



Vulnerability and Over-Exploitation of Grey Mullet in UK Waters



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1. Introduction

There are three species of *Mugilidae* commonly present in UK waters; Golden-Grey Mullet (*Liza aurata*), Thin-lipped Grey Mullet (*Liza aurata*) and Thick-lipped Grey Mullet (*Chelon labrosus*). They have been regarded as having limited commercial interest with consequently no limit on catches and are simply collectively named as “grey mullet” for reporting landings; this takes no account of the individual species ecology, growth rates, or size at maturity. This perceived lack of commercial interest has resulted in little scientific interest and no studies on population size and dynamics, and fails to recognise the increased commercial interest as populations of other species decline.

It is a recognised science-based and common-sense approach that exploitation should not take place until the majority of the fish stock has spawned at least once. The Marine Management Organisation (MMO) has set no Minimum Conservation Reference Size (MCRS) for any of the species, and five of the Inshore Fisheries and Conservation Authorities (IFCAs) have no prescribed size limit. Where IFCAs have set limits - two at 20cm and two at 30cm – they are below the size at which thin-lipped and thick-lipped mullet are known to first spawn in UK and Irish waters.

Although mullet have always been targeted to some degree, especially by inshore fishermen, the recent restrictions on fishing for bass, *Dicentrarchus labrax*, has seemingly led to an increase in commercial exploitation of grey mullet. Landing statistics clearly demonstrate falling catches because, or in spite, of this increased interest. This in turn leads to an increase of their value and further exploitation pressure as their population declines.

The slow growth, late maturity, biannual spawning and high site fidelity of grey mullet renders them highly vulnerable to over-exploitation, and evidence there is evidence that many local populations have already declined. The setting of a realistic MCRS should be seen as a minimum management measure together with limiting gill-netting in estuaries and near-shore areas and eliminating the exploitation of pre-spawning accumulations in winter.

2. Growth & Maturity of Grey Mullet

The earliest studies on the growth and maturity of grey mullet around the British Isles are those of Kennedy and Fitzmaurice (1969) for Ireland and Hickling (1970) for England, North Wales and the Scilly Isles.

Kennedy & Fitzmaurice examined more than 900 thick-lipped grey mullet from 23 different localities around the Irish coast with a size range of 1.5 to 58.5 cm fork length. They were sourced mainly from gill net and rod & line and hand net for sampling fry.

Hickling (1970) studied 1377 thick-lipped mullet, 44 thin-lipped mullet and 73 golden grey mullet. The Thick-lipped mullet, sampled from Essex to Cumbria and the Isles of Man and Scilly, were aged between and 2 and 15 years old and from 9 to 57 cm in total length.

Figure 1 shows the mean length and at age of thick-lipped mullet from both studies, that of Hickling by closed circles from scales and triangles from opercula, and of Kennedy & Fitzmaurice by open circles (from scales). These emphasise the slow growth and longevity of the species in Northern Europe. The youngest mature male was aged 9 years (38 cm) with others aged 10, whereas other males aged 10 and 11 were still immature. It appeared that females did not spawn every year, but the smallest gravid females were aged 11 (40.9 cm) and 12 (41.6 cm). 50% of the males were mature at 40 cm and females at 47 cm. Therefore, not only were the thick-lipped grey mullet long-lived and

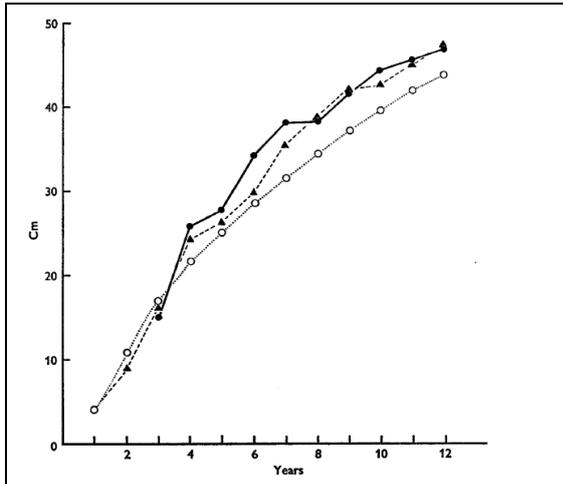


Figure 1 . Growth of Thick-lipped Mullet from England and the Isles of Man and Scillies: closed circles from scales, triangles from operculum (Hickling, 1970) using total length. Open circles are from Kennedy and Fitzmaurice (1969) using fork length.

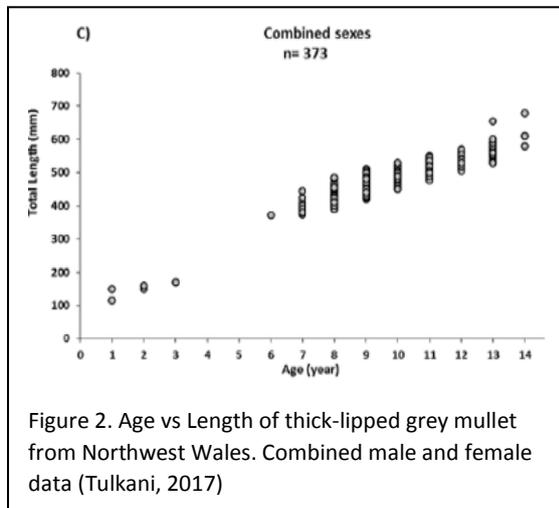


Figure 2. Age vs Length of thick-lipped grey mullet from Northwest Wales. Combined male and female data (Tulkani, 2017)

slow-growing but also very late maturing, with some females not spawning every year. Hickling concluded that females grew slightly faster than males and are dominant among older fish.

There had been no further studies on growth and maturity of thick-lipped mullet in England and Wales until very recently (Tulkani 2017). This examined 373 specimens predominantly caught from commercial gillnets in Northwest Wales and supplemented by a small number of juveniles captured by shore seine net. The larger fish ranged from 373 – 580mm for males and 380 – 680mm for females. Their length at age is shown in Figure 2 and is very similar to the previous works. The smallest mature female was 48cm in length.

Quite clearly, to comply with the recognised fundamental approach that species be allowed to spawn at least once before harvesting, the minimum size limit for thick-lipped and thin-lipped mullet should be 40 cm for males and 47 cm for females. Because sexing is difficult in live fish, 47 cm must be the default position.

The MMO has no MCRS for any species of grey mullet, but in England and Wales the IFCA (and Welsh Government) may set minimum landing sizes (mls) for fish caught within their six nautical mile limit jurisdiction. The current mls set by the various bodies is as follows:

- Northeastern, Eastern, Devon & Severn, Sussex and the Isles of Scilly each have no minimum size limit.
- Northumberland has no byelaw size limit, but recommends a minimum retention size of 47 cm for grey mullet “as recommended by the Angling Trust”. It is unclear to which sector this might apply, but it obviously has no legal basis.

- Cornwall for “Grey Mullet (*Mugil spp.*)” 20 cm. There are no *Mugil* species commonly found.
- N & NW Wales *Chelon labrosus* 20 cm
- Southern and Kent & Essex “Grey Mullet” 30 cm
- S & SW Wales thick-lipped mullet 35 cm.

All IFCA have a vision that they will *lead, champion and manage a sustainable marine environment and inshore fisheries, by successfully securing the right balance between social, environmental and economic benefits to ensure healthy seas, sustainable fisheries and a viable industry* (<http://www.association-ifca.org.uk/about-us/defra-guidance-to-the-ifcas>). It is quite clear that they are failing in this goal in relation to thick-lipped and thin-lipped grey mullet in all cases and golden grey mullet in many. The Angling Trust - the national body representing anglers in England and Wales – has published recommendations for minimum retention size for thick lipped and thin lipped

grey mullet of 47 cm and for gold grey mullet of 28 cm. The national specialist body for mullet angling, the National Mullet Club, advocate catch and release of all mullet irrespective of size.

3. Stocks of Grey Mullet

The perceived commercial unimportance of grey mullet has meant that no research into their stock levels has been undertaken in the UK. Grey mullet are experiencing increased commercial pressure especially as a result of the limitations imposed on the bass fishery following their population crash. This has manifested itself in two main ways. Firstly, grey mullet, especially thin-lipped and thick-lipped, are residents of inshore areas, especially estuaries and harbours. They are very visible, easy to target and, because of their spiny fins, very vulnerable to capture with monofilament tangle nets. They apparently have a high site fidelity so local populations which have been heavily targeted are very slow to recover. Secondly, in the winter months they tend to aggregate in large numbers for overwintering and pre-spawning in known locations and therefore very vulnerable to pair-trawling, tangle netting and even shore seine nets.

Historically, commercial landings of grey mullet were small; for example between 1923 and 1967 the average was 31t per annum and a maximum of 87t (Hickling 1970). By contrast, Figure 3 shows the commercial landing of grey mullet by English and Welsh boats into the UK and abroad

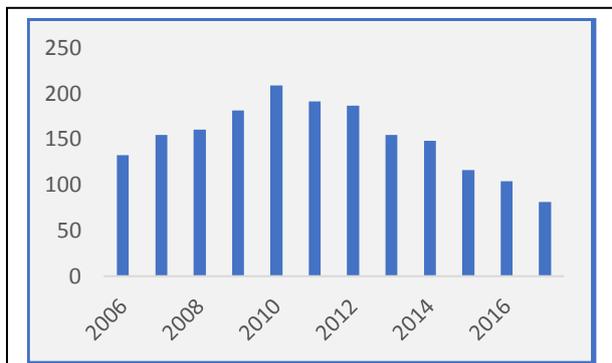


Figure 3. Commercial landings (tonnes) of grey mullet between 2006 and 2017. Data MMO

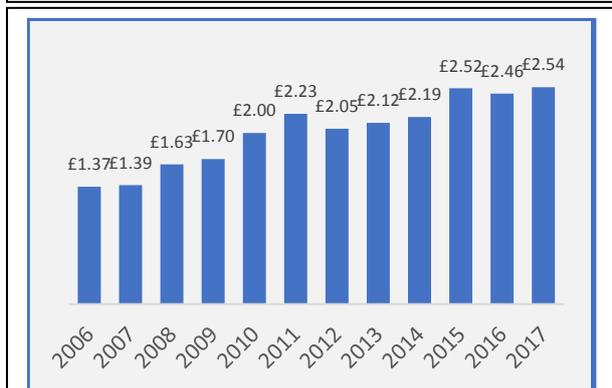


Figure 4. Average market value (£/kg) of grey mullet between 2006 and 2017.

between 2006 and 2017. The average over the period is 151 tonnes, the peak is 209 tonnes in 2010 after which landings have declined every year to just 81t in 2017. Commercial fishermen have stated that they are increasing their focus on targeting grey mullet as further restrictions are placed on commercial bass fishing. For example, the impact assessment for the proposed netting byelaw by Devon and Severn IFCA stated that *Commercial fishermen expressed a concern that the inability to target bass would place more importance on potential access to stocks of mullet to supplement incomes.* Figure 4 indicates that falling landings have resulted in the market value increasing, again indicating that demand has outstripped supply and that the population of grey mullet is currently rapidly declining.

Thin-lipped and thick-lipped grey mullet may be highly visible in estuaries, harbours and marinas, and there have been many reports of a substantial reduction in numbers sighted in recent years. The NMC has been collating

annual records of members' catches by rod-and-line for over 30 years. Because of the specialist nature of angling for mullet the club has a high proportion of anglers who could be considered expert. It can be concluded that their success rate should be consistent, even increasing, as techniques, equipment and collective knowledge is improved, and that the venues that are fished are broadly the same. Therefore, if the targeted population is stable, the number of mullet landed by members should at worst be constant if not increasing. Instead, as shown by Figure 5, there has been a significant decline – a 30% reduction – most noticeably in the last 10 years. Figure 6 displays

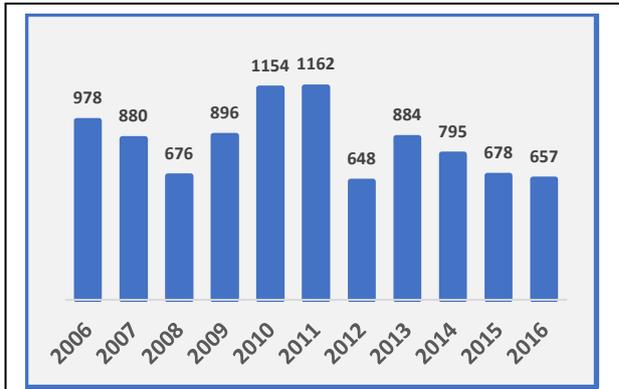


Figure 5. Reported catches of grey mullet by NMC members in England and Wales, 2006 - 2016

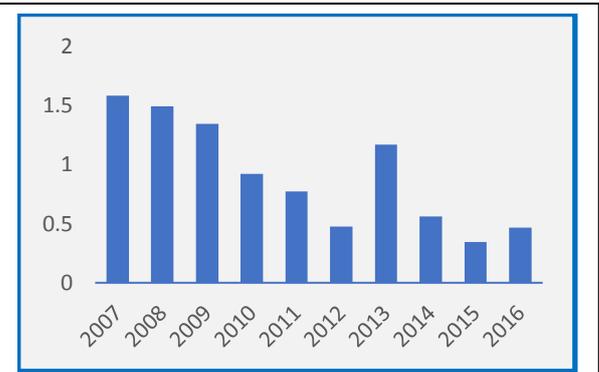


Figure 6. Average number of thick-lipped grey mullet per angling session from the River Camel between 2007 and 2016

angling success in terms of fish captured per session for thick-lipped grey mullet on the River Camel in Cornwall for the period 2007-2016. This demonstrates a similar – even greater – decline in captures as the national picture.

It has been shown that an indicator of over-exploitation in a fish population is the decline of the average size of individuals (Beverton & Holt, 1957). Figures 7 and 8 show the average weight of individual thick-lipped grey mullet captured with rod-and-line by NMC members in the Southern and Sussex IFCA Regions between 2008 and 2017. All fish captured were returned. The trend is indicated by the dotted lines, and it is evident that the average size of fish fell over the period, a clear indication that the population is over-exploited.

The evidence from visual observation, and decline in average size, commercial landings and recreational rod-and-line angling all indicate that the population of grey mullet has fallen and, inevitably, will continue to do so unless commercial fishing for them is seriously curtailed. Devon & Severn and Cornwall IFCAs have introduced bylaws to control netting within estuaries where both thick- and thin-lipped mullet are targeted. It is essential that other IFCAs follow those leads if grey mullet populations are to be restored. The Marine Conservation Society, the UK’s leading marine charity, has recognised the parlous state of the thick-lipped grey mullet population by categorizing their sustainability as “fish to avoid” from eating.

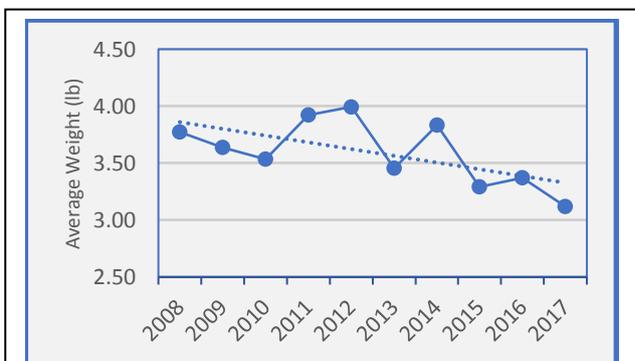


Figure 7. Average weight of thick-lipped grey mullet captured in Southern IFCA Region. N = 2815



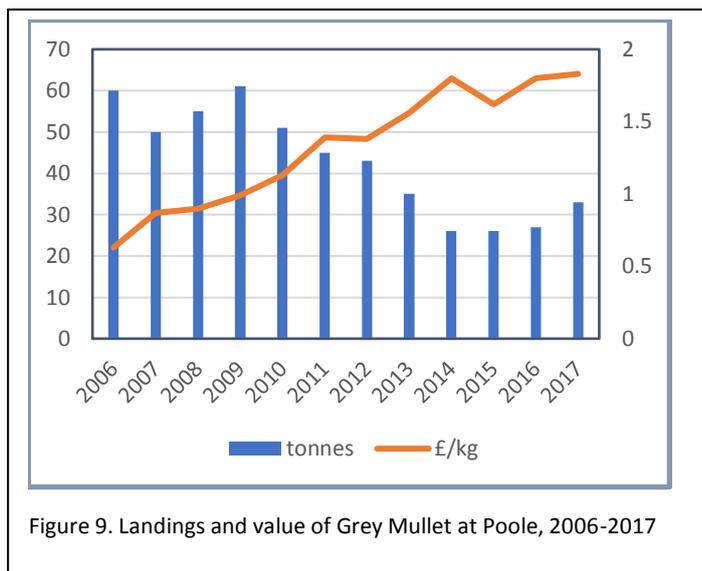
Figure 8. Average weight of thick-lipped grey mullet captured in Sussex IFCA Region. N = 713

4. Social and Economic Impact

Table 1 itemises the commercial landings and value of grey mullet in the different IFCA regions during 2017. The total reported landings was just over 81t with a value of £172k. Southern IFCA, whose area consists of Dorset and Hampshire (including the Isle of Wight) has by far the most

Region	Landing(t)	Value(£)
Cornwall	5.521	17,281
Devon&Severn	7.997	20,270
Eastern	5.929	11,951
Isles of Scilly	0.025	15
Kent & Essex	1.774	2,844
North East	0.567	1,356
North West	0.088	269
Southern	48.888	97,209
Sussex	5.196	10,913
Wales	4.979	10,010

Table 1. Landings and value of grey mullet in IFCA regions, 2017.



significant fishery. The port of Poole in Dorset had the greatest landings of any port at almost 34t with a value of £62k, mostly from within Poole Harbour. Figure 9 shows the landings and value for grey mullet from 2006 to 2017 landed at Poole. This shows a similar trend to the national data of declining catches and increasing value. The largest landing was some 61t in 2009 and the value rose from as low as 63p per kg in 2006 to £1.83 in 2017, again indicative of a population in decline that is unable to meet current demand. Within Southern, only one boat landed a total annual catch in excess of £10,000 and only four others had catches worth over £2,000. Overall, grey mullet only contributed 1.14% to the total income of U10m inshore fishing vessels. Nationally, they accounted for just 0.03% of total landings in 2015 (MMO data).

The finances demonstrate that grey mullet commercial fisheries cannot be classed as economically or societally important. Commercial fishermen would not be deprived of a large income that they are used to or rely upon and neither is there a great tradition of commercial mullet fishing, they have mostly been considered as an unwanted bycatch, often when targeting bass. What can be concluded is that the grey mullet fishery is extremely fragile and that it is a relatively new fishery that has only developed over the last ten or fifteen years. It cannot be argued otherwise by the commercial fleet as the figures show that they were not actively targeting grey mullet before then in any numbers and so cannot have evidence to the contrary.

Angling for grey mullet can be considered as a specialised activity but has been ranked as the fourth most important shore target species. They are also a “gateway” species for sea angling, attracting many freshwater and junior anglers, and there is an increasing interest in fly fishing for all three species. The high value of recreational sea angling in general was clearly defined in DEFRA’s report *Sea Angling 2012 – a survey of recreational sea angling activity and economic value in England*. There was no breakdown of the economic value of grey mullet angling specifically within that report, but another, *Invest in fish South West*, estimated that in 2005 about £1.5M was attributable to recreational mullet angling by resident anglers in that region, compared to just £37k from mullet landings in Cornwall and Devon & Severn IFCA regions in 2017.

5. Summary

The current need for management measures as the consequence to the gross overfishing for bass can be argued in exactly the same way for grey mullet – the factors which make the bass population

vulnerable are not only applicable to grey mullet but arguably apply in even greater measure to them:

- Mullet aggregate to spawn in areas that make them very easy to find and exploit.
- Grey mullet have a very slow growth rate and mature at a relatively old age.
- A proportion of the mullet population may only spawn every two years.
- They are very easy to net in harbours and estuaries especially with monofilament gill nets.
- They have high site fidelity resulting in fished-out areas being slow to recover.
- Minimum landing sizes are either non-existent or inadequate.
- No other management measures exist as they have always been considered to be of limited commercial value.
- Commercial fishing is increasing due to the restrictions on bass fishing and that they are targeted as a means to justify a high bycatch of bass.
- As commercial fishing increases, the stock decreases leading to increased value which further increases fishing pressure.

The available data on the populations of the three native UK grey mullet species (*Chelon labrosus*, *Liza aurata* and *L. ramada*) is limited compared with that for more southerly populations (which tend to be faster growing and earlier maturation). However, enough is known to conclude that their slow growth and late maturation will not support high levels of commercial activity, as is evident from the large decline in catches, both commercial and recreational, and other evidence. Tulkani (2017) argues that *there are no quotas set and there are no management plans currently in force to regulate either fishery. Clearly future research work should focus on providing the biological data required for the development of sustainable exploitation plans.* As research takes time, which grey mullet arguably have not got, then the precautionary principle should be that rigorous measures are taken now to severely curtail, if not eliminate, commercial activity.

6. References

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