

**EXPLANATORY MEMORANDUM TO  
THE UNDERSIZED BASS ORDER 2007**

**2007 No. 809**

**1.** This explanatory memorandum has been prepared by The Department for Environment Food and Rural Affairs and is laid before Parliament by Command of Her Majesty.

**2. Description**

2.1 The objective of the measures is to provide more and bigger bass for capture by both commercial and recreational fishermen. The Statutory Instrument establishes the Minimum Landing Size (MLS) for bass (*Dicentrarchus labrax*) in England as 40cm and applies to both commercial and recreational fishermen. To complement this measure, the Minimum Mesh Size (MMS) for gill, tangle, drift, trammel and any other enmeshing nets used to target bass in British Fishery Limits (BFLs) adjacent to England will be 100mm.

**3. Matters of special interest to the Joint Committee on Statutory Instruments**

3.1 None

**4. Legislative Background**

4.1 The SI implements an increase in the size at which bass can be landed in England from 36 to 40cm. It applies to both recreational and commercial fishermen, whether fishing from a boat or from the shore. The landing size is supported by an increase in the mesh size of enmeshing nets (such as gill, trammel and drift nets) used to target bass from 90 to 100mm. Boats that only land bass as a bycatch (i.e. less than 10% of the total catch) will not be subject to these mesh size restrictions. Enforcement of the measures is further enhanced by a provision that prohibits the carriage of undersized bass (i.e. bass less than 40cm) on board fishing boats.

4.2 Powers stem from the Sea Fish (Conservation) Act 1967. Under EC regulations (Council Regulation (EC) No 850/98, as amended), the MLS for bass is currently 36cm and the MMS at which bass can be retained on board a vessel is 90mm. The measures imposed by this order are undertaken under Article 10 of the CFP (Council Regulation (EC) No 2371/2002), which allows the UK to take measures for the conservation and management of stocks in relation to its own vessels, that are more restrictive than those set by the EC.

**5. Territorial Extent and Application**

5.1 The instrument applies to England.

5.2 The instrument will apply measures to English, Welsh, Northern Irish, Scottish and Crown Dependency vessels when operating in British Fishery Limits adjacent to England.

Mesh size restrictions and carriage provisions will also apply to English and Welsh fishing boats anywhere within British Fishery Limits except when within Welsh Territorial Waters.

## **6. European Convention on Human Rights**

6.1 As the instrument is subject to negative resolution procedure and does not amend primary legislation, no statement is required.

## **7. Policy background**

7.1 The objective of the measures is to increase the number and size of bass available to both commercial and recreational fishermen. The measures were proposed in response to a recommendation in the Prime Minister's Strategy Unit Report 'Net Benefits' in relation to bass and calls by recreational sea anglers in 2005 to provide increased protection for bass stocks and increase the number and size of bass available for capture. This is a species of significant importance to the recreational angling sector.

7.2 A three month consultation was launched in November 2005 on possible options to provide more and bigger bass. The central option was to increase the MLS to 45cm with an accompanying MMS of 105mm. There was a significant public reaction to the proposals with 2749 responses to the consultation. Views were polarised with strong sectoral support. With some exceptions, the commercial fishing sector supported option 1 (do nothing) and the angling sector supported option 2 (increase the MLS to 45cm). A comprehensive Summary of Responses is available from the contact details at section 9. The Summary provides Defra's response to the key issues raised, whilst evidence and information submitted by consultees was thoroughly analysed and included as part of the Regulatory Impact Assessment (RIA).

7.3 The Minister announced his decision on 10 August 2006. On the basis of the analysis of the costs and benefits set out in the RIA, it was decided that an increase in MLS to 45cm would be difficult to justify at present. However, an increase to 40cm would bring the MLS closer to the average spawning size of bass, thereby protecting more juvenile fish and providing enhanced recruitment to the spawning stock. This should provide benefits to the angling community and to commercial fishermen and at a reduced cost to the commercial sector, with the prospect of a recovery in landings in 3 to 4 year's time.

7.4 A 100mm MMS for enmeshing nets is a complementary conservation measure and is based on scientific advice on the most appropriate mesh size to accompany a MLS of 40cm in order to reduce potential discards of undersized fish.

7.5 The increased MLS will not apply to other member states' vessels. However, fewer than 10% of bass tagged within the UK inshore fishery and reported as recaptured were taken by other countries' vessels. This suggests that the main benefits of an increased MLS would accrue chiefly to UK fishermen and anglers.

7.6 We will be collecting evidence of the impact of the measures on both commercial and recreational fishermen.

## **8. Impact**

8.1 A Regulatory Impact Assessment is attached to this memorandum.

## **9. Contact**

Nicola Clarke at the Department for Environment Food and Rural Affairs Tel: 020 7270 8031 or e-mail: [nicola.clarke@defra.gsi.gov.uk](mailto:nicola.clarke@defra.gsi.gov.uk) can answer any queries regarding the instrument.

# DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS

## BASS MEASURES

### FULL REGULATORY IMPACT ASSESSMENT

#### 1.0 TITLE OF PROPOSAL

1. Increase in the minimum landing size and minimum mesh size for bass.

#### 2.0 PURPOSE AND INTENDED EFFECT OF THE PROPOSALS

##### Objective

2. To increase the number of larger bass around the coast of England available for the benefit of both commercial and recreational fishermen.

##### Background

3. The Prime Minister's Strategy Unit's Report "Net Benefits" recommended that the four fisheries administrations consider the evidence for the re-designation of bass as a sport fish, as in some circumstances the economic and social benefits of sea angling for specific species may provide a greater contribution to society than if they are caught commercially. Following stakeholder consultations within the Net Benefits English Inshore Fisheries Working Group and consideration of the available evidence, it was decided not to designate bass as a sport fish. Instead, the Government is looking to increase the number of larger bass available to both commercial fishermen and anglers, as announced in "Charting a New Course"<sup>1</sup>.
4. To do this, Defra has considered a range of measures. The first is to increase the minimum landing size (MLS) of bass to 45cm. This would apply to English fishing vessels wherever they may be (except when in the Welsh territorial sea, where vessels would be subject to Welsh MLS), and Scottish, Northern Irish and Welsh fishing vessels when in the English part of UK fishery limits. The increased minimum landing size would also apply to anglers, whether fishing from the shore or from vessels. Accompanying the proposal to increase the MLS is a complementary proposal to increase the mesh size in enmeshing nets (such as gill, tangle, drift, trammel and seine nets) targeting bass in order to reduce discards. In effect, only those vessels landing catches composing over 10% bass from these gears would be affected by an increased mesh size. The proposed measures would be undertaken under Article 10 of the CFP framework Regulation (EC No 2371/2002) which allows Member States to take measures for the conservation and management of stocks in relation to its own vessels. This Article requires such measures to be compatible with the objectives of the CFP.
5. A planned subsequent package of measures, on which further consultation will be conducted, may include measures such as bag limits for recreational sea anglers

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<sup>1</sup> [www.defra.gov.uk/fish/sea/sfp/newcourse.pdf](http://www.defra.gov.uk/fish/sea/sfp/newcourse.pdf)

and unlicensed fishermen, near-shore netting restrictions, closed areas and/or seasons and other gear restrictions.

### *The Bass fishery*

6. The International Council for the Exploration of the Sea (ICES) report for 2004 states that bass stocks in ICES sub-areas IV and VII (the North Sea, English Channel & the Western approaches) appear to be fished sustainably. A succession of strong year classes since 1989 and relatively modest fishing mortality has enabled stock biomass to be sustained or increased in UK coastal waters since the mid-1990s. The strength of recruitment depends strongly on environmental conditions; an increase in water temperatures in the Channel and the North Sea since the late 1980s has therefore led to better conditions for the growth and recruitment of bass.
7. An assessment by the Centre for the Environment, Fisheries and Aquaculture Science (Cefas) of the dynamics of sea bass stocks in English and Welsh coastal waters over the period 1985–2004 shows that recruitment has improved since 1990, and that stock abundance has increased generally since the mid-1990s (see annex 3) with little evidence of an overall increase in fishing effort.
8. The biological parameters of bass are consistent around the UK; male bass mature at length 31 – 35 cm (aged 3 – 6 years) and females at 40 – 45 cm (aged 5 – 8) years.
9. While it is difficult to generalise about the population structure of bass by size, fish of up to 36 cm (juveniles) tend to be found in estuaries, harbours and other sheltered inshore areas (nursery areas). The coastal zone will have bass up to 45 cm, especially in the warmer months and where good feeding opportunities occur in shallow water. There will also be bigger bass close inshore where there are reefs and other features, both in summer and winter, but in varying quantities, depending on tide, depth, weather etc. Offshore, in water deeper than 20 m or outside 6 miles, most bass will be above 40 cm.

### *Regulatory background*

10. Fishing effort on bass is not subject to quota limits; sustainability of the stock is controlled through a range of measures introduced in 1990 to protect juvenile bass and raise the age at first capture from 3-5 to 5-6 years. These measures included increasing the MLS from 32cm to 36cm, banning enmeshing nets with a mesh size of between 65 and 89 mm, and banning fishing from boats for bass in 34 areas where undersized fish are particularly vulnerable to capture (the “bass nursery areas”)<sup>2</sup>. A licence condition for UK vessels was also introduced in 2000 to limit landings of bass to no more than either 5 tonnes per week or 15 tonnes per month

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<sup>2</sup> The Bass (Specified Sea Areas) (Prohibition of Fishing) Order SI 1990 1156.

per vessel. In Cornwall, the MLS set by the Cornwall Sea Fisheries Committee (SFC), under local byelaws, is 37.5cm.

11. In 2005, a ban was placed on UK pair teams engaged in the winter bass fishery from fishing inside the UK 12 mile limit in VIIe, to reduce the bycatch of common dolphins.

#### *Commercial fishing fleet*

12. The commercial fleet fishing for bass can generally be broken down into vessels using three gear types: trawls, lines (including hand lines and long lines) and netters. The trawl fishery targeting bass can be further broken down into the offshore winter pair-trawl fishery and inshore trawl and pair-trawl fisheries such as the one along the Sussex coast.
13. Data on the number of vessels targeting bass are available from two sources: Defra's Fisheries Activity Database and a census by Cefas. The latter is more comprehensive as it picks up more of the under-10m vessels targeting bass and breaks them down into boats working full-time<sup>3</sup> and part-time<sup>4</sup> and so has been used in this RIA. According to the census there are 384 vessels targeting bass full-time and 935 targeting bass part-time. 180 of these full-time vessels are handliners, 131 are gill netters, 46 use drift nets and 27 are longliners.
14. A breakdown of the Cefas census data by ICES area is given in annex 1. 129 of the 180 full-time handliners (over 70%) and 262 out of the 296 part-time handliners (nearly 90%) work in VIIe and VIIf,g and are based in the South West of England.
15. Whilst there was one pair-team operating out of Plymouth using a mid-water trawl in the latter part of 2005, there were no UK vessels mid-water pair trawling for bass in 2006.

#### *Commercial landings by the UK Fleet*

16. Defra statistics<sup>5</sup> show that, in 2004, 610 tonnes of bass landings were recorded in England and Wales with a value of £3.3m. The port recording the highest volume of landings was Plymouth with 144 tonnes, followed by Shoreham with 39 tonnes, Brixham with 36 tonnes, Portsmouth with 31 tonnes and Newlyn with 18 tonnes. The remaining landings were spread around the coast. Only 8 tonnes of bass landings were recorded into foreign ports by UK vessels. 455 out of 610 tonnes (75%) were caught in the English Channel (VII d and e).
17. Landings data are also collected by Cefas through a voluntary logbook scheme, which is a more comprehensive assessment of landings by the under-10m fleet. A

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<sup>3</sup> Targeting bass for all or part of the season and who target bass for more than 3 days per week

<sup>4</sup> Targeting bass 3 days or less per week or who catch bass as a bycatch whether as part time or full time fishing

<sup>5</sup> <http://statistics.defra.gov.uk/esg/publications/fishstat/uksfs04.pdf>

summary of the bass landings estimates obtained by combining Cefas and Defra statistics is shown in table 1 below.

*Table 1 – bass landings by gear type and area in 2004 by value (£000s) and weight (tonnes)*

Area	Demersal trawl		Mid water trawl		Net		lines		All gear types	
	Value	Weight	Value	Weight	Value	Weight	Value	Weight	Value	Weight
<b>IVbc</b>	156	28			1,258	232	523	80	1,936	339
<b>VIIId</b>	763	127			1,691	285	3,673	590	6,127	1,002
<b>VIIe</b>	441	72	629 <sup>6</sup>	122	168	27	1,884	302	3,122	524
<b>VIIafg</b>	210	36			1,096	187	2,474	412	3,780	635
<b>all areas</b>	<b>1,569</b>	<b>263</b>	<b>629</b>	<b>122</b>	<b>4,213</b>	<b>731</b>	<b>8,554</b>	<b>1,384</b>	<b>14,965</b>	<b>2,500</b>

18. These estimates of the value of bass landed were derived from industry data and are based on unit values for bass caught in a demersal trawl. This could therefore be an underestimate of the value of fish caught by line, which tends to be better quality and can fetch a higher price.

#### *Commercial landings by the foreign fleet*

19. Outside 6 miles, French vessels fish for bass in the same grounds as UK vessels. ICES estimate that French vessels landed 937 tonnes of bass caught in areas IVb and c and VIIId in 2004, and 1,225 tonnes caught in VIIe and h and 53 tonnes in VIIa,f and g<sup>7</sup>. In 2004, the French fleet landed therefore an estimated total of 2,215 tonnes of bass. This figure is likely to underestimate the total landings from the French fleet from IVb and c and VIIId and e as it does not include landings from the under 10 metre fleet. Dutch vessels landed 197 tonnes of bass caught in areas IVb and c and VIIId. More recently, Belgian vessels with access rights to the UK 6-12 mile zone have switched to using fishing gear (otter trawls) with the potential to target bass but no landings of bass into UK ports have been recorded as yet.

#### *Sea Angling*

20. The Drew Report<sup>8</sup> into the economic impact of recreational sea angling (targeting all species) reported that in 2002 around 2 million people went sea angling at least once in England and Wales.
21. Anglers can generally be broken down into three groups: those fishing from the shore, those who fish from their own boat ('own boat anglers') and those that fish from charter boats ('charter boat anglers'). 54% of sea anglers fish mainly from the

<sup>6</sup> Pair teams operating out of Plymouth – taken as operating in VIIe but may also be in VIIafg.

<sup>7</sup> ICES WG New MOU New species Report, 2005

<sup>8</sup> <http://statistics.defra.gov.uk/esg/reports/SeaAngling/default.asp>

shore, 23% from private boats and 22% from charter boats. Shore anglers fish more often (13.6 days per year on average) than own boat anglers (12.4 days) or charter boats anglers (5.0 days)).

22. The total expenditure by sea anglers in the UK on their sport (e.g. on fishing equipment, travel, food and accommodation) has been estimated at £538m from 12.7m anglers' days annually. This expenditure relates to all anglers fishing for a variety of species. Around half of this expenditure is by own-boat anglers and reflects the importance of capital expenditure (52%) on boats and equipment. Shore anglers are the next most important group with 37% of the total expenditure. It is however not possible to identify how much of this expenditure is related to bass angling specifically.
23. There are some 375 known charter boats for sea angling around the coast of England<sup>9</sup>. Around 300 of these are likely to target bass at some point<sup>10</sup>. A proportion of these vessels are also licensed fishing vessels and fish commercially. For example, the Marine Fisheries Agency (MFA) estimates that six of the 37 charter boats in Cornwall are licensed. Many charter boats also double up as dive boats and sightseeing boats. These vessels can be broken down into two groups:
- Boats that work all year round and are chartered by groups of anglers to go out for a whole day of wreck, reef or shark fishing. These boats are likely to go out two or three days a week on average;
  - Boats that go out only in the summer and take groups of tourists out for relatively short periods, targeting fish such as mackerel. These boats work close to the shore.

*Table 2 – Number of known charter boats around the coast of England*

<b>Coastal region</b>	<b>Known charter boats</b>
Cornwall	37
South Devon	36
Dorset	41
Hampshire and IOW	55
Sussex	50
Kent	29
East Coast	26
Humber and Yorkshire	34
Northumberland	42
North West	11
North Devon and Bristol Channel	15
<b>Total</b>	<b>376</b>

<sup>9</sup> Drew Associates, *Research into the economic contribution of sea angling*,

<sup>10</sup> Excludes vessels based in the Humber, Yorkshire and the Northumberland.



24. It is difficult to estimate the number of boats used by the owner for angling, as potentially every private boat owner could fish for bass. The Cefas census attempted to estimate the number of vessels on the coast that were either charter boats or private angling boats. The total number of charter boats and private vessels was estimated at 1132. Using the data above for the number of charter vessels, there would be approximately 760 private boats. This is likely to be a significant underestimate, as it does not include boats that are pulled on trailers or other boats that may have been in storage when the survey was carried out.

### *Bass Angling*

25. In relation to numbers of bass anglers, there are three useful sources of information: two studies by CEMARE in 1986 and 1994 used the same methodology and can be compared directly. The CEMARE estimate of bass anglers in E&W in 1987 was 300,000 and in 1992 was 361,000. The Drew survey in 2003/04 did not reveal the number of bass anglers directly, but the Bass Anglers' Sportfishing Society (BASS) have assumed that 30% of the 1.11-1.45 million sea anglers (depending on assumptions about numbers in households that fish) are bass anglers, some 330 - 450 thousand. For the purposes of this RIA, we have assumed that there are approximately 350,000 bass anglers.
26. In terms of expenditure, there is no specific data to quantify the amount spent directly on bass angling. In its response to the consultation, BASS suggest a conservative estimate of 20% of the Drew study total of £538 million i.e. approximately £100 million could relate to bass angling and consider that the true figure may be far higher at over £200 million.
27. Given the data available, it is not possible to estimate the quantity of bass landed by sea anglers. This quantity will depend, amongst other things, on:
- the average number of bass caught by the estimated 350,000 bass anglers;
  - the number of bass returned to the sea following capture; and
  - the average weight of the bass caught.
28. If each of the 350,000 bass anglers took home only one fish with an average weight of 1.1kg<sup>11</sup> each year, then the total quantity of fish taken by bass anglers would be around 400 tonnes, though the true figure may well be higher. It is therefore likely that the quantity of bass caught by recreational anglers is significant.

### *Market for bass*

29. There are broadly two types of bass buyers, though the distinction is not rigid:

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<sup>11</sup> Sample data supplied by BASS in their response to the consultation suggests that, from a sample size of 126 bass caught, the average length was around 37cm. However of these 126 fish, 69 were below the minimum landing size of 36cm and would have been returned to the sea. The average size of the remaining fish was around 44.5cm (1.1kg)

- The first takes nothing but farmed bass for two reasons: they are always the perfect portion size and they have a longer shelf life<sup>12</sup>. 450-650g is the most popular size for farmed bass. One fish merchant reported that, of the 120 restaurants on his books, "most" prefer plate-sized bass; they either fillet the fish (3 fillets on a plate) or serve whole;
- The second type of buyer prefers wild bass mainly because it has a better flavour.

### Rationale for government intervention

30. Government intervention has been prompted, as explained in paragraph 3, by the Prime Minister's Strategy Unit's Report, 'Net Benefits' which recommended consideration of the designation of bass as a sport fish. Underlying this recommendation was the argument that the recreational fishing sector was a high contributor to local economies in coastal areas and that the recreational catch of commercially caught species was significant in some areas. It was recommended that fisheries management policy should recognise this contribution and interest, particularly in relation to stocks of interest to anglers.
31. According to ICES, bass stocks are being fished sustainably. However, the current management of the stock may not reflect the strong interest in bass from the recreational angling sector. The current consultation therefore considered ways in which the management of the stock could be changed to realise more of the potential benefits from the stock both for the angling sector and the commercial sector. This is in line with a commitment given in 'Charting a New Course' that Defra would consult on measures to increase the numbers and size of sea bass to benefit both recreational anglers and commercial fishermen.

### 3.0 CONSULTATION

32. The consultation on this proposal was carried out between 16 November 2005 and 8 February 2006. The results of this consultation are summarised in a separate document, available at:  
<http://www.defra.gov.uk/corporate/consult/bass-mls/index.htm>

### 4.0 OPTIONS

33. The consultation proposed the following options:
- **Option 1;** do nothing.
  - **Option 2;** increase the minimum landing size (MLS) for bass in UK fisheries from 36cm to 45 cm and the mesh size for enmeshing nets from 90mm to 105mm.

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<sup>12</sup> Farmed fish are generally chilled more quickly and the fish pellets they are fed on do not rot in the same way as the food wild fish have eaten.

- **Option 3**; increase the MLS for bass by stages over a three year period, or a different period and increase the mesh size for enmeshing nets from 90mm to 105mm.
- **Option 4**; increase the MLS for bass regionally, based on average landing sizes for each defined geographic area and apply corresponding increases in the mesh size for enmeshing nets from 90mm to 105mm.
- **Option 5**; a staged increase in the MLS for bass to 55 cm and corresponding increases in the mesh size for enmeshing nets.

34. In addition to the options outlined in this consultation, there are other options that might meet the objective of these proposals. These include restricted areas, catch and fishing effort controls, or adoption of an increased MLS across the EU.

## 5.0 BENEFITS AND COSTS

### Option 2

#### *Commercial sector*

35. The impact of an increase in the MLS for bass in UK fisheries from 36cm to 45 cm and the mesh size for enmeshing nets from 90mm to 105mm on the commercial fishing sector can be broken down into short-term and long-term costs and benefits.

#### *Short-term costs*

36. The main cost to the commercial fishing sector in the short term is the loss of earnings. There would also be costs to netters in buying new nets with a larger mesh size. The short-term impact on earnings will depend on the amount of bass under 45cm that vessels would otherwise have landed. Table 4 below shows the proportion of bass landed that is below 45cm by weight and value<sup>13</sup> by gear type, assuming that the average weight of a 45cm bass caught by the commercial sector is around 1.2 kg (see annex 2). These figures vary by region.

*Table 4 – The proportion of landings below 45cm by gear type*

	<b>Trawl</b>	<b>Net</b>	<b>Lines</b>
<b>by weight</b>	62%	61%	43%
<b>by value</b>	55%	54%	36%

37. Information on landings by individual vessels, including data provided in response to the consultation, supports these figures. For instance:

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<sup>13</sup> Derived from Cefas survey data

- In 2005, 111 vessels operating out of Plymouth landed 122 tonnes of bass with a value of £629k<sup>14</sup>. By weight, approximately 50% of this fish was below 1.2kg, making up around 47% of the total value of the catch.
- Landings data from a trawler fishing in VIId shows that bass below 1kg makes up nearly 80% of landings by weight and over 74% by value<sup>15</sup>.

38. The loss in revenue for fishing vessels, broken down by gear type, based on the estimate of landings in 2004 is shown in table 5 below. These losses will be spread over the 400 vessels targeting bass full-time and the 935 vessels targeting bass part-time.

*Table 5 - Estimated loss in revenue due to implementation of an MLS of 45cm by gear type and area (£ 000s)*

Area	Trawl	Mid-water trawl	Net	Lines	all gear types
Ivbc	86		876	118	1,080
VIId	233		557	779	1,570
VIIe	129	203	43	448	823
VIIafg	84		416	661	1,161
<b>Total</b>	<b>533</b>	<b>203</b>	<b>1,892</b>	<b>2,007</b>	<b>4,636</b>
<b>Number of vessels targeting bass full-time</b>	19	2	177	207	

39. The overall costs to industry of switching to enmeshing gear with a mesh size of 105mm is difficult to estimate given the wide range of vessels using nets and the fact that nets will be replaced periodically anyway. Some fishermen are also already using nets larger than the current 90mm minimum mesh size. Enmeshing gear costs in the region of £300 (for 10 sheets, generally 200m stretched length per sheet) or £900 (for 10 sheets, completely rigged). The Cefas census estimates that there are 183 full time netters and 446 part-time netters. All of these vessels could potentially be required to replace their nets. Assuming that a vessel has between 1000m and 2000m of nets, this would imply a maximum one-off cost to industry of between £280k and £570k. These costs could be minimised by giving an extended period of notice of the introduction of any new mesh size.

#### *Long-term costs and benefits*

40. Cefas have modelled the impact of imposing a MLS of 45 cm by removing all bass of 6 years and younger from the fishery's catch. This model has been used in this RIA to estimate when the benefits to the fish catching sector of increased abundance and stock size will outweigh the costs of not being able to land bass

<sup>14</sup> Plymouth Trawler Agents Limited, response to consultation, 1/2/06

<sup>15</sup> MFA

under 45cm. The results of this analysis are shown in table 6 below. The model does not attempt to estimate the costs and benefits to the fleet fishing outside 6 miles and is based on assumptions which may overestimate the benefits of the measures, as explained in paras 44-48.

*Table 6 - Number of years before revenue recovers to the same level as it was before the introduction of an MLS of 45cm*

Area	Gear type		
	trawl	net	Lines
<b>IVbc</b>	6yrs	7yrs	5yrs
<b>VIIId</b>	7yrs	7yrs	6yrs
<b>VIIe</b>	5yrs	5yrs	5yrs
<b>VIIIfg</b>	5yrs	5yrs	3yrs

41. The total costs of the measure to the commercial fishing industry can also be measured in terms of the time it would take for revenue to cover the losses experienced by this sector. Such a comparison shows that the benefits to the commercial sector would not be greater than the costs for at least 10 years<sup>16</sup>, with the exception of the handliners and longliners where the benefits would be greater than the costs after 5 to 8 years, depending on the area under consideration.
42. This comparison makes the following assumptions:
- The catch composition remains constant;
  - All fish caught under 45cm are released and survive;
  - There is no increase in effort catching larger fish;
  - Interaction with the offshore fleet (outside 6 miles) remains the same; the model is only for the inshore 6-mile zone.
  - The price structure remains constant;
  - There is no impact from changes to angling activity.
43. The biggest uncertainties in this model are related to the assumptions that all fish under 45cm would be released and survive and that the interaction with the offshore fishery would remain the same. These uncertainties are discussed below.

*Discards and survival rate of fish under 45cm*

44. The validity of the assumption that all fish under 45cm survive is dependent on the response of individual vessels to the increased MLS. If a vessel carries on targeting bass, there are two possible scenarios:
- a. It uses the same gear<sup>17</sup> but discards all fish under the MLS;

<sup>16</sup> i.e. in economic terms, the point where the undiscounted cumulative Net Present Value turns positive

<sup>17</sup> Except for the netters who would be required to use a larger mesh size.

- b. The vessel adjusts its gear or fishing patterns in an attempt to either avoid catching bass under 45cm or to catch larger bass.
45. At one extreme, if all vessels (with the exception of netters) took option (a) then the discard rate of bass (and subsequent mortality) would increase significantly and there would be limited benefit to either the commercial fishing industry or the anglers in the long term.
46. The likelihood of scenario (b) depends on the type of gear employed:
- Demersal trawlers could increase the size of their nets from the 80mm and 90mm that are currently employed. However, this would not necessarily result in an increase in the survival rates of fish under 45cm, as the chances of fish becoming enmeshed in the net (as opposed to being contained within the bag of the net) would increase.
  - There is also more chance that fish caught inside a relatively small-meshed net would survive being returned to the sea.
  - If trawlers over 10m in length fishing in the eastern Channel (of which there are currently around a dozen) increased their mesh size above 99mm, they would have a reduced number of days at sea (from 227 to 103 days per year) under the cod recovery plan. It is therefore very unlikely that they would do this.
  - Vessels either handlining or longlining for bass could potentially target bigger bass by adjusting the size of their hooks or the size of bait used and by fishing in different areas. This would increase the fishing effort on larger bass. It is, however, still likely that the handliners and longliners would continue to catch smaller bass, which would have to be discarded. Whilst the survival rate for bass released from lines is high compared to trawling or netting, there would be significant costs to the industry associated with this discarding.
  - All netters targeting bass (i.e. with a bass catch >10% by weight) would be required to increase the size of their mesh. Analyses to determine mesh selection characteristics for bass in enmeshing gears (drift and fixed nets) indicate that, in theory, a minimum gill net mesh size of between 105 and 110 mm best complements an MLS of 45 cm for bass. In practice, further work is required to ascertain the most appropriate mesh size to ensure that the majority of bass caught in enmeshing nets are at or above 45 cm.
47. Therefore under scenario b, the discard rate would also be likely to increase for trawlers. Whilst it is difficult to predict what would happen to vessels handlining or longlining, it is also likely that the discard rate would increase (though the survival rate would be higher than for the trawlers).
48. Survival rates vary according to a number of factors (area, type of fishing gear, towing time etc) and it is therefore difficult to specify survival rates in any detail. However, if a significant number of fish under 45cm were caught and did not survive, the time taken for revenues to return to their levels prior to the introduction of the MLS (as detailed in table 5 above) would increase.

### *Interaction between the inshore and offshore fisheries*

49. The Cefas model used data collected over a period when vessels were working in the offshore pair-trawl fishery. Therefore the model indirectly takes account of interactions between the inshore and offshore fishery and the level of exploitation of the offshore fishery. However, if the effort in the offshore fishery grew disproportionately in response to a growing stock, this would have an impact on inshore fisheries. The scale of this impact would depend on the number of fish moving between the offshore fishery and the inshore fishery. A tagging exercise carried out by Cefas (in conjunction with France) between 2000 and 2004 provides some information on this movement of bass in the western English Channel<sup>18</sup>.
50. These results show that the stock of bass exploited within 0-6 miles of the English Coast is not greatly exploited outside that zone by other member states' vessels, mainly because of fish behaviour. Fewer than 10% of bass tagged within the UK inshore fishery and reported as recaptured were taken by other countries' vessels. This suggests that the main benefits of an increased MLS would accrue chiefly to fisheries operating within the UK 6-mile zone. If an increase in the MLS resulted in an increased stock size, the impact on the offshore fishery, and therefore the incentive for effort to increase, would be limited.

### *Overall impact on the commercial fishing sector*

51. In the short term, the revenue of all vessels targeting bass will decrease as detailed in table 5. Most vessels would need to target other species to compensate them for the loss in revenue from not being able to land bass under 45cm, resulting in increased pressure on other stocks. Bass is currently a non-quota species and opportunities to shift to other quota and non-quota species may be limited. Many of the vessels that would be affected are based in the South West where the dependency on fishing is higher. An unquantifiable number of vessels would be forced to exit the industry.
52. In the longer term, for those vessels remaining in the industry, the revenue from fishing for bass would not be at the same level as it was prior to an increase in the MLS for between at least 3 to 7 years depending on the area fished and the gear

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<sup>18</sup> One problem with using tag recapture data for quantitative analysis is the uncertainty about levels of reporting recaptured fish. The reported recapture level of bass tagged inshore in this study was 6.6% and returns of recaptured fish tagged in the offshore fishery were much lower, at around 1.4 %. This suggests that the survival rate of even selected bass from pair-trawl catches is relatively poor by a factor of around 0.2, given that around 2,400 fish were tagged in each fishery.

used (table 6). As set out in paras 44-48, the assumptions used in the model serve to over-estimate the speed at which the benefits start to appear in practice.

### ***Non UK-registered fleet***

53. Merchants and vessels from other EU member states could land 36cm bass into the UK and would also benefit from an increase in the MLS. The extent of the benefit would depend on the growth of the bass stock and on the degree to which other member states' vessels increased their landings of fish between 36cm and 45cm (in the absence of competition from UK vessels for fish of this size range).

### ***Merchants, processors & net manufacturers***

54. Merchants would be significantly affected by these proposals, which would reduce catches and therefore trade significantly in the short term. However, it would be possible for merchants to make up for the shortfall in smaller bass by either buying directly from non-UK registered vessels landing into UK ports (or from other European ports) or by buying farmed bass.
55. Processors are less likely to be affected as their supplies are sourced primarily from farmed bass.
56. It is possible that more restaurants would switch to farmed bass, which is generally imported from Greece or Egypt, to ensure that bass is 'plate-sized'. From responses to the consultation it is clear that many merchants believe that many customers (in pubs etc) cannot tell the difference. Although more expensive restaurants are prepared to pay for wild bass, it is likely that an increased MLS would increase demand for farmed bass.
57. In the short term, any increase in the minimum mesh size may also result in costs to net manufacturers in terms of redundant stock of 90mm enmeshing nets. This would depend, however, on the extent to which fishermen whose catches constitute less than 10% bass would continue to use this mesh size to target other species.

### ***Recreational anglers***

58. Recreational anglers would benefit from an increased MLS (option 2) if fishing mortality declined and the population of bass increased, providing more fish and more bigger fish for them to catch. There would however also be some disbenefit to sea anglers, as they would no longer be able to keep fish between 36cm and 45cm in length.



59. The Drew report asked respondents to their survey<sup>19</sup> how much they would be willing to pay for various changes to fish stocks, including more diversity of fish species, increased number of fish and increased size.
60. The study showed that shore anglers and charter boat anglers would be willing to pay 27p per trip for each percentage increase in the size of fish they catch; own boat anglers would only be prepared to pay a comparatively low amount of 17p per trip for a one percentage increase in the size of fish. The survey also showed that shore anglers would be willing to pay 81p per extra fish caught per trip. Own boat anglers and charter boat anglers would not be prepared to pay anything for additional fish caught. This suggests that boat anglers see angling as an experience that is enhanced by bigger fish, rather than by more fish. Shore anglers, however, value it both as an experience and as a source of food.
61. If the introduction of the MLS were effective in increasing the number and size of bass available to anglers there would be real benefits for those own-boat anglers and charter boat anglers who have the capacity to catch the bigger bass found further off the coast. While most charter boats have the capacity to catch larger bass, boats owned by anglers tend to be smaller and may not be able to get to areas where the likelihood of finding larger bass is as high.
62. The availability of larger bass to the recreational sector might increase the anglers' interest in this stock, leading to increases in tackle, bait, travel and accommodation expenditure and thus increasing the economic contribution of recreational sea angling to the UK economy.
63. Bass above 45 cm can, at times, be found anywhere, depending on tide, depth, weather etc and it is difficult to generalise about the population structure of bass by size. However, bass up to 45cm can usually be found in the coastal zone, especially in the warmer months and where good feeding opportunities occur in shallow water. There will also be more bigger bass close inshore where there are reefs and other features, both in summer and winter. Offshore, in water deeper than 20m or outside 6 miles, most bass will be above 40 cm. Anglers who fished where bass over 45 cm in size were usually caught would see an improvement in the numbers of bass over that size in their catches. In many areas, anglers would see many more fish between 36 cm and 45 cm which would need to be returned to the sea.
64. It is not possible to scale up potential benefits to the charter boat and own boat anglers as there is a lack of robust data on the number of bass anglers and the frequency of their trips. The Drew report included these data for anglers targeting all species, but there is limited data available relating specifically to angling for bass.

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<sup>19</sup> Through a stated choice experiment

65. The overall impact on shore anglers of a 45cm MLS is also not clear. In the short term it is likely that, like the commercial sector, shore anglers would have significantly reduced catches of takeable bass. The figures provided by BASS show that, of the fish caught by anglers above the MLS of 36cm, approximately 58% are between 36cm and 45cm long<sup>11</sup>. Shore anglers would therefore on average be able to take home less than half as many fish as they could before the introduction of the MLS<sup>20</sup>. The Drew report shows that each shore angler would be prepared to pay 81p for each additional fish per trip, which gives an indication of the value they place on the fish that they would no longer be able to keep<sup>21</sup>.
66. In the longer term, even if the bigger bass could be found by shore anglers, the probability of catching them would not necessarily be higher, as there would also be more smaller fish, which anglers would have to return. Overall, even though the shore anglers might catch more fish, they might be catching fewer bass that they would be permitted to keep.
67. It is not clear therefore that shore anglers would benefit overall from option 2.

### **Other Costs**

68. Enforcement of the legislation would be undertaken by both the Marine Fisheries Agency and the local Sea Fisheries Committee within their existing budgets, and prioritised alongside other work.
69. Analysis by the Environment Agency on the impact of increasing the mesh size to 105-110 mm indicates the potential for significant impact on salmonids<sup>22</sup>. The Environment Agency has stated that it would not be able to support any package of measures that increased the risks to salmon and sea trout stocks. The Agency would prefer that measures on MLS, net sizes and wider restrictions were considered and determined together so as to ensure a sustainable outcome for salmonids as well as bass.
70. Any increase in (non-UK) trawling as a result of the increased availability of 36-45cm bass would have environmental impacts in terms of discards of fish below the EU MLS of 36cm, as trawling is a much less selective form of fishing than handlining, longlining and netting. The latter forms of fishing have much lower discard rates (including all species that are caught not just the bass) and a higher survival rate of discarded fish.
71. The European Commission has very recently indicated that, at some point in the future, bass might be designated as a pressure stock and managed under a quota

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<sup>20</sup> This may be an underestimate as the proportion of fish between 36cm and 45cm in length caught by the shore anglers is likely to be higher than the equivalent figure for the anglers as a whole.

<sup>21</sup> The figure derived in the Drew report was for willingness to pay (WTP), whereas the correct figure to use here would be 'willingness to accept' (WTA). WTA is conceptually different to WTP and is generally higher than WTP. Therefore the figure quoted here is likely to be an underestimate.

<sup>22</sup> Environment Agency response to consultation

system. This would be subject to advice from ICES and would need to be discussed and agreed with Member States. Any quotas would be likely to be based on recorded catches by EU Member States. Introduction of an MLS, greater than that currently applicable to other EU vessels, could significantly reduce the recorded catches by UK vessels in comparison to other EU vessels. However, this would depend on the years used to determine Member States' track records. It is likely that this would be a period before the introduction of a higher MLS in the UK in which case the UK would not be disadvantaged.

### **Option 3**

72. The benefits of Option 2 could be achieved over a longer time frame but with a reduced impact on the commercial catching sector if the increase to 45cm were to be reached through a process of staged increases. This could be achieved by staged increases of the MLS to 39 cm, 41 cm and 45 cm over a three-year period. This would extend the time frame for achieving the objective of more bigger fish by around two years. A longer period would extend the time frame for achieving the objective even further.
73. A staged increase in the MLS would allow fishermen to keep a greater proportion of their present levels of catches initially, but at a cost of longer delays in benefits to the stock and fishery in the medium to long term. For example, it is estimated that loss of earnings to commercial fisheries of a two-year staged increase in MLS to 45 cm would be reduced by approximately 50% in the first year, but that an immediate introduction of a MLS of 45cm would outperform the phased scenarios in terms of the bass stock by between 1 and 27% in each subsequent year. Simulations of the effect of a staged increase would have on the bass stock show that a significant increase in larger fish would not be seen for at least 5 years. A staged increase in the MLS would need to be introduced with complementary increases in mesh sizes; these would impose further additional costs on the fishery.

### **Option 4**

74. Some commercial fishermen in the North West report very small catches of any bass above 45 cm and argue that the current proposal would simply put them out of business such that there would be no fleet to enjoy the projected benefits of more and bigger fish. They have suggested that there should be no increase in the NW or at most a form of regionalisation of any increase in the MLS based on average landing sizes for defined geographic areas. In practice, this might only serve to consolidate the current exploitation patterns, and would create significant enforcement problems. Further, there would be considerable opportunity for vessels to "invade" an area to fish for smaller fish thus creating pressure on the local stock.

### **Option 5**

75. BASS has proposed in its management plan for the stock that the MLS should be increased to 55 cm, possibly via a stepped change over a number of years but moving to 45 cm in the first phase. However, it would be at least 6 years before fish currently protected by the 36 cm MLS were recruited to the commercial fishery at 55 cm. Even if such an increase in the MLS were to be introduced over a number of years, there is considerable doubt that bass over 55 cm would be available to many parts of the inshore fishery.

### ***Alternative options***

76. There are a number of options that, whilst not included in this consultation, might also achieve the aim of the proposal.

#### *Area based restrictions*

77. Fishing in areas where there are known to be bigger bass could be restricted with only sea anglers (possibly operating catch and release schemes) allowed to fish in these areas. The benefit of this approach over the increased MLS approach is that it would avoid any potential increase in discarding, and the overall distributional impacts would be less marked. There would be more certainty about the conservation benefits and the benefits to anglers, assuming that the policy could be effectively enforced. It would also avoid the environmental costs identified in paragraph 70 and the risks associated with any move to a quota system identified in paragraph 71. However, there is insufficient data available at present to support the identification of such areas and additional work would be needed to identify the most effective locations for any restrictions.

#### *Minimum landing size of 40cm*

78. Introducing a MLS of 40cm would have some of the same disadvantages as a MLS of 45cm, though the costs and the risks would be lower. Accompanying this MLS would be a MMS for enmeshing gear of 100mm. Because of the smaller change in the MLS there would be less incentive for other fishermen (i.e. those using trawls and lines) to change their fishing patterns or switch gear to avoid catching smaller bass or in an attempt to catch large bass. This could result in a relatively high level of discarding and therefore reduced benefits. Although some fishermen are already using 100mm enmeshing gear to target bass in some areas, there would also be additional costs for replacement gear for those fishermen currently using 90mm mesh.
79. Modelling by Cefas ([Annex 5](#)) to investigate the effects of an increase in the bass MLS to 40cm suggested that landings would be reduced in the short term (3-4 years), as outlined in table 7, but would subsequently recover to levels similar to, or above, the 'do nothing' scenario. The exceptions were in VIId, where trawl landings were reduced, and in VIIe, where line landings were slightly reduced. The advice from Cefas concludes that a 40cm MLS offers a way for the existing fisheries to operate much as they do at present, with short-term losses mostly being offset by

gains in the future. Biologically, an MLS of 40cm is closer to the average spawning size of bass (42cm) and so more juvenile fish would be protected and, therefore, there would be enhanced recruitment to the spawning stock. The appropriate accompanying minimum mesh size of 100mm would also reduce interactions with salmon and sea trout fisheries. The advice also suggests that there may be gains for the angling community in terms of greater availability of larger fish, but that these are substantially reduced compared to the 45cm scenario. As with the modelling for the impact of an increase to 45cm, there are uncertainties in this model related to the assumptions: that all fish under 40cm would be released and survive and that the interaction with the offshore fishery remains the same. These uncertainties are such that the benefits of the measure could be over-estimated.

80. Table 7 below gives an estimate of the costs to the commercial fishing industry of a MLS of 40cm. Handliners and longliners would be proportionately less affected by a MLS of 40cm than a MLS of 45cm as a lower proportion of their catch is less than 40cm. These calculations do not take account of the increased MLS of 37.5cm in the District covered by Cornwall SFC and will therefore be an overestimate of the losses in this area.

*Table 7 - Short term loss in revenue due to implementation of an MLS of 40cm by gear type and area (£ 000s)*

<b>Area</b>	<b>trawl</b>	<b>net</b>	<b>lines</b>	<b>all gear types</b>
<b>4bc</b>	50	582	64	696
<b>7d</b>	19	35	47	101
<b>7e</b>	35	15	157	207
<b>7afg</b>	30	134	179	343
<b>Total</b>	<b>134</b>	<b>766</b>	<b>448</b>	<b>1,347</b>

### ***Issues of equity and fairness***

81. Regulations to increase the MLS to 45cm would have significant distributional impacts both within the commercial fishing industry and on anglers.
82. Smaller vessels fishing closer to the shore would be most affected. Larger pair trawlers, including foreign owned pair trawlers, which use a less selective form of fishing, would be likely to disproportionately benefit as they fish in areas where there are fewer smaller bass.
83. Amongst sea anglers, the greatest potential benefits would be likely to go to anglers who rent out charter boats or own boats.

### **6.0 SMALL FIRMS IMPACT TEST**

84. This measure would apply to all UK-registered vessels (with the exemptions given in paragraph 4). Approximately 95% of those fishing for bass work from vessels of

10m or less. All companies affected by these proposals are understood to have fewer than 250 employees.

## **7.0 COMPETITION ASSESSMENT**

85. There would be no negative competitive effects arising from this measure between sectors of the UK fleet. The proposal neither restricts the ability of firms to choose the price, quality, range or location of their products, and the costs would be the same for new and existing commercial fishermen. The measure is unlikely to affect the market structure. No company associated with the commercial fishing sector has more than a 10% share of the English market.
86. The measures would not apply to fishing vessels from other EU Member States who either have historic rights to fish for demersal species such as bass within the 6 to 12 mile zone (mainly France and Belgium) or fish exclusively outside the 12-mile limit. They would be able to continue to fish for bass at the EU MLS of 36cm. In recent years, approximately 15 pairs of French vessels have targeted bass in the Western Channel. Other vessels take bass as a bycatch when shoals are encountered. They would not suffer the short or medium term losses that are envisaged for UK fishermen and thus their competitive advantage would be increased.

## **8.0 ENFORCEMENT, SANCTIONS AND MONITORING**

87. Enforcement of the legislation would be undertaken jointly by the Marine Fisheries Agency and the local SFCs, on a targeted/risk based assessment (as set out in the Hampton Principles of Inspection and Enforcement<sup>23</sup>). Penalties and fines would be consistent with other measures taken to restrict fishing activities.
88. Enforcing the MLS would be difficult as the French fleet would still be able to land bass less than 45cm into UK ports, and smaller wild bass could be transported from foreign ports to UK merchants. Proving that wild bass originated from a UK vessel would be complex and potentially divert resources from other enforcement activity. Securing compliance with any legislative measures is also difficult where the conservation benefits are unclear or not accepted by the commercial sector.
89. The effect of an increase in the MLS on bass stocks would be difficult to distinguish from changes due to climate change which are already known to have led to changes in the patterns of the bass fishery to its benefit. This factor will increase the difficulty of assessing the impact of any new management measures. Regardless of the introduction of any new management measures, Defra would continue to fund Cefas to carry out stock assessment work in relation to bass.

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<sup>23</sup> <http://www.betterregulation.gov.uk/simplification/hampton.asp>

## 9.0 SUMMARY AND RECOMMENDATIONS

90. A summary of responses to the consultation is available at <http://www.defra.gov.uk/corporate/consult/bass-mls/index.htm>.
91. Increasing the MLS to 45cm would cost the commercial fishing industry around £4.6m in the first year, reducing in subsequent years. Vessels using lines, predominantly handliners, would be most affected with a loss of around £2m, followed by those using nets (£1.9m) and inshore trawlers (£0.5m). These losses would be spread over 400 vessels targeting bass full-time, including 180 handliners, and 935 vessels targeting bass part-time. Most of the vessels affected would be under 10m. Over 70% of the handliners are based in the south west of England.
92. In the longer term, the commercial fishing industry would benefit once the abundance of fish over 45cm made up for the lost revenue from fish under 45cm. Depending on the type of fishing gear and the area fished, it would take at least between 3 and 7 years before the revenue from landing bass over 45cm would recover to the level it was before an increased MLS was introduced and 5-10 years before revenues covered the losses experienced. There are, however, significant uncertainties in this model, particularly related to the likely level of discards, which means that it could take longer for revenues from bass to recover. It is likely that a proportion of the vessels targeting bass would be forced to exit the industry, as bass makes up a significant proportion of their overall earnings. Any changes in fishing patterns that led to greater targeting of bass over 45cm would diminish any increase in the number of larger bass available to recreational fishermen.
93. There is a high risk that the rate of discards would increase if the MLS were increased to 45cm, particularly from trawlers, as they are restricted in the type of gear they can switch to. It is also likely that there would be an increase in fishing effort on other stocks. There is also a risk that the bycatch of salmon in nets targeting bass could increase with a mesh size increase to 105 or 110mm.
94. If an increase in the MLS to 45cm led to an increase in the number of bass and the size of bass, there would be real benefits to some groups of anglers and also potentially wider benefits in terms of increased spending by recreational anglers. However, it is not clear that shore anglers (who make up over 50% of anglers by number) would benefit, as they would no longer be able to take home fish under 45cm, and the likelihood of catching bass over 45cm might not increase. Charter boat anglers would be likely to see the greatest benefit as they would be able to travel to areas where bass over 45cm make up a higher proportion of the bass available. It has not been possible to quantify the total benefit to sea anglers as there is no robust data on the number of bass anglers, the number of trips they take or the quantity of fish they catch. The Drew report included estimates for anglers targeting all species, but there is limited data available relating specifically to angling for bass.

95. An increase in the MLS to 45cm would have significant distributional impacts. Smaller vessels fishing closer to the shore would be most affected. There may also be health and safety concerns arising if small vessels were tempted further offshore in pursuit of larger bass. Many of the vessels that would be affected are based in the SW where the dependency on fishing is higher. Larger pair trawlers, including pair trawlers from other member states, which use a less selective form of fishing, would be likely to disproportionately benefit as they fish in areas where there are fewer smaller bass.
96. An increase in the MLS would not apply to fishing vessels from other EU Member States, who would be able to continue to fish for bass at the EU 36cm MLS. These vessels would not suffer the short or medium term losses that are envisaged for UK fishermen and they would therefore have a competitive advantage over the UK fleet.
97. Enforcing the MLS would be difficult and potentially costly, as the French fleet would still be able to land fish less than 45cm into UK ports: proving that wild bass originated from a UK vessel would be difficult in some circumstances.
98. An alternative option would be to increase the MLS to 40cm. Handliners and longliners would be proportionately less affected by a MLS of 40cm than a MLS of 45cm, as a lower proportion of their catch is less than 40cm. Introducing a MLS of 40cm would have some of the same disadvantages as a MLS of 45cm, though the costs would be smaller and the risks lower. There would, however, be less incentive for fishermen using trawls to change their fishing patterns or switch gear to avoid catching smaller bass or in an attempt to catch large bass. This might result in a relatively high level of discarding and therefore reduced benefits in the long term.
99. Advice from Cefas concludes that a 40cm MLS offers a way for the existing fisheries to operate much as they do at present, with short-term losses mostly being offset by gains in the future. There would be gains in terms of enhanced recruitment to the spawning stock. The losses to the commercial sector from an increase to 40cm would be less than at 45cm at around £1.3 million in the first year, with reduced landings for 3-4 years, subsequently recovering to levels before the increase. The advice also suggests that there may be gains for the angling community in terms of the availability of larger fish but that these would be substantially reduced compared to the 45cm scenario. For anglers, these benefits would accrue mainly to those own-boat anglers and charter boat anglers who have the capacity to catch the bigger bass found further off the coast. As most bass inshore are below 40cm, many shore anglers would be unlikely to benefit from an increase to 40cm. However, the availability of larger bass to the recreational sector as a whole could increase the anglers' interest in this stock, leading to increases in angling-related expenditure, such as tackle, bait, travel and accommodation and so increasing the economic contribution of recreational sea angling to the UK economy.



100. On the basis of the analysis of the costs and benefits set out above, an increase to 45cm would be difficult to justify at present. However, an increase to 40cm (accompanied by an increased minimum mesh size of 100mm) should provide benefits to the angling community and to commercial fishermen and would provide enhanced protection to the stock at a reduced cost to the commercial sector, with the prospect of a recovery in landings in 3 to 4 year's time. The impact of an increase to 40cm will be monitored in terms of the stock, increases in angling activity and the value of commercial landings.

**I have read the Regulatory Impact Assessment and I am satisfied that the benefits justify the costs**

**Signed (Responsible Minister): Ben Bradshaw**

**8th March 2007**

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## Annex 1 – Number of vessels targeting bass by ICES area (Source: Cefas)

Area	IVb,c		VIId		VIle		VIIf,g		VIIa		All areas	
	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT
<b>Commercial</b>												
Trawls	1	56	1	31	0	17	1	14	0	0	3	118
Drift nets	4	24	8	41	6	38	2	19	26	43	46	165
Trammel nets	1	10	0	0	0	0	0	0	6	0	7	10
Gill nets	27	74	6	51	13	46	32	50	53	50	131	271
Longlines	1	8	11	24	0	0	0	10	15	0	27	42
Handline	8	1	19	17	38	180	91	82	24	16	180	296
Commercial rod and line	0	30	4	1	0	0	1	2	0	0	5	33
<b>Total</b>	<b>42</b>	<b>203</b>	<b>49</b>	<b>165</b>	<b>57</b>	<b>281</b>	<b>127</b>	<b>177</b>	<b>124</b>	<b>109</b>	<b>399</b>	<b>935</b>
<b>Charter/recreational rod and line</b>	13	367	1	201	11	200	23	176	8	132	56	1076

FT = Full time vessels are those that target bass for all or part of the season and who target bass for more than 3 days per week

PT = Part time vessels are those that target bass 3 or less days per week or who catch bass as a bycatch whether as part time or full time fishing

## Annex 2 - Conversion factors

There are various sources of information on the relationship between the length of bass and their weight. One fish merchant estimated that the weight of a 45cm bass is around 1kg, which was a common view among respondents to the consultation. BASS estimate that the average weight of a 45cm bass is 0.9kg. Figures from Cefas indicate that a 45cm bass, caught by the commercial sector, would weigh around 1.2kg on average. Table i) below shows the conversion factors for a range of lengths with corresponding ages.

Cefas also estimate the conversion factors for the population as a whole, rather than that caught by the commercial sector. These conversion factors are shown in table ii). This indicates that a 45cm bass would be around 1kg which is closer to that estimated by anglers. As it is the losses to the commercial sector that are being considered here, the conversion factors from table i) are used in this RIA. The average value at age was estimated from data provided by industry sources.

Table i - estimate of the mean weight at length for bass caught by the commercial sector.

Age	Mean length (cm)	Mean weight (kg)	Average value (£/kg)
3	29	0.462	4.52
4	33	0.578	4.73
5	37	0.683	4.92
6	40	0.878	5.26
7	44	1.112	5.68
8	48	1.460	6.29
9	50	1.568	6.48
10	52	1.756	6.82
11	55	2.194	7.59
12	60	2.424	8.00
13	63	2.710	8.51
14	65	3.066	9.14
15+	68	3.469	9.85

Table ii) - estimate of the mean weight at length for bass population overall.

Age	Mean length (cm)	Mean weight (kg)
3	29	0.270
4	33	0.390
5	37	0.550
6	40	0.690
7	44	0.920
8	48	1.190
9	50	1.345
10	52	1.510
11	55	1.785
12	60	2.310
13	63	2.670
14	65	2.930
15+	68	3.350

### Annex 3 – Dynamics of the bass population

1. There are three factors affecting the dynamics of fish populations: breeding success, survival and growth. Breeding success in bass is more closely linked with sea temperature than the size of the adult bass population, partly because females require temperatures above ~ 9 °C for their eggs to mature in late winter and for spawning (February – May around the UK), and young bass in their first year grow faster and survive their first winter better in warmer water. Large year classes are strongly associated with warm summers followed by relatively warm winters. Tagging studies suggest that adult bass make southerly/westerly migrations between summer feeding areas and the offshore spawning areas in the English Channel and eastern Celtic Sea as the water cools in the autumn (October-December), movements related to the necessity for adult female bass to seek out warmer water.
2. Bass larvae resulting from offshore spawning recruit from June onwards into coastal and estuarine nursery habitats, where their growth is strongly related to summer temperatures and survival of 0-groups through the first winter is reduced at temperatures below 5-6 °C. This may well explain the attraction of warm water (from coastal power stations, e.g.) for first year bass, especially in winter towards the north of their distribution, where they may otherwise not survive. Thus, warmer winters towards the northwards edge of their distribution range might be expected to enhance survival of first-year bass.
3. Surviving juveniles remain in their original nursery area until, at a length of approximately 36 cm, at age 3-6 years depending on growth, they disperse along the adjacent coastline. A significant proportion of juvenile bass emigrate from their respective “stock” areas and mix throughout large parts of the populations' distribution range.
4. After 3-7 years, or at approximate lengths of 35 cm for males and 42 cm for females, bass attain maturity, when they begin their migrations between feeding and spawning areas. They appear to return with great accuracy to the same (usually inshore) feeding areas each summer, and these migrations into seasonally warmer (and more productive) waters have benefits both for reproductive performance and growth.
5. Cefas has developed a hypothesis that suggests that, during warmer winters, the movement of adult (mature) bass to spawning areas will occur later and be over shorter distances from summer feeding areas, and also that first-year bass might have enhanced survival. A consequence of this is that, if climate warming occurred, there will be an extension northwards of the distribution of self-sustaining bass populations, which may become established in “new” areas.
6. A recent tagging study has shown that adult sea bass are found in inshore waters in the North Sea and Irish Sea throughout the year, in contrast to the situation for the early 1980s. There is also evidence that juvenile bass are now to be found in nursery

areas well to the north of the previously defined limits (e.g. in Morecambe Bay and the Humber Estuary), and reports of adult bass being caught in February and March inshore off Cumbria and in the central and southern North Sea. Note that mean sea temperature for January – March at coastal stations such as Southwold on the English coast of the southern North Sea has risen from 4.7 ° C in 1980-84 to 6.3 ° C in 2000 – 2004.

7. Assessment of the dynamics of sea bass stocks in English and Welsh coastal waters over the period 1985–2004 shows that recruitment has improved since 1990, and that stock abundance has increased generally since the mid-1990s. Landings of bass from the UK fishery rose from around 600 t in 1990 to around 2000 t in 2004, with little evidence of an overall increase in fishing effort.
8. Thus, climate warming appears to have resulted in an expansion of the distribution range of bass stocks around the English and Welsh coasts, through a combination of a northerly and eastwards shift of spawning areas (where water of >8-9 C is available through January – April) and enhanced growth and survival of juveniles. This, in turn, has contributed to an increased in the population’s abundance since the early 1990s, mediated through temperature influences on the reproductive biology of bass and the species’ propensity for a dispersive pre-adult stage and migratory behaviour that capitalises on favourable environment change.

#### **Size and maturity at age.**

The following table shows the proportion mature and mean weight-at-age for bass (combined sex) around the UK, as used in Cefas assessments.

Age	Mean length-at-age (cm)	Mean weight-at-age (kg)	Proportion mature
3	29	0.462	0.03
4	33	0.578	0.23
5	37	0.683	0.43
6	40	0.878	0.57
7	44	1.112	0.9
8	48	1.460	1
9	50	1.568	1
10	52	1.756	1
11	55	2.194	1
12	60	2.424	1
13	63	2.710	1
14	65	3.066	1
15+	68	3.469	1

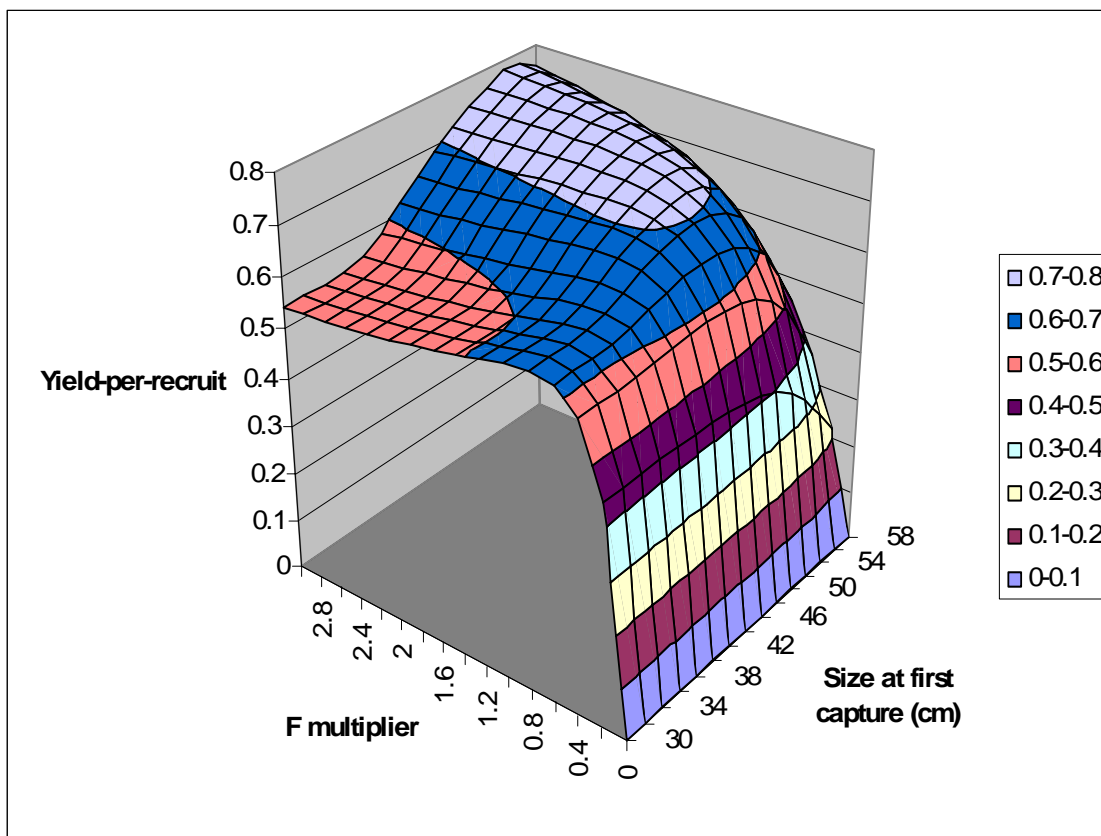
## Annex 4 - Cefas SCIENTIFIC PAPER

### Bass management plan: scientific advice on increased MLS and complementary mesh sizes for enmeshing nets.

#### *Basis for a 45 cm MLS.*

Calculations of yield to the fishery per bass recruit at age 3 (before they enter the fishery) have been used to show that the predicted benefits of the 1990 bass management package – a 30-40% higher yield to the fishery– did indeed take place, and a paper has been published in Fisheries Research (Pawson, Pickett and Smith, 2005). The objective in 1990 was to protect juvenile bass and raise the age at first capture from 3-5 to 5-6, by implementing a MLS of 36 cm, a banned range of mesh sizes in enmeshing nets at 65-89 mm, and prohibition of fishing for bass in areas where undersized fish are particularly vulnerable to capture (the “bass nursery areas”). These calculations made no assumptions about changes in the fishery or levels of recruitment. Since 1990, recruitment has increased (largely due to a favourable climate change, especially warmer winters), and both effort and catches in the fishery have also increased (shown in a paper submitted to the ICES Science Journal; Pawson, Kupschus and Pickett).

We have used the same approach to model the likely effects of a further increase in MLS, based on our current assessments of the bass fishery. For example, in ICES Divisions VIIa,f,g the yield per recruit (YPR) curve is relatively flat at current levels of fishing (F multiplier of 1.0), but the highest YPR occurs at around 45 cm (line in the pink band) and decreases thereafter (Figure below). This result is consistent with that obtained for the North Sea and SW England in the 1980s.



This also shows that a 55 cm MLS (as requested by BASS) would not realise the increases in yield to the fishery, unless fishing effort was increased considerably.

A first exploitation size at 45 cm confers considerable protection of female bass up to the size at which they first spawn, which is consistently above 42 cm in NW Europe (Pawson and Pickett, 1996).

*Impact of a 45 cm MLS on the bass population.*

Using the same assessment, we have carried out simulations imposing a MLS of 45 cm on the west coast bass fishery, to indicate how the numbers of bigger bass in the population and yields to the fishery might develop over the next 10 years. Because we have little information on the most recent year classes, which are not yet large enough to enter the fishery, we have stepped back 5 years to use the 1997 year class. These fish were the most abundant year class in the 1990s, and feature well in our assessments, so can be used as a proxy for the 2002 year class which will enter the fishery in 2006/7. We have assumed that new year classes will be of average abundance recorded over the 1990s.

If an effective MLS of 45 cm (and complementary mesh size for enmeshing nets) is imposed in the fishery, this is equivalent to removing all bass of 6 years and younger from the fishery's catch, and leaves many more fish to survive to be bigger than 45 cm. The following table shows how the number of bass in the 2002 year class (the first that would be protected by new measures) on the west coast is predicted to change over the next 8 years, if an effective MLS of 45 cm is introduced in 2006, assuming that fishing effort remains the same as in 2004. (F<7 = 0 implies no fishing mortality by any gear on bass under 7 years old; FLN<7 = 0 implies no fishing mortality by lines or nets on bass under 7 years old; FL<7 = 0 implies no fishing mortality by lines on bass under 7 years old)

Relative increase in numbers of bass at age (2002 year class)

Age	Year	F<7=0	FLN<7=0	FL<7=0
3	2005	1.00	1.00	1.00
4	2006	1.03	1.02	1.02
5	2007	1.09	1.08	1.05
6	2008	1.31	1.27	1.10
7	2009	1.60	1.51	1.20
8	2010	1.60	1.51	1.20
9	2011	1.60	1.51	1.20
10	2012	1.60	1.51	1.20
11	2013	1.60	1.51	1.20

This suggests that a measurable increase in the numbers of the 2002 year class should be apparent by 2008/9, and that this increase would be largest if the measures apply effectively to all

fishing gears, and least if they only applied to lines (i.e. just a 45 cm MLS). It is important, therefore, that the whole fishery is subject to measures that protect undersized bass.

*Impact of protection of bass < 45 cm on fishery.*

Because the reduction of mortality on younger fish would allow more to survive to be caught when older (and larger), the catch of 7 years and older bass would be increased for all gears. Landings (weight) for trawls, nets and lines would show initial declines, but these would recover and would be close to (trawls) or above (nets and lines) the current level after 5 years. The greatest increase in landings would be in the line fishery if appropriate measures were applied either to all gears or to lines and nets only, and the largest reduction in the overall commercial catch from the 2002 year class would be obtained if the measures were implemented for lines only.

This analysis assumes that the larger bass would not be targeted as effectively as smaller fish, but we would expect the fishery to adapt rapidly to any new management measures, and the recovery in landings to occur that much faster. One benefit would be that the increase in average size of fish in the catch would attract higher value per kg on the market.

Note that we have assumed discards in the trawl (and sometimes net) fishery are landed/killed. Thus, the numbers of larger fish in the population are underestimated if discarded fish survive. We could also model the size distribution of each age group (rather than just assuming all bass under 7 years will be protected), and include a modified gill net selection pattern that will take more larger fish (see below). It is unlikely that the results would be markedly different from the above.

**Estimating gillnet mesh size consistent with a MLS of 45cm for bass**

In consultations on bass management measures in the late 1980s, we argued that it was necessary to restrict the use of small mesh sizes in all enmeshing nets because:

- a) undersized fish caught in such gear have a low probability of survival even if discarded, due to the damage caused when extracting them from the meshes;
- b) it is not possible to identify a "bass gill net fishery", not least for the purposes of bringing prosecutions for infringements of regulations. The term "gill net" is applied to an increasing variety of enmeshing nets, which are often used to take a mixture of species, the relative proportions of which vary with grounds fished and season;
- c) approximately one third of the commercial bass catch in the UK was taken by enmeshing nets; and
- d) the method was commonly used by casual and part-time fishermen, with whom enforcement of any management measure (particularly specific ones such as a MLS) can be very difficult.

All four points are still valid, except that b) may no longer be applicable if we need to constrain bass exploitation quantitatively in order to achieve the management objective (more, bigger bass).

We carried out extensive trials to determine mesh selection characteristics for bass in enmeshing gears (drift and fixed nets, see Reis and Pawson, 1992), and analytically demonstrated that a



minimum gill net mesh size of 90 mm complements an MLS of 36 cm for bass (as enshrined in national and EU regulations).

For the present purposes, we have used two approaches based on the length structured catch data for a range of mesh sizes used by Reis & Pawson (1992). The first method (following McCombie and Fry, 1960) is based on a relationship between mesh size and the length and maximum girth of fish captured in gill nets. These are used to produce a “master curve” that describes the characteristics of bass being retained by gill nets, viz: fish with a small girth slip through the net, those with too large a girth bounce off, those between have a range of probabilities of being retained within a mesh.

This model indicates that the mesh size that retains 10% of the cumulative distribution of bass above 45 cm is 107 mm (i.e. 10% of the bass caught in a 107 mm net would be <45 cm, assuming equal numbers of all sizes encounter the net). The optimum size of capture for this mesh is 48-49 cm.

Our second approach was to fit mesh selection curves directly to the length frequency observations (Sparre et al. 1989) and allow the shape of the selection curve to become wider with increasing mesh size (as it would in practice). This method also produces good fits of observed length distributions of bass in known mesh sizes (70 - 92 mm). It indicates that a mesh size of approximately 109 mm is needed to obtain a catch where the proportion of bass less than 45 cm is 10% of the cumulative distribution.

These two methods give similar results, and we believe that the approach is sufficiently robust to suggest that a minimum mesh size (stretched from knot to opposite knot) of between 105 and 110 mm would ensure that the majority of bass caught in enmeshing nets are above 45 cm. Reis and Pawson (1992) noted that extrapolation of such modelled retention curves for nets outside the monitored mesh size range normally used for bass (82 – 100 mm) is not without uncertainty, and it may be necessary to seek the views of the industry as to an appropriate mesh size for a bass MLS of 45 cm.

#### *Implementation of a mesh size regulation.*

On the assumption that the new bass MLS will be 45 cm, and that a 105 – 110 mm minimum mesh size would support this by reducing the chances of undersized fish being caught in nets and (probably) killed, we propose the following approach to a control measure.

This is, to stipulate that sea bass cannot be landed in an enmeshing net fishery unless a mesh size of at least 105 -110 mm is used, and/or that bass comprise less than 10% by weight of the landed catch taken in nets with a smaller mesh size (but still subject to EU regulation 850/98, which only applies to fixed gears). Taken together, this means that those targeting bass with any fixed or drifting enmeshing net must use nets with a 105 - 110 mm minimum mesh size, thus minimising the chances of bass under 45 cm being caught, whilst the 45 cm MLS protects bass taken as by-catch in fisheries targeting other species. Because the growth and biological characteristics of bass do not vary greatly around the British Isles, we suggest that one comprehensive national regulation is to be preferred to local variations.

#### *Impact.*

This measure would have an immediate impact on most netting fisheries in which bass comprise a significant part (> 10% by weight, and much more by value) of landings (even seasonally), in that mesh sizes would have to be increased and there would be a loss not only of small bass but also of some by-catch species (mullet, sea trout). As shown above, bass catches would soon recover to a similar level to that experienced at the moment. It would have no implications for other netting fisheries, where existing mesh sizes would continue, though the increased bass MLS would result in higher levels of discards in areas where bass < 45 cm were vulnerable.

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## **Cefas advice on management of bass fisheries in relation to a 40 cm MLS (March 2006)**

The effects of an increase in the bass MLS to 40 cm have been modelled, based on stock assessments for 2004 that indicate that the biomass of adult bass is stable or rising in all sea areas around the UK and recruitment appears to have been strong in the late 1990s. Landings are also generally increasing in all areas, while fishing mortality (F) appears relatively stable.

In terms of relative exploitation level, line fisheries appear to be most important in the Channel and west coast fisheries, with nets more important in the North Sea. Trawl fisheries were generally least important, but note the absence from the assessments of the offshore fishery in VIIe (data deficient).

Yield per recruit (YPR) analyses carried out previously suggest that gains can be made in all areas by increasing size at first capture up to around 44-48 cm assuming no change in the fisheries' activity (status quo F). At a size of 40 cm at first capture, YPR gains will be small, but significant gains in spawner per recruit will still be achieved.

Models investigating the effects of an increase in the bass MLS to 40 cm suggested the following. Landings were significantly reduced in the short term (3-4 years), but subsequently recovered to levels similar to, or above, the status quo scenario. Exceptions were in Division VIId, where trawl landings were reduced, and in VIIe, where line landings were slightly reduced. Spawning stock biomass (SSB) and numbers of older bass in the population are increased because F has been reduced on younger ages. Population numbers of the 2002 year class (using 1997 as a proxy) were higher than the SQ scenario for all alternatives in all areas. Reducing F on all gears resulted in a relative increase after 3-4 years of around 20% in **VIIa,e,f,g,h**; 13 % in **VIId** and 36% in **IVb,c**. Losses occur initially as young fish are no longer taken, but these are compensated to varying degrees later as more older fish are captured. All this assumes measures are fully effective in reducing F for all gears.

### **Mesh size for enmeshing nets.**

Using the same models as previously (but not extrapolating beyond known data), the estimated mesh size for achieving 10% of cumulative catch of bass less than 40 cm is 96 mm. This mesh size would optimally catch bass of around 43 cm in length. Female bass mature at around 42 – 45 cm.

### **Conclusions.**

A new MLS of 40 cm for bass provides for small gains in bass > 5 years old in the population, and landings in all fisheries generally appear to be reduced for 3-4 years, and then to be similar or slightly above the SQ. In the eastern Channel, trawl fisheries target

small bass and discarding could potentially be a problem, and it may be necessary to consider how they could be made more selective, or whether they should be curtailed. The effect on nets seems to be generally neutral across all areas, while lines may benefit most.

A 40 cm MLS would, therefore, seem to offer a way for the existing fisheries to operate much as at present, with short-term losses often being offset by gains into the future. There may be gains for the angling community in terms of greater availability of larger fish, but these are substantially reduced compared to the 45 cm scenario. Biologically, more juvenile fish will be protected and, therefore, there will be enhanced recruitment to the spawning stock.

## **Annex**

### **Basis for short/medium term age structured projections approximating to removal of fishing mortality for fish less than 40cm**

Age-structured short to medium term projections were carried out to evaluate the possible effects on bass populations and fisheries of a 40 cm MLS and supporting measures. All calculations are the same as those carried out for a 45 cm MLS in August 2005, using data for population numbers from assessments over the period 1985 – 2004. Potential management measures were implemented partly as 'hindcasts' and partly as forecasts, implementing changes in 2000 and assuming the strong 1997 year class as a proxy for the currently incoming 2002 year class which anglers suggest may also be strong. Recruitment from 2003 onwards was taken as a recent 10 year geometric mean (93-02). With the exception of the status quo run (to provide the comparison), future (post 2000) landings by gear assume that an MLS of 40 cm (age 5) is in place so fish of ages >5 are included in the landings, and the F for age 5 is assumed to be halved for all gears. Mean length at age 5 (estimated using alternative assumptions regarding statistical distributions) varied from 38.6 cm to 42 cm. .

**Output details by sea area** (all relative to status quo, i.e. no change).

### **VIIa,f,g**

- Trawl landings were reduced for the first two years, and later become similar to those from the SQ run.
- Net landings were reduced for 3-4 years and were similar or slightly above thereafter.
- Line landings were reduced for 3 to 4 years, but in later years were slightly higher than the SQ run.
- In the medium term catch numbers of 5-11 year old bass were similar or increased for all gears.
- Landings for 2002 year class were above those of the status quo run after 3 years, but there is an initial cost as young fish are no longer landed.

- Population numbers of the 2002 year class increase by around 20% on the SQ scenario after 3-4 years. This assumes measures are fully effective in reducing F for all gears.

#### **VIIe,h**

- Trawl landings were reduced for 3 years, but increased beyond 4 years.
- Net landings were reduced for 3 years and were similar to the status quo run thereafter.
- Line landings were reduced, more in the short term and slightly into the medium term.
- In the short term, catch numbers of 5-11 year old bass were reduced, but were higher than SQ for trawls and lines and similar for nets into the medium term.
- Landings of the 2002 year class were above those of the SQ run after 3-4 years.
- Population numbers of the 2002 year class increased by around 20% on the status quo scenario after 3-4 years.

#### **VIIId**

- Trawl landings were below the SQ run during the first 3-4 years.
- Net landings were below to the SQ run in the short term, but were similar in the medium term.
- Line landings were reduced in the short term and were similar in the medium term.
- Catch numbers of 5-11 year-old bass were reduced initially but similar to the SQ run for all gears in the medium term.
- Landings for 2002 year class were slightly above those of the SQ run after 3-4 years.
- Population numbers of the 2002 year class were 13% higher than the SQ scenario after 4-5 years.

#### **IVb, c**

- Trawl landings were reduced in the short term but increased in the medium term.
- Net landings were reduced in the short term and slightly increased in the medium term.
- Line landings were reduced in the short term and increased in the medium.
- Catch numbers of 5-11 year-old bass were above SQ in the medium term.
- Landings for 2002 year class for all gears were above those of the SQ run after 3 years.
- Population numbers of the 2002 year class were 36% higher than the SQ scenario after 3-4 years.

Table 1. Summary and comparison of results for projections (F changed for all gears)

	<b>Vlla<sub>fg</sub></b>	<b>Vlle<sub>h</sub></b>	<b>Vlld</b>	<b>IVbc</b>
<b>97 Y/C rel. pop. nos 5-11</b>	1.19	1.22	1.13	1.36
<b>97 Y/C tot. landings</b>	1.00	0.98	0.96	1.02
<b>Rel. trawl landings &gt;5 yrs</b>	up	up	down	up
<b>Rel. net landings &gt;5 yrs</b>	slightly up	similar	similar	slightly up
<b>Rel. line landings &gt;5 yrs</b>	up	slightly down	slightly up	much up