RED MULLET – NORTHEAST ATLANTIC, BOTTOM GILLNET CAUGHT

*Mullus surmuletus*

Sometimes known as Striped Red Mullet

**SUMMARY**

Red Mullet are found in the Northeast Atlantic from the North Sea to the northwestern coast of Africa, as well in the Mediterranean and Black Seas. They are short lived, with a maximum life span of 10 years, and reach sexual maturity at 1-2 years of age. In the Northeast Atlantic, Red Mullet are primarily caught with bottom trawls, but some are caught with bottom gillnets in inshore waters of the UK, in the western English Channel. Fishing with bottom gillnets can cause some damage to bottom habitats and results in a high level of bycatch. Abundance of Red Mullet in the Northeast Atlantic is unknown and currently there are few management regulations in place; however, in recent years there have been efforts to improve monitoring and management of this species.

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**Final Score** 2.05
LIFE HISTORY

Core Points (only one selection allowed)

If a value for intrinsic rate of increase (‘r’) is known, assign the score below based on this value. If no r-value is available, assign the score below for the correct age at 50% maturity for females if specified, or for the correct value of growth rate (‘k’). If no estimates of r, age at 50% maturity, or k are available, assign the score below based on maximum age.

1.00 Intrinsic rate of increase <0.05; OR age at 50% maturity >10 years; OR growth rate <0.15; OR maximum age >30 years.

2.00 Intrinsic rate of increase = 0.05-0.15; OR age at 50% maturity = 5-10 years; OR a growth rate = 0.16–0.30; OR maximum age = 11-30 years.

3.00 Intrinsic rate of increase >0.16; OR age at 50% maturity = 1-5 years; OR growth rate >0.30; OR maximum age <11 years.

Red Mullet, found in the Eastern Atlantic, is one of many fish species belonging to the Mullidae family, a group commonly referred to as ‘goat fish’ due to their characteristic chin barbels. Female Red Mullet grow to larger sizes than males (Renones et al. 1995, N’Da et al. 2006). In the Mediterranean, males may reach a maximum size of 23 cm in length and females a maximum size of 34 cm in length (Morales-Nin 1992), while in the Northeast Atlantic they may grow to 45 cm in length (Seafish 2011). Growth by the Red Mullet is medium to fast, with growth rates ranging from k = 0.14-0.49 in the Mediterranean Sea (Renones et al. 1995, Machias et al. 1998, reviewed in Mehanna 2009). In other regions information on growth of Red Mullet is more limited, but the growth rate was estimated to be k = 0.30 in the Bay of Biscay (N’Da et al. 2006) and k = 0.22 in the Canary Islands (Pajeulo et al. 1997).

The timing of sexual maturation in Red Mullet varies slightly by area, but typically occurs between 1-2 years of age, when fish reach 15-19 cm in length (Renones et al. 1995, Pajeulo et al. 1997, Mahe et al. 2005, Mehanna 2009). The maximum reported age for Red Mullet is 10 years (Wheeler 1969); although more recent studies have only reported fish as old as 5-8 years (Renones et al. 1995, N’Da et al. 2006, Mehanna 2009).

Overall, Red Mullet have medium to fast growth rates, reach sexual maturity at a young age, and are short-lived. These life history characteristics make them resilient to fishing pressure, and thus we have awarded a score of 3.
Points of Adjustment (multiple selections allowed)

-0.25 Species has special behaviors that make it especially vulnerable to fishing pressure (e.g., spawning aggregations; site fidelity; segregation by sex; migratory bottlenecks; unusual attraction to gear; etc.).

Young Red Mullet are found in shallow, coastal waters and then typically move to deeper waters as they grow (Machias et al. 1998). There is limited information on behaviors exhibited by Red Mullet, but high numbers of young, immature Red Mullet are caught in the commercial fisheries which may mean these young fish are particularly susceptible to capture (ICES 2011, 2012a). Due to the limited information, no points are subtracted.

-0.25 Species has a strategy for sexual development that makes it especially vulnerable to fishing pressure (e.g., age at 50% maturity >20 years; sequential hermaphrodites; extremely low fecundity).

-0.25 Species has a small or restricted range (e.g., endemism; numerous evolutionarily significant units; restricted to one coastline; e.g., American lobster; striped bass; endemic reef fishes).

-0.25 Species exhibits high natural population variability driven by broad-scale environmental change (e.g. El Nino; decadal oscillations).

In recent years, there has been an increase in the abundance of Red Mullet in the northern parts of their distribution range in the English Channel and North Sea (Vaz et al. 2004, Beare et al. 2005, ICES 2006). Red Mullet use to be relatively rare in the North Sea, but now appear to be shifting or expanding their distribution northward (Beare et al. 2005). These abundance increases and/or distribution changes are thought to be the result of warming ocean temperatures (Beare et al. 2005). However, further information is needed to determine if and how environmental change affects Red Mullet populations, so at this time no points are subtracted.

+0.25 Species does not have special behaviors that increase ease or population consequences of capture OR has special behaviors that make it less vulnerable to fishing pressure (e.g., species is widely dispersed during spawning).

+0.25 Species has a strategy for sexual development that makes it especially resilient to fishing pressure (e.g., age at 50% maturity <1 year; extremely high fecundity).

Red Mullet spawn or reproduce in the spring to early summer. In the Mediterranean, spawning occurs from April to May (Renones et al. 1995), while in the Northeast Atlantic spawning occurs from May to June/July (N'Da and Déniel 1993, Seafish 2011). The eggs and newly hatched larvae float in the surface layers, but once they reach around 5 cm in length they settle to the bottom (ICES 2012c). Information on fecundity (i.e. egg production) of Red Mullet is lacking, so no points are added.
Species is distributed over a very wide range (e.g., throughout an entire hemisphere or ocean basin; e.g., swordfish; tuna; Patagonian toothfish).

Red Mullet are found in the Northeastern Atlantic, along the European and northwestern African coasts from south Norway/northern Scotland in the North Sea south to Senegal, as well as in the Mediterranean and Black Seas (Quero and Vayne 1997, Seafish 2011, ICES 2012a). Younger fish are found in coastal waters, whereas adults generally prefer deeper waters with sandy bottoms (Machias et al. 1998, Carpentier et al. 2009). However, adults may also occur in near shore waters in some areas and along the edge of rough grounds (Forster and Smith 2011).

Information on the population structure of Red Mullet indicates that Red Mullet populations in the Atlantic Ocean are genetically distinct from those in the Mediterranean Sea (Galarza et al. 2008). Additionally, there appear to be at least two population groups for the Northeast Atlantic European region, with one population consisting of the North Sea and eastern English Channel and the other of the western English Channel, Bay of Biscay, and Celtic Sea (Benzinou et al. 2012, ICES 2012a).

Red Mullet are considered to have a medium distribution range, so no points are added.

Species does not exhibit high natural population variability driven by broad-scale environmental change (e.g., El Nino; decadal oscillations).

3.00 Points for Life History

ABUNDANCE

Core Points (only one selection allowed)

Compared to natural or un-fished level, the species population is:

1.00 Low: Abundance or biomass is <75% of BMSY or similar proxy (e.g., spawning potential ratio).

2.00 Medium: Abundance or biomass is 75-125% of BMSY or similar proxy; OR population is approaching or recovering from an overfished condition; OR adequate information on abundance or biomass is not available.

Red Mullet are captured in commercial fisheries throughout much of their range in the Northeast Atlantic and Mediterranean Sea. In the Northeast Atlantic, catches of Red Mullet have increased greatly since 1990, from around 1,500 metric tons (mt) to 4,000-
8,000 mt in 2000-2010 (ICES 2012a). Much of this increase has been due to expanding fishing of this species in the northern part of its range. France accounts for the majority of the Red Mullet commercial catch in the Northeast Atlantic, followed by the Netherlands, and then the UK and Spain (ICES 2012a, ICES 2011). In the Mediterranean Sea, Red Mullet are heavily fished, with catches of 8,000-10,000 mt in recent years (2005-2010) (FAO 2012). In this region, Turkey, Tunisia, Italy, and Greece account for the highest catches. This report will be focused on Red Mullet fisheries in the Northeast Atlantic only.

In the Northeast Atlantic there are two populations of Red Mullet, the north population, which consists of the North Sea and eastern English Channel, and the western population which includes the western English Channel, the Celtic Sea, and Bay of Biscay (ICES 2012a, b). For the north population, catches were low prior to the mid-1990’s (<500 mt), but have since ranged from 1,500 to 4,500 mt. Survey data from both the North Sea and eastern English Channel indicate large fluctuations in abundance from 1988 to 2010, but abundances have generally been higher in the 2000’s compared to the 1990’s (ICES 2012a, b). In the eastern English Channel there have been several large peaks in abundance in the last decade, in 2003, 2007 and 2009; the abundance information from this area primarily represents recruitment abundance (i.e. amount of new fish entering the population). In the North Sea, abundance in the winter survey has increased since the early 1990’s, while abundance in the summer survey has been variable. In the winter Red Mullet tend to be more common off the UK coast, while in the summer they are found off the Belgium and Netherlands coasts (ICES 2012a). For the western population, catches have also increased since the early 1990’s from around 1,000-1,500 mt to 2,500-3,000 mt. For this region survey data from the eastern English Channel suggests abundance was fairly stable during the 1990’s, but has been variable over the last decade with large abundance peaks occurring in 2003 and 2006. Survey data from the Celtic Sea and Bay of Biscay areas represents recruitment abundance and also shows fluctuations in abundance over the last decade (ICES 2012a). There is not sufficient information for either population to conduct population assessments, so the statuses of these populations are unknown (ICES 2012a, b).

Since the abundance level of Red Mullet in the Northeast Atlantic is unknown, a score of 2 is awarded.

3.00 High: Abundance or biomass is >125% of BMSY or similar proxy.

Points of Adjustment (multiple selections allowed)

-0.25 The population is declining over a generational time scale (as indicated by biomass estimates or standardized CPUE).
-0.25 Age, size or sex distribution is skewed relative to the natural condition (e.g., truncated size/age structure or anomalous sex distribution).

Information on the age/size structure of Red Mullet in the Northeast Atlantic is limited, as this data has only begun to be collected in recent years. In the northern region, the majority of the catch appears to be comprised of age-1 fish (<17 cm) (ICES 2012a, b), which means many fish are likely being caught before they have had a chance to reproduce. In the inshore fisheries in the western English Channel, the catch consists of larger fish of 25-35 cm (Forster and Smith 2011). Information on the sex distribution is also limited. Due to a lack of information, no points are subtracted.

-0.25 Species is listed as "overfished" OR species is listed as "depleted", "endangered", or "threatened" by recognized national or international bodies.

-0.25 Current levels of abundance are likely to jeopardize the availability of food for other species or cause substantial change in the structure of the associated food web.

+0.25 The population is increasing over a generational time scale (as indicated by biomass estimates or standardized CPUE).

For the northern population, abundance of Red Mullet has generally been higher in the 2000’s compared to the 1990’s, and catches have been higher as well (ICES 2012b). This is believed to be a result of more fish migrating into the north area in recent years in response to warming ocean temperatures (Beare et al. 2005). Over the last decade though (2000-2011), survey data indicate that abundance has fluctuated greatly in both the northern and western populations, with no overall increasing or decreasing trend (ICES 2012a, b). Therefore, no points were added.

+0.25 Age, size or sex distribution is functionally normal.

+0.25 Species is close to virgin biomass.

+0.25 Current levels of abundance provide adequate food for other predators or are not known to affect the structure of the associated food web.

Red Mullet use their long barbels, which carry sensory organs, to find food. They feed on species that live on the bottom of the ocean floor, such as shrimps, crabs, worms, mollusks (e.g. clams), and fishes, and may dig into the sediment with their mouth to capture their prey (N’Da 1992, Labropoulou et al. 1997). This feeding behavior may help contribute to the mixing of sediments and reveal hidden prey that can then be eaten by a variety of species, providing important ecosystem benefits (Uiblein 2007). Information on predators of Red Mullet is limited, but may include various fishes (Fishbase 2012). Since the abundance of Red Mullet in the Northeast Atlantic is unknown, no points will be added.

2.00 Points for Abundance
Core Points (only one selection allowed)

1.00 The fishing method causes great damage to physical and biogenic habitats (e.g., cyanide; blasting; bottom trawling; dredging).

2.00 The fishing method does moderate damage to physical and biogenic habitats (e.g., bottom gillnets; traps and pots; bottom longlines).

In the Northeast Atlantic, catches of Red Mullet in the north region (North Sea and eastern English Channel) have varied greatly over 2000-2010, ranging from 1,500 to 4,500 metric tons a year, while catches in the western area (western English Channel, Celtic Sea, and Bay of Biscay) have been more stable at 2,000 to 3,000 mt a year (ICES 2012a, b). In both regions France accounts for the majority of the Red Mullet catches, with most caught (>90%) with bottom trawls (ICES 2012a, 2011). The Netherlands and UK have also contributed to significant portions of the catch in recent years. Dutch fishermen fish for Red Mullet with flyshooters (also called Scottish seines), which is a less destructive type of bottom trawling (ICES 2012c). Fishermen in the UK catch Red Mullet with bottom trawls in offshore waters and with bottom gillnets in near shore waters of the western English Channel (Forster and Smith 2011, Sussex IFCA 2012, ICES 2012a).

This report is focused on Red Mullet caught with bottom gillnets, so the remainder of fishery information in this section will focus on the UK gillnet fisheries in the western English Channel. Bottom gillnets consist of a mesh-netting wall that is held vertically in the water column by floats on the top and weights on the bottom. The net is anchored to the bottom of the seafloor so that is it not free to move. Gillnets are designed to capture fish by entangling them by their gills. The typical bottom gillnet used by UK fishermen to capture Red Mullet has a mesh size (size of holes) of just under 70 mm (2 ¾ in), and is 200 m (660 ft) long and 40 meshes deep (Forster and Smith 2011). Fishermen will target Red Mullet at the edge of rough grounds, towards the end of summer (Forester and Smith 2011).

Because bottom gillnets are set on the ocean floor they can potentially cause some habitat damage, particularly when being pulled in, as they can snag and entangle rocks and sessile organisms (High 1992, SAFMC 1991, Morgan and Chuenpagdee 2003). Therefore a score of 2 is awarded.

3.00 The fishing method does little damage to physical or biogenic habitats (e.g., hand picking; hand raking; hook and line; pelagic long lines; mid-water trawl or gillnet; purse seines).
Points of Adjustment (multiple selections allowed)

-0.25 Habitat for this species is so compromised from non-fishery impacts that the ability of the habitat to support this species is substantially reduced (e.g., dams; pollution; coastal development).

-0.25 Critical habitat areas (e.g., spawning areas) for this species are not protected by management using time/area closures, marine reserves, etc.

-0.25 No efforts are being made to minimize damage from existing gear types OR new or modified gear is increasing habitat damage (e.g., fitting trawls with roller rigs or rockhopping gear; more robust gear for deep-sea fisheries).

-0.25 If gear impacts are substantial, resilience of affected habitats is very slow (e.g., deep water corals; rocky bottoms).

UK gillnet fishermen typically fish for Red Mullet at the edge of rough grounds (Forester and Smith 2010). However, gear impacts on habitat are only moderate, so no points are subtracted.

+0.25 Habitat for this species remains robust and viable and is capable of supporting this species.

In the Northeast Atlantic, Red Mullet are found along the European coast from south Norway and northern Scotland to the Straits of Gibraltar (ICES 2012a). Younger fish are found in coastal waters, whereas adults generally prefer deeper, offshore habitats with sandy bottoms (Machias et al. 1998, Carpenter et al. 2009). However, adults may also occur in near shore waters in some areas and along the edge of rough grounds (Forster and Smith 2011). There is no indication that the habitat for Red Mullet is not viable, so points are added.

+0.25 Critical habitat areas (e.g., spawning areas) for this species are protected by management using time/area closures, marine reserves, etc.

Important spawning habitats for Red Mullet in the Northeast Atlantic include the southern coast of Brittany, France in the Bay of Biscay, and the southern UK coast in the western English Channel (N'Da and Deniel 1993, Russell 1976). Spawning may also occur in the south part of the North Sea (ICES FishMap 2012). Important habitats for juvenile fish likely include a variety of coastal habitats (Machias et al. 1998, Carpenter et al. 2009).

Throughout the Northeast Atlantic various marine protected areas have been established and work is on-going to create a large network of marine protected areas (OSPAR Commission 2010). In the UK, there are currently around 200 marine protected areas that cover 6% of UK’s marine waters (JNCC 2012). However, it is unclear whether these
protected areas are providing sufficient protection to Red Mullet critical habitats, so no points are added.

+0.25 Gear innovations are being implemented over a majority of the fishing area to minimize damage from gear types OR no innovations necessary because gear effects are minimal.

+0.25 If gear impacts are substantial, resilience of affected habitats is fast (e.g., mud or sandy bottoms) OR gear effects are minimal.

### 2.25 Points for Habitat Quality and Fishing Gear Impacts

**MANAGEMENT**

**Core Points (only one selection allowed)**

Select the option that most accurately describes the current management of the fisheries of this species.

1.00 Regulations are ineffective (e.g., illegal fishing or overfishing is occurring) OR the fishery is unregulated (i.e., no control rules are in effect).

2.00 Management measures are in place over a major portion over the species' range but implementation has not met conservation goals OR management measures are in place but have not been in place long enough to determine if they are likely to achieve conservation and sustainability goals.

In the Northeast Atlantic, fisheries are managed by individual national governments and the European Commission under the Common Fisheries Policy, which aims to collaboratively manage fisheries across Europe (European Commission 2012). Management advice for Northeast Atlantic fisheries is often provided by the International Council for the Exploration of the Sea (ICES), a regional fishery body.

There are currently few management regulations in place for Red Mullet in the Northeast Atlantic; there are no catch limits and there is no regional minimum size limit, which has led to high catches of immature fish (ICES 2012a, c). However, in recent years, ICES has started providing management advice to the European Commission for the Red Mullet fisheries and there has been increased monitoring of Red Mullet populations. For 2012, ICES provided management advice for the northern (North Sea and eastern English Channel) and western (western English Channel, Celtic Sea, and Bay of Biscay) populations combined; recommending that as a precautionary measure catches should not be increased, since there is currently insufficient information to determine the status of the Red Mullet populations (ICES 2011). For 2013 and 2014, ICES recommended an
annual total allowable catch of 1,700 metric tons for the northern population, which is equivalent to the average Red Mullet catch in the northern area in 2009 and 2010, but significantly lower than the maximum catch (4,500 mt) observed during the 2000’s (ICES 2012b). For the western population, ICES recommended a precautionary 20% reduction in catches from the average catches in 2008-2010, which equates to a total allowable catch of 2,000 mt (ICES 2012d). It remains to be seen though whether the European nations will implement and follow ICES recommendations.

Red Mullet caught in the inshore UK gillnet fisheries in the western English Channel, which is the focus of this report, are part of the larger western population. These inshore fisheries are managed separately form the offshore fisheries, on a district by district basis by various Inshore Fisheries Conservation Authorities (IFCAs). In a few of these districts (Cornwall and Southern) there is a 15 cm minimum size limit for Red Mullet (Southern IFCA 2011, Cornwall IFCA 2012), but it should be noted that this is still below the size at which Red Mullet reach sexual maturity (16 cm) (ICES 2011). There are also some gear restrictions in place (Southern IFCA 2011, Cornwall IFCA 2012).

Because there has been a recent initiative to start assessing and managing Red Mullet fisheries in the Northeast Atlantic (ICES 2011, 2012b, 2012d), a score of 2 is awarded.

3.00 Substantial management measures are in place over a large portion of the species range and have demonstrated success in achieving conservation and sustainability goals.

Points of Adjustment (multiple selections allowed)

-0.25 There is inadequate scientific monitoring of stock status, catch or fishing effort.

Catches of Red Mullet are monitored and surveys have been conducted in several areas of the Northeast Atlantic since the late 1980’s to monitor abundance trends. However, there is limited information on age and length compositions of the catch, as this data has only recently begun to be collected (ICES 2012b, c). There is also limited information on fishing effort. The available information is currently insufficient to conduct a full population assessment for Red Mullet and thus the status of the Red Mullet populations in the Northeast Atlantic remains unknown (ICES 2012a, b, c). Therefore points are subtracted.

-0.25 Management does not explicitly address fishery effects on habitat, food webs, and ecosystems.

-0.25 This species is overfished and no recovery plan or an ineffective recovery plan is in place.
Management has failed to reduce excess capacity in this fishery or implements subsidies that result in excess capacity in this fishery.

The European Commission, which is responsible for the sustainable management of fisheries throughout Europe, has so far been unsuccessful at regulating excess capacity in the European fisheries, as fishing fleets have continued to grow. The European Commission is currently working to address this through the reform of the Common Fisheries Policy (European Commission 2012). Capacity has expanded in recent years in both the inshore Red Mullet fisheries in the UK and the offshore Red Mullet fisheries (Cornwall IFCA 2012b, ICES 2012b), but it is unclear if the fisheries are overcapitalized or not. No points are subtracted.

There is adequate scientific monitoring, analysis and interpretation of stock status, catch and fishing effort.

Management explicitly and effectively addresses fishery effects on habitat, food webs, and ecosystems.

In the Northeast Atlantic, there are several marine protected areas in place, which help protect ecosystems from fishing impacts, and efforts are on-going to create a well-managed network of protected areas throughout the region (OSPAR Commission 2010, JNCC 2012). There have also been recent initiatives to address bycatch issues. The European Commission is currently working on reforming its Common Fisheries Policy, and the new policy will include a ban on discarding bycatch so that all catches can be counted (European Commission 2012). In the Cornwall district of the UK, management has developed a code of practice for the Red Mullet fishery that aims to minimize bycatch (Forster and Smith 2011, Cornwall IFCA 2012b). However, bycatch concerns have not been addressed in all areas, and potential food web impacts have also not been addressed. Therefore no points are added.

This species is overfished and there is a recovery plan (including benchmarks, timetables and methods to evaluate success) in place that is showing signs of success OR recovery plan is not needed.

Management has taken action to control excess capacity or reduce subsidies that result in excess capacity OR no measures are necessary because fishery is not overcapitalized.

1.75 Points for Management
BYCATCH

Core Points (only one selection allowed)

Select the option that most accurately describes the current level of bycatch and the consequences that result from fishing this species. The term, "bycatch" used in this document excludes incidental catch of a species for which an adequate management framework exists. The terms, "endangered, threatened, or protected," used in this document refer to species status that is determined by national legislation such as the U.S. Endangered Species Act, the U.S. Marine Mammal Protection Act (or another nation's equivalent), the IUCN Red List, or a credible scientific body such as the American Fisheries Society.

1.00 Bycatch in this fishery is high (>100% of targeted landings), OR regularly includes a "threatened, endangered or protected species."

In the Northeast Atlantic, Red Mullet are primarily captured with bottom trawls, but also with bottom gillnets in UK nearshore waters of the western English Channel. This report is focused on Red Mullet captured with bottom gillnets, so the remainder of the information for this section will focus on bycatch in the UK Red Mullet gillnet fisheries.

The amount of bycatch in the Red Mullet gillnet fisheries will vary depending on the specific fishing practices used by individual fishermen, but bycatch of non-target species can be high (Cornwall IFCA 2012b). Common bycatch species include cod, pollock, haddock, whiting, wrasse, gurnards, and dogfish (Forster and Smith 2011). A study that investigated the catch of target versus non-target species in the Red Mullet fishery found that non-target catch far exceeded the targeted catch, being 2.5-4 times that of the targeted catch (Forster and Smith 2011). However, bycatch levels observed in this study may be inflated because the study was conducted outside the typical Red Mullet fishing season. Due to increasing concern about the high bycatch in Red Mullet fisheries, a code of practice for selective fishing techniques has been developed in the Cornwall district of the UK for Red Mullet fishermen, in an effort to reduce bycatch levels (Cornwall IFCA 2012b).

There is also the potential for marine mammals and seabirds to be caught in gillnet fisheries around the UK, but there were no observed catches of these species during the bycatch study mentioned above (Forster and Smith 2011).

Although bycatch information for the UK Red Mullet gillnet fisheries is limited and efforts are being made to reduce bycatch in the fishery, the current available information suggests bycatch levels are high. Therefore a score of 1 is awarded.

2.00 Bycatch in this fishery is moderate (10-99% of targeted landings) AND does not regularly include "threatened, endangered or protected species" OR level of bycatch is unknown.
Bycatch in this fishery is low (<10% of targeted landings) and does not regularly include "threatened, endangered or protected species."

Points of Adjustment (multiple selections allowed)

-0.25 Bycatch in this fishery is a contributing factor to the decline of "threatened, endangered, or protected species" and no effective measures are being taken to reduce it.

-0.25 Bycatch of targeted or non-targeted species (e.g., undersize individuals) in this fishery is high and no measures are being taken to reduce it.

-0.25 Bycatch of this species (e.g., undersize individuals) in other fisheries is high OR bycatch of this species in other fisheries inhibits its recovery, and no measures are being taken to reduce it.

-0.25 The continued removal of the bycatch species contributes to its decline.

+0.25 Measures taken over a major portion of the species range have been shown to reduce bycatch of "threatened, endangered, or protected species" or bycatch rates are no longer deemed to affect the abundance of the "protected" bycatch species OR no measures needed because fishery is highly selective (e.g., harpoon; spear).

Bycatch of marine mammals is a concern in some gillnet fisheries around the UK coast, particularly those in the Cornwall district. However, it is primarily a concern for large-mesh gillnets, whereas Red Mullet fisheries use small-mesh nets (Hardy et al. 2012). A recent study on bycatch in the UK Red Mullet gillnet fishery observed no catches of marine mammals over the 20 day study (Forster and Smith 2011). In the Cornwall district of the UK, management has developed a code of practice for all net fishermen to follow to help avoid the accidental capture of marine mammals (Cornwall IFCA 2012c). Since bycatch of marine mammals does not appear to be a significant concern in the Red Mullet gillnet fisheries and management has taken action to address marine mammal bycatch, points are added.

+0.25 There is bycatch of targeted (e.g., undersize individuals) or non-targeted species in this fishery and measures (e.g., gear modifications) have been implemented that have been shown to reduce bycatch over a large portion of the species range OR no measures are needed because fishery is highly selective (e.g., harpoon; spear).

Bycatch of non-target species, like cod, pollock, whiting, haddock, wrasse, gurnards, and dogfish, can be high in the Red Mullet bottom gillnet fisheries (Forster and Smith 2011, Cornwall IFCA 2012b). In the Cornwall, UK district, management has taken action to try to reduce bycatch in the Red Mullet fishery by developing a code of practice for fishermen to follow. This code of practice outlines when, where, and how fishing should be conducted in order to minimize bycatch of non-target species. For example fishermen are being asked to avoid setting their nets over hard grounds, use shallower nets, and
reduce the time they leave their gear in the water (Cornwall IFCA 2012b). However, these measures have not yet been shown to be effective at reducing bycatch, and it is unclear if bycatch measures in other UK districts are needed as well. For the European region as a whole, the European Commission plans to address bycatch issues by instituting a ban on discards, which means that European fishermen will be required to keep all of their catch (European Commission 2012).

Although bycatch issues are being addressed, measures in place to reduce bycatch have not yet been shown to be effective and measures are not yet in place in all areas. Thus no points are added.

+0.25 Bycatch of this species in other fisheries is low OR bycatch of this species in other fisheries inhibits its recovery, but effective measures are being taken to reduce it over a large portion of the range.

+0.25 The continued removal of the bycatch species in the targeted fishery has had or will likely have little or no impact on populations of the bycatch species OR there are no significant bycatch concerns because the fishery is highly selective (e.g., harpoon; spear).

Survival rates of bycatch that is returned to the sea were found to be relatively high (>80%) for cod, pollock, gurnards, and wrasse, if the gear is only left in the water for a few hours. However, survival of whiting was low and was not determined for other bycatch species, like dogfish and haddock (Forster and Smith 2011). In the Cornwall district of the UK, management has recommended that Red Mullet gillnet fishermen limit the amount of time they leave their gear in the water in an effort to reduce bycatch mortalities (Cornwall IFCA 2012b), but it remains to be seen whether fishermen will follow this advice. Additionally, when the amount of bycatch is high, the number of mortalities may still be detrimental to some species’ populations. No points will be added.

1.25 Points for Bycatch
REFERENCES


ICES (2012b) Striped red mullet in subarea IV (North Sea) and divisions VIIId (Eastern English Channel) and IIIa (Skagerrak-Kattegat). ICES Advice 2012, June, Book 9:1-6.


