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SURVEYING FISH POPULATIONS IN THE SOLENT AND ADJACENT HARBOURS USING THE CEFAS BASS TRAWL

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1. INTRODUCTION

Since 1981, CEFAS has carried out trawl surveys each year in the Solent, Southampton Water, Langstone and Chichester Harbours - areas that include the most important bass (*Dicentrarchus labrax* L.) nursery areas on the south coast of England (Pickett and Pawson, 1994) (Figure 1). Until 1983 surveys were primarily undertaken to catch bass for tagging, and fishing was therefore concentrated in areas where catch rates were highest. The main aim of the surveys since 1984 has been to determine the distribution and relative abundance of pre-recruit bass and a representative selection of habitats where these fish are present in the Solent has been covered since then.

The surveys were initially carried out once or twice a year in May, June, July or September but, since 1990, have been fixed in May (to take account of over-winter survival), and September (to include summer growth and distribution). With the exception of one survey (September 1996), the same commercial fishing vessel (*MFV ANGELLE MARIE*) has been used since 1983. Since then, the surveys have used trawl nets of a similar design. Although aimed at bass, the survey catches a wide range of demersal and pelagic finfish species, including uncommon varieties such as trigger fish, (*Ballistes carolinensis)*, gilthead sea-bream, (*Sparus auratus)* and shads, (*Alosa* sp.) along with molluscs, crustaceans and echinoderms. All biota caught are recorded and, for some species, as for bass, the data set constitutes a time series of their local distribution, relative abundance and population size structure. The survey, therefore, has the potential as a faunal community index. (A similar, but general, fish survey was started in the Thames Estuary in 1996 in partnership with the Environment Agency, and this has been extended to adjoining estuaries; Pickett *et al*, in prep.). This report describes the gear, fishing operation and the methods used for sampling and recording the catch in the Solent bass survey. Examples are given of survey results, plus a complete list of all finfish species encountered in the survey series and, for bass, the calculated year-class recruit indices.

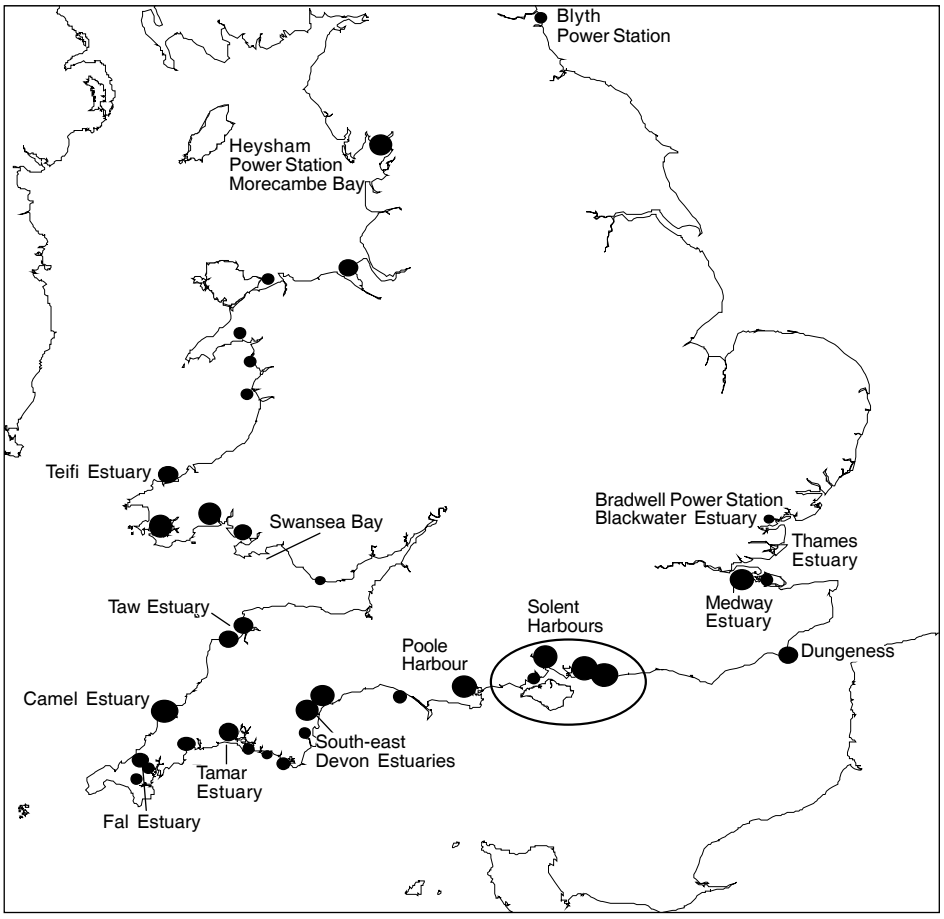


Figure 1. Location of bass nursery areas in England and Wales, showing those in the Solent area where the trawl surveys were conducted (ringed)

2. METHODS

The survey method was developed by CEFAS in consultation with charter vessel skippers, who also advised on the initial design of the survey trawls, each of which has been specially made for these surveys. In setting up and carrying out such surveys, the detailed knowledge and advice of local skippers is essential to minimise risks, such as tide patterns, trawl 'hangers', shoal areas and location of static fishing gears such as fleets of nets or pots.

2.1 Survey Gear

The survey vessel has a registered length of 10.42 m, a GRT of 10 tonnes, engine power of 158 kw, and is equipped as a stern trawler. The trawl is fished from the stern gantry on two sets of twin, 10-fathom (18.28 m) bridles of 6 mm diameter wire (top) and 8 mm (bottom). The ends of the footrope and groundline of the trawl are connected to the bottom bridles by means of triangular fish plates and each end of the headline is attached to the top bridles by swivelled shackles. The two 1.0 m steel trawl doors are attached to the bridles by short back strops and G-links, that are detached on hauling inboard to allow the main towing warp to be wound onto twin winch drums. The length of towing warp is set to approximately 3x the depth being fished and an attempt is made to keep towing speed close to 3 knots over the ground. The length and duration of tows at each station are dictated by local topographic and hydrographic conditions, with a range of 5 - 20 minutes (mode 10 minutes), but they are similar at each station between surveys.

The survey trawl is based on a local pattern of high headline bass trawl with a rubber bobbin foot-rope (Figure 2). Mesh size is 70 mm diagonal stretched throughout and the cod-end is fitted with a 4 mm mesh, knot-less, 'Frymer' liner (Figure 3). Panels of heavier duty mesh ('chafers') offer some protection to the cod-end and are fitted as standard. The pattern for this trawl,

Figure 2. Two high-headline bass survey trawls, made to the same specification, but constructed with different coloured yarns

Figure 3. High-headline bass trawl, showing headline with floats and rubber bobbins on the footrope

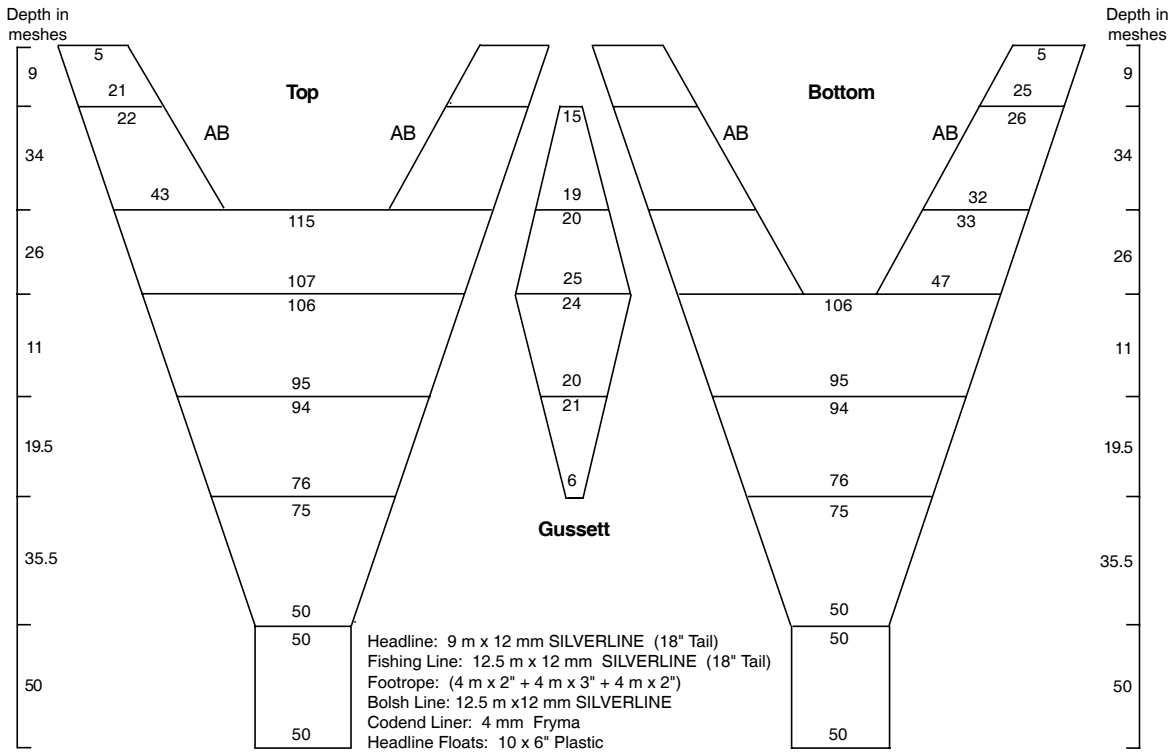


Figure 4. High-headline bass trawl (plan by Barrie Horton, CEFAS)

which has a 9 m headline and 12 m foot-rope, is shown in Figure 4. A spare trawl and cod-end liners are taken on all surveys, in case of severe net damage, which occasionally occurs, even on previously clean tows. When a trawl net needed replacement, such as in 1993, any differences in sampling performance and efficiency have been estimated and later results corrected to the original standard.

2.2 Survey operational details

Similar sets of tides are chosen for each survey - falling spring tides of 4.8-5.2 m at HW, Portsmouth, with LW between 0600 and 0930 BST, fishing the last of the ebb and through the flood tide. Tows are made in a straight line, with the tide. Four or five days are required to complete the present grid of around 35 core stations

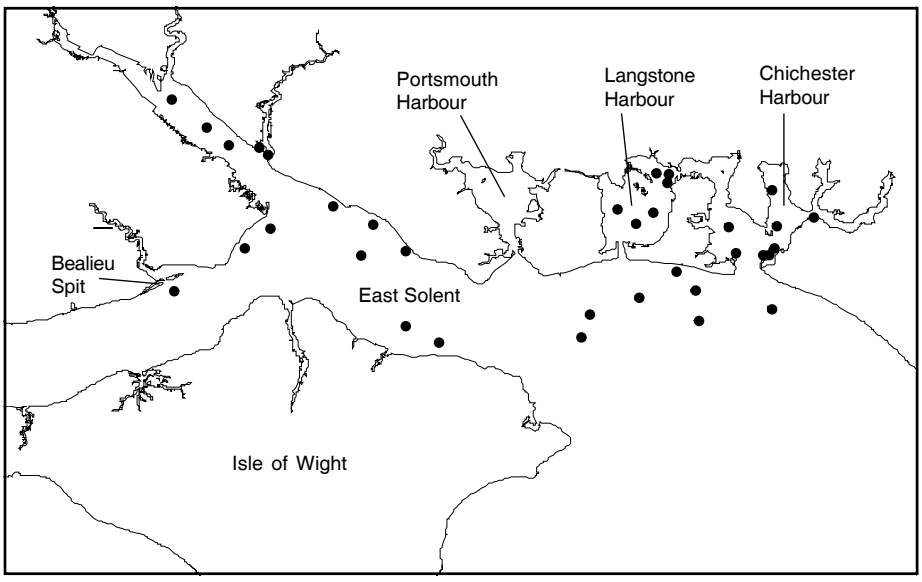
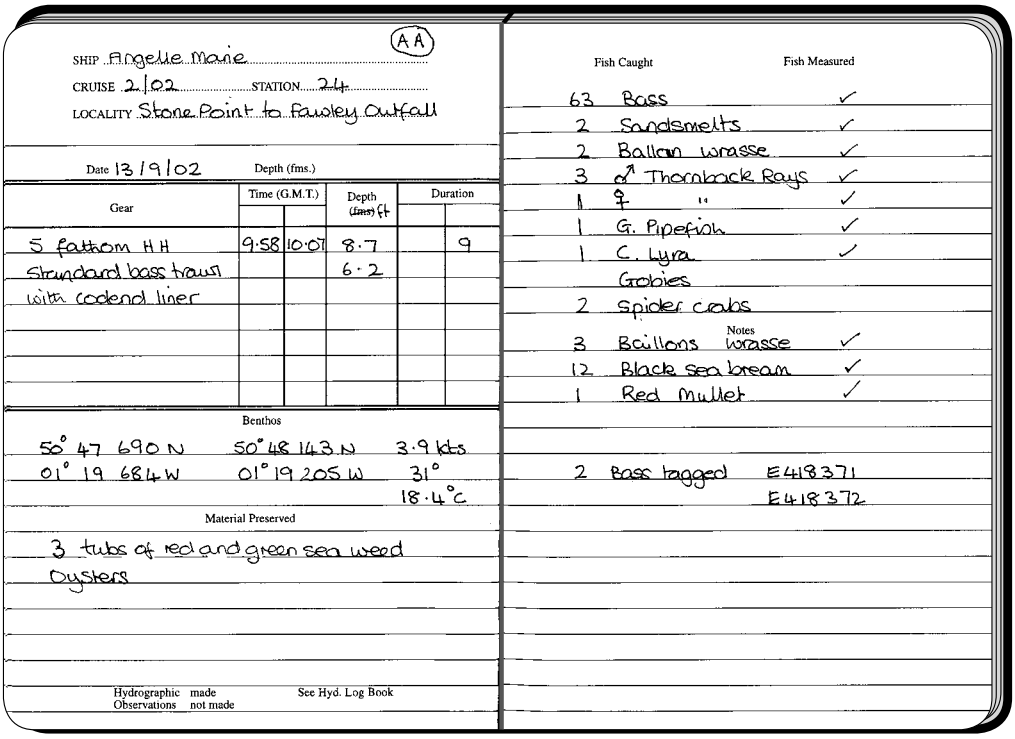


Figure 5. Solent bass - current core station positions

(Figure 5), plus a number of tows that are repeated at different states of the tide, giving a total of 40-45 tows in each survey. The pattern of survey tows has been modified over the years to account for changing topography - some stations have become unworkable owing to dredging activity or erosion and around 48 different stations have been sampled since 1984. The depth of water at core station positions, as measured below the keel of the vessel (which draws 1.29 m) at the time of fishing has ranged from 1.05 m on the Beaulieu Spit, to 15 m in the dredged channel in Southampton Water.

For each survey, a station log is completed, recording shooting and hauling times, position (longitude and latitude) and depth, weather conditions and numbers of each species caught* (Figure 6). Small clupeids (generally recorded as 'whitebait'), Gobiidae (gobies) and bivalve molluscs are not counted, but for benthic material, including shell, larger marine algae (seaweed) and hydroids, a rough estimate of quantity or volume is made.

On hauling, at the end of each tow, once the net is on the surface, the vessel is kept 'under way' until the foot-rope and headline are aboard, an important consideration that ensures that strong swimming species, such as bass, are prevented from swimming back up the trawl and escaping. The cod-end (liner) is opened directly onto the deck and fish are sorted into groups by species, with bass and other live roundfish being placed in tubs of running seawater, supplied by a deck hose. For ease of handling, flatfish and non-commercial species are placed in plastic bins without seawater. Commercial finfish species are all measured and total lengths to the nearest cm below are recorded in fish-measuring logbooks. Bass are removed with a hand-net for measuring and removal of scale samples for age determination - this operation normally takes place between hauls. For most sizes of bass encountered in these surveys, a sub-sample of scales from 5 fish per 1 cm group per sampling area (i.e. Southampton Water, inside harbours and outside harbours, west and east) is sufficient to produce age-length keys that are used to allocate ages to the whole length distributions. After sampling, all fish and benthos are returned to the sea except on occasions when samples of various fish species are retained for other programmes, such as contaminant monitoring.



SHIP Angelie Marie (AA)
CRUISE 2/02 STATION 24
LOCALITY Stone Point to Fawley Outfall
Date 13/9/02 Depth (fms.)

Gear	Time (G.M.T.)		Depth (fms) ft	Duration	
5 fathom HH	9:58	10:07	8.7		9
Standard bass trawl			6.2		
with codend liner					

Benthos

50° 47 690 N 50° 48 143 N 3.9 kts
01° 19 684 W 01° 19 205 W 31°
18.4°C

Material Preserved

3 tubs of red and green sea weed
Oysters

Hydrographic Observations made / not made — See Hyd. Log Book

Fish Caught		Fish Measured
63	Bass	✓
2	Sandsmelts	✓
2	Ballan wrasse	✓
3	♂ Thornback Rays	✓
1	♀ "	✓
1	G. Pipefish	✓
1	C. Lyra	✓
	Gobies	
2	Spider crabs	
3	Bcullons	✓
12	Black sea bream	✓
1	Red Mullet	✓

Notes: wrasse

2 Bass tagged E418371
E418372

Figure 6. Example of a survey station log entry

* *Identification of species according to Wheeler (1969)*

2.3 Data handling

Data from each station log and measuring book are entered, by survey and for all identified organisms, onto the CEFAS Fish Survey System database.

Bass survey abundance indices are calculated on the basis of density per age-group at each core station, standardised to a 10-minute tow. These data are summed to provide mean abundance indices for spring/ summer and autumn surveys separately, by individual age-groups 0-5, using the following method, adapted from Pawson (1992).

The relative mean abundance ($\bar{x}_{a,s}$) of *y* bass year-classes caught at age *a* in each survey *s* (May or September) is calculated using:

$$\bar{x}_{a,s} = \frac{1}{n_{s,y}} \sum_{n_{s,y}} x_{a,s,y}$$

where $x_{a,s,y}$ is the survey mean catch/10 min of year-class *y* at age *a*, and $n_{s,y}$ is the number of years of the survey in which bass year-classes from 1977 onwards were sampled at age *a*.

The year-class relative abundance index or recruit index ($\bar{x}_y$), based on all surveys on each year-class, is calculated using the expression:

$$\bar{x}_y = \frac{1}{n_{a,s}} \sum_{n_{a,s}} \frac{x_{a,s,y}}{\bar{x}_{a,s}}$$

here $n_{a,s}$ is the number of surveys and ages across which bass of year-class *y* have been sampled.

The processing of the bass survey data is now carried out by use of a suite of macros in Microsoft® EXCEL (Brown and Dunn, in prep.). Although calculated for bass only at present, survey abundance indices could be produced for any other species' populations that are considered sufficiently well represented in such surveys. On completion of each survey, a cruise report is produced and sent to interested parties, including local Defra and Sea Fisheries Committee offices. These reports provide a narrative of the survey and a record of the total numbers and percentage of bass by age-class and overall catch rates of bass in the separate areas. The numbers of the other most abundant species are also given, along with details of any rare species. An example of a completed cruise report can be found in Appendix 1.

3. RESULTS AND DISCUSSION

3.1 Surveys completed to date

A list of bass surveys in the Solent area since 1983, made using the standard bass trawl, is given in Table 1.

Table 1. List of surveys in the Solent bass cruise series

Cruise Number	Start Date	End Date
1/1983	06 September	09 September
1/1984	02 May	09 May
2/1984	24 September	27 September
2/1985	02 July	06 July
1/1986	22 September	25 September
1/1987	10 May	16 May
2/1987	07 September	10 September
1/1988	16 May	20 May
1/1989	17 September	22 September
1/1990	25 May	28 May
2/1990	18 September	23 September
1/1991	14 May	18 May
2/1991	09 September	12 September
1/1992	13 May	17 May
2/1992	26 September	03 October
1/1993	23 May	27 May
2/1993	18 September	22 September
2/1994	26 May	30 May
3/1994	19 September	22 September
1/1995	15 May	19 May
2/1995	11 September	14 September
1/1996	06 May	10 May
2/1996	16 September	19 September
1/1997	08 May	12 May
2/1997	01 September	04 September
1/1998	14 May	18 May
2/1998	07 September	12 September
1/1999	17 May	20 May
2/1999	26 September	30 September
1/2000	05 May	09 May
2/2000	30 August	03 September
1/2001	09 May	13 May
2/2001	05 September	09 September
1/2002	15 May	19 May

3.2 Bass abundance

During the course of the surveys, it has become apparent that catches of any year-class of bass are less consistent at ages 0 and 1 than at ages 2-4. Although this is partly attributable to trawl selectivity, environmental factors are also involved. There may be considerable variation in water temperature, particularly in the harbours, from year to year. Bass at ages 0 (caught only in September survey) and 1 move into the shallow creeks and margins (e.g. in < 0.5 m of water), when temperatures there are around the summer peak (20-25°C) (Kelley, 2002)

- areas too shallow to be sampled by the trawl survey. Similarly, 5-year-olds were at times poorly represented, probably owing to emigration from the survey area (Pickett *et al.* 1995). The recruit index has therefore been based on the survey abundance indices (mean numbers per 10 minute tow) of 2-4-year-olds only. The pattern, since 1989, of two surveys per year, was established to produce more robust abundance estimates, sampling each cohort six times (Table 2) at ages 2-4. Within each age-class of bass, the variation in mean abundance between surveys is a function of such factors as size selectivity, mortality and seasonal distribution, which are assumed common for each year-class. The final recruit indices of bass derived from the surveys are also shown in Table 2, which indicates particularly abundant year-classes in 1983, 1989 and 1997 as well as very poor ones from 1984 to 1986.

3.3 Other species

The full range of finfish species encountered in these surveys between 1983 and 1997 is listed in Table 3. The frequency of occurrence of each species by station is compared with the CEFAS Young Fish Survey (YFS) data obtained by push net and 2 m beam trawl (Rogers *et al.* 1998), from within a similar geographical area and over a similar sampling period (1981-1997). In all, 86 species have been recorded in the Solent bass surveys and 54 species in this sector of the YFS. An example of the typical species composition, by number and percentage, using data from the September 2001 bass survey, is shown in Table 4.

The 2-4 year-old bass recruit index, derived from the CEFAS Solent trawl survey time series, is probably the most useful indicator of potential recruitment to the UK bass fishery currently available. Time series of 0-group indices, derived from seine-net surveys or sampling bass impinged on coastal power station cold water intake screens, (Kelley, 1988, 2002; Riley *et al.* 1986) reflect spawning success (ICES, 2002), but they do not account for varying levels of over-winter survival. Furthermore, the potential geographical coverage of a survey grid has distinct advantages compared with fixed-point sampling at power station intakes that has been used in the past by various agencies to obtain indices of fish abundance.

Owing to the wide range of other species caught, which includes adult as well as juvenile phases, and the relatively high volume of samples, the CEFAS bass trawl is a useful method for general estuarine and inshore fish population monitoring. In particular, the bass trawl appears more versatile than the small beam trawls and push nets that have been used by CEFAS and other agencies for this sort of work, although the latter gears were designed to sample mainly juvenile flatfish (Rogers *et al*., 1998). The relative efficiency of the bass trawl, compared with these gears, in terms of catch per area/volume sampled over similar tows, has not yet been tested by CEFAS, although some comparative tows have been undertaken by the Environment Agency (Coates, *pers. comm.*).

Table 2. Age-class relative abundance indices by survey, derived from mean numbers per 10 minute tow, and the year-class (recruit) indices for the Solent bass survey (SBS)

Age	Survey	Year class											
		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
2	May-July				0.23		0.44	11.18					1.30
	September				0.40	1.21	0.17		0.03	0.01		0.82	0.35
3	May-July		0.06	0.42		0.51	1.99		0.08	0.00		0.48	0.12
	September			2.31	0.21	0.15		0.98	0.06		0.1	0.26	0.05
4	May-July	0.09	0.06		0.16	0.93		1.15	0.17			0.03	0.13
	September		0.46	2.27	0.11		1.58	2.74			0.0	0.04	0.19
Recruit Index		**0.09**	**0.19**	**1.67**	**0.22**	**0.70**	**1.04**	**4.01**	**0.09**	**0.00**	**0.05**	**0.33**	**0.36**

Age	Survey	Year class										
		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
2	May-Jul	2.66	0.05	0.02	0.02	0.02	0.66	0.12	0.00	0.28	0.23	0.79
	Sept	0.38	0.12	0.82	0.41	0.59	0.68	4.13	0.15	2.38	1.11	4.23
3	May-Jul	1.35	1.41	0.31	0.30	0.79	0.37	1.30	0.18	7.12	1.22	
	Sept	4.26	0.82	0.42	1.07	0.10	1.03	1.26	0.15	3.88	0.90	
4	May-Jul	5.08	0.41	0.35	1.22	0.04	2.10	4.46	0.38	1.24		
	Sept	5.29	0.35	0.87	0.13	0.07	0.74	1.05	0.19	1.90		
Recruit Index		**3.17**	**0.53**	**0.47**	**0.53**	**0.27**	**0.93**	**2.05**	**0.18**	**2.80**	**0.86**	**2.51**

Introduction of new trawl

Table 3. Fish caught by CEFAS surveys within the Solent coastal region, shown by their frequency of occurrence by station (number of stations in which the species occured / total number of stations in the area (YFS -1983-97* and SBS - 1983-1997)). ('+' = <9%, '1' = 10-39%, '2' = 40-59% and '3' = >60%)

Common name	Latin name	YFS in Solent	CEFAS Solent Bass Survey
Bream	*Abramis brama*		+
Pogge	*Agonus cataphractus*	1	+
Allis shad	*Alosa alosa*		+
Twaite shad	*Alosa fallax*		+
Sandeel	*Ammodytes marinus*		+
Sand eel family	*Ammodytidae*	+	1
Eel	*Anguilla anguilla*	+	1
Transparent goby	*Aphia minuta*	+	+
Gt Silver Smelt	*Argentina silus*		+
Scaldfish	*Arnoglossus laterna*	+	
Red gurnard	*Aspitrigla cuculus*		+
Sand-smelt	*Atherina presbyter*	+	1
Trigger Fish	*Balistes carolinensis*		+
Garfish	*Belone belone*		1
Butterfly blenny	*Blennius ocellaris*		+
Solenette	*Buglossidium luteum*	1	+
Dragonet family	*Callionymidae*	3	1
Rock cook	*Centrolabrus exoletus*		+
Thick lipped mullet	*Chelon labrosus*		+
Five-bearded rockling	*Ciliata mustela*	1	+
Herring	*Clupea harengus*		1
Herrings	*Clupeidae*		+
Bullhead	*Cottus gobio*		+
Corkwing wrasse	*Crenilabrus melops*	2	+
Crystal goby	*Crystallogobius linearis*	+	+
Goldsinny	*Ctenolabrus rupestris*	+	+
Lump sucker	*Cyclopterus lumpus*		+
Sting ray	*Dasyatis pastinacus*		+
Sea bass	*Dicentrarchus labrax*	+	3
Two-spotted clingfish	*Diplecogaster bimaculata*	+	
Lesser weever	*Echiichthys vipera*	1	+
Four-bearded rockling	*Enchelyopus cimbrius*	+	
Snake pipefish	*Entelurus aequoreus*	+	
Grey gurnard	*Eutrigla gurnardus*	+	
Cod	*Gadus morhua*		+
Rocklings	*Gaidropsarus spp*		+
Three-bearded rockling	*Gaidropsarus vulgaris*	+	
Sticklebacks	*Gasterosteidae*		+
Stickleback	*Gasterosteus aculeatus*		+
Black goby	*Gobius niger*	2	+
Rock goby	*Gobius paganellus*	+	
Two-spotted goby	*Gobiusculus flavescens*	+	
Great sandeel	*Hyperoplus lanceeolatus*		+
Wrasses	*Labridae*		+
Ballan wrasse	*Labrus bergylta*	+	+
Cuckoo wrasse	*Labrus mixtus*	+	+
Dab	*Limanda limanda*	1	1
Sea-snail	*Liparis liparis*	+	+
Montagu's sea-snail	*Liparis montagui*	+	
Golden grey mullet	*Liza aurata*		1
Thin lipped mullet	*Liza ramada*		+
Whiting	*Merlangius merlangus*	+	1

/continued:

Table 3. continued:

Common name	Latin name	YFS in Solent	CEFAS Solent Bass Survey
Grey mullet	*Mugil cephalus*		+
Red mullet	*Mullus surmuletus*	+	+
Starry smooth hound	*Mustelus asterias*		+
Smooth hound	*Mustelus mustelus*		+
Bull-rout	*Myoxocephalus scorpius*	+	+
Straight-nosed pipefish	*Nerophis ophidion*	+	
Smelt	*Osmerus eperlanus*	+	+
Red Seabream	*Pagellus bogaraved*		+
Sand sole	*Pegusa lascaris*	+	+
European Perch	*Perca fluviatilis*		+
Butterfish	*Pholis gunellus*	+	+
Flounder	*Platichthys flesus*	1	1
Plaice	*Pleuronectes platessa*	2	2
Pollack	*Pollachius pollachius*	+	1
Sand Goby	*Pomatoschistus minutus*		1
Sand goby family	*Pomatoschistus spp.*	3	1
Nine-spined stickleback	*Pungitius pungitius*		+
Blonde ray	*Raja brachyura*		+
Thornback ray	*Raja clavata*	+	1
Spotted ray	*Raja montagui*	+	+
Undulate ray	*Raja undulata*	+	
Sea trout (Brown Trout)	*Salmo trutta*		+
Pilchard	*Sardina (Clupea) pilchardus*		+
(European) Mackerel	*Scomber scombrus*		1
Turbot	*Scophthalmus maximus*	+	+
Brill	*Scophthalmus rhombus*	1	+
Lesser spotted dogfish	*Scyliorhinus canicula*		+
Sole	*Solea solea*	2	1
Gilt-Head seabream	*Sparus auratus*		+
Fifteen-spined stickleback	*Spinachia spinachia*	1	+
Black sea-bream	*Spondyliosoma cantharus*	1	1
Sprat	*Sprattus (Clupea) sprattus*		+
Spurdog	*Squalus acanthias*		+
Greater pipefish	*Syngnathus acus*	2	1
Nilsson's pipefish	*Syngnathus rostellatus*	1	+
Deep-snouted pipefish	*Syngnathus typhle*	+	
Sea scorpion	*Taurulus bubalis*	1	+
Leopard-spotted goby	*Thorogobius ephippiatus*	+	
Greater Weever Fish	*Trachinus draco*		+
Horse-Mackerel (Scad)	*Trachurus Trachurus*		1
Tub gurnard	*Trigla lucerna*	+	+
Streaked gurnard	*Trigloporus lastoviza*		+
Norway pout	*Trisopterus esmarki*		+
Bib	*Trisopterus luscus*	1	1
Poor cod	*Trisopterus minutus*	+	+
John dory	*Zeus faber*		+
Viviparous blenny	*Zoarces viviparus*		+
		+ = 35	+ = 64
		1 = 12	1 = 20
		2 = 5	2 = 1
		3 = 2	3 = 1
		54	86

** From Rogers et al., 1998*

Table 4. Species composition for September 2000 Solent Bass Survey. Percentage of total numbers of fish caught (excluding herring and gobies)

Species	Number caught	Percentage
Sand eel family	13	0.35
Eel	18	0.49
Sand-smelt	129	3.48
Solenette	2	0.05
Dragonet family	30	0.81
Rock cook	3	0.08
Five-bearded rockling	2	0.05
Herrings	*	
Corkwing wrasse	63	1.70
Crystal goby	*	
Sea bass	1990	53.62
Black goby	4	0.11
Cuckoo wrasse	70	1.89
Dab	12	0.32
Golden grey mullet	161	4.34
Thin lipped mullet	2	0.05
Whiting	30	0.81
Red mullet	28	0.75
Starry smooth hound	11	0.30
Flounder	53	1.43
Plaice	103	2.78
Pollack	39	1.05
Sand goby family	*	
Thornback ray	12	0.32
Pilchard	3	0.08
(European) Mackerel	9	0.24
Brill	2	0.05
Lesser spotted dogfish	2	0.05
Sole	70	1.89
Fifteen-spined stickleback	1	0.03
Black sea-bream	230	6.20
Greater pipefish	13	0.35
Sea scorpion	2	0.05
Horse-Mackerel (Scad)	103	2.78
Tub gurnard	6	0.16
Bib	495	13.34

** Herring and gobies were observed only*

4. ACKNOWLEDGEMENTS

We thank Alec and Dave Baldacchino, owners and successive skippers of the *MFV ANGELLE MARIE*, for their detailed local knowledge and invaluable help and patience over the years, for the original trawl design, skilful repairs to damaged gear and endless cups of tea and sandwiches.

5. REFERENCES

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APPENDIX 1. Example of a completed cruise report

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

2000 CHARTER CRUISE PROGRAMME

REPORT: ANGELLE MARIE 2/2000
(**PROVISIONAL:** not to be quoted without prior reference to the author)

STAFF: B F M Harley
M J Brown
M Parker-Humphreys

DURATION: 30 August - 4 September 2000

LOCATION: The Solent, Southampton Water, Chichester and Langstone Harbours

AIMS:
1. To carry out the annual September trawl survey for pre-recruit bass in the Solent area.
2. To determine the relative abundance and distribution of juvenile bass and other species in the Solent and associated harbours.
3. To contribute to the bass tagging programme and tag and release all commercial size bass.

NARRATIVE:

Staff travelled to Portsmouth on 29 August. Survey gear was unloaded that evening at Sparkes Marina, in Chichester Harbour. The survey commenced at 0812 on 30 August, and with a bad forecast for the following day it was decided to work stations outside the harbours. The weather remained fine throughout the day and the 10 tows in this area were completed without incident. Over the next two days the tows in Chichester and Langstone harbour were completed, with one invalid tow when the port warp parted at the start of the tow. Only 45 minutes were lost and there was no other damage. The Angelle Marie then moved round to Warsash Marina in order to start the tows at the western end of the survey area the following day. 9 tows in the Western Solent and off Ryde, Isle of Wight, were completed without incident on the 2 September. The following day we carried out the tows in Southampton Water, including deep-water channel. On 4 September the day was devoted to fishing for commercial bass for tagging and 11 tows were completed. The fishing gear was unloaded at Warsash Marina and staff returned to Lowestoft on 5 September.

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44 valid tows on 35 core stations were fished. Two new tows, one in Southampton Water and one in the mouth of the Hamble River were fished but these were not included in the calculation of the recruit index. Bass were caught on all but 1 of the valid survey tows.

A total of 1755 bass were caught in the survey, 1488 in the harbours and 267 outside. Only four tows yielded in excess of 100 bass.

A total of 414 bass scales were taken and read during the survey, allowing an age length distribution to be produced before returning to the laboratory. The majority of bass caught were 1 and 3 year olds (1997 and 1999 year classes, Figure 1). These two year classes dominated catches in the harbours and had modal lengths of 17 and 28 cm, respectively. The bass caught in the outside tows were mainly 3 year olds (27-28 cm). Sixty (3%) of the bass caught were above the minimum landing size (36cm).

Catch rates of bass were 5.97/minute towing in the harbours and 1.35/minute outside (3.66/minute overall). This overall value is slightly below the mean for the September surveys and is well down on the figure for May of this year (7.8/minute). Bass were caught on all but 1 of the core survey stations with the largest concentrations in Langstone harbour.

A wide variety of other species were caught, notably bib (500+), sandsmelt (200+ fish), black sea bream (185 fish) and golden grey mullet (152 fish).

118 commercial sized fish were tagged and released as part of CEFAS's bass tagging programme.

The new tows in Southampton Water and the River Hamble both yielded bass and will continue to be fished in the future, in the view to include them in the bass recruit indices. For purposes of comparison with previous years survey results, these data have not been included in Figure 1.

B F M Harley

INITIALLED:

DISTRIBUTION:

Basic list +
B Harley
M J Brown
M Parker-Humphreys
G D Pickett
Mr D Baldacchino,
Skipper FV Angelle Marie
Mr D Jenkins, FOII Portsmouth
Mr T Dapling, CFO Sussex SFC
Mr I Carrier, CFO Southern SFC

Figure 1. September 2000 Age/Length Distribution a) inside Harbours, b) outside Harbours