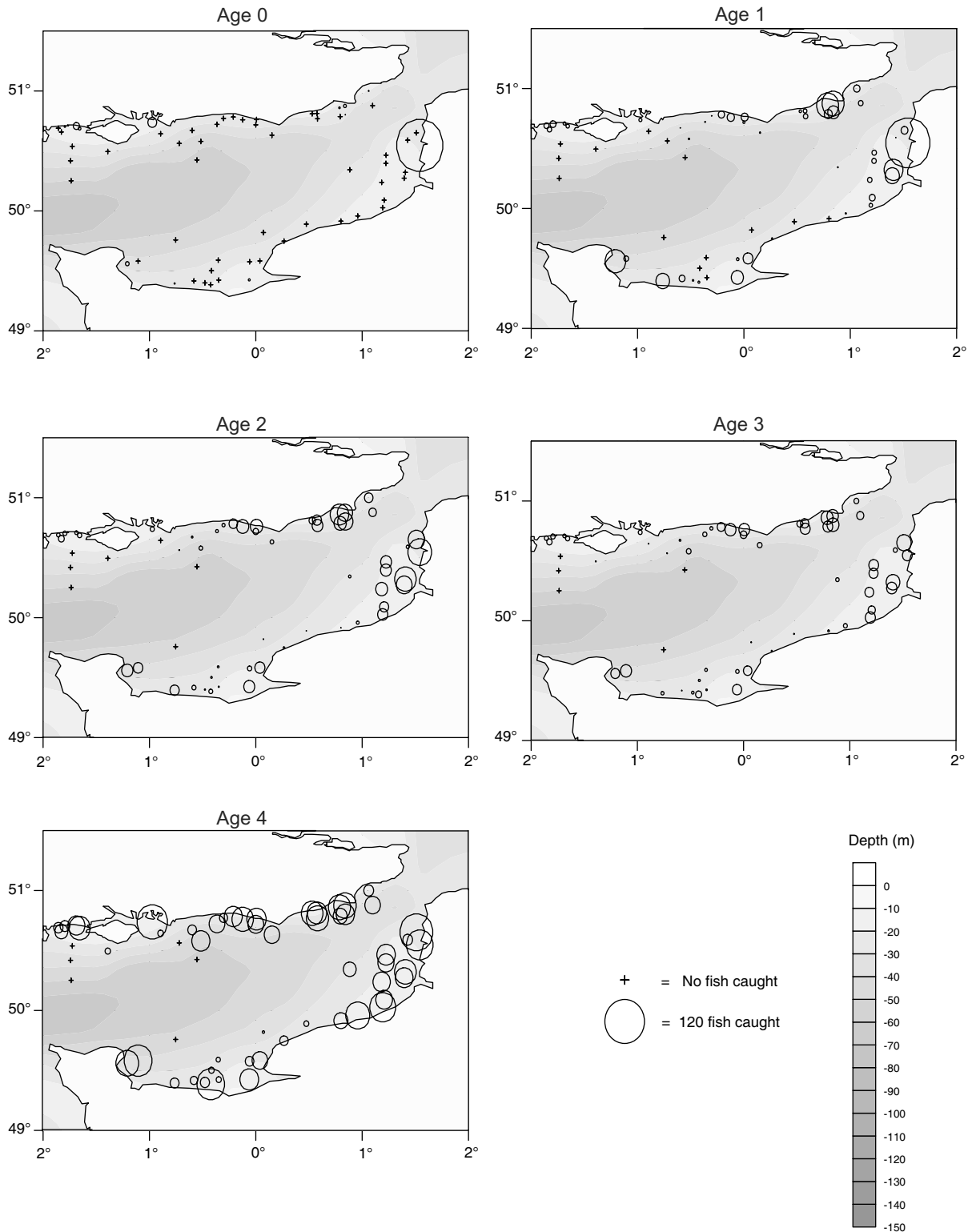
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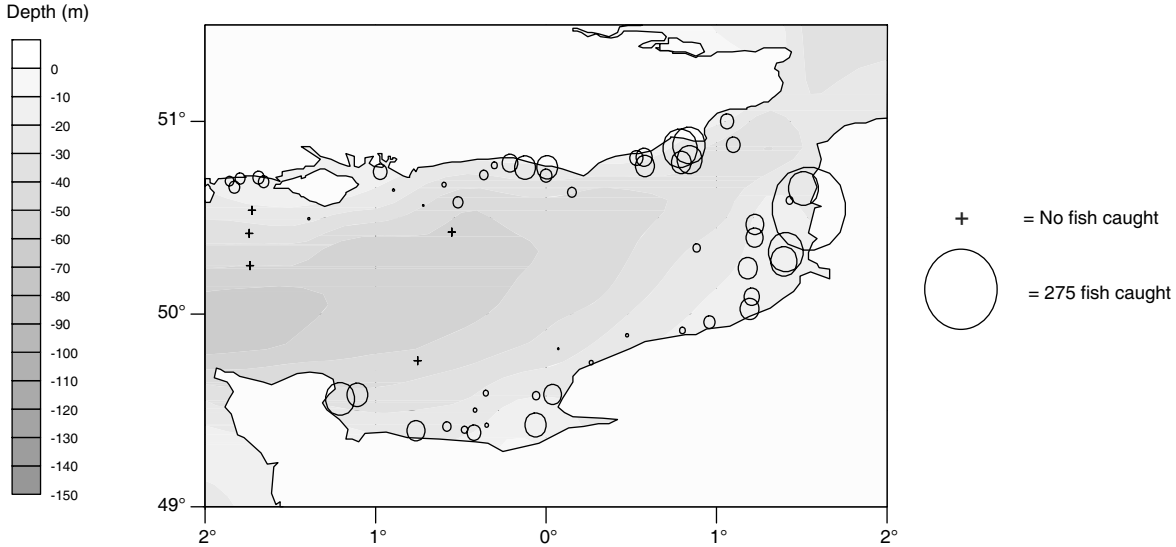
Flatfish

Plaice - *Pleuronectes platessa*

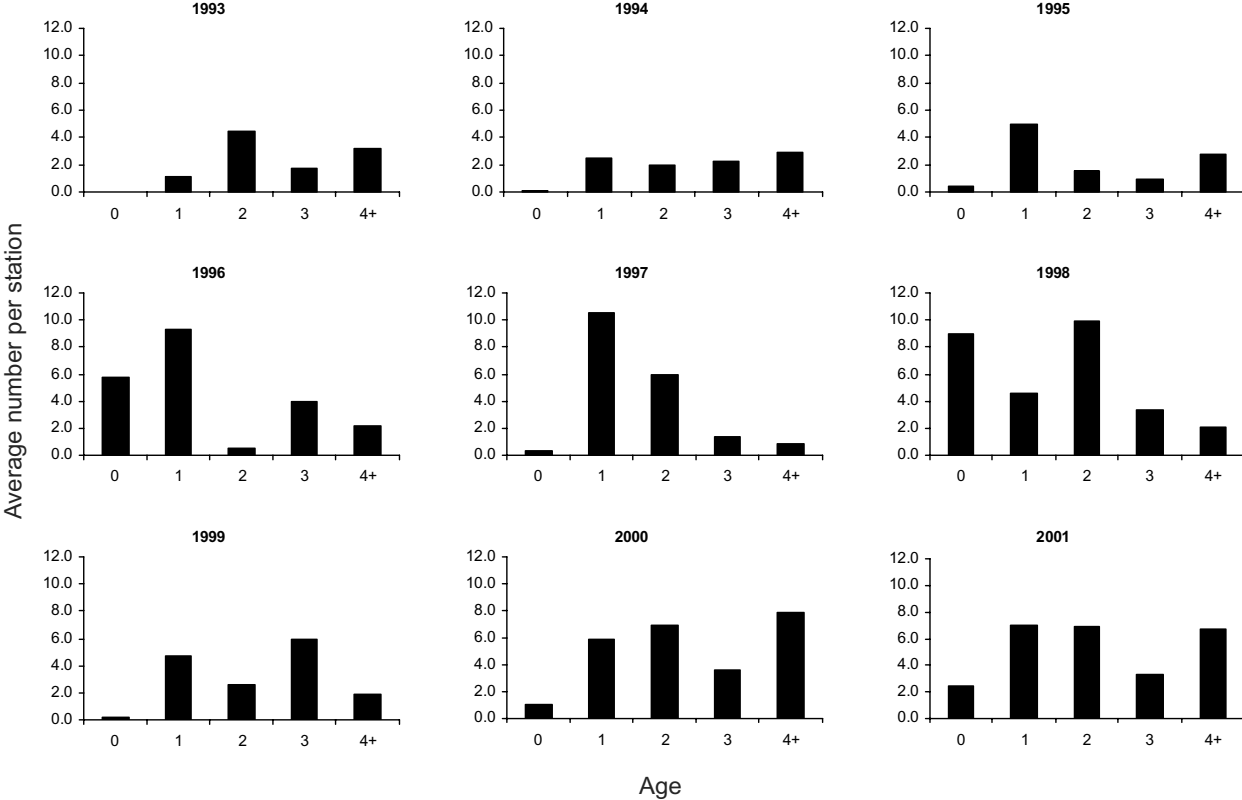
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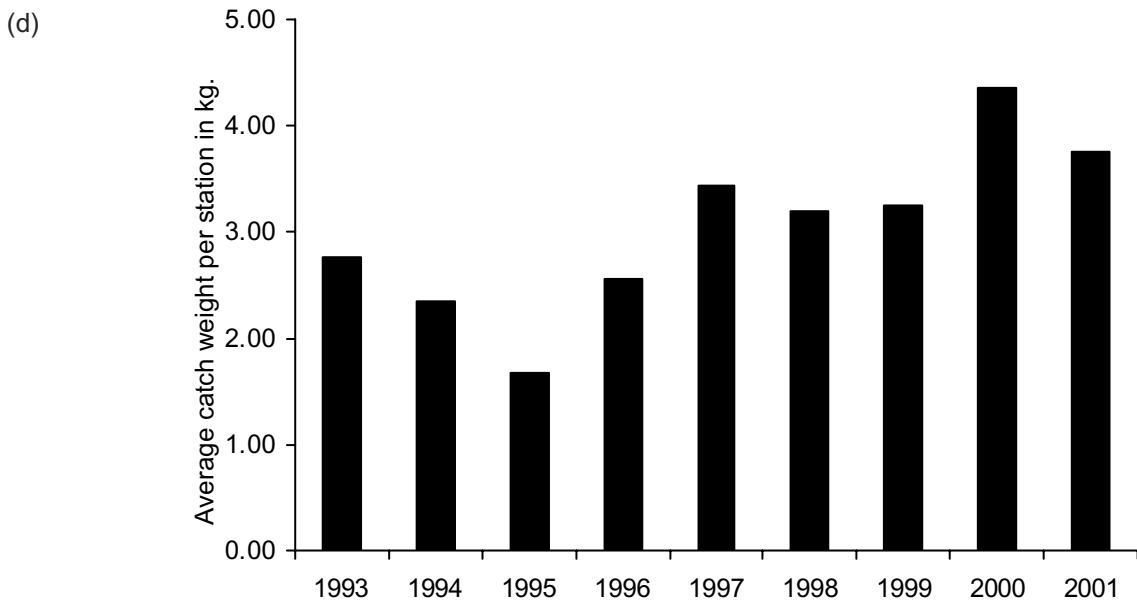
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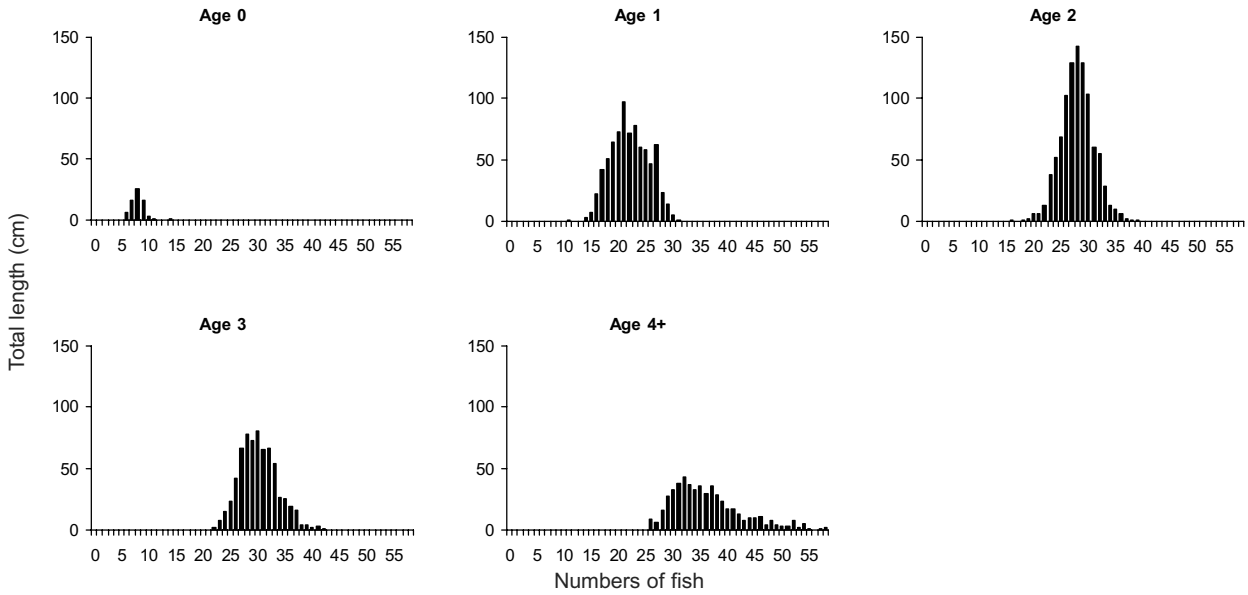


Plaice - *Pleuronectes platessa*

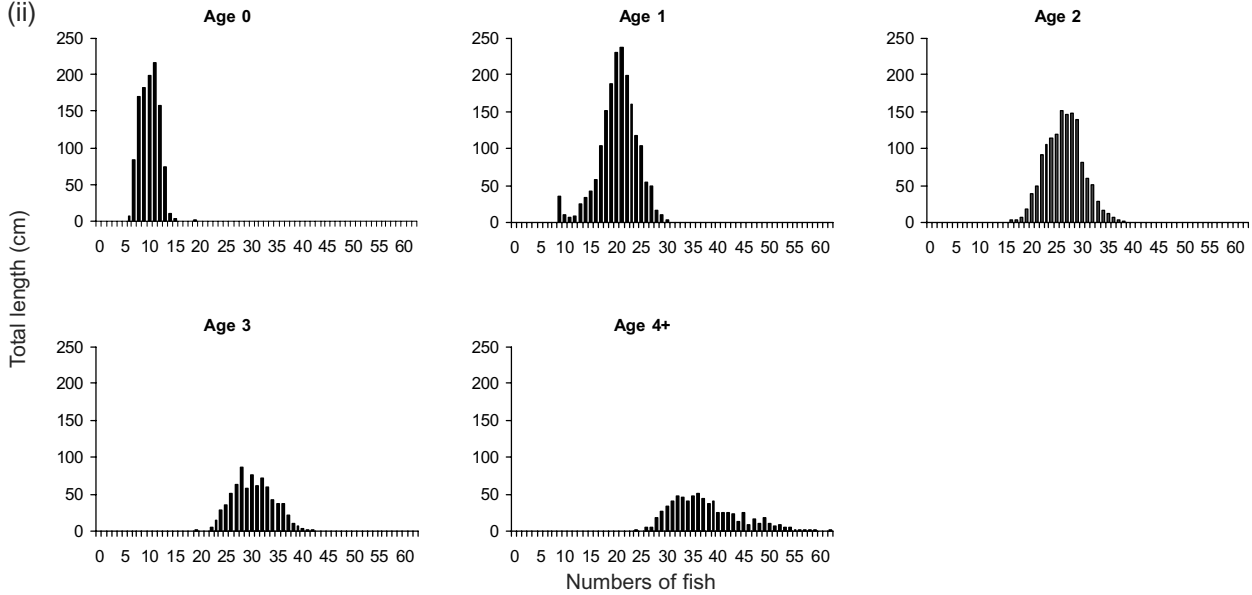


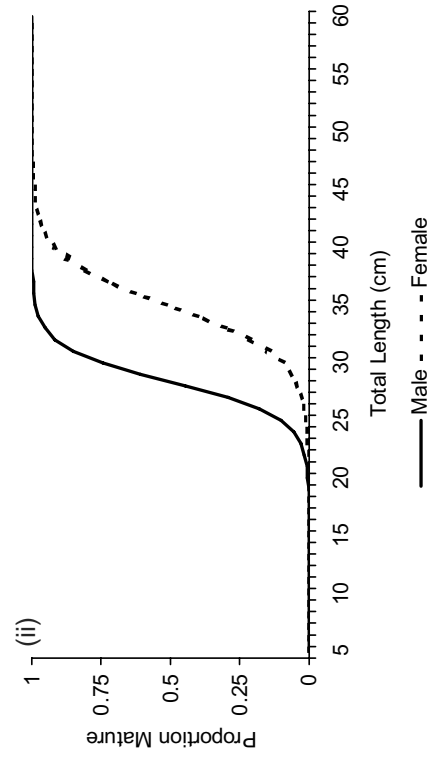
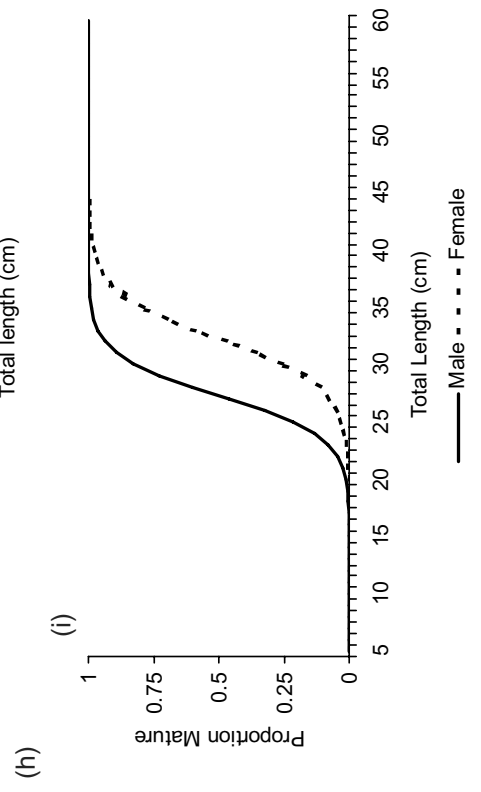
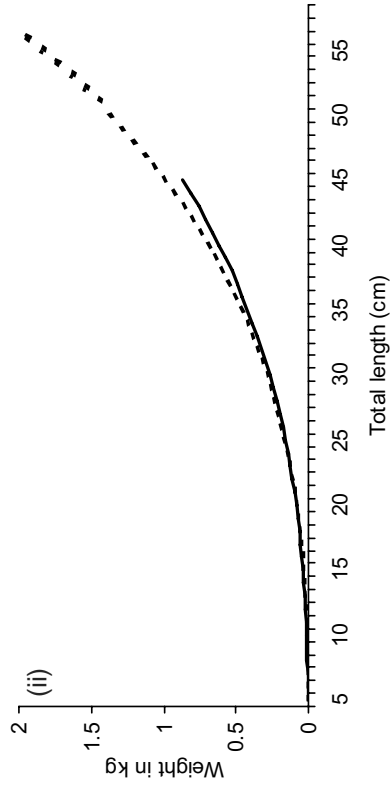
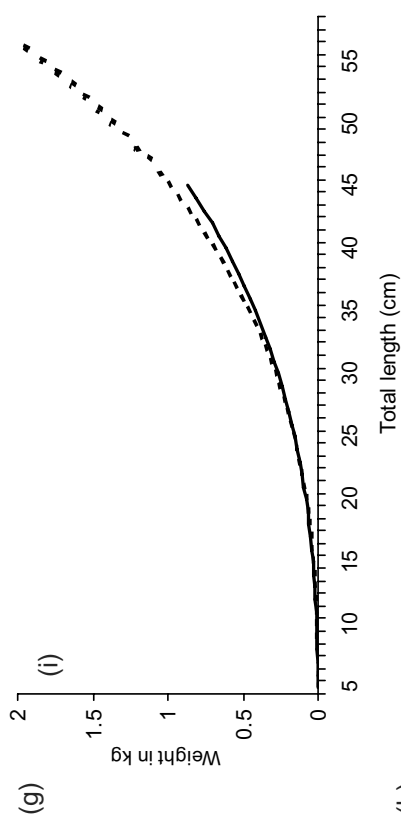
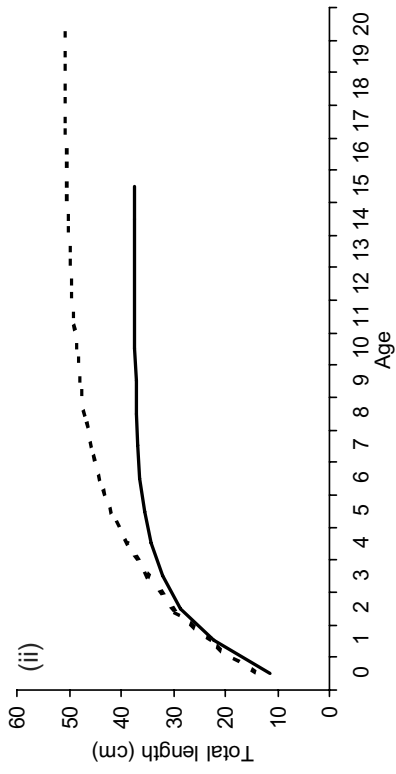
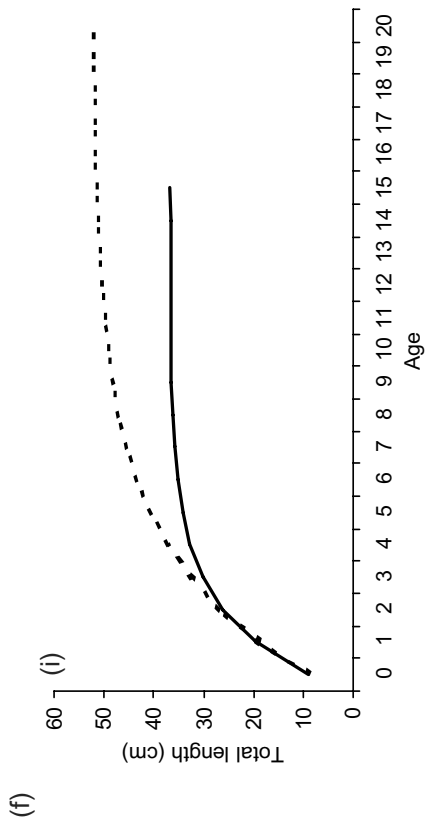
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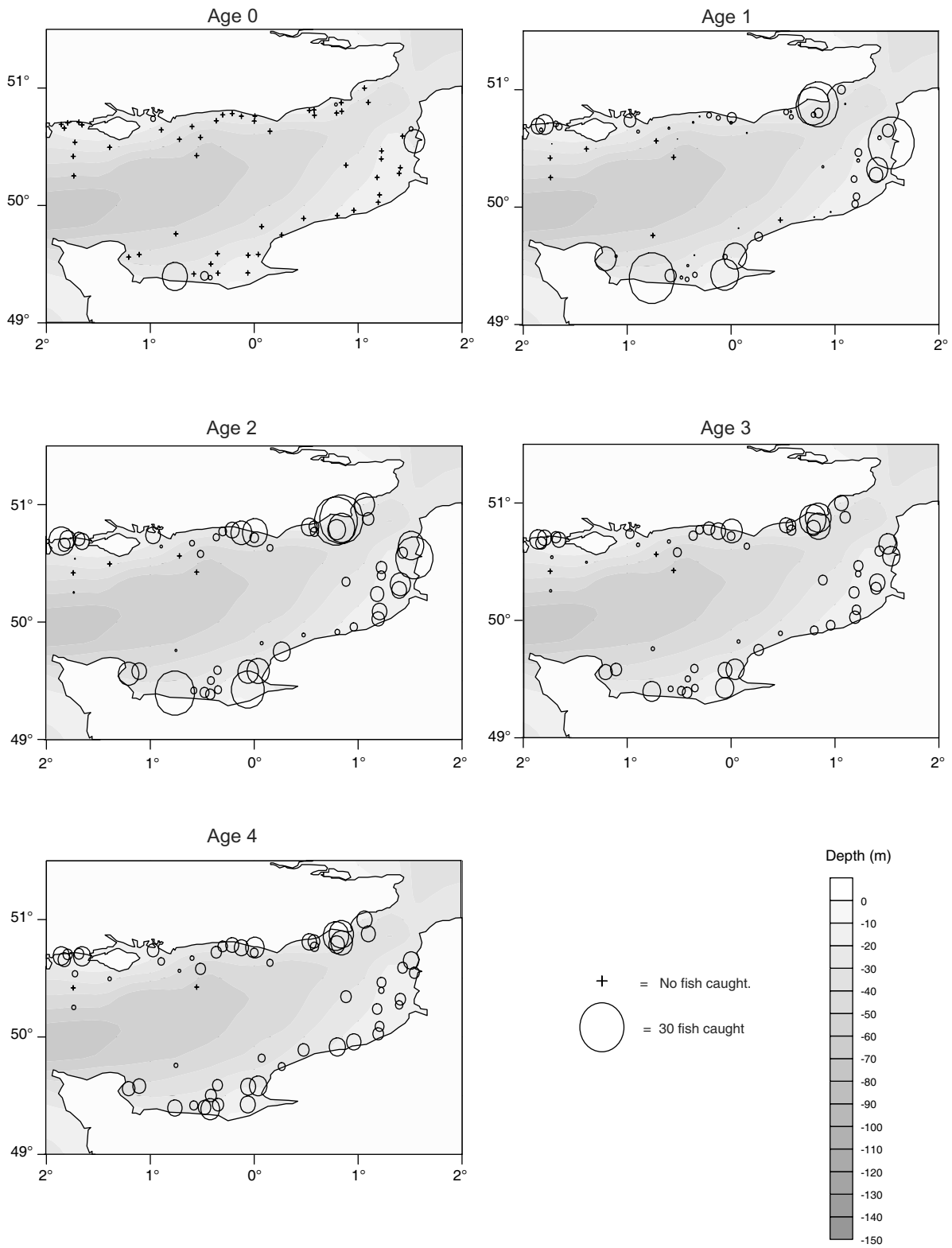
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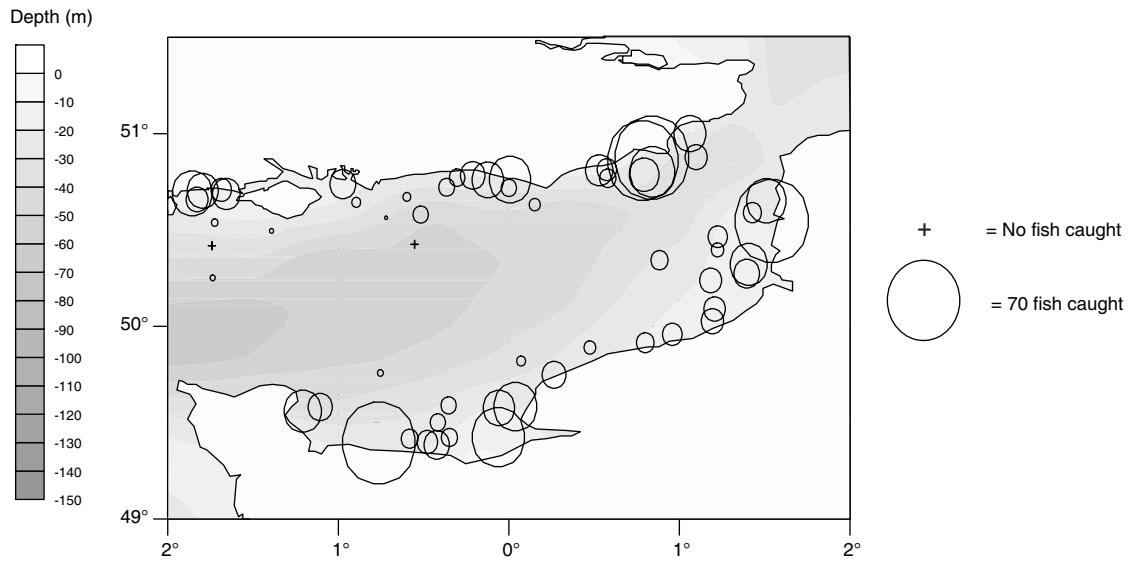


Sole - *Solea solea*

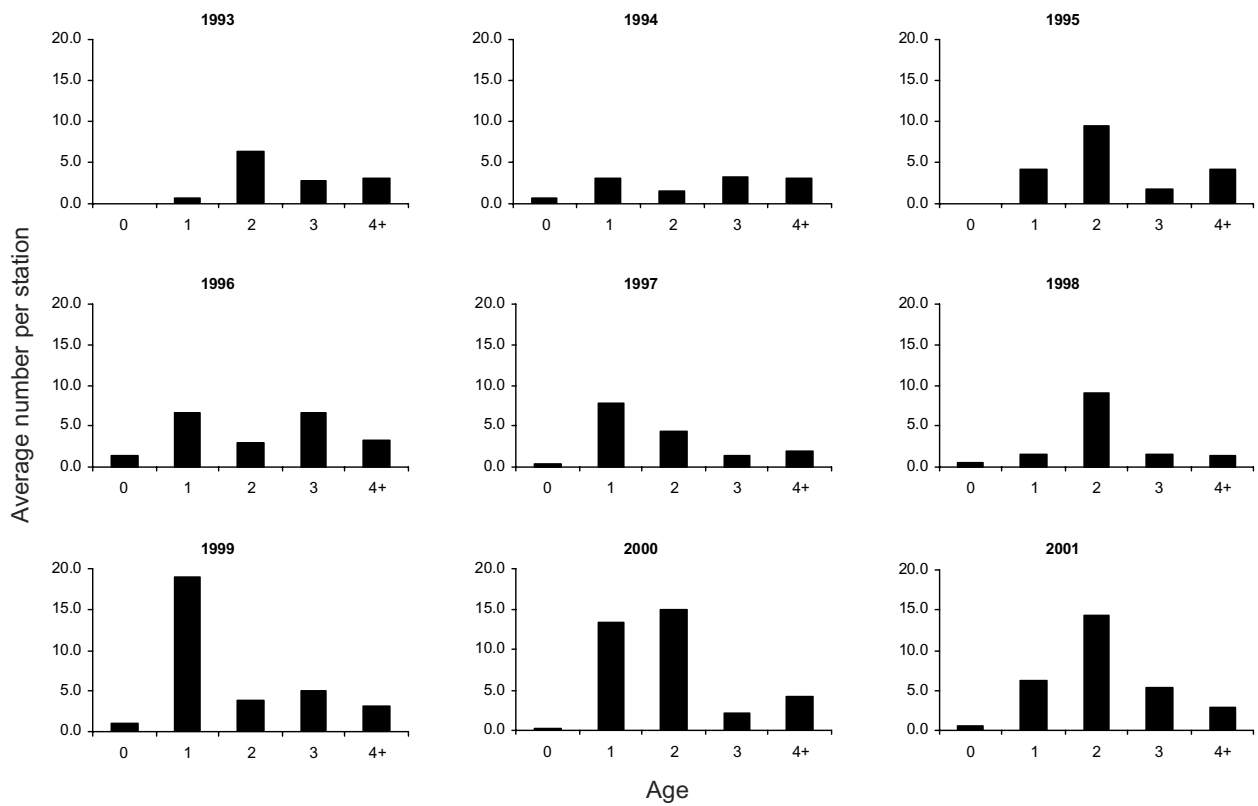
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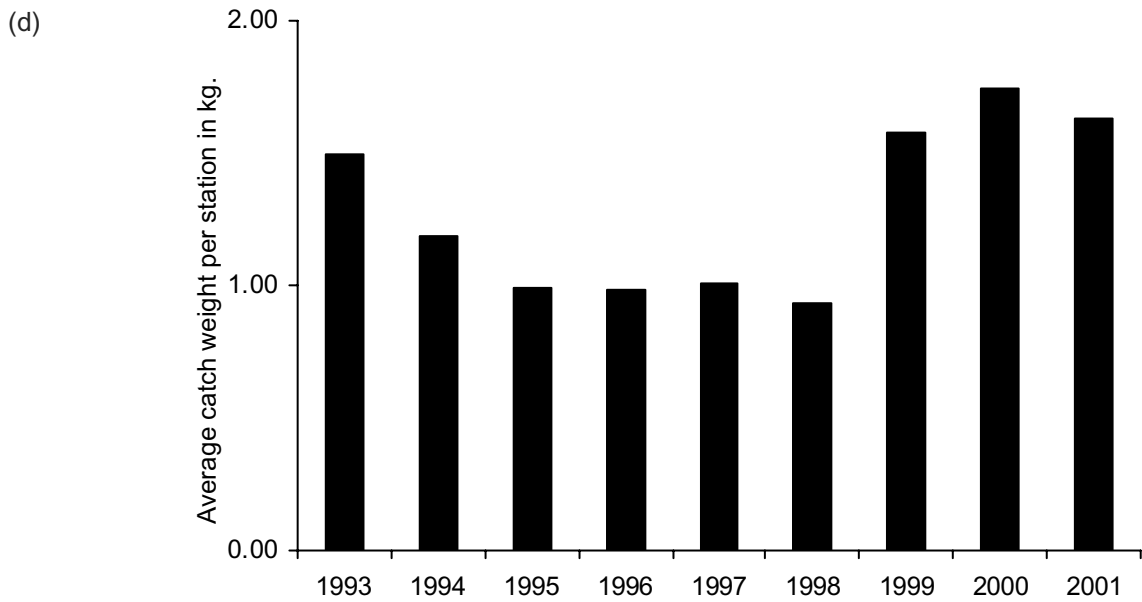
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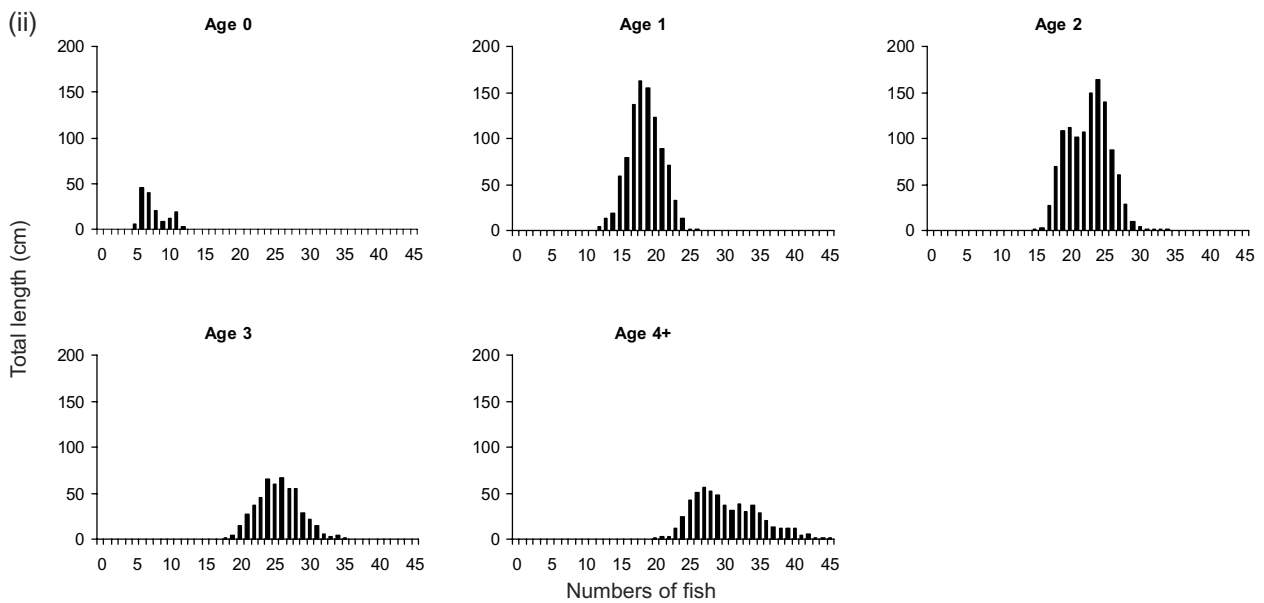
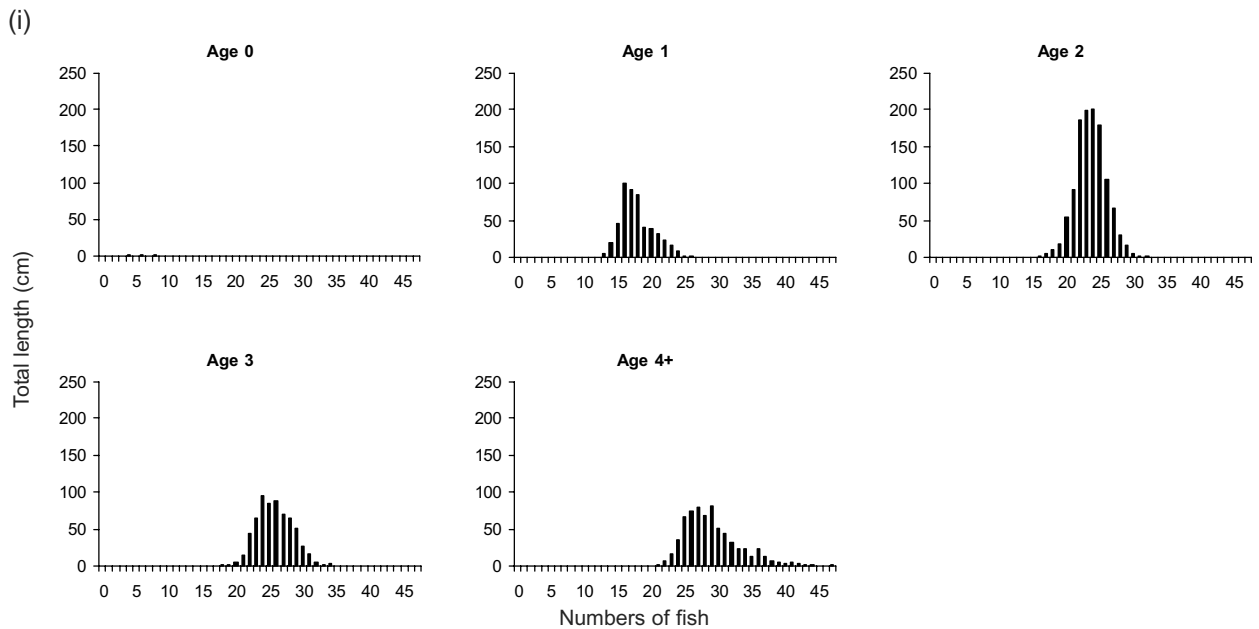
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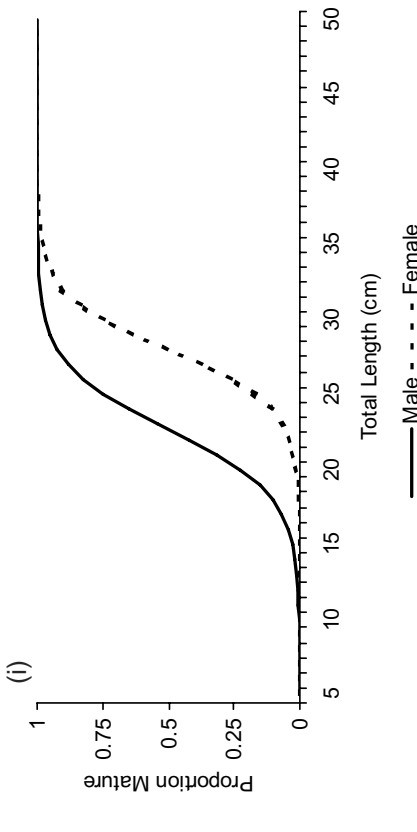
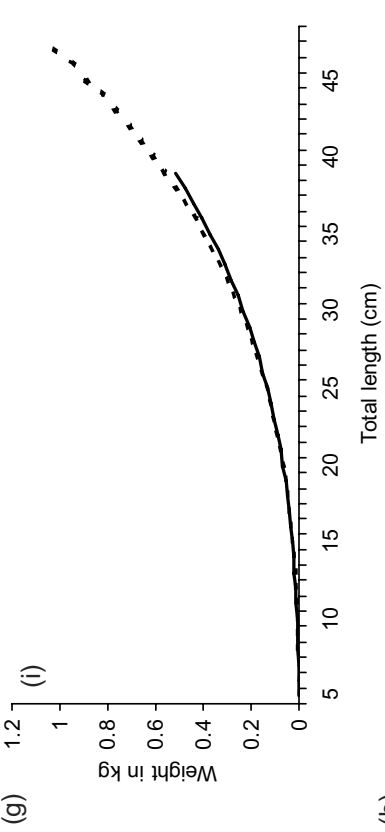
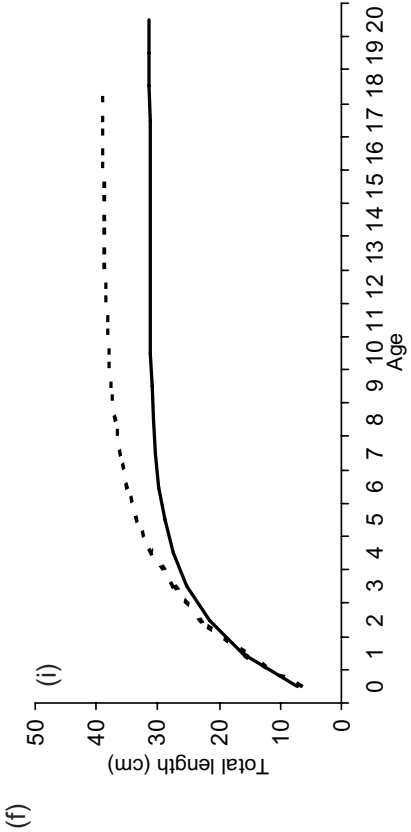
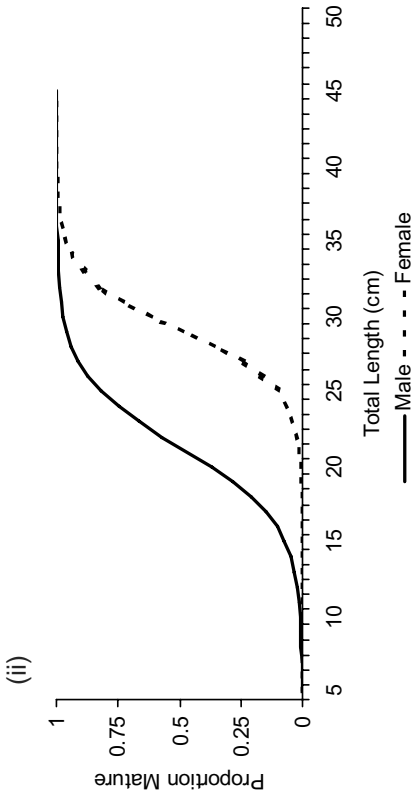
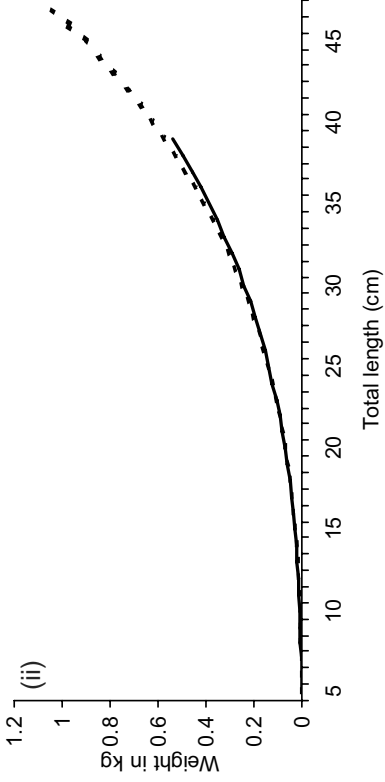
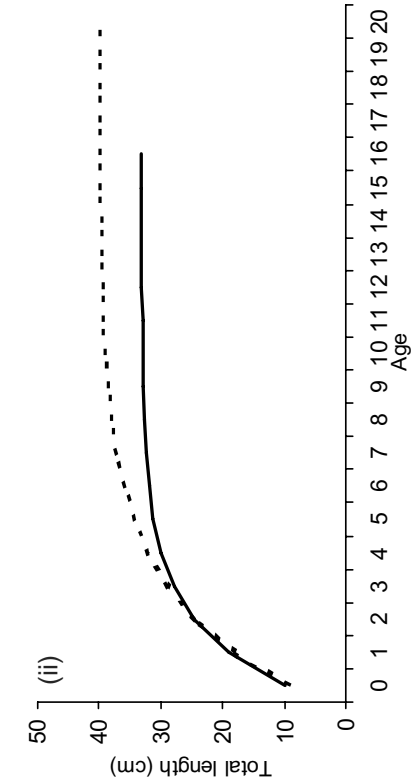


Sole - *Solea solea*



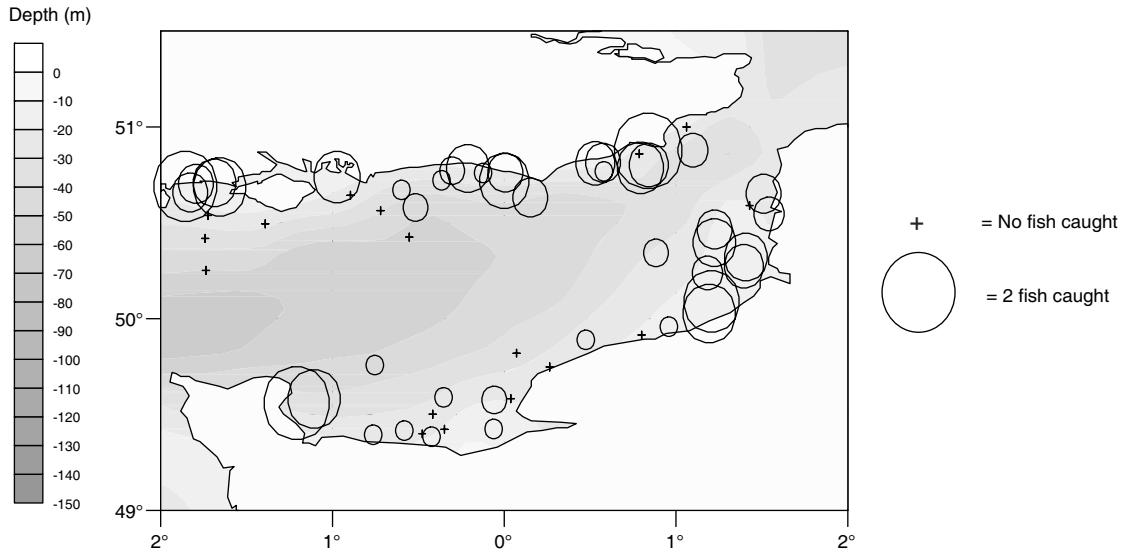
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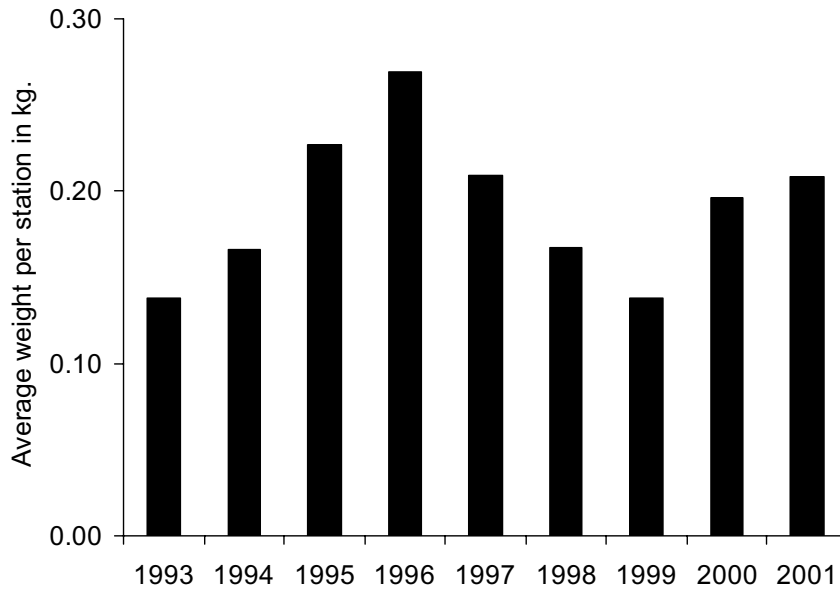


Brill - *Scophthalmus rhombus*

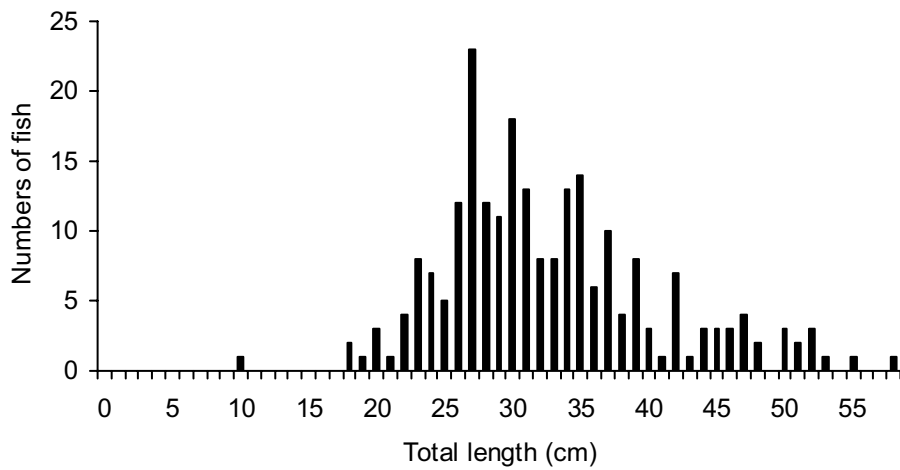
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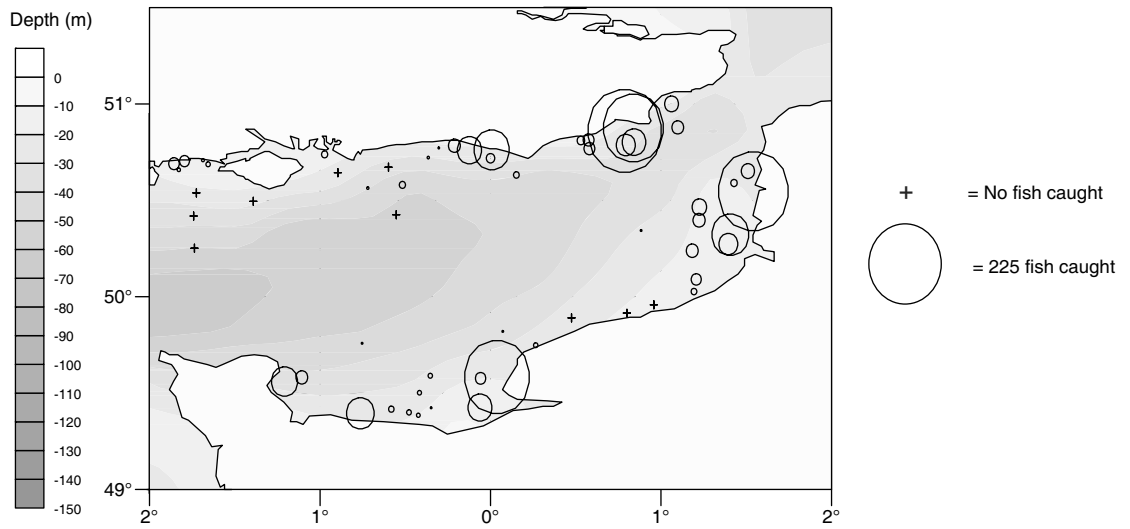
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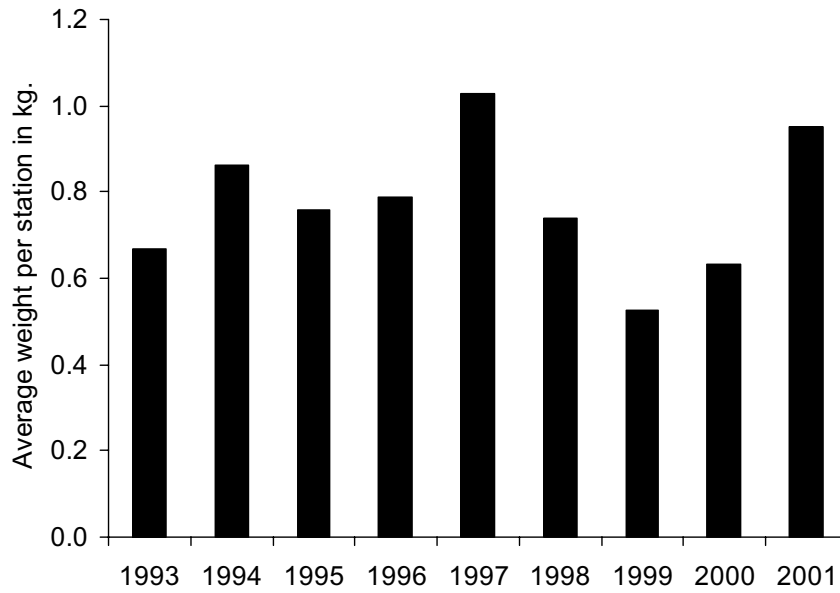
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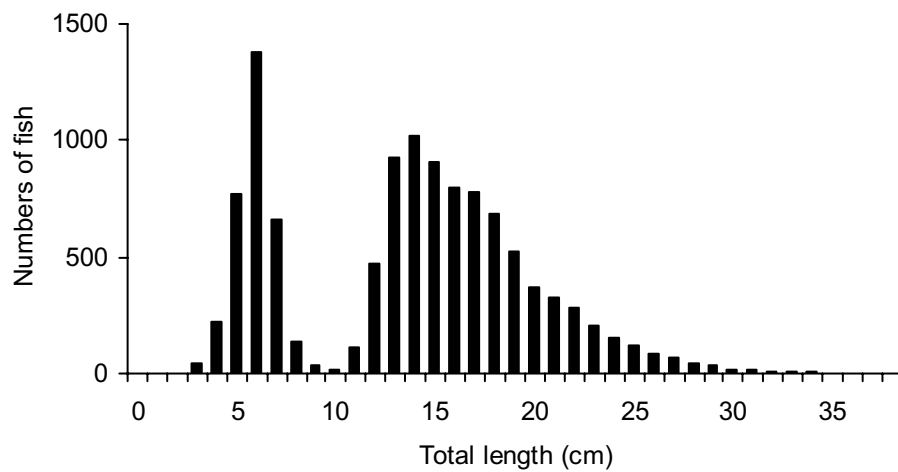
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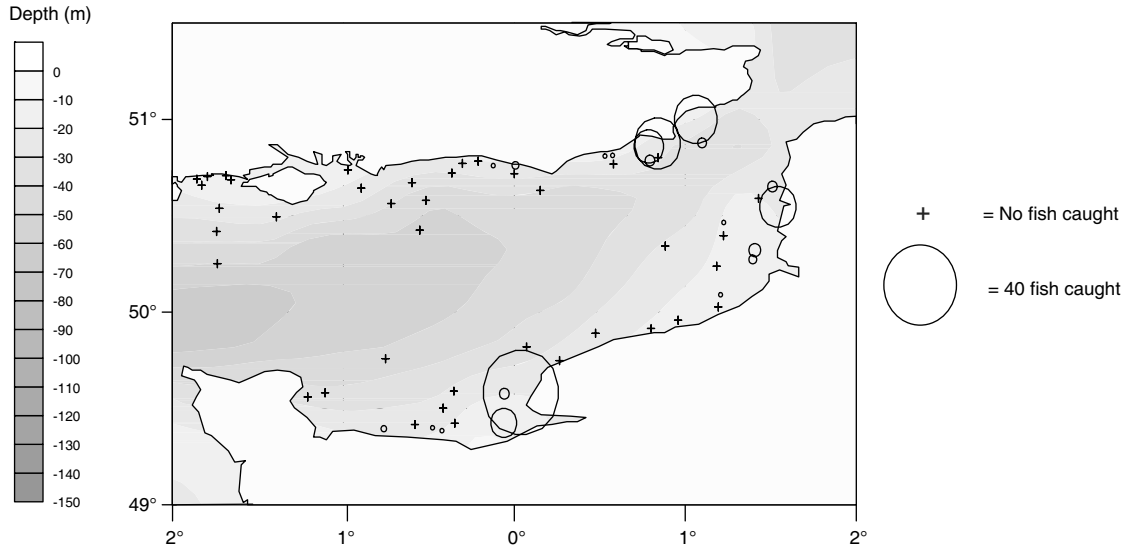


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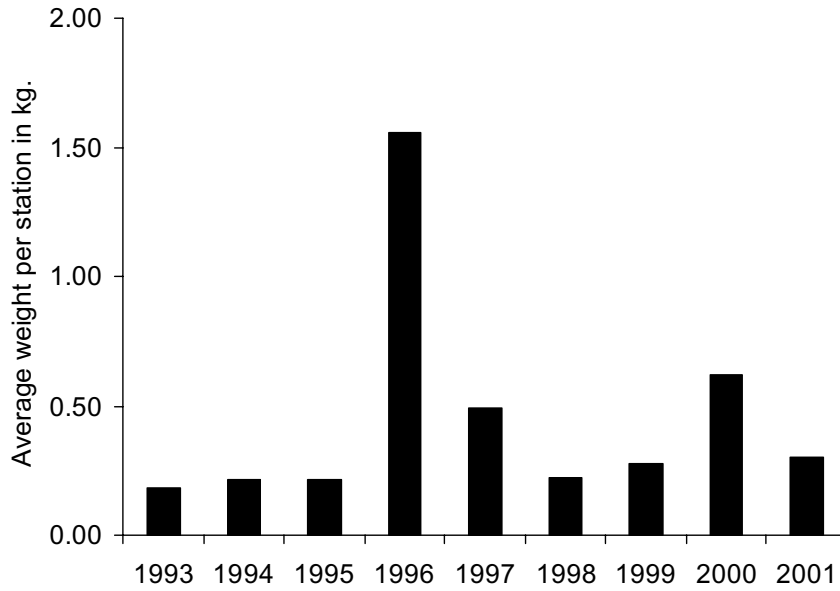


Flounder - *Platichthys flesus*

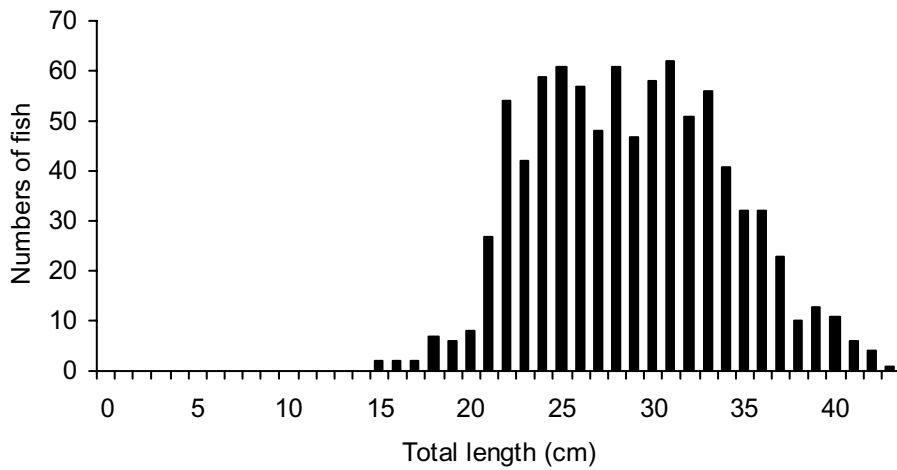
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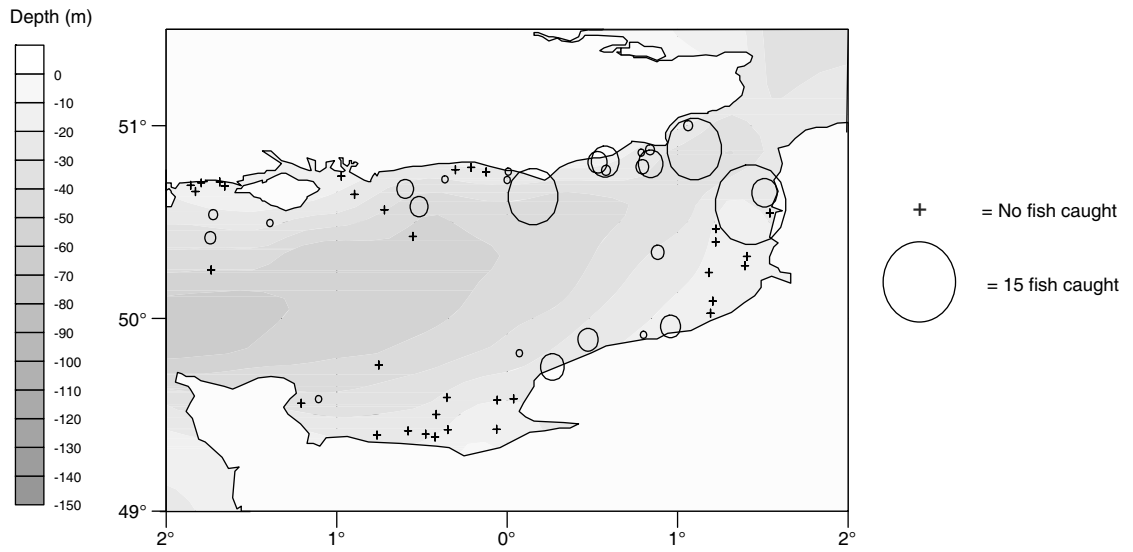
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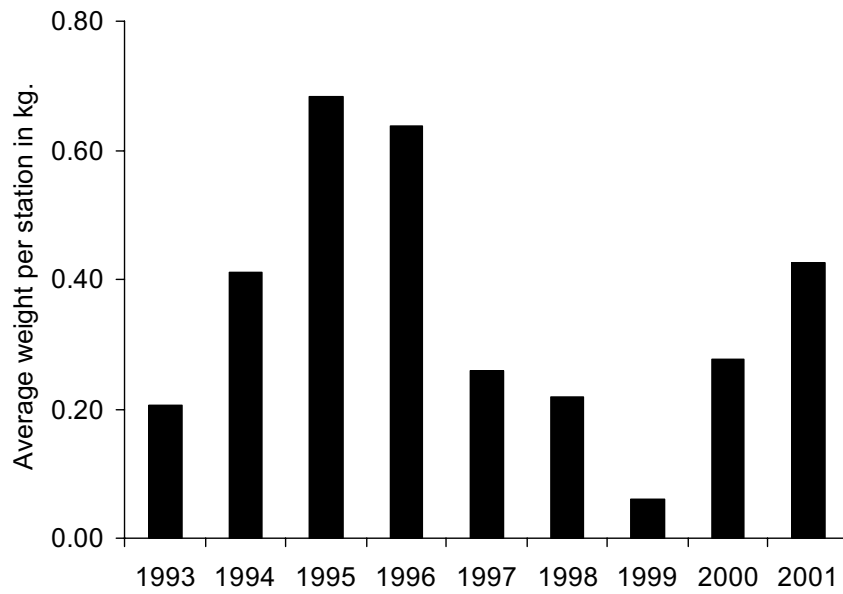
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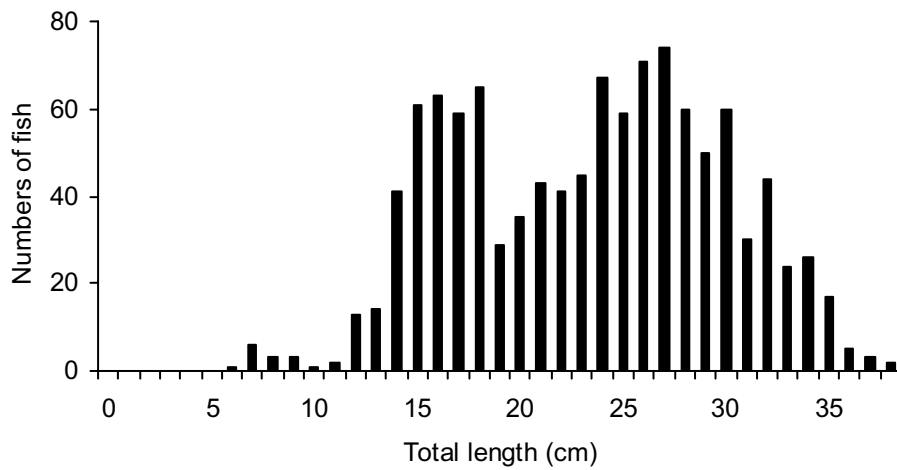
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(b)

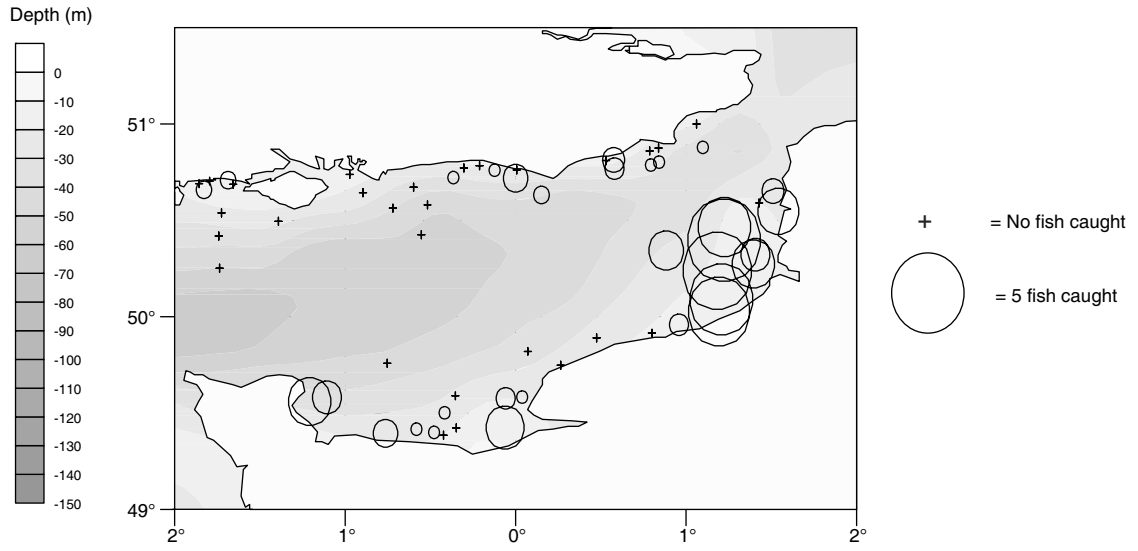


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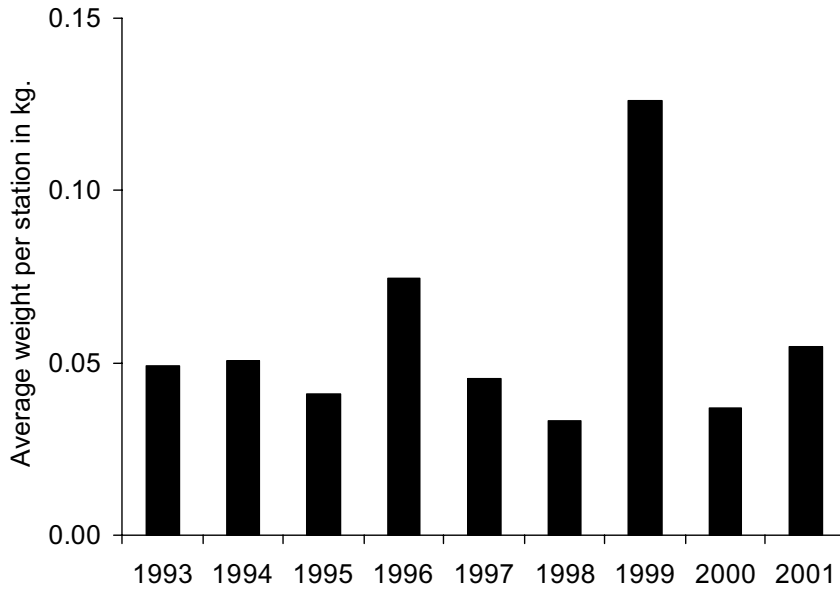


Sand sole - *Solea lascaris*

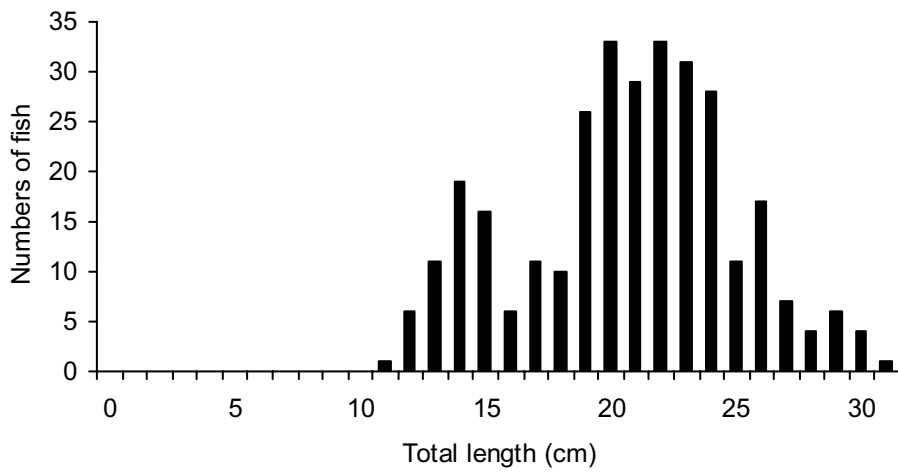
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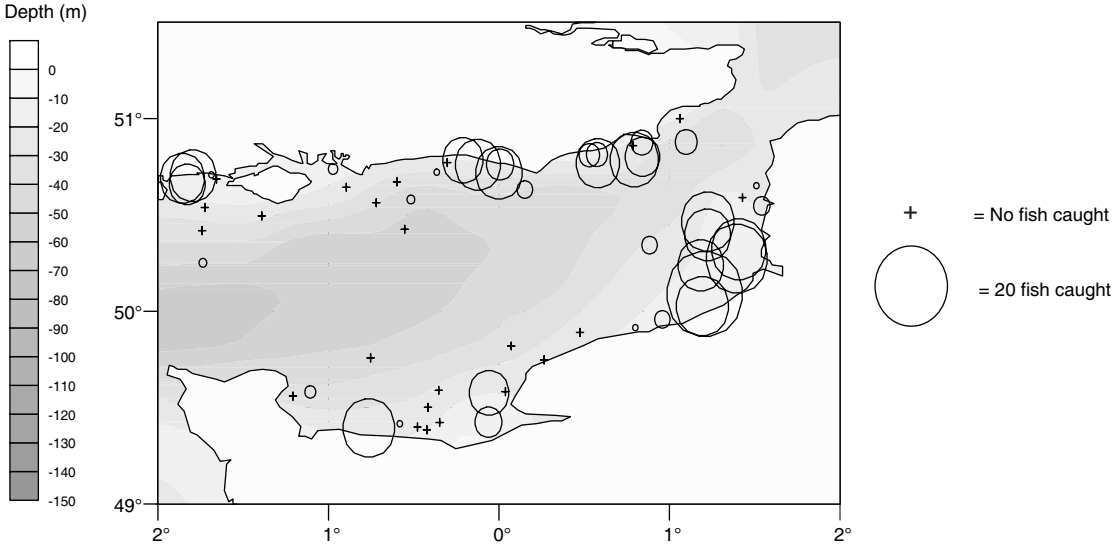
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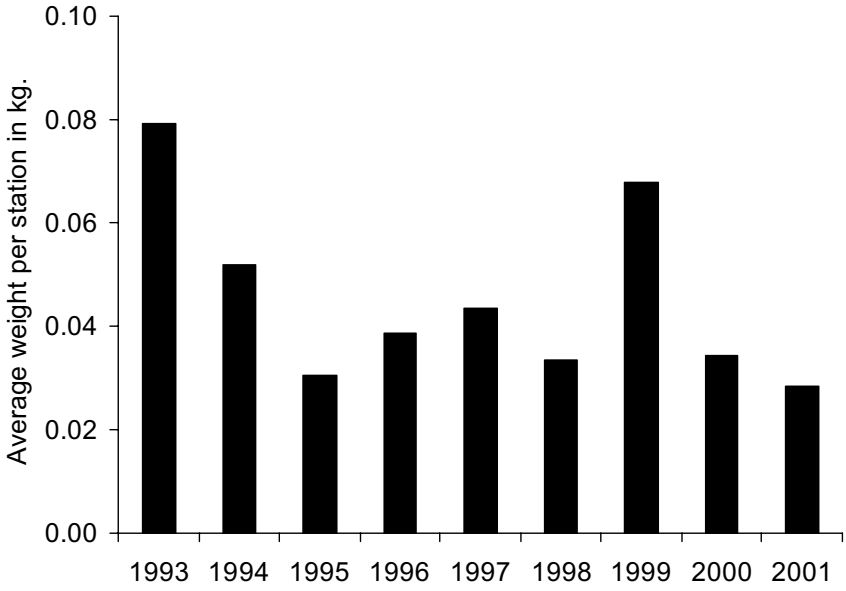
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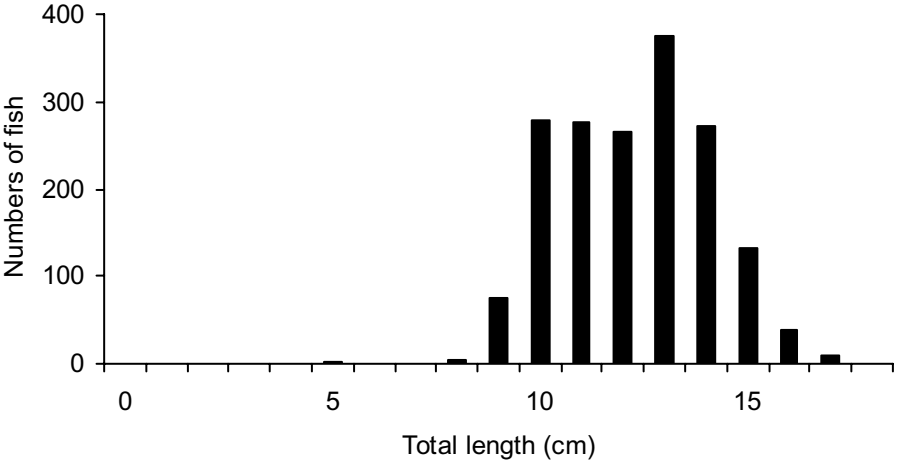
(a)



(b)

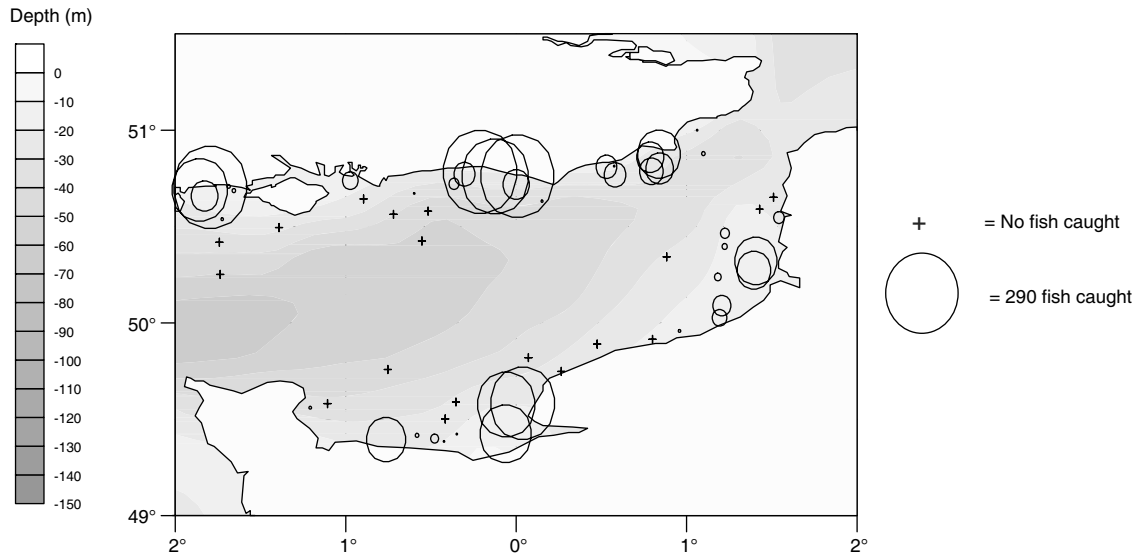


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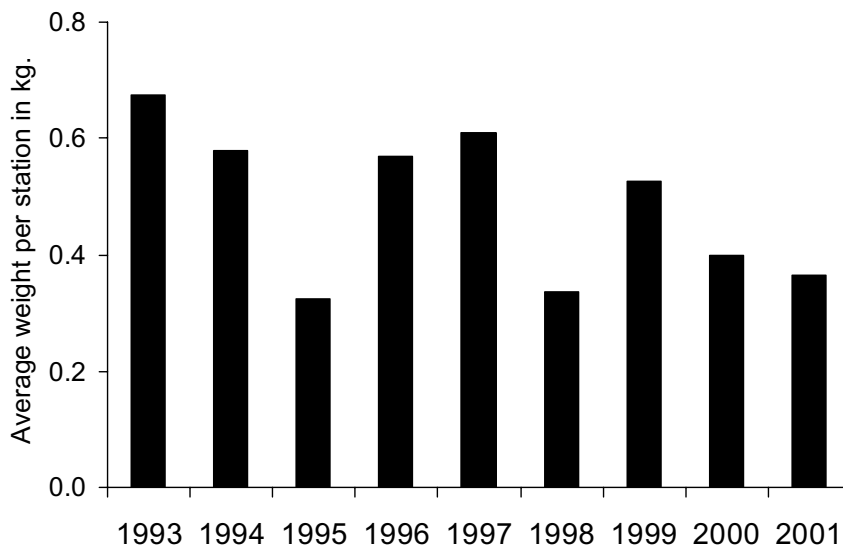


Solenette - *Buglossidium luteum*

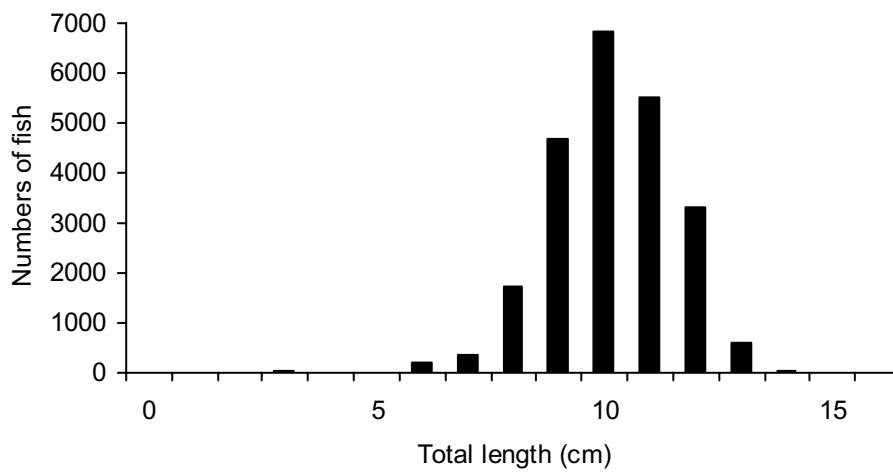
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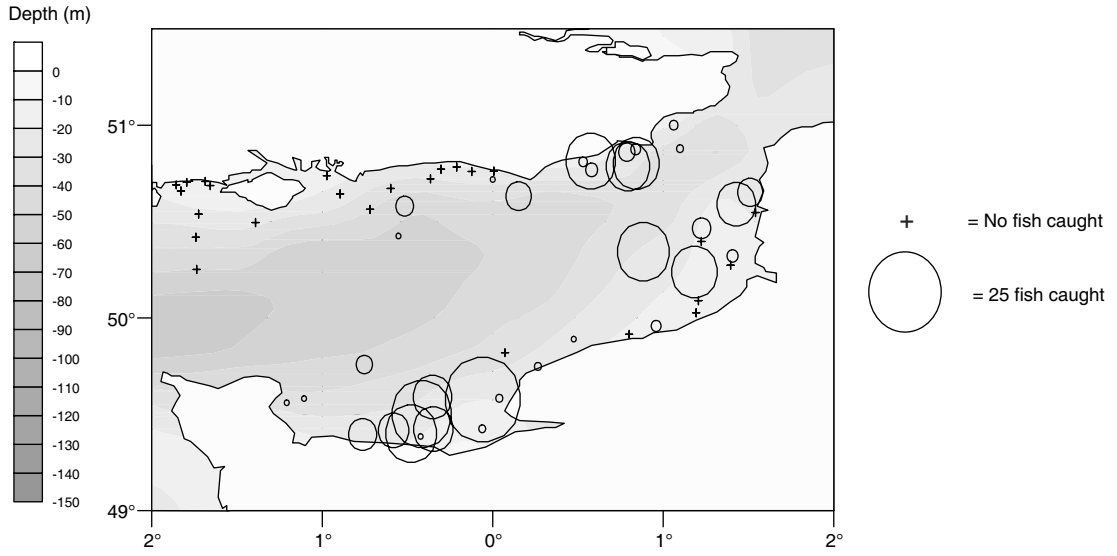
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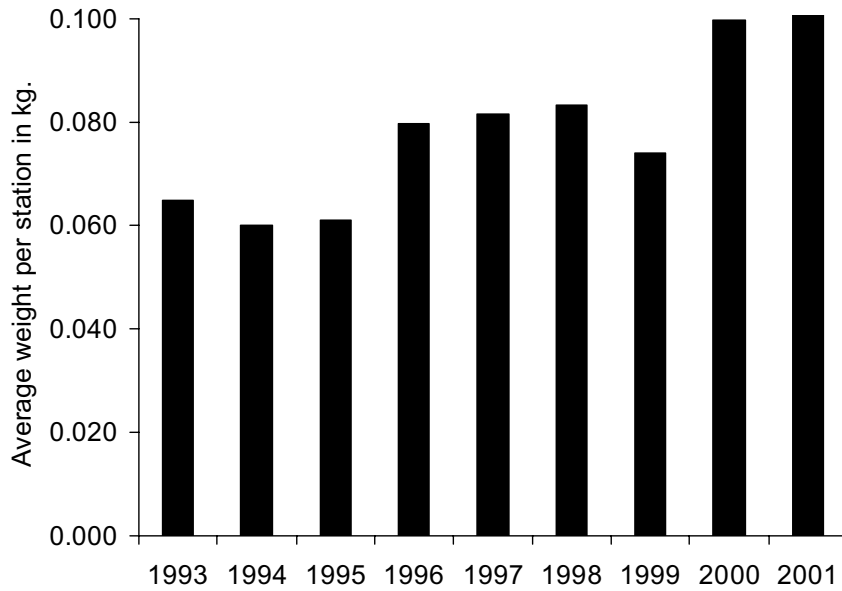
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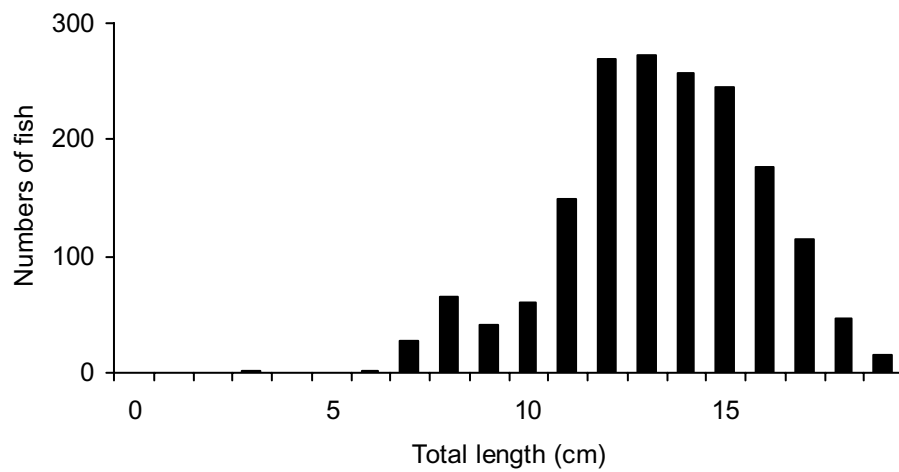
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(b)

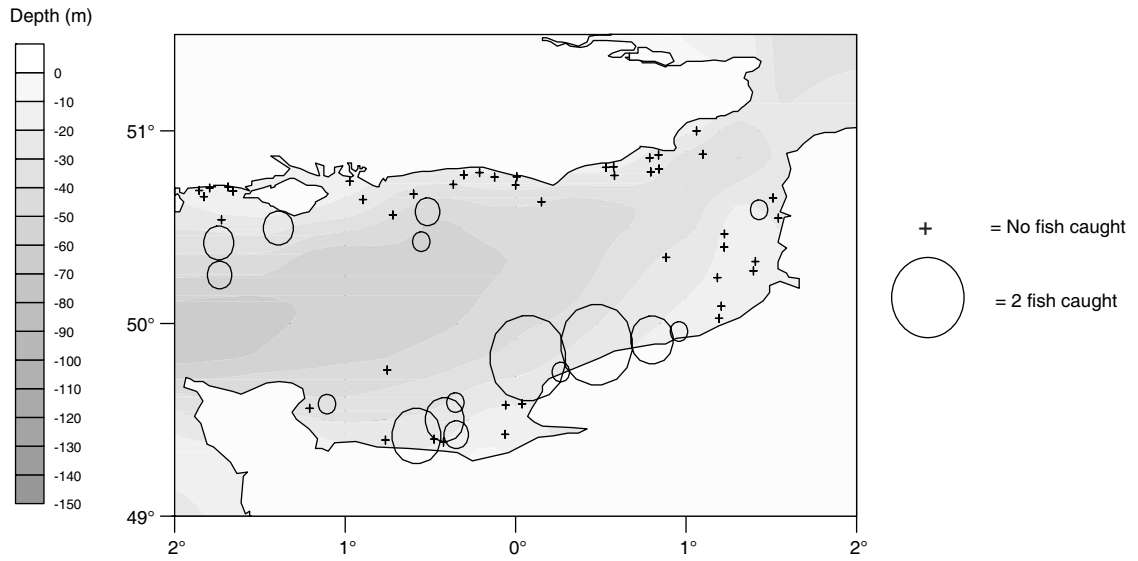


(c)

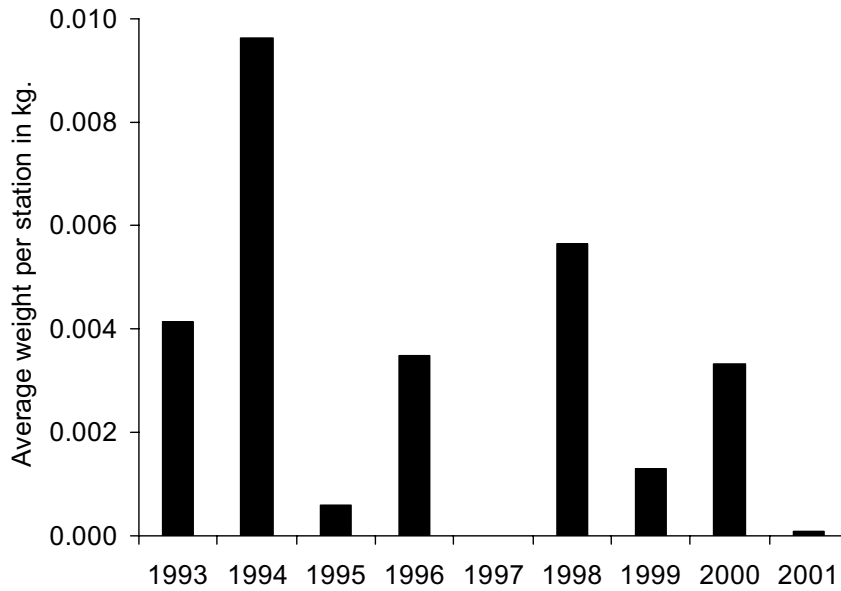


Topknot, common - *Zeugopterus punctatus*

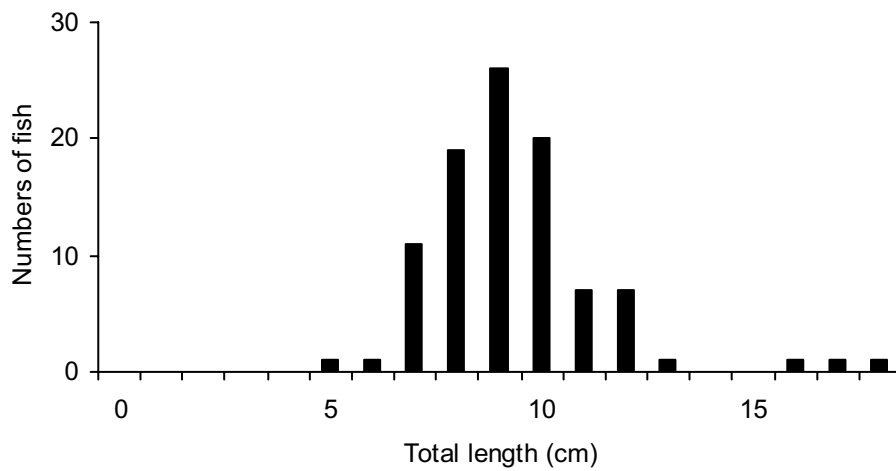
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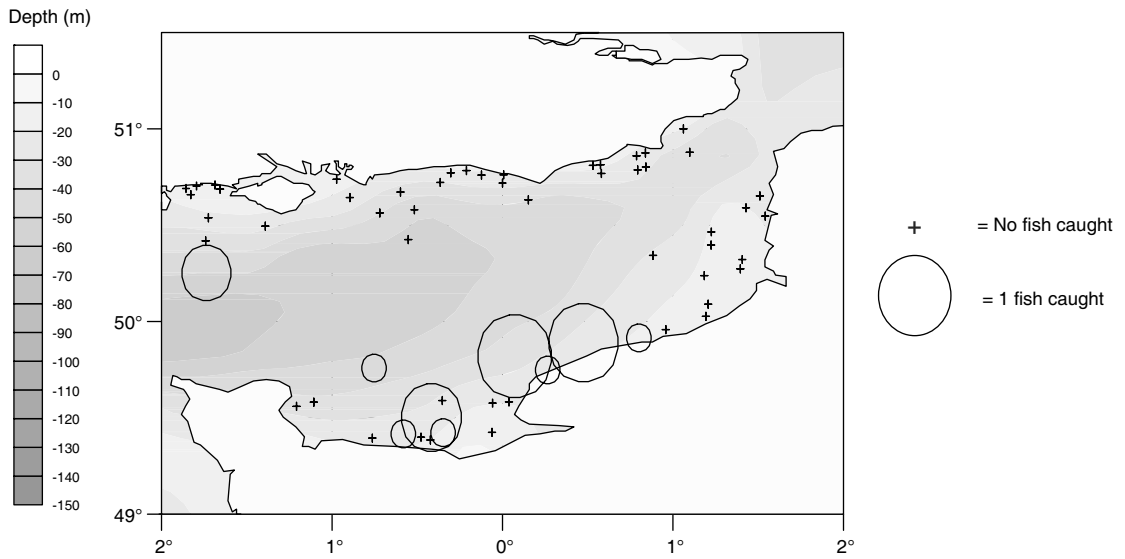
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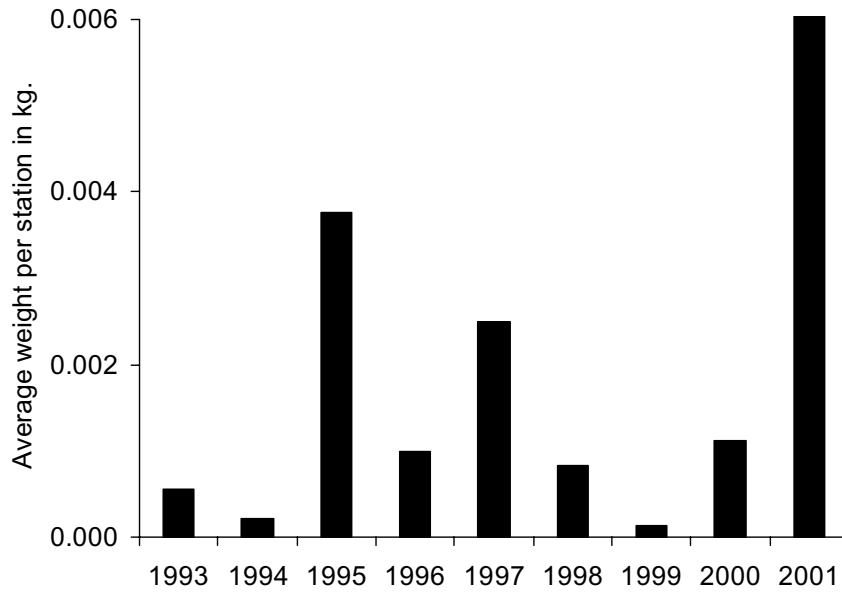
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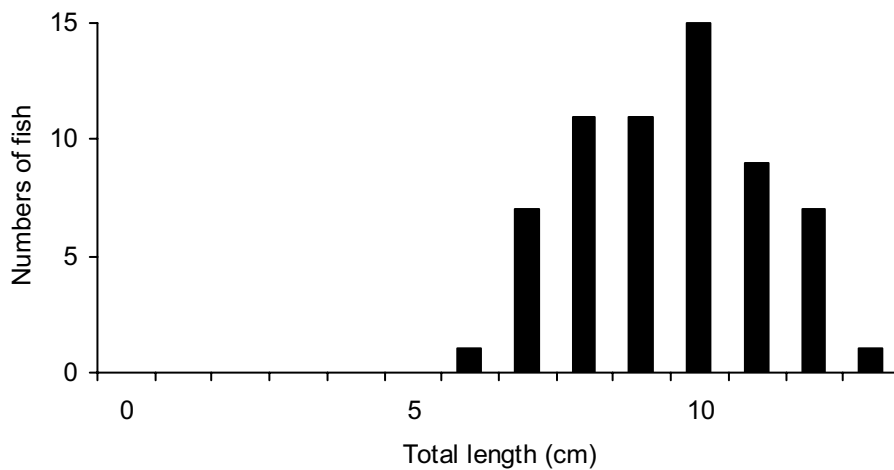
(a)



(b)

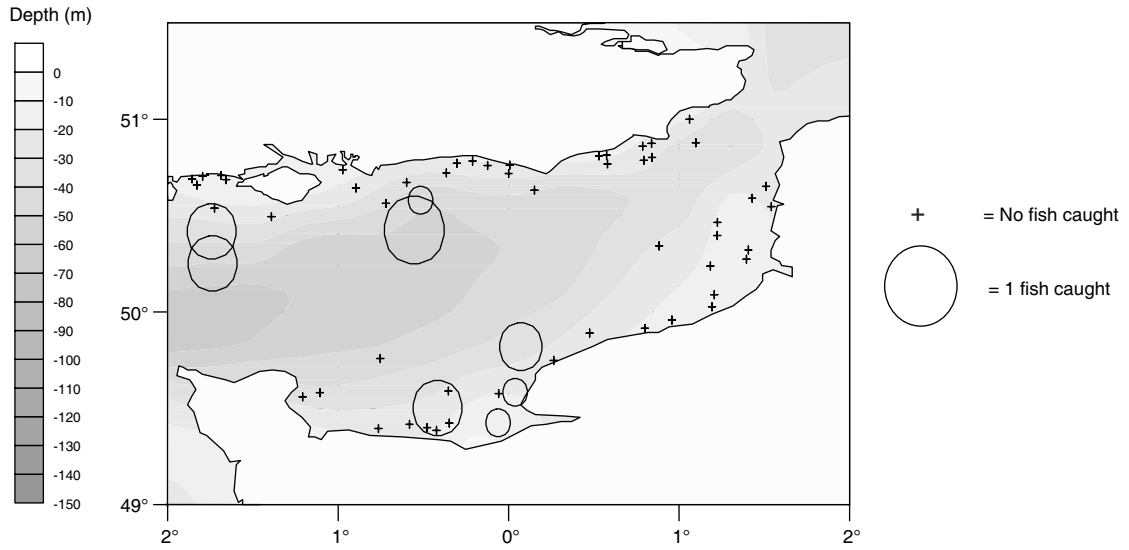


(c)

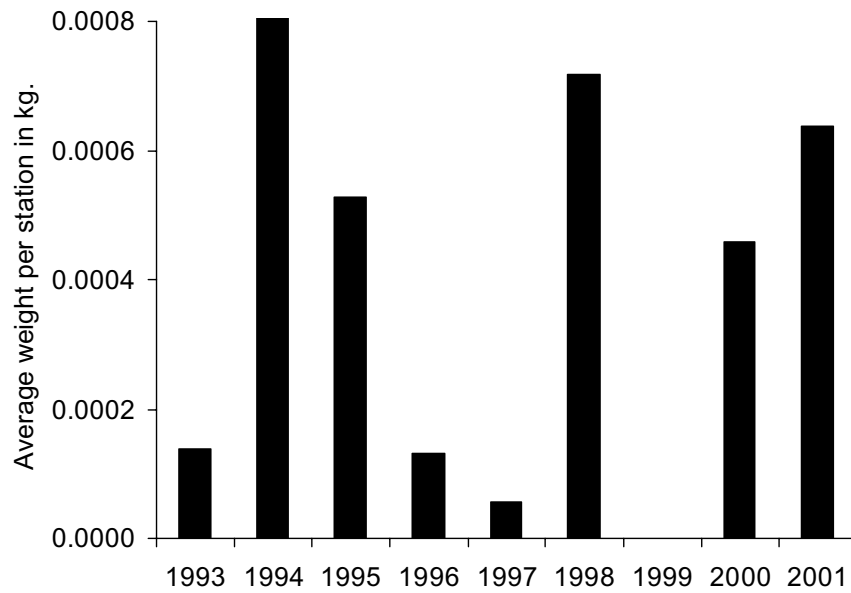


Topknot, Norwegian - *Phynorhombus norvegicus*

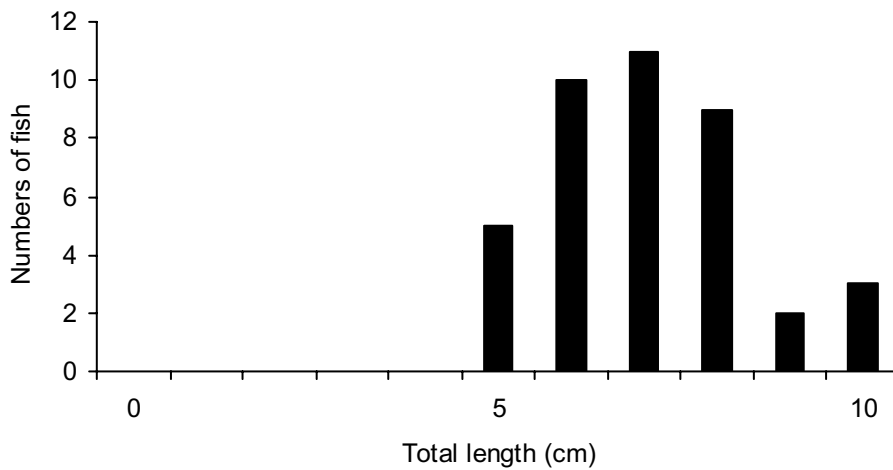
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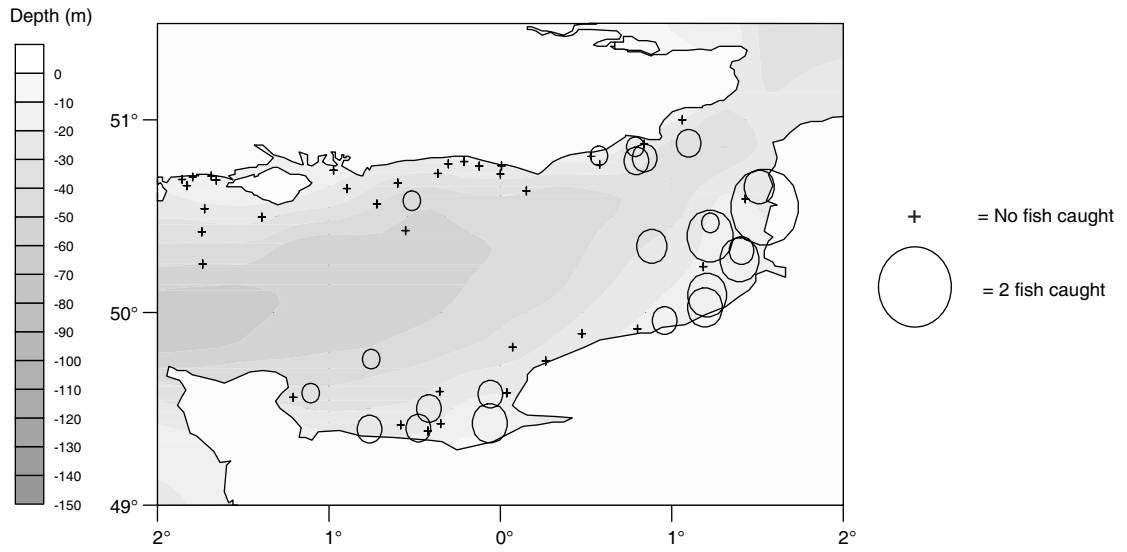
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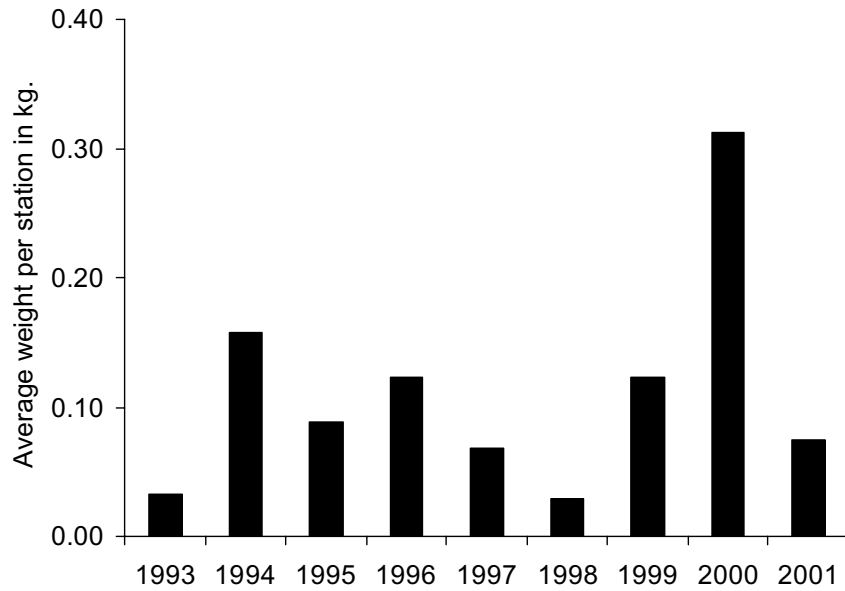
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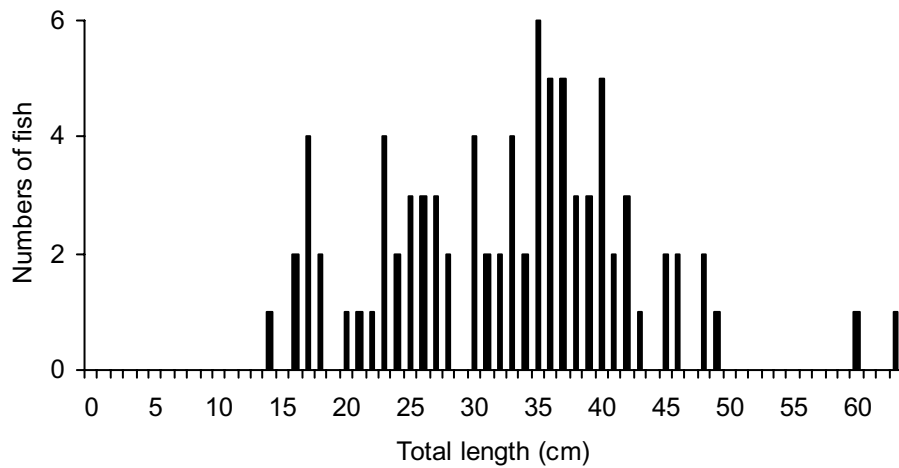
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(b)



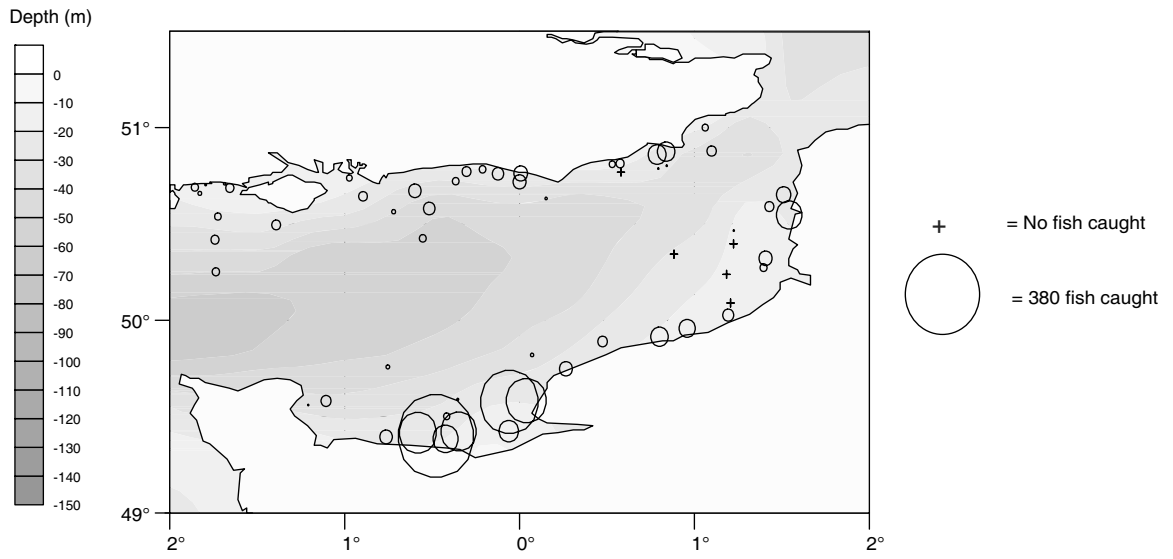
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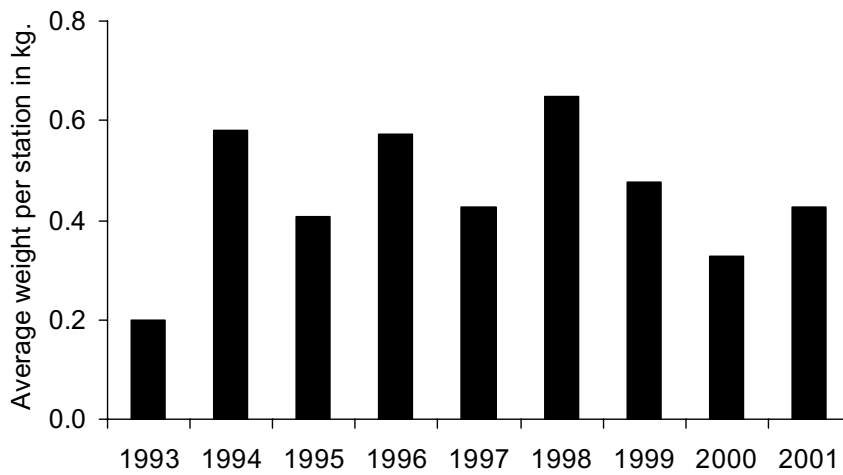
Gadoids

Bib - *Trisopterus luscus*

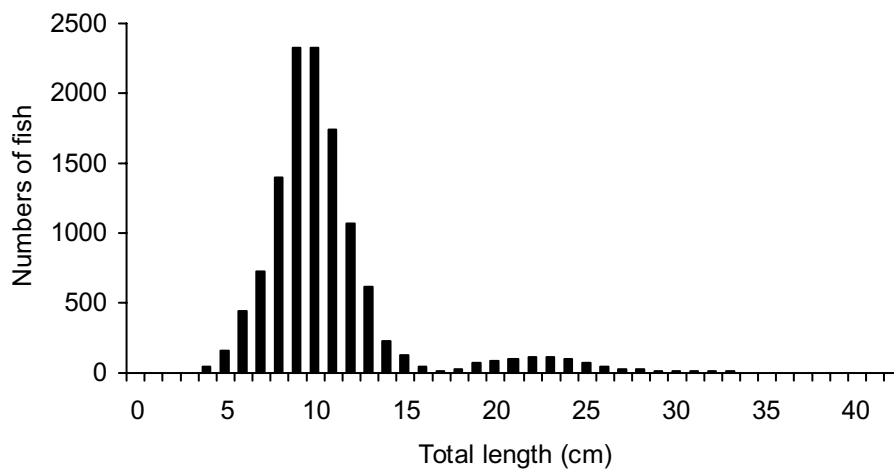
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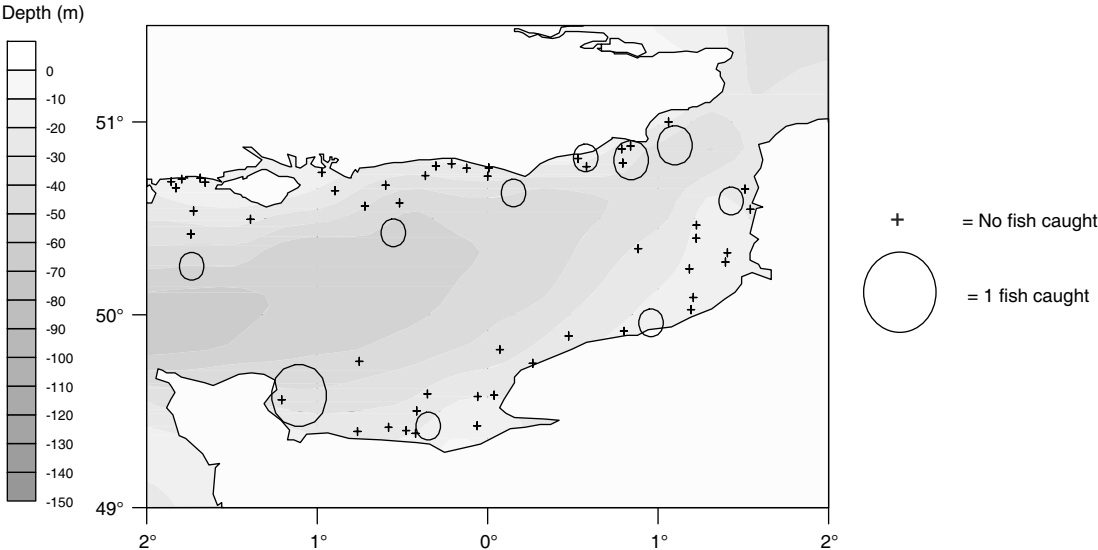
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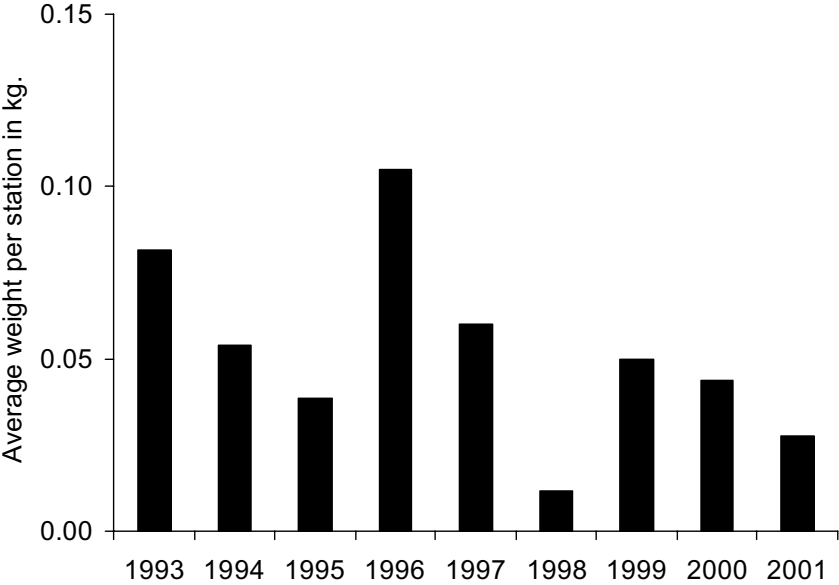
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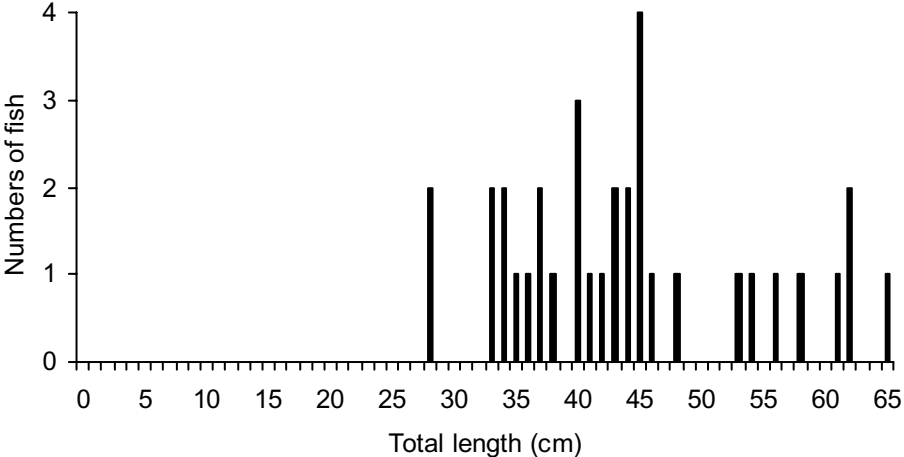
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(b)

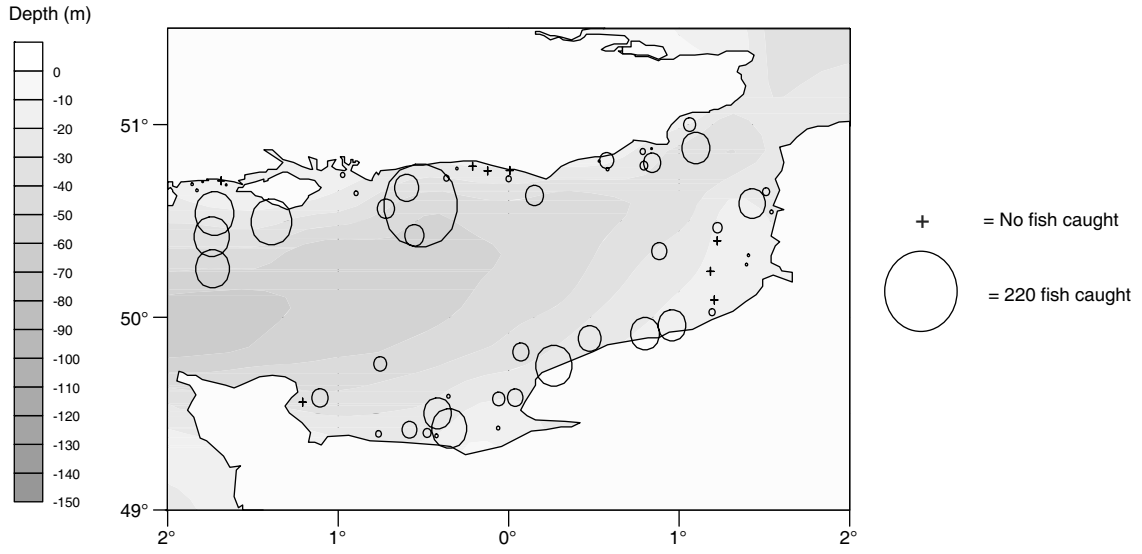


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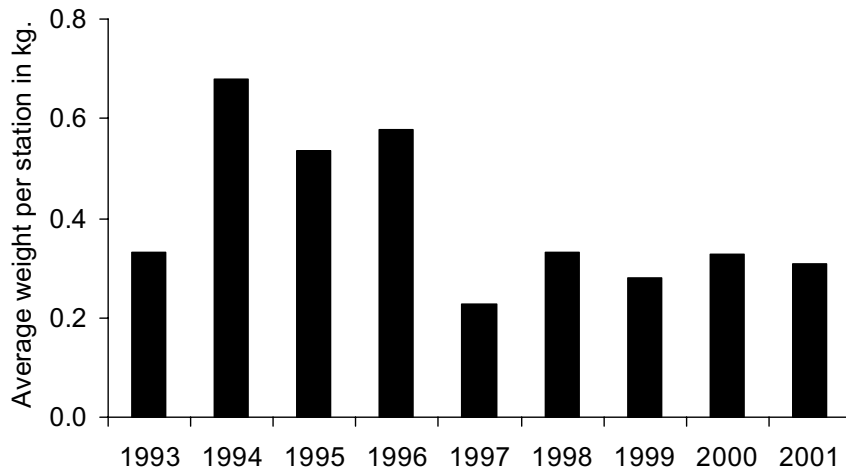


Poor cod - *Trisopterus minutus*

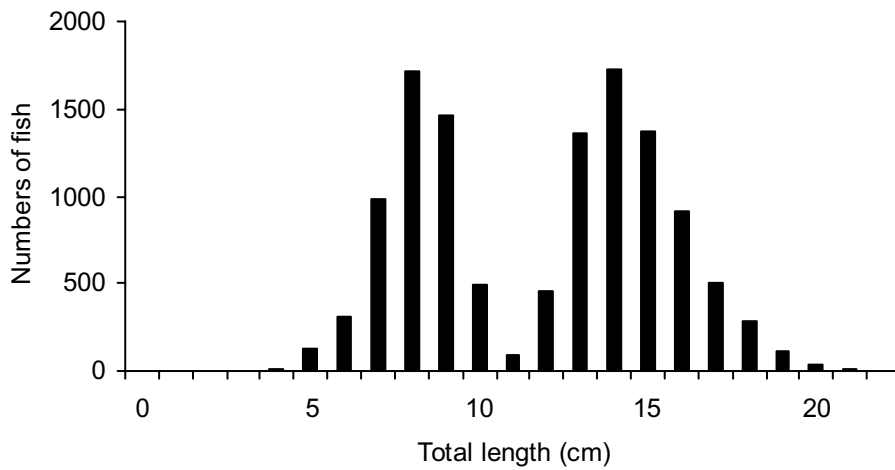
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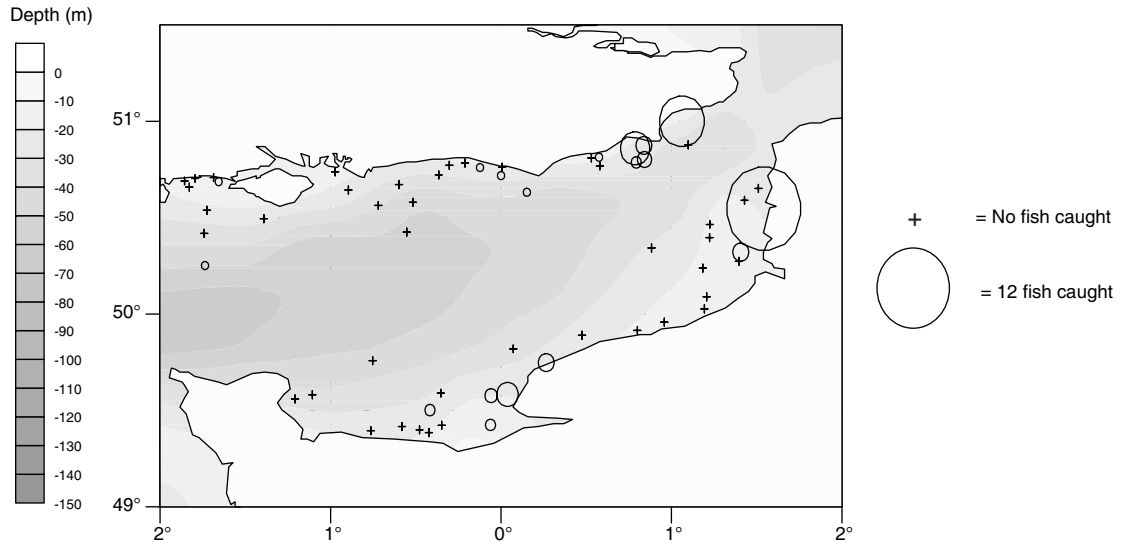
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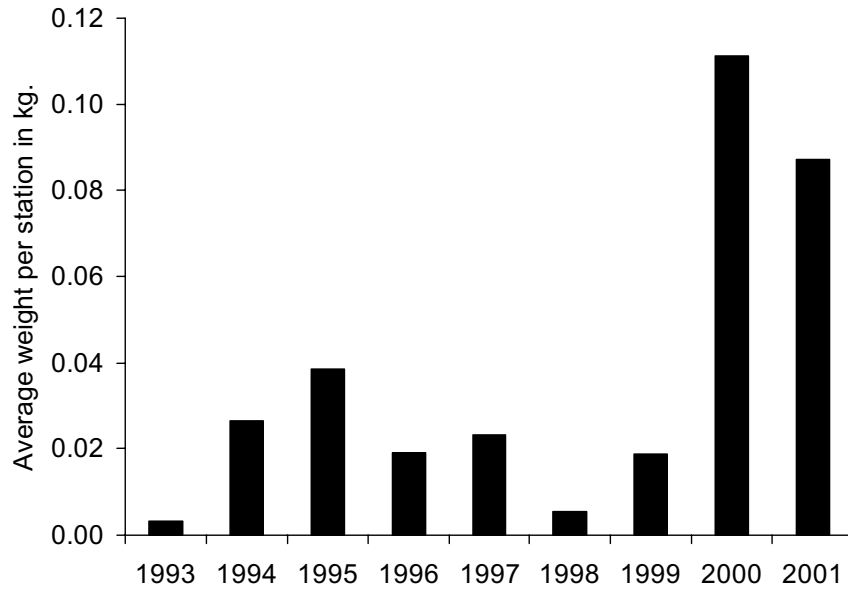
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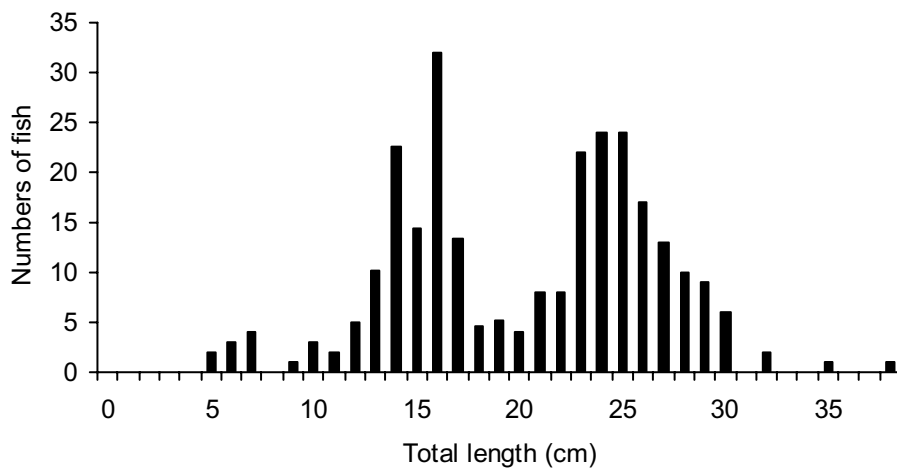
(a)



(b)



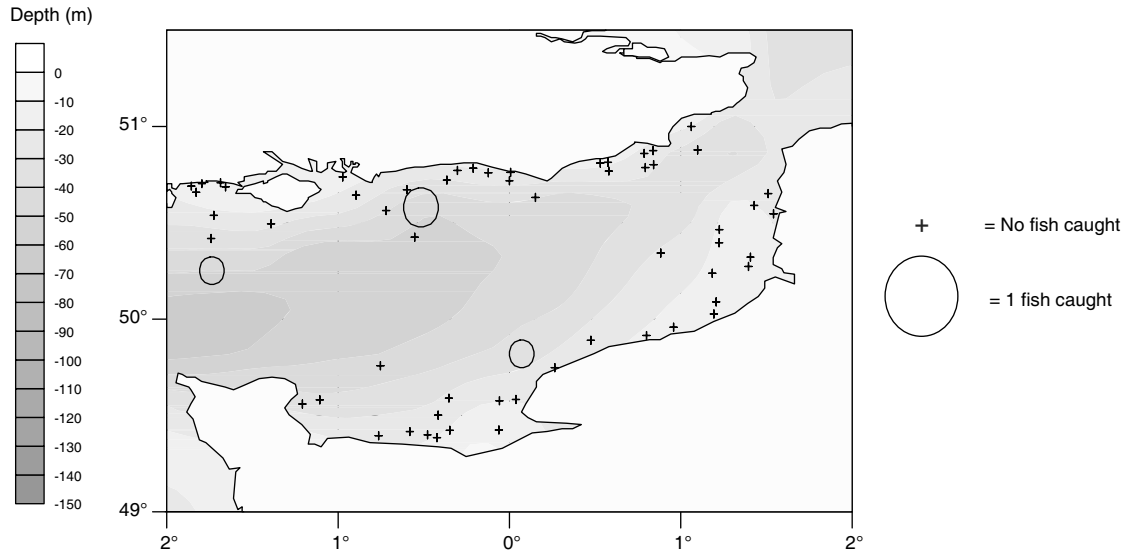
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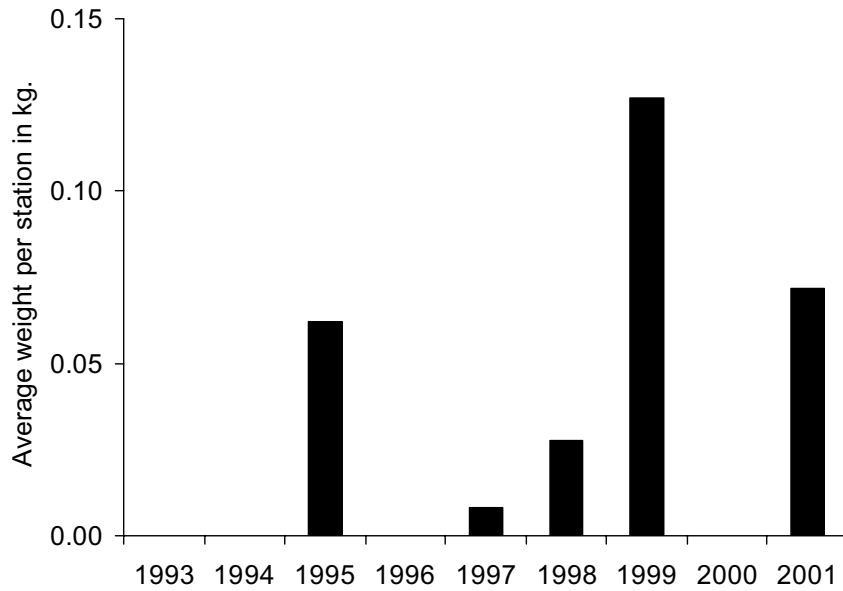
Elasmobranchs

Dogfish, greater spotted - *Scyliorhinus stellaris*

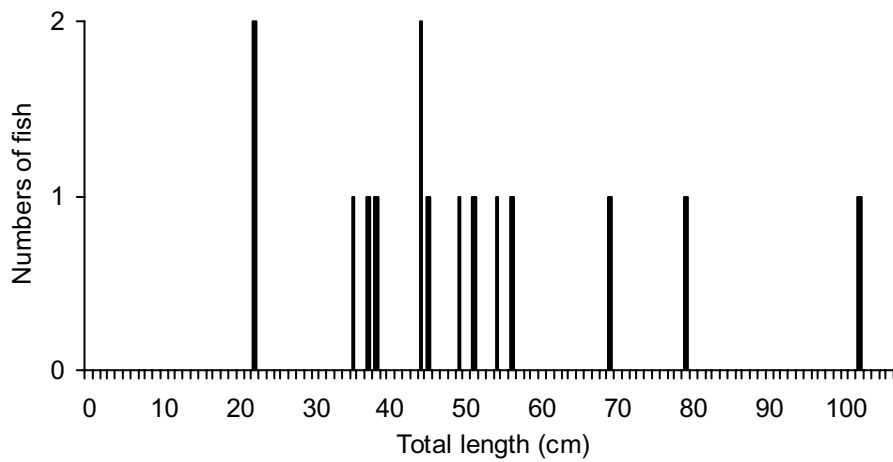
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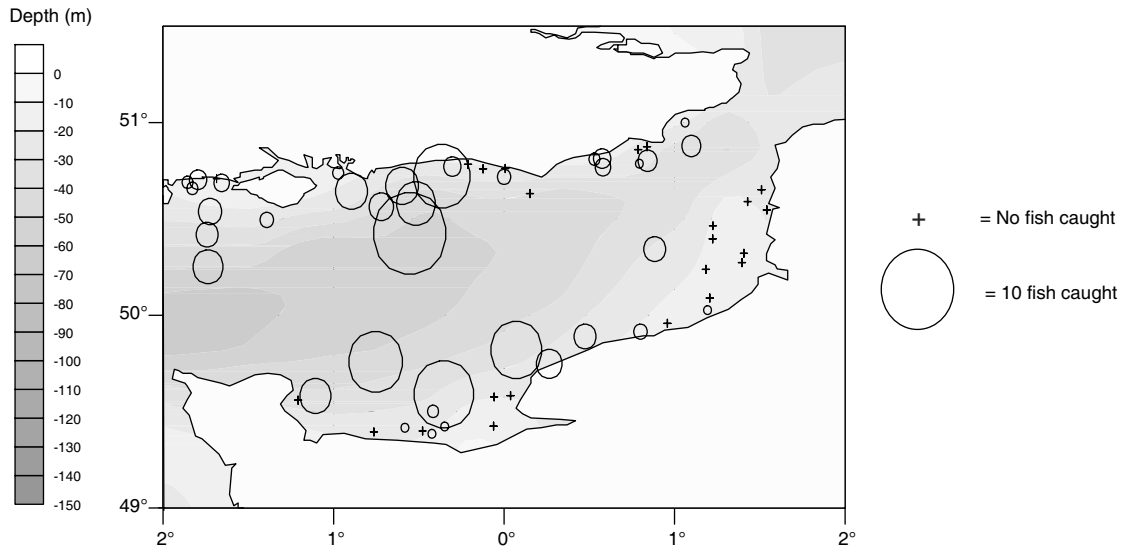
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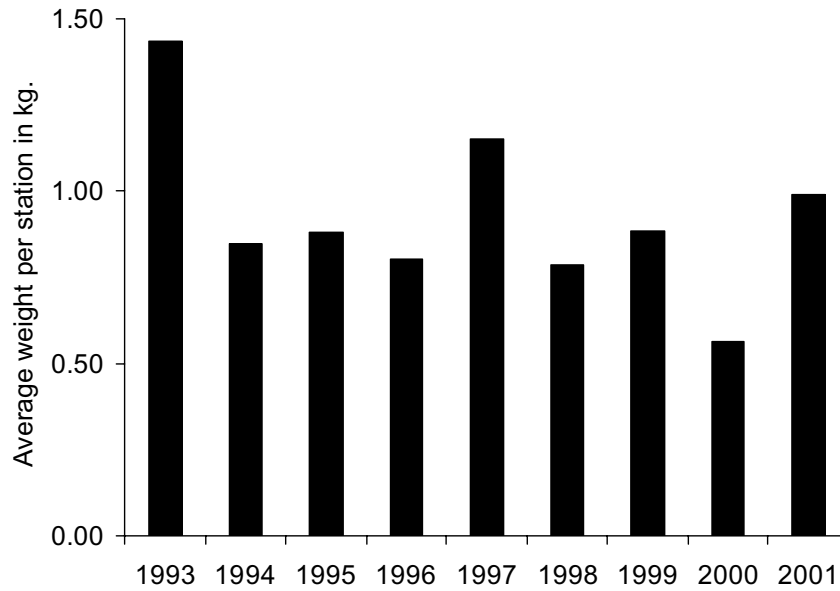
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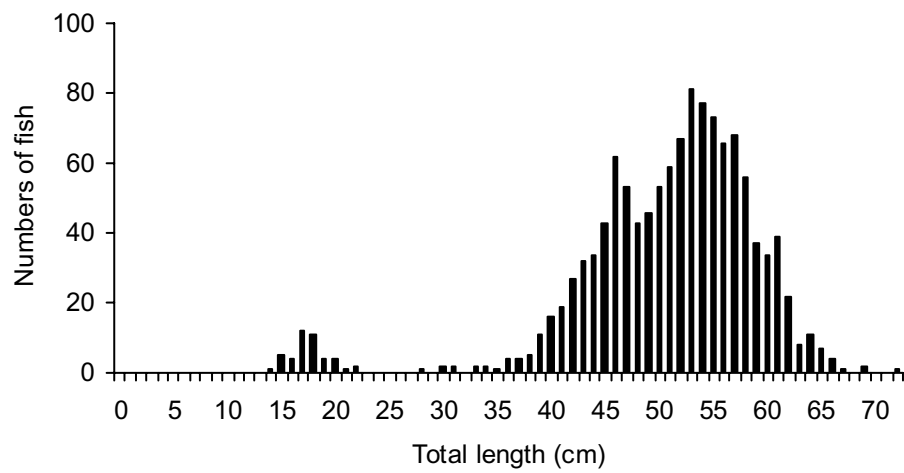
(a)



(b)

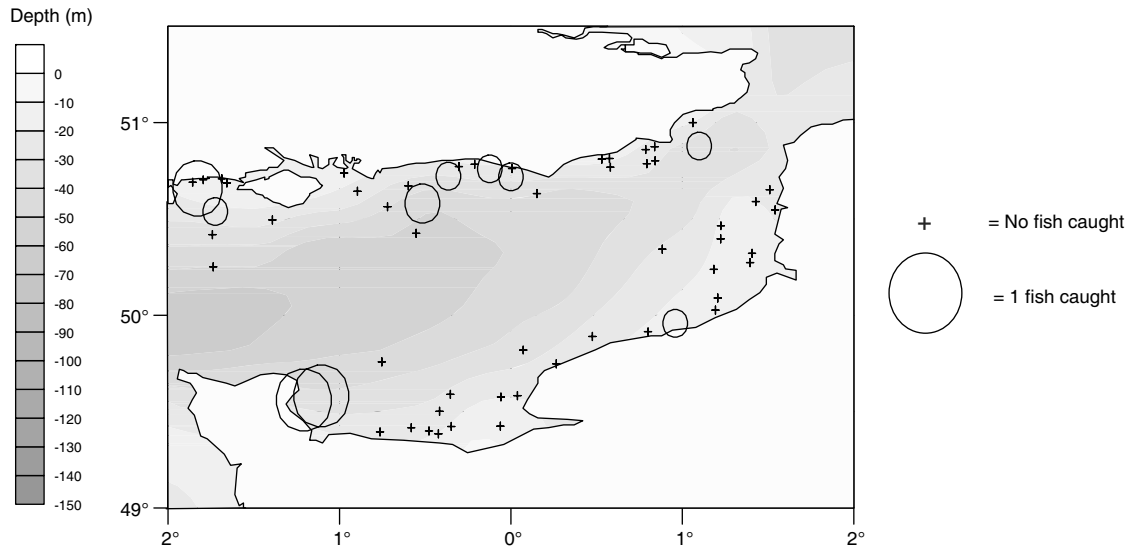


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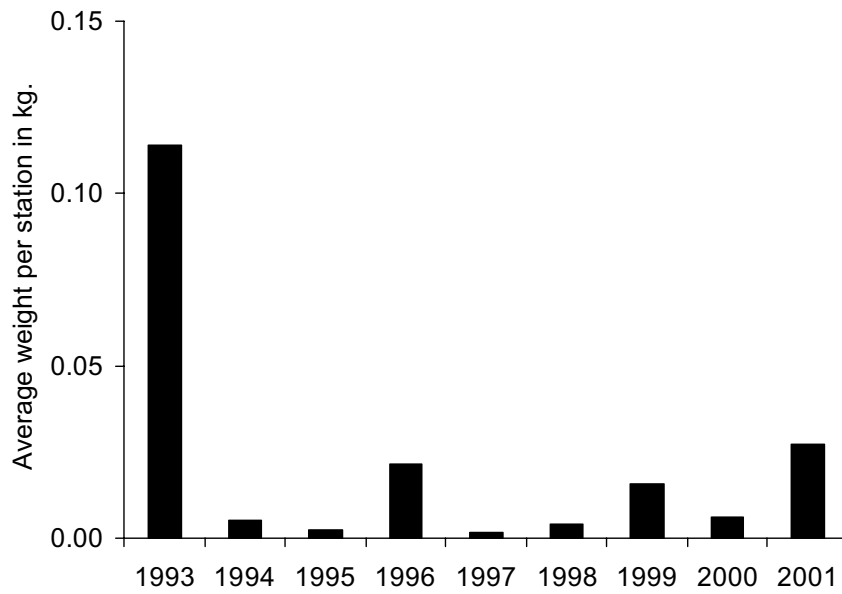


Ray, blonde - *Raja brachyura*

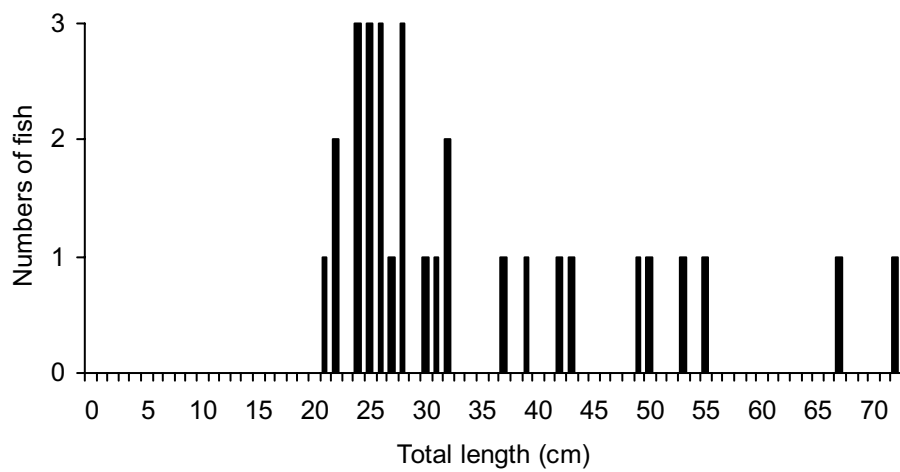
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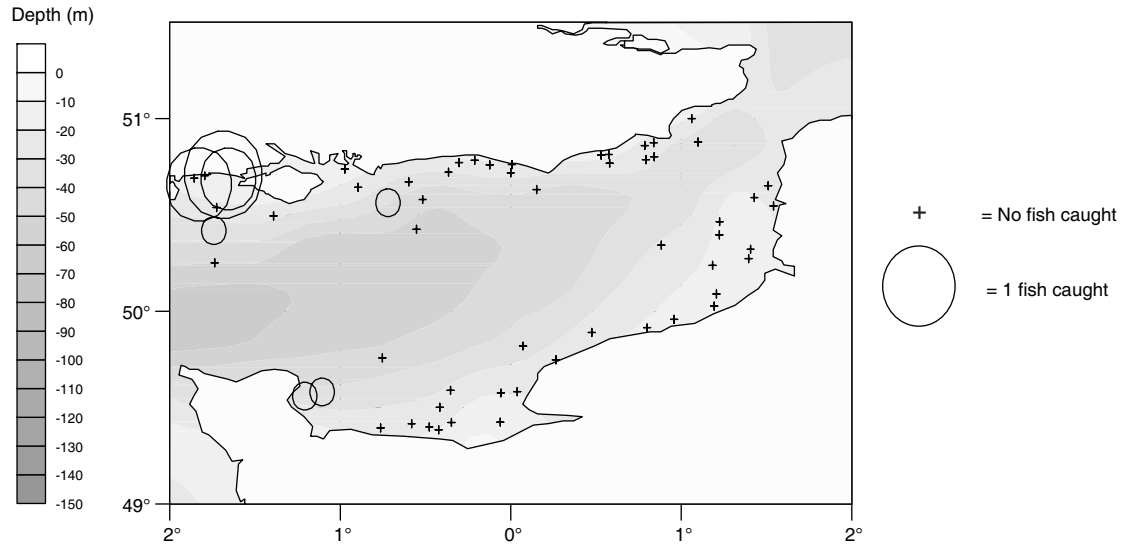
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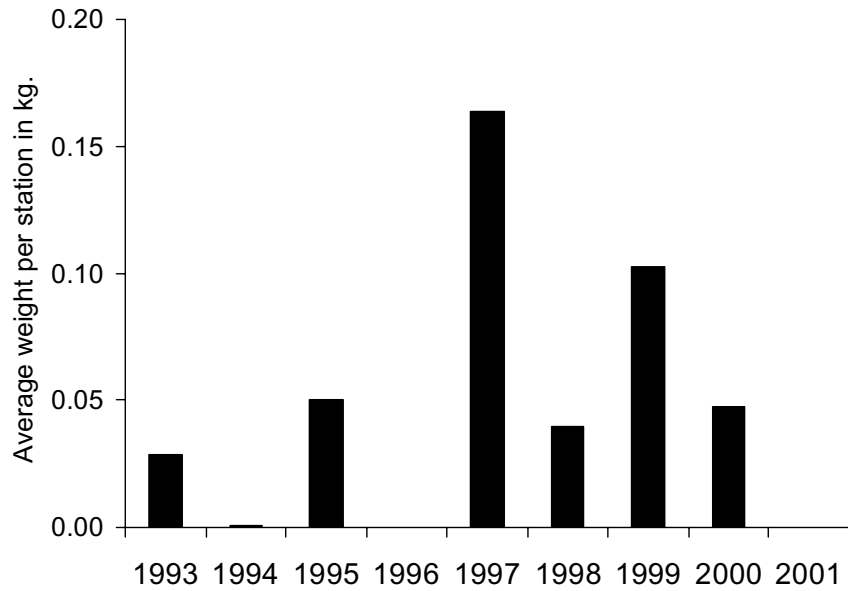
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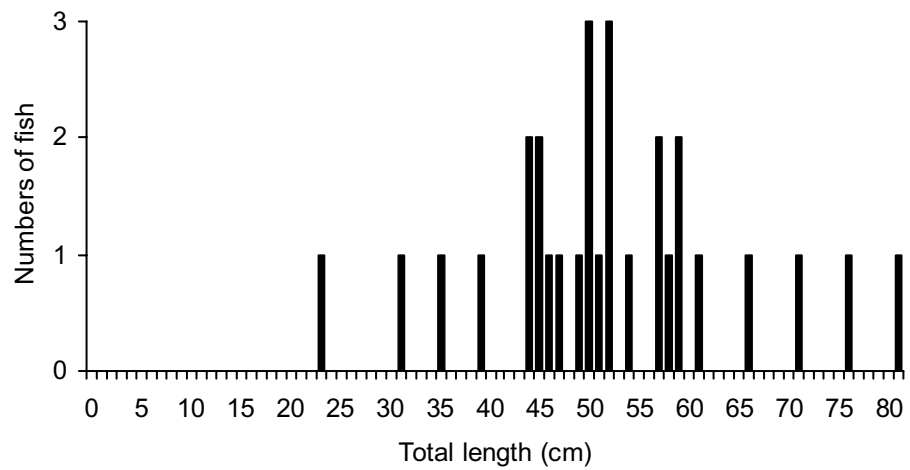
(a)



(b)

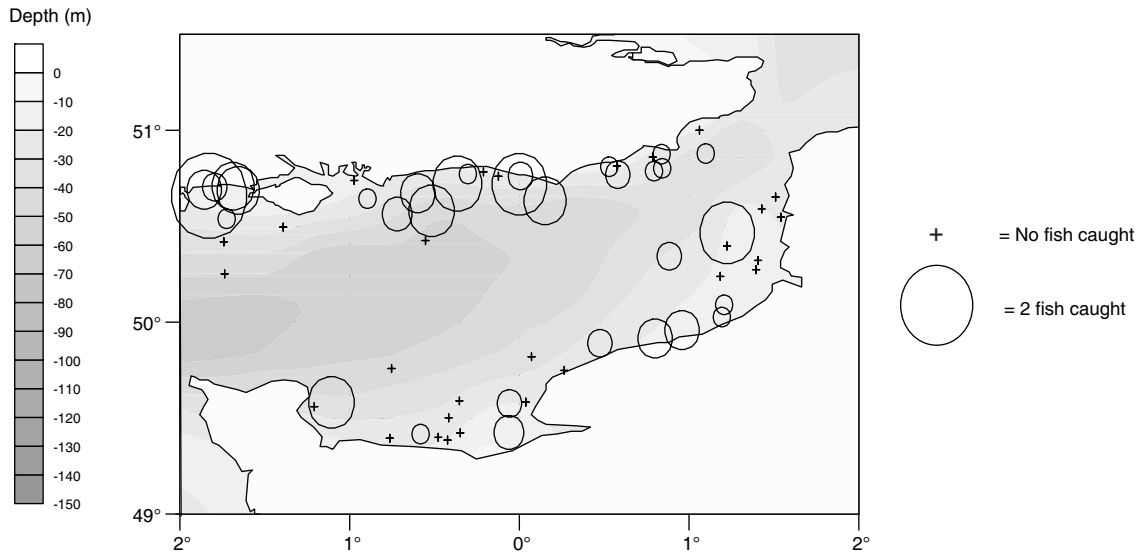


(c)

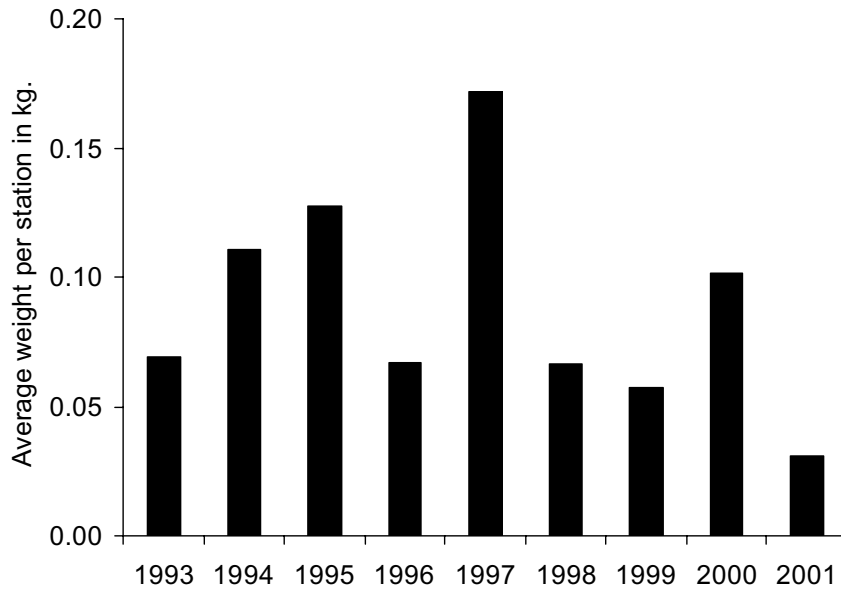


Ray, spotted - *Raja montagui*

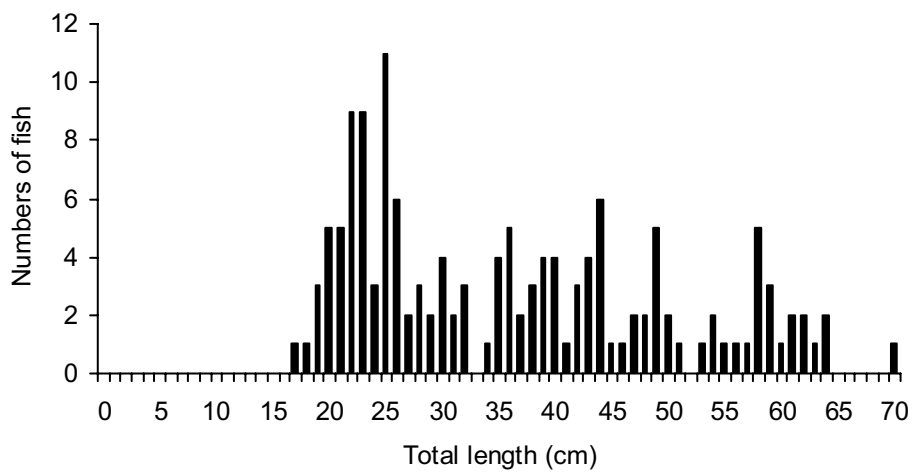
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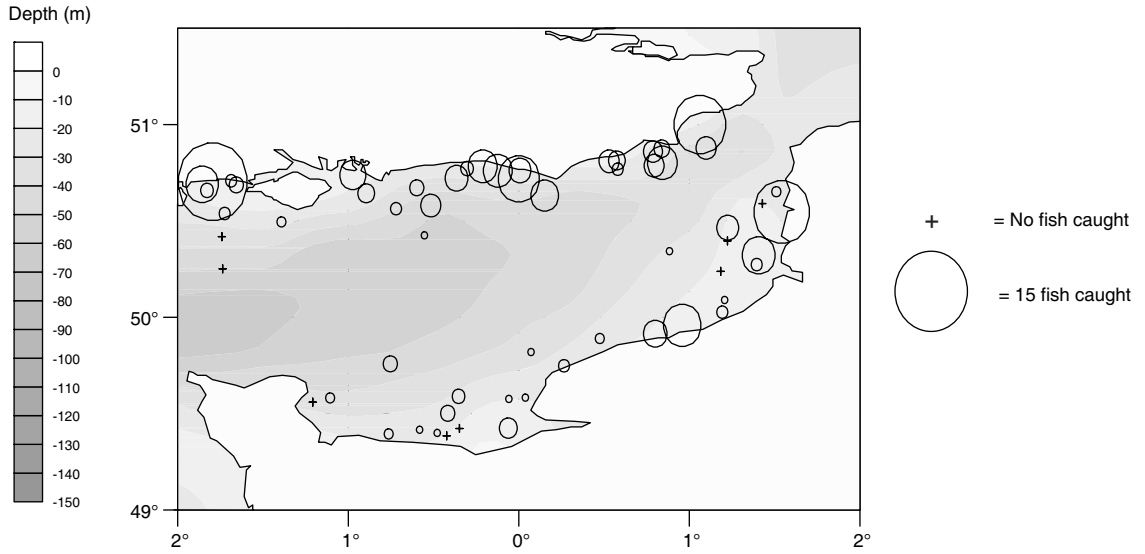
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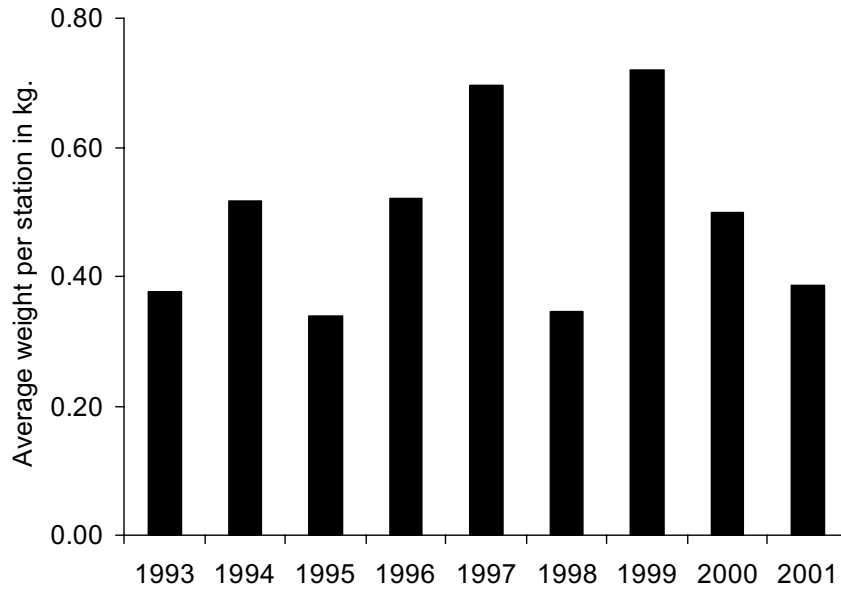
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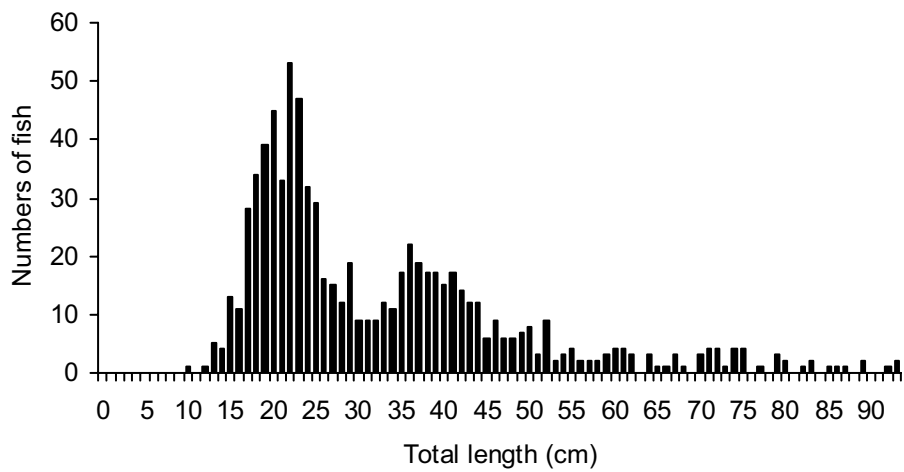
(a)



(b)

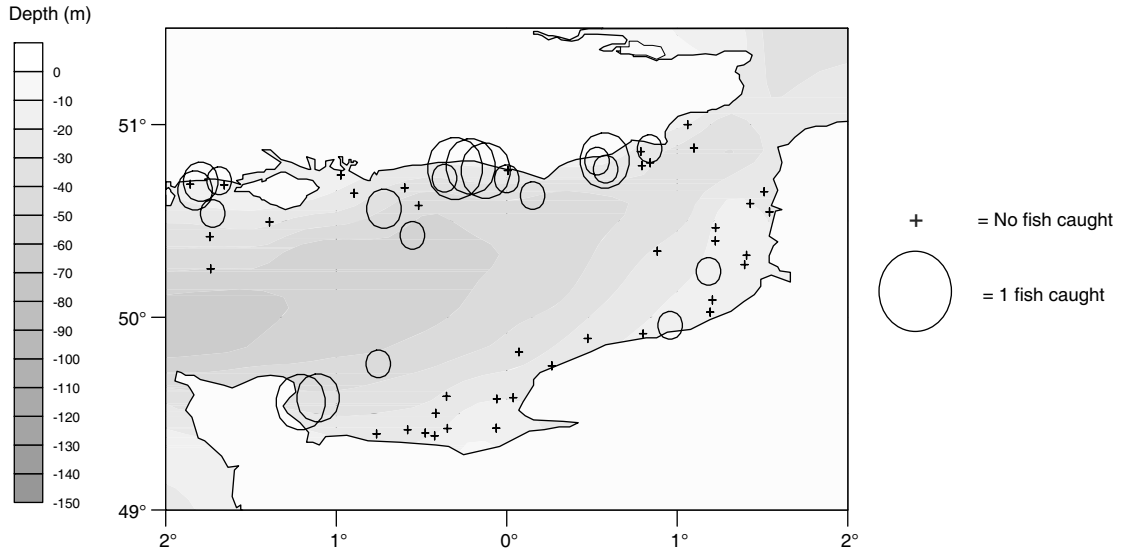


(c)

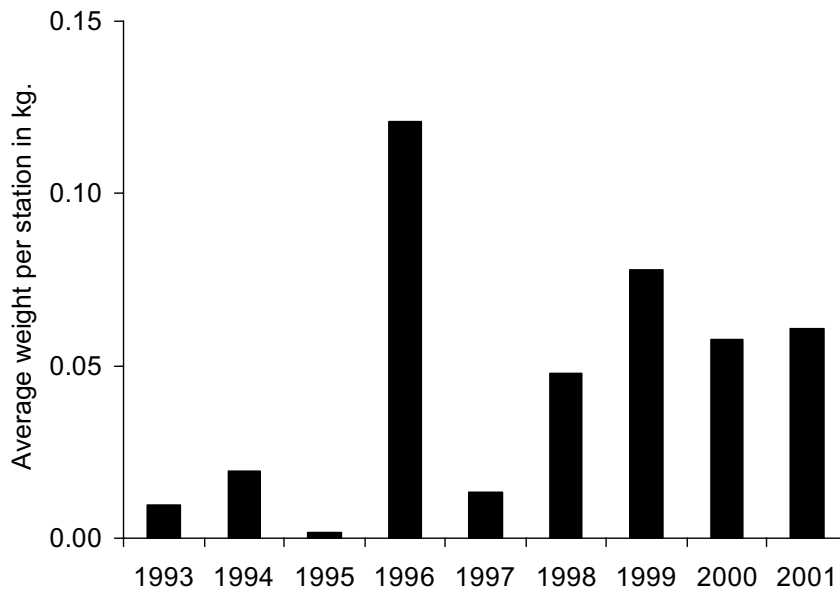


Ray, undulate - *Raja undulata*

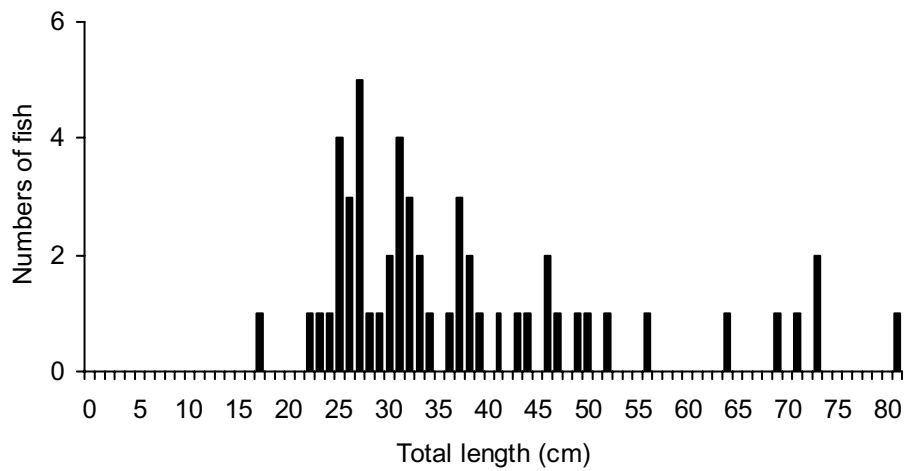
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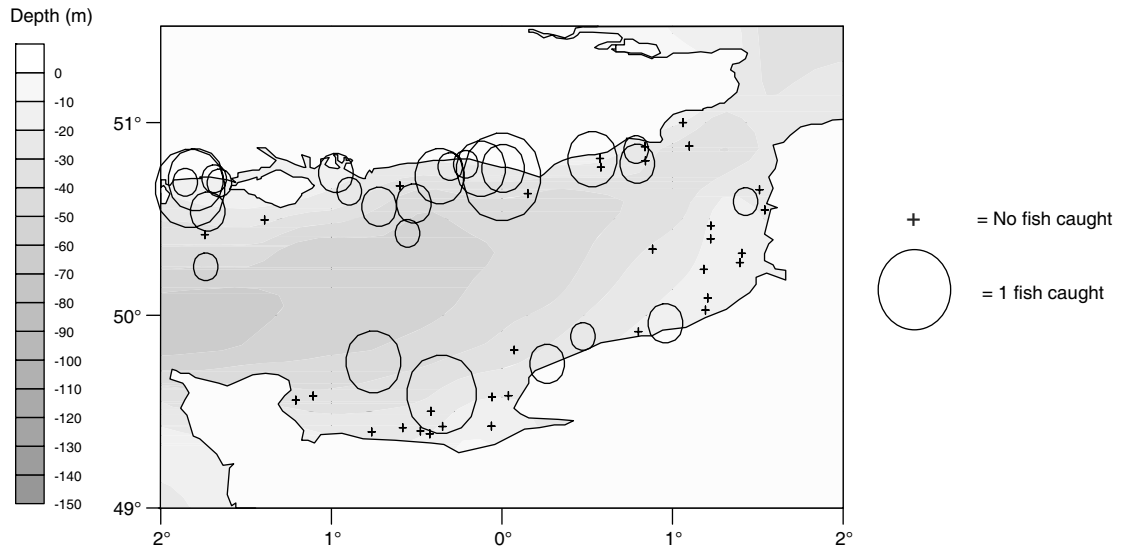
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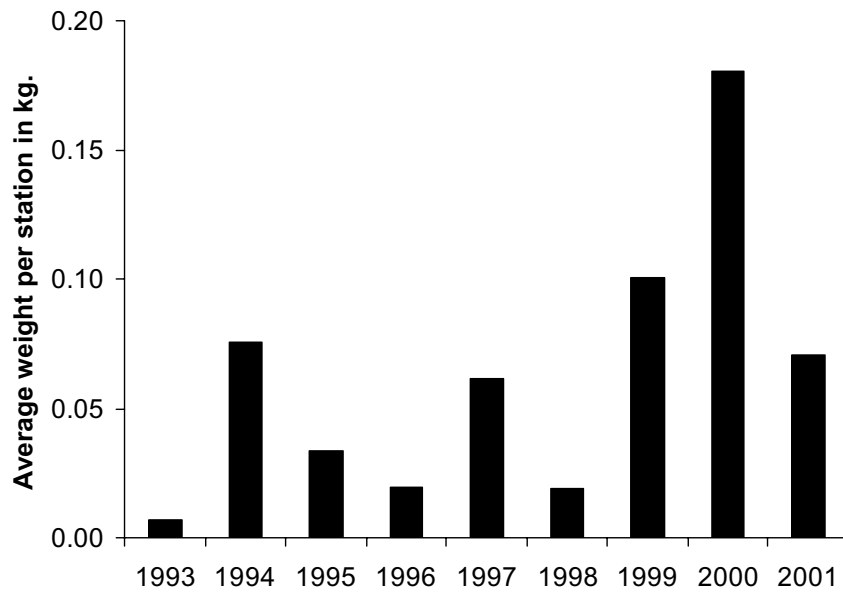
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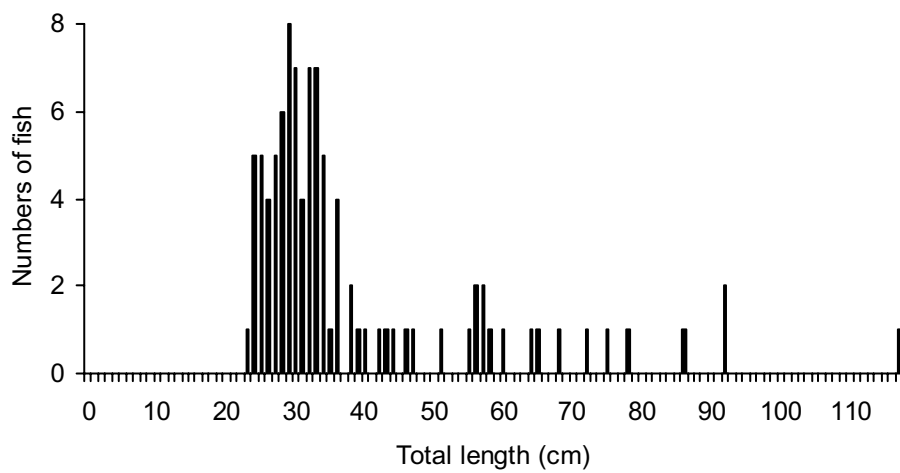
(a)



(b)



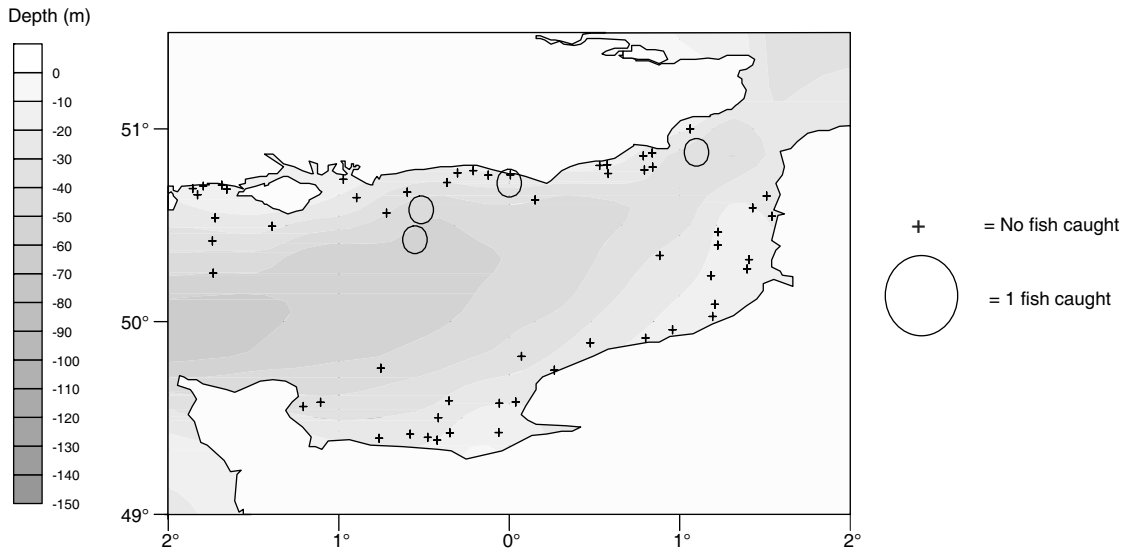
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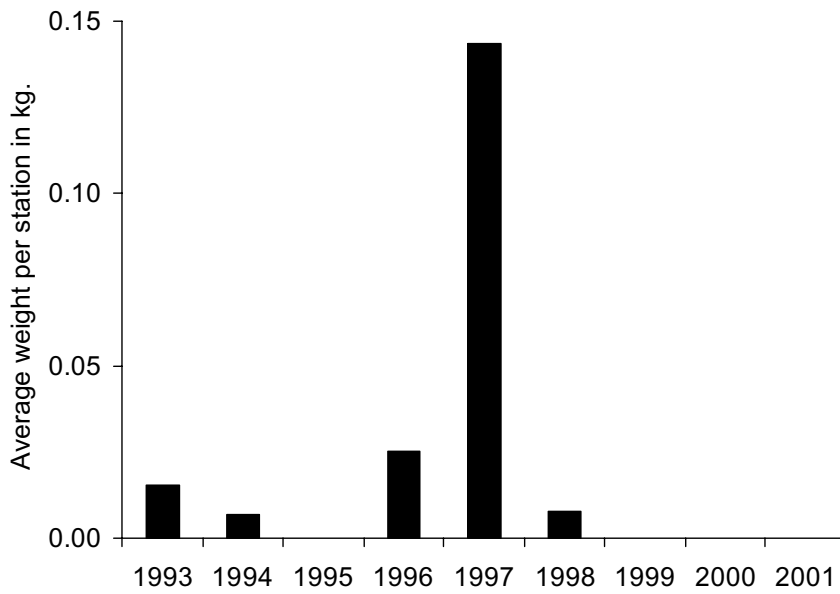
Other fish species

Anglerfish - *Lophius piscatorius*

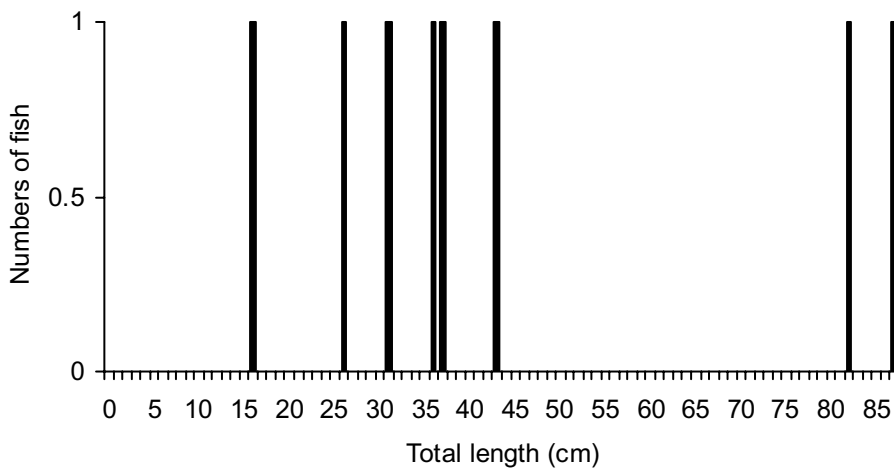
(a)



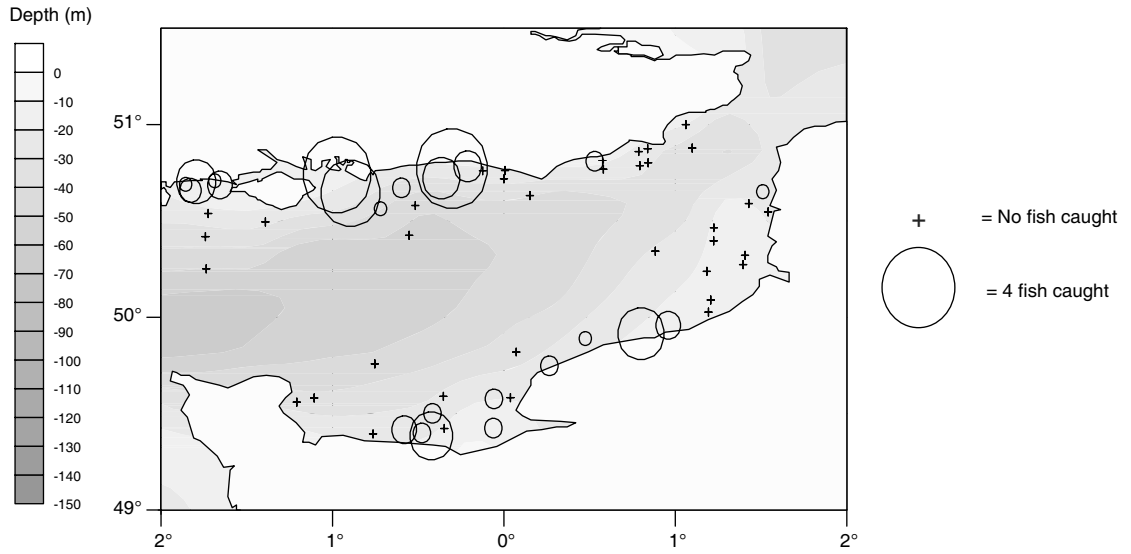
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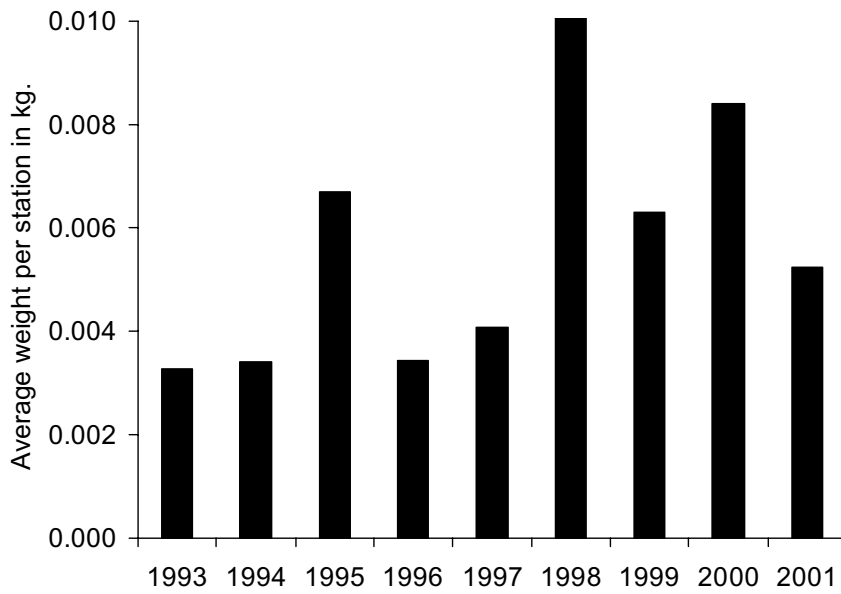
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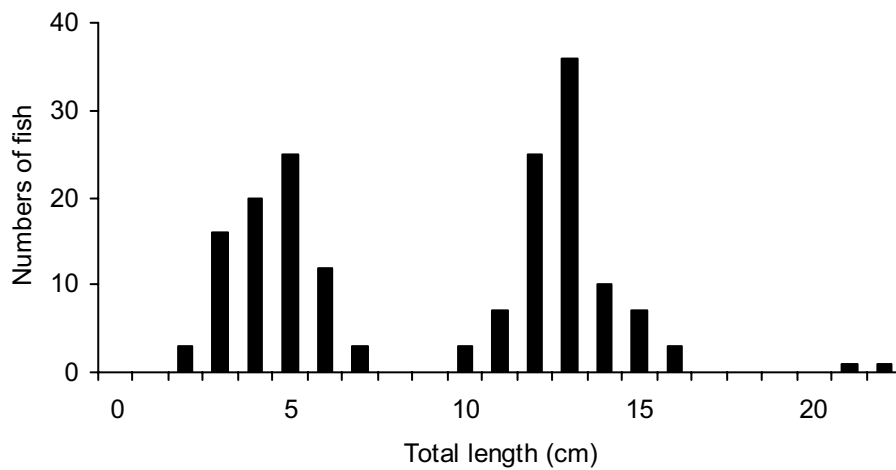
(a)



(b)

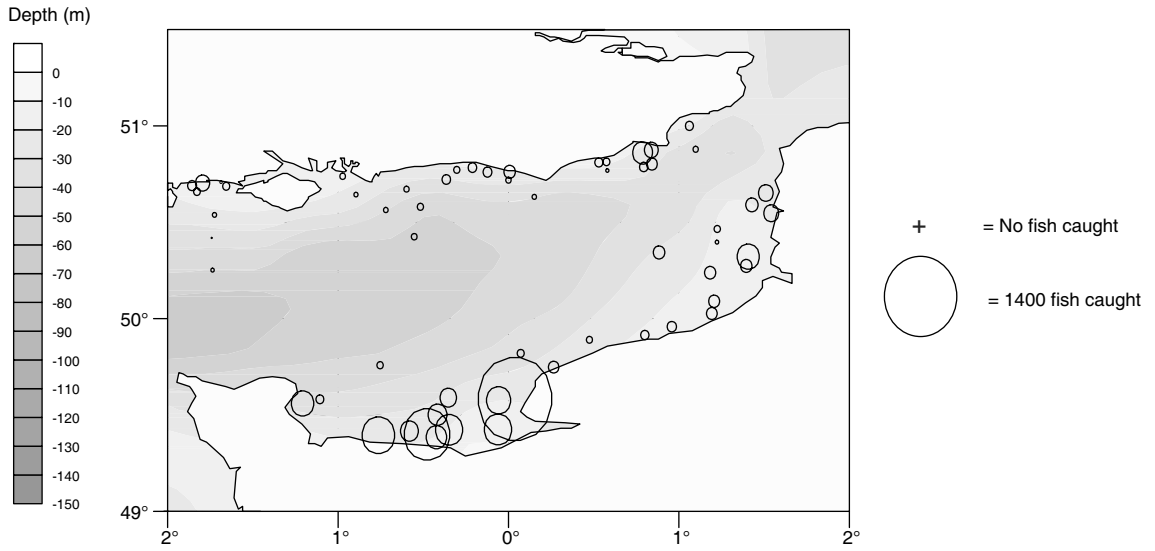


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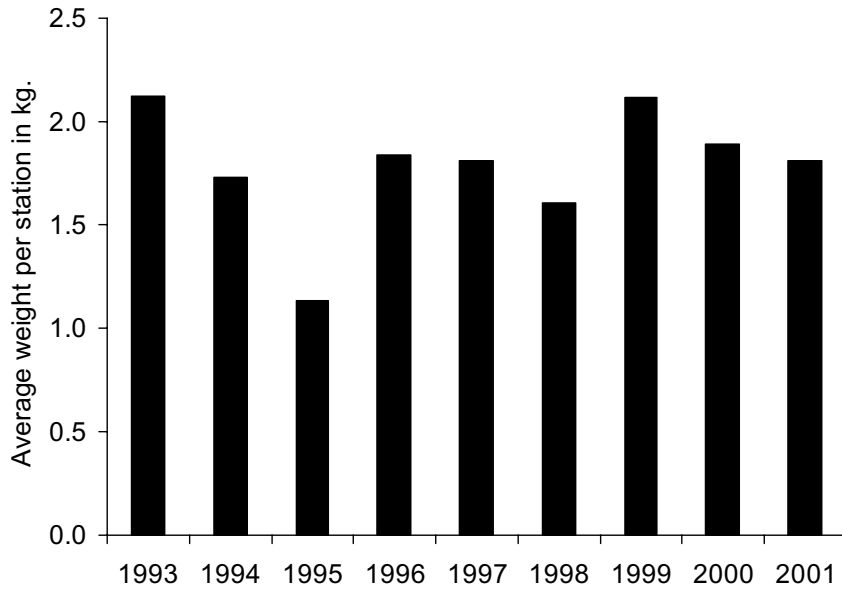


Dragonet, common - *Callionymus lyra*

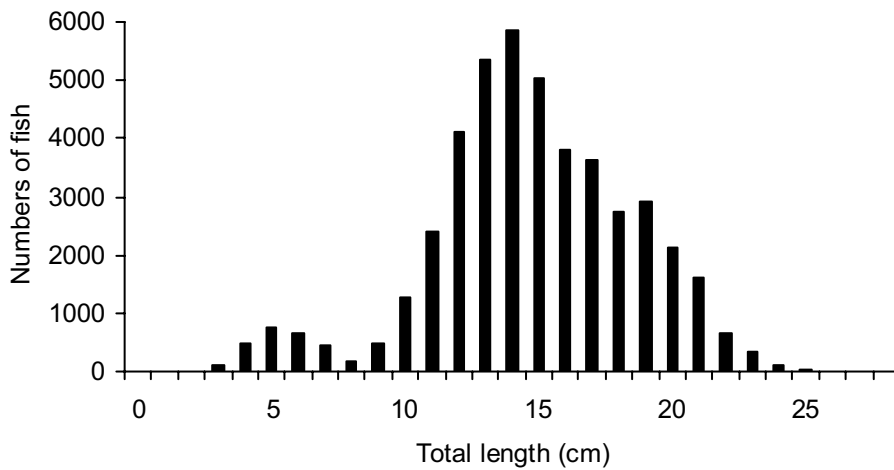
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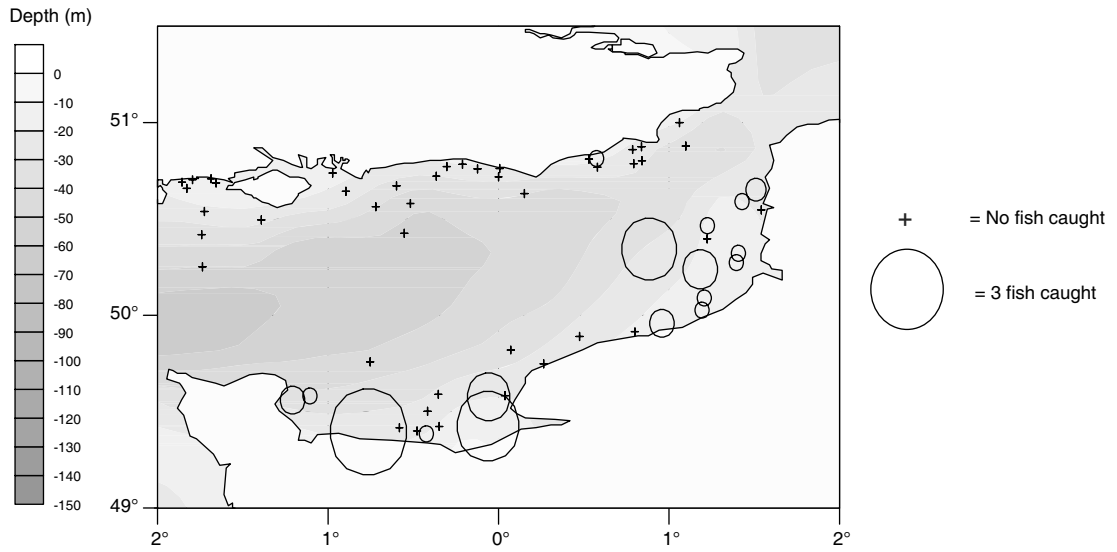
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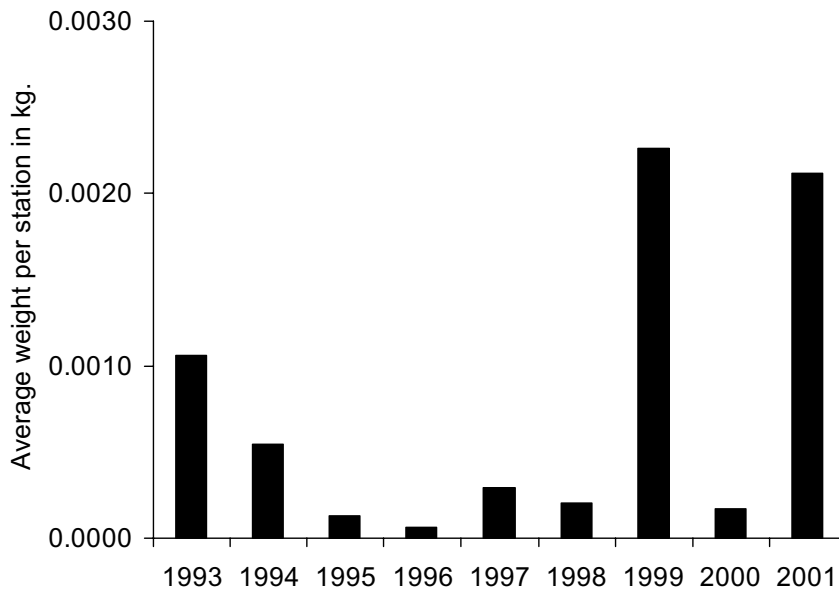
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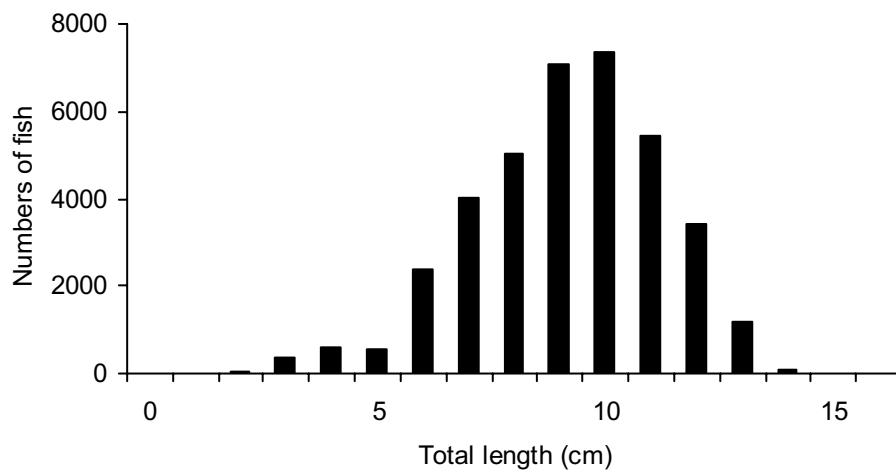
(a)



(b)

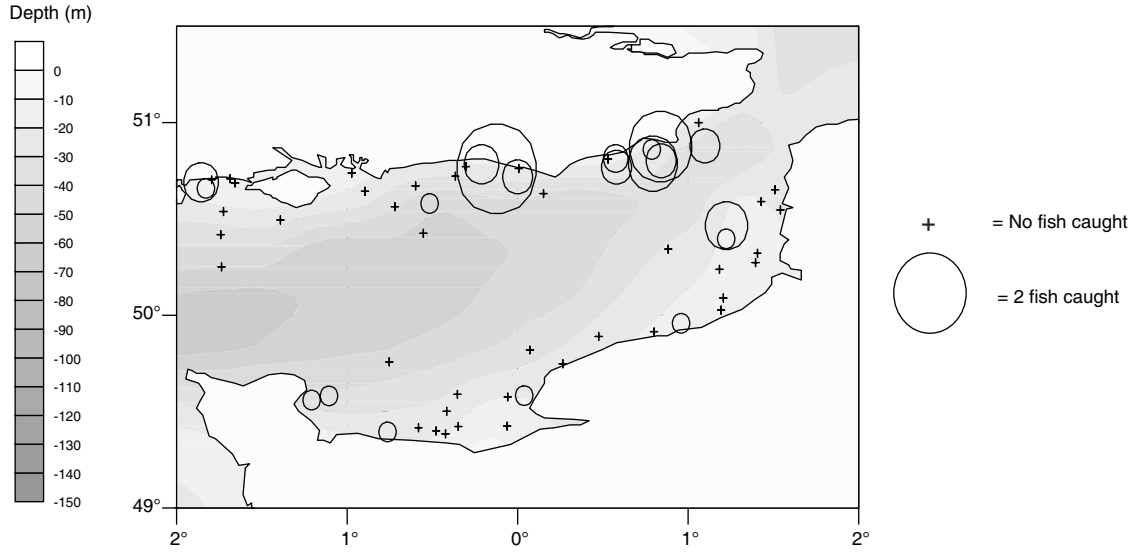


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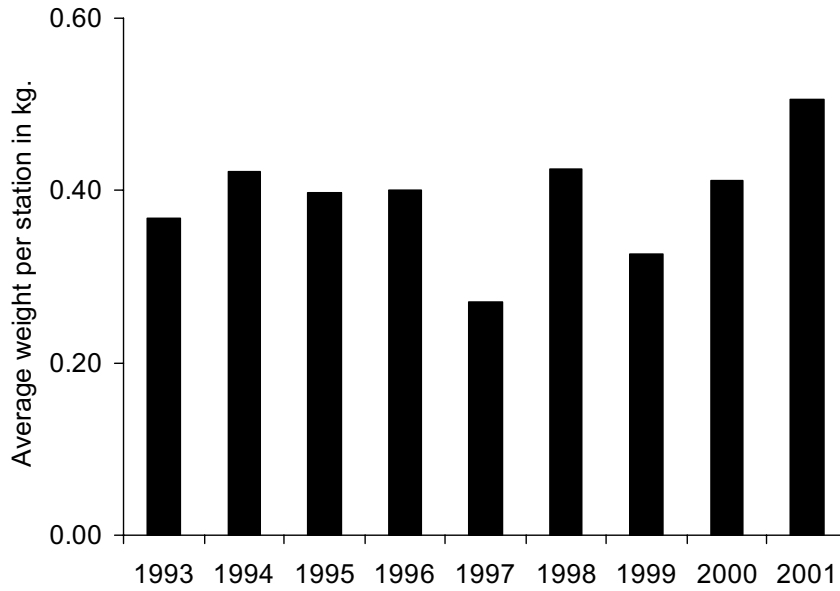


Gurnard, grey - *Eutrigla gurnardus*

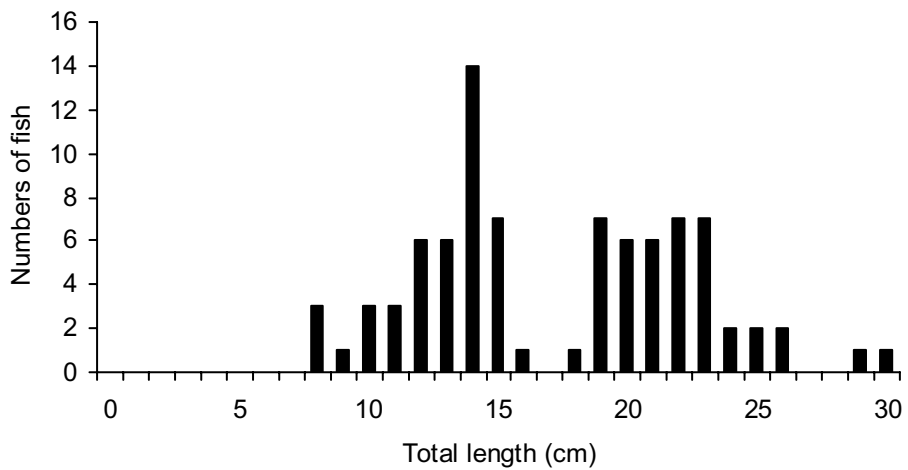
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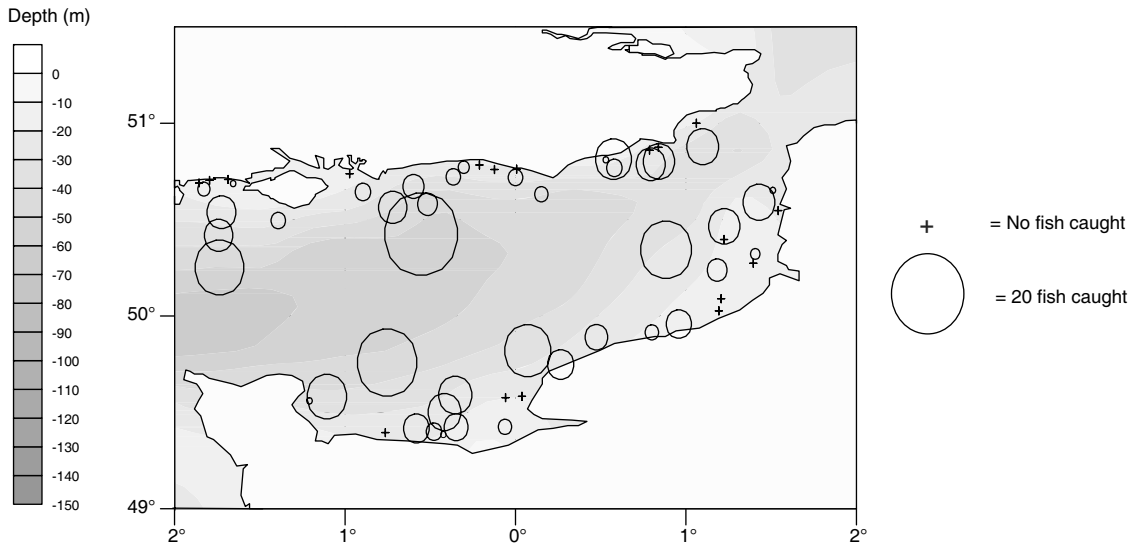
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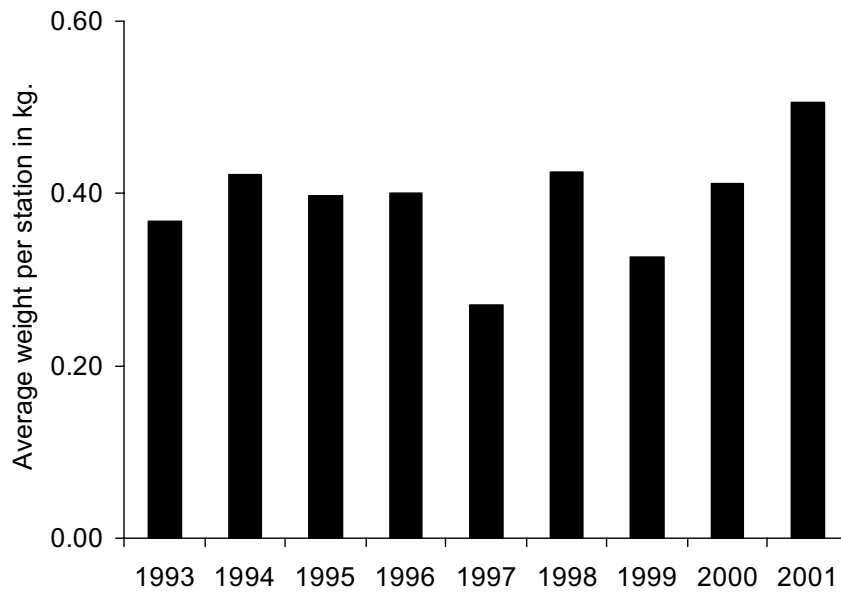
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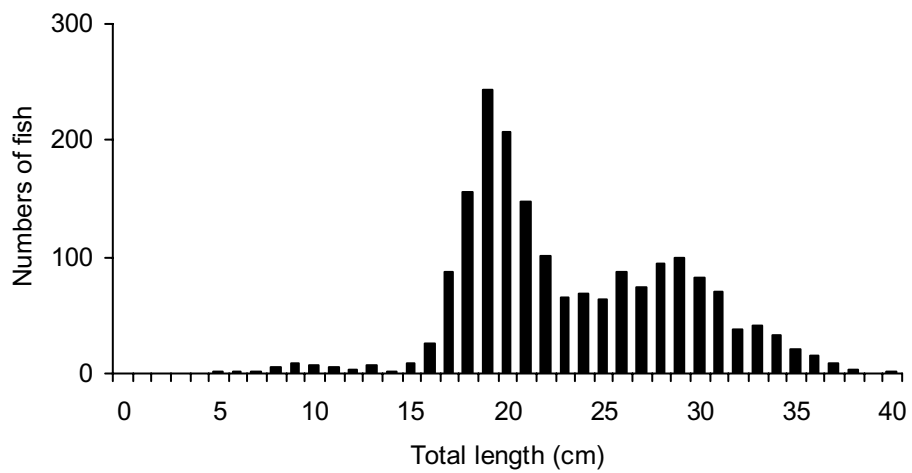
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(b)

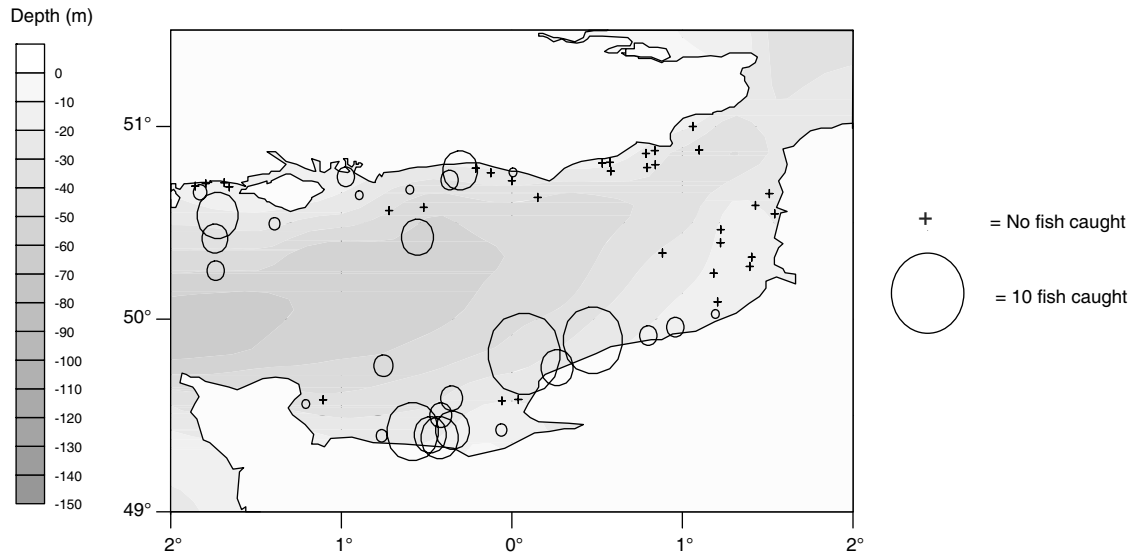


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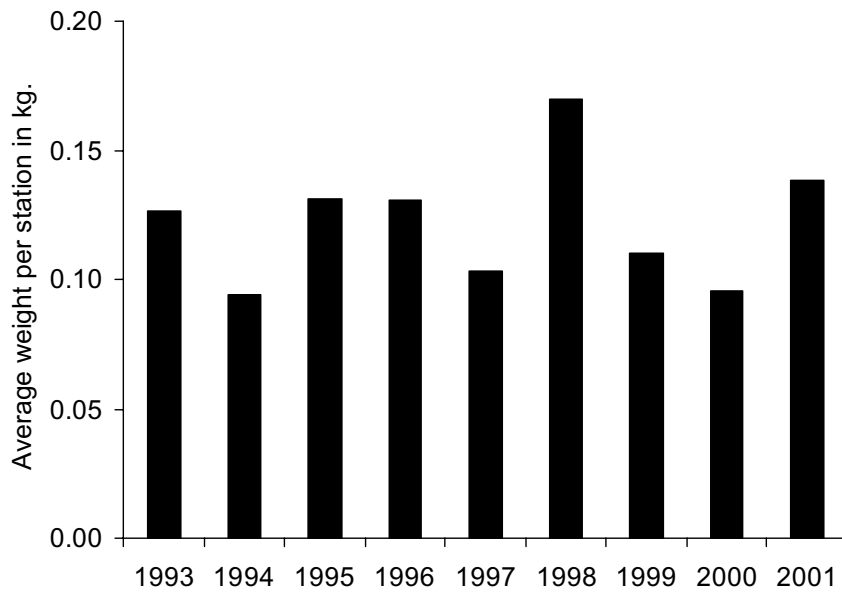


Gurnard, streaked - *Trigloporus lastoviza*

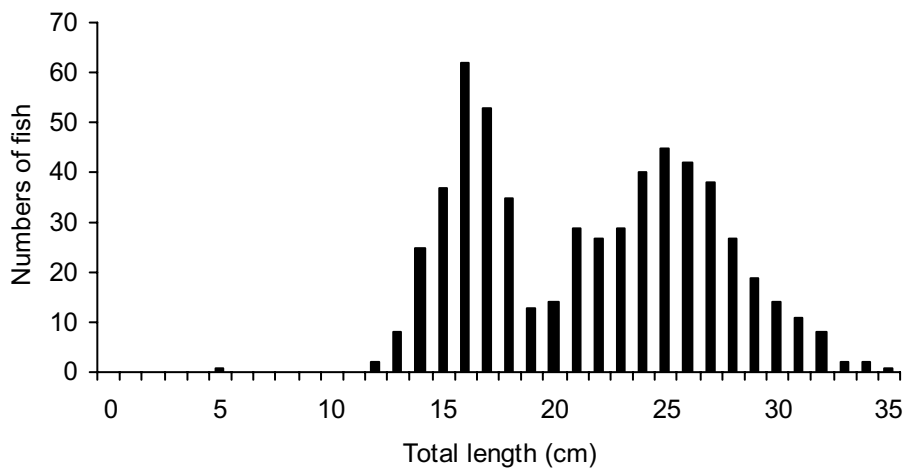
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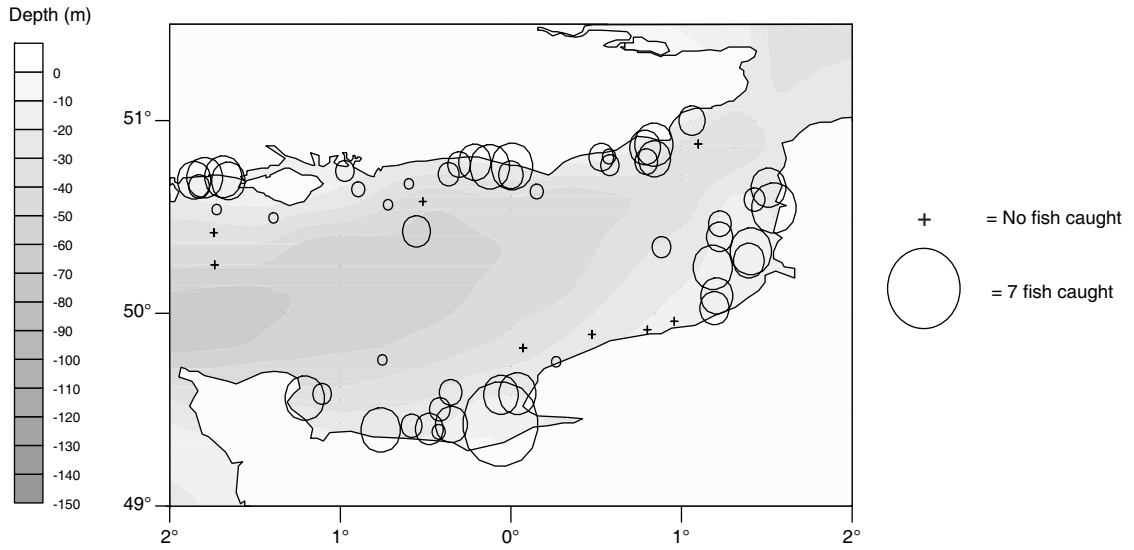
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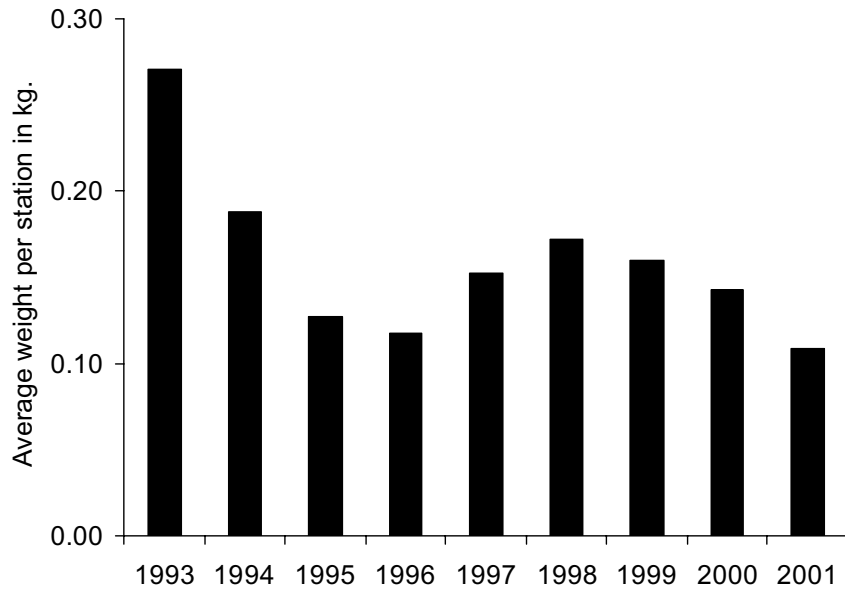
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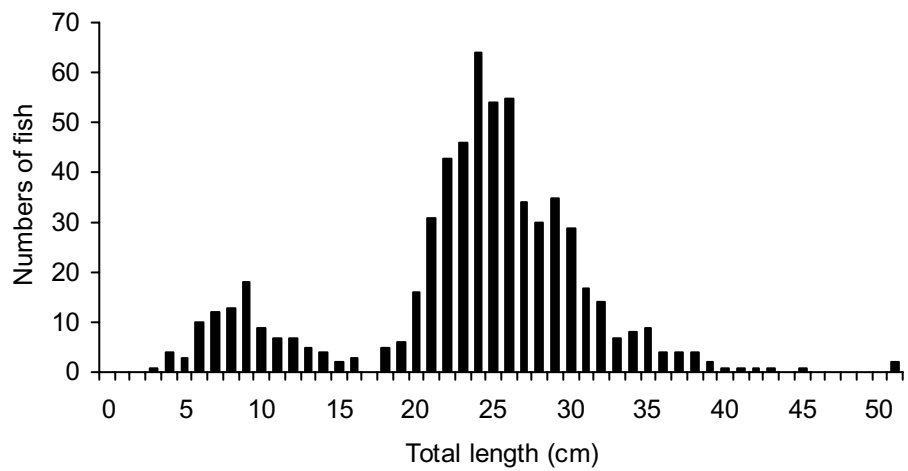
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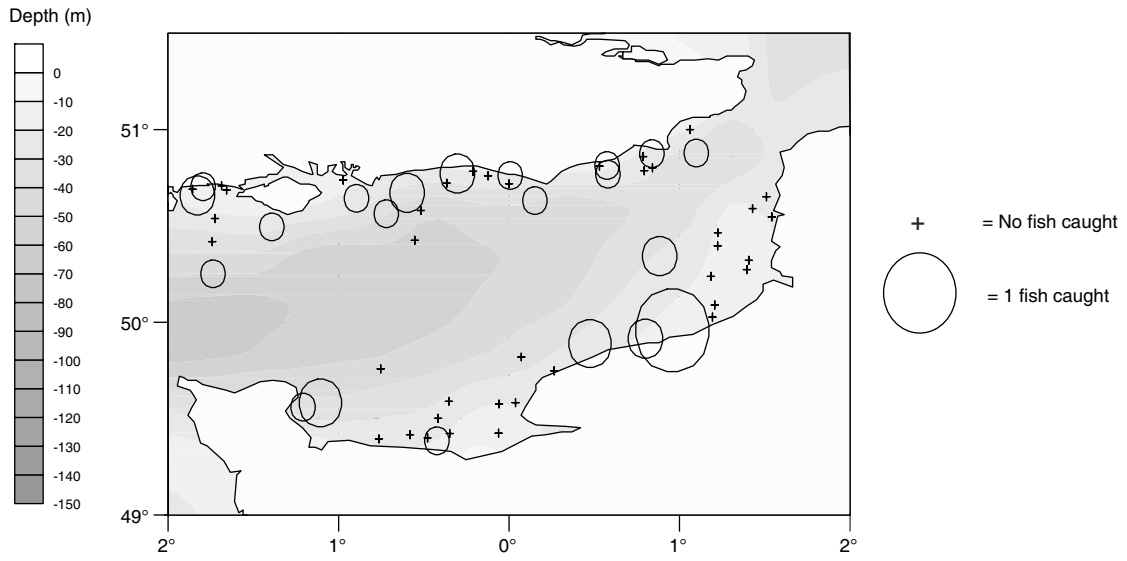


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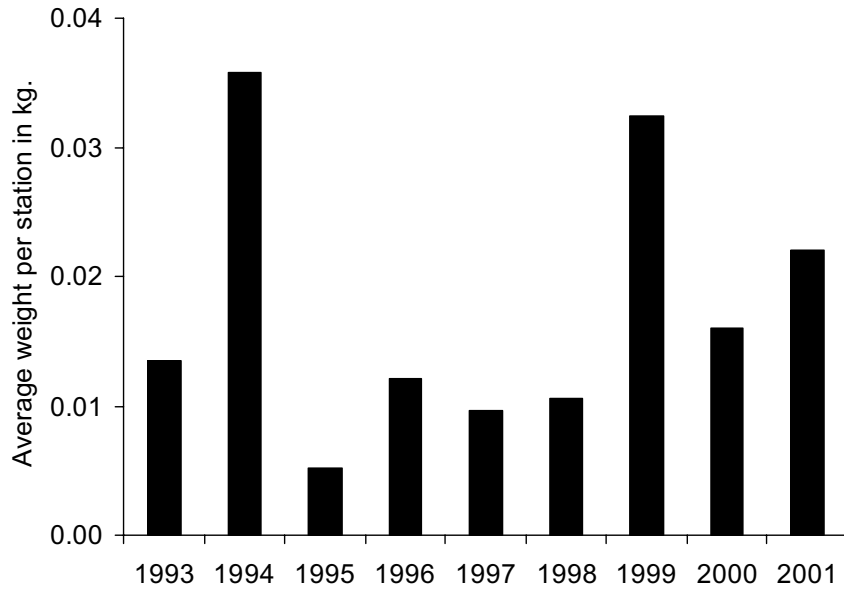


John Dory - *Zeus faber*

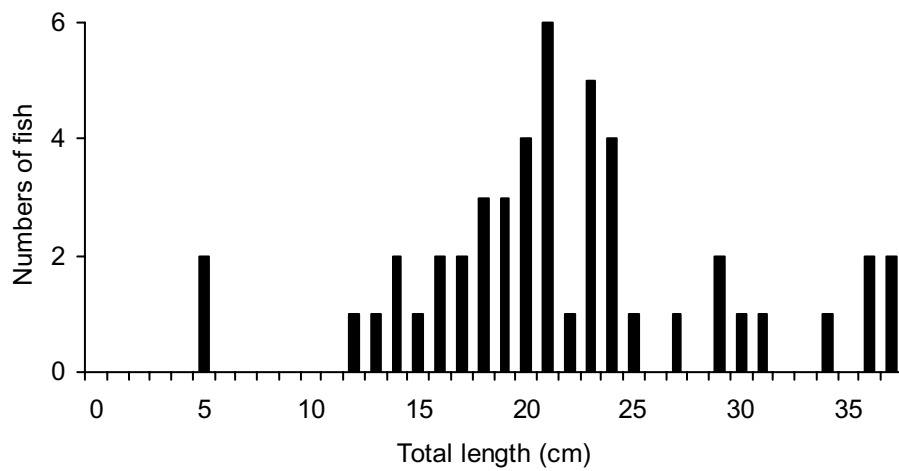
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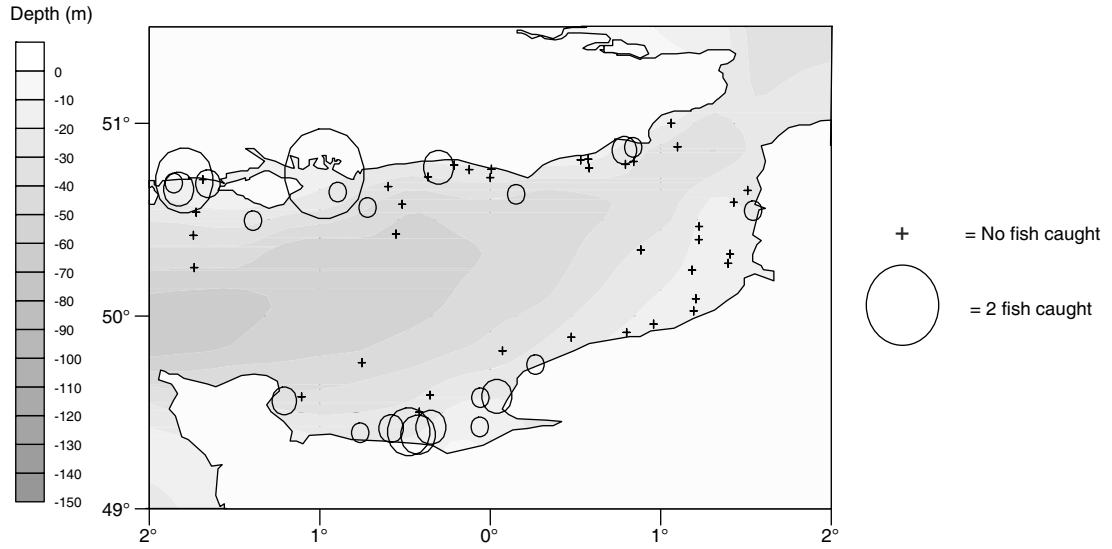
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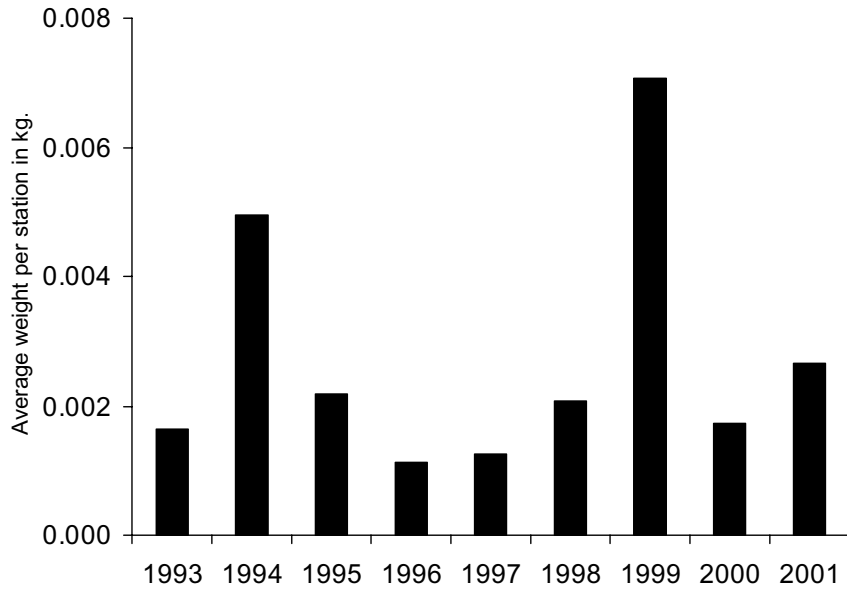
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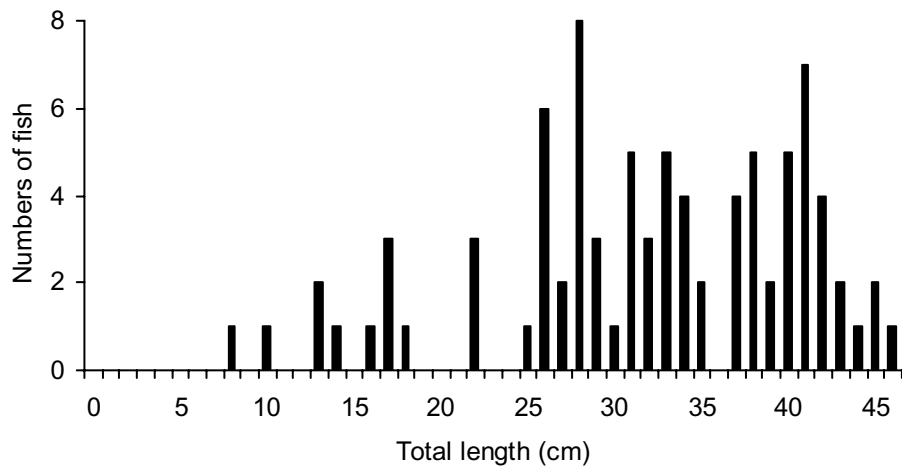
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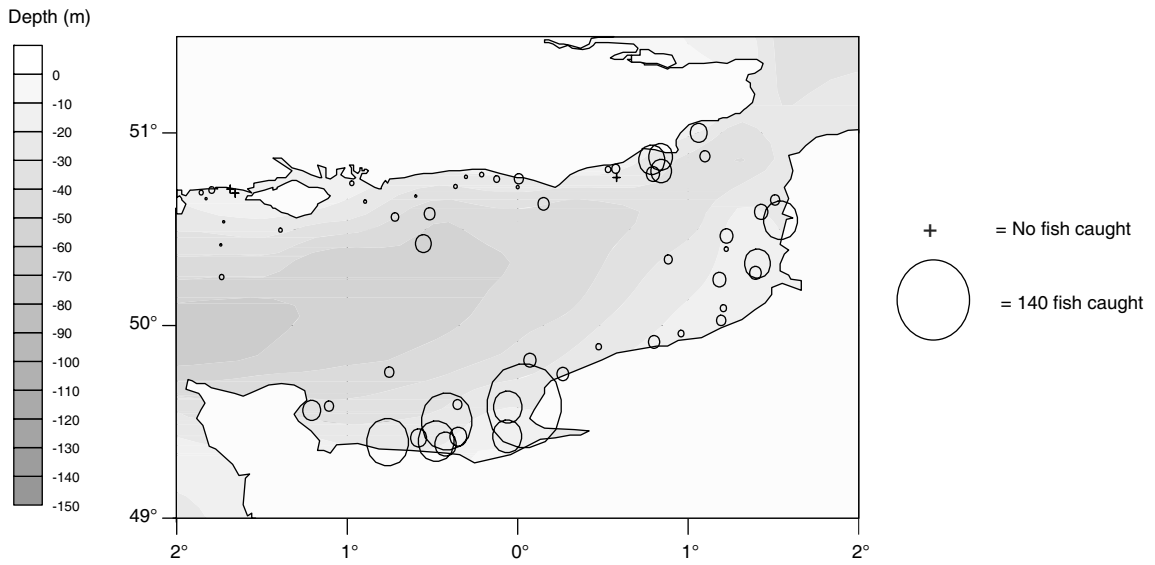


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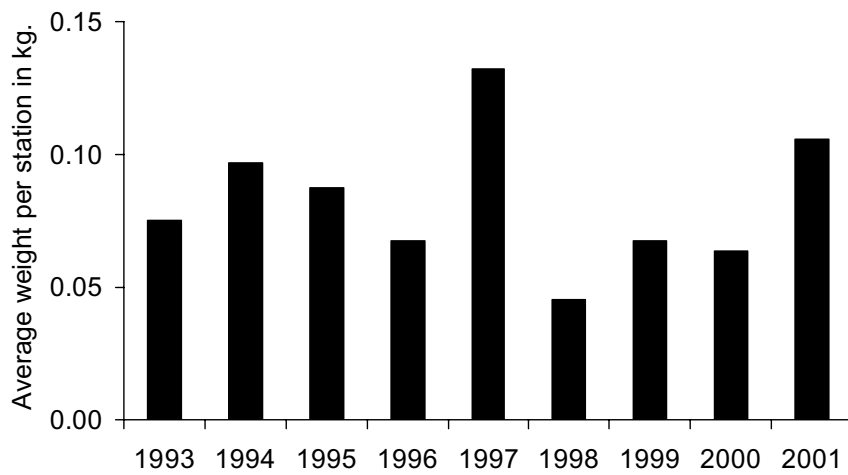


Pogge - *Agonus cataphractus*

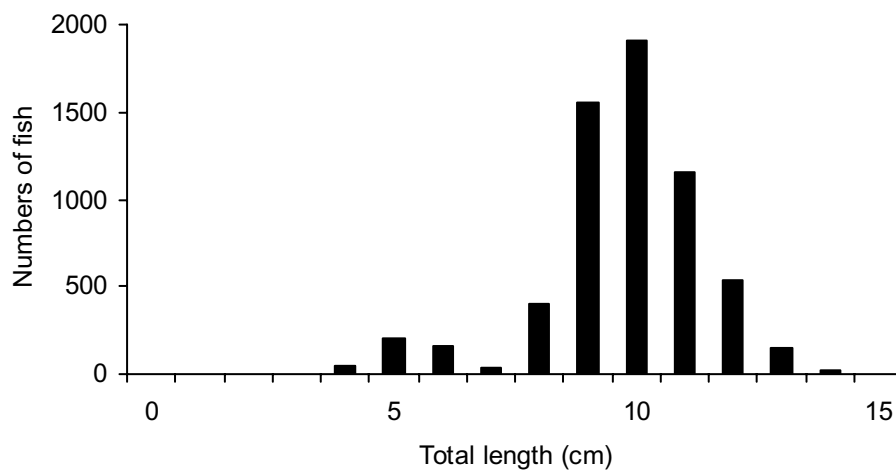
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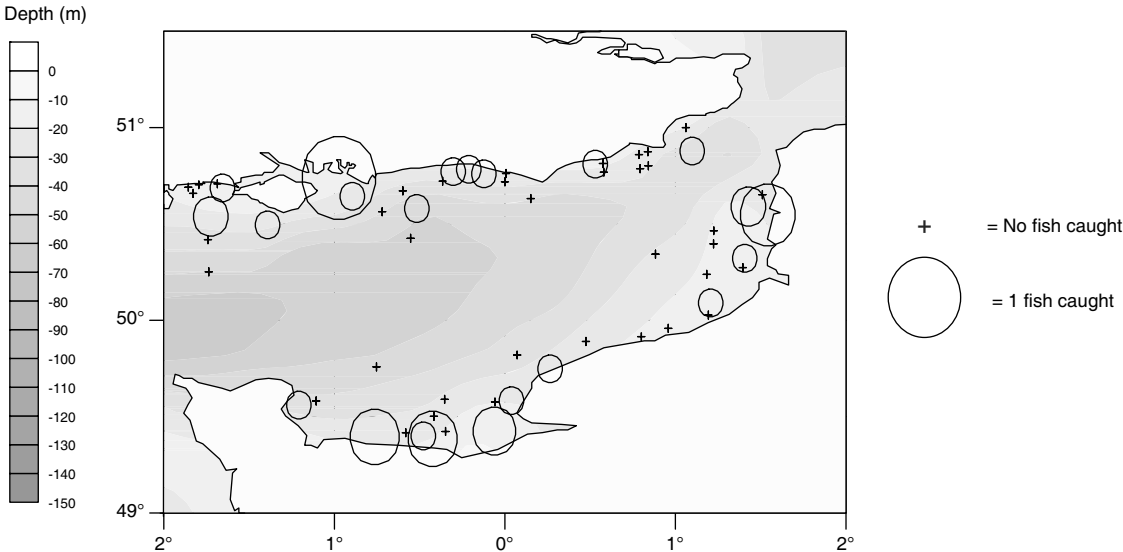
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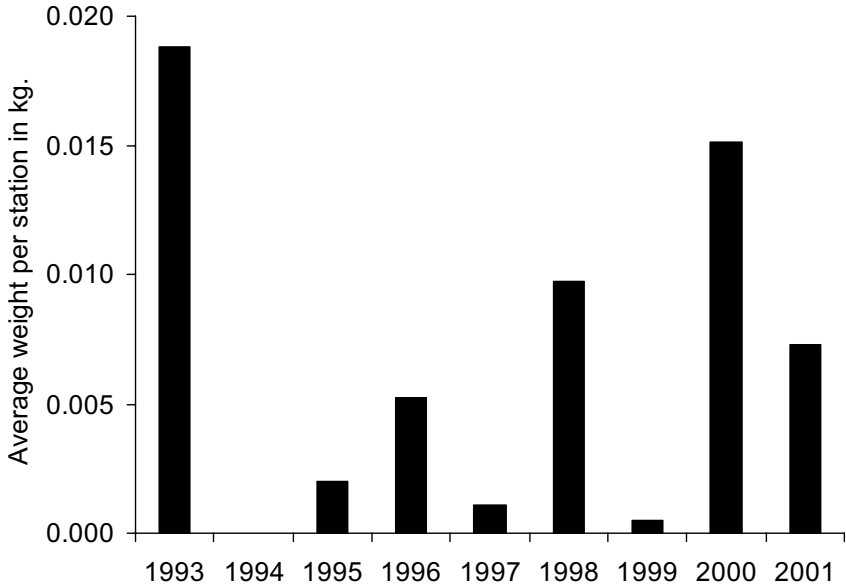
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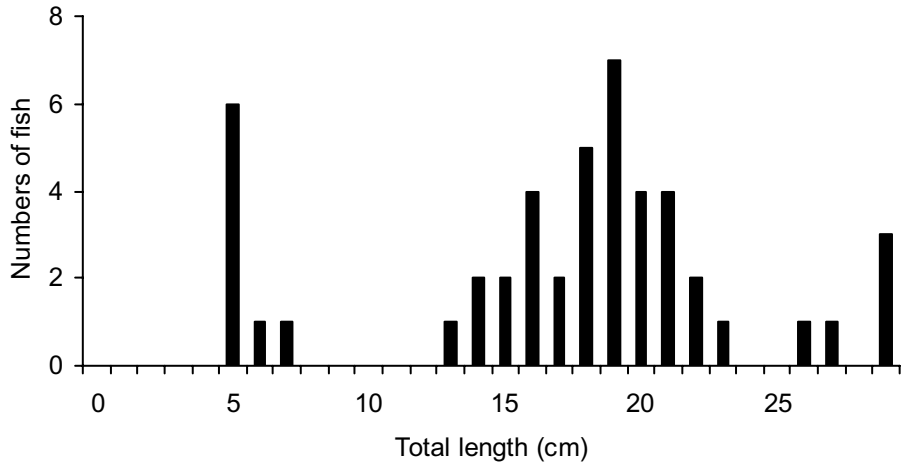
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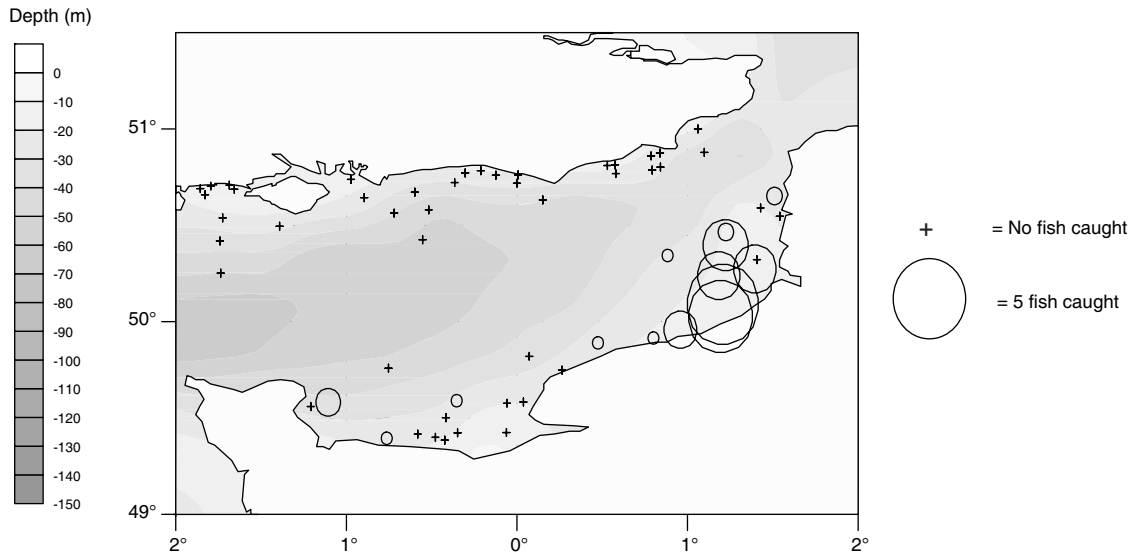


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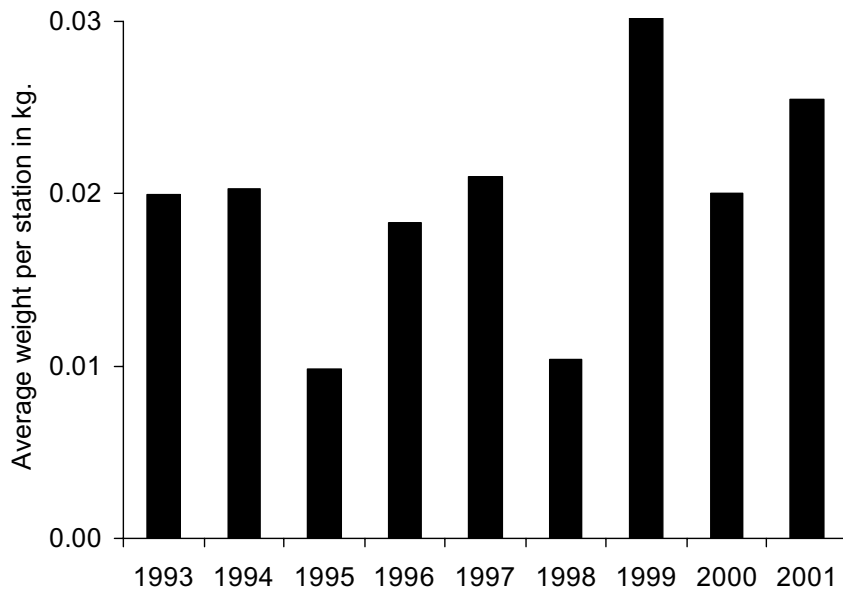


Weever, greater - *Trachinus draco*

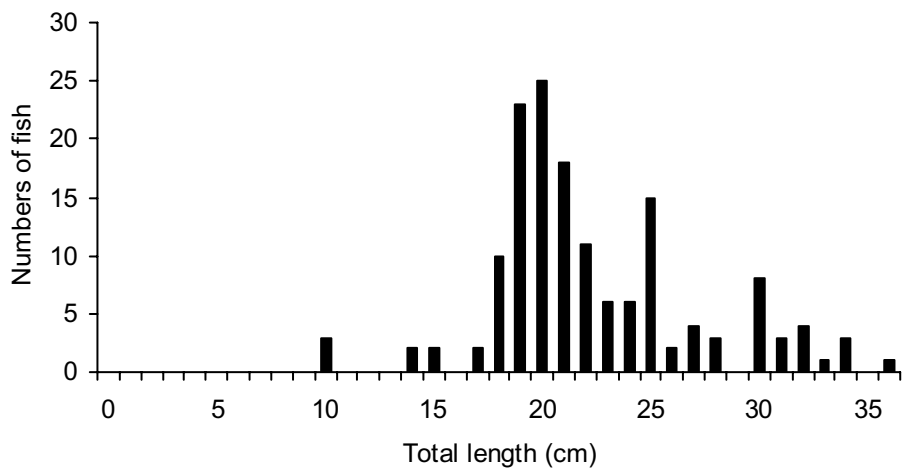
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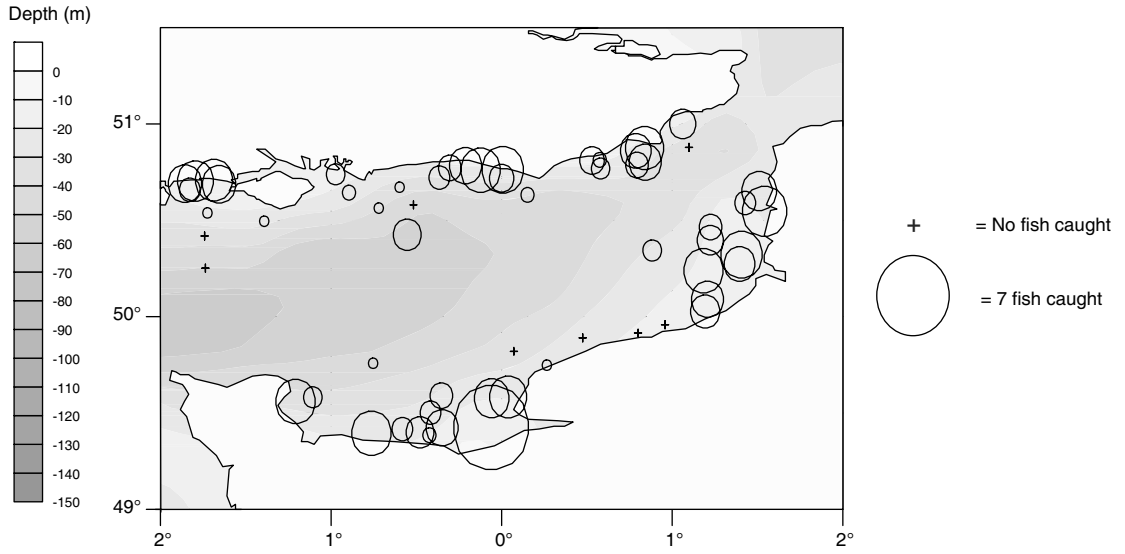
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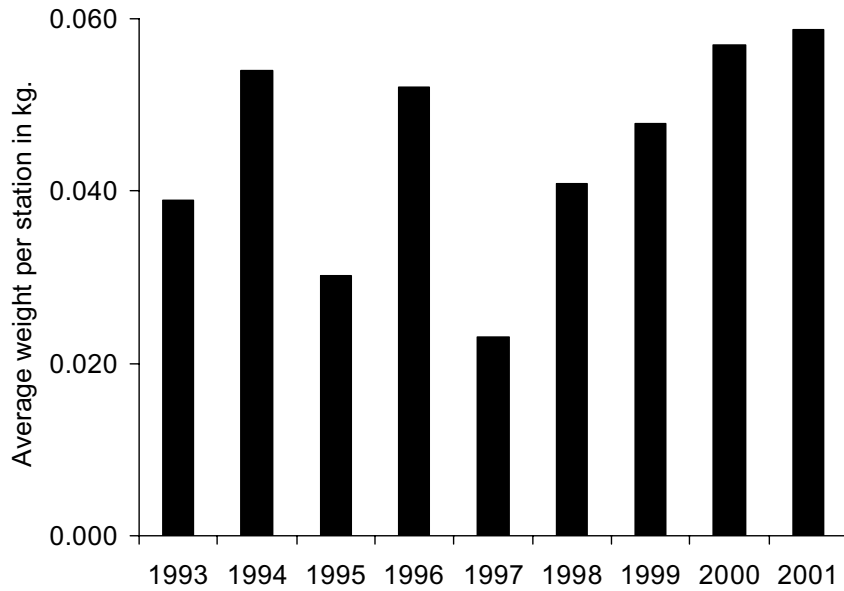
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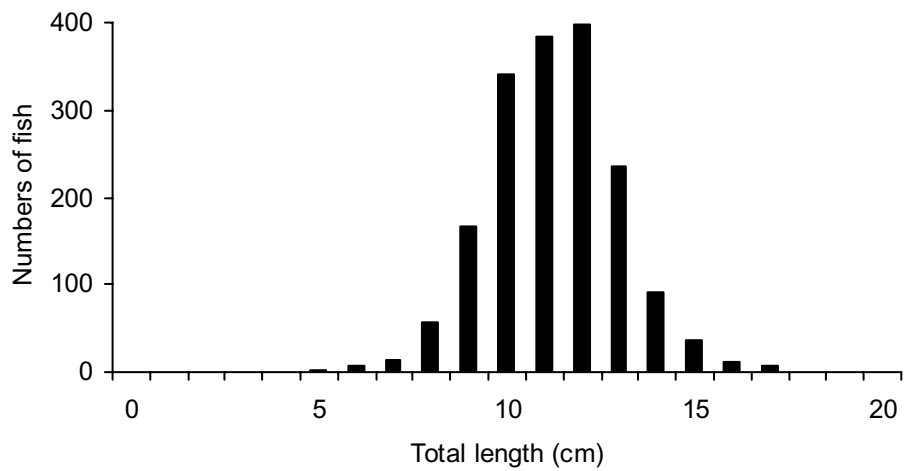
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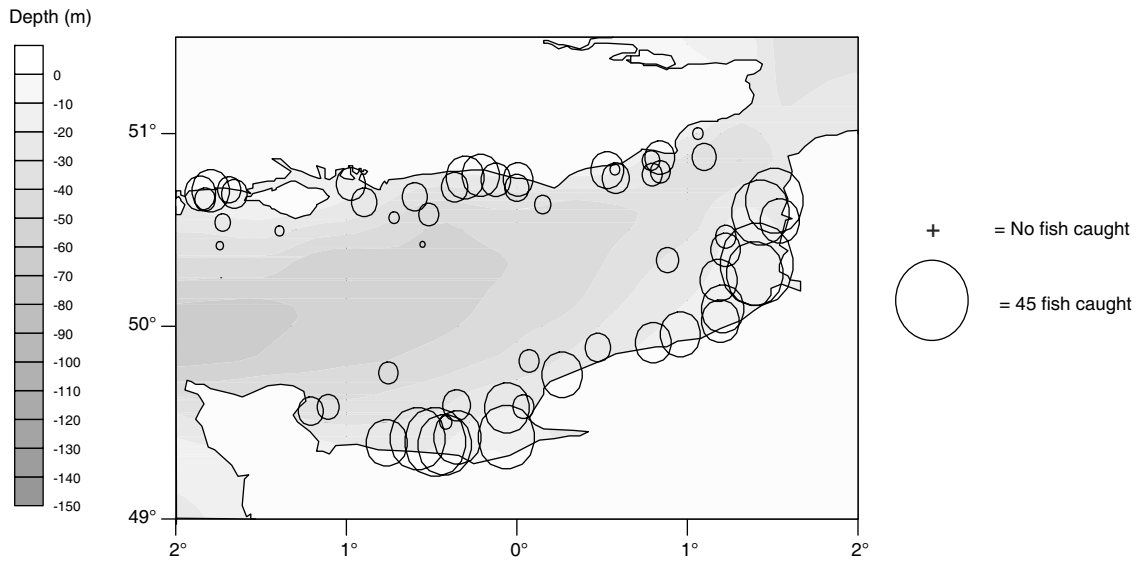
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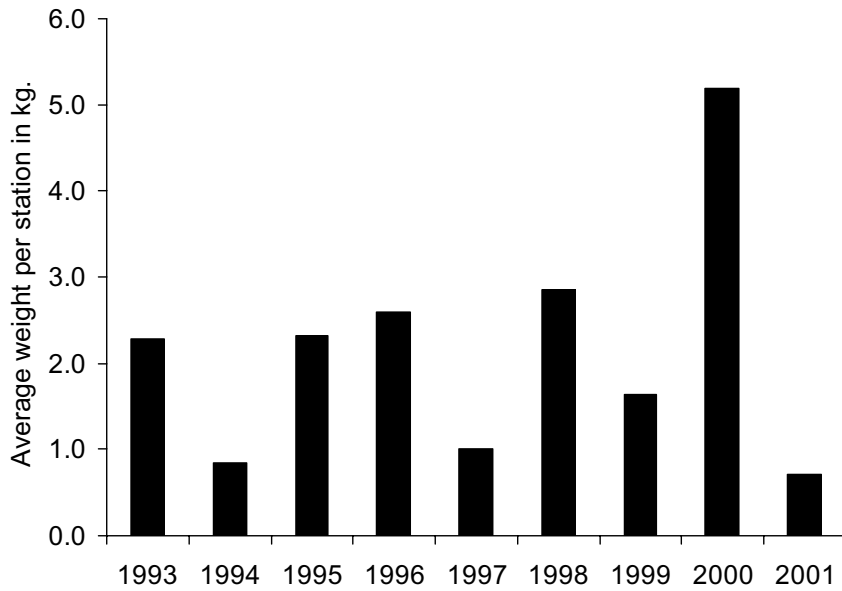
Invertebrate species

Cuttlefish - *Sepia officinalis*

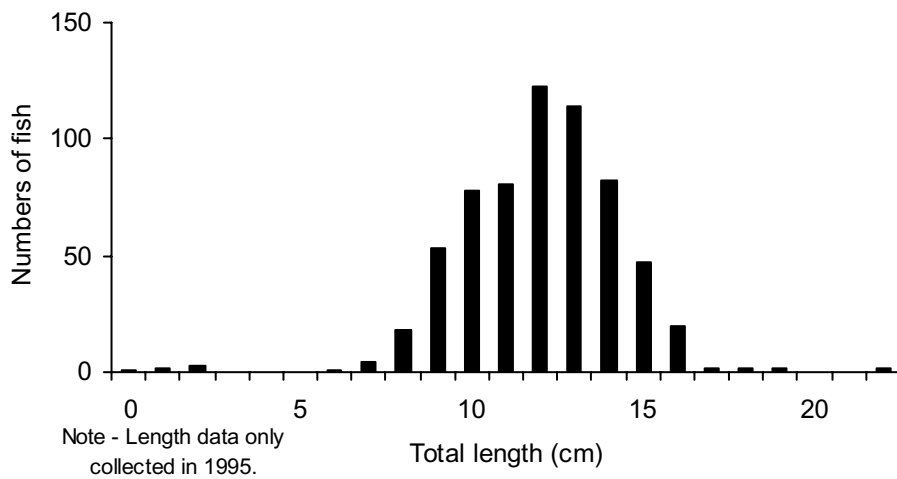
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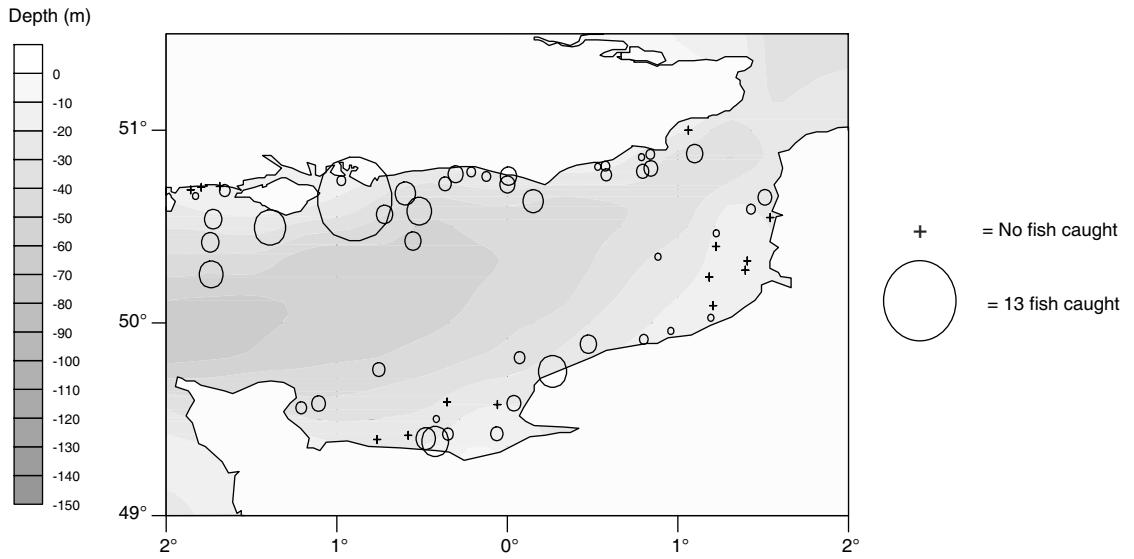
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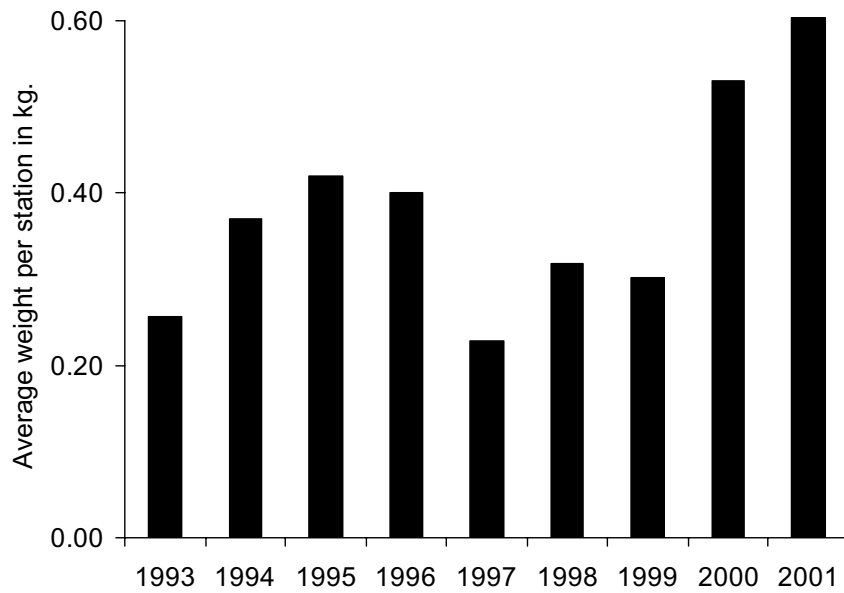
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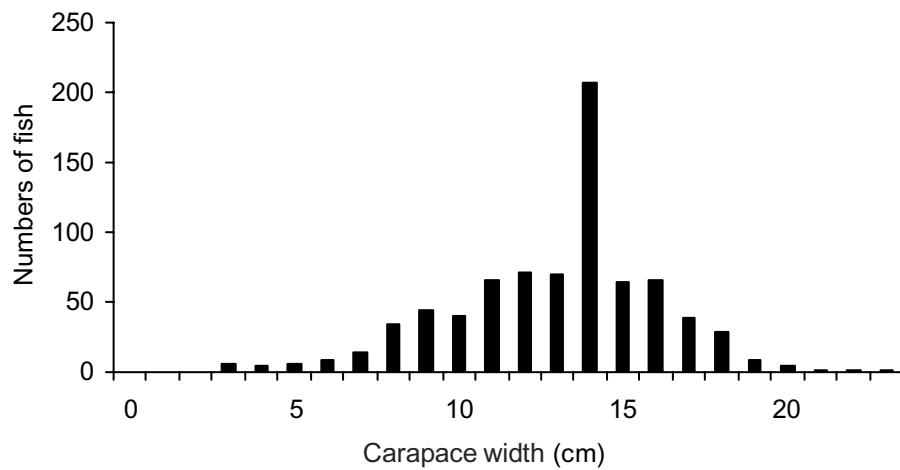
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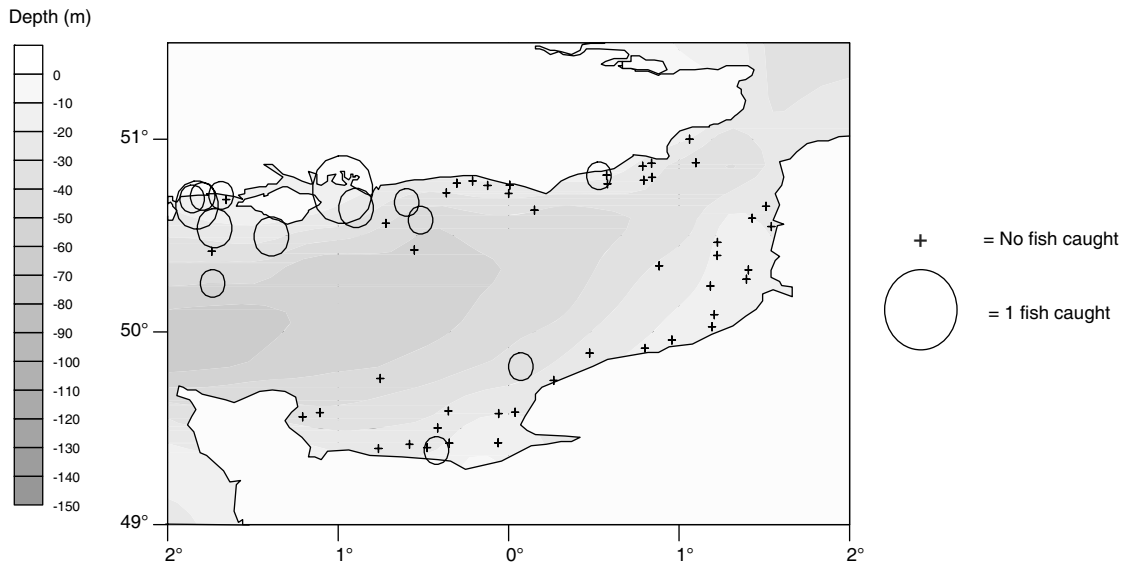


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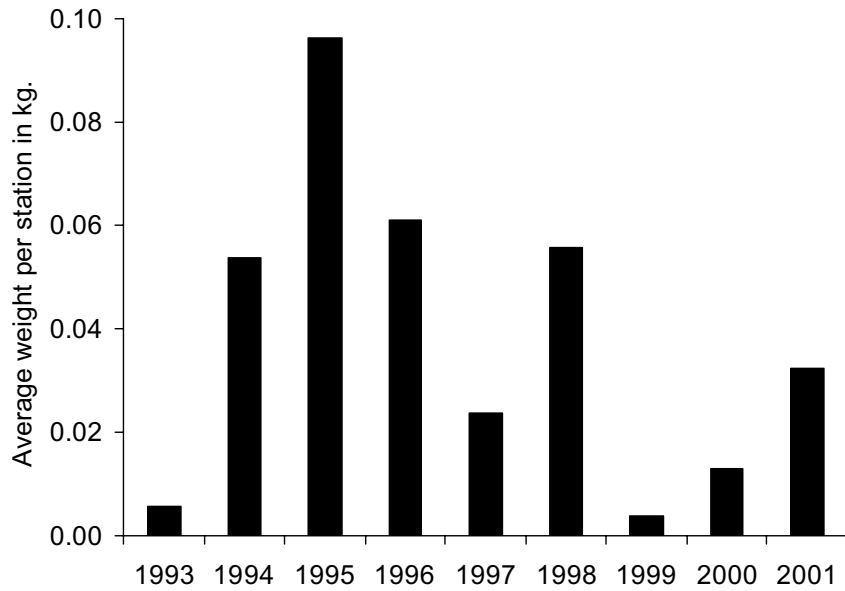


Lobster - *Homarus gammarus*

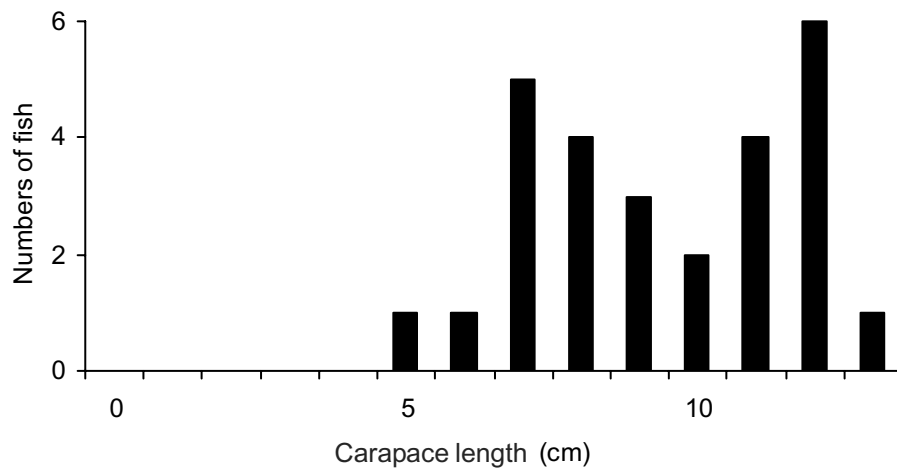
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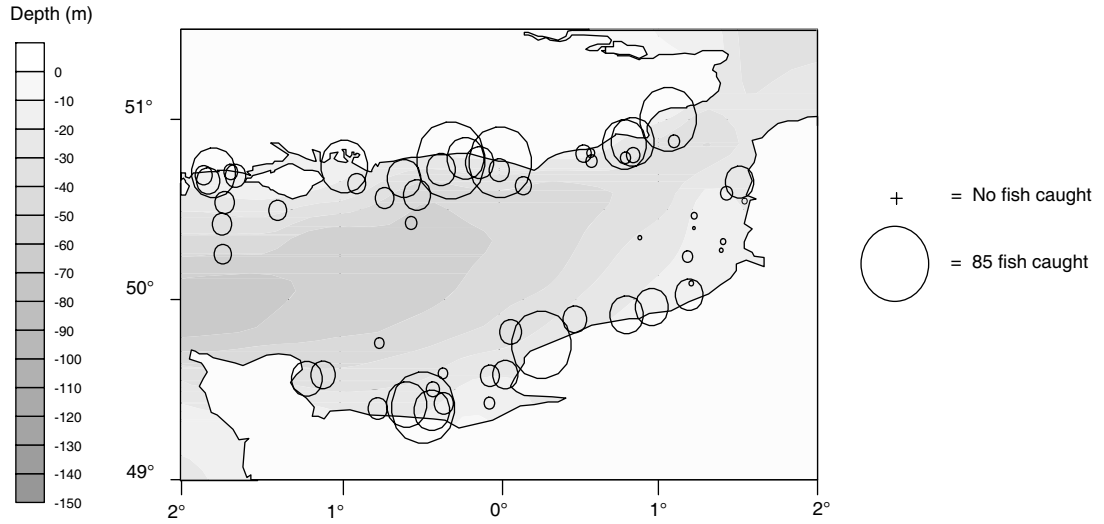
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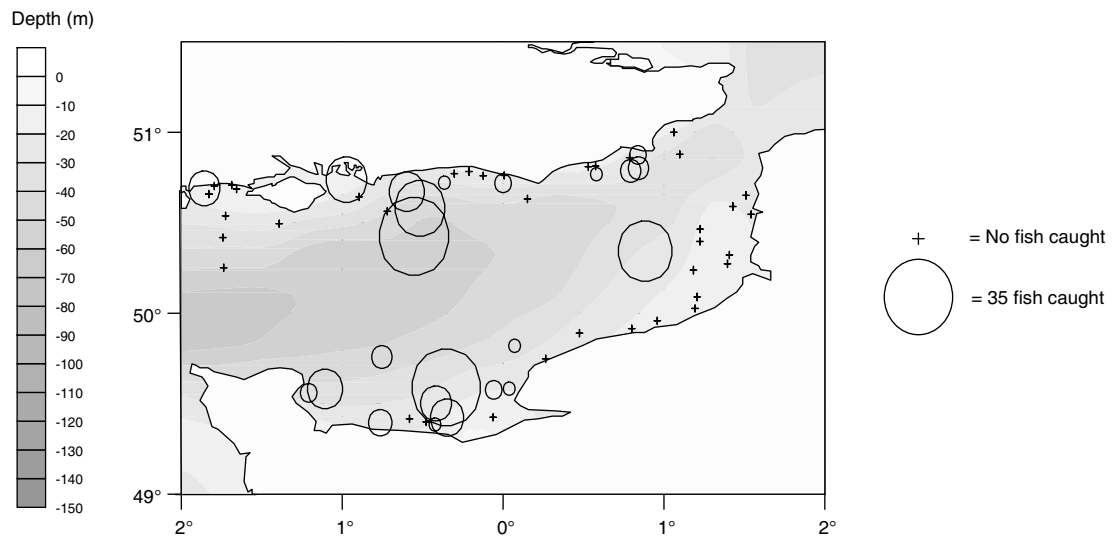
(c)



Spider crab - *Maia squinado* (mean from 1994-2001)



Scallop - *Pecten maximus* (sum of all hauls)



Appendix - Distribution and relative abundance of demersal fishes from beam trawl surveys in the southern North Sea (ICES division IVc) 1993-2001

As previously discussed, part of the eastern English Channel survey grid extends into the southern North Sea (ICES Division IVc), but these data are not included in the main body of the report.

The stations within ICES Division IVc have less priority than those in the VIIId area and consequently this component of the survey grid has not been fished as consistently. A total of 32 stations have been fished in ICES Division IVc from 1993 to 2001, but of these only five stations have been fished every year, 17 stations have been fished five years or more, and 15 stations have been fished three years or less.

This appendix presents the data describing catches of the major fish and shellfish species from this area.

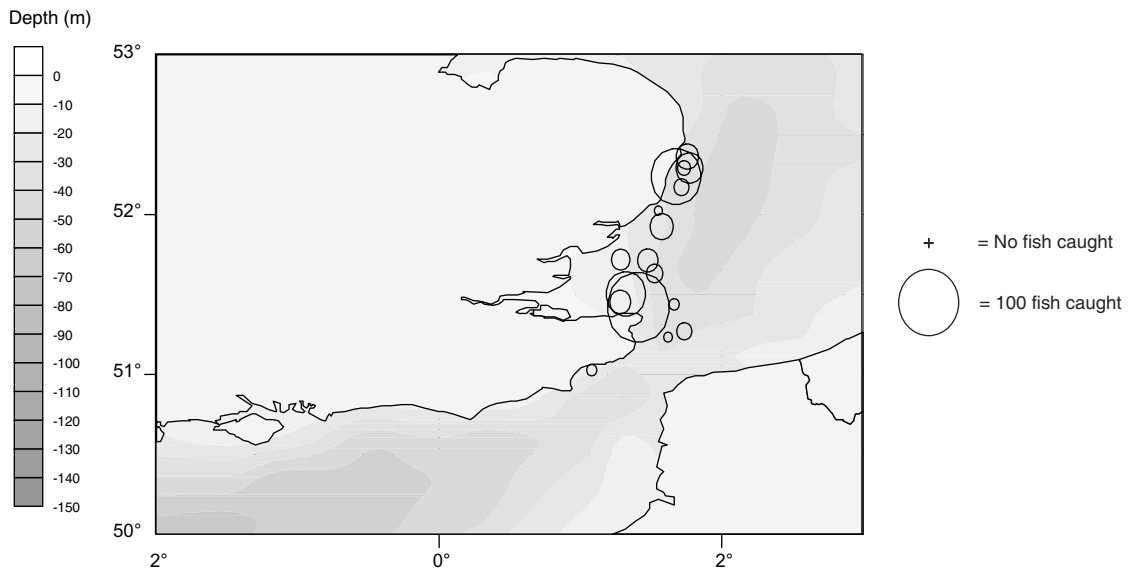
Analyses for the southern North Sea provide the species recorded from all stations fished (Table 4), and:

- (a) The mean number of fish caught per 30 min tow at stations fished five times or more from 1993 to 2001.
- (b) The mean catch weight of fish from a 30 min tow at stations fished five times or more from 1993 to 2001.
- (c) Length frequency distributions.

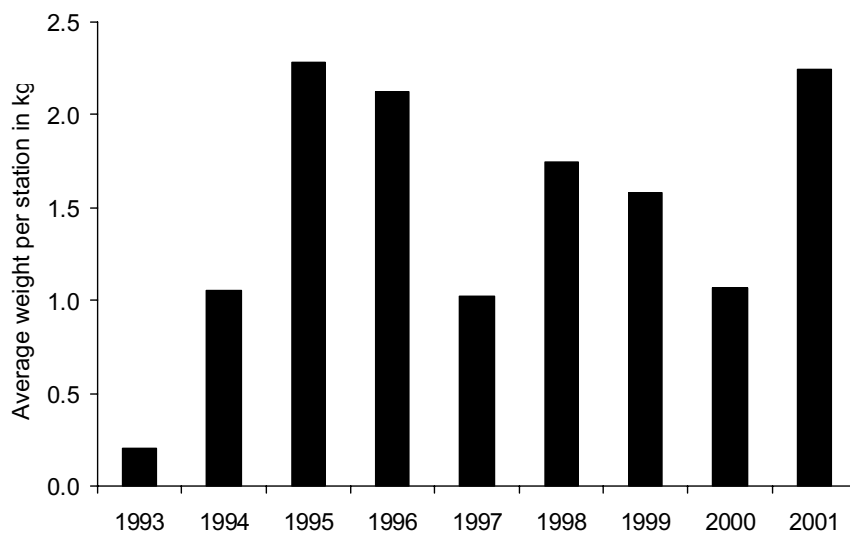
Table 4. Species recorded by the surveys

Latin name	Common name	Number	% abundance	Weight in kg	% of total weight
<i>Solea solea</i>	Sole	7650	24.38	699.859	31.05
<i>Trisopterus luscus</i>	Bib	4743	15.12	141.561	6.28
<i>Agonus cataphractus</i>	Pogge	3289	10.48	29.783	1.32
<i>Limanda limanda</i>	Dab	2397	7.64	114.571	5.08
<i>Merlangius merlangus</i>	Whiting	2074	6.61	128.871	5.72
<i>Trisopterus minutus</i>	Poor cod	2005	6.39	55.717	2.47
<i>Pleuronectes platessa</i>	European plaice	1840	5.87	170.518	7.56
<i>Microstomus kitt</i>	Lemon sole	1320	4.21	134.020	5.95
<i>Pomatoschistus minutus</i>	Sand goby	1317	4.20	1.824	0.08
<i>Callionymus lyra</i>	Common dragonet	1049	3.34	33.566	1.49
<i>Myoxocephalus scorpius</i>	Bullrout	710	2.26	40.567	1.80
<i>Platichthys flesus</i>	Flounder	692	2.21	199.623	8.86
<i>Raja clavata</i>	Thornback ray	503	1.60	238.847	10.60
<i>Scyliorhinus canicula</i>	Lesser spotted dogfish	455	1.45	128.471	5.70
<i>Echiichthys vipera</i>	Lesser weever fish	435	1.39	6.516	0.29
<i>Taurulus bubalis</i>	Sea scorpion	124	0.40	4.112	0.18
<i>Pholis gunnellus</i>	Butter fish	95	0.30	1.043	0.05
<i>Liparis spp</i>	Sea snails	78	0.25	0.304	0.01
<i>Raja montagui</i>	Spotted ray	70	0.22	11.443	0.51
<i>Gadus morhua</i>	Cod	67	0.21	24.946	1.11
<i>Buglossidium luteum</i>	Solenette	58	0.18	0.556	0.02
<i>Trigla lucerna</i>	Tub gurnard	41	0.13	7.676	0.34
<i>Mustelus asterias</i>	Starry smooth hound	37	0.12	32.295	1.43
<i>Eutrigla gurnardus</i>	Grey gurnard	32	0.10	2.606	0.12
<i>Gobius niger</i>	Black goby	22	0.07	0.299	0.01
<i>Scophthalmus rhombus</i>	Brill	20	0.06	6.263	0.28
<i>Liparis montagui</i>	Montagu's seasnail	19	0.06	0.052	+
<i>Ciliata mustela</i>	Five bearded rockling	19	0.06	0.502	0.02
<i>Anguilla anguilla</i>	European eel	19	0.06	7.226	0.32
Gobiidae	Gobies	15	0.05	0.026	+
<i>Arnoglossus laterna</i>	Scald fish	14	0.04	0.264	0.01
<i>Sprattus sprattus</i>	Sprat	13	0.04	0.030	+
<i>Aspitrigla cuculus</i>	Red gurnard	12	0.04	1.416	0.06
<i>Ciliata septentrionalis</i>	Northern rockling	11	0.04	0.081	+
<i>Trachurus trachurus</i>	Horse mackerel	9	0.03	2.090	0.09
<i>Raja brachyura</i>	Blonde ray	8	0.03	1.785	0.08
<i>Liparis liparis</i>	Sea snail	6	0.02	0.018	+
<i>Syngnathus rostellatus</i>	Nilssons pipefish	6	0.02	0.022	+
<i>Hyperoplus lanceolatus</i>	Greater sandeel	6	0.02	0.419	0.02
<i>Mullus surmuletus</i>	Red mullet	6	0.02	0.574	0.03
<i>Belone belone</i>	Garfish	5	0.02	0.103	+
<i>Zoarces viviparus</i>	Eelpout/viviparus blenny	5	0.02	0.145	0.01
<i>Mustelus mustelus</i>	Smooth hound	5	0.02	12.580	0.56
<i>Gobius paganellus</i>	Rock goby	4	0.01	0.038	+
Ammodytidae	Sandeels	4	0.01	0.167	0.01
<i>Osmerus eperlanus</i>	Smelt	4	0.01	0.195	0.01
<i>Raja undulata</i>	Undulate ray	4	0.01	0.280	0.01
<i>Pegusa lascaris</i>	Sand sole	4	0.01	0.625	0.03
<i>Dicentrarchus labrax</i>	European seabass	4	0.01	3.890	0.17
<i>Clupea harengus</i>	Herring	3	0.01	0.005	+
<i>Microchirus variegatus</i>	Thickback sole	3	0.01	0.159	0.01
<i>Enchelyopus cimbrius</i>	Four bearded rockling	2	0.01	0.080	+
<i>Conger conger</i>	European conger eel	2	0.01	0.410	0.02
<i>Galeorhinus galeus</i>	Tope shark	2	0.01	1.688	0.07
<i>Psetta maximus</i>	Turbot	2	0.01	2.085	0.09
Gobiesocidae	Clingfishes	1	+	0.001	+
<i>Ammodytes tobianus</i>	Sandeel	1	+	0.001	+
<i>Glyptocephalus cynoglossus</i>	Witch	1	+	0.001	+
<i>Ammodytes marinus</i>	Sandeel	1	+	0.002	+
<i>Callionymus maculatus</i>	Spotted dragonet	1	+	0.002	+
<i>Gasterosteus aculeatus</i>	Three spined stickleback	1	+	0.003	+
<i>Syngnathus acus</i>	Greater pipefish	1	+	0.015	+
<i>Engraulis encrasicolus</i>	European anchovy	1	+	0.037	+
<i>Ctenolabrus rupestris</i>	Goldsinny	1	+	0.040	+
<i>Squalus acanthias</i>	Spurdog	1	+	0.180	0.01
<i>Lophius piscatorius</i>	Anglerfish	1	+	0.940	0.04

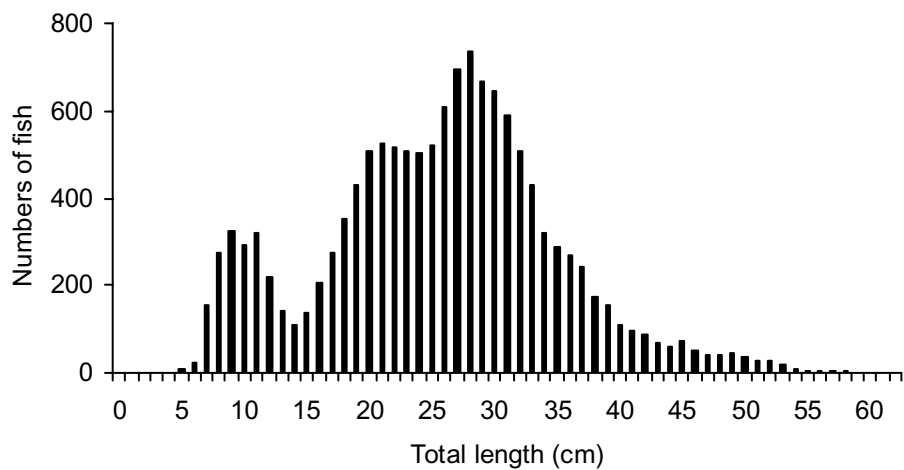
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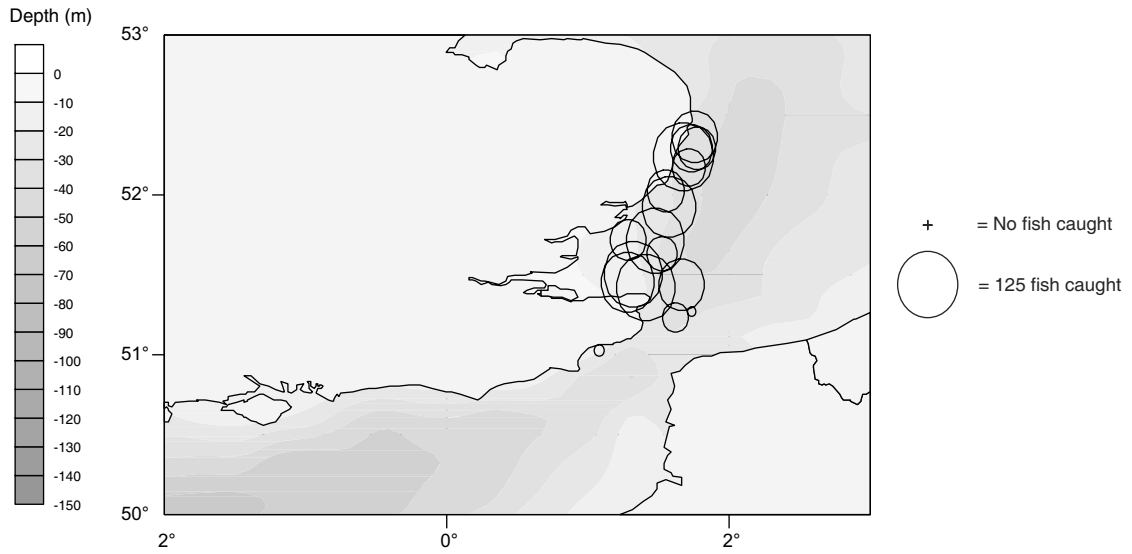


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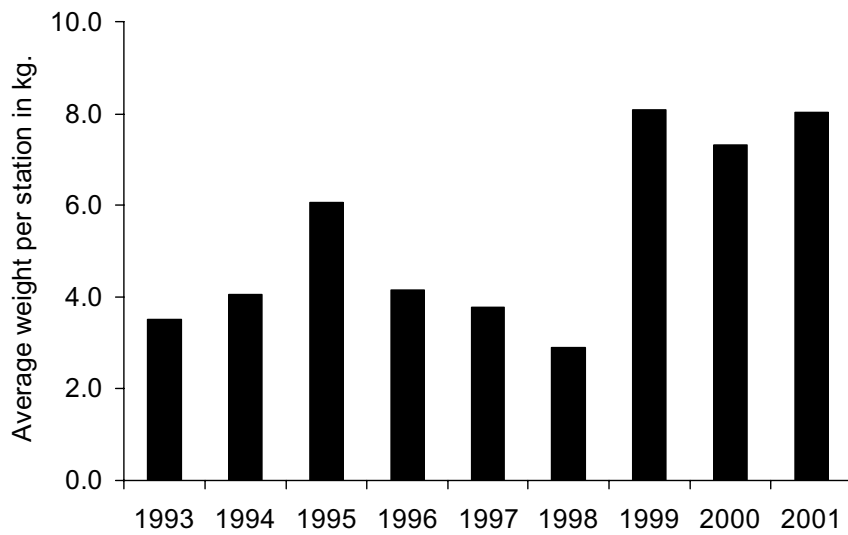


Sole - *Solea solea*

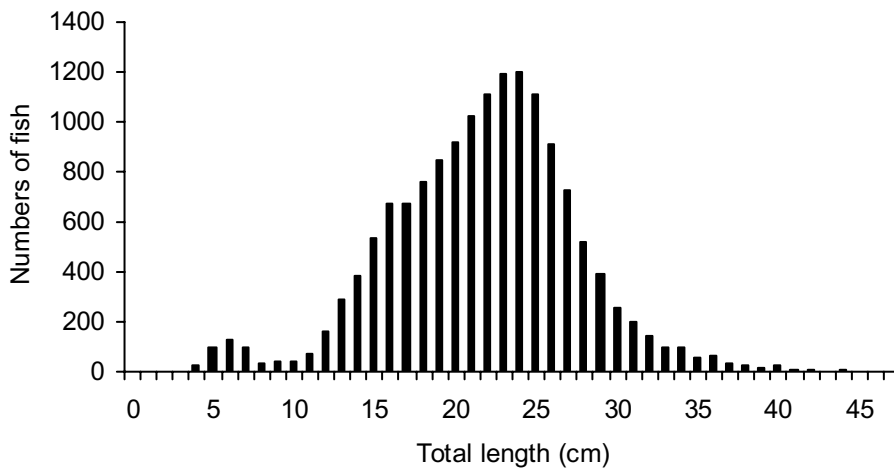
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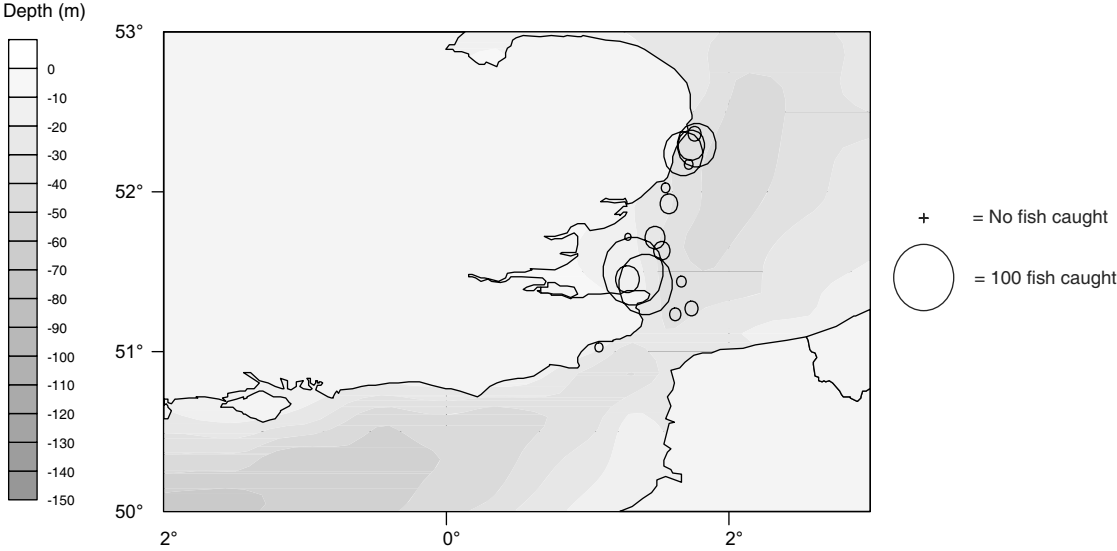
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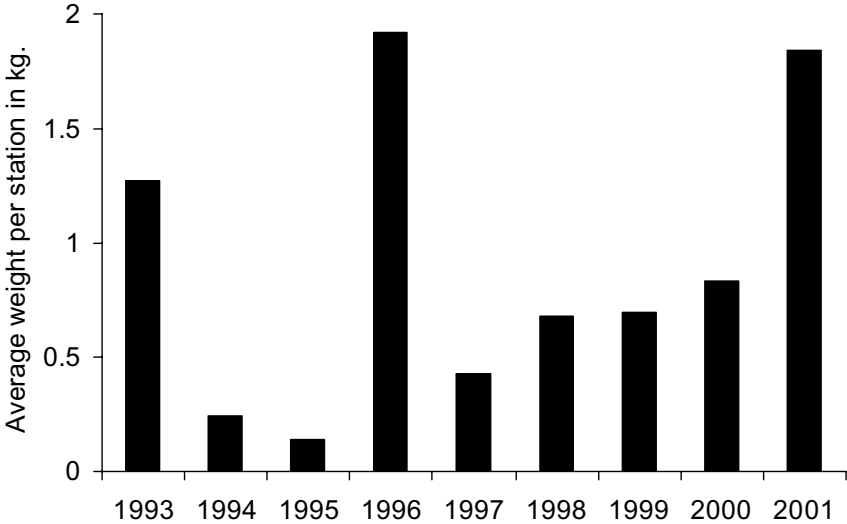
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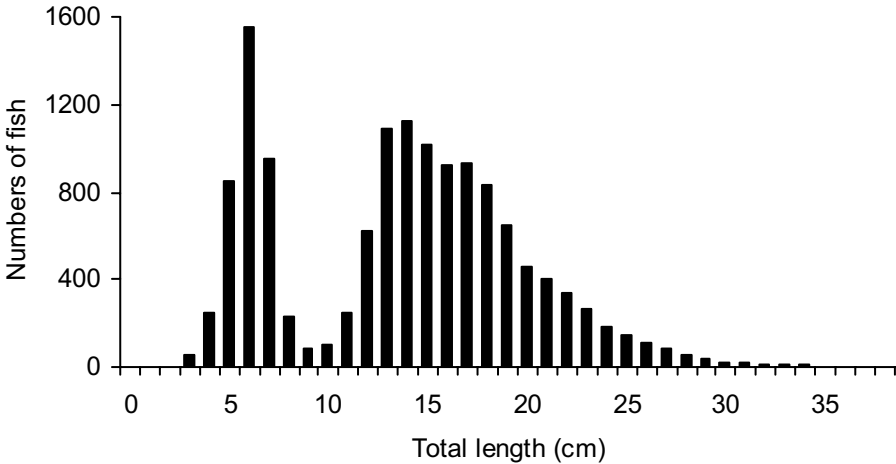
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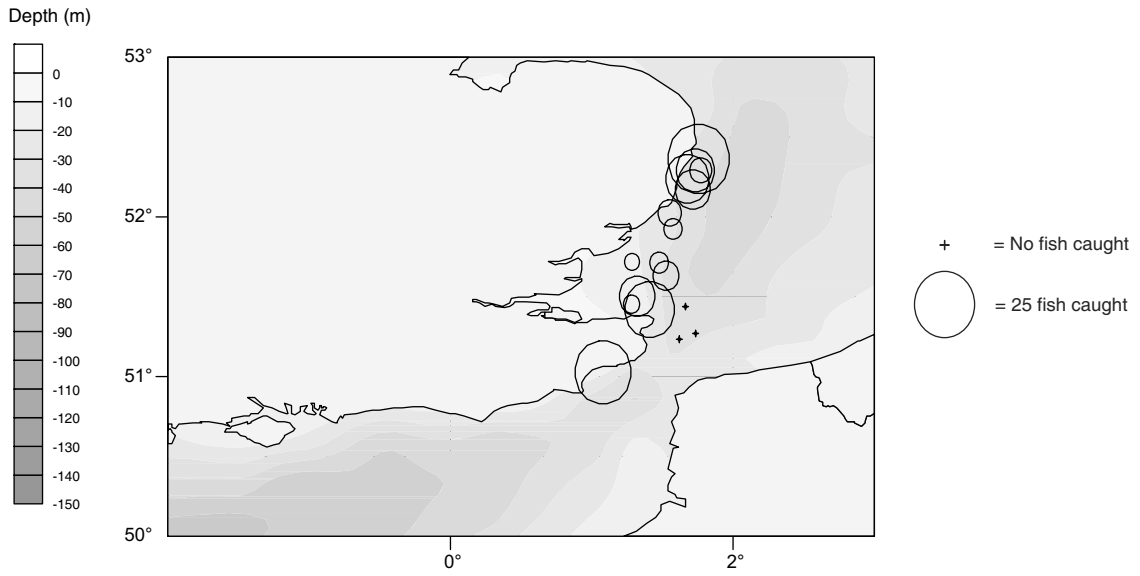


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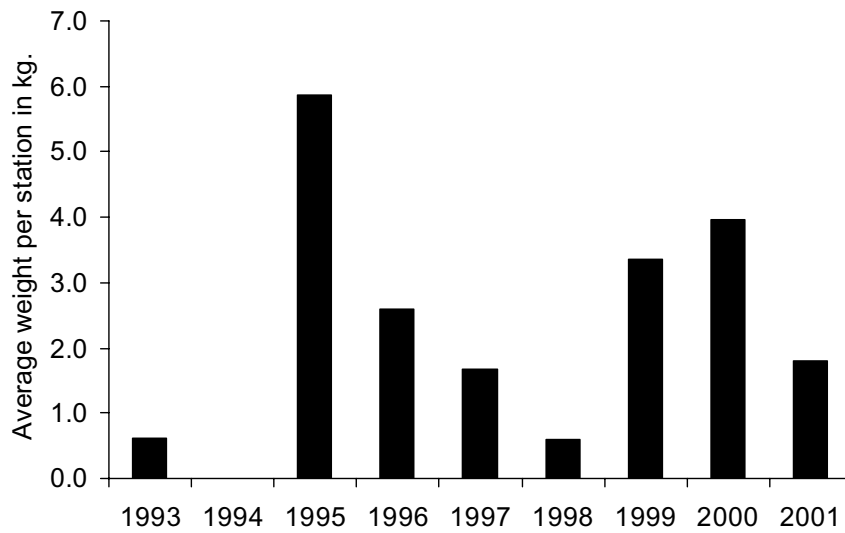


Flounder - *Platichthys flesus*

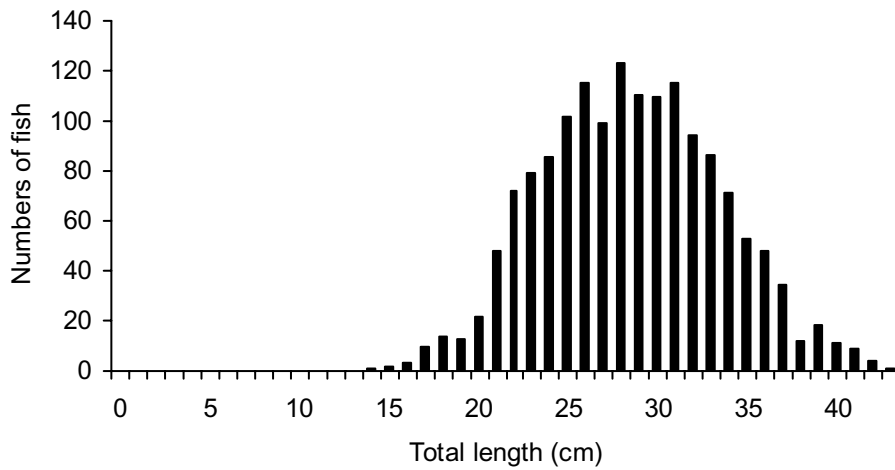
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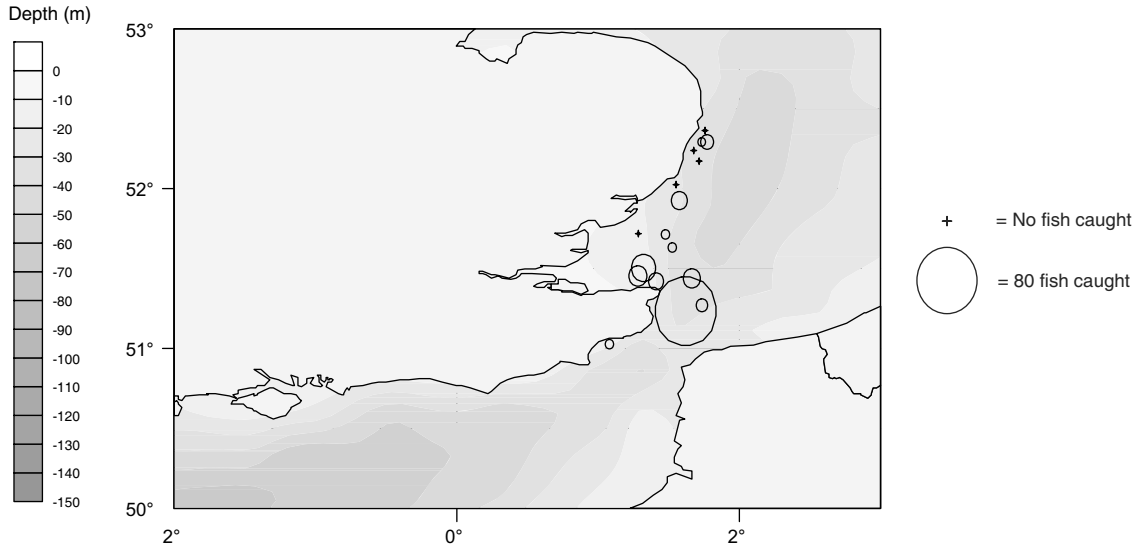
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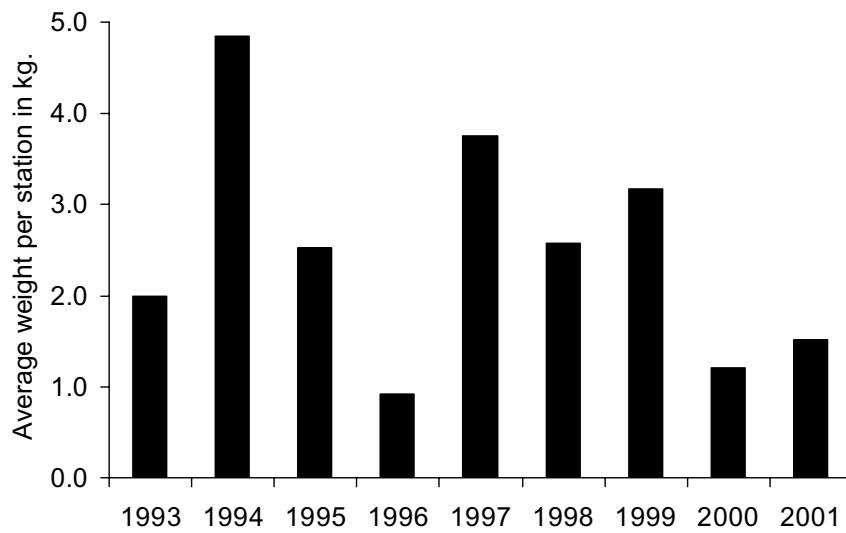
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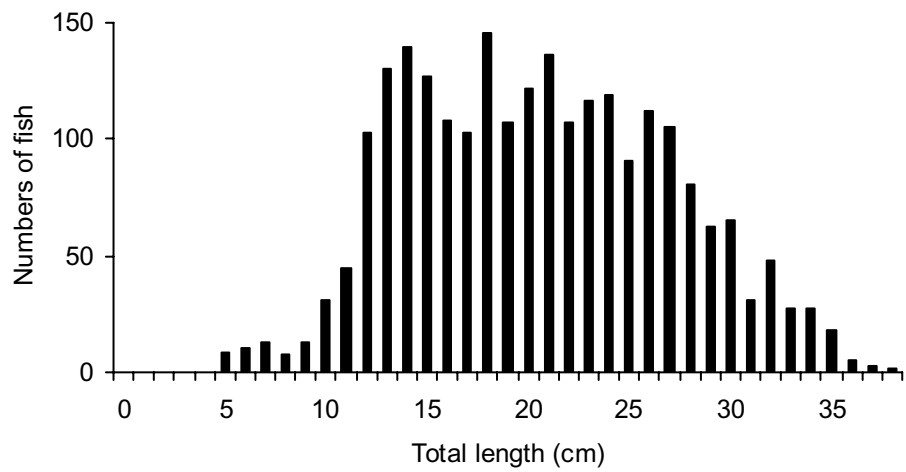
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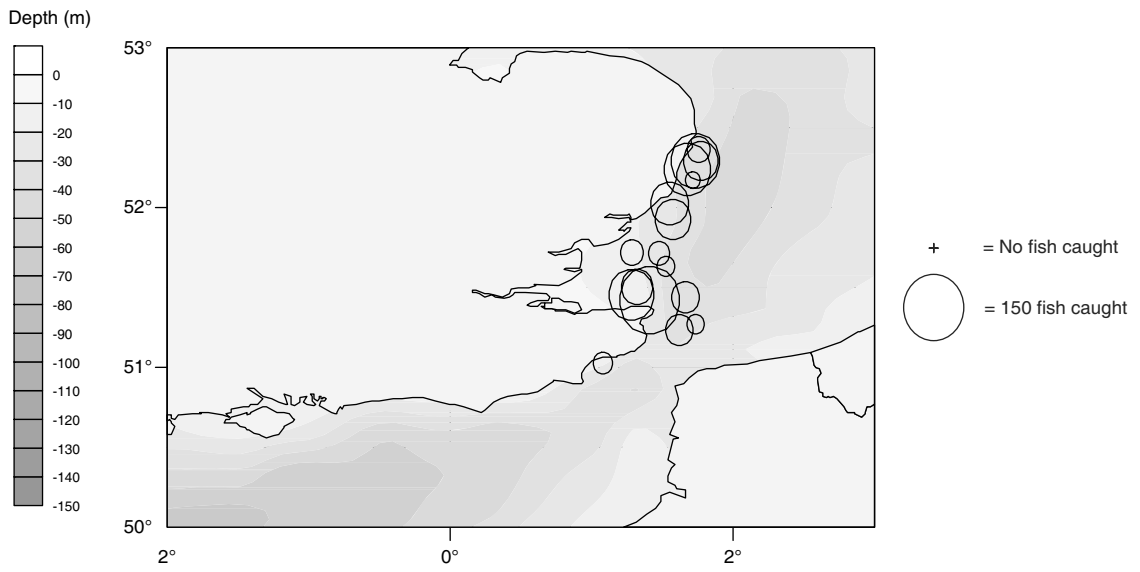


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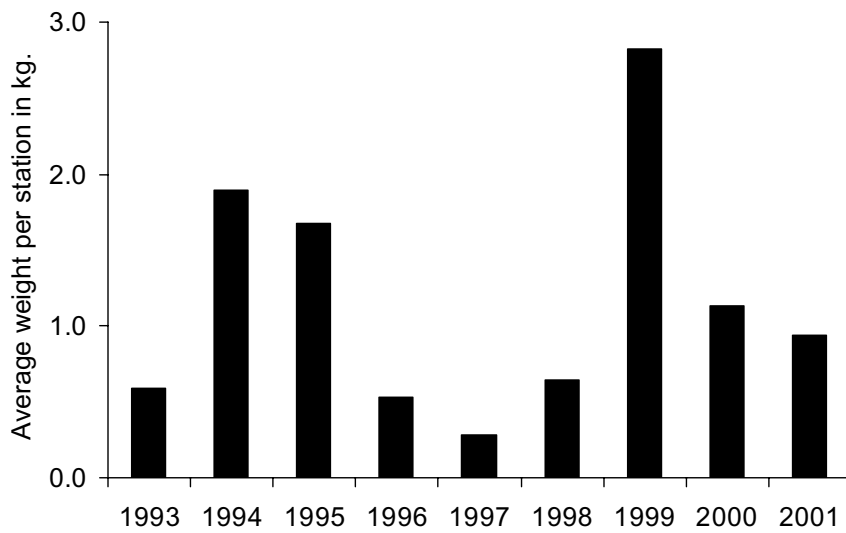


Bib - *Trisopterus luscus*

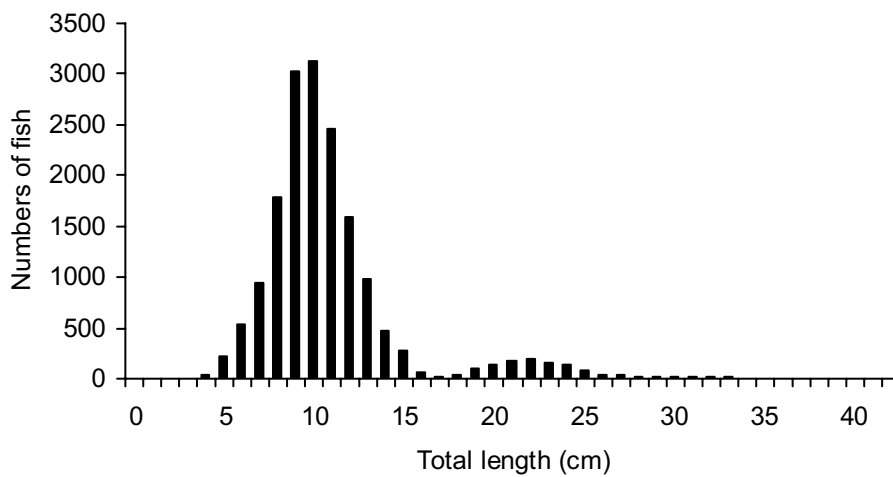
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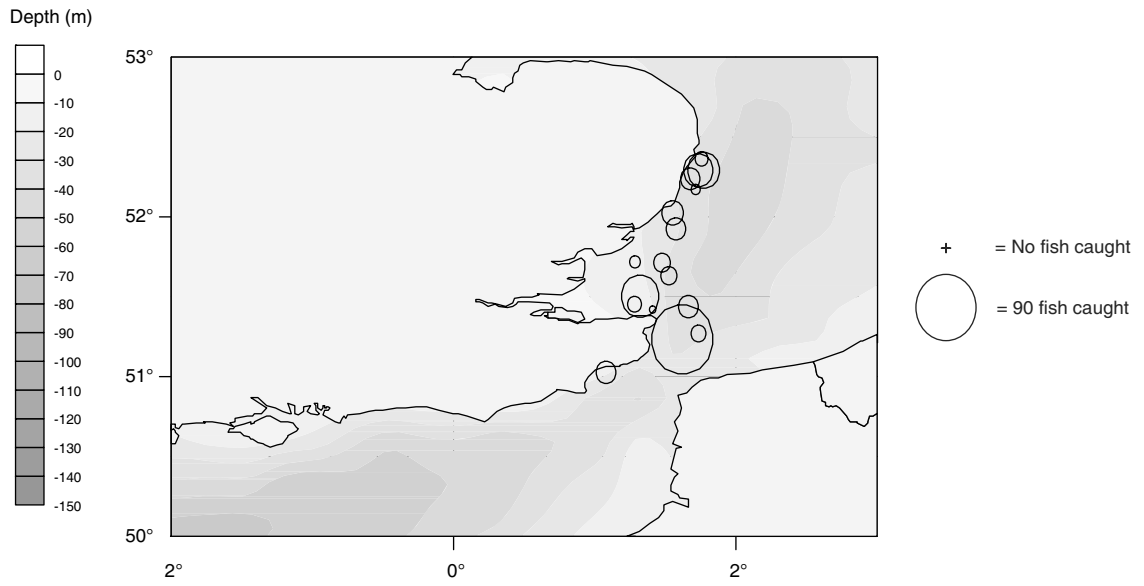
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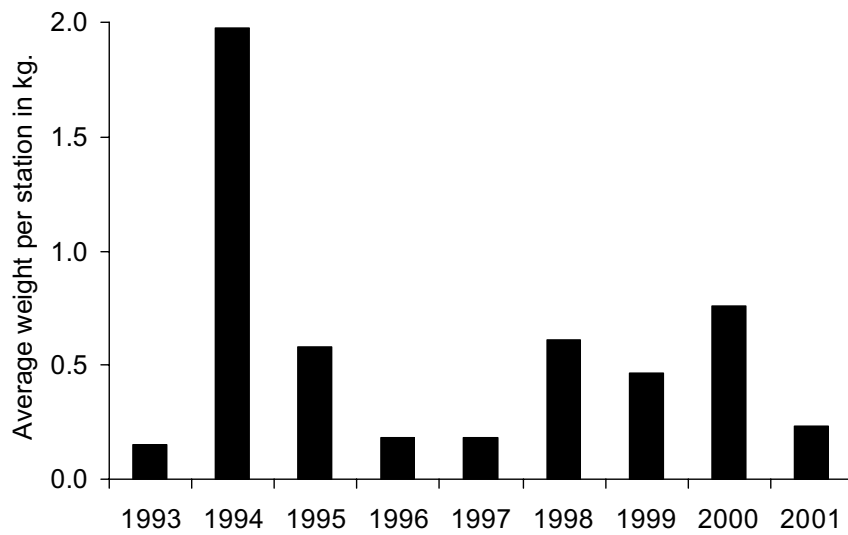
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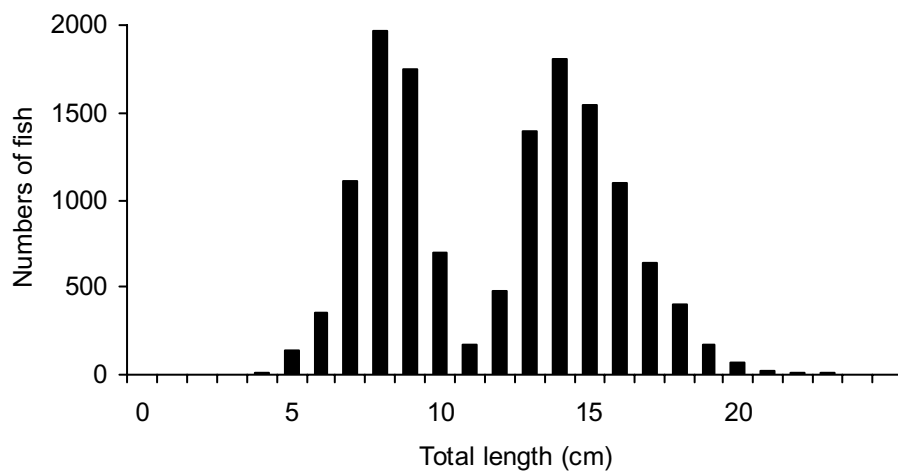
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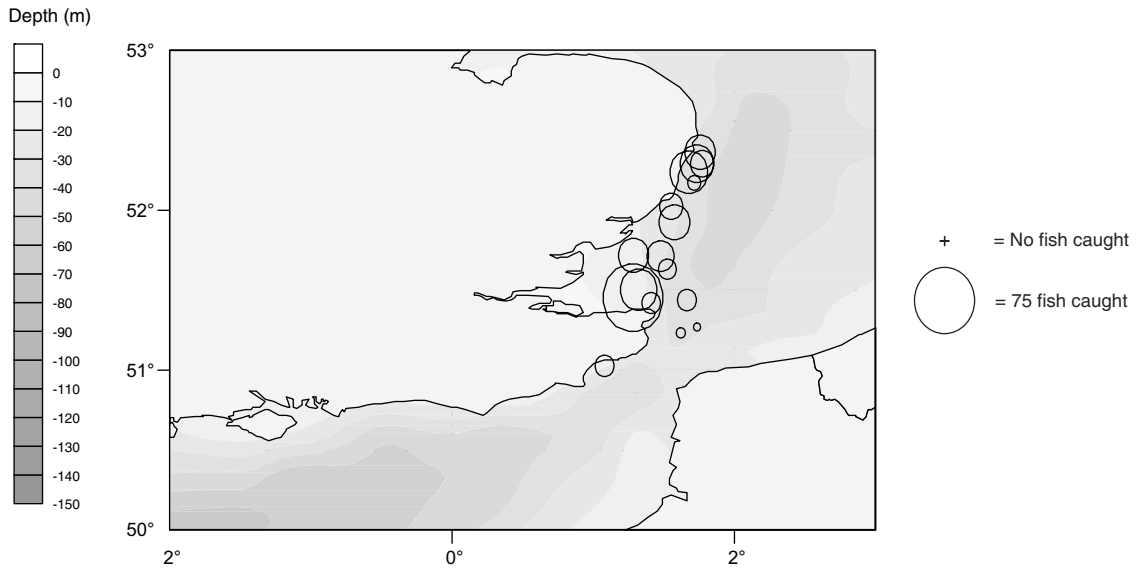


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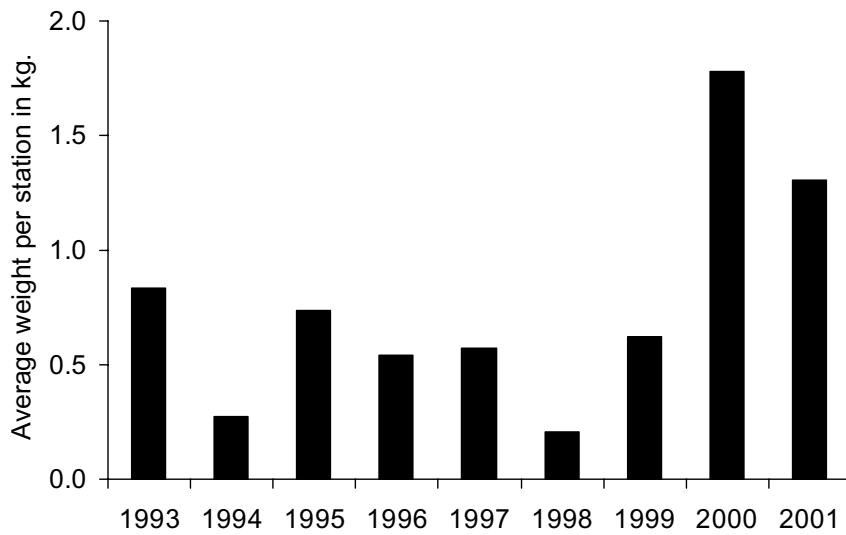


Whiting - *Merlangius merlangus*

(a)



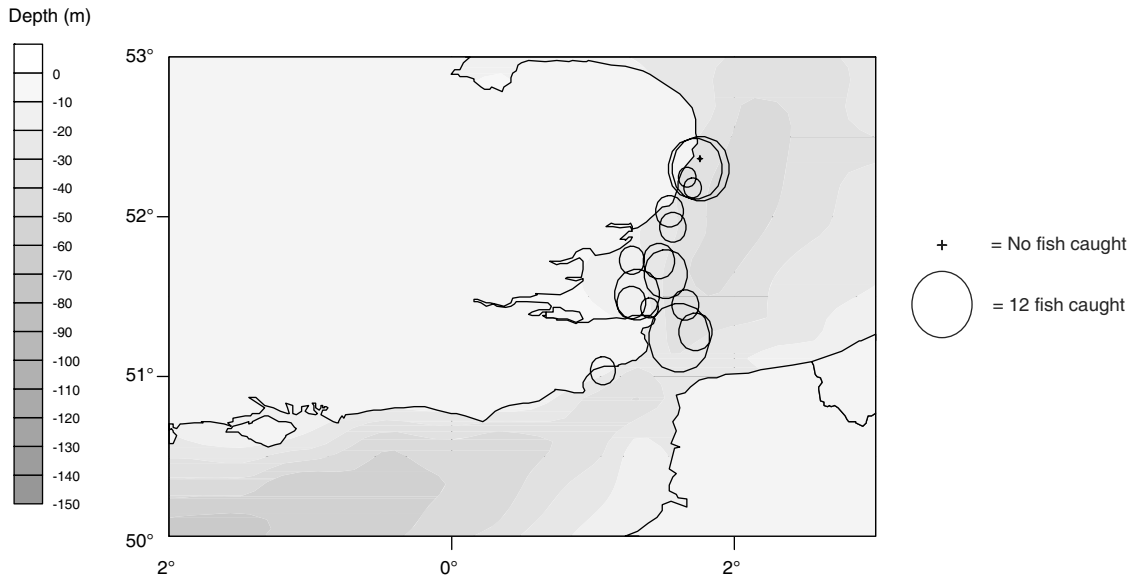
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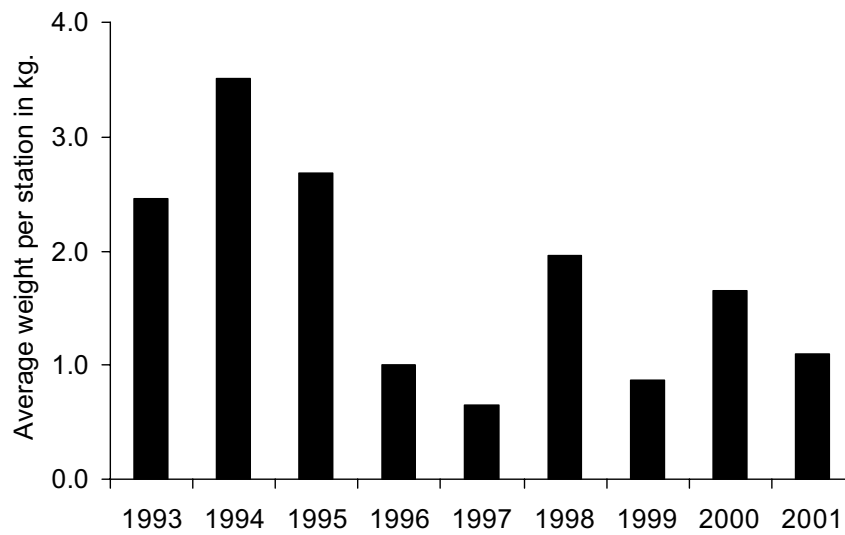
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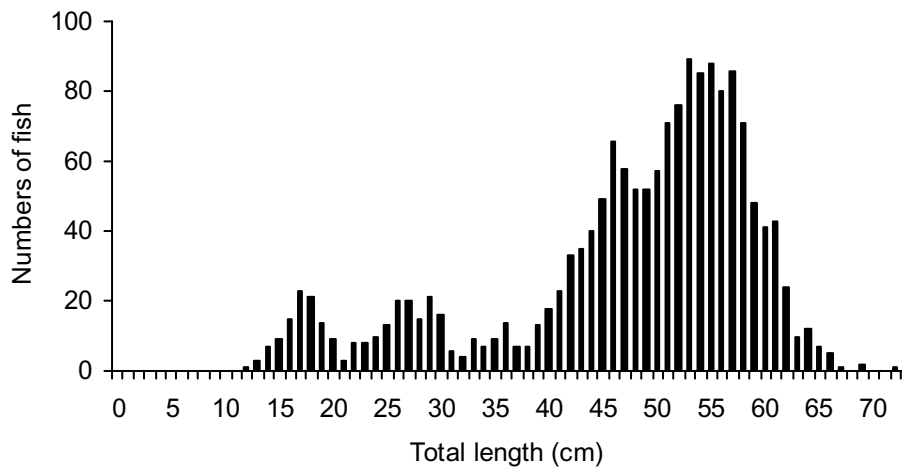
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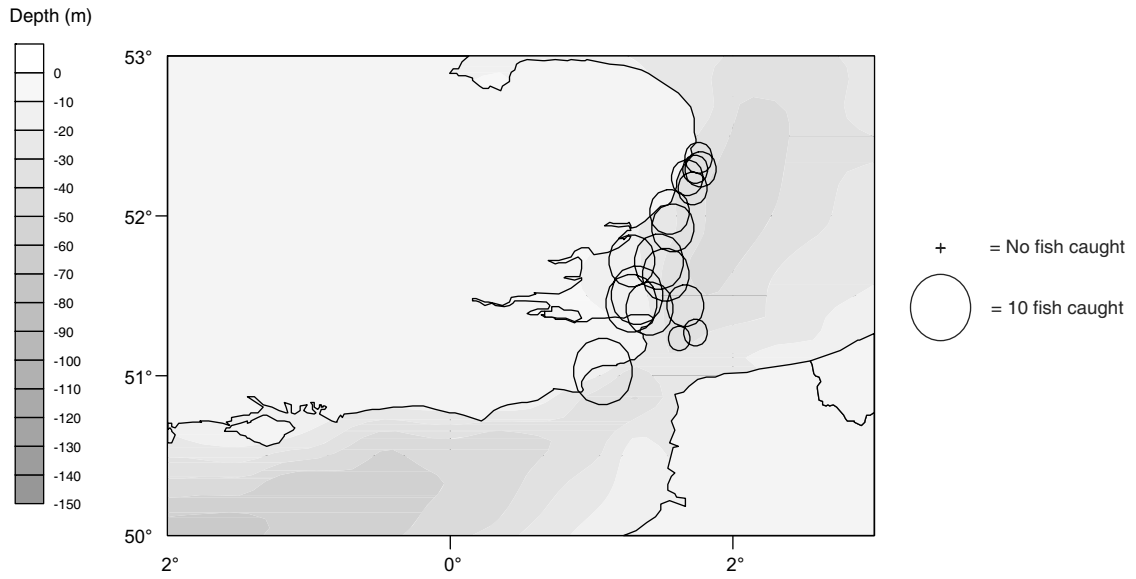


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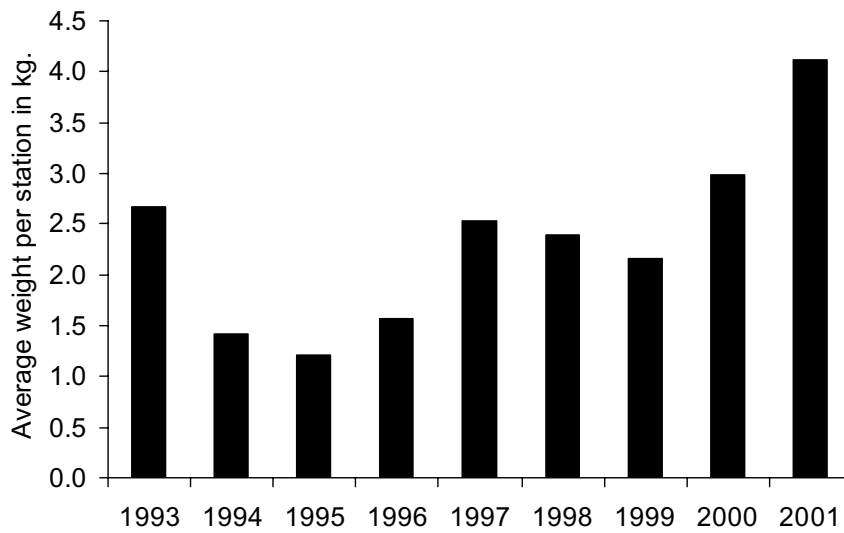


Ray, thornback - *Raja clavata*

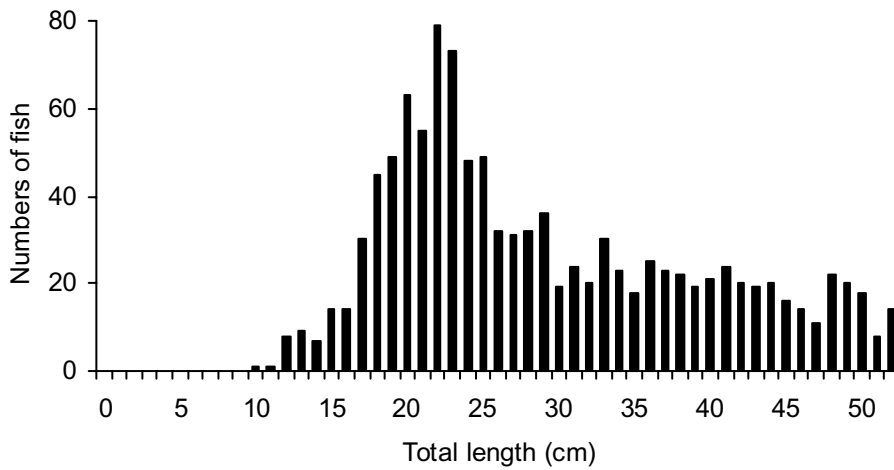
(a)



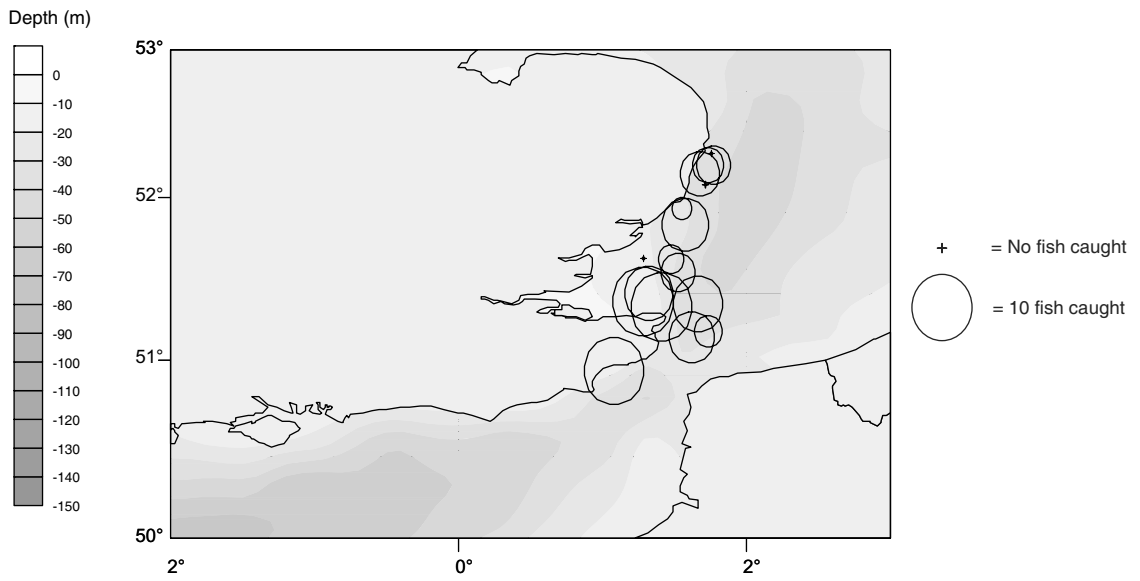
(b)



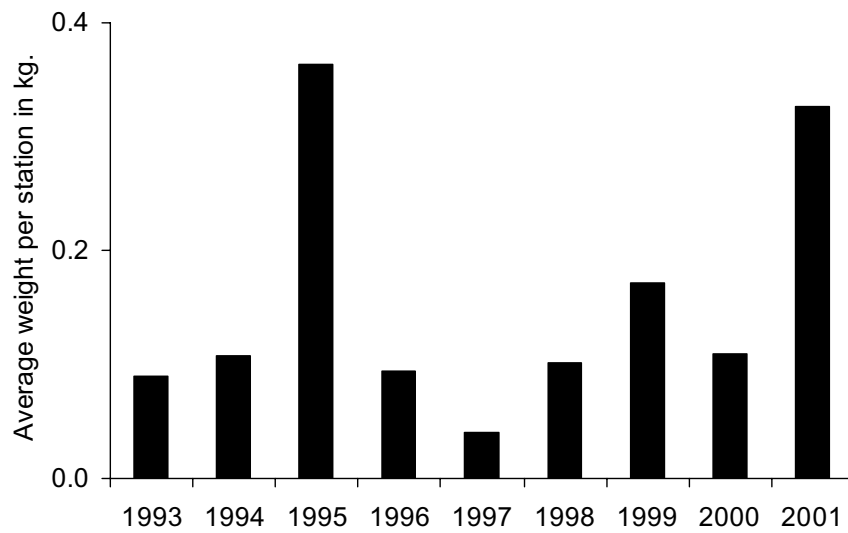
(c)



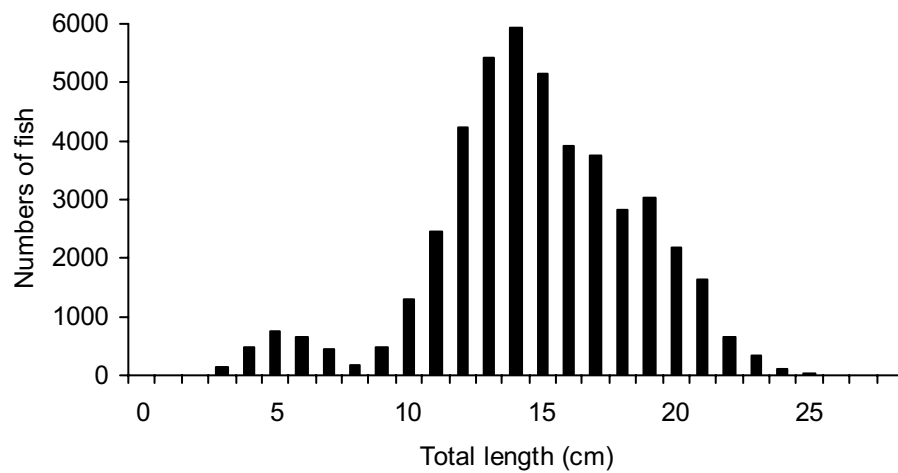
(a)



(b)

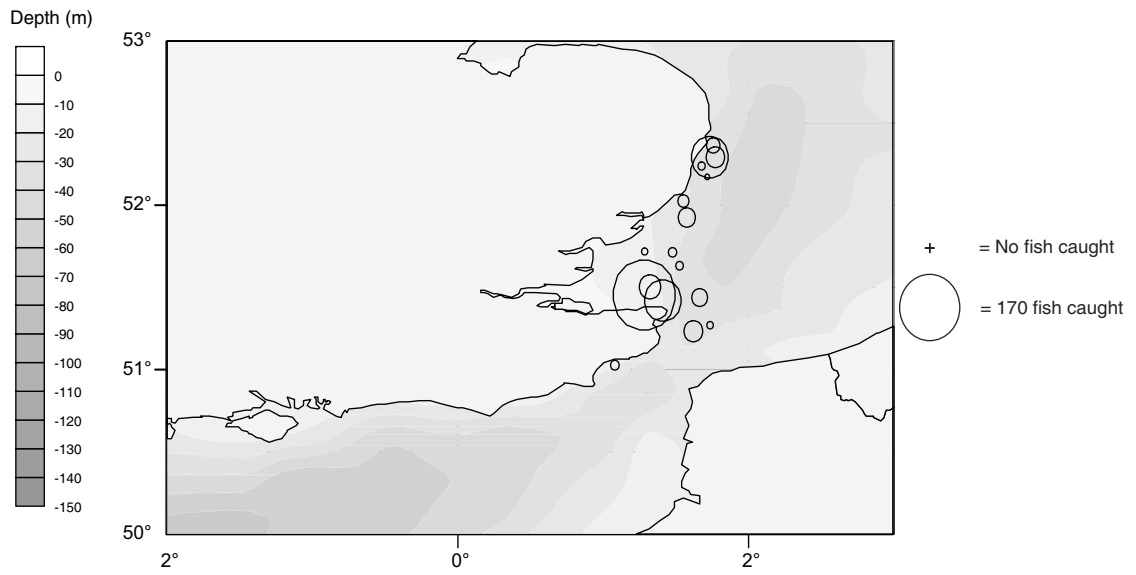


(c)

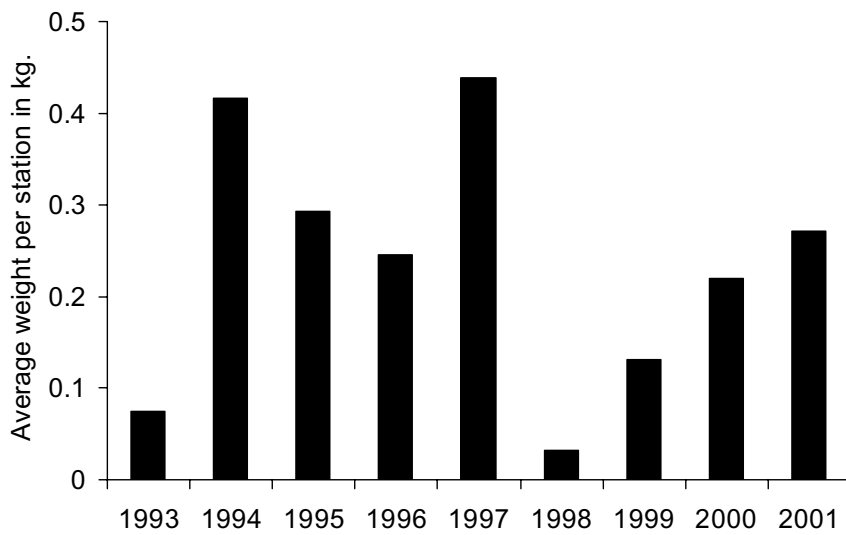


Pogge - *Agonus cataphractus*

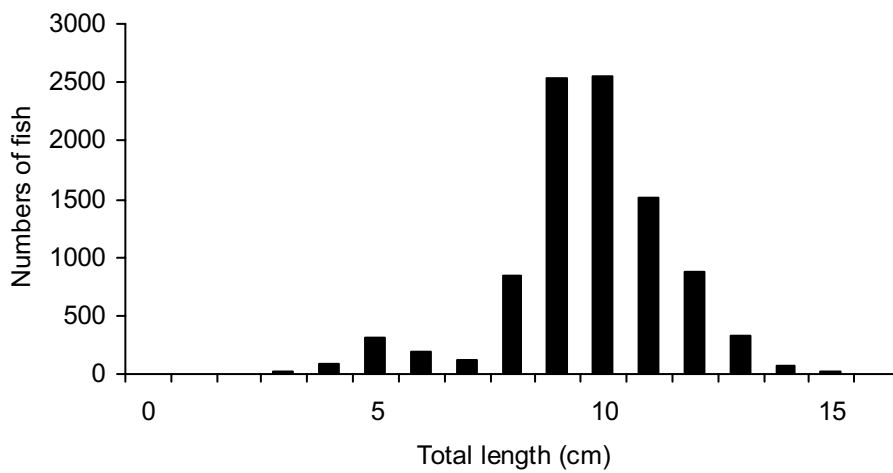
(a)



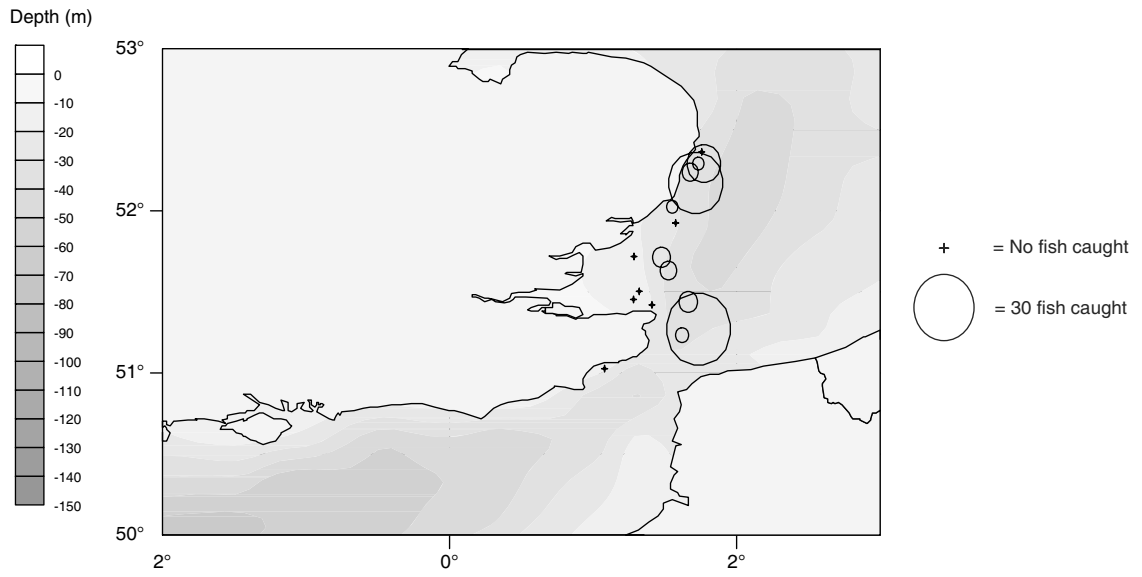
(b)



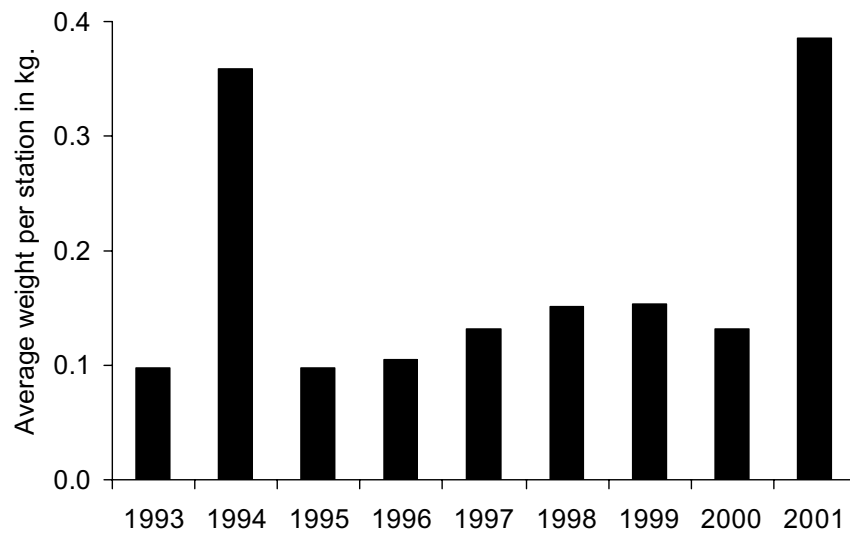
(c)



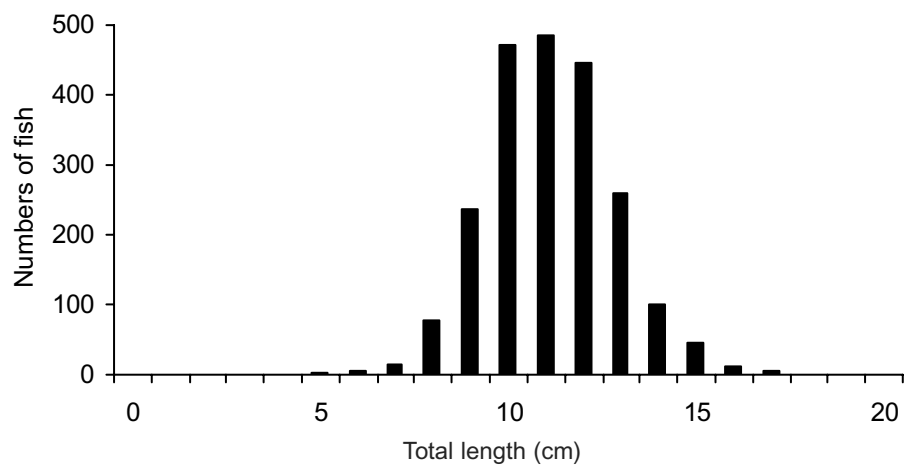
(a)



(b)

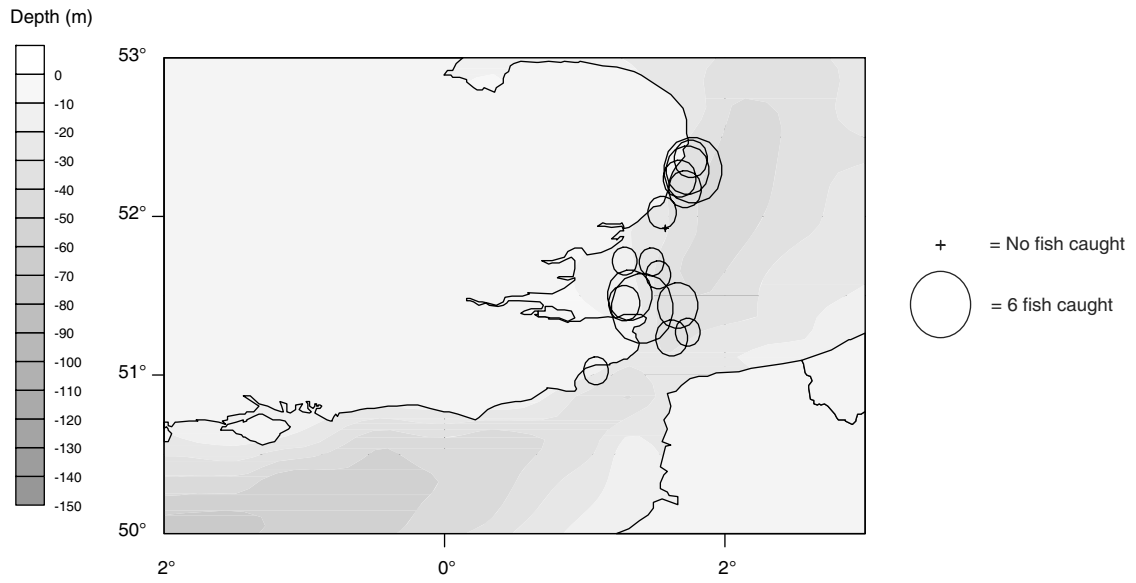


(c)

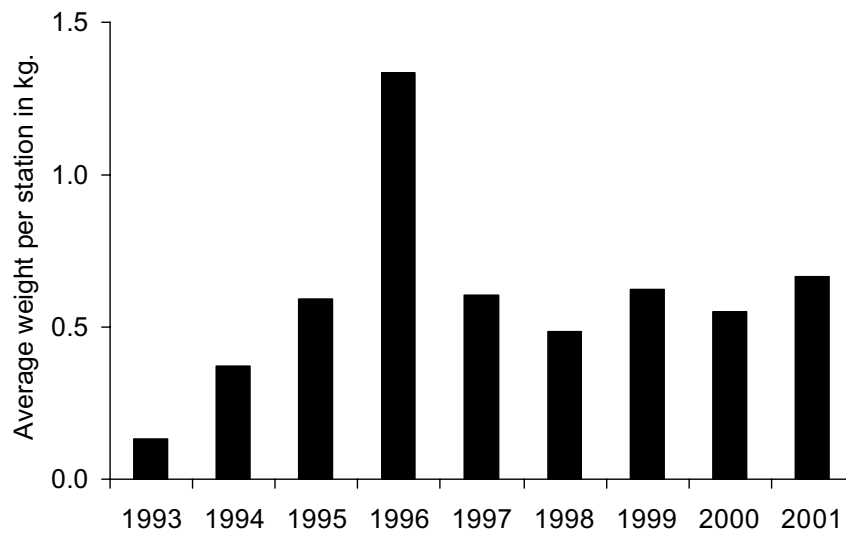


Edible crab - *Cancer pagurus*

(a)



(b)



(c)

