Monterey Bay Aquarium Seafood Watch

Environmental sustainability assessment of wild-caught European sprat from Ireland and Scotland caught using midwater trawls

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Species:	European sprad *(Sprattus sprattus)*
Location:	Ireland and Scotland: Northwest Atlantic
Gear:	Midwater trawls
Type:	Wild Caught
Author:	Seafood Watch
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Assessed using Seafood Watch Fisheries Standard v4

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About Seafood Watch

Monterey Bay Aquarium's Seafood Watch program evaluates the environmental sustainability of wild-caught and farmed seafood commonly found in the United States marketplace. Seafood Watch defines sustainable seafood as originating from sources, whether wild-caught or farmed, which can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems. The program's goals are to raise awareness of important ocean conservation issues and empower seafood consumers and businesses to make choices for healthy oceans.

Seafood Watch's science-based ratings are available at www.SeafoodWatch.org. Each rating is supported by a Seafood Watch assessment, in which the fishery or aquaculture operation is evaluated using the Seafood Watch standard.

Seafood Watch standards are built on our guiding principles, which outline the necessary environmental sustainability elements for fisheries and aquaculture operations. The guiding principles differ across standards, reflecting the different impacts of fisheries and aquaculture.

- Seafood rated Best Choice comes from sources that operate in a manner that's consistent with our guiding principles. The seafood is caught or farmed in ways that cause little or no harm to other wildlife or the environment.

- Seafood rated Good Alternative comes from sources that align with most of our guiding principles. However, one issue needs substantial improvement, or there's significant uncertainty about the impacts on wildlife or the environment.

- Seafood rated Avoid comes from sources that don't align with our guiding principles. The seafood is caught or farmed in ways that have a high risk of causing harm to wildlife or the environment. There's a critical conservation concern or many issues need substantial improvement.

Each assessment follows an eight-step process, which prioritizes rigor, impartiality, transparency and accessibility. They are conducted by Seafood Watch scientists, in collaboration with scientific, government, industry and conservation experts and are open for public comment prior to publication. Conditions in wild capture fisheries and aquaculture operations can change over time; as such assessments and ratings are updated regularly to reflect current practice.

More information on Seafood Watch guiding principles, standards, assessments and ratings are available at www.SeafoodWatch.org.

Guiding Principles

Seafood Watch defines sustainable seafood as originating from sources, whether fished[1] or farmed, that can maintain or increase production in the long term without jeopardizing the structure or function of affected ecosystems.

The following guiding principles illustrate the qualities that fisheries must possess to be considered sustainable by the Seafood Watch program (these are explained further in the Seafood Watch Standard for Fisheries):

- Follow the principles of ecosystem-based fisheries management.
- Ensure all affected stocks are healthy and abundant.
- Fish all affected stocks at sustainable levels.
- Minimize bycatch.
- Have no more than a negligible impact on any threatened, endangered, or protected species.
- Managed to sustain the long-term productivity of all affected species.
- Avoid negative impacts on the structure, function, or associated biota of aquatic habitats where fishing occurs.
- Maintain the trophic role of all aquatic life.
- Do not result in harmful ecological changes such as reduction of dependent predator populations, trophic cascades, or phase shifts.
- Ensure that any enhancement activities and fishing activities on enhanced stocks do not negatively affect the diversity, abundance, productivity, or genetic integrity of wild stocks.

These guiding principles are operationalized in the four criteria in this standard.Each criterion includes:

- Factors to evaluate and score
- Guidelines for integrating these factors to produce a numerical score and rating

Once a rating has been assigned to each criterion, Seafood Watch develops an overall recommendation. Criteria ratings and the overall recommendation are color coded to correspond to the categories on the Seafood Watch pocket guides and online guide:

Best Choice/Green: Buy first; they're well managed and caught or farmed responsibly.

Good Alternative/Yellow: Buy, but be aware there are concerns with how they're caught, farmed or managed.

Avoid/Red: Take a pass on these for now; they're caught or farmed in ways that harm other marine life or the environment.

[1] "Fish" is used throughout this document to refer to finfish, shellfish and other invertebrates

Summary

This assessment covers European sprat (*Sprattus sprattus*) caught with midwater trawl gear in ICES area 27.6.a, which is to the west of Scotland and northwest of Ireland. Vessels from Scotland and Ireland land European sprat from this area.

European sprat in this area does not have a clear stock delineation, and data are not available to complete a stock assessment or a data-limited assessment. A productivity-susceptibility analysis (PSA) determined that the species has a medium vulnerability to overfishing. The level of fishing mortality is unknown.

Bycatch and discards in the fishery are low; however, observer coverage is almost nonexistent. The Unknown Bycatch Matrix (UBM) was used to identify the impacts on endangered, threatened, and protected (ETP) species. There are potential impacts on marine mammals, seabirds, and sharks. Because the Scottish fishery is only one or two vessels and they fish for only a couple of months a year, the potential fishing mortality on ETP species is assumed to be low. The fishing mortality from Ireland is unknown.

There is no total allowable catch (TAC) in place for the European sprat caught in ICES area 27.6.a. The International Council for the Exploration of the Sea (ICES) advice for catch limits has been exceeded every year since the advice was implemented. Management Strategy and Implementation is scored ineffective. Based on the available bycatch data, the Bycatch Strategy is considered highly effective; however, the bycatch data are extremely limited for ETP species. The fishery may have negative impacts on sensitive taxa, but data are not being collected to assess these impacts. In addition, there is no stock assessment for European sprat in this area. Therefore, Scientific Data Collection and Analysis scores ineffective. Enforcement in Scotland is considered highly effective. There are significant concerns with Ireland's enforcement agency. Independent reports have called for major overhauls of the agency because it is not functioning effectively. Therefore, Enforcement in Ireland is considered ineffective. Stakeholder Inclusion for Scotland is moderately effective, based on the presence of a stakeholder engagement organization, but there is a need to improve inclusion and transparency. Stakeholder Inclusion in Ireland is considered highly effective, based on the work of the Pelagic Advisory Council.

Midwater trawl gear has negligible impacts on substrate, and mitigation for this gear is unnecessary. European sprat plays an important role in the ecosystem, but it is not a key forage species. Although there is essentially no management plan in place for the species, it is unlikely that the fishery is causing detrimental food web impacts. Therefore, Ecosystem-based Fisheries Management scores a moderate concern.

Overall, European sprat caught with midwater trawl gear in ICES area 27.6.a by Scotland and Ireland receives a Red rating. This rating is driven by an ineffective management strategy, concerns about impacts on this population of European sprat, and impacts on ETP species.

Final Seafood Recommendations

SPECIES | FISHERY	C 1 TARGET SPECIES	C 2 OTHER SPECIES	C 3 MANAGEMENT	C 4 HABITAT	OVERALL	VOLUME (MT) YEAR
European sprat | Atlantic, Northeast | Ireland | Midwater trawls	2.644	1.000	0.000	3.873	**Avoid (0.000)**	160
European sprat | Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls	2.644	2.236	1.000	3.873	**Avoid (2.187)**	1,700

Scotland and Ireland do not fish for European sprat in this area every year. In the years that they do report landings, the landings are highly variable. Scottish landings for 2001-2021 range between 70 mt to 2,770 mt (D. Turnbull, Marine Scotland, unpublished data) . Irish landings for 2003-2022 range between 85 mt and 3,200 mt (D. O'Sullivan, Marine Institute Ireland, unpublished data). Landings reported in the draft recommendation table are based on the most up to date information available to Seafood Watch. Landings for Ireland are from 2022 and landings for Scotland are from 2021. See ICES 2021 for published landings data which covers all of the southern Celtic Seas and West of Scotland areas (ICES 2021).

Summary

European sprat caught with midwater trawl gear in ICES area 27.6.a by Scotland and Ireland receives a Red rating. This rating is driven by an ineffective management strategy, concerns about impacts on this population of European sprat, and impacts on ETP species.

Scoring Guide

Scores range from zero to five where zero indicates very poor performance and five indicates the fishing operations have no significant impact.

Final Score = geometric mean of the four Scores (Criterion 1, Criterion 2, Criterion 3, Criterion 4).

Best Choice/Green = Final Score >3.2, and no Red Criteria, and no Critical scores

Good Alternative/Yellow = Final score >2.2-3.2, and neither Harvest Strategy (Factor 3.1) nor Bycatch Management Strategy (Factor 3.2) are Very High Concern2, and no more than one Red Criterion, and no Critical scores

Avoid/Red = Final Score ≤2.2, or either Harvest Strategy (Factor 3.1) or Bycatch Management Strategy (Factor 3.2) is Very High Concern or two or more Red Criteria, or one or more Critical scores.

[2] Because effective management is an essential component of sustainable fisheries, Seafood Watch issues an Avoid recommendation for any fishery scored as a Very High Concern for either factor under Management (Criterion 3).

Introduction

Scope of the analysis and ensuing recommendation

The assessment covers European sprat (*Sprattus sprattus*) caught with midwater trawl gear in ICES area 27.6.a, which is to the west of Scotland and northwest of Ireland. Vessels from Scotland and Ireland land European sprat from this area.

Species Overview

European sprat is a small pelagic fish that forms schools in relatively shallow, inshore waters. The species is widely distributed around Europe and the Mediterranean, extending from the waters around Norway down to Morocco. It is found in Northeast Atlantic waters, the North Sea, the Baltic Sea, the Mediterranean Sea, and the Black Sea (ICES 2005).

Growth rates and developmental parameters exhibited by European sprat are highly variable (ICES 2005). Studies have shown that individuals reach sexual maturity between 1 and 4 years (ICES 2005). Sprat can spawn year-round once it reaches sexual maturity, though it is most common from spawning to occur in spring and summer (ICES 2005). There are usually separate winter and summer spawning grounds (ICES 2005). The species will migrate inshore during the winter months, and this is when the fishery typically catches European sprat (ICES 2005) (pers. comm., C. Pert, Marine Scotland).

The population of European sprat in ICES area 27.6.a is not well studied. The stock delineation for sprat in this area is uncertain (ICES 2023b). As a result, the population(s) of European sprat throughout the Celtic Sea ecoregion are managed together (ICES 2021). Sprat in ICES areas 27.6.a–b, 27.7a–c, and 27.7f–k are functionally treated as one management unit. The International Council for the Exploration of the Sea (ICES) provides combined catch advice for all these areas, and sprat landings in these areas are combined in ICES reports (ICES 2021).

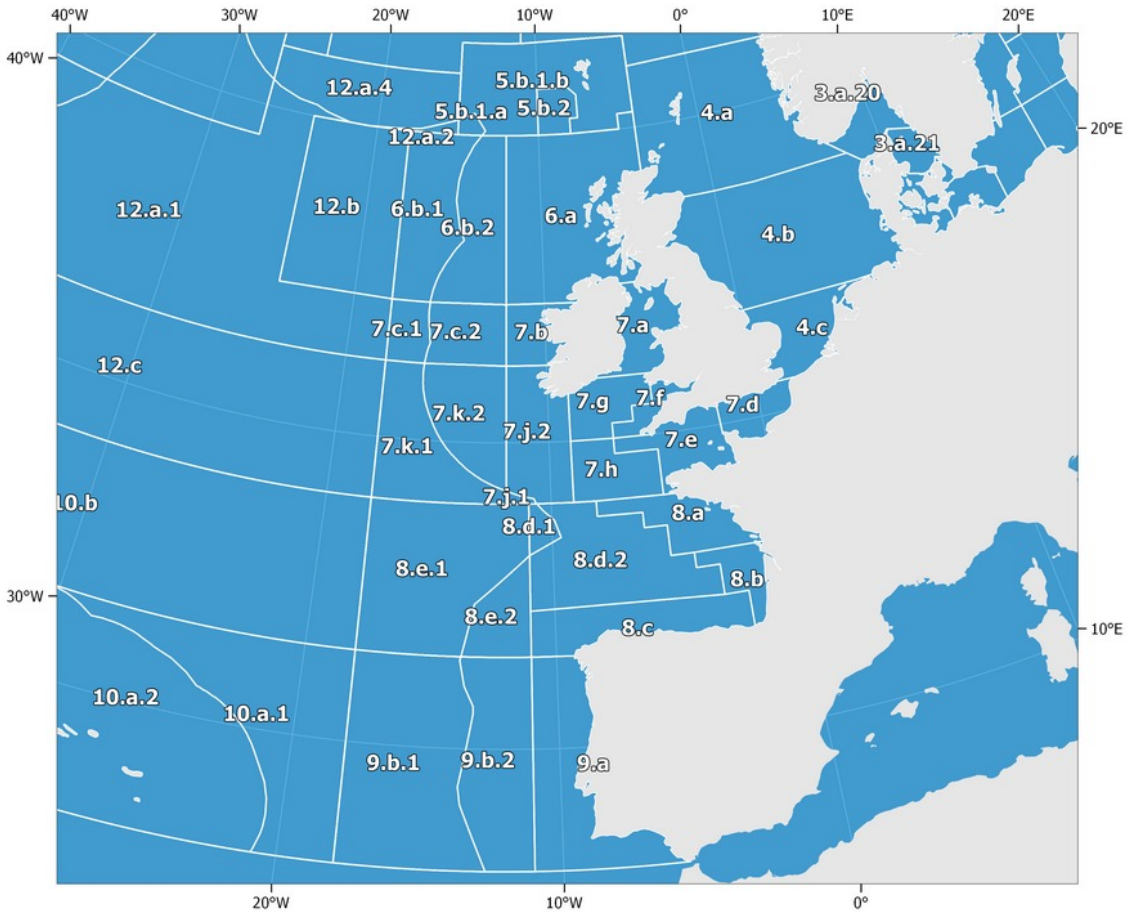

Figure 1: Map of ICES area 27 showing the subarea delineations. Area 27.6.a is west of Scotland and northwest of Ireland (FAO 2023).

Production Statistics

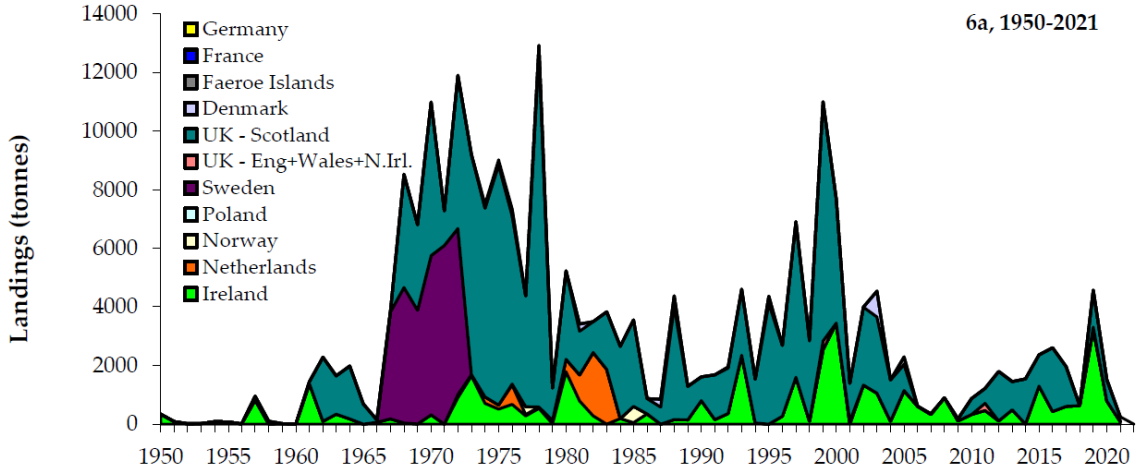

Figure 2: Annual landings of European sprat in ICES area 27.6.a reported by country for 1950–2021. Image courtesy of ICES HAWG 2022 report (ICES 2022).

Scotland

This is an extremely small fishery with only one or two Scottish vessels active in any given year. The vessels mainly target *Nephrops* (lobster) and will switch to sprat in November and December if the *Nephrops* catch slows (pers.. comm., C. Pert, Marine Scotland).

There were no landings from Scotland in 2018 and 2022 because the vessels chose to continue fishing for *Nephrops* during the window when European sprat are usually caught (D. Turnbull, Marine Scotland, unpublished data) (pers.. comm., C. Pert, Marine Scotland).

Ireland

Irish vessels also display sporadic involvement in the fishery in this area, and landings can vary greatly from year to year (ICES 2022). Between 2013 and 2021, landings ranged between 1 mt and 3,243 mt. But, this may be a slight underestimate because there is some difficulty with quantifying landings from vessels <10 m (ICES 2022).

Importance to the US/North American market.

The U.S. National Oceanic and Atmospheric Administration (NOAA) does not track imports of European sprat. The species is caught across its wide range, and the landings from this area are only a couple thousand metric tons. With that in mind, it is likely that this fishery does not account for a significant portion of the European sprat that makes it to the U.S. market.

Common and market names.

European sprat or sprat

Primary product forms

Sprat in brine or oil; cold-smoked whole or fillets

Assessment

This section assesses the sustainability of the fishery(s) relative to the Seafood Watch Standard for Fisheries, available at www.seafoodwatch.org. The specific standard used is referenced on the title page of all Seafood Watch assessments.

Criterion 1: Impacts on the species under assessment

This criterion evaluates the impact of fishing mortality on the species, given its current abundance. When abundance is unknown, abundance is scored based on the species' inherent vulnerability, which is calculated using a Productivity-Susceptibility Analysis. The final Criterion 1 score is determined by taking the geometric mean of the abundance and fishing mortality scores. The Criterion 1 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Rating is Critical if Factor 1.3 (Fishing Mortality) is Critical.

Guiding principles

- *Ensure all affected stocks are healthy and abundant.*
- *Fish all affected stocks at sustainable level*

Criterion 1 Summary

EUROPEAN SPRAT			
REGION / METHOD	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Atlantic, Northeast | Ireland | Midwater trawls	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)

Criterion 1 Assessments

SCORING GUIDELINES

Factor 1.1 - Abundance

Goal: Stock abundance and size structure of native species is maintained at a level that does not impair recruitment or productivity.

- *5 (Very Low Concern) — Strong evidence exists that the population is above an appropriate target abundance level (given the species' ecological role), or near virgin biomass.*
- *3.67 (Low Concern) — Population may be below target abundance level, but is at least 75% of the target level, OR data-limited assessments suggest population is healthy and species is not highly*

vulnerable.

- *2.33 (Moderate Concern) — Population is not overfished but may be below 75% of the target abundance level, OR abundance is unknown and the species is not highly vulnerable.*
- *1 (High Concern) — Population is considered overfished/depleted, a species of concern, threatened or endangered, OR abundance is unknown and species is highly vulnerable.*

Factor 1.2 - Fishing Mortality
Goal: Fishing mortality is appropriate for current state of the stock.

- *5 (Low Concern) — Probable (>50%) that fishing mortality from all sources is at or below a sustainable level, given the species ecological role, OR fishery does not target species and fishing mortality is low enough to not adversely affect its population.*
- *3 (Moderate Concern) — Fishing mortality is fluctuating around sustainable levels, OR fishing mortality relative to a sustainable level is uncertain.*
- *1 (High Concern) — Probable that fishing mortality from all source is above a sustainable level.*

European sprat

Factor 1.1 - Abundance

Atlantic, Northeast | Ireland | Midwater trawls
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Moderate Concern

European sprat caught in the Celtic Sea ecoregion is considered data-limited by the International Council for the Exploration of the Sea (ICES) (ICES 2021). Landings data are available but likely underestimate the landings, and the historic data may be inaccurate. The stock structure and the appropriate management unit for the species in this area are unknown (ICES 2021). Therefore, a productivity-susceptibility analysis (PSA) was conducted. The final score was 2.66, which indicates that the species has a medium vulnerability. Therefore, abundance scores a moderate concern.

Justification:

Productivity Attributes	Selection	Score	Explanation	Reference
Average age at maturity	<5	1	Maximum age is 5 years	(Bailey 1980)
Average maximum age	<10	1	Maximum age is 5 years	(Bailey 1980)
Von Bertalanffy Growth Coefficient (K)	>0.25	1	FishBase has compiled growth parameters for *Sprattus sprattus* across 23 studies that cover various geographic locations. K ranged from 0.297 to 1.020.	(FishBase 2023)
Fecundity	>20,000 eggs per year	1	100–400 eggs per gram of body weight. Up to 10 spawning batches per spawning season.	(Alheit 1987)(George & Alheit 1987)
Average maximum size	<100 cm	1	16 cm	(FishBase 2023)
Average size at maturity	<40 cm	1	10 cm	(FishBase 2023)
Reproductive strategy	Broadcast spawner	1	It lays pelagic eggs	(FishBase 2023)
Density dependence	N/A			
Quality of habitat	N/A			

Susceptibility Attribute	Selection	Score	Explanation	Reference
Areal overlap	>30% of the species concentration is fished, considering all fisheries	3	European sprat is targeted in the Northwest Atlantic, Northeast Atlantic, Mediterranean Sea, and Black Sea. The species is heavily targeted throughout its range.	(Nedreaas et al. 2019)
Vertical overlap	Default score for target species	3	This is a targeted species.	
Seasonal availability	Fisheries overlap with species <3 months/year	1	Vessels fish for sprat in winter months (November and December) when the inshore concentrations are high.	(pers. comm., C. Pert, Marine Scotland, 2023) (ICES 2005)
Selectivity of fishery	Default score	2	No evidence of species or fishery characteristics that increase the selectivity of the fishery.	
Post-capture mortality	Default score for retained species	3	This is a retained species.	

Productivity score: 1

Susceptibility score: 2.4

Final PSA score: 2.6

Factor 1.2 - Fishing Mortality

Atlantic, Northeast | Ireland | Midwater trawls

Moderate Concern

Estimations of F and reference points are not available for data-limited stocks. ICES uses a precautionary approach for catch recommendations. ICES started providing catch recommendations for European sprat in the Celtic Sea ecoregion in 2013. The recommendations have ranged between 2,240 and 3,500 mt, and landings have exceeded the recommendation every year (ICES 2021). But, the recommendation is for combined landings in ICES areas 27.6, 27.7.a–c, and 27.7.f–k. Annual landings from ICES area 27.6.a, which is the scope of this assessment, are only a portion of Ireland's total landings {D. O'Sullivan, Marine Institute Ireland, unpublished data}. Ultimately, a sustainable level of fishing mortality for European sprat in these areas is unknown because there are no reference points to determine an appropriate level for F. Therefore, fishing mortality scores a moderate concern.

Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Moderate Concern

Estimations of F and reference points are not available for data-limited stocks. ICES uses a precautionary approach for catch recommendations. ICES started providing catch advice for European sprat in the Celtic Sea ecoregion in 2013. The recommendations have ranged between 2,240 and 3,500 mt, and landings have exceeded the recommendation every year (ICES 2021). It is important to note that the recommendation is for combined landings in ICES areas 27.6, 27.7.a–c, and 27.7.f–k.

In ICES area 27.6.a, which is the scope of this assessment, there are only one or two Scottish vessels that operate in this fishery, and they do not fish for sprat every year. Sprat is not the main target of these vessels, and they target the species only for a small window of time in November and December (pers. comm., C. Pert, Marine Scotland) (ICES 2023b). Total landings from Scottish vessels during 2010–22 fluctuate between 500 and 2,000 mt in the years when there are landings. Landings dipped to 160 mt in 2021, and there were no landings in 2018 or 2022. It is probable that fishing mortality from Scottish vessels is at or below a sustainable level; however, there are no reference points available for the species in this area, and the sustainable level of fishing mortality is unknown. Therefore, fishing mortality scores a moderate concern.

Criterion 2: Impacts on Other Species

All main retained and bycatch species in the fishery are evaluated under Criterion 2. Seafood Watch defines bycatch as all fisheries-related mortality or injury to species other than the retained catch. Examples include discards, endangered or threatened species catch, and ghost fishing. Species are evaluated using the same guidelines as in Criterion 1. When information on other species caught in the fishery is unavailable, the fishery's potential impacts on other species is scored according to the Unknown Bycatch Matrices, which are based on a synthesis of peer-reviewed literature and expert opinion on the bycatch impacts of each gear type. The fishery is also scored for the amount of non-retained catch (discards) and bait use relative to the retained catch. To determine the final Criterion 2 score, the score for the lowest scoring retained/bycatch species is multiplied by the discard/bait score. The Criterion 2 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Rating is Critical if Factor 2.3 (Fishing Mortality) is Crtitical

Guiding principles

- *Ensure all affected stocks are healthy and abundant.*
- *Fish all affected stocks at sustainable level.*
- *Minimize bycatch.*

Criterion 2 Summary

Criterion 2 score(s) overview

This table(s) provides an overview of the Criterion 2 subscore, discards+bait modifier, and final Criterion 2 score for each fishery. A separate table is provided for each species/stock that we want an overall rating for.

EUROPEAN SPRAT			
REGION / METHOD	**SUB SCORE**	**DISCARD RATE/LANDINGS**	**SCORE**
Atlantic, Northeast | Ireland | Midwater trawls	1.000	1.000: < 100%	Red (1.000)
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls	2.236	1.000: < 100%	Yellow (2.236)

Criterion 2 main assessed species/stocks table(s)

This table(s) provides a list of all species/stocks included in this assessment for each 'fishery' (as defined by a region/method combination). The text following this table(s) provides an explanation of the reasons the listed species were selected for inclusion in the assessment.

ATLANTIC, NORTHEAST | IRELAND | MIDWATER TRAWLS			
SUB SCORE: 1.000	DISCARD RATE: 1.000	**SCORE: 1.000**	
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Marine mammals	1.000: High Concern	1.000: High Concern	Red (1.000)
Sharks	1.000: High Concern	1.000: High Concern	Red (1.000)
Seabirds	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
European sprat	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)

ATLANTIC, NORTHEAST | UNITED KINGDOM | SCOTLAND | MIDWATER TRAWLS			
SUB SCORE: 2.236	DISCARD RATE: 1.000	**SCORE: 2.236**	
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Marine mammals	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Seabirds	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Sharks	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
European sprat	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)

Bycatch in this fishery is minimal. Landings data from Scotland and Ireland show that whiting, sardine, horse mackerel, mackerel, and herring are all landed with European sprat, but none of the species makes up >5% of the total landings (D. Turnbull, Marine Scotland, unpublished data){D. O'Sullivan, Marine Institute Ireland, unpublished data}. Discards in the fishery are considered to be negligible (ICES 2021) (ICES 2022).

Observer coverage of the fishery is almost nonexistent. There were only 29 at-sea sampler trips logged by Ireland's Marine Institute over the course of 2007–22. No interactions with endangered, threatened, or protected (ETP) species were reported on those trips {D. O'Sullivan, Marine Institute Ireland, unpublished data}. Because this level of observer coverage is not high enough to reach definitive conclusions about potential ETP species interactions, the Unknown Bycatch Matrix (UBM) was used. For the purposes of the UBM, the gear was identified as midwater trawl gear (TM) used in the Northeast Atlantic region. Marine mammals, sea turtles, sharks, and seabirds were identified by the UBM as taxa that the fishery potentially interacts with. The UBM also indicates that finfish and forage fish should be included as bycatch categories. They were not included as Criterion 2 species because landings data already identified specific finfish and forage fish species and showed that they are not main components of the catch.

There are long-term records of sea turtle interactions around the United Kingdom and Ireland. These interactions include sightings, strandings, and captures in fishing gear. Most interactions were with leatherback turtle, loggerhead turtle, and Kemp's ridley turtle (Botterell et al. 2020). Spatial and temporal patterns in sea turtle interactions with fishing gear show that this fishery does not significantly affect any of these sea turtle species. There were no recorded fishing gear interactions with loggerhead turtle or Kemp's ridley turtle in the area where this fishery occurs (Botterell et al. 2020). Leatherback turtle interactions have been documented in this fishing area, but there is a seasonality to those interactions. The interactions peak in the summer and drop off in November (Botterell et al. 2020)(Penrose and Westfield 2023). The few interactions that occurred in November and December were likely cold-shock strandings and were probably not the result of fishing activity (Penrose and Westfield 2023)(Kettemer et al. 2022). Because this fishery occurs during a short period in November and December, it is unlikely that it is having an impact on leatherback turtle.

Criterion 2 Assessment

SCORING GUIDELINES

Factor 2.1 - Abundance
(same as Factor 1.1 above)

Factor 2.2 - Fishing Mortality
(same as Factor 1.2 above)

Factor 2.3 - Modifying Factor: Discards and Bait Use
Goal: Fishery optimizes the utilization of marine and freshwater resources by minimizing post-harvest loss. For fisheries that use bait, bait is used efficiently.

Scoring Guidelines: The discard rate is the sum of all dead discards (i.e. non-retained catch) plus bait use divided by the total retained catch.

Ratio of bait + discards/landings	Factor 2.3 score
<100%	1
>=100	0.75

Marine mammals

Factor 2.1 - Abundance

Atlantic, Northeast | Ireland | Midwater trawls
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

High Concern
This is a highly vulnerable taxon that scores a 2 on the Unknown Bycatch Matrix. Therefore, abundance is a high concern.

Factor 2.2 - Fishing Mortality

Atlantic, Northeast | Ireland | Midwater trawls

High Concern
This taxon scores a 2 on the Unknown Bycatch Matrix, which corresponds to a score of high concern for fishing mortality.

Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Low Concern
There are only one or two vessels that operate in this fishery. They do not target sprat every year and when they do, it is only for a short period of time (pers. comm, C. Pert, Marine Scotland). Fishing effort is extremely low in this fishery. It is probable that mortality from Scottish vessels is low enough to not adversely affect this taxon. Therefore, fishing mortality scores a low concern.

Seabirds

Factor 2.1 - Abundance

Atlantic, Northeast | Ireland | Midwater trawls
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

High Concern
This is a highly vulnerable taxon that scores a 3 on the Unknown Bycatch Matrix. Therefore, abundance is a high concern.

Factor 2.2 - Fishing Mortality

Atlantic, Northeast | Ireland | Midwater trawls

Moderate Concern
This taxon scores a 3 on the Unknown Bycatch Matrix, which corresponds to a score of moderate concern for fishing mortality.

Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Low Concern
There are only one or two vessels that operate in this fishery. They do not target sprat every year and when they do, it is only for a short period of time (pers. comm, C. Pert, Marine Scotland). Fishing effort is extremely low in this fishery. It is probable that mortality from Scottish vessels is low enough to not adversely affect this taxon. Therefore, fishing mortality scores a low concern.

Sharks

Factor 2.1 - Abundance

Atlantic, Northeast | Ireland | Midwater trawls
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

High Concern
This is a highly vulnerable taxon that scores a 2 on the Unknown Bycatch Matrix. Therefore, abundance is a high concern.

Factor 2.2 - Fishing Mortality

Atlantic, Northeast | Ireland | Midwater trawls

High Concern
This taxon scores a 2 on the Unknown Bycatch Matrix, which corresponds to a score of high concern for fishing mortality.

Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Low Concern

There are only one or two vessels that operate in this fishery. They do not target sprat every year and when they do, it is only for a short period of time (pers. comm, C. Pert, Marine Scotland). Fishing effort is extremely low in this fishery. It is probable that mortality from Scottish vessels is low enough to not adversely affect this taxon. Therefore, fishing mortality scores a low concern.

Factor 2.3 - Discard Rate/Landings

Atlantic, Northeast | Ireland | Midwater trawls
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

< 100%

Based on limited sampling, discards appear to be <1% of landings. Discards are assumed to be negligible, and the fishery does not use bait (ICES 2021)(ICES 2022).

Criterion 3: Management Effectiveness

Five factors are evaluated in Criterion 3: Management Strategy and Implementation, Bycatch Strategy, Scientific Research/Monitoring, Enforcement of Regulations, and Inclusion of Stakeholders. Each is scored as either 'highly effective', 'moderately effective', 'ineffective,' or 'critical'. The final Criterion 3 score is determined as follows:

- *5 (Very Low Concern) — Meets the standards of 'highly effective' for all five factors considered.*
- *4 (Low Concern) — Meets the standards of 'highly effective' for 'management strategy and implementation' and at least 'moderately effective' for all other factors.*
- *3 (Moderate Concern) — Meets the standards for at least 'moderately effective' for all five factors.*
- *2 (High Concern) — At a minimum, meets standards for 'moderately effective' for Management Strategy and Implementation and Bycatch Strategy, but at least one other factor is rated 'ineffective.'*
- *1 (Very High Concern) — Management Strategy and Implementation and/or Bycatch Management are 'ineffective.'*
- *0 (Critical) — Management Strategy and Implementation is 'critical'.*

The Criterion 3 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Rating is Critical if Management Strategy and Implementation is Critical.

Guiding principle

- The fishery is managed to sustain the long-term productivity of all impacted species.

Five factors are evaluated in Criterion 3: Management Strategy and Implementation, Bycatch Strategy, Scientific Research/Monitoring, Enforcement of Regulations, and Inclusion of Stakeholders. Each is scored as either 'highly effective', 'moderately effective', 'ineffective,' or 'critical'. The final Criterion 3 score is determined as follows:

Criterion 3 Summary

FISHERY	MANAGEMENT STRATEGY	BYCATCH STRATEGY	DATA COLLECTION AND ANALYSIS	ENFORCEMENT	INCLUSION	SCORE
Atlantic, Northeast | Ireland | Midwater trawls	Critical	Highly effective	Ineffective	Ineffective	Highly effective	**Black (0.000)**
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls	Ineffective	Highly effective	Ineffective	Highly effective	Moderately Effective	**Red (1.000)**

Criterion 3 Assessment

SCORING GUIDELINES

Factor 3.1 - Management Strategy and Implementation

Considerations: What type of management measures are in place? Are there appropriate management goals, and is there evidence that management goals are being met? Do manages follow scientific advice? To achieve a highly effective rating, there must be appropriately defined management goals, precautionary policies that are based on scientific advice, and evidence that the measures in place have been successful at maintaining/rebuilding species.

Factor 3.2 - Bycatch Strategy

Considerations: What type of management strategy/measures are in place to reduce the impacts of the fishery on bycatch species and when applicable, to minimize ghost fishing? How successful are these management measures? To achieve a Highly Effective rating, the fishery must have no or low bycatch, or if there are bycatch or ghost fishing concerns, there must be effective measures in place to minimize impacts.

Factor 3.3 - Scientific Research and Monitoring

Considerations: How much and what types of data are collected to evaluate the fishery's impact on the species? Is there adequate monitoring of bycatch? To achieve a Highly Effective rating, regular, robust population assessments must be conducted for target or retained species, and an adequate bycatch data collection program must be in place to ensure bycatch management goals are met.

Factor 3.4 - Enforcement of Management Regulations

Considerations: Do fishermen comply with regulations, and how is this monitored? To achieve a Highly Effective rating, there must be regular enforcement of regulations and verification of compliance.

Factor 3.5 - Stakeholder Inclusion

Considerations: Are stakeholders involved/included in the decision-making process? Stakeholders are individuals/groups/organizations that have an interest in the fishery or that may be affected by the management of the fishery (e.g., fishermen, conservation groups, etc.). A Highly Effective rating is given if the management process is transparent, if high participation by all stakeholders is encouraged, and if there a mechanism to effectively address user conflicts.

Factor 3.1 - Management Strategy And Implementation

Atlantic, Northeast | Ireland | Midwater trawls

Critical

There is no management plan in place for this fishery. The limited and unreliable data collected from fishery-dependent and fishery-independent sources have precluded stock or management unit delineation for the population(s) caught in this fishery (ICES 2021). There is a roadmap to improve data collection, but currently ICES cannot determine a sustainable level of fishing or a total allowable catch (TAC) when the data on a population are so limited (ICES 2023b). In the absence of a TAC, ICES has recommended catch limits based on a precautionary approach, and the recommendations have been exceeded every year since they were implemented in 2013 (ICES 2022). The landings in Ireland alone exceeded ICES catch advice in every year except 2014 (ICES 2022). Ireland has implemented a quota that has a limited scope. There is a catch limit on the amount of sprat that can be harvested by vessels >18 m that are fishing within 6 nm of Ireland (Sea Fisheries Policy and Management Division 2019)(Sea Fisheries Policy and Management Division 2021). There are a number of vessels <10 m that operate in this fishery. In some years, these smaller vessels account for the majority of sprat landings for this area {D. O'Sullivan, Marine Institute Ireland, unpublished data}. But, there are no catch limits in place that apply to these smaller vessels. There are general regulations in place that apply broadly to vessels operating in Irish waters (Sea-fisheries and Maritime Jurisdiction Act 2006).

ICES advice is nonconstraining, and Ireland has highly limited management in place to constrain the catch of European sprat. Ireland routinely exceeds the ICES catch advice, which applies to European sprat caught by all countries fishing in this area. The limited management in this fishery and the high landings from Ireland suggest that the management strategy is not sufficiently precautionary to protect the European sprat population. Therefore, management strategy and implementation scores critical.

Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Ineffective

There is no management plan in place for this fishery. The limited and unreliable data collected from fishery-dependent and fishery-independent sources have precluded stock or management unit delineation for the population(s) caught in this fishery (ICES 2021). There is a roadmap to improve data collection, but currently ICES cannot determine a sustainable level of fishing or a TAC when the data on a population are so limited (ICES 2023b). In the absence of a TAC, ICES has recommended catch limits based on a precautionary approach, and the recommendations has been exceeded every year since they were implemented in 2013 (ICES 2022). Because sprat is not a quota-managed species, there are no regulations in Scotland that are specific to the species. There are general regulations in place that apply broadly to vessels operating in Scottish waters (Marine Scotland 2018)(Marine Scotland 2017).

Because ICES advice is nonconstraining, there is effectively no management in place to limit catch. Even so, the fishery is small, with few vessels participating, and it is unlikely that it is having serious negative impacts on the population(s). Given the lack of management for the fishery and the low

likelihood that the fishery is causing serious negative impacts, management strategy and Implementation scores ineffective.

Factor 3.2 - Bycatch Strategy

Atlantic, Northeast | Ireland | Midwater trawls
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Highly effective
Based on the available data, bycatch in the fishery is low. None of the other species that are landed in the fishery makes up >5% of landings (D. Turnbull, Marine Scotland, unpublished data){D. O'Sullivan, Marine Institute Ireland, unpublished data}. The discard rate in the fishery is <1% (ICES 2021)(ICES 2022). Therefore, bycatch strategy scores highly effective.

Justification:
Even though the impact on other species section (Criterion 2) of this assessment considers the impact on ETP species, those species were identified through the Unknown Bycatch Matrix. The scoring for Criterion 3 is based only on the available data. The dearth of data on ETP interactions in this fishery is considered in the scoring for Factor 3.3.

Factor 3.3 - Scientific Data Collection and Analysis

Atlantic, Northeast | Ireland | Midwater trawls
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Ineffective
ICES considers this a category 5 stock, which is the worst data category for a species that is directly targeted by a fishery. Landings data are available from the fishery, along with some biological sampling and fishery-independent data from various surveys. The data from biological sampling and the surveys are fragmented. Most of the surveys were halted at one point or another (ICES 2022). This has left gaps in almost all the time-series data.

There are not enough data to complete a stock assessment, nor are there enough data to determine what the delineation should be for management units of European sprat in this area. Currently, subareas 27.6, 27.7.a–c, and 27.7.f–k are combined for the purposes of ICES advice and assessment, even though the management unit is uncertain (ICES 2021)(ICES 2022).

There are concerns about potential interactions with ETP species in this fishery. The extent to which the fishery interacts with these highly vulnerable species is unknown because observer coverage is almost nonexistent. Scotland has not conducted any at-sea observer trips for this fishery. Ireland's Marine Institute conducted 29 at-sea observer trips over the course of 2007–22 {D. O'Sullivan, Marine Institute Ireland, unpublished data}.

European sprat in this area remains unassessed due to a lack of data; fishery-independent surveys

have fragmented time-series data; and observer coverage is insufficient to assess the fishery's impact on highly vulnerable species (ICES 2022). Therefore, scientific data collection and analysis scores ineffective.

Justification:
Biological sampling for European sprat in subarea 27.6.a was conducted from 1985 to 2002; it resumed in 2012 and has continued since. Fishery-independent information comes from a variety of surveys. The Clyde Herring and Sprat Acoustic Survey ran from 1985 to 1990, was resumed in 2012, was cancelled in 2013, and was resumed for 2014–18. It has since been discontinued. The Scottish West Coast IBTS survey has run continuously since 1981 (ICES 2022). The UK's Centre for the Environment, Fisheries and Aquaculture Science (Cefas) conducted egg and larval surveys in the Celtic Sea. There are 10 surveys between 1986 and 2011 that have records for European sprat. There are various bottom trawl surveys and acoustic surveys that may encounter sprat and have been identified as potential sources of data (ICES 2023b).

Factor 3.4 - Enforcement of and Compliance with Management Regulations

Atlantic, Northeast | Ireland | Midwater trawls

Ineffective
Ireland's current enforcement system stems from the Sea-Fisheries and Maritime Jurisdiction Act 2006 (ClientEarth 2017). This act created the enforcement branch known as the Sea-Fisheries Protection Authority (SFPA). Sea-Fisheries Protection Officers from SFPA are charged with inspecting landings, and they completed 1,808 vessel inspections in 2020 (SFPA 2021). SFPA collaborates with the Naval Service and Air Corps to carry out further enforcement actions on the water (ClientEarth 2017). The Naval Service conducted a total of 309 inspections in 2020. Two of those inspections were undertaken in ICES area 27.6.a (SFPA 2021). The Naval Service also runs the Irish Fisheries Monitoring Centre, which monitors vessels equipped with a vessel monitoring system (VMS) that are operating in Ireland's exclusive economic zone (EEZ) (ClientEarth 2017).

As an EU Member State, Ireland oversees the enforcement of EU agreements within its EEZ. The main enforcement agreement is the Common Fisheries Policy (CFP). The CFP provides general guidelines for how Member States should apply sanctions when noncompliance occurs. This helps to keep sanctions consistent across the Member States (ClientEarth 2017). For serious infringements, the CFP has a points system to track and deter serial infringers.

The effectiveness of SFPA has been called into question by both the EU and independent reviews. In 2021, the EU revoked Ireland's "control plan" (EC 2021). This was a measure in which the catch did not have to be weighed at the point of landing; rather, it could be weighed after it was transported to another location. A 2018 audit by the EU determined that enforcement of the control plan was not sufficient to ensure that the reported weights were accurate. Ireland failed to meet seven out of the eight benchmarks that are required for the catch to be considered fully inspected (EC 2018). It was determined that SFPA did not take adequate action to remedy the systematic compliance issues, even after being made aware of the issues (EC 2021).

An independent report commissioned by the Irish government to investigate the capability of the SFPA determined that the organization was "not working effectively and requires urgent attention" (PwC 2020). The report advocates a full reset of the organization so that it can be rebuilt with a clear, concise core mission. There are recommendations for short-, medium-, and long-term goals (PwC 2020). In 2021, SFPA appointed a Director of Transformation to implement the many recommendations outlined in the independent report. Given the scale and timeline of the recommendations, it is likely that the SFPA has not significantly improved yet.

Ireland's SFPA is in charge of enforcement and compliance within the country's EEZ. Significant concerns have been raised about the organization's ability to successfully carry out those duties. Therefore, enforcement of and compliance with management regulations scores ineffective.

Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Highly effective

All vessels fishing in UK waters are required to have VMS (MMO 2019). Vessels longer than 12 m are required to submit daily logbook records (MMO 2019). Marine enforcement officers ensure that regulations are being followed, and they have the authority to issue citations for regulation violations (Scottish Government 2023). Given that the fishery is small and there is no evidence of systematic noncompliance, the capacity of the enforcement system is appropriate for the scale of the fishery. Therefore, this factor scores highly effective.

Factor 3.5 - Stakeholder Inclusion

Atlantic, Northeast | Ireland | Midwater trawls

Highly effective

The EU implemented regionalization to allow stakeholders more direct access and influence within their area of fishing. Part of this process involved setting up seven regional advisory councils (ACs), which forward the opinions of their regional constituents to the European Commission (EU 2013). The Commission takes the ACs' input into account in the decision-making process, making ACs a key nexus of information exchange between administrations, scientists, and fishers. The Pelagic Advisory Council (PelAC) is the AC that covers this fishing area (PelAC 2023). The PelAC comprises a General Assembly, an Executive Committee, and two Working Groups. Working Group II oversees decisions about sprat in areas 27.6 and 27.7 (PelAC 2023).

There are 34 members in the General Assembly, of which 28 are part of the fishing industry and 6 are from other sectors (PelAC 2023). The PelAC Executive Committee is a subset of the General Assembly. The Executive Committee membership is split, with 60% of the members being representatives from the fishing sector and 40% coming from other sectors, including nongovernmental organizations (NGOs), consumer advocates, and environmental associations (PelAC 2023).

Transparency in the PelAC is good. The AC publishes agendas, notes, and reports from previous meetings on its website and posts information about upcoming meetings (PelAC 2023). Not all ACs

have reached this level of transparency (NWWAC 2023). The PelAC also reimburses travel costs for those who attend the meetings (PelAC 2023). This type of financial assistance makes the meetings more accessible to individuals or smaller groups that do not have the financial means to sponsor travel to meetings or take several days off of work. It is an important step for inclusivity.

The PelAC provides an avenue for stakeholder inclusion, makes transparent decisions, and has taken steps to make the council accessible for smaller groups. Stakeholder inclusion for this fishery scores highly effective.

Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Moderately Effective

There is a stakeholder engagement strategy in place for ICES that encourages participation in the management process (ICES 2023a). In Scotland, the inshore fisheries utilize a system of comanagement that encourages stakeholder engagement through Regional Inshore Fisheries Groups (RIFGs) (Scottish Government 2020). The RIFGs were established in 2016 and were modeled as a way for stakeholders to be proactive about fishery management (SIFT 2018). The framework allows stakeholder input on TAC setting procedures, management measures, and pilot programs (Scottish Government 2020)(SIFT 2018). Unfortunately, the system has some issues.

The RIFG program comprises six nonconstituted bodies (SIFT 2018). Because the organizations are not bound by governing rules outlined in a constitution, there are no formal rule-making or decision-making procedures (SIFT 2018). This means that the decision-making process is confusing, opaque, and can vary between RIFGs. These concerns are compounded because RIFGs are not required to take or publish meeting minutes (SIFT 2018)(Marine Scotland 2023). At the time of publishing this assessment, meeting minutes for the West Coast RIFG, which covers the area of sprat fishing considered in this assessment, were available for only one previous meeting (Marine Scotland 2023). The rules around membership and the list of members in each group are also not required to be published (SIFT 2018) (MRAG 2017).

Frameworks exist for stakeholder engagement in ICES and Scotland; however, there are transparency issues in Scotland's RIFG system. Therefore, stakeholder inclusion scores moderately effective.

Criterion 4: Impacts on the Habitat and Ecosystem

This Criterion assesses the impact of the fishery on seafloor habitats, and increases that base score if there are measures in place to mitigate any impacts. The fishery's overall impact on the ecosystem and food web and the use of ecosystem-based fisheries management (EBFM) principles is also evaluated. Ecosystem Based Fisheries Management aims to consider the interconnections among species and all natural and human stressors on the environment. The final score is the geometric mean of the impact of fishing gear on habitat score (factor 4.1 + factor 4.2) and the Ecosystem Based Fishery Management score. The Criterion 4 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Guiding principles

- Avoid negative impacts on the structure, function or associated biota of marine habitats where fishing occurs.
- Maintain the trophic role of all aquatic life.
- Do not result in harmful ecological changes such as reduction of dependent predator populations, trophic cascades, or phase shifts.
- Ensure that any enhancement activities and fishing activities on enhanced stocks do not negatively affect the diversity, abundance, productivity, or genetic integrity of wild stocks.
- Follow the principles of ecosystem-based fisheries management.

Rating cannot be Critical for Criterion 4.

Criterion 4 Summary

FISHERY	FISHING GEAR ON THE SUBSTRATE	MITIGATION OF GEAR IMPACTS	ECOSYSTEM-BASED FISHERIES MGMT	FORAGE SPECIES?	SCORE
Atlantic, Northeast | Ireland | Midwater trawls	Score: 5	Score: 0	Moderate Concern		**Green (3.873)**
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls	Score: 5	Score: 0	Moderate Concern		**Green (3.873)**

Criterion 4 Assessment

SCORING GUIDELINES

Factor 4.1 - Physical Impact of Fishing Gear on the Habitat/Substrate
Goal: The fishery does not adversely impact the physical structure of the ocean habitat, seafloor or associated biological communities.

- *5 - Fishing gear does not contact the bottom*
- *4 - Vertical line gear*
- *3 - Gears that contacts the bottom, but is not dragged along the bottom (e.g. gillnet, bottom*

longline, trap) and is not fished on sensitive habitats. Or bottom seine on resilient mud/sand habitats. Or midwater trawl that is known to contact bottom occasionally. Or purse seine known to commonly contact the bottom.

- *2 - Bottom dragging gears (dredge, trawl) fished on resilient mud/sand habitats. Or gillnet, trap, or bottom longline fished on sensitive boulder or coral reef habitat. Or bottom seine except on mud/sand. Or there is known trampling of coral reef habitat.*
- *1 - Hydraulic clam dredge. Or dredge or trawl gear fished on moderately sensitive habitats (e.g., cobble or boulder)*
- *0 - Dredge or trawl fished on biogenic habitat, (e.g., deep-sea corals, eelgrass and maerl)*
  Note: When multiple habitat types are commonly encountered, and/or the habitat classification is uncertain, the score will be based on the most sensitive, plausible habitat type.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts
Goal: Damage to the seafloor is mitigated through protection of sensitive or vulnerable seafloor habitats, and limits on the spatial footprint of fishing on fishing effort.

- *+1 —>50% of the habitat is protected from fishing with the gear type. Or fishing intensity is very low/limited and for trawled fisheries, expansion of fishery's footprint is prohibited. Or gear is specifically modified to reduce damage to seafloor and modifications have been shown to be effective at reducing damage. Or there is an effective combination of 'moderate' mitigation measures.*
- *+0.5 —At least 20% of all representative habitats are protected from fishing with the gear type and for trawl fisheries, expansion of the fishery's footprint is prohibited. Or gear modification measures or other measures are in place to limit fishing effort, fishing intensity, and spatial footprint of damage caused from fishing that are expected to be effective.*
- *0 —No effective measures are in place to limit gear impacts on habitats or not applicable because gear used is benign and received a score of 5 in factor 4.1*

Factor 4.3 - Ecosystem-Based Fisheries Management
Goal: All stocks are maintained at levels that allow them to fulfill their ecological role and to maintain a functioning ecosystem and food web. Fishing activities should not seriously reduce ecosystem services provided by any retained species or result in harmful changes such as trophic cascades, phase shifts or reduction of genetic diversity. Even non-native species should be considered with respect to ecosystem impacts. If a fishery is managed in order to eradicate a non-native, the potential impacts of that strategy on native species in the ecosystem should be considered and rated below.

- *5 — Policies that have been shown to be effective are in place to protect species' ecological roles and ecosystem functioning (e.g. catch limits that ensure species' abundance is maintained at sufficient levels to provide food to predators) and effective spatial management is used to protect spawning and foraging areas, and prevent localized depletion. Or it has been scientifically demonstrated that fishing practices do not have negative ecological effects.*
- *4 — Policies are in place to protect species' ecological roles and ecosystem functioning but have not proven to be effective and at least some spatial management is used.*
- *3 — Policies are not in place to protect species' ecological roles and ecosystem functioning but detrimental food web impacts are not likely or policies in place may not be sufficient to protect species' ecological roles and ecosystem functioning.*

- *2 — Policies are not in place to protect species' ecological roles and ecosystem functioning and the likelihood of detrimental food impacts are likely (e.g. trophic cascades, alternate stable states, etc.), but conclusive scientific evidence is not available for this fishery.*
- *1 — Scientifically demonstrated trophic cascades, alternate stable states or other detrimental food web impact are resulting from this fishery.*

Factor 4.1 - Physical Impact of Fishing Gear on the Habitat/Substrate

Atlantic, Northeast | Ireland | Midwater trawls
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Score: 5
European sprat is a pelagic species that is caught with midwater trawl gear, which is not known to have significant bottom contact.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

Atlantic, Northeast | Ireland | Midwater trawls
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Score: 0
Bottom contact is negligible, so impact mitigation is unnecessary.

Factor 4.3 - Ecosystem-based Fisheries Management

Atlantic, Northeast | Ireland | Midwater trawls
Atlantic, Northeast | United Kingdom | Scotland | Midwater trawls

Moderate Concern
Seabirds, whales, and other pelagic species rely on European sprat as a food source (ICES 2022). Seafood Watch has determined that the species is not a key forage species, based on measures of connectance, energy flow through the species, and the SURF index (Roos, in press). Still, European sprat does play an important part in ecosystem function, and the fishery lacks management to address the ecosystem role of this species. Critically, there are no harvest control rules in place for the stock (ICES 2021). Given that the fishery is relatively small, it is unlikely that it is contributing to detrimental food web impacts. Therefore, ecosystem-based fisheries management scores a moderate concern.

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Scientific review does not constitute an endorsement of the Seafood Watch® program, or its seafood recommendations, on the part of the reviewing scientists. Seafood Watch® is solely responsible for the conclusions reached in this report.

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