

EAA urges EU to fully implement the age and size requirements needed to achieve healthy fish stocks and 'Good Environmental Status'

In the European Union, fisheries management is largely based on the concept of maximum sustainable yield (MSY). The narrow focus on maximum allowable catches has led to a considerable collapse of the age structure and a significant loss of the most productive part of the fish population, the big female fish. This in turn threatens the long-term sustainability of the fishery.

Challenging the MSY paradigm

In April 2023 the RecFishing Forum had arranged the event: "*More big fish in the sea! - Challenging the MSY paradigm for sustainable, long-term marine fisheries management*" at the European Parliament¹. Markus Lundgren from the Swedish national anglers' association 'Sportfiskarna' and Dr. Christopher Griffiths from the Swedish University of Agricultural Sciences (SLU) challenged the EU's concept of MSY and presented alternative management approaches.

In a 2001 study, scientists recommended that MSY should be understood exclusively as an avoidable upper limit and not as a target. The study concluded that fishing capacity must be matched to the fishery resources if appreciable stock improvement is to be obtained while maintaining the necessary biological and genetic diversity (Mace, 2001²).

Age- and size-based indicators to complement the MSY approach

Barnett et al. (2015³) went on to elaborate on the importance of so-called "big old fat fecund female fish" (BOFFFFs) for stock productivity and the overall stability of marine fish species. Compared to smaller mature females, BOFFFFs have been observed in a variety of marine and freshwater fish species to produce far more, and often larger eggs that can develop into larvae that grow faster and are more resistant to starvation. Of equal importance is the fact that BOFFFFs have been observed to have earlier and longer spawning times and tend to spawn in different locations than smaller females of their species who are more likely to spawn en masse. These characteristics suggest that BOFFFFs are key players in the overall stock of fish and contribute significantly towards ensuring individual reproductive success in highly temporally and spatially diverse

environments. BOFFFFs can survive periods that are generally unfavourable towards successful spawning and then tend to go on and reproduce even more when reproductive conditions are more favourable. Due to net fishing, many BOFFFFs are removed from the fish stock. This typically results in a degradation of the size and age structure of the remaining population (Hixon et al., 2014⁴), where via exploitation the number of older fish are reduced at a higher rate than the younger ones (Barnett et al., 2015²).

Although some fishery models are beginning to account for these age effects, many such models continue to treat the total spawning stock biomass as identical, i.e.: assuming that many smaller young females are able to contribute the same amount to stock productivity as can an equivalent mass of BOFFFFs. However, scientific evidence shows that fishery productivity and stability would be improved if age structure was maintained despite continued exploitation (Hixon et al., 2014³, Griffiths et al., 2023⁵).

The EU's Marine Strategy Framework Directive (MSFD)

The EU's annual assessments of the status of commercially exploited fish stocks are based mainly on two indicators, namely fishing mortality and spawning stock biomass. However, the EU's Marine Strategy Framework Directive (MSFD)⁶, additionally requires that populations of all commercially exploited fish and shellfish exhibit an age and size distribution that is indicative of a healthy stock. This is a necessity to achieve Good Environmental Status (GES) as required by the directive.

Scientists suggest a new management approach

Griffiths et al. (2023⁵) suggests a new management approach with an age-based indicator. Many stocks currently lack older fish. Past levels of exploitation have resulted in a truncation in age structure, and a loss of the most productive part of the fish population. The researchers applied the indicator to 72 fish stocks in the Northeast Atlantic, clearly demonstrating that the new indicator represents a readymade tool for stock assessment and advice that can complement the MSY approach. According to Griffiths et al. (2023⁵), alternative management objectives could lead to more desirable outcomes in terms of spawning stock biomass (SSB) and age structure of fish populations, with little overall costs to long-term catch.

" MSY is a valuable tool for sustainable marine fisheries management, but needs to be adapted to reflect the long-term changing needs of our ecosystems "

MEP Isabel Carvalhais during the RecFishing Forum at the European Parliament on April 25, 2023

Selective angling enables alternative fisheries management

In contrast to largely unselective commercial fisheries, anglers can fish highly selective. Anglers can fish "slots", which means to keep only fish within a set maximum and minimum size e.g., to protect the BOFFFFs. Marshall et al. (2021⁷) wrote that management tools such as spatiotemporal closures and harvest slot length limits can outperform current fisheries management approaches in terms of overall yield. For cod in the Baltic Sea, Haase et al. (2022⁸) have demonstrated that a combination of different measures (e.g., catch limit, closed season, and harvest slot length limit) effectively allows fishing to continue with minimal impact on angler welfare. A study on cod in the Baltic Sea by scientists from

Denmark and Germany (Bronnmann et al., 2023⁹) found through the use of surveys that anglers are quite willing to contribute to the conservation of the cod stock by means of self-regulation. According to this study, a harvest slot length limit based on the targeted release of larger and smaller cod while allowing for the landing of fish belonging to the median size bracket of the overall stock would be preferable to a restriction based on minimum size or bag-limits.

The European Anglers Alliance urges:

- 1) to aim for healthy fish age/size structures in all EU commercially exploited fish stocks as required by the Marine Strategy Framework Directive, as a need to achieve Good Environmental Status;
- 2) the Recognition of angling's huge social and economic contributions to society, as well as angling's low impact on the resource as anglers can fish very selectively e.g., by releasing juvenile fish as well as the big, productive female fish if required by management;
- 3) the consideration and examination of a possible combinations of measures (see e.g., Haase et al., 2022), rather than relying solely on catch restrictions;
- 4) the Commission and Member States to expand on the existing management regime to include all requirements from the Common Fisheries Policy (CFP), the Marine Strategy Framework Directive (MSFD) and other policies and legislative acts, which aim at sustainable fisheries.

¹ <https://www.eaa-europe.org/european-parliament-forum/ep-recfishing-forum-events/25-april-2023-more-big-fish-in-the-sea.html>

² Mace PM (2001). A new role for MSY in single-species and ecosystem approaches to fisheries stock assessment and management. *Fish and fisheries*, **2**(1), 2-32

³ Barnett LA, Branch TA, Ranasinghe RA, & Essington TE (2017). Old-growth fishes become scarce under fishing. *Current Biology*, **27**(18), 2843-2848.

⁴ Hixon MA, Johnson DW & Sogard SM (2014). BOFFFFs: on the importance of conserving old-growth age structure in fishery populations. *ICES Journal of Marine Science*, **71**(8), 2171-2185.

⁵ Griffiths CA, Winker H, Bartolino V, Wennhage H, Orio A and Cardinale M (2023). Including older fish in fisheries management: a new age-based indicator and reference point for exploited fish stocks. *Fish and Fisheries*, *00*: 1-20.

⁶ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0056>

⁷ Marshall DJ, Bode M, Mangel M, Arlinghaus R & Dick EJ (2021). Reproductive hyperallometry and managing the world's fisheries. *Proceedings of the National Academy of Sciences*, **118**(34), e2100695118.

⁸ Haase K, Weltersbach MS, Lewin WC, Zimmermann C & Strehlow HV (2022). Potential effects of management options on marine recreational fisheries—the example of the western Baltic cod fishery. *ICES Journal of Marine Science*, **79**(3), 661-676.

⁹ Bronnmann J, Koemle D, Meyerhoff J, Weltersbach MS, Strehlow HV, & Arlinghaus R (2023). Willingness to pay for harvest regulations and catch outcomes in recreational fisheries: A stated preference study of German cod anglers. *Fisheries Research*, **259**, 106536