THE CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE
LOWESTOFT LABORATORY, LOWESTOFT, SUFFOLK NR33 0HT

2006 CHARTER CRUISE PROGRAMME REPORT: CEFAS ENDEAVOUR 8/06

(**PROVISIONAL:** not to be quoted without prior reference to the author)

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DURATION: 22 March – 4 April 2006

LOCATION: Western Channel Portland to Scilly Isles in UK, French and Channel Island waters.

AIMS:

NARRATIVE:

The CEFAS Endeavour sailed from Portland at 10:30 on the 22nd of March to commence the CEND 8/06 survey of the western Channel. The new gear was inspected on the way to the first station. Small modifications to the dog-ropes were required for use on Endeavour. (Towing chain certificates were not received, and enquiries need to be made as to the necessary certificates). Sampling started in stratum 6 at 14:00 amongst strong northerly winds completing 2 stations on the first day as crew and scientist were accustoming themselves to the new gear arrangements. Beam 1 was towed on the port side fitted with the 40mm blinder with the CTD attached (Gearcode 101530402). The starboard beam (Beam 2) was fished using just the commercial 80mm codend supplied by the manufacturer (Gearcode 101530503). Tagging work was carried out in Lyme Bay during the dark period (30 min tows) with 40 sole successfully tagged.

Defects:
The only spare supplies for the beams were an additional beam fully fitted, an additional trawl, and one codend. No separate panels, chains or shackles (these were kept from the previous cruise) were available and these will need to be sourced prior to commencement of next years survey.
The chemical storage box kept on deck was full of water without any provisions for emptying. Additionally there seemed to be more chemicals present than required for the current cruise.

Continuous water sampler was not working. It was working on the previous cruise and I was told I would not have to do anything to it. It appears just to have been switched off.
The multi-beam was not functional as the external harddrive was lost without any error reports from the software. If this had not been noticed the raw data to the entire cruise could have been lost as appears to be the case for the last stations of the previous cruise. Storage was restored by a complete system reboot. Control of the multi-beam from the bridge would have been preferable as it required personnel to leave the fish room or bridge to set surveys.
Helmsman 4 (aft wheelhouse) monitor was not functioning.
No water bottles supplied as per gear list.

On day two 9 stations were sampled in Lyme Bay and off Start Point, mostly positioned in stratum 4 with winds increasing to gale force. Small numbers of sole and reasonable numbers of plaice were encountered. Weather conditions were too severe to continue tagging at night.

On the 24th of March sampling continued from Start Point to Falmouth Bay with a further 9 stations completed. The gear performed well and discussions with the crew, Bob Rogers and Dave Murphy indicated the gear was satisfactory for the survey and that low survey catches of sole appeared to be the result of low abundance on the ground rather than the gear. Tagging was attempted during the hours of dark near the Eddy Stone, but few sole were caught

After completion of a further six stations in Falmouth Bay on the next day the Endeavour headed to Falmouth to drop off Bob, whilst awaiting the return of the launch the drop keel deployed due to the parting of a block. The remaining survey time in the afternoon was spent making emergency repairs to facilitate the continuation of the cruise. Increasing winds made tagging operations impossible.

On the 26th of March 6 stations of Falmouth were sampled in stratum 3 and 8, with few fish encountered. Imminent gale force winds forced a return to Falmouth in the afternoon (about 17:00).

Defects:
A lack of cup holders and better rails on the SIC table on the bridge could have prevented a serious spillage of coffee on the bridge.

The 27th of March was spent on anchor in Falmouth due to winds in excess of 40 knots.

The following day the Endeavour weighed anchor at 6:00 heading west to Mounts Bay to sample stations in the inshore sector in rough conditions. The decision was made to continue out towards the Scilly Isles despite poor conditions. 7 Stations were completed, the last of which were located south of the Scilly Isles. Tagging was attempted south of the Scilly's but only six sole caught and tagged.

On the 29th the sampling commenced at the eastern edge of the sampling grid near the 2 degree line, swinging south east to complete stations mid-channel in rough conditions. Two further stations were sampled during the dark period as distances

were too great to complete these during daylight hours given the length of the survey. Consequently no tagging was attempted.

The following day the remaining mid-channel stations were completed, dipping into French territorial waters east of Guernsey heading to the Langoustine Bank in the afternoon. Abundance of soles increased on the edge of the Hurd Deep, and some activity of Brixham beamers was observed in the vicinity. Six sole were tagged near the Banks during the night. The decision was made to scrap three stations on the western edge of stratum 12 as there was insufficient time to sample these with the transit distances involved.

Defects:
The protective boards recently fitted in dry dock came away on the port side. One board was lost, with the others being recovered to prevent further losses).

On Saturday sampling started on the French coast (strata 11 and 10) on unknown tows. Tides were generally severe although weather was improving. The ground was extremely rocky and three tows had to be repeated due to codend damage. Stations with invalid tows were repeated for a 1-mile rather than the usual 2-mile tows. Few soles and little fisheries activity was observed in the area. 19 soles were tagged during the night-time, before moving along the coast for the next days sampling.

On the 1st of April sampling continued on the French inshore stations with heavy catches of ophiuroids on several of the stations near St Marlo. Few soles encountered until the last stations on of the day (Station 703), on which 14 soles were caught. 96 soles were tagged in the area of 703 during the night.

On Sunday sampling continued northwards along the French coast and amongst the Channel Islands. Lots of sea-horses and spider crabs encountered on two stations, but few soles. No tagging was possible due to very strong tides.

Defects:
Towing chain of the port side beam caught on the remains of the structure holding the protective boards. This created slack on the winch drum when the warp was paid out. Winch problems were resolved and offending structure removed.

Sampling of the final day (3rd of April) commenced at 7:00 hours as the tides near the Race of Alderney were very strong and trawling was only possible during slack water. After completing two further stations all sampling was complete and the Endeavour headed back for Lowestoft docking at lunchtime on the 4th of April.

Results for main aims:

A total of 76 survey stations were sampled with 80 completed hauls and 77 valid tows for each of the two gears. Table 1 indicates the number of samples collected by stratum and gear code. Strata 4,5,10 and 11 were sampled more intensively than other strata as they are thought to contain the main fishing grounds of the French and UK fleets exploiting dover sole in division VIIe. Location of samples is indicated in Table 2 along with times and ICES rectangles sampled.

Length distributions for each of the major commercial species are shown in Table 3 and graphically displayed in Figure 1-3 for the three major commercial species. Catches of monk (216), sole (118 female; 89 male) and plaice (260 female; 96 male) were spread over a wide range of lengths, but only a small number of small sole were encountered. Numbers of otolith and maturity stages taken are indicated in Table 4. Otoliths were taken in three strata (Uk inshore, French inshore and mid-channel) with most commercial specimens taken for EU-dataregs species.

Tagging operations carried out at night provided 176 tagged fish released near the location of capture. Unfortunately most sole tagged were larger than the juvenile stages that we had hoped to tag, but the number of small sole caught in the survey as a whole indicated that there were few sole of that size available for capture in the areas that could be sampled. Figure 4 shows the length frequency of soles tagged with release positions, length, and weight for soles tagged shown in Table 5.

Additional aims:

Multi-beam information was collected for all 80 samples taken, but unfortunately weather and light conditions did not permit the deployment of the underwater camera for groundtruthing.

Length frequency information for spider crabs was collected in 10mm increments. Unfortunately it was not possible to collect information in the 5mm increments as requested, as the EDC had been set up for 10mm increments and it was not possible to change the set up. All spider crabs caught were measured.

Berried female edible crabs were sampled for genetic analysis. Only 16 samples were taken as only 16 sample vials were provided.

Shell samples were collected for micro chemistry analysis at each of the stations and frozen immediately.

Squid samples for genetic analysis for each species encountered were collected and frozen. No alcohol or vials had been provided.

No four-spot megrim fin clip samples were collected as no specimens were encountered. Sand sole samples had been completed on the previous cruise.

Table 1 Sampling Summary by stratum and gear code

Gear Validity Code	Starboard 80mm codend					Port 40mm mesh liner					Grand Total	
Stratum	D	I	N	R	V	D	I	N	R	V		
1						5					5	10
2						5					5	10
3						4					4	8
4				2		8			2		8	20
5						8					8	16
6						4					4	8
7		1				4	1				4	10
8						4					4	8
9			1			4		1			4	10
10					1	10		1			10	22
11						9					9	18
12			1		1	3		1		1	3	10
13				2		3			2		3	10
Grand Total		1	2	4	2	71	1	3	4	1	71	160

Table 2 Stations Sampled

Station	Cruise	Date / Time		Shooting Position					Hauling Position			Rectangle
		Shot	Hauled	Lat		Long			Lat			
1	CEND 8/06	3/22/06 14:01	3/22/06 14:29	50	28.03	2	9.59	W	50	29.09	W	29E7
2	CEND 8/06	3/22/06 16:16	3/22/06 16:45	50	16.65	2	18.91	W	50	15.86	W	29E7
3	CEND 8/06	3/23/06 6:16	3/23/06 6:45	50	37.57	2	48.42	W	50	37.01	W	30E7
4	CEND 8/06	3/23/06 7:28	3/23/06 7:57	50	33.85	2	43.2	W	50	31.99	W	30E7
5	CEND 8/06	3/23/06 8:38	3/23/06 9:07	50	27.11	2	47.59	W	50	25.28	W	29E7
6	CEND 8/06	3/23/06 10:38	3/23/06 11:08	50	25.22	2	52.11	W	50	23.82	W	29E7
7	CEND 8/06	3/23/06 12:24	3/23/06 12:52	50	23.48	3	8.09	W	50	25.45	W	29E6
8	CEND 8/06	3/23/06 13:28	3/23/06 13:57	50	26.26	3	11.08	W	50	28.26	W	29E6
9	CEND 8/06	3/23/06 15:13	3/23/06 15:41	50	32.72	3	26.46	W	50	30.71	W	30E6
10	CEND 8/06	3/23/06 17:04	3/23/06 17:33	50	21.2	3	20.39	W	50	19.88	W	29E6
11	CEND 8/06	3/23/06 18:32	3/23/06 18:59	50	16.53	3	30.04	W	50	14.68	W	29E6
12	CEND 8/06	3/24/06 5:57	3/24/06 6:26	50	6.52	2	44.09	W	50	4.81	W	29E7
13	CEND 8/06	3/24/06 8:40	3/24/06 9:08	50	1.54	3	15.44	W	50	1.85	W	29E6
14	CEND 8/06	3/24/06 10:58	3/24/06 11:28	50	9.65	3	33.64	W	50	7.75	W	29E6
15	CEND 8/06	3/24/06 12:10	3/24/06 12:38	50	4.35	3	31.06	W	50	3.29	W	29E6
16	CEND 8/06	3/24/06 13:51	3/24/06 14:21	49	57.25	3	40.46	W	49	59.29	W	28E6
17	CEND 8/06	3/24/06 15:30	3/24/06 15:59	50	5.04	3	44.91	W	50	4.99	W	29E6
18	CEND 8/06	3/24/06 17:06	3/24/06 17:36	49	58	3	57.21	W	49	58.02	W	28E5
19	CEND 8/06	3/24/06 18:28	3/24/06 18:55	50	5.35	3	56.23	W	50	5.35	W	29E6
20	CEND 8/06	3/24/06 19:18	3/24/06 19:47	50	5.1	4	3.05	W	50	4.98	W	29E5
21	CEND 8/06	3/25/06 5:55	3/25/06 6:25	50	11.15	4	1.03	W	50	12.63	W	29E5
22	CEND 8/06	3/25/06 6:54	3/25/06 7:22	50	11.43	4	7.24	W	50	13.31	W	29E5
23	CEND 8/06	3/25/06 7:39	3/25/06 8:08	50	13.23	4	9.01	W	50	15.29	W	29E5
24	CEND 8/06	3/25/06 9:28	3/25/06 9:58	50	9.99	4	24.36	W	50	10.02	W	29E5
25	CEND 8/06	3/25/06 10:30	3/25/06 11:01	50	9.69	4	25.16	W	50	9.93	W	29E5
26	CEND 8/06	3/25/06 11:46	3/25/06 12:18	50	9.03	4	37.18	W	50	9	W	29E5
27	CEND 8/06	3/26/06 5:58	3/26/06 6:25	50	8	4	44.01	W	50	6.66	W	29E5
28	CEND 8/06	3/26/06 7:10	3/26/06 7:41	50	4.43	4	32.61	W	50	2.83	W	29E5
29	CEND 8/06	3/26/06 9:41	3/26/06 10:12	49	50.92	4	10.62	W	49	50.47	W	28E5
30	CEND 8/06	3/26/06 11:42	3/26/06 12:12	49	40	4	17.11	W	49	39.95	W	28E5
31	CEND 8/06	3/26/06 14:44	3/26/06 15:13	49	40.01	4	51.96	W	49	39.98	W	28E5
32	CEND 8/06	3/26/06 16:38	3/26/06 17:06	49	45.33	5	10.73	W	49	47.46	W	28E4
33	CEND 8/06	3/28/06 8:46	3/28/06 9:17	49	58.3	5	23.53	W	49	58.32	W	28E4
34	CEND 8/06	3/28/06 9:54	3/28/06 10:24	50	1.08	5	26.78	W	50	0.99	W	29E4
35	CEND 8/06	3/28/06 10:48	3/28/06 11:19	50	1.01	5	30.39	W	50	0.97	E	29E4
36	CEND 8/06	3/28/06 13:28	3/28/06 13:55	49	52.63	5	47.96	W	49	52.49	W	28E4
37	CEND 8/06	3/28/06 14:41	3/28/06 15:10	49	50.61	5	47.53	W	49	51.09	W	28E4
38	CEND 8/06	3/28/06 17:20	3/28/06 17:48	49	44.4	6	9.53	W	49	43.79	W	28E3

39	CEND 8/06	3/28/06 18:26	3/28/06 18:53	49	46.12	6	17.47	W	49	44.82	W	28E3
40	CEND 8/06	3/29/06 5:54	3/29/06 6:22	49	56.77	6	56.69	W	49	59.01	W	28E3
41	CEND 8/06	3/29/06 7:21	3/29/06 7:50	49	52.65	7	3.35	W	49	50.87	W	28E2
42	CEND 8/06	3/29/06 9:29	3/29/06 10:00	49	41.93	6	37.33	W	49	42.19	W	28E3
43	CEND 8/06	3/29/06 11:05	3/29/06 11:37	49	36.36	6	44.37	W	49	35.91	W	28E3
44	CEND 8/06	3/29/06 13:54	3/29/06 14:24	49	25.57	6	17.04	W	49	27.37	W	27E3
45	CEND 8/06	3/29/06 15:42	3/29/06 16:07	49	24.04	5	56.74	W	49	24.71	W	27E4
46	CEND 8/06	3/29/06 17:32	3/29/06 17:59	49	40.13	5	57.72	W	49	41.38	W	28E4
47	CEND 8/06	3/29/06 20:09	3/29/06 20:38	49	39.06	5	16.72	W	49	41.04	W	28E4
48	CEND 8/06	3/30/06 0:22	3/30/06 0:51	49	28.87	4	32.53	W	49	28.91	W	27E5
49	CEND 8/06	3/30/06 5:15	3/30/06 5:50	49	46.74	3	32.64	W	49	45.8	W	28E6
50	CEND 8/06	3/30/06 8:22	3/30/06 8:52	49	35.34	3	49.94	W	49	35.32	W	28E6
51	CEND 8/06	3/30/06 9:55	3/30/06 10:25	49	29.85	3	35.13	W	49	27.84	W	27E6
52	CEND 8/06	3/30/06 13:18	3/30/06 13:48	49	40.41	2	54	W	49	41.28	W	28E7
53	CEND 8/06	3/30/06 14:26	3/30/06 15:03	49	40.43	2	53.76	W	49	41.22	W	28E7
54	CEND 8/06	3/30/06 16:17	3/30/06 16:48	49	30.28	2	53.96	W	49	32.28	W	28E7
55	CEND 8/06	3/30/06 17:38	3/30/06 18:17	49	28	2	59.16	W	49	26.27	W	27E6
56	CEND 8/06	3/31/06 5:37	3/31/06 6:17	48	49.63	3	47.87	W	48	50.04	W	26E6
57	CEND 8/06	3/31/06 6:58	3/31/06 7:11	48	50.1	3	50.71	W	48	49.86	W	26E6
58	CEND 8/06	3/31/06 8:56	3/31/06 9:28	49	2.82	3	42.95	W	49	4.74	W	27E6
59	CEND 8/06	3/31/06 9:54	3/31/06 10:08	49	4.45	3	43.69	W	49	3.56	W	27E6
60	CEND 8/06	3/31/06 11:40	3/31/06 12:20	49	11.81	3	28.34	W	49	13.37	W	27E6
61	CEND 8/06	3/31/06 13:18	3/31/06 13:57	49	17.99	3	20.78	W	49	17.99	W	27E6
62	CEND 8/06	3/31/06 14:45	3/31/06 15:16	49	14.69	3	12.48	W	49	15.79	W	27E6
63	CEND 8/06	3/31/06 15:42	3/31/06 15:58	49	15.3	3	11.26	W	49	14.77	W	27E6
64	CEND 8/06	3/31/06 17:19	3/31/06 17:41	49	2.77	3	14.87	W	49	2.82	W	27E6
65	CEND 8/06	3/31/06 18:26	3/31/06 18:47	48	57.97	3	15.09	W	48	57.85	W	26E6
66	CEND 8/06	4/1/06 5:40	4/1/06 6:27	49	8.02	2	54.13	W	49	7.76	W	27E7
67	CEND 8/06	4/1/06 7:51	4/1/06 8:22	49	2.13	2	37.57	W	49	2.13	W	27E7
68	CEND 8/06	4/1/06 9:32	4/1/06 10:04	48	53.13	2	42.89	W	48	54.11	W	26E7
69	CEND 8/06	4/1/06 11:28	4/1/06 12:00	48	41.85	2	41.8	W	48	40.01	W	26E7
70	CEND 8/06	4/1/06 14:03	4/1/06 14:33	48	58.03	2	30.66	W	48	56.66	W	26E7
71	CEND 8/06	4/1/06 16:29	4/1/06 16:59	48	43.15	2	13.8	W	48	43.16	W	26E7
72	CEND 8/06	4/1/06 18:31	4/1/06 19:11	48	45.94	1	47.66	W	48	45.25	W	26E8
73	CEND 8/06	4/2/06 5:27	4/2/06 6:10	49	3.32	2	15.22	W	49	4.28	W	27E7
74	CEND 8/06	4/2/06 7:14	4/2/06 7:47	49	9.18	2	28.19	W	49	10.12	W	27E7
75	CEND 8/06	4/2/06 11:20	4/2/06 11:50	49	18.56	2	30.25	W	49	18.33	W	27E7
76	CEND 8/06	4/2/06 13:15	4/2/06 13:53	49	17.13	2	8.74	W	49	17.09	W	27E7
77	CEND 8/06	4/2/06 15:55	4/2/06 16:35	49	33.06	2	0.07	W	49	35.04	W	28E7
78	CEND 8/06	4/2/06 18:15	4/2/06 18:47	49	37.68	2	12.46	W	49	38.06	W	28E7
79	CEND 8/06	4/3/06 6:15	4/3/06 6:47	49	38.9	2	17.83	W	49	38.3	W	28E7
80	CEND 8/06	4/3/06 8:35	4/3/06 9:06	49	45.71	2	27.82	W	49	44.99	W	28E7

Table 2: Length frequencies for commercial species:

Species	MON	BKS	BLL		COD	CUR		DAB		HAD	HKE	JOD	LEM	MEG		MUR	PLE		PTR		SDR		SOL		TUR	UNR		WAF	WHG
Sex	U	U	F	M	U	F	M	F	M	U	U	U	U	F	M	U	F	M	F	M	F	M	F	M	F	F	M	U	U
Length																													
50																													
60									5	2																			
70		4							5	10																			
80		16							7	4			1				1												
90		35							4	3			4				2												
100		23							1	0			4				5												1
110		10							2	1			3				6												3
120	1	1							1	2			1				16					1							5
130	0	0							1	3		1	2		1		25					2							12
140	1	4					1		1	1		0	2		0		16					0							9
150	3	11					1		1	1		0	2		2	1	6					0							12
160	3	15					0	1	1	4		2	3		1	1	1		2			0	1						6
170	4	9					0		7	6		1	2		1	0	3		1			1							9
180	1	10					0		11	6		1	0	1	1	0	0		1			0	1						8
190	10	11					0		5	6		1	2	0	0	0	0		2			1	1	1					11
200	6	10					0		7	1	3	1	0	3	1	1	1	3	1		2			1	3				9
210	6	7					0	1	2	2	7	1	0	5	0	0	0	3	1					0	1				5
220	4	8					0		2	2	5	2	0	6	0	0	4	3	4					3	2				6
230	6	2					0	1	2	3	2	0	0	10	1	2	0	3	6					6	4				5
240	7	1					0	1	2	1	0	3	1	8	1	0	2	5	10					4	7				4
250	6	1					0	0	2		0	0	4	13	1	0	0	10	4					4	1				12
260	5	1					0	0	1		0	1	3	18	1	0	4	30	16					9	8				4
270	5	0				1	1	0	1		0	1	5	17	0	1	3	28	11					3	4				7
280	6	2			1	1	1	0	1		1	0	1	13	3	2	3	26	8			1		5	4				1
290	4	1				0	1	0			0	1	2	8	3	5	0	21	2			1		8	5				5
300	6	0			1	1		0			0	2	0	9	5	2	4	23	8			1	2	4	8			1	1
310	6	0				0		1			0	0	1	15	7	1	1	12	3			0	1	7	6				2
320	7	0				0		0			0	0	2	4	2	4	6	9	8			0		7	5				5

330	10	1			0		0		0	2	1	6	5	0		9	2			0		6	5					3
340	12	0	1		0		1		1	1	1	2	5	0		11	2			0		4	8					2
350	10	0	0		1	2	0			0	1	5	4	2	1	9	1			2		5	2				1	3
360	10	0	0	1	0		1		1	1	0	1	0	1		10	0			0		7	7					0
370	2	0	0	1	0	1	1		0	0	1	1	1			10	3			0		2	1					2
380	4	0	0		0		1		1	2		1	1			5				0		4	0					0
390	8	1	0		0		0		1	0		0	0			6				0		0	3					1
400	4	1	0	1	0	1	0		0	0		2	1			4		1		0	1	7	1					1
410	5	0	0	2	0	0	0		0	0		1	1			5				0		2	2	1				1
420	1	0	0	0	0	1	3		0	0			0			2				1		3	0		1			1
430	2	1	0	0	0	0	0		0	0			1			3						3	1					0
440	4		0	1	0	2	0		0	0			1			0						5						0
450	2		0	1	0		1		1	0			0			1						3						2
460	3		1	0	1		0			1			0			1						2						0
470	2		1	0	0	1	0			0			0			2						1						1
480	2			0	0	1	1			0			1			1						1	1		1			1
490	3			0	1		0			0						0												
500	6		1	2	0		0			0						0												
510	8				0		0			0						1		1			1	1						
520	1				0		1			0						1												
530	3				0		1			0						1												
540	4		1		0					0						0			1									
550	2				0	1				0						1												
560	0		1		0					1						0												
570	0				0					0						0												
580	1				0					0						0											1	
590	1				0					0						0												
600	1		1		0					1						1												
610	0				0																						1	
620	1				1															1								
630	0				0																							
640	1				0																1							

650	0				0	1																					1			
660	0				0		1																			1				
670	0				0																									
680	0				0																									
690	0				0																									
700	1				0																									
710	1				0																						1			
720	0				0																									
730	2				0																									
740	0				0																									
750	0				0																									
760	0				0													1												
770	0				1																									
780	1																													
1070	1																													
Total	216	186	7	11	8	16	17	72	58	23	27	49	149	52	23	110	260	96	3	3	12	9	118	89	2	2	2	4	160	

Table 4: Number of Otoliths and Maturity samples by Species

	Sex		Grand Total
Species	F	M	
MON	111	103	214
BLL	7	11	18
BLR	10	7	17
COD	3	5	8
CUR	16	17	33
ESB	1	3	4
HAD	12	9	21
HKE	11	16	27
LEM	71	70	141
MEG	52	23	75
MUR	37	24	61
PLE	171	93	264
PTR	3	3	6
SDR	12	9	21
SHR	1	1	2
SKT	1	1	2
SOL	119	79	198
THR	6	6	12
TUR	2		2
UNR	2	2	4
WAF	2	2	4
WHG	75	48	123
Grand Total	725	532	1257

Table 5 Position, length and weight of released fish:

Tag number	Date	Releae latitude	Releae latitude minute	Release long degree	Release long minute	EW	Species code	Sex	Length (cm)	Weight (kg)	State 1=lively 2=sluggu ish
699701	22-Mar-06	50	35.21	2	56.98	W	SOL	U	25	0.139	1
699702	22-Mar-06	50	35.21	2	56.98	W	SOL	U	26	0.18	1
699703	22-Mar-06	50	35.21	2	56.98	W	SOL	U	26	0.156	1
699704	22-Mar-06	50	35.21	2	56.98	W	SOL	U	24	0.132	1
699705	22-Mar-06	50	35.21	2	56.98	W	SOL	U	27	0.179	1
699706	22-Mar-06	50	35.21	2	56.98	W	SOL	U	24	0.126	1
699707	22-Mar-06	50	35.21	2	56.98	W	SOL	U	22	0.1	1
699708	22-Mar-06	50	37.15	2	52.47	W	SOL	U	26	0.159	1
699709	22-Mar-06	50	37.15	2	52.47	W	SOL	F	36	0.563	1
699710	22-Mar-06	50	37.15	2	52.47	W	SOL	U	25	0.134	1
699711	22-Mar-06	50	37.15	2	52.47	W	SOL	U	22	0.096	1
699712	22-Mar-06	50	38.70	2	45.80	W	SOL	F	44	0.985	1
699713	22-Mar-06	50	36.72	2	43.44	W	SOL	U	28	0.243	1
699714	22-Mar-06	50	36.72	2	43.44	W	SOL	U	24	0.139	1
699715	22-Mar-06	50	36.72	2	43.44	W	SOL	F	32	0.356	1
699716	22-Mar-06	50	36.72	2	43.44	W	SOL	U	23	0.099	1
699717	22-Mar-06	50	36.72	2	43.44	W	SOL	U	19	0.074	1
699718	22-Mar-06	50	36.72	2	43.44	W	SOL	U	26	0.175	1
699719	22-Mar-06	50	36.72	2	43.44	W	SOL	F	30	0.335	1
699720	22-Mar-06	50	36.72	2	43.44	W	SOL	U	35	0.46	1
699721	22-Mar-06	50	36.72	2	43.44	W	SOL	U	24	0.13	1
699722	22-Mar-06	50	36.72	2	43.44	W	SOL	U	20	0.072	1
699723	22-Mar-06	50	36.72	2	43.44	W	SOL	U	23	0.102	1
699724	22-Mar-06	50	36.72	2	43.44	W	SOL	U	25	0.17	1
699725	22-Mar-06	50	36.72	2	43.44	W	SOL	U	29	0.257	1
699726	23-Mar-06	50	37.52	2	43.32	W	SOL	U	22	0.088	1
699727	23-Mar-06	50	37.52	2	43.32	W	SOL	U	23	0.098	1
699728	23-Mar-06	50	37.52	2	43.32	W	SOL	U	26	0.181	1
699729	23-Mar-06	50	37.52	2	43.32	W	SOL	U	36	0.492	1
699730	23-Mar-06	50	37.52	2	43.32	W	SOL	U	21	0.079	1
699731	23-Mar-06	50	37.52	2	43.32	W	SOL	U	29	0.269	1
699732	23-Mar-06	50	37.52	2	43.32	W	SOL	F	34	0.437	1
699733	23-Mar-06	50	37.52	2	43.32	W	SOL	U	24	0.126	1
699734	23-Mar-06	50	37.52	2	43.32	W	SOL	U	24	0.116	1
699735	23-Mar-06	50	37.52	2	43.32	W	SOL	F	36	0.53	1
699736	23-Mar-06	50	37.52	2	43.32	W	SOL	U	26	0.166	1
699737	24-Mar-06	50	11.10	4	5.22	w	SOL	U	24	0.116	1
699738	24-Mar-06	50	12.48	4	12.15	W	SOL	U	37	0.533	1
699739	25-Mar-06	50	5.40	4	6.12	W	SOL	U	24	0.112	1
699740	25-Mar-06	50	5.48	4	0.47	W	SOL	U	32	0.317	1
699741	25-Mar-06	50	5.48	4	0.47	W	SOL	U	34	0.350	1
699742	25-Mar-06	50	5.48	4	0.47	W	SOL	U	33	0.340	1
699743	25-Mar-06	50	5.48	4	0.47	W	SOL	U	38	0.533	1
699744	25-Mar-06	50	5.48	4	0.47	W	SOL	U	28	0.205	1
699745	28-Mar-06	49	46.40	6	25.30	W	SOL	U	37	0.542	1
699746	28-Mar-06	49	47.30	6	29.43	W	SOL	U	27	0.198	1
699747	28-Mar-06	49	46.40	6	25.30	W	SOL	U	41	0.845	1
699748	28-Mar-06	49	46.40	6	25.30	W	SOL	U	30	0.271	1
699749	29-Mar-06	49	48.33	6	40.13	W	SOL	U	29	0.235	1

699750	30-Mar-06	49	15.50	3	17.50	W	SOL	U	42	0.790	1
699751	30-Mar-06	49	15.50	3	17.50	W	SOL	U	38	0.599	1
699752	30-Mar-06	49	15.50	3	17.50	W	SOL	U	45	1.017	1
699753	30-Mar-06	49	15.50	3	17.50	W	SOL	U	37	0.540	1
699754	30-Mar-06	49	15.50	3	17.50	W	SOL	U	34	0.315	1
699755	30-Mar-06	49	15.50	3	17.50	W	SOL	U	34	0.372	1
699756	30-Mar-06	49	15.50	3	17.50	W	SOL	U	44	0.752	1
699757	30-Mar-06	49	14.39	3	19.69	W	SOL	U	37	0.552	1
699758	30-Mar-06	49	14.39	3	19.69	W	SOL	U	34	0.368	1
699759	30-Mar-06	49	14.39	3	19.69	W	SOL	U	39	0.546	1
699760	30-Mar-06	49	14.39	3	19.69	W	SOL	U	42	0.762	1
699761	30-Mar-06	49	14.39	3	19.69	W	SOL	U	44	0.870	1
699762	30-Mar-06	49	14.39	3	19.69	W	SOL	U	32	0.276	1
699763	30-Mar-06	49	14.39	3	19.69	W	SOL	U	28	0.169	1
699764	30-Mar-06	49	14.39	3	19.69	W	SOL	U	36	0.504	1
699765	31-Mar-06	49	15.13	3	18.33	W	SOL	U	49	1.111	1
699766	31-Mar-06	49	15.13	3	18.33	W	SOL	U	29	0.265	1
699767	31-Mar-06	49	15.13	3	18.33	W	SOL	U	31	0.269	1
699769	31-Mar-06	49	9.69	2	56.27	W	SOL	F	43	0.915	1
699770	31-Mar-06	40	10.01	3	8.01	W	SOL	U	28	0.183	1
699771	31-Mar-06	49	10.16	3	7.95	W	SOL	U	51	1.145	1
699772	31-Mar-06	49	10.16	3	7.95	W	SOL	U	43	0.813	1
699773	31-Mar-06	49	10.16	3	7.95	W	SOL	U	50	1.564	1
699774	31-Mar-06	49	10.16	3	7.95	W	SOL	U	26	0.136	1
699775	31-Mar-06	49	10.16	3	7.95	W	SOL	U	37	0.485	1
699776	31-Mar-06	49	9.69	2	56.27	W	SOL	U	32	0.238	2
699777	31-Mar-06	49	9.69	2	56.27	W	SOL	U	22	0.099	1
699778	31-Mar-06	49	9.69	2	56.27	W	SOL	U	36	0.562	1
699779	31-Mar-06	49	9.69	2	56.27	W	SOL	U	44	0.947	1
699786	01-Apr-06	48	45.24	1	51.39	W	SOL	U	23	0.113	1
699787	01-Apr-06	48	45.24	1	51.39	W	SOL	F	41	0.840	1
699788	01-Apr-06	48	45.24	1	51.39	W	SOL	U	24	0.106	1
699789	01-Apr-06	48	45.24	1	51.39	W	SOL	U	22	0.083	1
699790	01-Apr-06	48	45.24	1	51.39	W	SOL	U	32	0.311	1
699791	01-Apr-06	48	45.24	1	51.39	W	SOL	U	33	0.353	1
699792	01-Apr-06	48	45.24	1	51.39	W	SOL	F	40	0.723	1
699793	01-Apr-06	48	45.24	1	51.39	W	SOL	U	30	0.246	1
699794	01-Apr-06	48	45.24	1	51.39	W	SOL	U	38	0.536	1
699795	01-Apr-06	48	45.24	1	51.39	W	SOL	U	49	1.293	1
699796	01-Apr-06	48	45.24	1	51.39	W	SOL	U	40	0.670	1
699797	01-Apr-06	48	45.24	1	51.39	W	SOL	U	26	0.153	1
699798	01-Apr-06	48	45.24	1	51.39	W	SOL	U	41	0.665	1
699799	01-Apr-06	48	45.24	1	51.39	W	SOL	U	37	0.517	1
699800	01-Apr-06	48	45.24	1	51.39	W	SOL	U	34	0.367	1
699801	01-Apr-06	48	45.24	1	51.39	W	SOL	U	34	0.367	1
699802	01-Apr-06	48	46.18	1	47.60	W	SOL	U	33	0.389	1
699803	01-Apr-06	48	46.18	1	47.60	W	SOL	U	26	0.134	1
699804	01-Apr-06	48	46.08	1	47.08	W	SOL	U	38	0.626	1
699805	01-Apr-06	48	46.18	1	47.60	W	SOL	U	32	0.276	1
699807	01-Apr-06	48	46.18	1	47.60	W	SOL	U	31	0.280	1
699808	01-Apr-06	48	46.18	1	47.60	W	SOL	U	32	0.285	1
699809	01-Apr-06	48	46.18	1	47.60	W	SOL	U	37	0.563	1
699810	01-Apr-06	48	46.18	1	47.60	W	SOL	U	32	0.347	1
699811	01-Apr-06	48	46.08	1	47.08	W	SOL	U	37	0.463	1
699812	01-Apr-06	48	46.18	1	47.60	W	SOL	U	40	0.669	1
699813	01-Apr-06	48	46.18	1	47.60	W	SOL	U	40	0.646	1

699814	01-Apr-06	48	45.97	1	47.93	W	SOL	U	40	0.698	1
699815	01-Apr-06	48	46.18	1	47.60	W	SOL	U	30	0.221	1
699816	01-Apr-06	48	46.18	1	47.60	W	SOL	U	29	0.188	1
699817	01-Apr-06	48	46.18	1	47.60	W	SOL	U	36	0.456	1
699818	01-Apr-06	48	46.18	1	47.60	W	SOL	U	24	0.113	1
699819	01-Apr-06	48	46.18	1	47.60	W	SOL	U	34	0.351	1
699820	02-Apr-06	48	45.97	1	47.93	W	SOL	U	39	0.600	1
699821	02-Apr-06	48	45.97	1	47.93	W	SOL	U	36	0.492	1
699822	02-Apr-06	48	45.97	1	47.93	W	SOL	U	35	0.419	1
699823	02-Apr-06	48	45.97	1	47.93	W	SOL	U	38	0.615	1
699824	02-Apr-06	48	45.97	1	47.93	W	SOL	F	37	0.647	1
699825	02-Apr-06	48	45.97	1	47.93	W	SOL	U	31	0.281	1
699826	02-Apr-06	48	45.97	1	47.93	W	SOL	U	37	0.626	1
699827	02-Apr-06	48	45.97	1	47.93	W	SOL	U	38	0.581	1
699828	02-Apr-06	48	45.97	1	47.93	W	SOL	U	40	0.709	1
699829	02-Apr-06	48	45.97	1	47.93	W	SOL	U	32	0.313	1
699830	02-Apr-06	48	45.97	1	47.93	W	SOL	U	40	0.809	1
699831	02-Apr-06	48	45.97	1	47.93	W	SOL	U	24	0.124	1
699832	02-Apr-06	48	45.97	1	47.93	W	SOL	U	39	0.625	1
699833	02-Apr-06	48	45.97	1	47.93	W	SOL	U	45	1.041	1
699834	02-Apr-06	48	45.97	1	47.93	W	SOL	U	34	0.366	1
699835	02-Apr-06	48	45.97	1	47.93	W	SOL	U	41	0.828	1
699836	02-Apr-06	48	45.97	1	47.93	W	SOL	U	33	0.301	1
699837	02-Apr-06	48	45.97	1	47.93	W	SOL	F	43	0.946	1
699838	02-Apr-06	48	46.08	1	47.08	W	SOL	U	33	0.414	1
699839	02-Apr-06	48	46.08	1	47.08	W	SOL	U	34	0.402	1
699840	02-Apr-06	48	46.08	1	47.08	W	SOL	U	32	0.320	1
699841	02-Apr-06	48	46.08	1	47.08	W	SOL	U	32	0.354	1
699842	02-Apr-06	48	46.08	1	47.08	W	SOL	U	33	0.356	1
699843	02-Apr-06	48	46.08	1	47.08	W	SOL	F	44	0.939	1
699844	02-Apr-06	48	46.08	1	47.08	W	SOL	U	39	0.656	1
699845	02-Apr-06	48	46.08	1	47.08	W	SOL	U	36	0.461	1
699846	02-Apr-06	48	46.08	1	47.08	W	SOL	U	36	0.525	1
699847	02-Apr-06	48	46.08	1	47.08	W	SOL	U	43	0.810	1
699848	02-Apr-06	48	46.08	1	47.08	W	SOL	U	28	0.201	1
699849	02-Apr-06	48	46.08	1	47.08	W	SOL	U	36	0.516	1
699850	02-Apr-06	48	46.08	1	47.08	W	SOL	U	45	0.971	1
699851	02-Apr-06	48	46.08	1	47.08	W	SOL	U	28	0.211	1
699852	02-Apr-06	48	46.08	1	47.08	W	SOL	U	34	0.355	1
699853	02-Apr-06	48	46.08	1	47.08	W	SOL	U	35	0.393	1
699854	02-Apr-06	48	46.08	1	47.08	W	SOL	U	32	0.299	1
699855	02-Apr-06	48	46.08	1	47.08	W	SOL	U	36	0.533	1
699856	02-Apr-06	48	47.62	1	57.79	W	SOL	U	30	0.275	1
699857	02-Apr-06	48	47.62	1	57.79	W	SOL	U	40	0.711	1
699858	02-Apr-06	48	47.62	1	57.79	W	SOL	U	33	0.302	1
699859	02-Apr-06	48	47.62	1	57.79	W	SOL	U	26	0.164	1
699860	02-Apr-06	48	47.62	1	57.79	W	SOL	U	37	0.528	1
699861	02-Apr-06	48	47.62	1	57.79	W	SOL	U	38	0.624	1
699862	02-Apr-06	48	47.62	1	57.79	W	SOL	U	25	0.126	1
699863	02-Apr-06	48	47.62	1	57.79	W	SOL	U	45	1.018	1
699864	02-Apr-06	48	47.62	1	57.79	W	SOL	U	36	0.437	1
699865	02-Apr-06	48	47.62	1	57.79	W	SOL	U	33	0.327	1
699866	02-Apr-06	48	47.62	1	57.79	W	SOL	U	41	0.817	1
699867	02-Apr-06	48	47.62	1	57.79	W	SOL	U	40	0.657	1
699868	02-Apr-06	48	47.62	1	57.79	W	SOL	U	42	0.778	1
699869	02-Apr-06	48	47.62	1	57.79	W	SOL	U	41	0.624	1

699870	02-Apr-06	48	47.62	1	57.79	W	SOL	U	32	0.306	1
699871	02-Apr-06	48	47.62	1	57.79	W	SOL	U	41	0.812	1
699872	02-Apr-06	48	47.62	1	57.79	W	SOL	F	37	0.593	1
699873	02-Apr-06	48	47.62	1	57.79	W	SOL	F	35	0.483	1
699874	02-Apr-06	48	47.62	1	57.79	W	SOL	F	45	1.073	1
699875	02-Apr-06	48	47.62	1	57.79	W	SOL	U	28	0.196	1
699876	02-Apr-06	48	47.62	1	57.79	W	SOL	U	29	0.233	1
699877	02-Apr-06	48	47.62	1	57.79	W	SOL	U	34	0.428	1
699878	02-Apr-06	48	47.62	1	57.79	W	SOL	U	41	0.697	1
699879	02-Apr-06	48	47.62	1	57.79	W	SOL	F	44	1.123	1
699880	02-Apr-06	48	47.62	1	57.79	W	SOL	U	38	0.640	1
699881	02-Apr-06	48	47.62	1	57.79	W	SOL	U	34	0.367	1

Figure 1 Sole length frequency

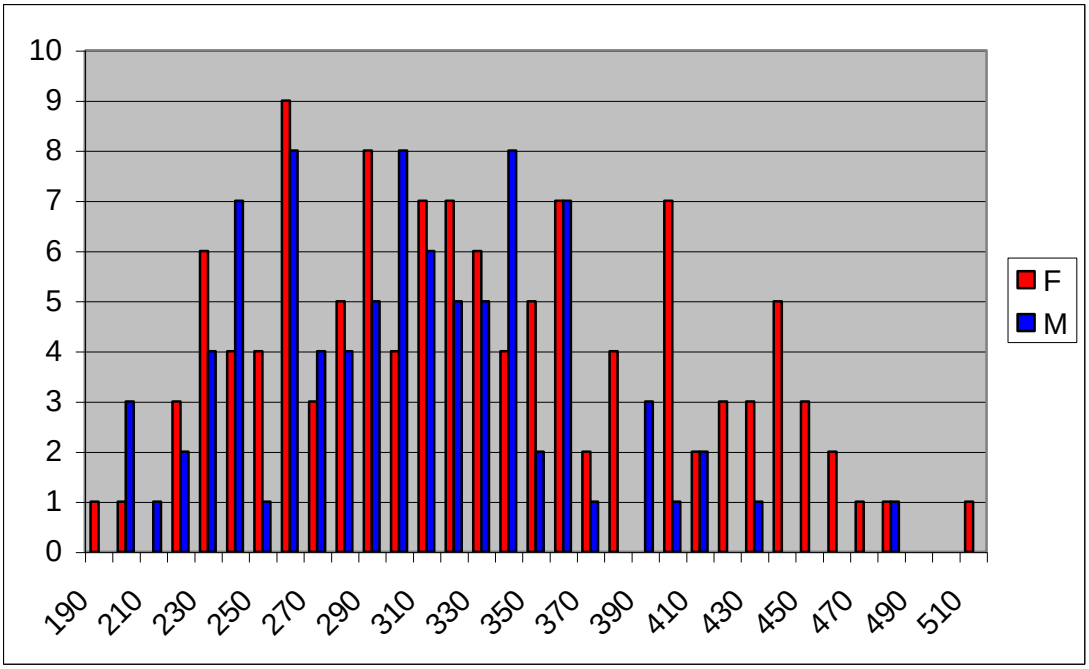

Figure 2 Plaice length frequency

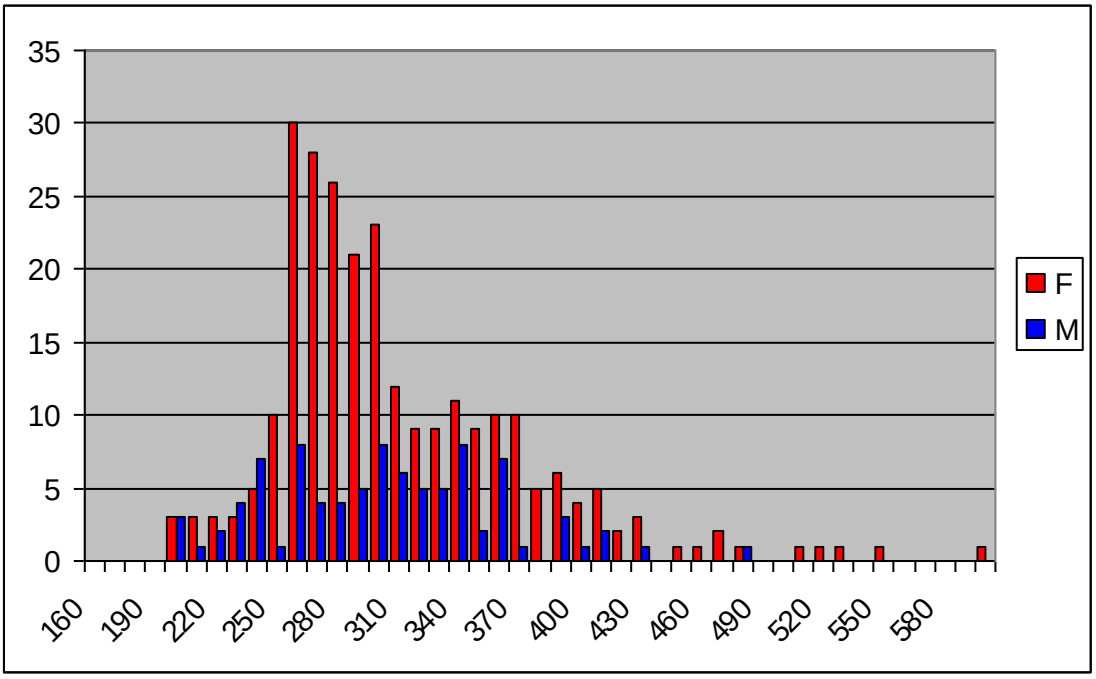

Figure 3 Monk length frequency

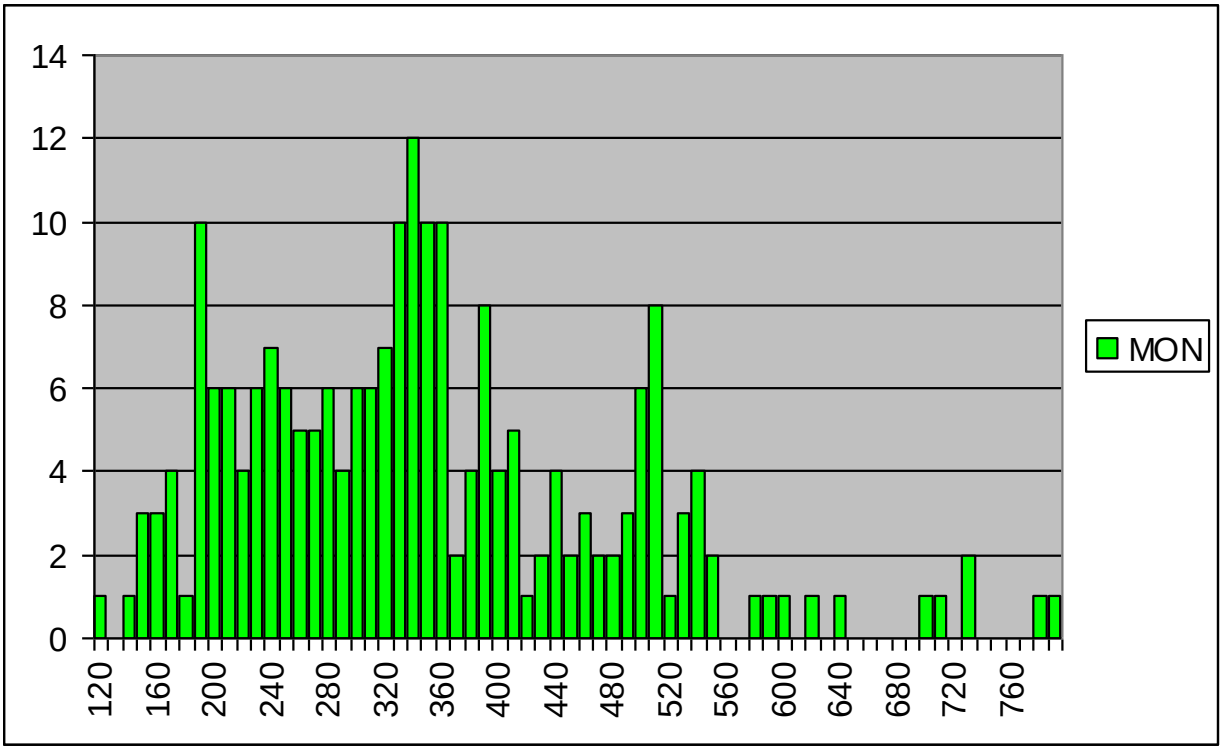

Figure 4 Length frequency of tagged sole