15. Thornback Ray (*Raja clavata*)

Irish name: Roc garbh

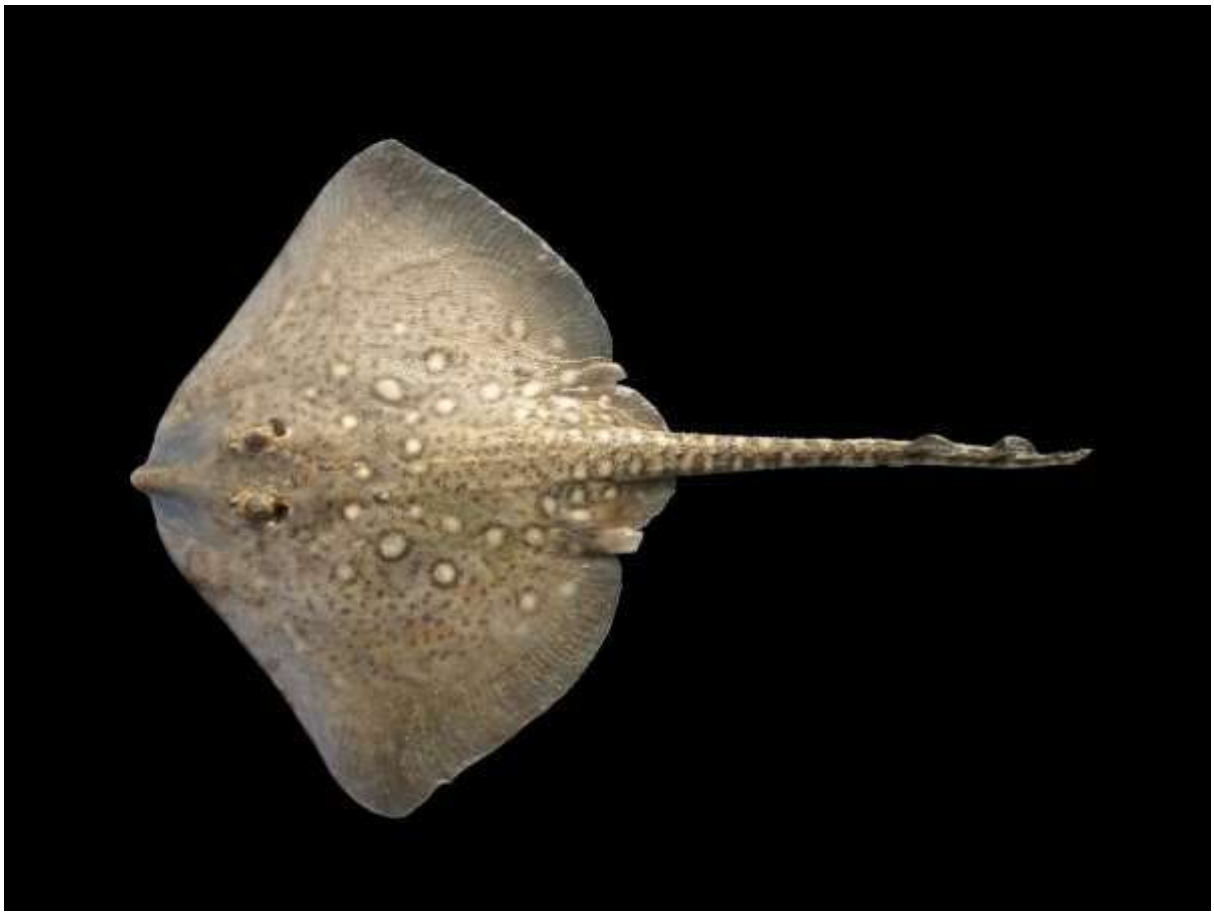

Figure 1: Thornback ray, *Raja clavata* (Linnaeus, 1758), Belgium. Credit: © Hans Hillewaert. Retrieved from https://www.flickr.com/photos/bathyporeia/9074024023/in/photolist-eQ3aZo-iKTBTk-ePQKd4-25zhoEq

Background

The thornback ray is a medium sized cartilaginous fish species in the Class Chondrichthyes. They have a large habitat range occurring in depths from 1-300m with juveniles residing inshore (10-30m depth) and adults occupying offshore waters (Hunter et al., 2006; Walker et al., 1997). Their maximum size is reported at 118cm for females and 98cm for males and a maximum age of 15 years (Walker, 1999, www.fishbase.se, n.d.). Size at maturity ranges regionally, but in general, they are an oviparous, slow maturing species producing 60-140 eggs per individual annually (Holden, 1975). Thornback rays are distributed throughout the North, North-eastern, Eastern Central, and Southeast Atlantic, and the Mediterranean Sea. Globally, genetic studies indicate segregation between the Azores, Mediterranean and the European shelf populations (Chevolot et al., 2006). Three distinct populations are recognized by ICES around Ireland, Northwest, West, and the Irish/Celtic Sea/Bristol Channel. The coastal populations in the Irish Sea (Irish and Wales coast) exhibit low genetic differentiation, possibly due to the genetic drift between Ireland and Wales (Chevolot et al., 2008).

Rationale for spatial protection in the western Irish Sea

This species is listed by OSPAR and the IUCN and classified as Near Threatened globally and as Least Concern in the 2016 Ireland Red List. The population in the Irish Sea experienced a 45% abundance decrease between 1988-1997 but have shown positive population growth since the early 2000's (Clarke et al., 2016; Dulvy et al., 2000). However, populations in the North Sea have been experiencing population decline with pushes to enact species specific management strategies (Wiegand et al., 2011).

Feature is not currently protected or conserved in the western Irish Sea. Thornback rays are covered under the Common Fisheries Policy (2015). However, species specific fisheries management is absent, limiting commercial landings by the total allowable catch ceiling for the named rays group.

It is known whether the western Irish Sea is a significant part of its range. The distribution of the species within the coastal Irish Sea is somewhat well known. They are the most abundant skate in coastal Ireland, with annual government funded trawl surveys capturing them frequently in the Irish Sea. Spawning areas are also present along the east and west Irish coast (Varian et al., 2010). The species shows high site fidelity with a range of 37-111km (Hunter et al., 2005a, 2005b). Although, juveniles and adults do exhibit seasonal migrations, it is not well understood in the Irish Sea.

Based on current knowledge thornback ray are amenable to spatial protection. Owing to egg presence along the Irish coast, useful management measures for thornback ray could include closed areas to protect spawning females. Data storage and mark-recapture tags in the North Sea indicate seasonal migration and high site fidelity for juveniles and adults (Hunter et al., 2006). These individuals are also repeatedly captured in the same coastal areas over long time periods.

Sensitivity assessment

The highest, publication backed, associated sensitivity scoring for thornback rays was in relation to its targeted and non-targeted removal (bycatch) by fishing (medium confidence). Thornback rays are not usually targeted on the Irish coast, instead they are largely captured as bycatch by trawl and gillnet fisheries (Clarke et al., 2016). Although, estimates from the early 2000s indicate a growing and stable population, species specific management is important to avoid another collapse. Currently, the species is managed as part of the generic maximum total allowable catch for named ray species in the Irish Sea and west of Ireland, limiting management effectiveness. Regardless of the impacts of fishing pressure on stock health, the population has experienced a body size reduction. Skippers report decreases in thornback ray body size with recent annual heaviest individual only weighing 60% of the weight of the heaviest thornback in 1977 (Richardson et al., 2006). According to the Irish Specimen Fish Committee, there have been no records of captured >8kg individuals since 2007.

Thornback rays were regarded as not sensitive to shipping-related activities (low confidence). Vessel presence in marine environments produce noise and create a collision risk. Noise impacts 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 ability in demersal elasmobranch species seems to be most sensitive to low frequencies (Casper, 2006), however, hearing range varies depending on the species (Popper and Fay, 1977). Thornbacks are a benthic species, rarely ever rising to the surface, making collision risk minimal.

Offshore energy impacts on elasmobranchs are poorly understood, however, based on existing knowledge thornback ray scored not-sensitive to medium sensitivity to the associated pressures (low confidence). Construction activities may displace some species; however, quantitative data is absent. Thornback rays are generalist and occur on different types of seabeds. There is little evidence to support that they are impacted by offshore energy structures.

Further research needs

Key knowledge on the seasonal migrations of thornback rays in the western Irish Sea remains limited and requires further investigation. In addition, evidence to identify the potential effect of multiple pressures was insufficient to form an assessment. Several chemical pressures had insufficient evidence: transition elements and organo-metal contamination, hydrocarbon and PAH contamination, synthetic compound contamination, introduction of other substances, and organic enrichment. Some physical pressures had no relevant publications and relied solely on scientist knowledge: abrasion/disturbance of substratum surface or seabed, changes in suspended solids, and smother and siltation changes (light and heavy).

Figure 2. Global geographic distribution of thornback ray, *Raja clavata,* from the IUCN.

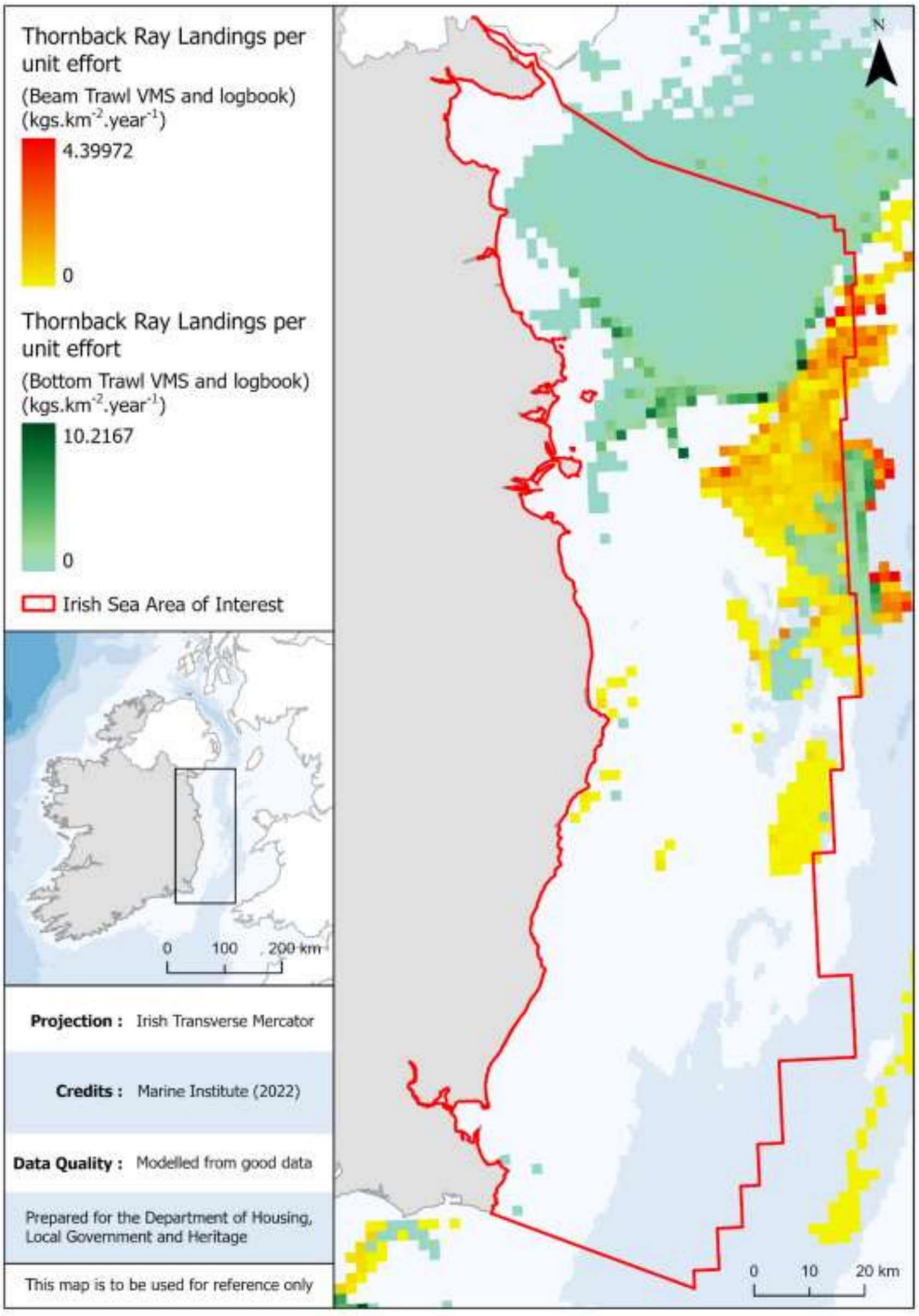

Figure 3. Distribution of thornback rays (*Raja clavata*) in the western Irish Sea. International Bottom Trawl Survey (IBTS) Fisheries Database of Trawl Surveys (DATRAS) visualised.

Data sources and quality

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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