14. Ocean sunfish (*Mola mola*)

Irish name: Iasc gréine

Figure A10.14.1. ocean sunfish (*Mola mola*). Photo © Haley Dolton.

Background

The ocean sunfish is a large, bony fish species (up to 333 cm total length; Claro, 1994) in the Class Actinopterygii. It is a species found in warm and temperate waters across the globe in coastal and pelagic waters, ranging from Scandinavia to south Africa in the eastern Atlantic (Liu et al., 2015). It is found between 0 - 400 m (Cartamil & Lowe, 2004). The ocean sunfish can reach 23 years old (Then and Hoenig, 2014) with females being sexually mature between 5 and 7 years (Liu et al., 2015). The generation length of ocean sunfish is estimated at 8 – 10 years (Liu et al., 2015). Exact reproductive information is lacking, but spawning is thought to occur between August and October in Japan, and it is thought to have asynchronous egg development (a multiple spawner; Nakatsubo et al., 2007). It is the most fecund of all vertebrates producing ~300 million eggs, with hatchlings growing at an impressive rate in a short timeframe (Schmidt, 1921; Carwardine, 1995). For example, ocean sunfish are estimated to increase mass by 0.02 – 0.49 kg/day (Liu et al., 2015). Sea temperatures of 13-21℃, fronts, and abundance of prey appear to be good indicators of adult sunfish distribution, with juveniles found in higher numbers near to the coast (Houghton et al., 2006; Potter et al., 2011; Thys et al., 2013; Hinrichsen et al., 2022). More regionally to the Atlantic, ocean sunfish occupy waters of >10◦C (Sims et al., 2009; Potter et al., 2011) and fish north of 35˚latitude spent ~75% of the time in the top 50 m of the water column (Potter & Howell, 2011). Additionally, another study found this species spends up to 30% of its time in the top 10 m of the water column (Potter & Howell, 2011).

This, along with daily vertical migrations, may help to explain reported vessel strikes of this species in the literature (Hinrichsen et al., 2022; Sawai & Nyegaard, 2022).

In the Northeast Atlantic, minimum abundance estimates are 12,702 (CI: 9,864-16,357) in the summer (Density = 0.043 ind/km²) and 8,223 individuals (CI: 6,178-10,946) (Density = 0.028 ind/km²) in the winter (Breen et al., 2017). In Irish and Celtic Seas, the overall estimated density is 0.98 sunfish per 100 km² (Houghton et al., 2006). Additionally, more recent density surface models predict a high density of ocean sunfish in the South Celtic Sea during the summer and a lower density during the winter (but still a presence of fish; Breen et al., 2017). Bycatch of the ocean sunfish in drift nets, set nets and longlines is common, although misidentification with other sunfish species occurs (Liu et al., 2015). Consequently, accurate population estimates, and bycatch numbers are difficult to obtain. However, research suggests sunfish make up 51 – 93% of bycatch in some fisheries (Silvani et al., 1999; Petersen and McDonell, 2007). There is an unregulated targeted fishery for ocean sunfish in Japan, Taiwan and South Korea (Phillips et al., 2023). Selling of ocean sunfish for consumption within the EU is prohibited due to risk of life to humans as toxins, similar to those in the pufferfish, are found within the meat, although recent research indicates there is a limited risk of poisoning (Baptista et al., 2022). Based on high catch rates in fisheries, the species is thought to be declining globally by at least 30% over three generation lengths (24 – 30 years; Liu et al., 2015). This is especially of concern as this species appears to show residency, with discrete populations suggested (Pope et al., 2010; Potter and Howell, 2011).

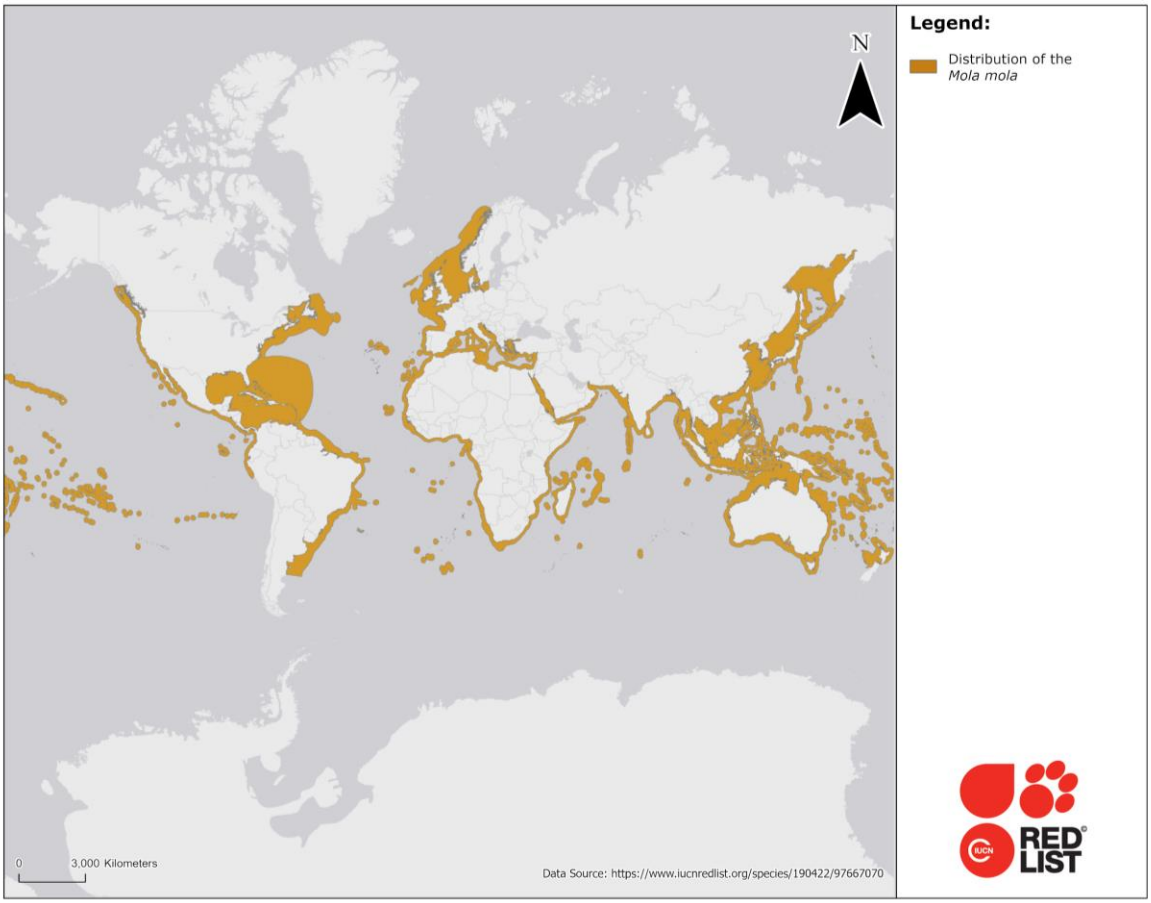

Figure A10.14.2. Global geographic distribution of ocean sunfish (*Mola mola*) (https://www.iucnredlist.org/species/190422/97667070).

Rationale for spatial protection in the southern Celtic Sea

Ocean sunfish were nominated for inclusion with particular reference to their conservation listing under the IUCN as being Vulnerable globally, Data Deficient in Europe, and Not Evaluated in Ireland. The ocean sunfish is not protected under any legislation. There are unregulated targeted fisheries and high levels of bycatch of this species (Liu et al., 2015). Management suggestions, such as deploying nets to below a minimum depth, have been suggested to reduce bycatch of the species. As the ocean sunfish likely displays residency and is found in the South Celtic Sea throughout the year, a precautionary approach is applied, and spatial protection of this species is considered.

The southern Celtic Sea appears to be a significant part of its range. The current level of exploitation from fisheries (whether targeted or bycatch) is uncertain. However, the South Celtic Sea has been highlighted as a hotspot for ocean sunfish during the summer and individuals may remain in the area year round.

Based on current knowledge, ocean sunfish are amenable to spatial protection. Although sunfish are pelagic, they are also a coastal species with juveniles aggregating in coastal areas (Pope et al., 2010). They also show residency and there are potential subpopulations of the species making them vulnerable to fishing pressures (Dewar et al., 2010; Potter et al., 2011). Although it is unknown where ocean sunfish spawn in the Northeast Atlantic, the central gyres of the North Atlantic have been suggested as a potential spawning area for *M. Mola* and eddy kinetic energy, along with warmer sea temperatures, have been suggested to aid in spawning of other sunfish species (Pope et al., 2009; Arostegui et al., 2020). Under a precautionary approach, the presence of the Celtic Front and suggested higher density of adult sunfish in the summer, make this area suitable for spatial protection for the ocean sunfish.

Sensitivity assessment

The highest associated sensitivity scoring for the ocean sunfish was in relation to targeted and non-targeted removal (bycatch) by fishing (high confidence). Although not commercially important, ocean sunfish are caught in large numbers in tuna and billfish fisheries. Individuals in bycatch are reported as being returned alive, however the post release effects of being caught and true mortality have not been quantified (Silvani et al., 1999; Liu et al., 2015). Ocean sunfish are also targeted in an unregulated fishery in Japan and Taiwan with a reported biomass of 20.8-49.4 tonnes per annum being removed (Liu et al., 2009). Following a precautionary approach, ocean sunfish were deemed sensitive to transition elements and organo-metal contamination (low confidence), hydrocarbon and PAH contamination (low confidence). Ocean sunfish were deemed moderately sensitive to death or injury by collision linked to fisheries activities (medium confidence). This perceived sensitivity is owing to using the top vertical habitat available for extended periods.

Ocean sunfish were assessed as having a medium sensitivity (medium confidence) to shipping related pressures such as death or injury by collision. Following a precautionary principle, they were also deemed sensitive to contaminants (low confidence). It is worth noting that although assessed as not sensitive to underwater noise due to a lack of swim bladder and of species-specific evidence, other spawning fish that use noise for communication would be assessed as sensitive to this pressure under a precautionary approach (de Jong et al., 2020). However, whether sunfish use noise in this way is unknown.

Offshore energy impacts on ocean sunfish are poorly understood, however ocean sunfish were deemed not sensitive to several offshore energy impacts. For example, ocean sunfish were deemed not sensitive to Water Flow Changes (medium confidence) since juvenile and adult sunfish are mobile and increases in eddy kinetic energy have been shown to aid larval transport (Pope et al.,

2009; Arostegui et al., 2020). How fish will respond to deoxygenation is poorly understood, however, research indicates the ocean sunfish might be able to tolerate low oxygen levels. As such, it was deemed not sensitive to deoxygenation (medium confidence).

Data sources available

Data sources for the ocean sunfish in the Celtic Sea AOI that were available to the MPA Advisory Group, and the quality / suitability of those data for conservation prioritization analyses (See Table 3.2.1 Main Report), are shown in Figure A10.14.3. For information on how data were prepared for use in prioritization analyses, and for visualisation of layer used, see Appendix 5e, section 5e.4.

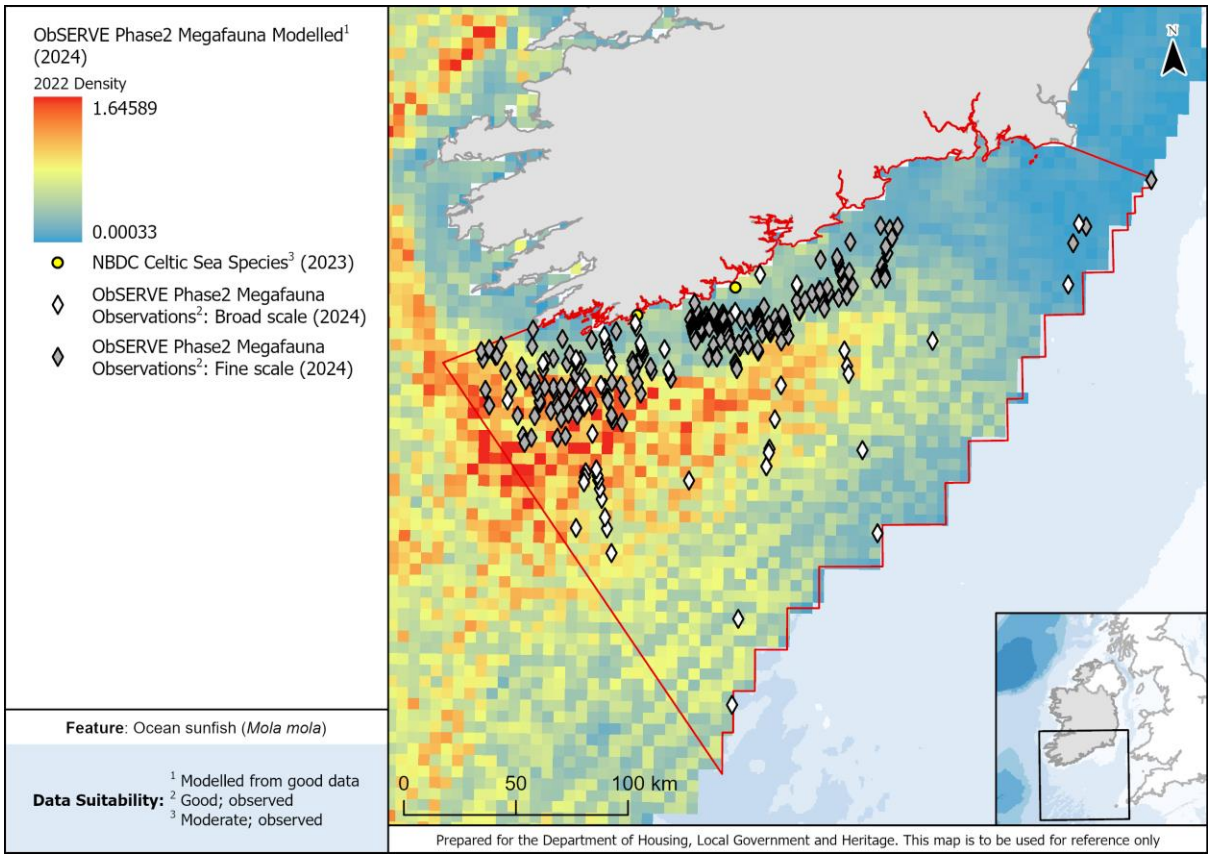

Figure A10.14.3. Distribution of the ocean sunfish (*Mola mola*) in the Celtic Sea

Further research needs

Key knowledge on the ecology and biology of the ocean sunfish are currently lacking. For example, more information is needed regarding natural growth rates, longevity, habitat use, distribution, migration, population size, diet changes during growth, spawning, age of sexual maturity and connectivity (Phillips et al., 2023). In addition, evidence to identify the potential effects of multiple

pressures was insufficient to form an assessment based on literature and relied on expert judgement. There remains taxonomic confusion in the early literature meaning there are large gaps in information regarding migration, range, fishery discards and population trends.

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