



Skates & Rays

Size at Maturity Review

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Introduction

Southern Inshore Fisheries and Conservation Authority (IFCA) has undertaken an extensive literature review, using published and grey literature, based upon 50% size of sexual maturity for commercial and recreational species in the Southern IFC District (“the District”). The information gathered will help inform the IFCA’s Minimum Conservation Reference Sizes (MCRS) Review.

Many commercial species caught within the District are subject to a MCRS, previously known as Minimum Landing Size or Minimum Legal Size. This statutory measure prevents fish or shellfish below a set size from being removed from the fishery and is therefore recognised as an effective tool for the sustainable management of fisheries. A MCRS for a species is often set based upon the size at which 50% of the population reaches maturity. This ensures at least 50% of juveniles have an opportunity to sexually mature and reproduce at least once before potential capture. Additional factors such as market size, existing legislation, stock status and reproductive strategies can also influence whether and how a MCRS is set.

The following tables (1-7) summarise the literature reviewed for 50% size at maturity (SOM) for 7 species of skate and ray. Tables highlight key information from studies including study location, total number of individuals sampled overall, size range sampled, total number of individuals used to assess size at maturity, size of smallest mature individual, size at 50% maturity, size at 100% maturity, and age at 50% maturity. Information for each species varies depending on the available data.

Data for 6 of the 7 species listed below has been incorporated into detailed ‘Species Profiles’ where best available evidence on reproductive biology, life history and the social and economic value of each species has been summarised. Species with a Profile have been indicated below and linked to the Southern IFCA website where all Species Profiles can be downloaded and viewed.

Important information to note about summarised data:

- Maturity values have been rounded
- Where possible data has been extracted from peer-reviewed scientific literature
- All values are recorded in **cm**
- L_{50} - Length at 50% maturity; DW_{50} - Disc width at 50% maturity
- Size at maturity estimates may vary between studies due to differences in maturity criteria used, sampling period and sample size
- Species reviewed are listed under Southern IFCA’s MCRS Byelaw. Consultation for this Byelaw took place in 2019/2020 and the Byelaw was made by the Authority in June 2020. At the time of writing this Byelaw is awaiting sign off by the Secretary of State.
- All efforts have been made to review the available literature as thoroughly as possible, however this is not an exhaustive list of maturity data. If you know of a relevant study, please provide details and the information can be incorporated into the review.

Blonde ray (*Raja brachyura*)

MCRS: 40 cm Disc Width [Species Profile](#)
20 cm Detached Wing

Male and female total length (L_{50}) has been converted to disc width (DW_{50}) using conversion factors ($DW=0.7125L_{50} + -0.3288$) presented in McCully et al., 2012. Number of individuals in brackets represents the number of mature individuals within sample.

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data											Reference
				Size range (cm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (cm)		Size at 50% maturity (L_{50}) (cm)		Size at 50% maturity (DW_{50}) (cm)		Age at 50% maturity		
		M	F	M	F		M	F	M	F	M	F	M	F	M	F	
UK	743	357	386	13-100	12-102	746 (42)	359 (25)	387 (17)	55	60	78	83	55	59	-	-	McCully et al., 2012
Ireland	268	127	141	-	-	-	-	-	-	-	82	84	58	59	4.6	5.5	Gallagher et al., 2005
Jersey	184	93	90	26-114		81	81	0	82	-	-	-	-	-	-	-	Ellis et al., 2010
Sardinia - Italy	1792	862	930	18-97	13 - 106	-	-	-	75	85	81	87	57	62	10	14	Porcu et al., 2014

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Cuckoo ray (*Raja naevus*)

MCRS: 40 cm Disc Width

[Species Profile](#)

20 cm Detached Wing

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. Number of individuals in brackets represents the number of mature individuals within sample.

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data										Reference	
				Size range (cm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (cm)		Size at 50% maturity (L_{50}) (cm)		Size at 50% maturity (DW_{50}) (cm)		Age at 50% maturity		
				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	51	54	29	30	-	-	McCully et al., 2012
North Sea	76	30	46	-	-	-	-	-	-	-	-	49-55	-	28-31	-	2-3	Steenbergen, 1994
North Sea	113	51	62	-	-	-	-	-	-	-	55	55	31	31	6.8	7.4	Walker, 1999
Celtic Sea	1653	834	819	11-72	10-69	1654 (161)	835 (100)	819 (61)	49	51	57	60	32	34	-	-	McCully et al., 2012
Irish Sea	560	351	209	-	-	-	-	-	-	-	57	56	32	32	4.2	4.3	Gallagher et al., 2005
UK	1891	943	948	11-72	10-69	1892 (203)	944 (128)	948 (75)	48	45	56	59	32	34	-	-	McCully et al., 2012
Outside British Isles																	
Portugal	865	-	-	-	-	252	101	151	50.5	47.3	57	55	32	31	-	-	Maia, 2010

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Small-eyed ray (*Raja microcellata*)

MCRS: 40 cm Disc Width [Species Profile](#)
20 cm Detached Wing

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. Number of individuals in brackets represents the number of mature individuals within sample.

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Total No. of individuals	No. of individuals (n)		Size at Maturity Data						Reference		
				Size range (cm)			M	F	Size of smallest mature individual (cm)		Size at 50% maturity (L_{50}) (cm)		Size at 50% maturity (DW_{50})			Age at 50% maturity	
		M	F	M	F				M	F	M	F	M	F		M	F
Carmarthen Bay, Wales	2592	1218	1374	-	-	-	-	-	58	58	-	-	-	-	-	-	Ryland and Ajayi, 1984
UK	1436	703	733	13-80	12-85	1438 (91)	705 (65)	733 (26)	66	73	69	78	49	55	-	-	McCully et al., 2012
Jersey	521	244	275	37-89		180	180	0	64	-	68	-	48	-	-	-	Ellis et al., 2011

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Spotted ray (*Raja montagui*)

MCRS: 40 cm Disc Width [Species Profile](#)
20 cm Detached Wing

Male and female total length (L_{50}) has been converted to disc width (DW_{50}) using conversion factors ($DW=0.6605L_{50} + 0.2841$) presented in McCully et al., 2012. Number of individuals in brackets represents the number of mature individuals within sample.

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data										Reference	
				Size range (cm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (cm)		Size at 50% maturity (L_{50}) (cm)		Size at 50% maturity (DW_{50}) (cm)		Age at 50% maturity		
				M	F		M	F	M	F	M	F	M	F	M		F
UK*	3675	1900	1775	10-67	10-76	3686 (394)	1911 (310)	1775 (84)	40	49	51	63	34	42	-	-	McCully et al., 2012
North Sea and English Channel	587	-	-	-	-	-	-	-	-	-	60	60	40	40	-	-	Walker et al., 1997
North Sea, Netherlands	109	55	54	-	-	-	-	-	-	-	58-64	-	39-43	-	-	Steenbergen, 1994	
Irish Sea	468	274	194	-	-	-	-	-	-	-	54	57	36	38	3.4	4.1	Gallagher et al., 2005
Carmarthen Bay, Wales	2005	986	1019	-	-	-	-	-	56	57	-	-	-	-	-	-	Ryland, 1984

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Walker, P., Howlett, G., and Millner, R., 1997. Distribution, movement and stock structure of the three ray species in the North Sea and eastern English Channel. *ICES Journal of Marine Science*, 54: 797-808

Thornback ray (*Raja clavata*)

MCRS: 40 cm Disc Width [Species Profile](#)
20 cm Detached Wing

Male and female total length (L_{50}) has been converted to disc width (DW_{50}) using conversion factors ($DW=0.6572L_{50} + 0.9095$) presented in McCully et al., 2012.

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data											Reference
				Size range (cm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (cm)		Size at 50% maturity (L_{50}) (cm)		Size at 50% maturity (DW_{50}) (cm)		Age at 50% maturity		
				M	F		M	F	M	F	M	F	M	F	M	F	
North Sea and English Channel	5714	-	-	-	-	-	-	-	-	-	65	70	44	47	-	-	Walker et al., 1997
North Sea	1410	696	705	13-94	13-92	942	843*	99*	47	57	-	74	-	49	-	-	McCully et al., 2012
Greater Thames Estuary North Sea	6050	-	-	14-91	11-99	-	-	-	54	-	67-68	-	45-46	-	-	-	Ellis et al., 2008
Caernarfon Bay Wales	189	54	135	-	-	-	-	-	-	-	59	71	40	47	4.9	5.3	Whittamore and McCarthy, 2005
Celtic Sea	4795	2427	2368	10-89	10-98	383	276*	107*	56	47	-	78	-	52	-	-	McCully et al., 2012
Irish Sea	258	165	93	-	-	-	-	-	-	-	66	72	44	48	6.1	6.1	Gallagher et al., 2005
UK	6196	3123	3073	10-94	10-98	1325	1119	206	47	47	67	77	45	51	-	-	McCully et al., 2012
Outside British Isles																	
Black Sea Turkey	52	-	-	48-95	34-88	-	-	-	57	-	64	67	43	45	-	-	Demirhan et al., 2005
Black Sea Turkey	230	99	131	14-92	16-93	230	99	131	68	72	72	75	48	50	-	-	Saglam and Ak, 2011
Adriatic Sea Italy	364	183	181	12-95		-	-	-	47	48	59	61	40	41	-	-	Krstulovic Šifner et al., 2009
Gulf of Gabes	1280	530	750	15-89	14-110	-	-	-	55	72	67	81	45	54	5.3	7	Kadri et al., 2014

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Undulate ray (*Raja undulata*)

Minimum Landing Size : 78 cm total length

[Species Profile](#)

Maximum Landing Size: 97 cm total length

Male and female total length (L_{50}) has been converted to disc width (DW_{50}) using conversion factors ($DW=0.5648L_{50} + 4.7130$) presented in McCully et al., 2012. Number of individuals in brackets represents the number of mature individuals within sample.

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data										Reference	
				Size range (cm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (cm)		Size at 50% maturity (L_{50}) (cm)		Size at 50% maturity (DW_{50}) (cm)		Age at 50% maturity		
		M	F	M	F		M	F	M	F	M	F	M	F	M		F
UK	91	58	33	22-89	17-60	119 (29)	85 (28)	34 (1)	80	79	82	-	51	-	-	-	McCully et al., 2012
Outside British Isles																	
Bay of Biscay	1805	-	-	-	-	431 (191)	431 (191)	-	74	-	80	-	50	-	-	-	Stephan et al., 2013
Portugal south coast	187	94	93	23-83	19-88	35	19	16	71	76	74	76	46	48	7.7	9	Coelho and Erzini, 2006
Portugal, Peniche & Matosinhos	474	213	261	24-96	37-96	-	-	-	74	74	77	86	48	53	7.6	8.7	Serra-Pereira et al., 2015

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Common stingray (*Dasyatis pastinaca*)

MCRS: 40 cm Disc Width

20 cm Detached Wing

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data										Reference	
				Size range (cm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (cm)	Size at 50% maturity (L ₅₀) (cm)		Size at 50% maturity (DW ₅₀) (cm)		Age at 50% maturity			
				M	F		M	F		M	F	M	F	M	F		M
Iskenderun Bay Turkey	256	146	110	20-73	20.5-88	61	43	18	37	41	43	46	-	-	-	-	Ismen, 2003
Aegean Sea	-	-	-	40-110	37.5-114	86	33	53	53	53.5	62.5		-	-	6	7	Cigdem Yigin & Ismen, 2012
Cilician basin North-eastern Mediterranean	346	151	195	14.6-69.5	18.7-100.9	-	-	-	-	-	45	49	-	-	-	-	Yeldan et al., 2009
Gulf of Gabes	383	171	212	14.2-47*	12.7-69*	-	-	-	31.4*	39*	-	-	33	40	-	-	Saadaoui et al., 2015

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