

# Plaice

## (*Pleuronectes platessa*)

### Summary

<b>Size (total length)</b>	Max. 90-100 cm (Freyhof, 2014)
<b>Lifespan</b>	30 years (Freyhof, 2014)
<b>Size of maturity (L<sub>50</sub>) (North Sea pop.)</b>	22 – 34 cm (Rijnsdorp, 1989)
<b>Fecundity (North Sea pop.)</b>	>84,000 (Bagenal, 1966)
<b>Reproductive frequency</b>	Annual
<b>Capture methods</b>	Trawls, nets, handlines
<b>Minimum Landing Size</b>	27 cm total length
<b>Fishing Season</b>	Year round



### Description

Plaice (*Pleuronectes platessa*) is a species of right-eyed flatfish which is commonly found throughout the North East Atlantic from Greenland and Norway south to Morocco, including the western Mediterranean Sea (Nielsen, 1986; Wheeler, 1978). In the waters of the UK there are several nominal stocks of plaice including the eastern English Channel, western English Channel, North Sea, Celtic Sea and Irish Sea (Ellis et al., 2012).

Plaice is a bottom dwelling species found most abundantly on sandy bottoms but it can also occupy mud and gravel substrates to depths of 200 m (Wimpenny, 1953 cited in Bagenal, 1966; Wheeler, 1978). During the day plaice remain buried in the sand and become active at night to predate on molluscs, worms and crustaceans (Wheeler, 1978; Rijnsdorp and Vingerhoed, 2001).

### Reproductive Life history

Plaice spawn offshore throughout the central English Channel at depths ranging from 38 m to 67 m between late November and March (Houghton and Harding, 1976). The spawning stock consists of resident fish and individuals that have migrated from the southern North Sea (James et al., 2010). In the North Sea the spawning season is slightly longer with spawning males observed from November until May and spawning females from January to April with a peak in February (Rijnsdorp, 1989). In the Irish Sea plaice spawn over a shorter, later period from February to May (Armstrong et al., 2000). Females remain in spawning condition for around 5 weeks whereas males spawn for 11 weeks (Rijnsdorp, 1989). Eggs are released in batches by the female every 2 to 5 days (Rijnsdorp, 1989).

Fecundity varies greatly amongst females in the same population and on a larger geographical scale. Bagenal (1966) found fecundity ranged between 65,000 and 220,000 for two females, each 37 cm in length, from the same location. Across the British Isles fecundity ranges from 84,000 in the Southern Bight of the North Sea to 153,000 in Dingle Bay, Ireland (Bagenal, 1966). In Lyme Bay fecundity has been estimated at 244,000 however this was only based on 8 individuals, one of which was exceptionally fecund (Bagenal, 1960). In general, larger female plaice produce more eggs per unit length e.g., a 30 cm plaice may produce 60,000 eggs whereas a 45 cm plaice will produce over 280,000 eggs - over 400% more eggs than the smaller individual (Bagenal, 1966).

After spawning the eggs initially float on the surface before sinking and hatching in 10 to 12 days depending on temperature (Wheeler, 1978). The pelagic larvae drift on tidal currents until they are ready to undergo metamorphosis. This time period has been recorded to range anywhere between 31 to 66 days (Allen et al., 2008; Ryland, 1966). Flat fish undertake a dramatic metamorphosis from pelagic larvae to benthic juveniles. As larvae, plaice resemble a typical symmetrical fish with eyes on both sides of the body however, during metamorphosis the left eye of the plaice migrates to the right side of the head and the entire skull shifts in the process creating an asymmetrical appearance. The body increases in depth and the upper side develops pigmentation to help achieve camouflage whilst the underside remains white (Power et al., 2008). After metamorphosis the post larvae resemble miniature plaice and settle on sandy, shallow, inshore nursery grounds (James et al., 2010; Wheeler, 1978). Juveniles remain in shallow nurseries for the first few years of their lives (Wegner et al., 2003) before moving to deeper water once they are around 25 cm in length (Doran, 2011). Plaice are a long-lived species and can live up to 30 years reaching a maximum length of 90-100 cm although they more commonly grow to 50 cm (Wheeler, 1978; Freyhof, 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 methods (histology). 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).

A review of the literature infers SOM of plaice in UK waters ranges between 21-34 cm (table 1). Female plaice in the North Sea become sexually mature at a larger size than males, 34 cm and 22 cm, respectively. However, the opposite was found in plaice sampled in the Irish Sea with males mature at 23 cm compared to females at 21 cm. Horwood (1990) sampled plaice from several locations in 1987 and 1988 and found 50% of females in Lyme Bay, the Bristol Channel and South-east Ireland were mature

between 29-31 cm. A specific  $L_{50}$  for females in Lyme Bay is not provided however, the smallest mature female found in Lyme Bay was 30 cm in length whilst all females 31 cm and above were mature. In contrast Horwood (1990) also sampled plaice in Cardigan Bay and found the smallest mature female was 20 cm whilst 50% were mature at 22-23 cm. South of the English Channel in Brittany female plaice mature at a much larger size than in British and Irish waters at 38-40 cm (Brule, 1987).

Age at maturity also varies greatly between regions. Nash et al, (2000) found significant differences in age at first maturity within populations in the Irish Sea with age ranging between 2.7 and 4.4 years. Females in Liverpool Bay matured nearly two years earlier than females in the western Irish Sea. The differences in age are a result of environmental and anthropogenic factors that affect growth as plaice mature after reaching a size threshold rather than a specific age (Nash et al., 2000; Rijnsdorp, 1989, 1993).

Table 1. Size at maturity estimates ( $L_{50}$ ) for plaice (*Pleuronectes platessa*) in studies undertaken around the UK, Ireland and France. Male and female total length given in cm and figures rounded. Please refer to the Appendix for more information.

Location	Male	Female	Reference
Lyme Bay Bristol Channel South-east Ireland	-	29-31	Horwood, 1990
North Sea	22	34	Rijnsdorp, 1989
Irish Sea	23	21	Doran, 2012
Cardigan Bay, Wales	-	22-23	Horwood, 1990
<b>Outside UK &amp; Ireland</b>			
Brittany, France	-	38-40	Brule, 1987

The current minimum size for plaice caught within the Southern IFCA district is 27 cm (total length). The reviewed literature infers that this is below the size at which female plaice mature in the North Sea and Lyme Bay (table 1). However, these figures must be treated with caution as the data was collected over 30 years ago. Van Keeken et al, (2004) analysed data from the North Sea over a 50-year period and found the SOM of female plaice had declined over time. In 1955, 50% of females aged 5-years matured at 32 cm compared to more recent measures in 2005 at 27 cm. This overall decline in SOM is thought to be partly due to genetics whereby females that mature at an early age and small size have a greater chance of reproducing before capture in a fishery. Their genes are subsequently passed on at a higher rate than females that mature at a later age and larger size, which may be fished before reproducing (Grift et al., 2003).

## Southern IFCA Fishery

### Fishing activity

Plaice is one of the most economically important species of flatfish in Europe (Seafish, 2013). It is mainly caught as part of a mixed fishery and as bycatch when targeting sole (ICES, 2019). In the Southern IFCA district plaice are an important commercial species and are caught using trawls, gill nets, entangling nets and hook and line. Plaice can also be taken as bycatch in pot and trap fisheries. Since January 2019 plaice are subject to the European Union's Landings Obligation therefore all caught plaice, irrespective of size, must be landed (exemptions apply for certain gear types). Smaller specimens that cannot be sold at market are used as bait for other fisheries.

### Recreational

Plaice is a popular angling fish due to providing good sport fishing and being highly valued as an edible fish. It is commonly caught by shore anglers between March and September due to the plaice migrating offshore to spawn in the winter months. Plaice caught in the spring tend to be undernourished as they are yet to fatten up after the spawning period (Rijnsdorp, 1989). Charter boats in the District offer specific trips to catch plaice throughout March to October and sometimes combine these trips with black sea bream fishing as the species are often targeted in the same areas. Plaice is the third most valued species for charter boats in the South Inshore Marine Planning Area (MPLA) (Devon and Severn, Southern and Sussex IFCA districts) after skates and rays and breams (MMO,2020a).

### Landings & Value of Fishery

Plaice is the most popular species of flatfish landed in the UK. In 2019, 3,900 tonnes was landed into UK ports by UK vessels, worth £7.4 million (MMO, 2019). The second most landed species of flatfish was megrim at 3,300 tonnes, worth £8.6 million.

Southern IFCA do not hold effort or catch data for plaice caught within the District, however landings data from the MMO can help indicate the scale of the fishery over time. In 2019 approximately 83 tonnes\* of plaice valued at £206,000\* was landed into ports across the Southern IFCA district. Between 2005 and 2010 landings remained between 45 – 62 tonnes per year (fig.1). From 2011 onwards landings fluctuated between 75 tonnes and a high of 125 tonnes in 2018 (with the exception of 49 tonnes in 2015). Based on the values provided in figure 1 price per tonne has increased from a low of £1,360 in 2012 to around £2,480 in 2019. However, these figures are only estimates as price per tonne based on national figures in 2019 was lower at £1,890.

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

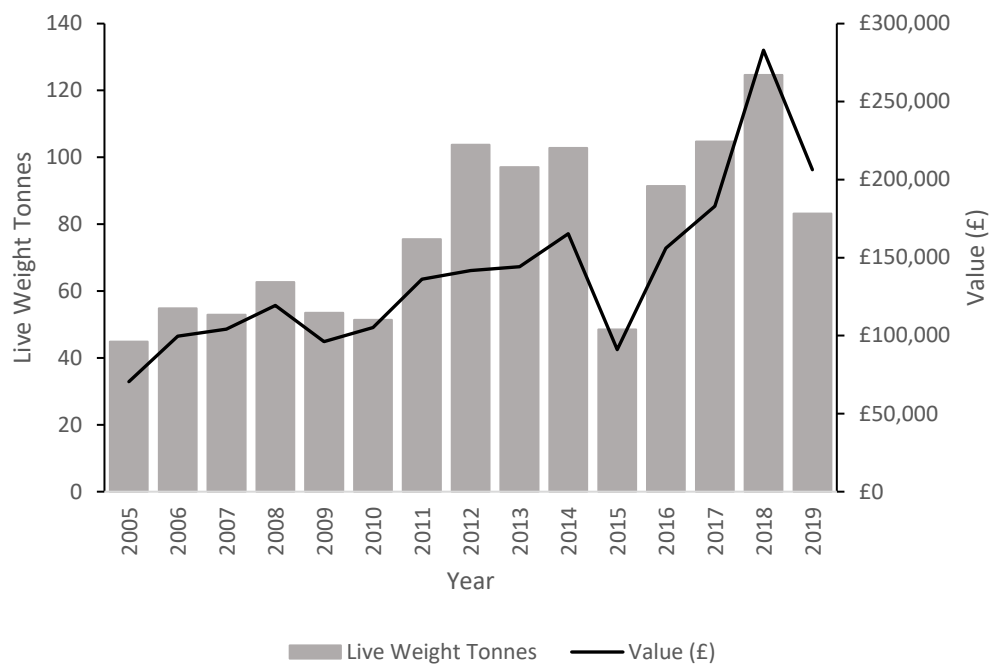


Figure 1. Landings of plaice (*Pleuronectes platessa*) in the Southern IFCA district from 2005 to 2019. Data sourced from the Marine Management Organisation (MMO)

Plaice stocks in the English Channel are healthy with the stock size above Maximum Sustainable Yield (MSY) (ICES, 2020a, 2020b). In the eastern English Channel fishing pressure has been at a sustainable level over the last few years with the exception of 2019 where there was a slight increase in effort causing fishing pressure to exceed MSY but still fall below precautionary levels (ICES, 2020a). Fishing pressure has been consistently higher over the last few years in the western English Channel compared to the eastern Channel but still within precautionary levels (ICES 2020b).

## Associated management

Commercial landings of plaice within the Southern IFCA district are subject to a minimum landing size of 27 cm (total length) under European Legislation (Regulation (EU) 2019/1241). The Southern IFCA Minimum Conservation Reference Size Byelaw, which is currently awaiting sign off by the Secretary of State, will apply the minimum size of 27 cm to all fishery participants in the district (including recreational). The minimum size for plaice is consistent around the coast of England as all IFCAs enforce the EU’s 27 cm minimum size. As is the case for Wales and the States of Jersey (table 2).

In addition to a minimum size plaice stocks within the District are managed by a single Total Allowable Catch (TAC) that covers both division 7.d and 7.e. In recent years the Common Fisheries Policy has introduced bycatch restrictions to reduce discarding. All quota species are subject to Landing Obligations meaning all catch must be landed and counted against quota regardless of size unless exemptions apply. Since 2019 plaice has been subject to the Landing Obligation, however exemptions based on

survival rates apply for plaice caught by otter and pair trawlers within Divisions 7.d and e and by danish seines in Division 7.d (MMO, 2020).

Table 2. Minimum Conservation Reference Sizes (MCRS) for plaice (*Pleuronectes platessa*) enforced by Inshore Fisheries and Conservation Authorities (IFCA) in England and by authorities in other regions. All measurements in cm for total length (L).

<b>IFCA</b>	<b>Minimum Conservation Reference Size (MCRS)</b>
Northumberland	27
North Eastern	27
Eastern	27
Kent & Essex	27
Sussex	27
Southern	27
Devon & Severn	27
Cornwall	27
Isles of Scilly	27
North Western	27
<b>Other</b>	
EU	27
States of Jersey Government	27
Wales	27

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## Appendix

Table A. Size at maturity estimates ( $L_{50}$ ) for plaice (*Pleuronectes platessa*) from studies undertaken in the UK, Ireland and France. Measurements given in cm for total length ( $L_{50}$ ).

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 ( $L_{50}$ )		Age at 50% maturity (years)		Size range of mature individuals		
		M	F	M	F		M	F	M	F	M	F	M	F	M		F
Lyme Bay	-	-	-	-	-	-	-	-	-	30	-	29-31	-	-	-	-	Horwood, 1990
Bristol Channel South-east Ireland	-	-	-	-	-	-	-	-	-	-	-	29-31	-	-	-	-	Horwood, 1990
North Sea	-	-	-	-	-	5042	2772	2270	-	-	21.9	33.9	-	-	-	-	Rijnsdorp, 1989
Irish Sea	2342	-	-	9-40	9-51	-	-	-	-	-	23	21	3	3	-	-	Doran, 2012
Cardigan Bay, Wales	-	-	-	-	-	-	-	-	-	20	-	22-23	-	-	-	-	Horwood, 1990
<b>Outside UK &amp; Ireland</b>																	
Brittany	-	-	-	-	-	1122	435	687	-	-	-	38-40	-	4	-	-	Brule, 1987