

Small-eyed ray

(Raja microocellata)

Summary

Size (total length)	Max. 91 cm (Ebert and Stehmann, 2013)
Lifespan	Unknown
Size of maturity (DW₅₀)	49-55 cm
Fecundity	54-61 eggs (Ryland and Ajayi, 1984)
Reproductive frequency	Annual
IUCN Status	Near Threatened (Ellis, 2009)
Capture methods	Bycatch in nets, trawls, dredges
Minimum Conservation Reference Size	40 cm (disc width)
Reference Size	20 cm (detached wing)
Fishing Season	Year round



Description

The small-eyed ray (*Raja microocellata*) is relatively rare throughout most of its restricted range along the Atlantic coasts of Northwest Europe from Gibraltar to the British Isles. It is occasionally reported in the North Sea and Irish Sea but is more frequently encountered in the Bristol Channel where it is locally abundant (Ellis, 2009). Low numbers of small-eyed ray are caught in the English Channel (Ellis, 2009).

Found on the continental shelf in depths less than 100 m the small-eyed ray favours sandbanks and sandy bays (Ellis, 2009). Juveniles tend to feed upon small crustaceans and progress to bony fish such as dragonets and sand eels as they increase in size as adults (Ebert and Stehmann, 2013).

Reproductive Life history

Skates and rays grow slowly, mature late and produce a limited number of young compared to fin fish. Following internal fertilisation, female small-eyed rays deposit 54-61 eggs with the spawning season spanning from April to December (Ryland and Ajayi, 1984). However, egg laying activity peaks between June and September (Ryland and Ajayi, 1984). Egg capsules are laid on the seabed and embryos take seven months to develop before hatching and emerging at around 10-13 cm in length (Ebert and Stehmann, 2013). Juveniles remain in very shallow water over sandy beaches and migrate further offshore as they become larger (Ebert and Stehmann, 2013).

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. SOM for skates and rays is commonly accepted as the total length (L) at which 50% of a population are mature and is referred to as the L_{50} . Some studies may also measure SOM based on the total disc width (DW) of a specimen (wing tip to wing tip). Table 1 includes total length-disc width conversions based on conversion factors in McCully et al, (2012).

Maturity in skates and rays is determined using criteria to define maturity stages either externally or internally. External observations are based upon analysing the length of claspers in males and the cloaca in females in relation to total body length. Internal examination includes macroscopic inspection of reproductive organs e.g. coiling of the vas deferens and development of the testes in males; development of the ovaries, ova and nidamental glands in females (Saglam and Ak, 2012).

Two studies conducted in the UK and Jersey found the SOM for small-eyed ray to be between 68-78 cm (table 1.). Females reached 50% maturity at a larger size of 78 cm, 10-11 cm larger than males. The smallest mature male and female observed by McCully et al. (2012), in ecoregions of the Celtic Sea and North Sea, were 66 cm and 73 cm, respectively, and the largest immature small-eyed rays were 74 cm and 83 cm, respectively. The smallest mature male caught in Jersey was 64 cm (Ellis et al., 2011) whilst a study conducted in Carmarthen Bay, Wales found the smallest mature individuals to be 58 cm for both male and female (Ryland and Ajayi, 1984). Age at maturity and longevity are unknown.

Table 1. Size at maturity estimates (L_{50} / DW_{50}) for small-eyed ray (*Raja microocellata*) in studies undertaken in the British Isles. Male and female total length (L_{50}) has been converted to disc width (DW_{50}) using conversion factors ($DW=0.7193L_{50} + -0.9008$) presented in McCully et al., 2012. Measurements given in cm and figures rounded. Refer to the Appendix for more information.

Location	L_{50}		DW_{50}		Reference
	Male	Female	Male	Female	
UK*	69	78	49	55	McCully et al., 2012
Jersey	68	-	48	-	Ellis et al., 2011

*ecoregions of Celtic Sea and North Sea combined, however samples predominately from the Celtic Sea

The minimum size for small-eyed ray in the Southern IFCA district is 40 cm and refers to disc width (wing tip to wing tip) rather than total length. Using the CEFAS conversion presented in McCully et al. (2012) the current minimum size for total length is around 57 cm. The literature review infers the SOM of small-eyed ray in the British Isles is 15 cm larger (55 cm DW) than the current minimum size of 40 cm DW (table 1). Therefore, small-eyed ray within the Southern IFCA district is at risk of removal from the fishery before having an opportunity to reproduce at least once.

Southern IFCA Fishery

Fishing activity

The small-eyed ray is not a commercially targeted species within the Southern IFCA district due to its patchy distribution in the English Channel, however it is taken as bycatch in trawl and set net fisheries (Ellis, 2009; ICES, 2018).

Like all species of skates and rays (excluding undulate rays) the wings of the retained catch are usually removed at sea rather than landed whole because it is not always practical to retain the whole fish due to the size and market prices are based upon wing weight. The remaining parts of the tail and central body cavity aren't wasted as they can be used as bait for crab pots.

Recreational

Despite not being a commercially important species in the District, the small-eyed ray is a popular recreational fish for both shore and sea-based angling. Mainly targeted from early May until September many charter boats provide specialised trips to target skates and rays and highlight the opportunity to catch small-eyed rays.

A recent review undertaken by the MMO to map recreational sea angling activity in England found skates and rays to be the most valued species for charter boats operating in the South Inshore marine planning area (Devon and Severn, Southern and Sussex IFCA districts) and amongst the top three most valued species across England (MMO, 2020a). The vast majority of skates and rays caught recreationally are released.

Landings & Value of Fishery

In 2019, 2,000 tonnes of skates and ray (mixed species) worth £2.6 million was landed by UK vessels into England (MMO,2019). Since 2017 landings have increased by 200 tonnes year-on-year, previous to this, landings remained around 1,600 tonnes between 2014 to 2017. Southern IFCA do not hold effort or catch data for the small-eyed ray fishery but landings data from the MMO can help indicate the scale of the commercial fishery within the Southern IFCA district over time. Figure 1. shows landings and value of small-eyed ray into ports within the district since 2009. Before this point small-eyed ray landings were recorded under a general category of skates and rays.

In 2019 approximately 4 tonnes of small-eyed ray worth £5,275* was landed into ports across the SIFCA district (figure 1). Over the last four years landings have declined from 13-15 tonnes per year (2012-2015) to between 2-4 tonnes per year (2016-2019). The reduction in landings corresponds with the 2016 introduction of the EU non-retention policy in Division 7e for small-eyed ray (ICES, 2018). The value of the small-eyed ray has fallen in recent years to around £1,250 per tonne compared to a height of around £2,100 per tonne in 2011.

*these figures represent 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.

The value of the recreational small-eyed ray fishery and the quantity of retained catches in the district is not known.

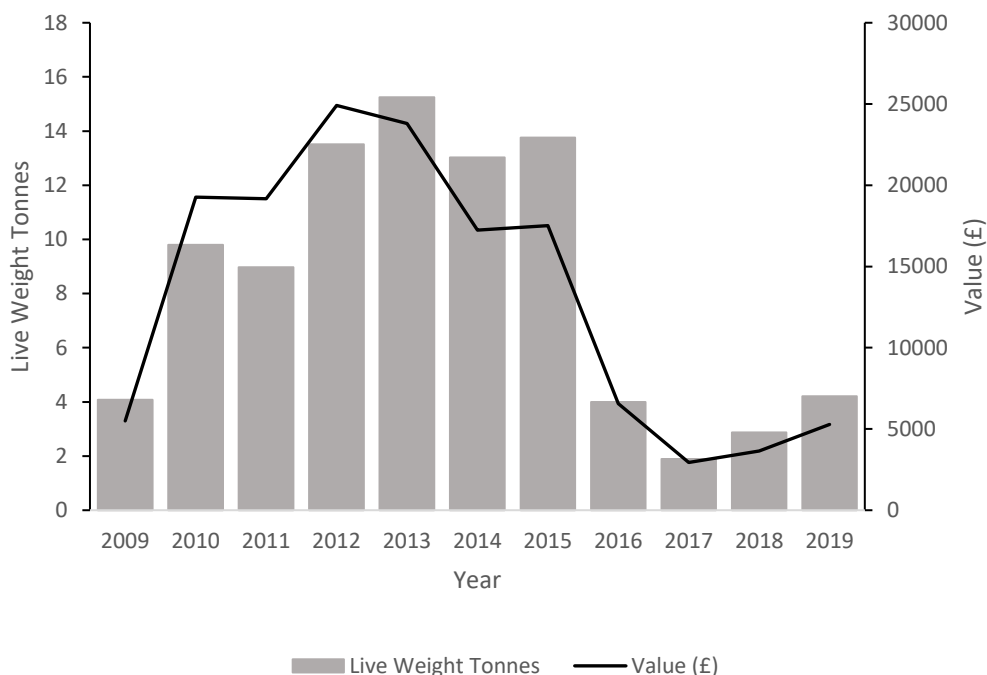


Figure 1. Landings of small-eyed ray (*Raja microocellata*) in the Southern IFCA district from 2009 to 2019. Data sourced from the Marine Management Organisation (MMO).

There is no assessment for the small-eyed ray stock in the English Channel, therefore ICES advise a precautionary approach to landings and recommends no more than 40 tonnes of small-eyed ray should be landed in each of the years 2021 and 2022 from divisions 7.d and 7.e (ICES, 2020). The species across its range is assessed by the IUCN as Near Threatened but close to meeting criteria for Vulnerable due to high levels of exploitation (Ellis, 2009).

Associated management

Small-eyed rays caught within the Southern IFCA district are subject to a minimum size byelaw ‘Skates and Rays – Minimum Size’. The byelaw prohibits the retainment of any species of skate or ray that measures less than 40 cm between the extreme tips of the wings or any detached wing that measures less than 20 cm in its maximum dimension. There are no minimum landing sizes for skates and rays on a national/EU level but some IFCA’s have introduced minimum size byelaws within their districts (table 2). Kent and Essex IFCA’s minimum size for skates and rays is 40 cm measured from the extreme tips of the wings and 19 cm for a detached wing measured in a straight line from the tip of the wing to the centre of the cut edge. North Western IFCA apply a minimum size within a certain area of their district, as introduced under the former Cumbria Sea Fisheries Committee District. Any skate or ray caught from Havrigg Point in Cumbria to the Scottish border in the Solway Firth must not measure

less than 45 cm between the extreme tips of the wings and 22 cm based on maximum dimensions for detached wings.

Small-eyed rays are part of a mixed Total Allowable Catch (TAC) under the European Union's Common Fisheries Policy (CFP). In 2016 non-retention restrictions were applied for small-eyed ray in Division 7e (Western Channel) (ICES, 2018). Within recent years the CFP 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. Skates and rays (excl. undulate ray) caught in the English Channel are currently exempt of the Landings Obligation based on their survival rates (MMO, 2020b). Cefas have assessed the health condition of 17,259 individual skates and rays caught as bycatch from various projects and found 100%, 98% and 95% survived fishing capture in longline, otter trawl and net fisheries, respectively (Cefas, 2018).

Table 2. Minimum Conservation Reference Size (MCRS) for small-eyed ray (*Raja microocellata*) in Inshore Fisheries and Conservation Authority (IFCA) Districts in England. All measurements in cm measured wing tip to wing tip.

IFCA	Minimum Landing Size (MLS) (cm)	
Northumberland	-	
North Eastern	-	
Eastern	-	
Kent & Essex	40	Detached wing: 19*
Sussex	-	
Southern	40	Detached wing: 20*
Devon & Severn	-	
Cornwall	-	
Isles of Scilly	-	
North Western	45	Detached wing: 22 * **

*Please note detached wings are measured differently depending on the byelaw

**North Western IFCA MLS only applies to a certain are of the district (from Haverigg Point in Cumbria to the Scottish border in the Solway Firth)

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Appendix

Table A. Size at maturity estimates (L_{50}/DW_{50}) for small-eyed ray (*Raja microcellata*) in studies undertaken in the British Isles. Male and female total length (L_{50}) has been converted to disc width (DW_{50}) using conversion factors ($DW = 0.7193L_{50} + -0.9008$) presented in McCully et al., 2012. Measurements given in cm. Number of individuals in brackets represents the number of mature individuals within the sample.

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 50% maturity (DW_{50})		Size range of mature individuals		
		M	F	M	F		M	F	M	F	M	F	M	F	M		F
Carmarthen Bay, Wales	2592	1218	1374	-	-	-	-	-	58	57.5	-	-	-	-	-	-	Ryland and Ajayi, 1984
UK	1436	703	733	13-80	12-85	1438 (91)	705 (65)	733 (26)	66	73	68.9	77.9	48.6	55.1	-	-	McCully et al., 2012
Jersey	521	244	275	37-89		180	180	0	64	-	68	-	48	-	-	-	Ellis et al., 2011