



Additional Species not listed in Southern IFCA’s MCRS Byelaw

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 (1-10) summarise the literature reviewed for 50% size at maturity (SOM) for 10 species of finfish that currently are not listed within the 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 4 of the 10 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. The following species were data deficient and thus not included in the below summary of reviews: Bull huss/Nursehound (*Scyliorhinus stellaris*)

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**
- L₅₀ - 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.

Blue shark (*Prionace glauca*)

MCRS: NA

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Total No. of individuals	Size at Maturity Data								Reference		
				Size range (cm)			No. of individuals (n)		Size of smallest mature individual (cm)		Size at 50% maturity (L ₅₀) (cm)		Size at 100% maturity (cm)			Age at 50% maturity (years)	
				M	F		M	F	M	F	M	F	M	F		M	F
All Oceans	-	-	-	-	-	-	-	-	-	-	212	208	-	-	-	-	da Silva et al., 2021
Western North Atlantic	554	-	-	-	-	-	-	-	153 FL	185 FL	183 FL	-	235 FL	-	-	-	Pratt, 1978
Southwestern Atlantic Ocean	-	-	-	-	-	-	-	-	-	-	225	228	-	-	-	-	Hazin and Lessa, 2005
Mediterranean	502	323	179	74-330	70-349	-	-	-	185	205	203	215	-	-	4	5	Megalofonou et al.,
South Africa	205	120	85	72-292	90-313	-	-	-	-	164	201.4	194.4	-	230	7	6	Jolly et al., 2013
Gulf of Guinea	1462	816	646	-	-	548	-	548 (419)	-	170 FL	-	220	-	-	-	6-7	Castro & Mejuto, 1995
Southern Brazil	5363	-	-	-	-	-	-	-	157 FL	163 FL	180 FL	171 FL	205 FL	195 FL	-	-	Montealegre-Quijano et al., 2014

Values inside brackets refer to number of gravid females in sample FL – Fork Length measured instead of Total Length

References

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- da Silva, T.E.F., Lessa, R., and Santana, F.M., 2021. Current knowledge on biology, fishing and conservation of the blue shark (*Prionace glauca*). *Neotropical Biology and Conservation* 16(1): 71–88 <https://doi.org/10.3897/neotropical.16.58691>
- Hazin, F., and Lessa, R., 2005. Synopsis of biological information available on blue shark, *Prionace glauca*, from the southwestern Atlantic ocean. *Col. Vol.Sci.Pap.ICCAT*, 58(3): 1179-1187
- Jolly, K.A., da Silva, C., and Attwood, C.G., 2013. Age, growth and reproductive biology of the blue shark *Prionace glauca* in South African waters, *African Journal of Marine Science*, 35(1): 99-109, DOI: 10.2989/1814232X.2013.783233
- Megalofonou, P., Damalas, D., and De Metrio, G., 2005. Size, age and sexual maturity of the blue shark, *Prionace glauca*, in the Mediterranean Sea. *CM 2005/N:09*

Montealegre-Quijano, S., Cardoso, A.T.C., Silva, R.Z., Kinas, P.G., and Vooren, C.M., 2014. Sexual development, size at maturity, size at maternity and fecundity of the blue shark *Prionace glauca* (Linnaeus, 1758) in the Southwest Atlantic. *Fisheries Research*, 160: 18-32

Pratt, H.L., 1978. Reproduction in the blue shark, *Prionace glauca*. *Fishery Bulletin*, 77(2): 445-470

Cuckoo wrasse (*Labrus mixtus*)

MCRS: NA (prohibited within the Live Wrasse Fishery under voluntary guidance) [Species Profile](#)

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 sexual inversion (cm)	Age at 50% maturity (years)		
		M	F	M	F		M	F	M	F	M	F		M	F	
Eastern Central Adriatic Sea	197	84	107	19 - 38	13 - 34	-	-	-	-	13	25	15	26	-	-	Matić-Skoko et al., 2013
Northern Europe	-	-	-	-	-	-	-	-	-	-	24*	16*	-	6-9*	2*	Darwall et al., 1992

References

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

Matić-Skoko, S., Varezić, D.B., Šiljić, J., Tutman, P., and Pallaoro, A., 2013. The cuckoo wrasse, *Labrus mixtus* (Pisces: Labridae): biological indices for life history and conservation. *Scientia Marina*, 77(4): 595-605

Garfish (*Belone belone*)

MCRS: NA

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 100% maturity (cm)		Age at 50% maturity (years)		
		M	F	M	F		M	F	M	F	M	F	M	F	M		F
Adriatic Sea	3393	1166	1195	28-63	27 - 75	-	-	-	28	30	28	32	-	-	-	-	Zorica et al., 2010
Tunisia	1046	500	546	-	-	222	100	122	-	-	36	37	-	-	-	-	Bedoui et al., 2002
Sinop Black Sea	931	322	609	29-58		-	-	-	-	-	-	39	-	-	-	2	Samsun et al., 2006

References

Bedoui, R., Gharbi, H., and El Abed, A., 2002. Periode de reproduction et maturite sexuelle de *Belone belone gracilis* (Belonidae) des Côtes est et Sud de la Tunisie. Bulletin de l'INSTM (7). Actes des 5èmes Journées de l'ATSMer.Aïn Draham

Samsun, O., Samsun, N., Bilgin, S., and Kalayci, F., 2006. Population biology and status of exploitation of introduced garfish *Belone belone euxini* (Günther, 1866) in the Black Sea

Zorica, B., Sinovčić, G., and Keč, C., 2011. The reproductive cycle, size at maturity and fecundity of garfish (*Belone belone*, L. 1761) in the eastern Adriatic Sea. Helgol Mar Res, 65: 435-444

Gilthead bream (*Sparus aurata*)

MCRS: NA [Species Profile](#)

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 sexual inversion (cm)	Age at 50% maturity (years)			
				M	F		M	F	M	F	M	F		M	F		
Gulf of Skikda, Algeria	576	391	185	17 - 29	18-29	-	-	-	-	-	-	18	20	-	-	-	Fateh et al., 2018
Gulf of Gabes Tunisia	1065	520	442	10-30	12-35	-	-	-	-	-	-	18	-	19	-	-	Hadj-Taieb, 2013
Bardawil lagoon Egypt	3262	-	-	11-33		-	-	-	-	-	-	21	23	-	0.47	0.83	Ahmed, 2011
Port Said Egypt	1714	-	-	10-36		-	-	-	-	-	-	26		15-27		1.67	Mehanna, 2007
Mellah lagoon Algeria	632	-	-	15 -61		99	-	-	-	-	-	33		44	18 months		Chaoui et al., 2006

References

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- Mehanna, S.F., 2007. A preliminary assessment and management of gilthead bream *Sparus aurata* in the Port Said Fishery, the Southeastern Mediterranean, Egypt. Turkish Journal of Fisheries and Aquatic Sciences, 7: 123-170

Grey gurnard (*Eutrigla gurnardus*)

MCRS: NA

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 100% maturity (cm)		Age at 50% maturity (years)			
		M	F	M	F		M	F	M	F	M	F	M	F	M		F	
Northwest Wales & Anglesey	1268	536	732	2-33	2-37	-	-	-	-	-	-	25	25	-	-	3.2	3.2	McCarthy et al., 2018
Adriatic Sea	469	137	195	9-17	10-25	-	-	-	-	-	-	12	15	-	-	-	-	Vallisneri et al., 2012

References

McCarthy, I., Cant, J., and Marriott, A., 2018. Population biology of grey gurnard (*Eutrigla gurnardus* L.; Triglidae) in the coastal waters of Northwest Wales. *Journal of Applied Ichthyology*, 34(4): 896-905. <https://doi.org/10.1111/jai.13733>

Vallisneri, M., Montanini, S., and Stagoni, M., 2012. Size at maturity of triglid fishes in the Adriatic Sea, northeastern Mediterranean. *Journal of Applied Ichthyology*, 28: 123-125

Red gurnard (*Aspitrigla cuculus*)

MCRS: NA

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 100% maturity (cm)		Age at 50% maturity (years)			
		M	F	M	F		M	F	M	F	M	F	M	F	M		F	
Northwest Wales & Anglesey	1871	-	-	15-35	10-43	755	192	563	-	-	26	28	-	-	3.6	3.5	Marriott et al., 2010	
Adriatic Sea	295	165	130	10-23	10-26	-	-	-	-	-	-	15	17	-	-	-	-	Vallisneri et al., 2012

References

Marriott, A.L., Latchford, J.W., and McCarthy, I.D., 2010. Population biology of the red gurnard (*Aspitrigla cuculus* L.; Triglidae) in the inshore waters of Eastern Anglesey and Northwest Wales. *Journal of Applied Ichthyology*, 26: 504-512

Vallisneri, M., Montanini, S., and Stagoni, M., 2012. Size at maturity of triglid fishes in the Adriatic Sea, northeastern Mediterranean. *Journal of Applied Ichthyology*, 28: 123-125

Tub gurnard (*Chelidonichthys lucerna*)

MCRS: NA

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Total No. of individuals	Size at Maturity Data										Reference	
				Size range (cm)			No. of individuals (n)		Size of smallest mature individual (cm)		Size at 50% maturity (L ₅₀) (cm)		Size at 100% maturity (cm)		Age at 50% maturity (years)			
		M	F	M	F		M	F	M	F	M	F	M	F	M	F		M
Northwest Wales & Anglesey	970	-	-	10-41	10-58	804	307	497	-	-	29	28	-	-	2.8	2.7	McCarthy & Marriott, 2018	
Adriatic Sea	975	430	545	15-34	14-42	-	-	-	-	-	-	22	24	-	-	-	-	Vallisneri et al., 2012
Gulf of Gabes	286	-	-	17-26	16-36	180	66	114	-	-	19	22	-	-	1.5	3	Boudaya et al., 2008	

References

Boudaya, L., Neifar, L., Rizzo, P., Badalucco, C., Bouain, A., and Fiorentino, F., 2008. Growth and reproduction of *Chelidonichthys lucerna* (Linnaeus) (Pisces: Triglidae) in the Gulf of Gabès, Tunisia. *Journal of Applied Ichthyology*, 24: 581-588

McCarthy, I., and Marriott, A., 2018. Age, growth and maturity of tub gurnard (*Chelidonichthys lucerna* Linnaeus 1758: Triglidae) in the inshore coastal waters of Northwest Wales, UK. *Journal of Applied Ichthyology*, 34(3): 581-589. <https://doi.org/10.1111/jai.13614>

Vallisneri, M., Montanini, S., and Stagoni, M., 2012. Size at maturity of triglid fishes in the Adriatic Sea, northeastern Mediterranean. *Journal of Applied Ichthyology*, 28: 123-125

Lesser spotted dogfish (*Scyliorhinus canicula*)

MCRS: NA [Species Profile](#)

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 100% maturity (cm)		Age at 50% maturity (years)			
		M	F	M	F		M	F		M	F	M	F	M	F		M
North Eastern Atlantic																	
Bristol Channel, UK	97	435	537	37-66	38-67	972	435	537	49	52	52	55	55	65	-	-	Ellis and Shackley, 1997
West coast of Ireland	560	-	-	-	-	-	-	-	53	52	58	58	-	-	-	6	Henderson and Casey, 2001
Irish and Celtic Seas	745	310	435	-	-	-	-	-	49	52	54	57	62	69	6.6	7.9	Ivory et al., 2004
Cantabrian Sea, North Spain	-	-	-	-	-	739	-	739	-	-	-	54	-	-	-	-	Rodriguez-Cabello et al., 1998
Mediterranean Sea																	
Strait of Sicily	-	-	-	-	-	236	131 (81)	105 (45)	34	35	39	37	-	-	-	-	Finotto et al., 2015
Northern Adriatic	-	-	-	-	-	249	55 (50)	194 (167)	37	39	40	41	-	-	-	-	Finotto et al., 2015
Aegean Sea	325	167	158	28-49	26-47	325	167 (115)	158 (85)	37	36	40	40	-	-	-	-	Kousteni et al., 2010
Western Algerian coast	461	212	249	22-50	20-47	-	-	-	-	-	-	36	-	-	-	-	Bendiab et al., 2012

References

Bendiab, A.A.T., Mouffok, S., and Boutiba, Z., 2012. Reproductive biology and growth of lesser spotted dogfish *Scyliorhinus canicula* (Linnaeus, 1758) in Western Algerian coasts (Chondrichthyes, Scyliorhinidae). *Biodiversity Journal*, 3(1): 41-48

Ellis, J.R., and Shackley, S.E., 1997. The reproductive biology of *Scyliorhinus canicula* in the Bristol Channel, U.K. *Journal of Fish Biology*, 51: 361-372

Finotto, L., Gristina, M., Garofalo, G., Riginella, E., and Mazzoldi, C., 2015. Contrasting life history and reproductive traits in two populations of *Scyliorhinus canicular*. *Mar.Biol.*, 162: 1175-1186

Henderson, A.C., and Casey, A., 2001. Reproduction and growth in the lesser-spotted dogfish *Scyliorhinus canicular* (Elasmobranchii; Scyliorhinidae), from the west coast of Ireland. *Cah.Biol.Mar.*, 42: 397-405

Ivory, P., Jeal, F., and Nolan, C.P., 2004. Age determination, growth and reproduction in the lesser-spotted dogfish, *Scyliorhinus canicular* (L.). *J.Northw.Atl.Fish.Sci.*, 35: 89-106

Kousteni, V., Kontopoulou, M., and Megalofonou, P., 2010. Sexual maturity and fecundity of *Scyliorhinus canicular* (Linnaeus, 1758) in the Aegean Sea. *Marine Biology Research*, 6: 390-398

Rodriguez-Cabello, Velasco, F., and Olaso, I., 1998. Reproductive biology of lesser-spotted dogfish *Scyliorhinus canicular* (L.,1758) in the Cantabrian Sea. *Scientia Marina*, 62(3): 187-191

Red/Blackspot bream (*Pagellus bogaraveo*)

MCRS: 33 cm (National legislation)

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 100% maturity (cm)		Age at 50% maturity (years)		
				M	F		M	F	M	F	M	F	M	F	M		F
Bay of Biscay	-	-	-	-	-	-	-	-	-	-	25	25	-	-	-	-	Dorel, 1986
Azorean waters	1581	-	-	-	-	-	-	-	-	-	28 _{FL}	35 _{FL}	-	-	5	8	Krug, 1990
Eastern Ionian	6411	-	-	-	-	-	-	19	20								Mytilineou et al., 2013
Italy (captive)	224	-	-	-	-	-	-	28	30	-	-	-	-	-	-	-	Micale et al., 2002

References

Dorel, D., 1986. Poissons de l'Atlantique nord-est relations taille-poids. Institut Francais de Recherche pour l'Exploitation de la Mer. Nantes, France. 165 p.

Krug, H.M., 1990. The Azorean blackspot seabream, *Pagellus bogaraveo* (Brünnich, 1768) (Teleostei, Sparidae). Reproductive cycle, hermaphroditism, maturity and fecundity. *Cybius*, 14(2): 151-159

Micale, V., Maricchiolo, G., and Genovese, L., 2002. The reproductive biology of the blackspot sea bream *Pagellus bogaraveo* in captivity. I. gonadal development, maturation and hermaphroditism. *Journal of Applied Ichthyology*, 18: 172-176

Mytilineou, C., Tsagarakis, K., Bekas, P., Anastasopoulou, A., Kavadas, S., Machias, A., Haralabous, J., Smith, C.J., Petrakis, G., Dokos, J., and Kapandagakakis, A., 2013. Spatial distribution and life-history aspects of blackspot seabream *Pagellus bogaraveo* (Osteichthyes: Sparidae). *Journal of Fish Biology*, 83: 1551-1575

Starry smooth-hound (*Mustelus asterias*)

MCRS: NA [Species Profile](#)

Study location	Total No. surveyed	No. of individuals (n)		Length Data		Total No. of individuals	Size at Maturity Data										Reference
				Size range (cm)			No. of individuals (n)		Size of smallest mature individual (cm)		Size at 50% maturity (L ₅₀) (cm)		Size ta 100% maturity (cm)		Age at 50% maturity (years)		
		M	F	M	F		M	F	M	F	M	F	M	F	M	F	
British Waters	504	238	266	24-99	28-124	504	238	266	65	69	70	82	75	88	-	-	McCully Phillips and Ellis, 2015
Celtic Sea ecoregion	231	113	118	35-104	43-112	-	-	-	72	83	78	87	-	-	4-5	6	Farrell et al., 2010

References

Farrell, E.D., Mariani, S., and Clarke, M.W., 2010. Reproductive biology of the starry smoothhound shark *Mustelus asterias*: Geographic variation and implications for sustainable exploitation. *Journal of Fish Biology*, 77: 1505–1525

McCully Phillips, S.R., and Ellis, J.R., 2015. Reproductive characteristics and life-history relationships of starry smooth-hound *Mustelus asterias* in British waters. *Journal of Fish Biology*, 87: 1411-1433