

Cruise Report CV0304

Biological Sampling Survey

Celtic Voyager

March 2004

Purpose of the cruise

The survey is intended to address the requirements of the Data Collection Regulation 1639/2001. Information on growth, maturity and sex ratio (biological data) were collected for a range of commercially important species. Ovary samples were collected to validate visual maturity staging. Additionally, ovary samples were taken for CEFAS in Lowestoft, tissue samples were taken for genetics projects within the Marine Institute as well as other labs. Samples of whole flatfish were taken for meristics analysis in GMIT.

Work Completed

Ninety valid and two foul hauls were completed during the survey. 18 days were spent fishing, 5 days were spent in port and 2 days at sea without getting any fishing done. The first leg was hampered by heavy weather and although work could be done inshore on most days, coverage of the Northern area was left incomplete. A large part of the division VIa also has hard ground and is unsuitable for the gear used which limited the choice of deeper stations. All other areas have reasonable or good coverage, although no sampling was done in the St. George's Channel due to time constraints.

Sampling Targets

Table 1 gives overview of the sample numbers that were achieved. Catch numbers area also plotted in Figure 2. Overall, biological samples (sex, maturity stage, age, weight) were taken for over 6,500 fish, nearly 28,000 fish were measured and over 133,000 fish of the target species were caught.

Haddock and whiting were present in large numbers in all areas and sub-samples were routinely taken for length measurements. Cod were caught in small numbers, mainly in the Irish Sea, biological parameters were recorded for every cod caught. Hake were found in the deeper hauls, mainly in the Celtic Sea. Every hake caught was measured and over half of them were sampled for biological parameters. Pollock were, as expected, virtually absent in any of the catches, only 5 were caught. Plaice were mainly caught in the Irish Sea and inshore on the west-coast, in these areas some hauls were sub-sampled, in other areas all fish were measured and taken for biological analysis. Sole were present in very low numbers. White monkfish was present in most hauls but in low numbers, while black monkfish were rarely caught. Rays virtually were absent in the Celtic Sea and found in small numbers elsewhere, the dominant species were thornback and spotted rays. Blue whiting were caught in large numbers in the south-west and occasionally elsewhere. Herring were regularly found in quite large numbers throughout and mackerel were caught in very large numbers on a few occasions in the west. Horse mackerel was mainly found in the south-west.

Figure 3 shows length distributions of the total catch and of the biological samples. Full sampling targets for biological sampling were met for haddock over a wide range of length classes (from 13cm to 40cm or more). There is an obvious bimodality in the length distribution of haddock, it is remarkable that the small (most likely 1-year-old) haddock are about 4 cm smaller in VIIb than in the other areas. Biological sampling targets for whiting were also widely met (and exceeded in VIIb). Cod were caught over a wide size range albeit in small numbers. Hake were mainly caught at juvenile sizes although larger fish were also caught regularly. Plaice were caught over a wide range of size ranges and sampling targets were met for many size classes in divisions VIIa and VIIb. Megrim were caught mainly in VIIj and VIIb and biological sampling targets were widely met in these areas. Blue whiting targets were met in VIIg,j and b. Herring were found throughout the area but juveniles were only found in VIIa in significant numbers. Mackerel were caught in very large numbers in VIIb but biological sampling targets were also met in many other areas. Horse mackerel were caught in variable numbers but overall covering a good size range.

Table 2 shows the sample numbers of ovaries taken for histological analysis and whole-mount analysis (size frequency of oocytes). The full sampling targets were only achieved for whiting in area VIIbjg. For the gadoids, there were very few stages 2, 3 and 4 (ripening) present. Flatfish seemed to be mainly immature or spent, with very few stages 3, 4, 5 and 6 present. This also becomes obvious

from Table 3. It appears that spawning of many species took place quite early this year, 17% of the biological samples of whiting was spent and 13% of cod (Table 3; whole survey area). If this is compared to Irish Sea groundfish survey time series run by DARD since 1992 at the same time of year (March), spent whiting and cod typically make up less than 3% of the samples. Dunmore-east fishermen also noticed that cod moved off the spawning grounds three weeks early this year. Although sampling targets for histological confirmation of the maturity stages were not met for certain stages, for most species this is not a problem as the main purpose of the survey is the determination of whether fish are mature or immature. When fish are recently spent, this distinction is quite obvious. However, many flatfish were in the recovered-spent stage (stage 8) and this can be very hard to distinguish from virgin fish (stage 2). This was especially a problem for males although female megrim were also well recovered by the end of the survey. As most flatfish spawn in winter, it might be preferable to use November groundfish survey data for these species. Many large female hake were also at maturity stage 2 but considering their size they were probably mature. Hake have a protracted spawning season and it is difficult to distinguish virgin fish from spent recovered fish.

Survey Log

Tue 9 Mar	Set out from Galway at 05:00. Fairly windy conditions. The hydrophone for the Scanmar is not working. 5 stations completed near the Aran Islands. Moved up the coast for shelter off north Mayo during the night
Wed 10 Mar	Weather much the same, 4 hauls completed in Donegal bay, first haul large catch of mackerel, too heavy to lift into hopper. Cod-end slightly damaged. Into Killybegs at 21:00
Thu 11 Mar	Gale force winds. In K'begs all day. New hydrophone arrived and is working. Spent day organising wetlab etc.
Fri 12 Mar	Left port at 06:00, good weather. 5 stations completed and one foul haul (doors got crossed). Heading north overnight to complete most northerly stations.
Sat 13 Mar	Three stations completed, weather freshening up, gale warnings for afternoon, had to steam south for shelter in lough swilly. Anchored overnight.
Sun 14 Mar	Lifted anchor at 08:00, weather not too bad but deteriorating quickly during first tow, which had to be abandoned. Brake on stbt winch broke, had to go into Derry for repairs. Weather too rough to be working anyway. In Derry around 18:00
Mon 15 Mar	Winch brake repaired but gale force winds. Did not attempt to go fishing.
Tue 16 Mar	In the morning still gales blowing. Three stations just outside Lough Foyle completed, this was the only soft ground near the codling box, but no cod caught. In afternoon headed around to the Irish Sea.
Wed 17 Mar	First tow of the day fauled: one of the doors was on its side, after that good progress made. Freshening up during the evening, went into Douglas (IOM) for shelter and some minor medical emergencies.
Thu 18 Mar	Five tows completed, windy but enough shelter from Welsh mainland. Severe gale force warnings for the night so into Holyhead for the night.
Fri 19 Mar	Winds eased slightly during the afternoon but not enough to cross over to the Irish coast. Severe gales during night.
Sat 20 Mar	Scientific crew changeover (by ferry). Severe gale warnings still in place.
Sun 21 Mar	Weather easing slightly but still very gusty and too rough to sail.
Mon 22 Mar	Set off at 09:00 in rough conditions. Injector of main engine faulty, into Dun Loaghaire for repairs. Engine repaired during evening.
Tue 23 Mar	Set off at 01:00. Weather easing. Sampled 7 stations but one haul fauled (gear buried itself in sandy ridge). Heading down to Celtic sea overnight.
Wed 24 Mar	Good weather. Sampled 6 stations. Nothing broke.
Thu 25 Mar	Three tows completed in morning. Weather deteriorated unexpectedly during afternoon, had to stop fishing. But settled early evening and one more tow was completed.
Fri 26 Mar	Fine weather. 5 Tows completed. Big rip in belly sheet on 5 th tow. Repaired during early evening. Into Cobh for some supplies at 20:00.
Sat 27 Mar	Left Cobh at 3am. Fine weather, 6 tows completed. Moving towards shelf edge during night.
Sun 28 Mar	Completed 5 stations in good weather. Clocks moved forward.

Mon 29 Mar Net ripped to shreds on first haul, spare net put on drum. Five tows completed. Weather still fine
 Tue 30 Mar Freshening, working closer inland. 6 stations completed
 Wed 31 Mar 5 Inshore stations completed
 Thu 01 Apr Wind still south-easterly. Completed 5 stations in shelter of Galway Bay. In evening of freshwater in Ros A Mhill. Overnight steamed out to westerly stations as weather looks to improve.
 Fri 02 Apr Weather improved. Completed 5 stations in the western area. Arrived back in Galway at 03:30 on Saturday.

Staffing

Scientific Team		Ship's crew
Leg 1(9 – 20 Mar)	Leg 2 (20 Mar – 3 Apr)	Dennis Rowan (Master)
Hans Gerritsen (MI, SiC)	Hans Gerritsen (MI, SiC)	James _____ (1 st mate)
Selene Hoey (MI)	Selene Hoey (MI)	Peter _____ (2 nd mate)
Dave Stokes (MI)	Ross Fitzgerald (MI)	Damien _____ / Brendan _____ (1 st Eng)
Diarmaid Murphy (MI)	Tracy McPhelim (MI)	Steve _____ (2 nd Engineer)
Phil McGinnity (MI)	Jennifer Doyle (MI)	Ken _____ (Deckhand)
Esther Sancho (UCC)	Linda Doran (NUIG)	Declan _____ (Deckhand)
		Ollie _____ (Cook)

Recommendations

Some minor technical glitches:

- There were a number of occasions where one of the doors fell on its side during shooting and the gear had to be hauled in again. If the survey is to be repeated on the Voyager this might be worth looking at.
- Access to the ship's network is still problematic for MI staff. It takes quite some setting up and you lose the MI network settings on return to the office which have to be reset by IT. Also you can't log in under your own name which means user settings are also lost.

Timing of the survey:

- Although spawning of many species took place early this year, the distinction between virgin and mature fish was still quite clear as the gonads were generally still enlarged and with residual sperm or eggs. For flatfish, however, this was not the case and it would be better to monitor the maturity of flatfish at the end of the year rather than in spring. The November groundfish survey would be suitable for this but due to the design of the gear, very few flatfish are being caught. The current survey has shown that reasonable numbers of flatfish can be caught with GOV gear as long as the ground rope is tied down close enough. It deserves serious consideration to make this amendment to the gear used in the November groundfish surveys, especially considering the fact that there is no time series as yet.

Future biological sampling surveys. Should this survey be repeated on a research vessel or can it be done using commercial vessels?

- Samples in formaldehyde: Although in the future the need to validate the maturity scales by taking gonad samples in formaldehyde might be less urgent, it seems to make sense to monitor the visual staging on a continual basis. Taking formaldehyde on board of commercial vessels is not really practical.
- Staffing and working space: Commercial vessels usually do not have the capacity for 6 staff or space for setting up the electronic measuring boards. To reduce staff numbers or measuring stations would mean a reduction in sampling targets.
- Fishing in rough weather. Commercial vessels would have a greater capacity to fish under borderline conditions when the Celtic Voyager would not be able to do so. However the current survey suffered from bad weather conditions and has nevertheless succeeded in achieving its targets.

Thanks

Thanks to all the people who worked amazingly hard to make this survey run smoothly.

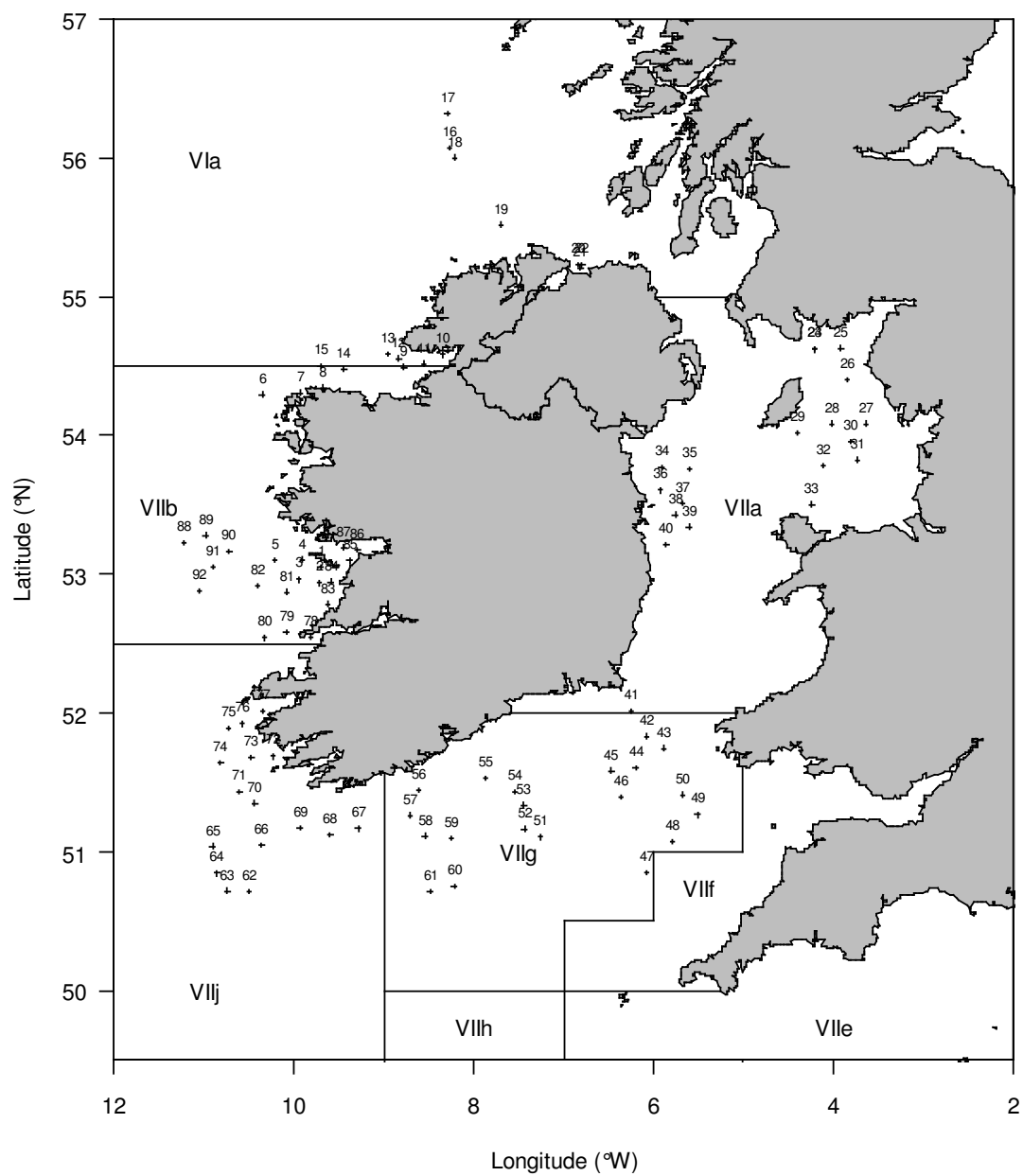


Figure 1. Station positions and Haul numbers. The survey started in Galway bay and worked clockwise around Ireland.

Table 1. Sample numbers per ICES Division. Numbers caught are estimated from the raising factors of the samples. 'measured' refers to the numbers that were actually measured and 'biological' refers to

the number of fish that had biological parameters recorded (weight, age, sex, maturity stage).

	Numbers	VIa	VIIa	VIIg	VIIj	VIIb	All
HAD	caught	403	9610	2931	5702	11550	30196
	measured	403	882	1542	2387	3408	8622
	biological	151	286	285	253	263	1238
WHG	caught	5410	12785	8646	3251	7046	37137
	measured	772	2715	2119	946	2530	9082
	biological	131	240	264	250	342	1227
COD	caught	4	70	44	9	8	135
	measured	4	70	44	9	8	135
	biological	4	70	44	9	8	135
HKE	caught	119	9	364	225	92	809
	measured	119	9	364	225	92	809
	biological	100	9	147	124	74	454
POK	caught	0	0	1	3	1	5
	measured	0	0	1	3	1	5
	biological	0	0	1	3	1	5
PLE , Female	caught	66	518	44	30	167	825
	measured	66	339	44	30	167	646
	biological	63	194	44	30	139	470
PLE, Male	caught	51	1061	10	27	217	1366
	measured	51	477	10	27	217	782
	biological	50	175	10	27	159	421
MEG, Female	caught	26	0	44	529	340	939
	measured	26	0	44	433	340	843
	biological	26	0	44	176	178	424
MEG, Male	caught	10	0	1	348	254	613
	measured	10	0	1	331	254	596
	biological	10	0	1	131	109	251
SOL, Female	caught	1	1	9	9	13	33
	measured	1	1	9	9	13	33
	biological	1	1	9	9	13	33
SOL, Male	caught	1	3	6	9	14	35
	measured	1	3	6	9	14	33
	biological	1	3	6	9	14	33
MON	caught	23	10	35	25	59	152
	measured	23	10	35	25	59	152
	biological	23	10	35	25	59	152
WAF	caught	1	0	0	7	2	10
	measured	1	0	0	7	2	10
	biological	1	0	0	7	2	10
Rays	caught	2	60	19	5	66	152
	measured	2	60	19	5	66	152
	biological	2	60	19	5	66	152
WHB	caught	0	0	194	16371	491	17056
	measured	0	0	194	1173	366	1733
	biological	0	0	96	126	109	331
HER	caught	1440	1872	3201	370	721	7603
	measured	321	771	480	233	265	2070
	biological	65	157	67	56	78	423
MAC	caught	61	10	218	2658	32647	35594
	measured	61	10	218	517	695	1501
	biological	54	10	131	169	130	494
HOM	caught	0	14	55	574	211	854
	measured	0	14	55	449	211	729
	biological	0	14	38	115	134	301
Total	caught	7617	26022	15821	30155	53899	133514
	measured	1861	5361	5185	6818	8708	27933
	biological	696	1233	1253	1524	1878	6584

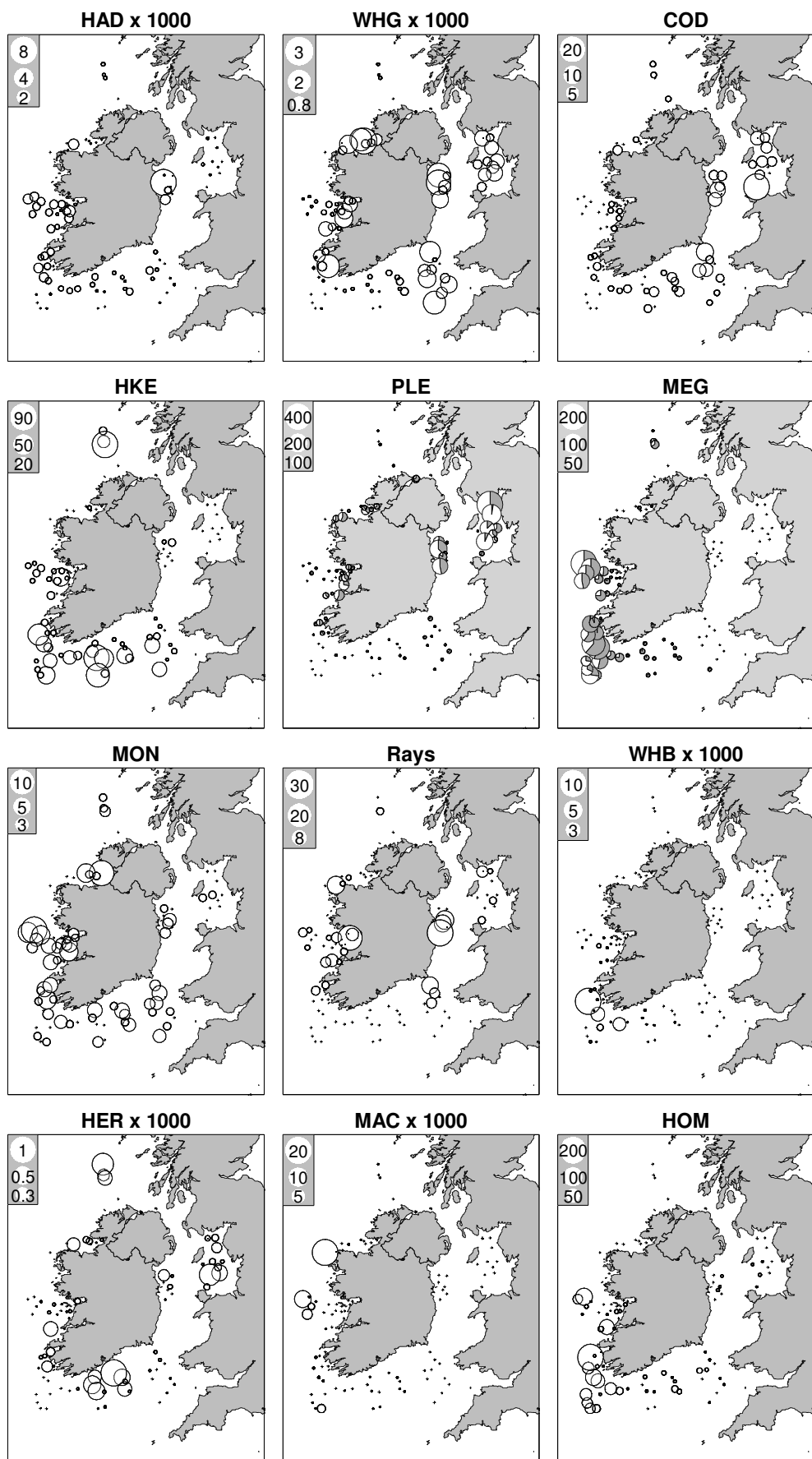


Figure 2. Bubble area represents catch numbers per 1/2 hr tow. For flatfish the grey area of the pie-plots represents the proportion of females

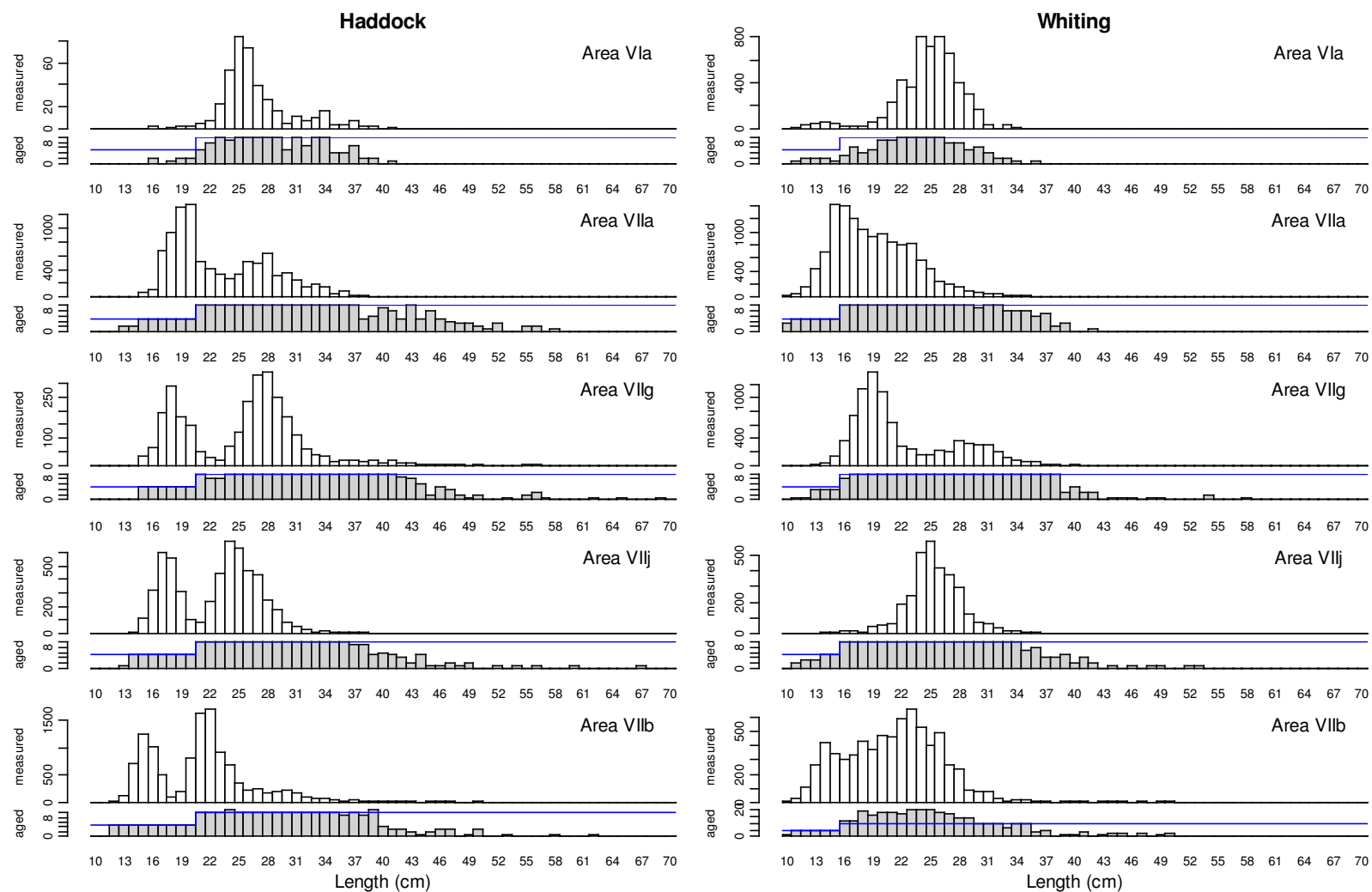
Table 2. Number of samples taken for histological and whole-mount analysis by maturity stage and area. Bold numbers show where the sampling targets were achieved.

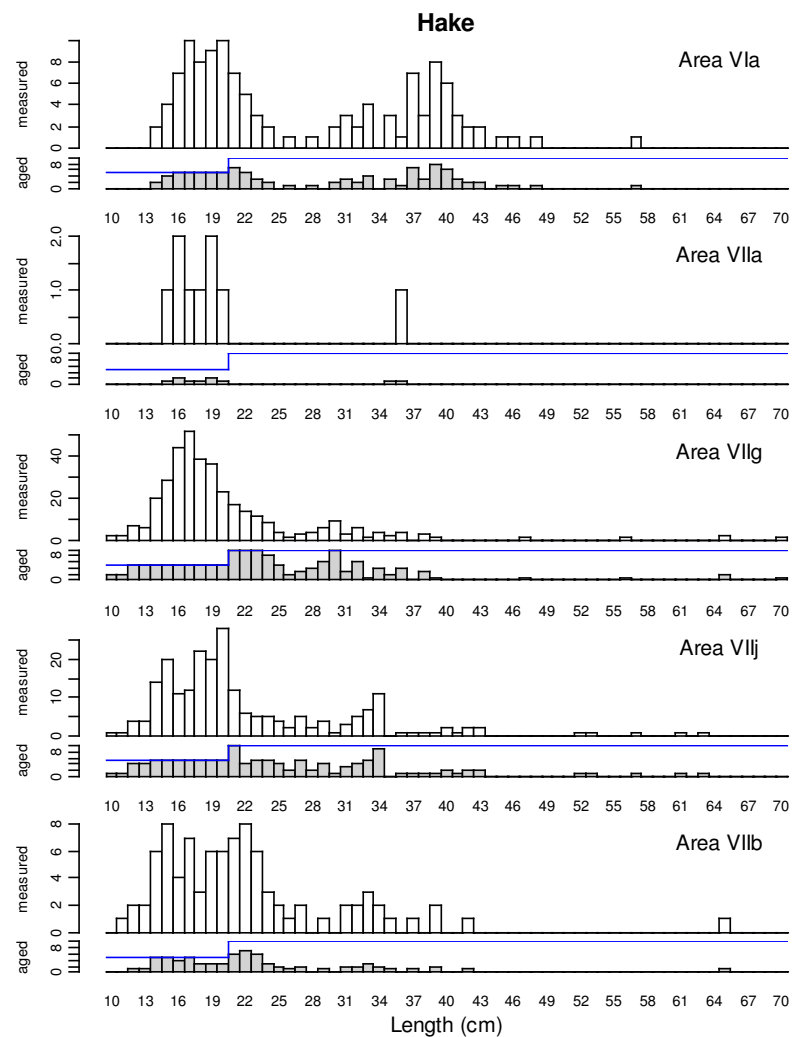
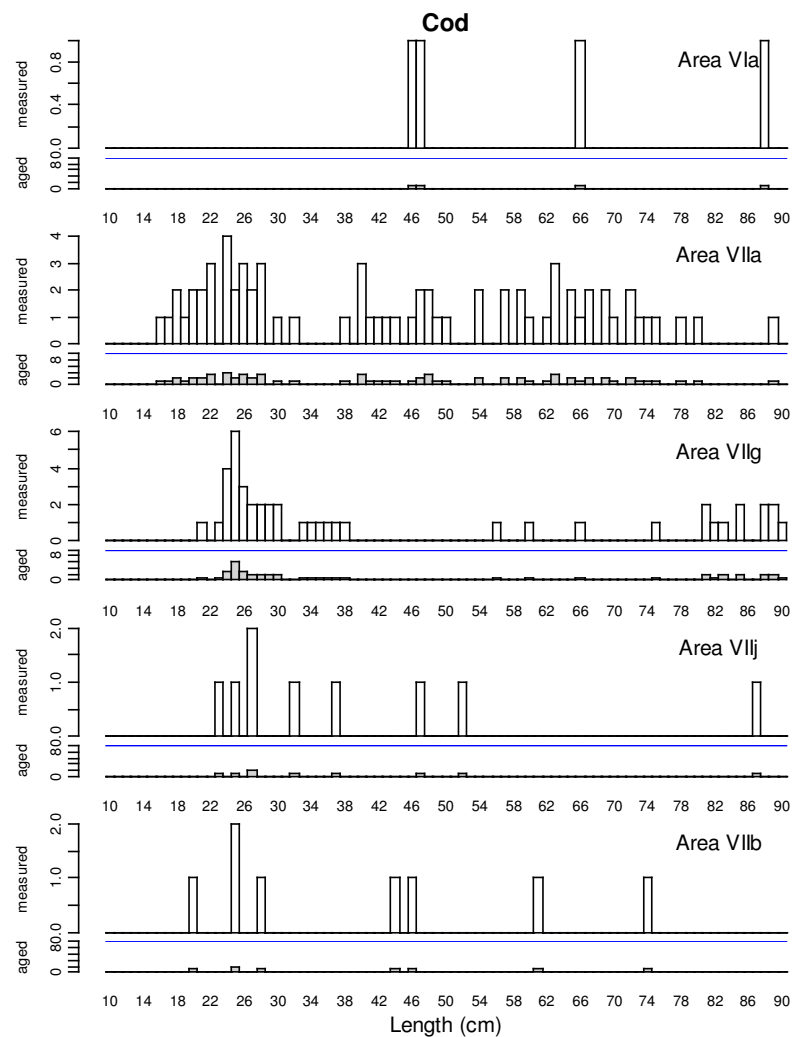
Species	Area	Maturity Stage	I	II	III	IV	V	VI	VII	Total
HAD	Vla		0	2	3	7	5	4	5	26
HAD	VIIa		5	7	2	7	5	5	5	36
HAD	VIIbjg		5	10	2	9	5	5	5	41
WHG	Vla		4	5	0	10	5	3	1	28
WHG	VIIa		5	2	3	10	5	5	5	35
WHG	VIIbjg		5	10	10	10	5	5	5	50
COD	Vla		0	0	0	0	0	0	1	1
COD	VIIa		5	1	0	2	3	2	4	17
COD	VIIbjg		1	10	1	0	3	0	5	20
HKE	All		5	10	4	6	1	0	3	29
PLE	Vla		5	4	0	0	0	0	5	16
PLE	VIIa		5	10	0	6	5	5	5	36
PLE	VIIbjg		5	10	2	1	1	0	5	24
MEG	All		5	10	2	3	5	5	5	35
SOL	All		0	4	7	7	2	0	5	25
Total			55	95	36	78	50	39	66	419

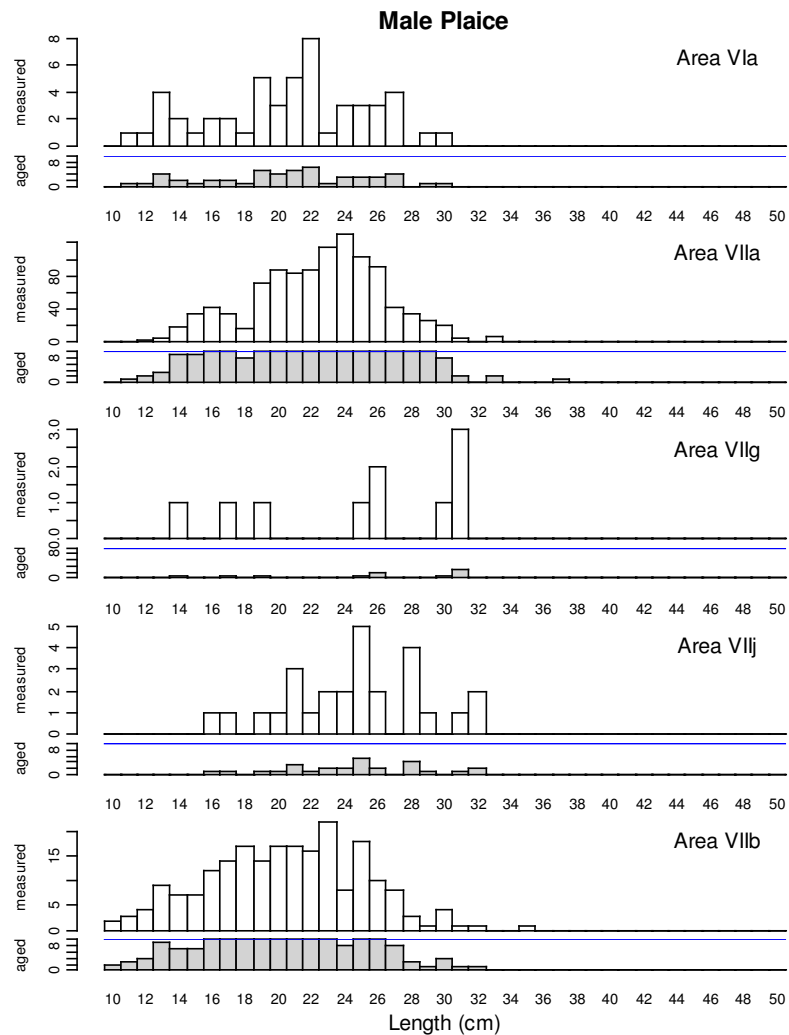
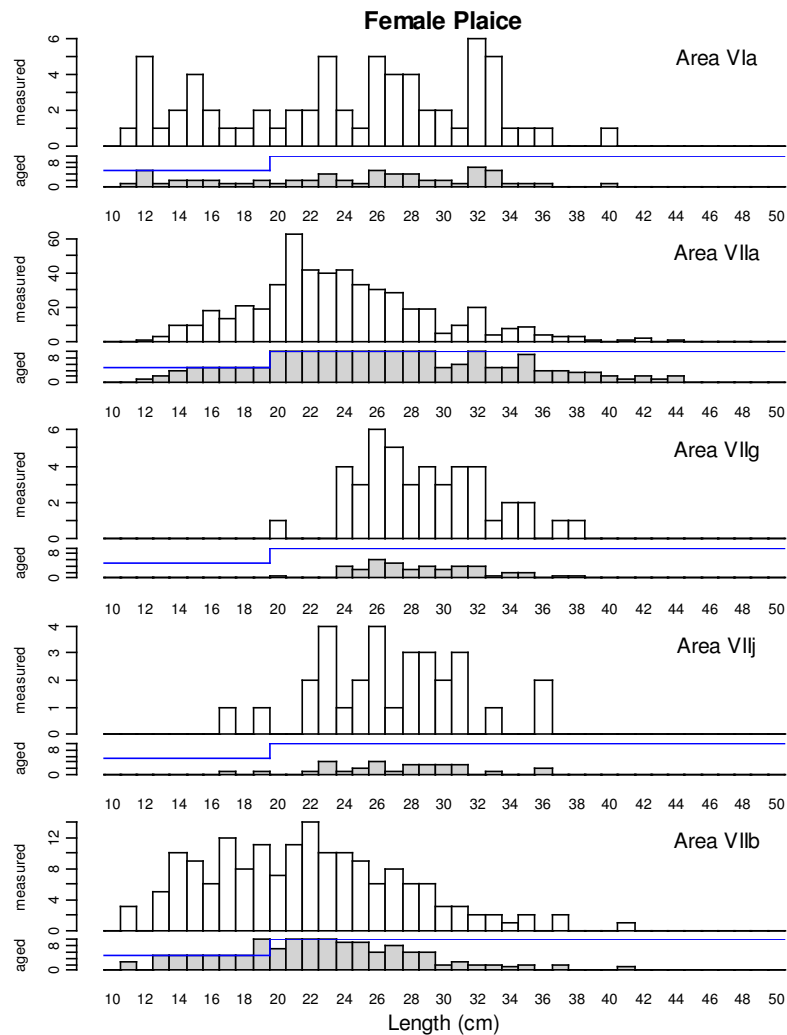
Table 3. Proportions of fish by maturity stage (simplified maturity scale as different scales are applied to various species). The last column refers to fish that could either be immature (virgin) or fish whose gonads have recovered from spawning so that they are indistinguishable from virgin fish. Numbers could be biased as they are taken from length-stratified and not random samples.

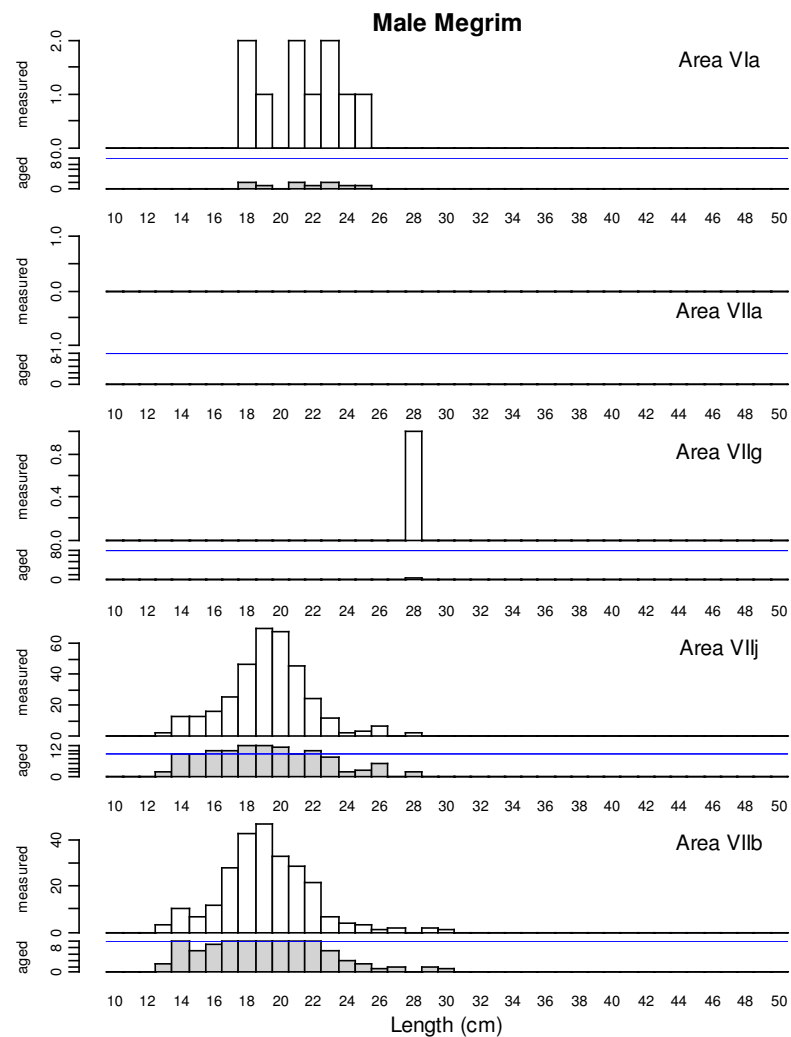
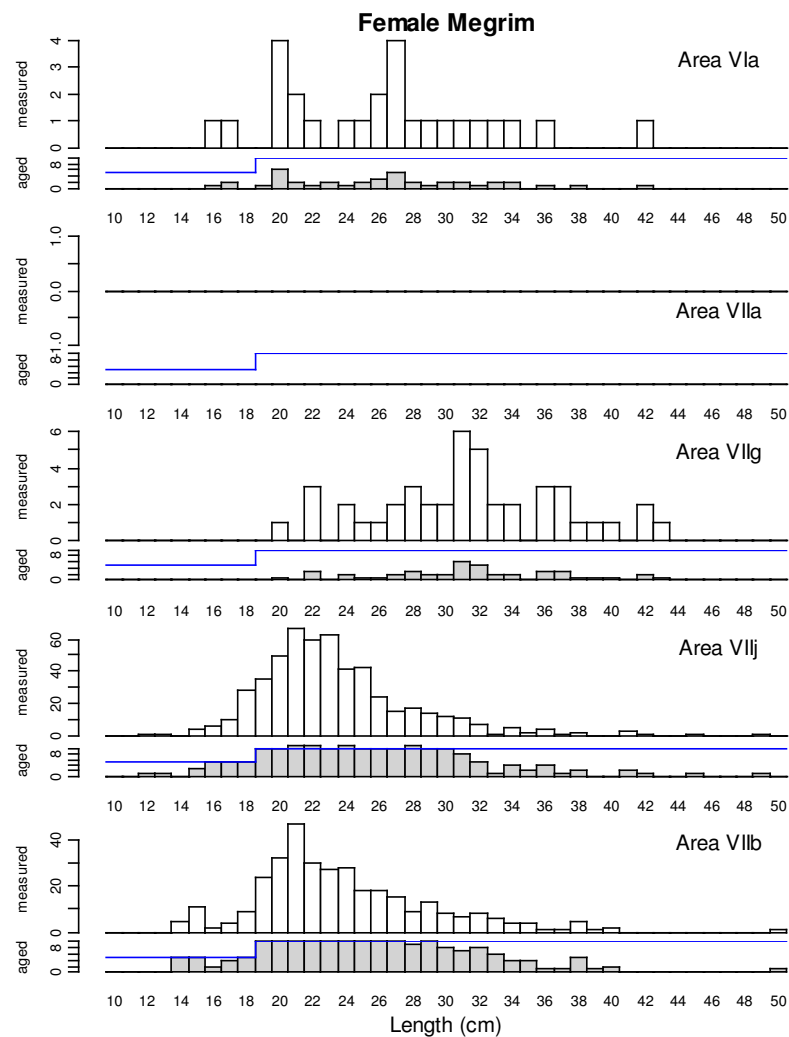
	Immature	Ripening	Spawning	Spent	Immature or recovered spent
HAD	20 %	14 %	22 %	43 %	0 %
WHG	26 %	28 %	28 %	17 %	0 %
COD	49 %	4 %	34 %	13 %	0 %
HKE	57 %	8 %	13 %	3 %	19 %
PLE	30 %	4 %	15 %	36 %	15 %
MEG	22 %	2 %	9 %	38 %	29 %
SOL	5 %	30 %	5 %	24 %	36 %
MON	96 %	2 %	0 %	3 %	0 %
Rays	47 %	53 %	0 %	1 %	0 %
WHB	54 %	14 %	14 %	18 %	1 %
HER	34 %	13 %	0 %	52 %	0 %
MAC	37 %	29 %	14 %	20 %	0 %
HOM	45 %	23 %	11 %	20 %	0 %

Figure 3. (This page and following) White bars represent the length frequency of the total catch in each ICES division. The grey bars represent the number of fish sampled for biological analysis and the blue line indicates the level of the sampling targets. These sampling targets are usually 5 fish per cm for juveniles and 10 fish per cm for larger fish.

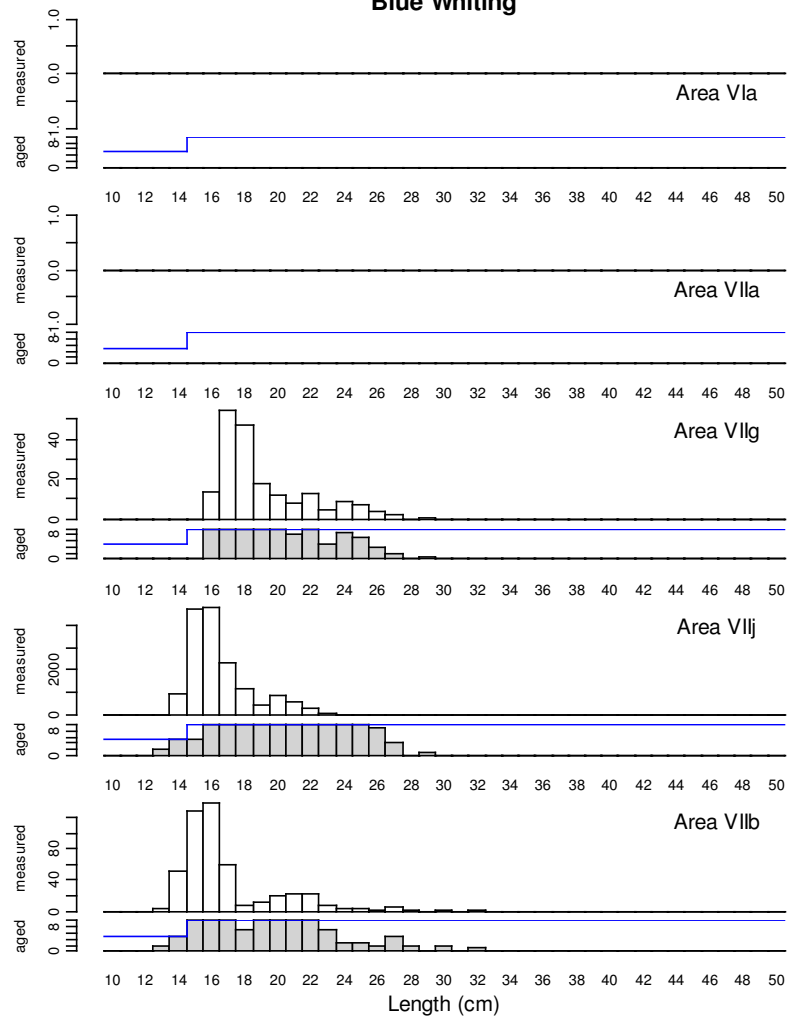




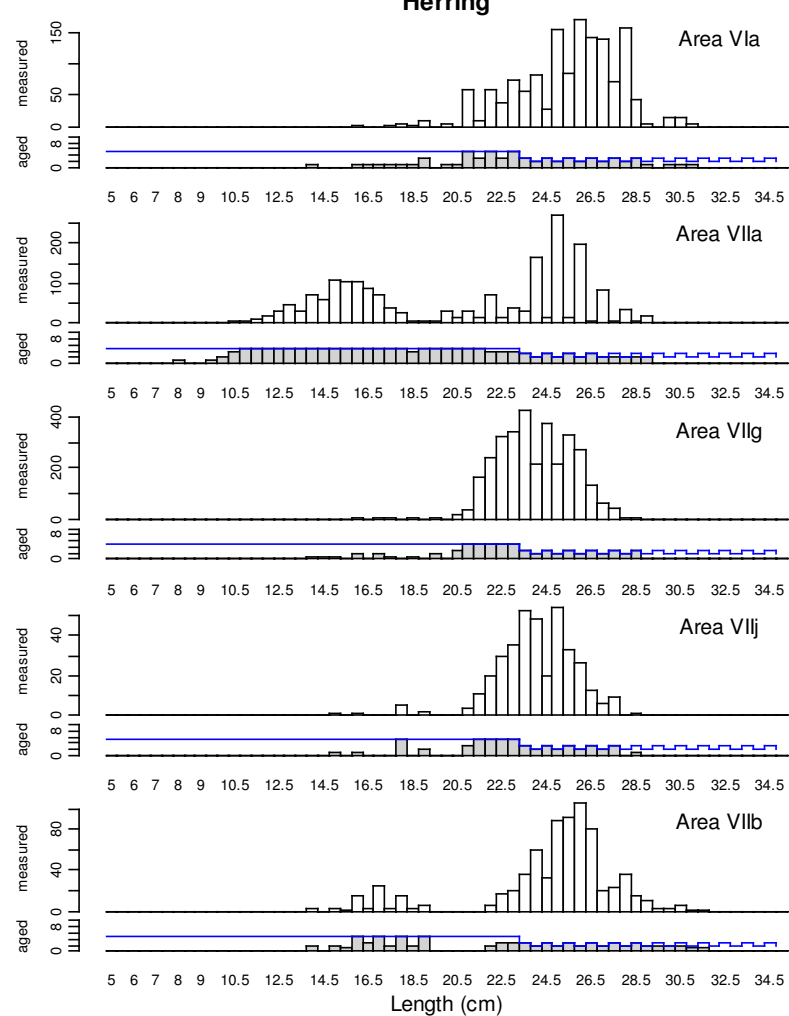




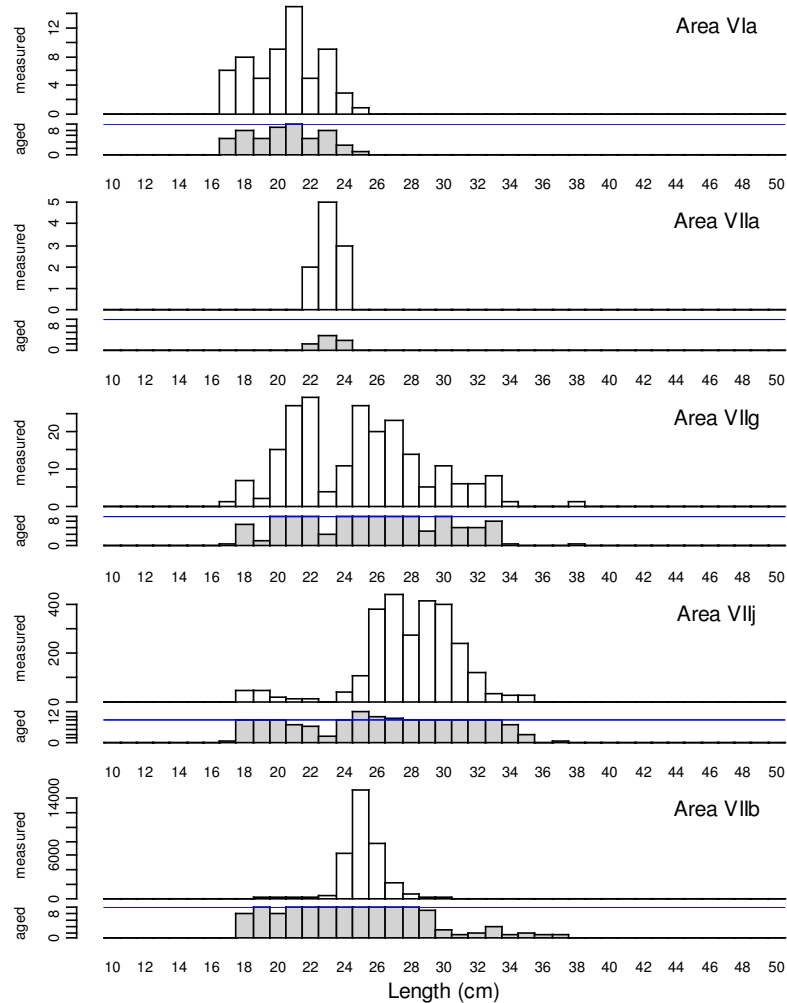
Blue Whiting



Herring



Mackerel



Scad

