18. Turbot (*Scophthalmus maximus*)

Irish name: Turbard

Figure A10.18.1. Turbot, *Scophthalmus maximus* (Linnaeus, 1758). © Luc Viatour (https://Lucnix.be), CC BY-SA 3.0

This case report has been updated from the western Irish Sea case report published in 2023. A new Web of Science literature review was conducted to assess whether any new research on the species had been conducted since the western Irish Sea report was published, and used to inform both the report and the sensitivity analysis.

Background

Turbot is a large, left-eyed flatfish found primarily in shallow waters throughout the Mediterranean, the Baltic Sea, the Black Sea, and the North Atlantic (Figure A10.18.2). Adults live on sandy, rocky or mixed bottoms; rather common in brackish waters. Feed mainly on other bottom-living fishes (sand-eels, gobies, *etc*.), and also, to a lesser extent, on larger crustaceans and bivalves. Batch spawner with spawning season between May and July; pelagic eggs. May reach 25 kg with females becoming much larger than males. Highly esteemed food fish. Source: fishbase[1]

Turbot displays high fidelity to spawning sites and is relatively sedentary. The principal threat to turbot is over-exploitation. Population declines have been documented throughout this species' range. Across Europe, turbot is a valuable bycatch species that is taken in various fisheries such as those targeting flatfishes like sole and plaice. This species is caught with beam trawls, seines, trammel nets, longlines, gillnets and otter trawls. Turbot is bred in captivity and is thought to be an excellent candidate for aquaculture in Europe (source: IUCN European Red List Assessment, 2013 and

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[1] https://www.fishbase.se/summary/scophthalmus-maximus.html

references therein). In Ireland, turbot are among the most valuable commercial non-quota species. Very little is known about their population dynamics in the wild, in particular during the sandy beach nursery phase of their life history (Haynes et al., 2010).

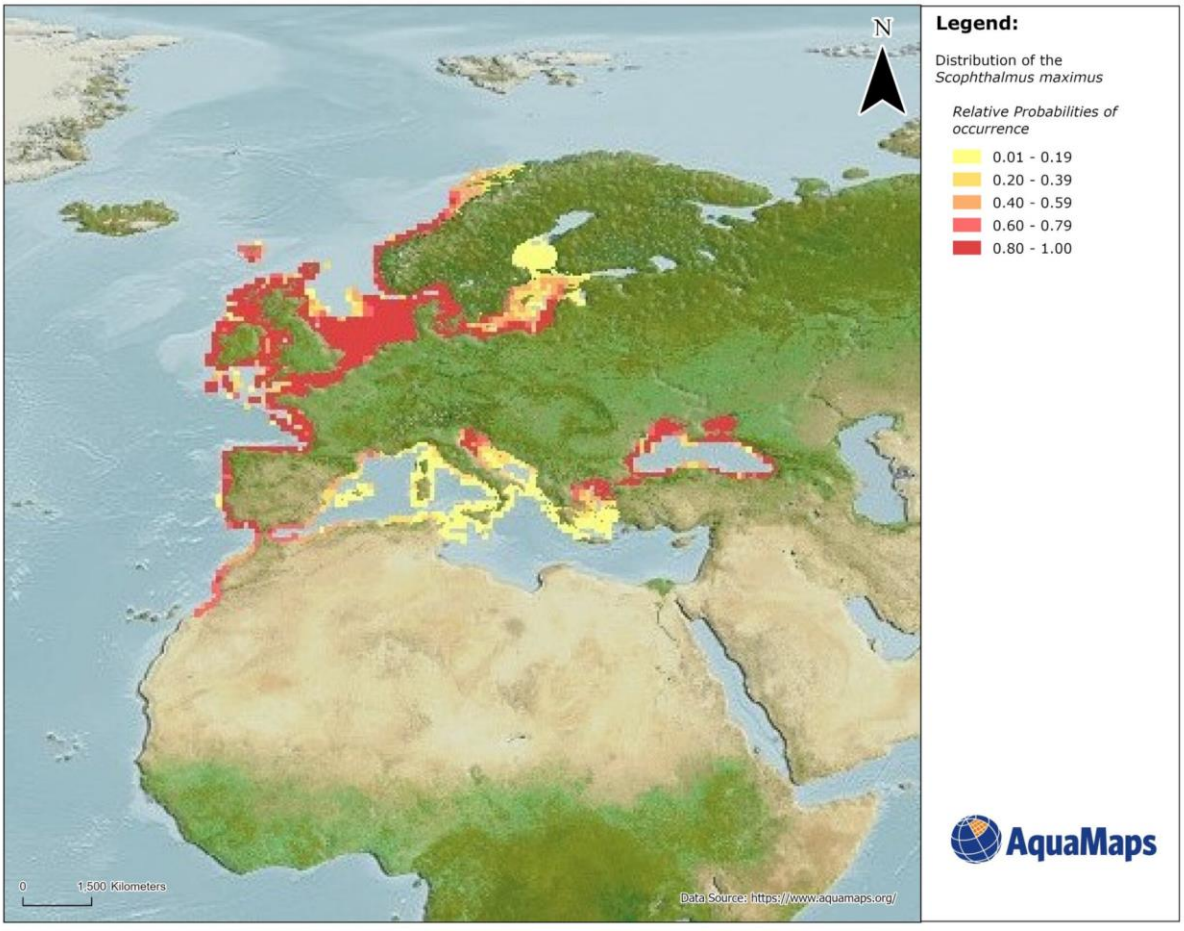

Figure A10.18.2. Global geographic distribution of Turbot, *Scophthalmus maximus,* from www.aquamap.org.

Rationale for spatial protection

Turbot is nominated for inclusion with particular reference to its listing as Vulnerable by the European IUCN Red List. The vulnerable status in the IUCN European assessment is based on declines mainly in the Mediterranean and Baltic Seas and the assessment was done in 2013. The latest Global IUCN Red List places turbot in the Least Concern category (Cardinale et al., 2021). There is no ICES assessment for turbot in the Celtic Sea; the latest ICES assessment for the North Sea shows the stock there is above reference points. Catch per unit effort (CPUE) in the Celtic Sea has shown a generally increasing trend since 2003 but catches are low and infrequent. An MSFD analysis of non-assessed fish stocks in 2020 the recent status of turbot in Irish waters was above longer term averages. Nevertheless, turbot is not subject to stock assessment or individual management in the Celtic Sea and there are no fishing restrictions in place under the Common Fisheries Policy (2015) so the precautionary principle was applied and spatial management is considered.

The Celtic Sea is a significant part of its range. Data on the distribution of this species in the Celtic Sea is comprehensive with the exception of very shallow areas; catch and positional data are available from the fishery (logbooks and VMS) and the IBTS survey reports CPUE, length, weight, age, sex and maturity from scientific hauls spread across the area in a stratified design.

Turbot are amenable to spatial protection owing to the fact they have high spawning site fidelity and generally do not undertake extensive movements (Cardinale et al. 2021 and references therein). However, definitive spawning sites in the Celtic Sea have yet to be determined. Pelagic larval duration is estimated at 29–39 days on the west coast of Ireland (Haynes et al., 2011) and Florin et al. (2013) found a high potential for larval export from a marine reserve in Sweden, showing that it may be important for maintaining a viable turbot stock.

Sensitivity assessment

No existing MarESA or FeAST sensitivity assessments were available for turbot. A full literature search (see appendices) produced 856 results, partially due to the use of turbot in aquaculture. 26 papers passed screening and formed the basis of the sensitivity assessment, supplemented with the latest IUCN Red List assessment (2021).

The highest associated sensitivity scoring for turbot was in relation to targeted and non-targeted (bycatch) removals by all fishing sub-sectors (medium sensitivity, high confidence). Physical loss or alteration of its habitat were deemed a medium sensitivity (with medium confidence). Due to its close association with certain shallow sediments, resistance to physical loss and change of sediment type were scored as low but, as they are mobile, have pelagic eggs and larvae, and have a long association with fisheries-related abrasion, resilience was scored medium.

Turbot were assessed as sensitive to waterflow changes as the transport and retention of their eggs and larvae to suitable areas of habitats may rely on local gyres (e.g. the Irish Sea gyre; Dickey-Collas et al. 1996) and large-scale disruption of such features could disrupt settlement of larvae.

Following the MarESA protocol, turbot were not identified as sensitive to chemical pollutants. MarESA guidelines state that pollutant pressures (transition elements, organo-metal, hydrocarbon and PAHs) are assessed as 'Not sensitive at the pressure benchmark', which assumes compliance with all relevant environmental protection standards. In these cases, resistance, resilience, and relevant confidence assessments are recorded as 'Not relevant' (see Tyler-Walters *et al*. 2018, section 2.5.23 for further explanation). However, a number of field and laboratory studies have shown that certain contaminants can have deleterious effects, e.g. Mhadhbi et al. (2010) state "Exposure to metals and PAHs in ecologically relevant concentrations, either in darkness or under artificial light, caused significant lethal and sublethal effects in turbot, such as alterations in yolk sac, pericardial edema and skeletal abnormalities." Turbot live in close association with the seabed and inhabit near shore areas so any contamination of their essential habitat is to be avoided.

Data sources available

Data were available from the Irish Ground Fish Survey (IGFS), part of the International Bottom Trawl Survey (IBTS), and International Anglerfish and Megrim Survey (IAMS) (Figure A10.18.3), both accessed via the ICES Database of Trawl Surveys (DATRAS). Both sampling gears have good catchability of turbot but neither survey can access the shallowest areas closest to the coast. For explanation of data suitability, refer to Table 3.2.1 Main Report. 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.

Further research needs

Existing data on the shallow water distribution of turbot in the Celtic Sea (e.g. from beach seine or inshore surveys) needs to be combined with the offshore data described below. The new Marine Institute inshore bottom trawl survey (ICeco), which began in 2023, should be a good source of data on the near-shore distribution of this species. Commercial catch data including spatial location of catches by inshore fishing vessels under 12m in length should also be recorded.

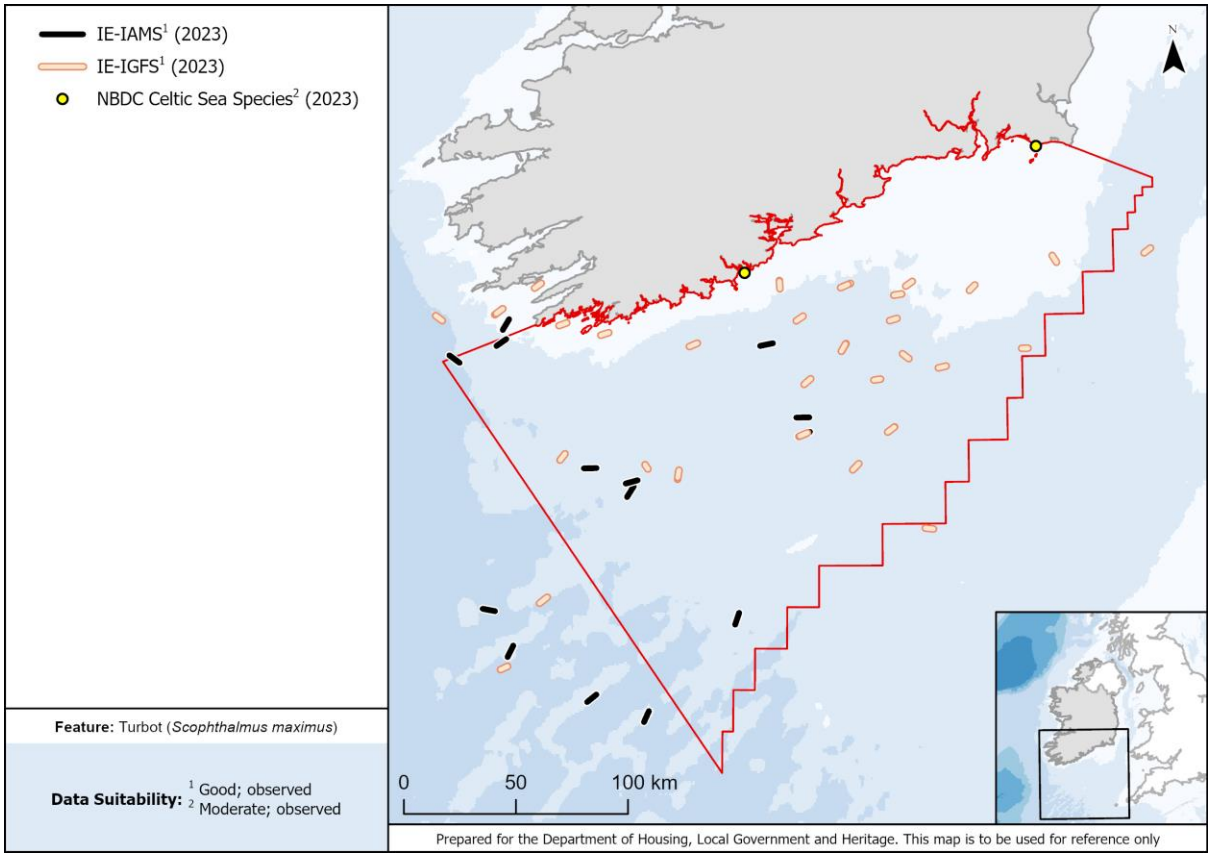

Figure A10.18.3. Data available for turbot, *Scophthalmus maximus,* in the Celtic Sea.

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