

# Fin fish

## 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 (1-13) summarise the literature reviewed for 50% size at maturity (SOM) for 18 species of finfish that are listed in Southern IFCA’s ‘Minimum Conservation Reference Size Byelaw’. 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 3 of the 18 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 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 **mm**
- L<sub>50</sub> - Length at 50% maturity
- FL – Fork length measured instead of total length
- 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.

## Ballan wrasse (*Labrus bergylta*)

MCRS: 180 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data								Reference	
				Size range (mm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (mm)		Size at 50% maturity (L <sub>50</sub> ) (mm)		Size at sexual inversion (mm)		Age at 50% maturity (years)
		M	F	M	F		M	F	M	F	M	F			M
Northern Europe	-	-	-	-	-	-	-	-	-	-	280*	160-180*	-	6-9	Darwall et al., 1992

\*Values from a review of the life histories of wrasse species. Review does not state whether figures refer to 50% maturity.

### References

Darwall, W.R.T., Costello, M.J., Donnelly, R., and Lysaght, S., 1992. Implications of lifehistory strategies for a new wrasse fishery. *Journal of Fish Biology*, 41: 111–123

## Black seabream (*Spondyliosoma cantharus*)

MCRS: 230 mm [Species Profile](#)

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data								Reference		
				Size range (mm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (mm)		Size at 50% maturity (L <sub>50</sub> ) (mm)		Size at sexual inversion (mm)		Age at 50% maturity (years)	
		M	F	M	F		M	F	M	F	M	F			M	F
English Channel/ Bay of Biscay	-	-	-	-	-	228	-	-	-	-	-	200	350	-	2	Perodou and Nedelec, 1980
English Channel	-	-	-	-	-	-	-	-	-	-	-	220	-	-	3	Soletchnik, 1983
Sagres Portugal	368	-	-	200 - 360		-	-	-	-	220	200	250	2 - 3		Goncalves and Erzini, 2000	
Peniche Portugal	1530	-	-	-	-	773	-	-	200	180	-	180	260	-	-	Neves et al., 2018

Gulf of Annaba Algeria	501	-	-	-	-	-	-	-	-	-	210	190	240	3	2	Boughamou et al., 2015
Tunisia	369	15	330	-	-	-	-	-	17	15	-	180	190	-	4	Mouine et al., 2011
Canary Islands	28,527	-	-	-	-	1276	-	-	-	-	230	170	-	3	2	Pajuelo and Lorenzo, 1999

## References

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- Pajuelo, J.G., and Lorenzo, J.M., 1999. Life history of black seabream, *Spondyliosoma cantharus*, off the Canary Islands, Central-east Atlantic. *Environmental Biology of Fishes*, 54: 325–336
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- Soletchnik, P., 1983. Gestion de la dorade grise, elements de biologie. *Oceanis* 9: 23-32

## Cod (*Gadus morhua*)

MCRS: 350 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data								Reference	
				Size range (mm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (mm)		Size at 50% maturity L <sub>50</sub> (mm)		Age at maturity (years)		
				M	F		M	F	M	F	M	F	M		F
Inshore North Sea	-	-	-	-	-	-	-	-	-	-	-	360	-	2.7	Yoneda and Wright, 2004
Offshore North Sea	-	-	-	-	-	-	-	-	-	-	-	480	-	2.9	Yoneda et al., 2004
North Sea	81	-	81	-	-	-	-	-	-	-	-	620	-	3.8	Thorsen et al., 2010
North Sea	968	-	-	-	-	-	-	-	-	-	530	600	-	-	Oosthuizen and Daan, 1974
North Sea	-	-	-	-	-	-	-	-	-	-	500	600	3	4	Pawson, 2009
North Sea	-	-	-	-	-	-	-	-	-	-	700		3.8		Jennings et al., 1998
North Sea	-	-	-	-	-	-	-	-	-	-	380		2.1		Froese & Sampang, 2013
Irish Sea	51	-	51	-	-	-	-	-	-	-	-	360	-	1.6	Thorsen et al., 2010
Irish Sea	-	-	-	-	-	-	-	-	-	-	610		2.5		Jennings et al., 1998
Irish Sea	3849	-	-	-	-	905	-	-	-	-	450		2*		Armstrong et al., 2004

\*maturity found to be predominantly a function of age. All specimens that were sampled were mature at 3 years old.

### References

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- Thorsen, A., Witthames, P.R., Marteinsdóttir, G., Nash, R.D.M., Kjesbu, O.S., 2010. Fecundity and growth of Atlantic cod (*Gadus morhua* L.) along a latitudinal gradient. *Fisheries Research*, 104: 45-55
- Yoneda, M., and Wright, P.J., 2004. Temporal and spatial variation in reproductive investment of Atlantic cod *Gadus morhua* in the northern North Sea and Scottish west coast. *Marine Ecology Progress Series*, 276: 237-248

## Conger eel (*Conger conger*)

MCRS: 580 mm [Species Profile](#)

There is extremely limited data on the size of maturity for the European conger eel as it is very difficult to sample mature females. One study undertaken in Algeria analysed 770 conger eels (n=450 female) and concluded size at first sexual maturity is 78 cm in males and 88 cm in females (Mazouz and Abi-Ayad, 2015). It is widely referenced that conger eels reach sexual maturity between 5 and 15 years of age but no studies could be found to confirm this.

### References

Mazouz, M., and Abi-Ayad, S-M.E-A., 2015. Contribution to the study of reproduction parameters of the European conger eel (*Conger conger*; Linnaeus, 1758) from the western Algerian Coasts, Oran Bay (Algeria). *International Journal of Scientific and Technology Research* 4 (9): 209-214

## Corkwing wrasse (*Symphodus melops*)

MCRS: 140 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Total No. of individuals	Size at Maturity Data								References	
				Size range (mm)			No. of individuals (n)		Size of smallest mature individual (mm)	Size at 50% maturity (L <sub>50</sub> ) (mm)		Age at 50% maturity (years)				
		M	F	M	F		M	F	M	F	M	F	M	F		
Northern Europe	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Darwall et al., 1992
Norway	3492	-	-	-	-	591	-	-	85	80	140	90	2	3	Matland, 2015	

\*Values from a review of the life histories of wrasse species. Review does not state whether figures refer to 50% maturity.

### References

Darwall, W.R.T., Costello, M.J., Donnelly, R., and Lysaght, S., 1992. Implications of lifehistory strategies for a new wrasse fishery. *Journal of Fish Biology*, 41: 111–123

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## European bass (*Dicentrarchus labrax*)

MCRS: 420 mm [Species Profile](#)

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data										Reference	
				Size range (mm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (mm)		Size at 50% maturity (L <sub>50</sub> ) (mm)		Size at 100% maturity (mm)		Age at 50% maturity (years)		
				M	F		M	F	M	F	M	F	M	F	M		F
UK	-	-	-	-	-	1320	590	730	-	-	350	410	-	-	-	-	ICES, 2018
UK	-	-	-	-	-	-	-	-	300	-	400	-	500-550		6	-	Armstrong and Readdy, 2013
England & Wales	2205	-	-	-	-	1657	-	-	-	-	320-360*	>420*	-	-	-	-	Pawson and Pickett, 1996
English Channel	498	-	-	20-690		-	-	-	-	-	310-410*	360-460*	-	-	-	-	Dorel, 1987
Gulf of Biscay	1567	-	-	60-820		-	-	-	-	-	320-370*	420*	-	-	-	-	Dorel, 1987

\*first maturity not 50% maturity

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Armstrong, M., and Hyder, K., 2013. Sea angling 2012 – a survey of recreational sea angling activity and economic value in England: Annex 4: An on-site survey of recreational sea angling catches from the shore and from private and rental boats in England in 2012. Report. Defra

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**Grey mullet spp. Golden grey (*Chelon aurata*)** MCRS: 360 mm  
**Thick-lipped (*Chelon labrosus*)** MCRS: 420 mm  
**Thin-lipped (*Chelon ramada*)** MCRS: 420 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Total No. of individuals	Size at Maturity Data								Reference
				Size range (mm)			No. of individuals (n)		Size of smallest mature individual (mm)		Size at 50% maturity L <sub>50</sub> (mm)		Age at maturity (years)		
		M	F	M	F		M	F	M	F	M	F	M	F	
<b><i>Chelon labrosus</i></b>															
Northwest Wales	373	168	205	373-580	380-680	21	-	21	-	490	-	-	-	-	Tulkani, 2017
English coast	1377	-	-	230-530	230-600	645	-	-	350	380	400	470	-	-	Hickling, 1970
Irish coast	>900	-	-	15-585		-	-	-	353	409	-	-	-	-	Kennedy and Fitzmaurice, 1969
<b><i>Chelon ramada</i></b>															
English coast	44	-	-	300-530	300-530	3	0	3	-	420	-	-	-	-	Hickling, 1970
<b><i>Chelon aurata</i></b>															
Brittany Coast France	127	-	-	13-550		-	-	-	217-230						Thong, 1969

## References

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## Goldsinny wrasse (*Ctenolabrus rupestris*)

MCRS: 120 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data								References	
				Size range (mm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (mm)		Size at 50% maturity (L <sub>50</sub> ) (mm)		Age at 50% maturity (years)		
				M	F		M	F	M	F	M	F	M		F
Northern Europe	-	-	-	-	-	-	-	-	-	-	100*		-	2*	Darwall et al., 1992
Norway	626	-	-	-	-	129	-	-	70	75	90	80	3	3	Matland, 2015

\*Values from a review of the life histories of wrasse species. Review does not state whether figures refer to 50% maturity.

### References

Darwall, W.R.T., Costello, M.J., Donnelly, R., and Lysaght, S., 1992. Implications of lifehistory strategies for a new wrasse fishery. *Journal of Fish Biology*, 41: 111–123

Matland, E.C., 2015. The biological indicators and temporal spawning habits of wrasse (Family: Labridae) from Sunnhordland. Masters thesis, University of Bergen, Bergen. P133.

## Horse mackerel (*Trachurus spp.*)

MCRS: 150 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data										Reference	
				Size range (mm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual		Size at 50% maturity L <sub>50</sub> (mm)		Size at 100% maturity (mm)		Age at 50% maturity (years)		
				M	F		M	F	M	F	M	F	M	F	M		F
North Sea & English Channel	-	-	-	-	-	-	-	-	-	-	200-220 FL		-	-	-	-	Polonsky (1969) cited in Abaunza et al., 2003
North Sea & English Channel	-	-	-	-	-	-	-	-	-	-	200-240		-	-	-	-	Macer (1974) cited in Abaunza et al., 2003
North Sea	-	-	-	-	-	-	-	-	-	-	180-190		-	-	-	-	Sahrhage (1970) cited in Abaunza et al., 2003

Irish & Celtic Seas	-	-	-	-	-	-	-	-	-	-	220	250	-	-	-	-	Kerstan (1985) cited in Abaunza et al., 2003
Bay of Biscay Spain	5796	2807	2989	90-411	89-423	-	-	-	-	-	200	210	-	-	-	-	Lucio & Martin, 1989
Strait of Sicily Italy	-	-	-	-	69-268	89	-	89	-	-	-	160	-	219*	-	-	Ferreri et al., 2019
Tyrhenian Sea Italy	-	-	-	-	92-445	231	-	231	-	-	-	180	-	273*	-	-	Ferreri et al., 2019
Béni-Saf Bay Mediterranean	488	240	208	102-344	91-351	-	-	-	105		160	150	-	-	-	-	Rahmani & Koudache, 2020
Algeria	1495	797	670	-	-	-	-	-	-	-	184	183	-	-	-	-	Gherra et al., 2018

\*95% maturity

## References

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Rahmani, K., and Koudache, F., 2020. Reproductive biology of horse mackerel, genus *Trachurus* Rafinesque, 1810 (Perciformes Carangidae), caught in Béni-Saf Bay, W-Mediterranean Sea (Algeria). *Biodiversity Journal*, 11 (2): 389-398

## Mackerel (*Scomber spp.*)

MCRS: 200 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual		Size at 50% maturity		Size at 100% maturity		Age at 50% maturity (years)		Reference	
				Size range			M	F	M	F	M	F	M	F	M	F		M
		M	F	M	F		M	F	M	F	M	F	M	F	M	F		M
<b><i>Scomber scombrus</i></b>																		
Northeast Atlantic	-	-	-	-	-	-	-	-	-	-	-	250	240	-	-	-	-	ICES, 2018
Western/Southern Atlantic	-	-	-	-	-	-	-	-	-	-	-	-	290	-	-	-	1.5	Clarke et al., 2003
Gulf of Cádiz Spain	-	-	-	130-390		-	-	-	-	-	-	260-300		-	-	-	-	Rodríguez, 2016
Northern Central Adriatic Sea	1649	722	927	130-360		1379	617	762	200		-	-	-	-	-	-	-	Meneghesso et al., 2013
South Adriatic Sea	828	367	461	195-380F L	195-375F L	-	-	-	210 FL	200 FL	-	-	-	-	-	-	-	Bottari et al., 2004
Northeast Coast USA	-	-	-	-	-	1467	770	697	-	-	260	260	-	-	1.9	1.9	O'Brien et al., 1993	
<b><i>Scomber japonicus</i></b>																		
Portuguese continental shelf	7540	3866	3674	180-510		2966 (1029)	0	2966 (1029)	-	-	-	270	-	-	-	2-3	-	Martins, 1996
Gran Canaria Canary Islands	1142	361	388	145-390	140-420	434	206	228	160	160	198	199	260*	260*	-	-	-	Lorenzo & Pajuelo, 1996
Azores	-	-	-	90-530FL		849	-	-	-	-	278		-	-	2.2		-	Carvalho et al., 2002
<b><i>Scomber colias</i></b>																		
Gulf of Cádiz Spain	-	-	-	130-350		-	-	-	-	-	220-250		-	-	-	-	-	Rodríguez, 2016
Madeira Island	4205	1998	2108	170-460	180-410	-	-	-	200	-	220	220	-	-	1	0.8	-	Vasconcelos et al., 2012
Northwest Atlantic USA	-	-	-	-	-	380	188	163	-	270	-	270	-	330	-	2.2	-	Daley, 2018

\*95% maturity

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## Pollack (*Pollachius pollachius*)

MCRS: 300 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Total No. of individuals	Size at Maturity Data										Reference
				Size range			No. of individuals (n)		Size of smallest mature individual		Size at 50% maturity		Size at 100% maturity		Age at 50% maturity (years)		
		M	F	M	F		M	F	M	F	M	F	M	F	M	F	
Northeast Atlantic	-	-	-	-	-	-	-	-	-	-	-	350	-	-	-	3-4	ICES, 2017
Galicia Spain	622	-	-	-	-	-	-	-	270	420	360	470	-	-	-	-	Alonso-Fernández et al., 2013

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ICES, 2017. Chapter 16 Pollack (*Pollachius pollachius*) in Subarea 4 and Division 3.a (North Sea, Skagerrak and Kategat) IN ICES WGNSSK Report 2017 p690-700

## Red mullet (*Mullus surmuletus*)

MCRS: 150 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Total No. of individuals	Size at Maturity Data										Reference
				Size range (mm)			No. of individuals (n)		Size of smallest mature individual (mm)		Size at 50% maturity L <sub>50</sub> (mm)		Size at 100% maturity (mm)		Age at 50% maturity (years)		
		M	F	M	F		M	F	M	F	M	F	M	F	M	F	
Eastern English Channel & Southern North Sea	1089	-	-	-	-	-	-	-	-	-	160	170			1	1	Mahé et al., 2013
Majorca Spain	-	-	-	100-320		-	-	-	-	150	170	-	-	1	1		Reñones et al., 1995

Balearic Islands Spain	1998	-	-	100-130	-	-	-	-	-	120	140	-	-	-	-	Tomàs-Ferrer et al., 2019
Canary Islands	-	-	-	120-330	776	235	541	-	-	170		-	-	-	-	Pajuelo et al., 1997
North Aegean Sea	656	-	-	118- 200	302	118	184	-	-	140	130	-	-	-	-	Arslan and İşmen, 2013
South Aegean Sea	1032	-	-	-	-	-	-	-	-	140	150	170	180	-	-	Kousteni et al., 2019
Mediterranean Egypt	1385	-	-	50-290	-	-	-	-	-	150		-	-	1.4		Mehanna, 2009
Western Mediterranean	838	-	-	120-250	-	-	-	120	123	-	180	-	-	-	-	Kherraz et al., 2014
Mediterranean	-	-	-	100- 200	443	161	282	-	-	110-120						Amin et al., 2016

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## Rock Cook Wrasse (*Centrolabrus exoletus*)

MCRS: 120 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Size at Maturity Data								References	
				Size range (mm)		Total No. of individuals	No. of individuals (n)		Size of smallest mature individual (mm)		Size at 50% maturity (L <sub>50</sub> ) (mm)		Age at 50% maturity (years)		
		M	F	M	F		M	F	M	F	M	F	M		F
Northern Europe	-	-	-	-	-	-	-	-	-	-	-	-	-	2*	Darwall et al., 1992
Norway	708	-	-	90-130		98	-	-	75	85	90	85	2	2	Matland, 2015

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## Whiting (*Merlangius merlangus*)

MCRS: 270 mm

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Total No. of individuals	Size at Maturity Data								Reference		
				Size range			No. of individuals (n)		Size of smallest mature individual		Size at 50% maturity		Size at 100% maturity			Age at 50% maturity (years)	
				M	F		M	F	M	F	M	F	M	F		M	F
Celtic Sea	3415	-	-	240-490		1123	383	740	180		300	280	-	-	3.6	2.7	Hehir, 2003
Irish Sea	-	-	-	-	-	10958	4506	6452	-	-	190	220	-	-	2	2	Gerritsen et al., 2003
Adriatic Sea	-	-	-	-	-	359	182	177	-	-	240	250	-	-	-	-	Vallisneri et al., 2006
Black Sea	1952	1122	830	108-204	116-307		1122 (752)	830 (528)	125	135	140	150	-	-	-	-	Bilgin et al., 2012

Brackets provide number of mature specimens in sample.

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