13. Spotted ray (*Raja montagui*)

Irish name: *Roc breac/ Roc mín*

Figure 1: Spotted ray *Raja montagui* © Natural England/Ross Bullimore

Background

Spotted rays are a small skate species in the Class Chondrichthyes. They are a demersal species that is most common on sandy sediments in inshore water and shallow shelf seas at 28-530 m, though may occur deeper in the southern parts of its range (Ellis, Cruz-Martinez, et al. 2005). It is most abundant in waters less than 100 m in depth (Ellis et al. 2007). Juveniles feed on small crustaceans with larger individuals switching to larger crustaceans, and fishes (Ellis et al. 2007). Spotted rays have a maximum size of approx. 80 cm total length (Ellis, Dulvy, et al. 2005), but average 50 cm in length (Bauchot 1987; Clarke et al. 2016), making it one of the smaller species caught in the Irish Sea. Spotted rays reach a maximum age of 18 (Muus, Nielsen, and Dahlström 1999). Females lay paired eggs during the summer, in sandy or muddy substrates, which hatch after approximately 5-6 months (Breder and Rosen 1966; Serena 2005; Stehmann et al. 1984). Spotted rays are distributed throughout the Northeast Atlantic, including the Celtic and Irish Sea, and the Mediterranean Sea (Ellis et al. 2007) and exhibit high levels of site fidelity (Simpson, Humphries, and Sims 2021; Walker 1996).

Rationale for spatial protection in the western Irish Sea

Spotted rays were nominated for inclusion because they have been on the OSPAR List of Threatened and/or Declining Species and Habitats since 2001. Recent data suggest the species is increasing in abundance in some ICES areas, however, it remains rare in several countries and there are substantial uncertainties in these population trends (OSPAR.org).

Spotted rays are currently managed under a generic total allowable catch (TAC) with other named ray species. This TAC includes thornback (*R. clavata*), painted (*R.*

microoecllata), blonde (*R. brachyura*), cuckoo (*Leucoraja naevus*) (Common Fisheries Policy, 2016). "ICES considers that management of the catches of several stocks under a combined TAC prevents effective control of single-stock exploitation rates and could lead to overexploitation of some stocks." (ICES 2022). Moreover, while landings are reported at the species level, misidentification of species is considered a challenge, particularly between blonde and spotted rays, therefore, the accuracy of landings is questionable. It is suggested that smaller bodies rays are more resilient to fishing pressure, however, large uncertainties remain with regards landings, discarding and overall population trends for this species.

Based on current knowledge spotted rays are amenable to spatial protection. Spotted ray are recorded throughout the Irish Sea (Clarke et al. 2016; Dedman et al. 2017; ICES 2022), and it is likely that the shallow sandy/muddy bays along the eastern coastline are important for egg laying and juvenile stages (Ellis, Cruz-Martinez, et al. 2005). Furthermore, spotted rays tagged in the North Sea and Western English Channel demonstrate high residency with little minimal range movement (Simpson et al. 2021; Walker 1996). Spotted rays may also have distinct substrate and depth preferences (Simpson et al. 2021) which can be used to design ecologically relevant protected areas.

Sensitivity assessment

The highest associated sensitivity scoring for blonde ray was in relation to its targeted and non-targeted removal (bycatch) by fishing (high confidence). The main threat to spotted rays is from fisheries, primarily through the non-targeted removal of the species. Spotted rays are not considered commercially important and are generally by-caught in trawl and gillnet fisheries that target other more valuable species (ICES 2022) (High confidence). Following a precautionary approach, spotted rays were deemed sensitive to transition elements and organo-metal contamination (low confidence), hydrocarbon and PAH contamination (low confidence). Spotted rays were deemed to have a medium sensitivity to heavy smothering and siltation changes which may result from bottom trawling activities (low confidence). While adults will likely move away from heavy siltation pressure, the sessile benthic eggs are vulnerable to becoming covered over and deprived of oxygenated fresh water.

Following a precautionary principle, spotted rays were assessed as sensitive to some shipping related pressures including contaminants (low confidence). There is no evidence that shipping activity directly impacts demersal rays, and the risk of collision was assessed as Not Relevant. Spotted rays were assessed as Not Sensitive to underwater noise (low confidence), however, the impacts of anthropogenic noise on elasmobranch species are very poorly understood. Lab based studies suggest noise can increase swimming activity (de Vincenzi et al. 2021), whereas research in the wild indicates an equivocal response to boat traffic (Rider et al. 2021). Hearing ability in demersal species seems to be most sensitive to low frequencies from nearby sources (Casper 2006) suggesting spotted rays may not be sensitive to vessel-related noise.

Offshore energy impacts on elasmobranchs are poorly understood, however, spotted rays were deemed moderately sensitive or sensitive to several offshore energy impacts. Physical

loss of marine habitat, abrasion/disturbance of the seabed, and heavy smothering/siltation were assessed at a medium sensitivity (low confidence) owing to limited mobility of early life stages. Other ORE associated pressures were assessed as Low or Not sensitive (e.g., water flow changes), however, the quality, applicability and concordance of the available evidence is low and, in some instances, non-existent. For instance, Spotted ray are electrosensitive and can detect weak electromagnetic fields (EMF) and may generate their own weak EMF (Fritzsch and Moller 1995). Other similar species are affected by electromagnetic fields from high voltage cables (Gill et al., 2009; Hutchison et al., 2020), therefore, some impact on spotted ray is possible (low confidence). The cumulative long-term impacts of large offshore energy developments are unknown currently. Post construction, wind farms may provide refugia and artificial reef communities which could prove beneficial to some species of elasmobranch. Construction activities may displace some species; however, quantitative data is absent.

Further research needs.

Further work is required to identify population size, population trends, migrations and movements, essential habitats, spawning and 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 judgment. 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.

Figure 2. Geographic distribution in the northeast Atlantic (https://www.iucnredlist.org/species/63146/12623141#geographic-range)

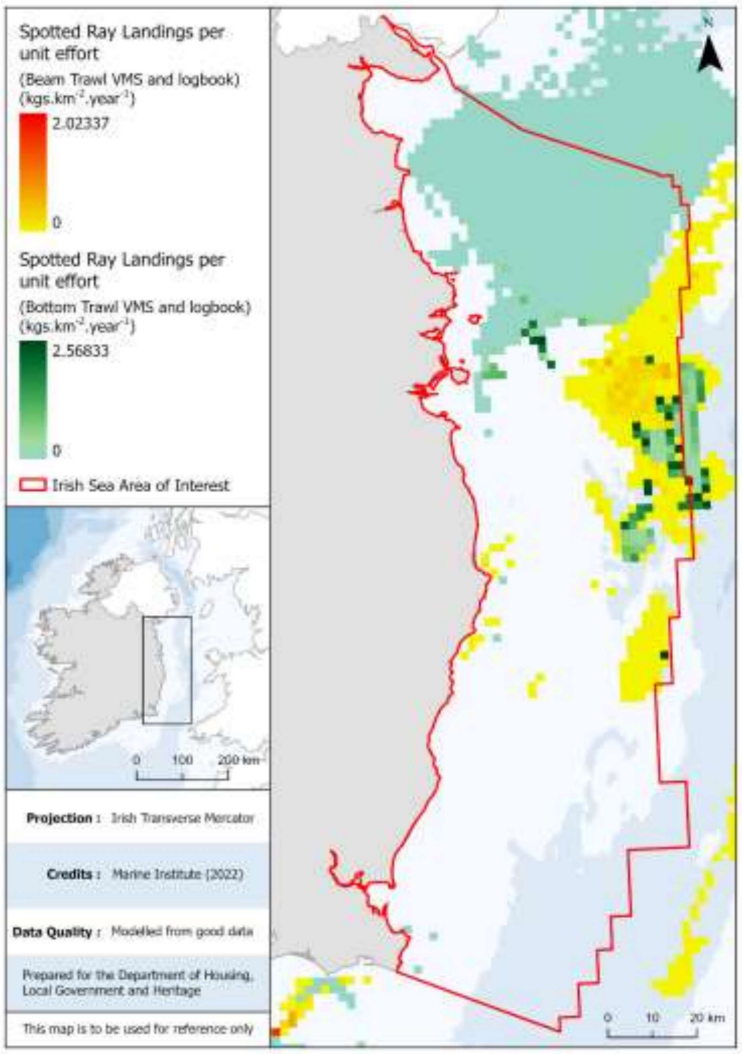

Figure 3. Distribution of spotted ray (*Raja montagui*) in the western Irish Sea. Data from ICES international fishing effort and swept area ratios and VMS.

Data sources and quality

Fisheries data and benthic surveys provide the information on which the status of *R. montagui* has been determined although grouping of the data for multiple ray species may obscure trends and lead to overexploitation (ICES 2022).

Dataset Name	Data Owning Organisation	Dataset Quality	Metadata URL	Comments
Dedman *et al.* (2015) Species Distribution Model (SDM)	Dedman *et al* (2015)	Modelled from moderate data		

ICES international fishing effort and swept area ratios; VMS	International Council for the Exploration of the Seas	Modelled from good data		
International Bottom Trawl Survey (IBTS) Fisheries Database of Trawl Surveys (DATRAS)	International Council for the Exploration of the Seas	Good; observed	IE-IGFS and NIGFS	Data is sparse for this species
Marine Institute VMS and logbook	Supplied to Marine Institute by Irish Naval Service and Sea Fisheries Protection Authority	Modelled from good data		

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