Black sea bream

(*Spondyliosoma cantharus*)

Summary

Size (total length)	Max 60 cm (Russell et al., 2014)
Lifespan	15 years (Pajuelo and Lorenzo, 1999)
Size of maturity (L_{50})	17 -23 cm
Fecundity	Avg. 292,870 (Dulčić et al., 1998)
Reproductive frequency	Annual
Capture methods	Static nets; rod and line
Minimum Landing Size	23 cm
Fishing Season	Year round (Peak April – July)

Description

Black sea bream (*Spondyliosoma cantharus* - referred to as black bream throughout this document) is widely distributed throughout the North Eastern Atlantic ranging from Norway south to the Mediterranean Sea and Canary Islands (Pawson, 1995). In the UK black bream are most abundant along the south coast and into the southern part of the North Sea (Rogers, 1998). Climate change is thought to have had a positive effect on bream stocks in the English Channel as the mean annual frequency of occurrence of black bream has increased with rising sea temperatures from 1913 to 2003 (Arkley and Caslake, 2004).

Black bream inhabits rocky and sandy bottoms and seagrass beds in depths between 5 – 300 m (Jackson et al, 2002). They are an omnivorous species and feed mainly on algae and small invertebrates (Pajuelo and Lorenzo, 1999).

In 2019 black bream was designated as a feature of three Marine Conservation Zones (MCZ) in the Southern IFC District: Poole Rocks, Southbourne Rough and Purbeck Coast.

Reproductive Life history

Black bream exhibit protogynous hermaphroditism meaning all individuals are born as female and change sex to male at a certain age and size (Pajuelo and Lorenzo, 1999). Females appear to change sex between 18 cm and 35 cm depending on population and most individuals over 40 cm in length are male (Perodou and Nedelec, 1980; Mouine et al., 2015; Neves et al., 2018). Males and females are almost indistingusihable for the majority of the year but sexual dimorphism in body colour is exhibited during the breeding season when the male changes from a silvery, pale

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violet to an intense almost black colouration with a prominent vertical white stripe on each side (Wilson, 1958; Pajuelo and Lorenso, 1999).

In the English Channel adult black bream move inshore to spawn between April and July once water temperatures are between 12-14°C (Collins and Mallinson, 2012; Wilson, 1958). In shallow waters, less than 5 m deep, the male excavates a nest by using his tail to fan gravel from the seafloor to create a circular clearing 1-2 m wide and 5-30 cm deep on the bedrock (Pawson, 1995; James et al., 2010). The female then lays her eggs in a thin layer within the nest where they adhere to the rock due to their sticky exterior (James et al., 2010). Annual fecundity has been estimated to range between 31,670 and 544,070 eggs per female (Dulčić et al., 1998). The male fertilises the eggs and maintains guard over the nest until the eggs hatch. Each nest contains several thousand eggs, potentially from more than one female as males continue to attract females to the nest whilst on guard (Wilson, 1958). The male is highly aggressive when guarding his eggs attacking any creature that may come too close by biting or physically moving the intruder away from the nest. He will also frequently fan the eggs to ventilate and prevent a build-up of sediment from smothering them (Wilson, 1958; James et al., 2010). After 9 days the eggs hatch and remain in a larval form for 38 days (Wilson, 1958). Juveniles stay in the vicinity of their nest until they reach 7-8 cm in length before dispersing slightly but still remaining in shallow inshore waters for 2-3 years until they reach sexual maturity (James et al., 2010; Pawson, 1995). Seagrass beds have been identified as key nursery areas for juvenile black bream (Jackson et al., 2002). Once juveniles recruit into the adult stock they overwinter in deeper water (50-100 m) before migrating inshore in the spring to spawn (Pawson, 1995). Black bream remain in the same area throughout their life, therefore populations are thought to be discrete throughout the species' geographical range (Neves et al., 2019).

Black bream is a relatively long-lived species reaching a maximum age of 15 years and a maximum length of 60 cm although more commonly 40 cm (Pajuelo and Lorenzo, 1999; Russell, 2014).

Size of maturity (SOM)

Size of maturity (SOM) is often used to help establish an appropriate Minimum Conservation Reference Size (MCRS) to ensure individuals can reproduce at least once before capture. For finfish, SOM is commonly accepted as the total length (L) at which 50% of a population are mature and is referred to as the L_{50}. Maturity in finfish is determined by the classification of gonad development based on macroscopic (external appearance of the gonad) or microscopic (histology) methods. Histological techniques (analysis of microscopic morphological features) provide the most accurate results but it is a time consuming and expensive process. Maturity classification based on the external appearance of the gonad is quick, simple and cheap however, it is not as accurate as histology and results may be subjective (Brown-Peterson et al., 2011).

There are very few studies that have identified SOM of black bream in its northern range. Two studies undertaken in the English Channel in the 1980's estimated females reach 50% maturity between 20-22 cm in length (table 1). At 25 cm more than 95% of females sampled were mature (Soletchnik, 1983). Sexual inversion was estimated to

occur at 35 cm but SOM for males was not identified. Perodou and Nedelec (1980) found all individuals under 30 cm were female and all above 40 cm were male.

In the southern range of the black bream SOM is within a similar range to the English Channel with 50% of females estimated to mature between 17.3 cm and 22 cm (table 1). Males reach maturity at a larger total length between 21.3 cm and 22.7 cm. The smallest SOM for females was found in populations located in the species most southerly range in the Canary Islands (17.3 cm) whilst the largest and most similar SOM estimates to the English Channel occurred in populations off Portugal (20 cm). There is no difference in SOM of males between populations sampled in the Canary Islands and Portugal as both mature at 22.7 cm and 22.4 cm respectively.

In the Portuguese population of black bream Gonçalves and Erzini (2000) calculated a combined SOM for both sexes, hermaphrodites and individuals of indetermined sex at 20.1 cm, corresponding to 2-3 years of age. Several other studies that estimated age at 50% maturity also found females and males to mature at 2 and 3 years respectively (Pajuelo and Lorenzo, 1999; Boughamou et al., 2015; Perodou and Nedelec, 1980). Females in Tunisia have been estimated to mature at a later age of 4 years (Mouine et al., 2011).

Sexual inversion occurs at a similar length between 24.3 cm and 25.6 cm for populations in Portugal and Algeria (table 1). Whereas females transform into males at a smaller size in Tunisia at 18.8 cm. This corresponds with females in Tunisia maturing at a smaller size than female populations in Portugal and Algeria.

Table 1. Size at maturity estimates (L_{50}) and size at sexual inversion for black sea bream (*Spondyliosoma cantharus*) across its southern range and the English Channel. All measurements given in cm and rounded to one decimal place. Please refer to the Appendix for more information.

Location	Female	Male	Sexual Inversion	Reference
English Channel/ Bay of Biscay	20	-	35	Perodou and Nedelec, 1980
English Channel	22	-	-	Soletchnik, 1983
Outside English Channel				
Sagres, Portugal	20	22.4	24.5	Gonçalves and Erzini, 2000
Peniche, Portugal	18.4	-	25.6	Neves et al., 2018
Gulf of Annaba, Algeria	19.3	21.3	24.3	Boughamou et al., 2015
Tunisia	17.8	-	18.8	Mouine et al., 2015
Canary Islands	17.3	22.7	-	Pajuelo and Lorenzo, 1999

The minimum size for black bream caught within the Southern IFCA district is 23 cm total length. SOM was found to be less than 23 cm in all studies reviewed in the literature for both males and females (17.3-22.7 cm) (table 1).

Southern IFCA Fishery

Fishing activity

Black bream is a highly valued commercial species due to its market value (Perodou and Nedelec, 1980; Boughamou et al., 2015; Pinder et al., 2017). In the Southern IFC District fishing for black bream takes place year round with the greatest abundance found from April to early July (Morton, 2009 cited in Southern IFCA, 2014). Fixed nets are the primary method used to catch bream in the District but trawl and rod and line fisheries also exist (Southern IFCA, 2014).

Recreational

Black bream is also a highly prized recreational species and can be caught by anglers within the District throughout most of the year but mainly from April to June (Collins and Mallins, 2012). The majority of angling is vessel based with many charter boats providing specific trips to target black bream however, the species can also be targeted from shore but to a lesser extent (Southern IFCA, 2014). A recent review undertaken by the MMO to map recreational sea angling activity in England found breams (mainly black bream) to be the second most valued species for charter boats operating in the South Inshore marine planning area (Devon and Severn, Southern and Sussex IFCA districts) (MMO, 2020). Black bream are retained by anglers but limits are often advised by charter boats to ensure the majority of fish caught are returned to the breeding stock.

Landings & Value of Fishery

Southern IFCA do not hold effort or catch data for black bream but landings data from the MMO can help indicate the scale of the fishery within the Southern IFC District over time.

Over the period 2005 - 2017 total landings of black bream into ports within the Southern IFC District ranged from ~1 tonne to 6 tonnes per year, with the lowest landings recorded in 2005 and the highest peaks in 2009 and 2013 (fig 1*). Landings substantially increased after 2008 from 1- 2 tonnes per year to around 5 tonnes per year between 2009 and 2014 (excluding 2012). Following 2014 landings declined and in 2017 total landings were in line with pre-2008 levels at ~ 1 tonne.

The value of black bream has increased over the years from a low of £1,985 per tonne in 2007 to a high of £3,948 in 2015. In 2017 price per tonne of black bream was around £3, 680.

Landings are only shown for years 2005-2017 because black bream was recorded under a general ‘sea breams’ category in the data provided for 2018 and 2019. It must also be noted that the data in figure 1 does not represent the absolute total landings of black bream within ports in the Southern IFC District because some landings of black bream prior to 2018 would have been recorded as ‘sea breams’.

*these figures represent vessels that land into ports in the Southern IFC District, some of which would have fished outside the district and be >12 metres in length.

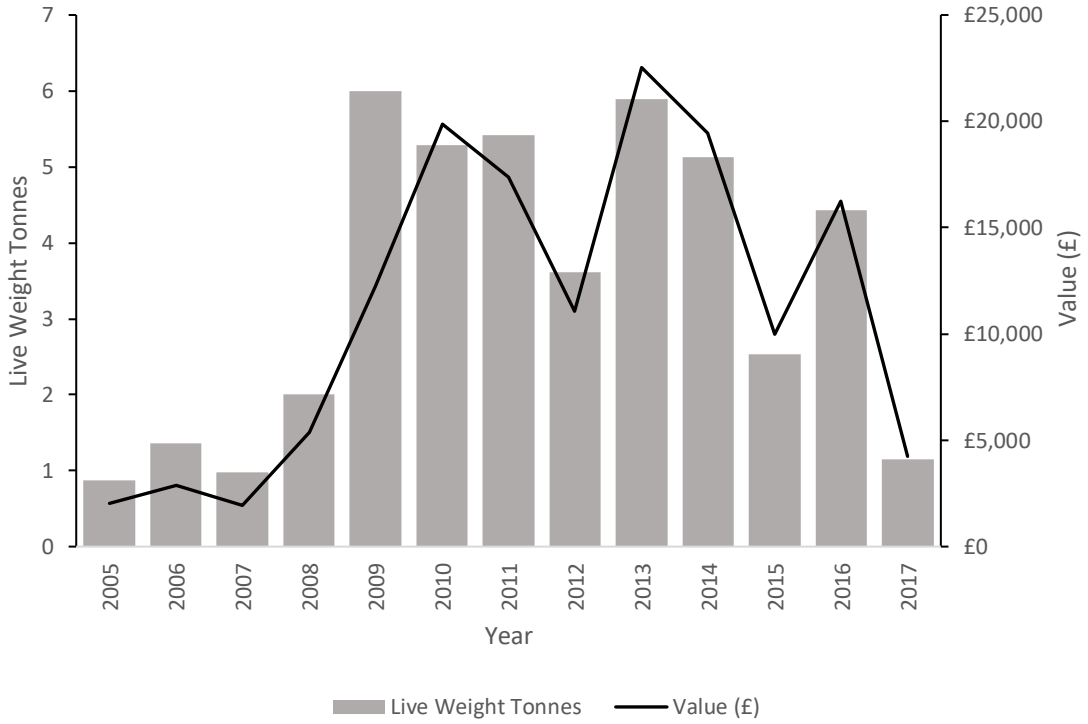

Figure 1. Landings of black sea bream (*Spondyliosoma cantharus*) into ports within the Southern IFCA district from 2005 to 2017. Data sourced from the Marine Management Organisation (MMO)

The amount of black bream retained by recreational anglers in the District is not known.

Associated management

Throughout the majority of the black breams' range there are no minimum landing sizes in place as there is no minimum size under EU technical regulations. However, black bream caught within the Southern IFC District are subject to a minimum landing size of 23 cm total length under the 'Minimum Fish Sizes' byelaw. The same minimum size is applicable in the Cornwall and North Western IFCA districts and in North Wales and the States of Jersey (table 2).

There are no additional management measures for black bream in the Southern IFC District. Black bream is not subject to a Total Allowable Catch (TAC) and ICES do not provide stock assessments. The EU does however place restrictions on any towed gear used for sea bream fishing, as it must have a mesh size >80 mm and sea bream must form a minimum of 70% of the catch (EU, 1998).

Table 2. Minimum Conservation Reference Sizes (MCRS) for black sea bream (*Spondyliosoma cantharus*) enforced by Inshore Fisheries and Conservation Authorities (IFCA) in England and authorities in other regions. All measurements in cm for total length.

IFCA	Minimum Conservation Reference Size (MCRS)
Northumberland	-
North Eastern	-
Eastern	-
Kent & Essex	-
Sussex	-
Southern	23
Devon & Severn	-
Cornwall	23
Isles of Scilly	-
North Western	23
Other	
EU	-
Government of Jersey	23
North Wales	23

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Appendix

Table A. Size at maturity estimates (L_{50}) for black sea bream (*Spondyliosoma cantharus*) in the English Channel and across its southern range. Measurements given in cm for total length and rounded to one decimal place (L_{50}).

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data									Reference
				Size range		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual		Size at 50% maturity (L_{50})		Size at sexual inversion	Age at 50% maturity (years)		
		M	F	M	F		M	F	M	F	M	F		M	F	
English Channel/ Bay of Biscay	-	-	-	-	-	228	-	-	-	-	-	20	35	-	2	Perodou and Nedelec, 1980
English Channel	-	-	-	-	-	-	-	-	-	-	-	22	-	-	3	Soletchnik, 1983
Sagres, Portugal	368	-	-	19.5 - 35.5		-	-	-	-	-	22.4	20	24.5	2 - 3		Goncalves and Erzini, 2000
Peniche, Portugal	1530	-	-	-	-	773	-	-	20	18.1	-	18.4	25.6	-	-	Neves et al., 2018
Gulf of Annaba, Algeria	501	-	-	-	-	-	-	-	-	-	21.3	19.3	24.3	3	2	Boughamou et al., 2015
Tunisia	369	15	330	-	-	-	-	-	17	15	-	17.8	18.8	-	4	Mouine et al., 2011
Canary Islands	28,527	-	-	-	-	1,276	-	-	-	-	22.7	17.3	-	3	2	Pajuelo and Lorenzo, 1999