Red gurnard in the North East Atlantic, Demersal otter trawl


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Stock:
Red gurnard in the North East Atlantic

Management:
EU

Overview

Red gurnard (Chelidonichthys cuculus) is a widespread demersal species on the Northeast Atlantic shelf, distributed from South Norway and north of the British Isles to Mauritania. The species is found in depths between 20 and 250m living on gravel or coarse sandy substrate.

Higher occurrences of red gurnard with patchy distribution have been observed along the Western approaches from the Shetlands Islands to the Celtic Seas and the Channel. A continuous distribution of fish crossing the Channel and the area West of Brittany does not suggest a separation of the Divisions VIId from VIIe and VIIh. Therefore a split of the population between the Ecoregions does not seem appropriate. Further investigations are needed to progress on stocks boundaries such as morphometric studies, tagging and genetic population studies.

Red gurnard feeds on a variety of small invertebrates, bottom dwelling fish and benthic shellfish and crustaceans. Length at first maturity has been reported at approximately 25cm. Spawning occurs between February and June.

Currently, all red gurnards in the Northeast Atlantic are treated as a single stock. Considering their behaviour, future assessment and management should identify and treat separate spawning aggregations independently.

Red gurnard is mainly taken as a bycatch in mixed demersal fisheries for flatfish and roundfish, as the market is limited a larger part of the gurnard catch is discarded. Gurnards have been landed as a mixed generic gurnard catch and therefore landings of red gurnard are uncertain. As well as miss-reporting issues, some countries did not report their landings of gurnards and therefore the catches are incomplete for a number of years.

Other than indirect management through fleets that target a mix of fisheries and the use of marine protected areas, there is no management of this stock. However, ICES advises on the ICES approach to data-limited stocks, implying that catches in 2013 should be reduced by 20% in relation to the average catch of the last three years. Because the data for catches of red gurnard are considered highly unreliable, ICES is not in a position to quantify the result.

Stock Status

less risk ● ● ○ ○ ○ more risk

Red gurnard in North East Atlantic has been scored as low risk. This is because the species has a low vulnerability score of 30/100 and the most recent assessment of the stock shows that the stock size has increased in most areas.

Management

less risk ● ● ● ● ○ more risk

The management of red gurnard in North East Atlantic has been scored a high risk. This is because there are no management

controls although a data-limited stock assessment has been carried out. There are management measures in place to control effort in the fisheries and regulations are enforced and independently verified using several surveillance measures.

Bycatch

less risk ● ● ● ● ○ more risk

The bycatch risk of this fishery is scored as high risk. This is because otter trawls have the potential to take relatively high quantities of bycatch of non-target and vulnerable species (> 30% of catch weight), including demersal elasmobranchs and protected, endangered and threatened (e.g. sharks and rays) species in certain circumstances**.** However, the incoming EU landings obligation is intended to reduce discarding.

Habitat

less risk ● ● ● ○ ○ more risk

The habitat risk of this fishery is scored as a moderate risk. This is because, although otter trawls are considered to have a potential to cause significant habitat damage, damage to vulnerable and sensitive marine habitats is likely to be minimised given that the footprint of the fishery is within core areas, typically historically fished ground.

Spatial management to reduce potential interactions with vulnerable habitats are being developed, but there remains uncertainties about the location of some sensitive seabed habitats and therefore some risk of further impact.

Outlook

	Current risk status	Outlook	Reason
Stock	Low	Unknown	The status of the stock is improving given that the stock size indicator has increased. Catches however are unknown and there is no direct management in place to control them.
Management	High	Stable	The management of the stock is likely to remain stable in the future. The EU Common Fisheries Policy is going through reform and there is some uncertainty on how this will impact fisheries management in this area.
Bycatch	High	Improving	Bycatch of non-target species in this fishery is relatively high with poor selectivity. However, with technical and spatial management measures continuously under development and the incoming EU landings obligation intended to reduce discarding of target species, the bycatch risk is likely to reduce in the future.
Habitat	High	Improving	Otter trawls disturb seabed habitats, but a range of Marine Protected Areas have been established and are under development to help minimise damage to vulnerable marine habitats.

Time-trends

Fisheries independent catch data for red gurnard are collected in the Celtic sea, Bay of Biscay, North Sea and the Eastern English Channel Research Vessel trawl surveys; although the data are limited there is some indication of biomass trends. The EVHOE-WIBTS-Q4 survey, figure 1, has shown a slight increase in abundance since its beginning in the 1990s and the North Sea IBTS Survey shown in figure 2 also indicates an increase in abundance during the same period. However, the Eastern Channel survey index has widely fluctuated, with a weak decline, figure 3.

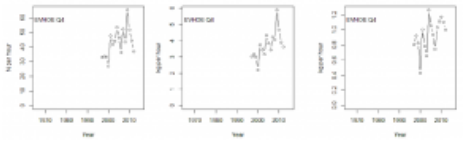

Figure 1. Time-series of abundance index of red gurnard from EVHOE-Q4 series in Bay of Biscay and Celtic Sea (ICES Divisons VIIIa,b and VIIh,g,h) . Numbers per hour (left panel), proxy for biomass (middle panel), and proxy for adult biomass (right panel) (ICES 2014).

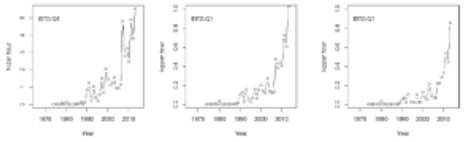

Figure 2. Time-series of abundance index of red gurnard from IBTS-Q1 in the North Sea. Numbers per hour (left panel), proxy for biomass (middle panel), and proxy for adult biomass (right panel) (ICES 2014).

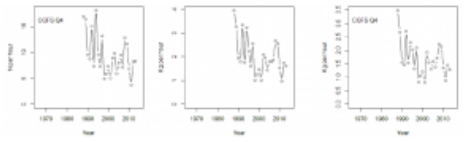

Figure 3. Time-series of abundance index of red gurnard from CGFS-Q4 series in VIId. Numbers per hour (left panel), proxy for biomass (middle panel), and proxy for adult biomass (right panel) (ICES 2014).

Stock structure and recruitment

There are insufficient data to distinguish distinct populations of red gurnard and further investigations are needed to progress on stocks boundaries such as morphometric studies, tagging and genetic population studies.

However, a compilation of datasets from bottom-trawl surveys has produced a distribution map (Figure 4) where the surveys suggest a continuous distribution of fish crossing the Channel and the area West of Brittany providing some evidence that there is no distinction of stocks between divisions VIId from VIIe and VIIh. Therefore, a split of the population between the North Sea and Celtic Sea does not appear to be appropriate.

Recruitment patterns are unknown for this area as very little comprehensive data is available.

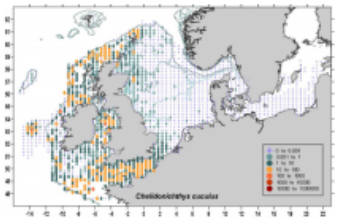

Figure 4. Spatial distribution of red gurnard in different trawl surveys. (ICES 2014)

Data gaps and research priorities

For management purposes, information should be available on catches and landings. The quality of landings data has been poor for this species because in the past only landings of “gurnards” were reported which is still the case for some countries today. Further, this species is highly discarded and for the past years discard data are not available covering all fleets. This makes interpretations of the records of official landings difficult.

Indices of red gurnard from UK (Scotland) and Irish surveys in the Celtic Seas Ecoregion should be made available. Extending the studied area by a survey in the Western English Channel (ICES Division VIIe) and collecting length and age data of red gurnard in the main area of production should help in better understanding the biology and dynamics of this species in the area.

References

ICES. 2014. Report of the Working Group on Assessment of New MoU Species (WGNEW), 24–28 March 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:21. 162 pp.

Management Details

less risk ● ● ● ● ○ more risk

Stock harvesting strategy

Red gurnard in the North East Atlantic is assessed using a data-limited approach to provide an indication of stock size. The stock assessment is based on a time-series of trends using bottom trawl survey data. Discarding of red gurnard is substantial due to its low value, however discard estimates are not fully quantified or included in the assessment due to the paucity of data.

Red gurnard are mainly taken as bycatch in demersal trawl fisheries and are managed under the EU Common Fisheries Policy (CFP) but not subject to EU TAC's and quotas. Harvesting of red gurnard is controlled primarily through management of effort controls and technical measures imposed for the recovery of other stocks within a mixed fisheries context, however the likelihood of overexploitation remains high.

Reductions in fishing effort associated with the long-term Atlantic cod (Gadus morhua) management plan (Regulation (EC)1342/2008) and the sole long-term management plan in the western English Channel (Council Regulation 509/2007) and the sole and plaice long term management plan in the North Sea (Council Regulation (EC) No. 676/2007) and the control of effort in vessels over 15 m in western waters (Council Regulation 1954/2002; aims to cap effort at 2002 levels) may have influenced pouting catches and fishing mortality in some areas of the Celtic Seas.

There is no minimum landing size for this species and there is no internationally agreed TAC.

Surveillance and enforcement

Fisheries which catch red gurnard are carried out by ten countries, and surveillance activities to record compliance with national and international fishery control measures are primarily the responsibility of the competent fishery inspection authorities in each country. In addition, the European Fisheries Control Agency (EFCA), established in 2005, organises operational coordination of fisheries control and inspection activities by the Member States as well as cooperation with third countries and other Regional Fishery Management Organisations.

The requirements for surveillance and sanctions for infringements are laid down in the EU Control Regulation (EC) No 1224/2009. Surveillance activities on fisheries for red gurnard include the use of vessel monitoring systems (VMS) on vessels over 12m overall length, an electronic reporting system (ERS), and a vessel detection system (VDS). Surveillance may also include direct observation by patrol vessels and/or aerial patrols, inspections of vessels, gear, catches at sea and on shore, and verification of EU logbook data against sales documents. The EU Control Regulation specifies that Member States should set up electronic databases containing the inspection and surveillance reports of their officials as well as records of infringements.

Bycatch Details

less risk ● ● ● ● ○ more risk

Targeting and behaviour

Demersal otter trawls operating in the Celtic Seas, West of Scotland and North East Atlantic are towed by a single boat as a single or multiple rig. The trawl doors create sand clouds that herd the fish into the net. Otter trawls can be rigged with different types of ground gear depending on seabed topography and the species targeted (Løkkeborg, 2005).

Demersal otter trawling is not a well-targeted fishing activity given that a wide variety of non-target species can be caught. This fishery catches a wide variety of mixed demersal finfish, such as sole, lemon sole, plaice, monkfish, John dory and skates and rays and these mixed catches means that the minimum cod end mesh size of 80 mm and other aspects of the management regimes and markets are not optimal for all the species caught. Other fish targeted may include important gadoid species such as Atlantic cod (Gadus morhua) and haddock (Melanogrammus aeglefinus). Fish may be discarded because they are smaller than the Minimum Conservation Landing Size, or the size and/or species are not marketable. Discarding due to the vessel being short of quota for the managed species also occurs.

Evidence of bycatch risk

Discard rates have been estimated from surveys at around 30-40% of total catch weight in European demersal otter trawl fisheries (European Commission, 2011) whilst Rochet et al., (2014) estimate discards as high as 70% in some areas, such as Biscay and Iberian waters. According to the Discard Atlas for North West waters (Anon, 2014) the main managed species discarded (2010 -2012) are species such as: cod (49%), haddock (47%), plaice (38%) and whiting (33%) by weight.

Smaller, demersal sharks are occasionally taken as bycatch in otter trawl fisheries such as Starry smooth-hound (Mustelus asterias) and spurdog (Squalus spp.). In addition, common skate (Dipturus batis) and spurdog (Squalus acanthias) can be taken as bycatch in offshore otter trawl fisheries. Currently landing of these species is prohibited and fishermen are required to return them to the sea where they have a chance of survival.

Other species bycatch and respective discards by the demersal otter trawl fishery in the Celtic Sea targeting plaice were made up primarily (60%) of four species: red gurnard, horse mackerel, boar fish and grey gurnard (Rochet et al., 2002; Enever et al., 2007).

However, catch composition and discard rates vary according to regional variations in species composition, the design of the trawl, the cod-end mesh size and other selectivity devices used (see mitigation measures). The fisheries are known to provide a diverse catch, in terms of species numbers, so inevitably some of the less valuable species are likely to be discarded.

Mitigation measures

A wide variety of non-target species are caught in European mixed otter trawl fisheries. Optimising gear selectivity in mixed fisheries is challenging given that different species have different selectivity requirements. Many mitigation measures have been designed and tested to increase selectivity in demersal otter trawls. In this fishery, using 100 mm instead of 80 mm cod ends, both as conventional diamond and as a square configuration (so called T90 or mesh turned through 90o), can substantially reduce discards (around 70%) without loss of commercial catch (Enever et al., 2010). Also mortality of discarded rays has been shown to be reduced through the use of cod end = 100 mm mesh and T90 because that results in a lower bulk of the catch causing less pressure on the fish in the cod end (Enever et al., 2009; 2010). However, the permitted minimum cod end mesh size for this fishery is 80 mm and so the use of the above gears would be an individual initiative by skippers.

To actually be effective in controlling bycatch levels in fisheries, these measures have to be operationally viable, enforceable and used within an incentive scheme which encourages fishers to use them. The introduction of the landings obligation or 'discard ban' under the EU Common fisheries policy (EU 1380/2013) is intended to take place over the period 2016 – 2019 in this fishery. This landings obligation will ultimately apply to all species managed by TAC; it will not apply to non-TAC species, however many of these are likely to benefit from improved selectivity.

Defra has begun a research project (MF 1232) to use applied science to support the industry in delivering an end to discards and has promised to provide the research and development needed to underpin the implementation of the landings obligation.

There are prohibitions on landing vulnerable marine species with depleted population abundance. For example, landings of the following elasmobranchs are prohibited: common skate, black (Norwegian) skate, white skate, undulate ray, spurdog and angel shark. Prohibitions on landing on vulnerable marine species deter fishers from targeting species with low population resilience to fishing activities and helps conserve stocks such as skates and rays that have a relatively high probability of surviving after being discarded.

There are a number of other ray species caught in trawl fisheries but the amount varies between fleets and areas. Most of these are assessed and managed under the European Common Fisheries Policy and there are active efforts by the EU, ICES, Defra and others to find improved assessment and management strategies for these stocks.

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Gear effects, targeting and behaviour

Fishermen use their knowledge of seasonal fish aggregations and seabed types together with information from the vessel's echosounder to make informed decisions on where to trawl. Gears are adapted to the substrate type and the species targeted, with a relatively narrow range of conditions in which they can operate. Most otter trawling occurs within core areas where yields are high and it is safe to trawl, typically historically fished grounds (Jennings and Lee, 2011).

This fishery dominated by smaller vessels, has core areas on inshore grounds around the South West peninsula of the UK, with similar fisheries off France and Ireland.

Risk of habitat impact

Otter trawl impact risk on the seabed habitat can include modification of bottom topography and disturbing biogenic features. Biological communities can potentially be disturbed both directly and indirectly by changes in the physical attributes of the areas being fished. Trawl doors have the most pronounced impacts on seabed habitats by creating scouring marks and furrows up to 20 cm deep (Løkkeborg, 2005).

The habitat risks are related to the types of seabed communities and other sources of seabed disturbance such as wave and tidal action. A number of theoretical and field studies have focused on the effects of towed gears, which show that areas outside core fished areas tend to be more sensitive to fishing (Grey et al., 2006; Jennings et al. 2012). Consequently, habitats that have not traditionally been disturbed by fishing activities are relatively more sensitive to the effects of otter trawling. However, TR2 gears predominate in shelf waters for plaice, sole and dab which occupy habitats subject to relatively high levels of natural disturbance (due wave and tidal action). The impacts of TR2 gears on habitats is therefore less significant than the potential impacts of TR1 gears which operate in deep water muddy habitat environments.

Understanding the nature of these differences is important in the management of the effects of otter trawling. Communities that inhabit areas where there is more disturbance by wave and tidal action are less likely to be affected by trawling, whereas communities inhabiting deeper waters unaffected by disturbance from wave and tidal action or on harder more gravely substrate are relatively more sensitive to trawling (Bolam et al., 2014). However, there are some habitats such as ross worm (or sabellaria) which inhabit shallower areas which are considered relatively sensitive, but such areas are traditionally avoided by TR2 fisheries.

Mitigation measures

The fishery targets relatively shallow core areas which are expected to be subject to wave and tidal action and hence relatively resilient to the effects of fishing. Fishing which has occurred in specific location over many years is likely to result in the seabed ecosystem adapting to fishing activity. However, there are sensitive areas, mostly outside the core areas of the fishery which may be vulnerable and there has been substantial work over recent years to map and protect these areas. These initiatives have resulted in improvements in habitat mapping and risk assessment of the effects of trawling on the seabed.

Under the Marine Strategy Framework Directive (MSFD) from the European Union (Council Directive 56/2008), Member States have committed to aim towards 'good environmental status' (GES) for the seabed habitats by 2020. The Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention'), which was signed up to by 15 nations plus the European Union, is developing a coherent network of Marine Protected Areas to protect vulnerable marine habitats in the North-East Atlantic.

The development of offshore Special Areas of Conservation under the European Habitats Directive (Council Directive 43/1992) contributes to this process as does the UK Marine Act designating Marine Protected Areas in UK waters. Marine Protected Areas cover almost 5% of the Celtic Seas (Celtic + Irish Seas + channels) (OSPAR, 2013).

The UK Marine Management Organisation (MMO) is engaging in a programme designed to assess the effects of fisheries and implement management measures where sites are considered at risk. Similar initiatives are taking place in other European countries.

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