6. Shagreen ray (*Leucoraja fullonica*)

Irish name: Roc úcaire

Figure A10.6.1. shagreen ray (*Leucoraja fullonica*) (photo © Edward Farrell).

Background

The shagreen ray is a large cartilaginous fish species in the Class Chondrichthyes. The shagreen ray can reach 110 cm total length and has an estimated generation length of 9.7 years (McCully & Wallas, 2015). Little is known regarding reproductive biology of this species. It is documented to lay egg cases, and in the Celtic and North Seas, males mature at approximately 75 - 96 cm total length (Stehmann & Bürkel 1984; McCully et al., 2012). Whereas females are estimated to mature at 82 cm (unknown location) (Ebert & Dando, 2021). It is a benthic species with an approximate vertical habitat range between 30 – 1400 m depth (Stehmann & Bürkel, 1984; Ellis et al., 2005; Bisch et al., 2022), but is found mostly at depths of approximately 200 m on sandy and coarse substrate. It is mostly found in offshore waters of the continental shelf in the Northeast Atlantic, extending from the Azores, the Bay of Biscay, the Mediterranean, Madeira, northern Morocco, Norwegian Sea, Icelandic waters, the Faroe Islands and east of Greenland (Stehmann & Bürkel 1984; ICES, 2012; McCully & Wallas, 2015).

The rationale for spatial protection in the southern Celtic Sea

The shagreen ray was nominated for inclusion with particular reference to its conservation listing under the Irish Red List as Vulnerable (2016 assessment) and under the IUCN red list as Vulnerable globally and at the European scale. There appears to be two deepwater subpopulations (Northeast Atlantic and Mediterranean), which might be geographically isolated (McCully & Wallas, 2015). Accurate trends in population are lacking due to improper survey methods and historical misidentification with the sailray (*Rajella lintea*), white skate (*Rostroraja alba*), small-eyed ray (*Raja microocellata*) and sandy skate (*Leucoraja circularis*) (McCully & Wallas, 2015; ICES, 2022). However, populations are decreasing, and it is presumed that the Northeast Atlantic population has decreased by 30-50% over three generations (McCully & Wallas, 2015). More locally, groundfish surveys suggested an overall decrease in biomass west of Scotland and Ireland between 1997 and 2011, with declines stabilising in 2010–2011 (ICES, 2012). Additionally, the maximum sustainable yield of this stock cannot be accurately quantified and there is a lack of evidence to suggest the shagreen ray has recovered despite regulations on fishing (ICES, 2022; ICES, 2024). These regulations include, management under a generic total allowable catch (TAC) of no more than 134 tonnes in the years 2023 and 2024 in subareas 6-7 and a permanent ban on deepwater gillnet fisheries at depths of > 600 m, and a maximum length of the nets deployed and soak time in the remaining fisheries at depths of < 600 m within the EU (EC Regulation No. 41/2006; EU regulation 2022/1614 and 2016/2336).

Based on current knowledge, the shagreen ray is amenable to spatial protection. The shagreen ray is caught in mixed demersal fisheries, bottom trawls, longlines and gillnet fisheries (Stehmann & Bürkel, 1984; Serena, 2005; McCully & Wallas, 2015). Although little is known about its reproductive strategy, it is an egg-laying species thought to lay pairs of eggs in sandy and/or muddy flats (Breder & Rosen, 1966) and consequently, sessile egg cases may be vulnerable to disturbance on the seabed from pressures such as fishing or ORE development. Additionally, the predicted distribution of adults and juveniles in the south-western Celtic Sea is high, with preferences being shown for a sandy habitat, 100-200 m depth and 230 km distance from shore (Bisch et al., 2022). Within those distribution predictions, there appears to be an ontogenetic shift in depth preference as smaller individuals are more likely to be found in deeper water (120 and 150 m depth) and larger individuals at a range of depths, including shallower waters (50 to 200 m; Bisch et al., 2022). Additionally, smaller shagreen rays were observed during the winter in the Northeast Atlantic indicating potential recruitment in the winter months (Bisch et al., 2022). As there is evidence of potential isolated populations, and the closely related small-eyed ray *Raja microocellata* showing site fidelity (Ellis et al., 2011), under a precautionary principle, adults and juveniles will benefit from spatial protection in our area. As seen in other skates, this assessment assumes that shagreen egg cases are also present at shallow depths (but this has yet to be observed owing to limitations of current survey methods).

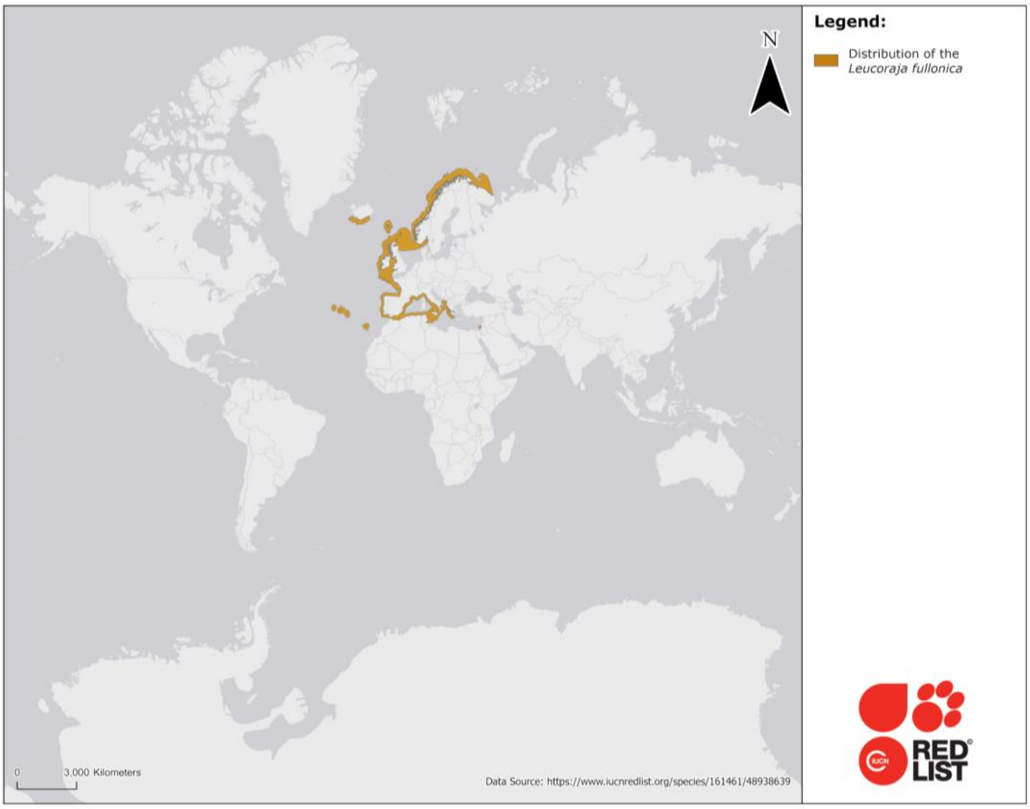

Figure A10.6.2. Global geographic distribution of the shagreen ray (*Leucoraja fullonica*). Taken from https://www.iucnredlist.org/species/161461/48938639#geographic-range

Sensitivity assessment

The highest associated sensitivity scoring for the shagreen ray was in relation to targeted and non-targeted removal (bycatch) by fishing (high confidence). Although there is management in place in terms of a TAC and limitations on fishing gear and soak times, accurate stock estimates are lacking and bycatch and discard cannot be quantified (Ellis et al., 2011; ICES, 2022). Additionally, there is some evidence of closely related species displaying site fidelity to certain areas (Ellis et al., 2011) and potentially two isolated populations in the Northeast Atlantic and Mediterranean. The effects of capture in fisheries are conflicting and highly species-specific (see Cameron et al., 2023 and Horton et al., 2023 for a review of catch-and-release studies), however a reduction in post-release fitness may occur. Following a precautionary approach, the shagreen ray was deemed sensitive to transition elements and organo-metal contamination (low confidence), hydrocarbon and PAH contamination (low confidence). The shagreen ray was deemed moderately sensitive to abrasion/disturbance of substratum surface linked to fisheries activities (low confidence). This perceived sensitivity is owing to their benthic nature (likely favouring sandy / muddy flats), and due to their sessile egg cases, which likely require well-aerated water for survival.

The shagreen ray was identified as not sensitive to the shipping related pressure of underwater noise. The impacts of vessel noise on elasmobranch species are poorly understood. Lab-based studies suggest noise can increase swimming activity (de Vincenzi et al., 2021), whereas research in the wild indicates an unclear response to boat traffic (Rider et al., 2021). Hearing in demersal elasmobranch species seems to be most sensitive to low frequencies (Casper, 2006), likely within the range of shipping and offshore wind (Tougaard et al., 2020). However the impact of vessel sound is uncertain. Whether sessile egg cases respond to noise is unknown, however, given the perceived depth preference for egg-laying this interaction is likely limited.

Offshore energy impacts on elasmobranchs are poorly understood, however, the shagreen ray was deemed moderately sensitive or sensitive to several offshore energy impacts. Pressures including physical loss of marine habitat (low confidence) and heavy smothering and siltation changes (low confidence) were deemed highly and moderately sensitive, respectively, owing to their benthic and sessile egg cases, which take time to mature and likely require well-aerated water for survival. Physical change to another seabed type and sediment type, habitat structure change (extraction) and penetration or disturbance of substratum were deemed moderately sensitive (low confidence) due to information regarding egg-laying in sediment and muddy areas of other skate egg-laying species. Given the nursery areas for egg-laying have not been delineated in the Celtic Sea region, a precautionary approach is recommended. Construction activities may displace some elasmobranch species, although quantitative data are absent. Electromagnetic fields from high voltage cables are likely to affect the behaviour of some species (Gill et al., 2009; Hutchison et al., 2020), however, long-term impacts are unknown at present. Post construction, wind farms may provide refugia and artificial reef communities which could prove beneficial to some species of elasmobranch.

Data sources available

Data sources for shagreen ray 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 A10.6.3. For information on how data were prepared for use in prioritization analyses, and for a visualisation of layers used, see Appendix 5e, section 5e.4.

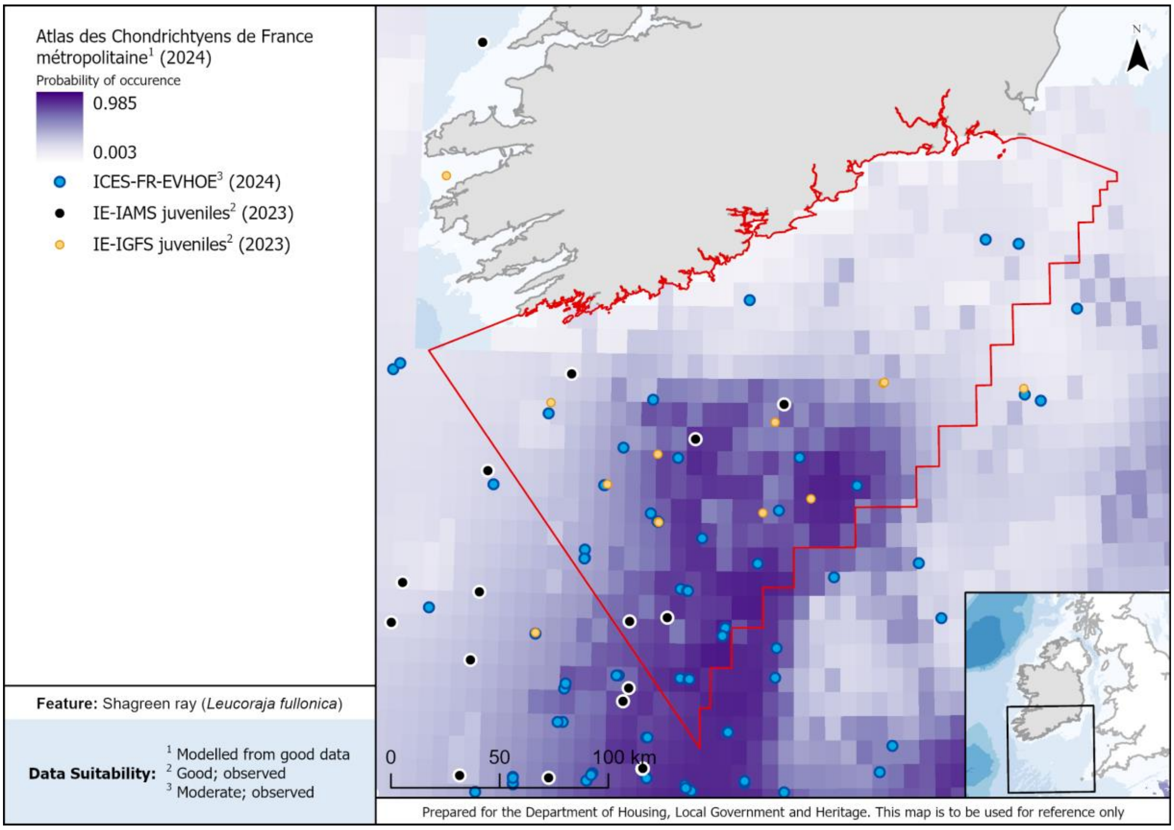

Figure A10.6.3. Data available for shagreen ray (*Leucoraja fullonica*) in the Celtic Sea.

Further research needs

Further work is required to identify population size, population trends, migrations and movements, essential habitats, spawning and egg nursery areas. Equally, discard quantity and survival require further investigation. In addition, evidence to identify the potential effect of multiple pressures was insufficient to form an assessment, or relieved heavily on expert judgement. These pressures included the effects of changes in suspended solids (water clarity), smothering and siltation changes (light and medium), electromagnetic energy, death or injury by collision, transition elements and organo-metal contamination, hydrocarbon and PAH contamination, synthetic compound contamination, introduction of other substances and the introduction or spread of invasive non-indigenous species.

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