

Cuckoo ray

(*Leucoraja naevus*)

Summary

Size (total length)	Max. 75 cm Female 68 cm Male (Ebert and Stehmann, 2013)
Lifespan	12 years (Du Buit, 1976)
Size of maturity (DW₅₀)	29-34 cm
Fecundity	90 – 100 egg capsules
Reproductive frequency	Year round
IUCN Status	Least Concern (Ellis et al., 2015)
Capture methods	Bycatch – nets, dredge, trawl
Minimum Conservation	40 cm (disc width)
Reference Size	20 cm (detached wing)
Fishing Season	All year



Description

Distributed across North Eastern Atlantic waters from western North Africa to the British Isles and throughout the Mediterranean, the cuckoo ray (*Leucoraja naevus*) is common in the Irish Sea, Celtic Sea and northern North Sea (Ebert and Stehmann, 2013; Ellis et al., 2005). It is rarely encountered in the eastern English Channel and southern North Sea (Ellis et al., 2005).

The cuckoo ray inhabits gravel and coarse sand seabeds and is typically found further offshore than other species of skate, such as the thornback and spotted ray, at depths ranging from 30 to 200 m (Ebert and Stehmann, 2013; Ellis et al., 2015). Juvenile cuckoo rays feed on small crustaceans and polychaete worms whilst adults target bony fish such as gobies and sand eels (Ebert and Stehmann, 2013).

Reproductive Life history

Like all skate species the cuckoo ray is oviparous (egg laying) and lays eggs on the seabed after internal fertilisation. The cuckoo ray is considered to be one of the most fecund skate species as it can reproduce throughout the year and deposits around 90-100 eggs (Walker, 1999; Du Buit, 1976; Ebert and Stehmann, 2013). Although there is no defined reproductive season maximum spawning activity has been observed in populations studied in Portuguese continental waters between January and May (Maia et al., 2012). After eight months of development juvenile cuckoo rays hatch at 9-10cm long (Clark, 1922; Ebert and Stehmann, 2013). The cuckoo ray grows to a maximum total length of 75 cm with a maximum of 73 cm recorded for populations in the North Sea (Ebert and Stehmann, 2013; Walker, 1998). It is one of the smaller skate species.

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).

Size of maturity for the cuckoo ray has been recorded between 49-60 cm total length in studies undertaken around the British Isles (table 1). In the North Sea SOM ranged between 49-55 cm for females and 51-55 cm for males. SOM is slightly larger in populations sampled in the Celtic and Irish Sea at 57 cm and 56-59 cm for males and females respectively. Combined, populations in the Celtic Sea and North Sea reach 50% maturity at 56 cm male and 59 cm female (McCully et al., 2012). A study undertaken in Portuguese waters also found SOM to be of a similar size at 55-57cm for females and males respectively (Maia, 2010). The smallest mature male recorded in the British Isles was 48 cm and smallest female 45 cm whilst the largest immature male and female were measured at 64 cm and 65 cm (McCully et al., 2012).

Two of the studies outlined in table 1 assessed age at maturity and found both male and female cuckoo ray in the Irish Sea mature at around 4 years of age whilst maturity is reached later in Portuguese waters at around 7 years for both sexes (Gallagher et al., 2005; Maia, 2010). The cuckoo ray, unlike other species of elasmobranchs, does not display dimorphism in SOM, where-by the male matures at a smaller size and younger age than the female. This may be because the cuckoo ray is a smaller species of skate and dimorphism is more applicable to larger species where the female grows slowly.

Table 1. Size at maturity estimates (L_{50}/DW_{50}) for cuckoo ray (*Leucoraja naevus*) in studies undertaken around and outside the British Isles. Male and female total length (L_{50}) has been converted to disc width (DW_{50}) using conversion factors ($DW=0.5840L_{50} + -1.0050$) 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	
North Sea	51	54	29	30	McCully et al., 2012
North Sea	-	49-55	-	28-31	Steenberg, 1994
North Sea	55	55	31	31	Walker, 1999
Celtic Sea	57	60	32	34	McCully et al., 2012
Irish Sea	57	56	32	32	Gallagher et al., 2005
UK*	56	59	32	34	McCully et al., 2012
Outside British Isles					
Portugal	57	55	32	31	Maia, 2010

*ecoregions of Celtic Sea and North Sea combined

The minimum size for cuckoo 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 70 cm. The literature review infers that the SOM of cuckoo ray is below the SIFCA minimum size at 49-60 cm (L_{50}) / 29-34 cm (DW_{50}) (table 1). Therefore, the current minimum size byelaw does provide protection for immature cuckoo rays and the majority of mature individuals as maximum size is 68-75 cm total length for males and females respectively (Ebert and Stehmann, 2013).

Southern IFCA Fishery

Fishing activity

Cuckoo ray is not a key commercial species in the Southern IFCA district or in the UK in general due to it being smaller than other skate species and less valuable (ICES, 2018). Its distribution mostly lies outside of the Southern IFCA district but it may be encountered in the far west of the district. In areas where cuckoo ray is more abundant (Celtic Sea) it is taken as bycatch in demersal gill netting or more commonly as bycatch in offshore trawl and dredge fisheries (ICES, 2018).

Recreational

Due to the cuckoo rays' distribution and presence in deeper offshore waters it is not targeted by recreational anglers in the district.

Landings & Value of Fishery

As previously outlined, cuckoo ray is not a key species within the Southern IFCA district. Figure 1. demonstrates the low level of landings of cuckoo ray recorded as being caught in the district (ICES rectangles 30E7 and 30E8). In 2019 no landings from the district were recorded and previous to 2019 all landings were minimal - below half a tonne.

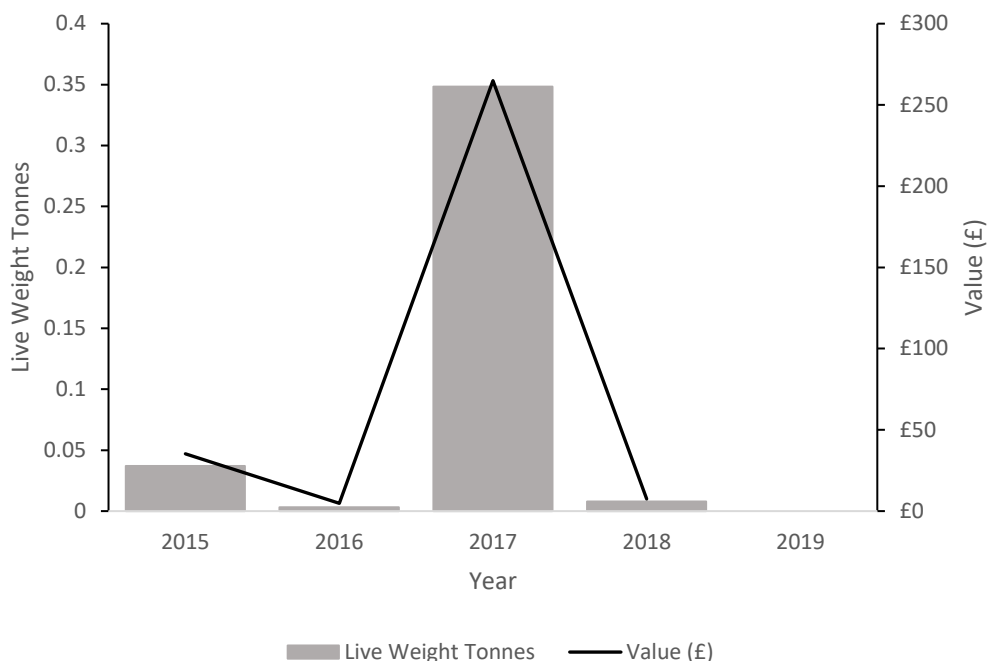


Figure 1. Landings of cuckoo ray (*Leucoraja naevus*) in the Southern IFCA district from ICES rectangles 30E7 and 30E8 from 2015 to 2019. Data sourced from the Marine Management Organisation (MMO).

ICES advice outlines cuckoo ray stock size in subarea 7 is increasing however the fishing pressure status relative to reference points is unknown, therefore a precautionary approach was applied when quantifying advised landings for 2021 and 2022 (no more than 3150 tonnes per year) (ICES, 2020).

Associated management

Cuckoo ray 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 IFCAs 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.

Cuckoo rays are part of a mixed Total Allowable Catch (TAC) under the European Union's Common Fisheries Policy (CFP). 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 rays) 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 cuckoo ray (*Leucoraja naevus*) 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 cuckoo ray (*Leucoraja naevus*) in studies undertaken around and outside the British Isles. Male and female total length (L_{50}) has been converted to disc width (DW_{50}) using conversion factors ($DW = 0.5840L + -1.0050$) 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})		
		M	F	M	F		M	F	M	F	M	F	M		F
North Sea	238	109	129	17-63	15-62	238 (42)	109 (28)	129 (14)	48	45	50.8	53.6	28.7	30.3	McCully et al., 2012
North Sea	76	30	46	-	-	-	-	-	-	-	-	49-55	-	28-31	Steenbergen, 1994
North Sea	113	51	62	-	-	-	-	-	-	-	54.95	55.03	31	31	Walker, 1999
Celtic Sea	1653	834	819	11-72	10-69	1654 (161)	835 (100)	819 (61)	49	51	57.3	59.8	32.45	33.9	McCully et al., 2012
Irish Sea	560	351	209	-	-	-	-	-	-	-	56.8	56.2	32.2	31.8	Gallagher et al., 2005
UK	1891	943	948	11-72	10-69	1892 (203)	944 (128)	948 (75)	48	45	56.4	59.4	31.9	33.7	McCully et al., 2012
Outside British Isles															
Portugal	865	-	-	-	-	252	101	151	50.5	47.3	57	55	32.3	31.1	Maia, 2010