Size of Maturity in Mullet Species and Gilthead Bream

Background

At the Byelaw and Permitting Sub-Committee (B&PSC) meeting on 16th November 2023, Members proposed to apply a Minimum Conservation Reference Size (MCRS) for mullet species and for gilthead bream, and to consult on what size(s) should be applied. A MCRS is a minimum size at which a fish or shellfish can be removed from a given fishery, and usually relates to the size at which the species is able to breed.

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. For finfish, SOM is commonly accepted as the total length (L) at which 50% of a population are mature; this length is referred to as the L_{50}.

Size of Maturity in Mullet Species

Researchers from the University of Plymouth (Turnbull, 2022) assessed the SOM of 144 thick-lip grey mullet (*Chelon labrosus*), 166 thin-lip grey mullet (*C. ramada*) and 231 golden grey mullet (*C. aurata*) caught in Southern IFCA's District. Gonads were assessed to determine maturity, and length at 50% maturity (L_{50}) was estimated from these data using standard statistical techniques (logistic regression). This is the most relevant study for D&S IFCA's understanding of maturity in mullet due to its methods, timing and sampling locations.

Turnbull (2022) calculated L_{50} values (Table 1) that are comparable to other studies on these species in England and elsewhere (e.g. Hickling, 1970; Kennedy & Fitzmaurice, 1969), indicating they are reliable estimates. Some researchers (e.g. in the Mediterranean) have found smaller L_{50} values particularly for thin-lip and golden grey mullet (e.g. Hotos, 1999), but this is likely because fish in warmer waters mature faster than those in the UK. Hickling (1970) found an L_{50} of 47 cm for female thick-lip grey mullet, based on 1377 fish in England.

Table 1. L_{50} of three grey mullet species in Southern England (Turnbull, 2022)

Species	Sex	Length at Maturity (L_{50})
Thick-lip grey mullet (*C. labrosus*)	Female	43.9 cm
	Male	43.1 cm
Thin-lip grey mullet (*C. ramada*)	Female	41.7 cm
	Male	38.6 cm
Golden grey mullet (*C. aurata*)	Female	35.2 cm
	Male	35.9 cm

These L_{50} values suggest that appropriate MCRS limits for individual mullet species would be: 44 cm for *C. labrosus*, 42 cm for *C. ramada*, and 36 cm for *C. aurata*.

Size of Maturity in Gilthead Bream

Gilthead sea bream (*Sparus aurata*) is a "protandrous hermaphrodite" meaning it matures as a male but may change sex to a female later in life. The SOM for this species in UK waters is not yet known. SOM varies across the species' geographic range even at small spatial scales: estimates from various locations in the Mediterranean suggest SOM is between 17.6 – 32.6 cm, and the size of sexual inversion is between 15 – 44 cm. The United Nations Food and Agriculture Organisation lists gilthead sea bream maturity at 1-2 years (20-30 cm) for males and 2-3 years (33-40 cm) for females. Growth and maturity is typically delayed in colder waters, so SOM and sexual inversion may not occur in the UK until fish are larger than suggested by these estimates. As with ballan wrasse (a protogynous hermaphrodite), the existence of hermaphroditism in this species may indicate that both minimum and maximum conservation reference sizes could be beneficial.

References

Hickling, C.F., 1970. A Contribution to the Natural History of the English Grey Mullets [Pisces, Mugilidae]. Journal of the Marine Biological Association of the United Kingdom 50, 609–633. https://doi.org/10.1017/S0025315400004914

Hotos, G., 1999. Biology and population dynamics of Liza aurata (Risso, 1810) (Pisces: Mugilidae) of the Mesolongi-Etoliko lagoon. University of Patra.

Kennedy, M., Fitzmaurice, P., 1969. Age and growth of thick-lipped grey mullet Crenimugil labrosus in Irish waters. Journal of the Marine Biological Association of the United Kingdom 49, 683–699. https://doi.org/10.1017/S002531540003722X

Turnbull, R.M. (2022). Age, length, maturity and morphology of grey mullet (Mugilidae) in England. MRes Marine Biology Thesis, University of Plymouth. 52pp.