6.2 Bay of Biscay and the Iberian Coast ecoregion – fisheries overview

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Executive summary

The commercial fisheries in the ecoregion target a wide variety of stocks, resulting in a diverse and spatially varied fishing industry. The countries with the largest landings and effort in the ecoregion are Spain, Portugal, and France, with minor landings from Ireland, Belgium, and UK. The most common gear used in the area is bottom trawls, which target demersal species. The highest landings, however, are taken by midwater trawls mainly targeting species such as blue whiting, mackerel, and to a lesser extent species such as sardine.

Of the wide variety of stocks both targeted and caught as bycatch, 73 are evaluated by ICES for spawning-stock biomass (SSB) size and fishing pressure. Twenty-two stocks have been evaluated against maximum sustainable yield (MSY) reference points for fishing mortality, and 86% of these are fished below F_{MSY}.

In addition to biomass removal, ecosystem effects of fisheries include abrasion, ghost fishing, damage to benthic fauna by demersal trawling, and bycatch of marine mammals, elasmobranchs, and seabirds. Several regulatory and research efforts are in place or are being developed that are aimed at reducing the impact of fishing on the ecosystem.

Supporting data used in the Bay of Biscay and Iberian Coast fisheries overview is accessible at https://doi.org/10.17895/ices.advice.21641396

Definition of the ecoregion

The Bay of Biscay and Iberian Coast ecoregion covers the southwestern areas of the EU. It includes areas of the deeper eastern Atlantic Ocean, as well as coastal areas from Brittany in the north to the Iberian Peninsula and Gulf of Cadiz in the south. The following areas constitute this ecoregion:

- The Bay of Biscay (divisions 8.a and 8.b, and part of subdivisions 8.d.2 and 8.e.2);
- The Cantabrian Sea (Division 8.c); and
- the western coast of Spain, the Portuguese coast, and the Gulf of Cadiz (Division 9.a and part of Subdivision 9.b.2).

At its southeastern limit, this ecoregion is connected to the Mediterranean Basin by the Strait of Gibraltar. Deep-water currents composed of Mediterranean water have a strong influence on the southwest Iberian and Gulf of Cadiz circulation patterns.

Note that updates to the figures using data from the stock assessment graphs (SAG) include only advice published before 10 October 2022. Therefore, meg.27.7b-k8abd, rjn.27.678abd, nep.fu.25, nep.fu.2627, and nep.fu.31 refer to the advice current at this time (the advice applicable for 2022).

This overview provides:

- a short description of each of the national commercial fishing fleets in the ecoregion, including their fishing gears, and spatial and temporal patterns of activity;
- a summary of the status of the fisheries resources and the level of exploitation relative to agreed objectives and reference points;
- mixed-fisheries considerations of relevance to the management of the fisheries; and
- an evaluation of the effects of fishing gear on the ecosystem in terms of the seabed and on the bycatch of protected, endangered, and threatened species.

The scientific names of all species described in this overview are listed in Table A2 in the Annex.

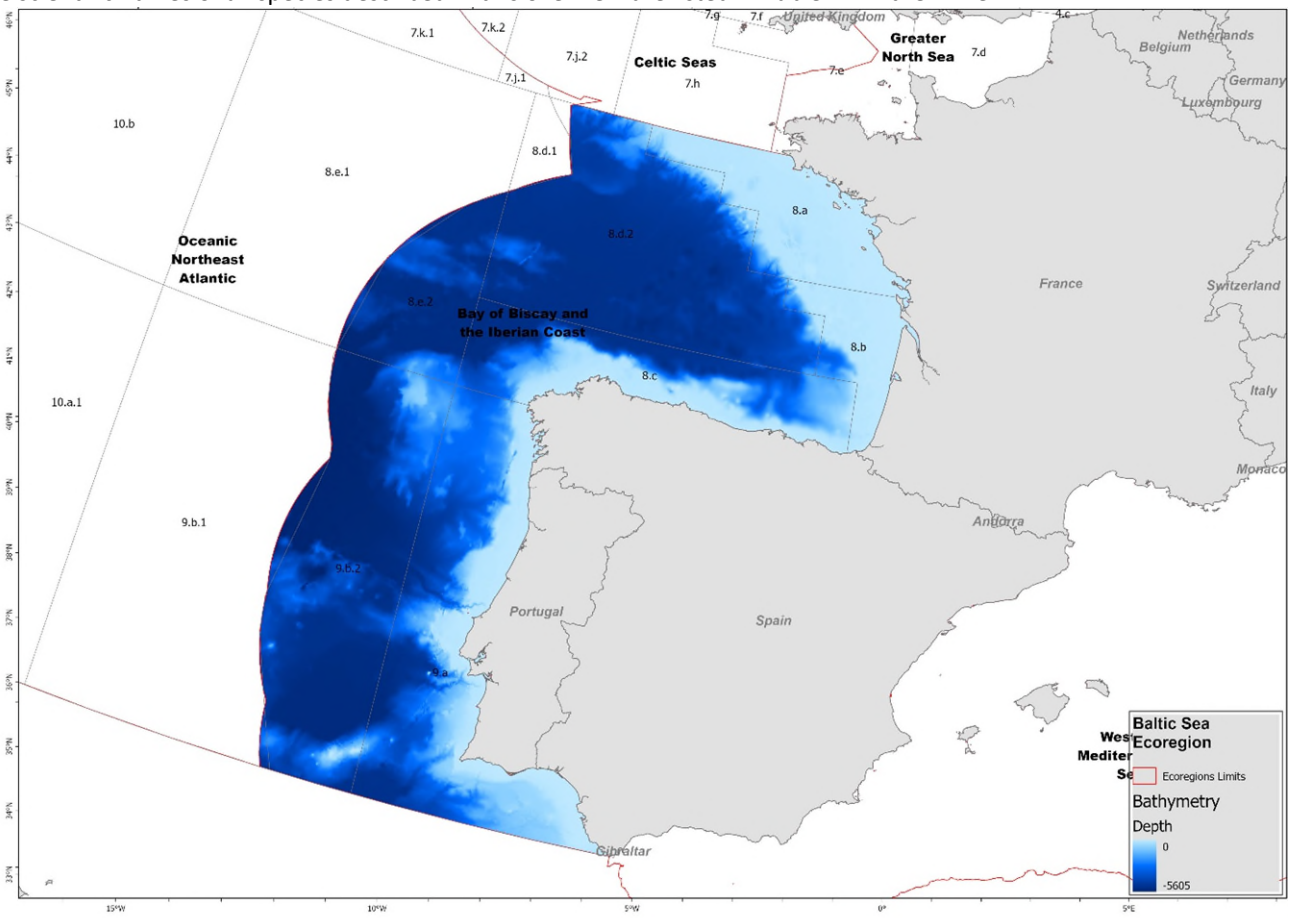


Figure 1 The Bay of Biscay and Iberian Coast ecoregion and ICES statistical areas.

Who is fishing

Seven nations currently have fisheries targeting the many marine stocks within this diverse and extensive ecoregion. The highest landings are by Spain, Portugal, and France. Lesser amounts are landed by other countries including the Netherlands, Belgium, Ireland, and UK (Figure 2).

In the European Commission's Scientific Technical and Economic Committee for Fisheries (STECF) Fisheries Dependence Information (FDI) data call, "confidentiality" in the landings and effort tables by country was introduced. The data call suggests that data related to fewer than three vessels could be considered confidential. Given the disaggregation of this data call (e.g. vessel length, gear, mesh size, quarter) many entries were submitted as confidential. It is therefore not possible to assess the extent to which the effort data are impacted by confidentiality and whether this is consistent over time. As a consequence, no effort by country was presented.

Portugal

The fleet is comprised of otter trawlers, purse-seiners, and multi-gear vessels; it operates primarily in Division 9.a.

There are 80 bottom otter trawlers; 25 target crustaceans (deep-water rose shrimp and Norway lobster) and blue whiting in deep waters from 200 m to 800 m, while 55 catch finfish in waters shallower than 500 m. The majority of the vessels are between 18 m and 40 m in overall length, and only eight are smaller than 12 m in length.

The purse-seine fleet predominantly operates at depths between 20 m and 100 m, and traditionally targets sardine. The fleet comprises around 150 vessels, between 8 and 27 m in overall length. It contributes to more than 50% of the total catch, and mainly harvests sardine, chub mackerel, anchovy, horse mackerel, and blue jack mackerel.

Around 3500 vessels hold multiple licences for several gear types, including gillnets (80 mm mesh size), trammel nets (100 mm mesh size), hand- and longlines, pots and dredges, and small purse-seines. This multi-gear fleet operates generally within 30 miles of the Portuguese coast, catching, among others, hake, anglerfish, octopus, pout, horse mackerel and clams. These are mostly small vessels under 12 metres in overall length. Around 300 vessels in this fleet exceed 12 metres and also operate offshore. This includes the deep-water longline fleet, composed of 15 vessels with an average of 20 m length, operating at depths ranging from 800 to 1450 m; it targets black scabbard fish.

France

There are around 1500 vessels operating primarily in ICES Subarea 8, representing more than 4000 fishers. Seventy-one percent of all vessels operate predominantly within the 12-nautical-mile limit. Around 1000 vessels operate in Division 8.a and 500 in Division 8.b. Around 20 vessels operate occasionally in Division 8.c.

The mean size of the vessels is 12 m, while more than 1100 vessels are under 12 m. The main gears used by coastal vessels are nets, lines (longlines and handlines), pots, scoop nets, dredges and bottom trawls. The offshore fishery is mostly carried out by bottom trawlers, netters, and a few longliners. The main species caught by French vessels in the area are hake, anglerfish, sole, sea bass, Norway lobster, sardines, cuttlefish, albacore, squids, pollack, and anchovy.

Spain

There are around 4750 vessels in this fleet, operating mainly in northern Spanish waters. The fleet comprises artisanal vessels, trawlers, purse-seiners, demersal longliners, and gillnetters. Around 3600 vessels are operating in the artisanal fishery (of 7 m average length) using artisanal gears including dredges, trammelnets, gillnets, pots, bottom longline, handline, purse-seine and beam trawl; they target mackerel, clams and octopus. The trawlers (71 vessels of 28 m average length) use bottom- and pair trawl to target horse mackerel, mackerel, blue whiting, and hake. The purse-seiners (236 vessels of 22 m average length) target mackerel, anchovy, horse mackerel, and sardine. The demersal longliners (57 vessels of 16 m average length) target hake as main species, as well as European conger. The gillnetters (59 vessels of 18 m average length) catch mainly hake and anglerfish.

Around 660 vessels operate mainly in the Gulf of Cadiz Spanish waters. The fleet comprises artisanal vessels, trawlers, and purse-seiners. Around 480 vessels are operating in the artisanal fishery (of 9 m average length) using artisanal gears including dredges, trammelnets, gillnets, bottom longline, and handline; they target blackspot seabream, stripped venus, octopus and cuttlefish. The trawlers (120 vessels of 19 m average length) target shellfish and cephalopods. The purse-seiners are composed of 70 vessels of 17 m average length.

Other fleets operating in Iberian waters mainly on the northern coast and Galician waters comprise around 400 vessels – 300–350 trolling and 60 with live bait (of 17 m average length). These fleets target albacore.

Around 66 vessels operate mainly in the Bay of Biscay. The fleet comprises trawlers and passive gears (bottom longline and gillnet). Thirteen vessels are operating in the trawler fleet targeting hake, anglerfish, and megrim. Fifty-three vessels use passive gears (mainly bottom longlines and some gillnets) which target hake.

Netherlands

The Netherlands has fishing rights for sole in the Bay of Biscay. In the last two decades, however, the Dutch fleet has not been active in the area. Since the mid-2000s, the Netherlands has been using its fishing rights in the Bay of Biscay for quota swaps with Belgium (i.e the Dutch quota in the Bay of Biscay has been exchanged for Belgian quota in the North Sea).

Belgium

The Belgian fisheries in the Bay of Biscay mainly take place in Division 8.b. There are fifteen vessels operating, all with beam trawl, and the fishery takes place from 1 June to 30 September. The main target species is sole with monkfish as a bycatch species, though monkfish is increasing in importance in the landings.

Ireland

Ireland has four fisheries in this ecoregion. The highest catches are made by around eight large vessels (> 40 m in length) that target small pelagic fish, mainly boarfish, horse mackerel, and mackerel. Approximately 40 vessels target albacore tuna, with paired midwater pelagic trawls in the summer as the fish migrate northward. The gillnet fishery for hake involves around 15 vessels, and there is minor demersal otter trawl activity involving up to eight vessels in Subarea 8.

UK

The UK fleet operating in the ecoregion mainly operates in divisions 8.a and b, and further offshore in Division 8.d. The fleet is comprised of pelagic trawlers, gillnetters, and longliners; the fleet size varies, from seven to 13 vessels over the last four years. The pelagic trawlers are the larger of the vessels, with an overall total length of between 50 m and 114 m. Pelagic trawlers mainly target mackerel and horse mackerel in divisions 8.a and b. Longliners and gillnetters target a mix of species, and have an overall length of between 20 m and 35 m; they operate in both divisions 8.a and 8.b and further offshore in Division 8.d. The main target species of the longliners is hake, whereas gillnetters target hake, anglerfish, and pollack.

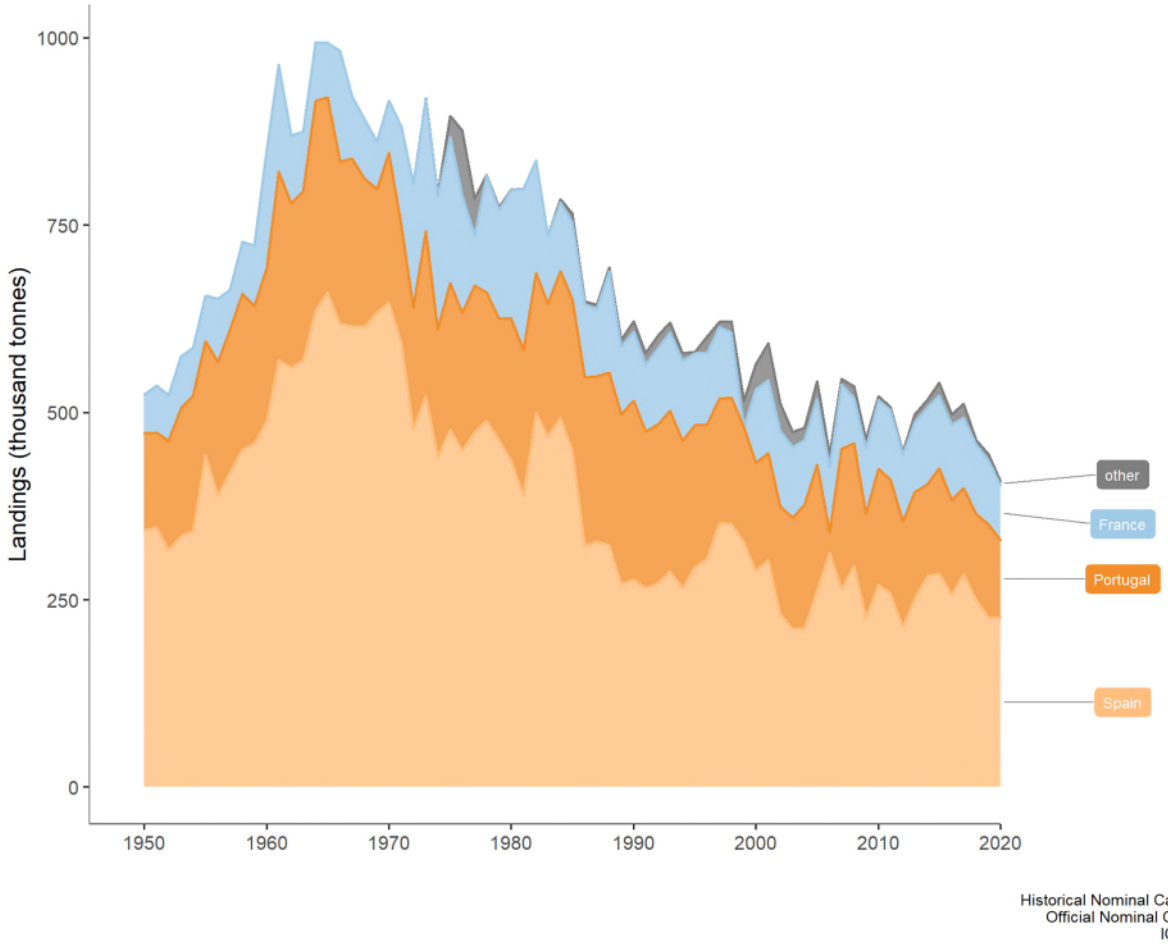


Figure 2 Landings (thousand tonnes) from ICES subareas 8 and 9, between 1950 and 2020. The three countries with the highest landings over the period are shown individually, while the remaining countries are aggregated and displayed as "other".

Catches over time

In the descriptions below, the term "landings" is used because the analyses are based on landings reported in logbooks.

Landings in the ecoregion are variable, but showed an increasing trend over the period from 1950 to 1960 before a general decline to recent levels (Figure 2). The total landings comprise a large mix of pelagic, demersal, benthic, and shellfish species, with pelagic fisheries contributing the highest proportion. The number of species landed by the different nations makes this a very rich and diverse ecoregion, and not all species could be displayed in the figure, resulting in a very large combined "undefined" category (Figure 3).

Of the species presented in Figure 4, sardine gives the highest proportion of the total landings, followed by blue jack and horse mackerel; these are all pelagic species. Sardine landings are showing a decreasing trend since the 1980s, whereas the other main species landings fluctuate without trends (Figure 4). Other notable species in the area include mackerel, hake, and anchovy. As a large proportion of the landings comprise pelagic species, it follows that the pelagic gears also give the highest landings (Figure 5). Static gears such as nets, lines, and pots are also important in this ecoregion.

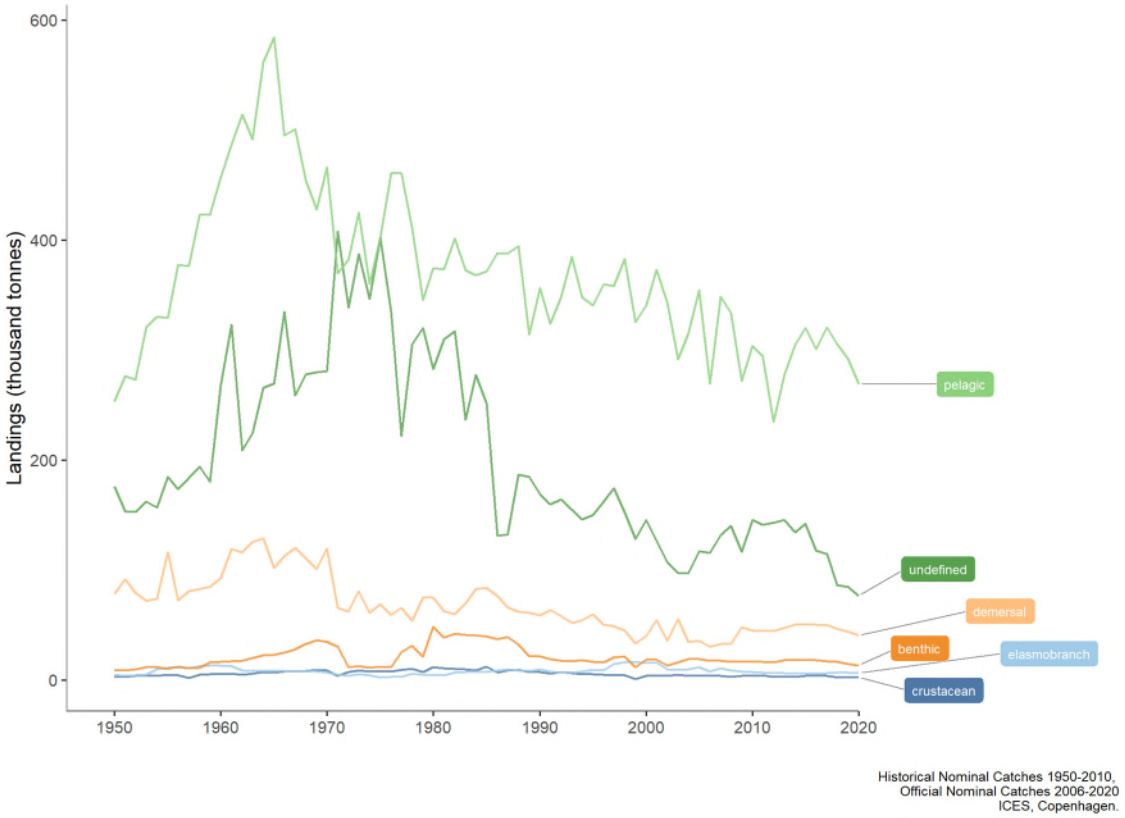


Figure 3 Landings (thousand tonnes) from ICES subareas 8 and 9 in 1950–2020, by fisheries guild. Table A1 in the Annex details the species that belong to each fish category.

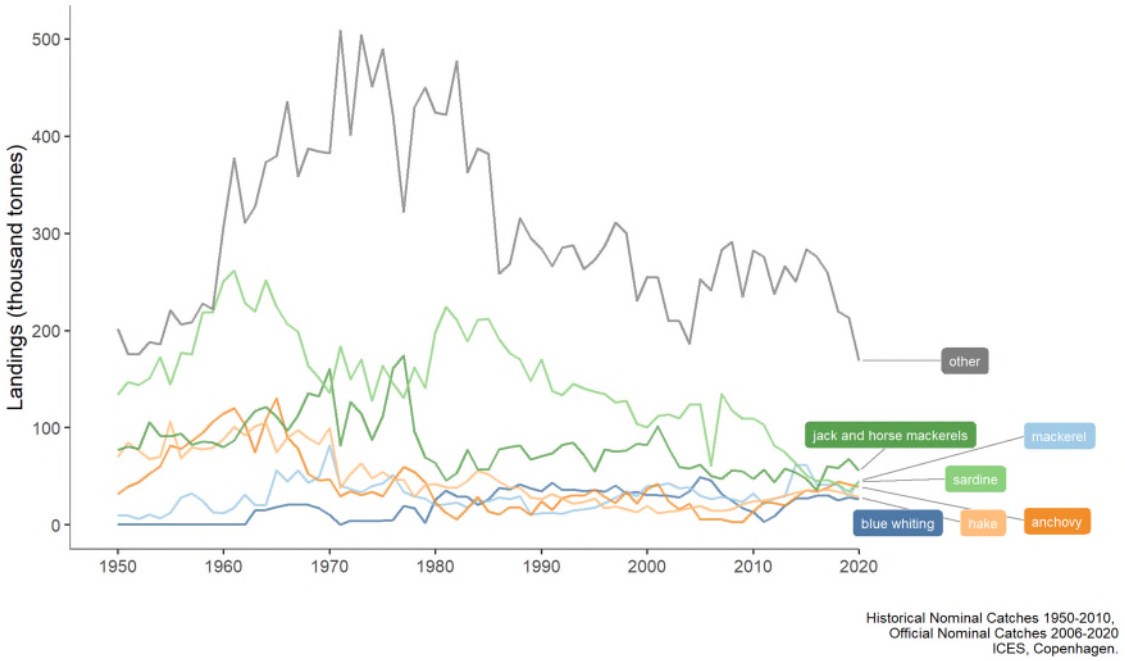


Figure 4 Landings (thousand tonnes) from ICES subareas 8 and 9 in 1950–2020, by species. The species groupings with the highest cumulative landings over the entire time-series are displayed separately; the remaining species are aggregated and labelled as “other”.

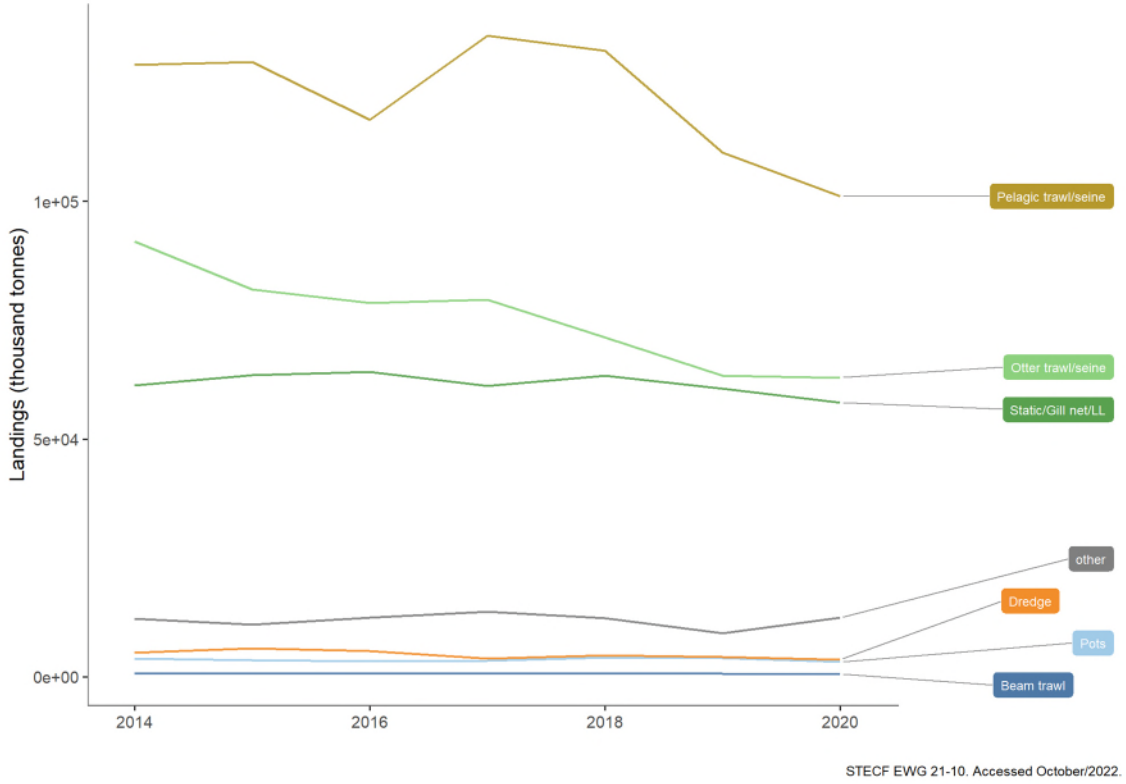


Figure 5 Commercial landings (thousand tonnes) from ICES subareas 8 and 9 in 2014–2020, by gear type for EU Member States. Some confidential values have been reported by France, Belgium, and Ireland.

Discards

The percentage of pelagic species discarded is estimated to be very low (Figure 6), with very high catches. Discards of demersal and benthic species are around 10%, whereas the discard rate for crustacean is higher at around 20%. The EU landing obligation for pelagic species came into force in 2015, while for demersal stocks it has come into force incrementally since 2016. Discard estimates for several species of elasmobranch are highly uncertain due to low encounter probabilities, and are so not shown here.

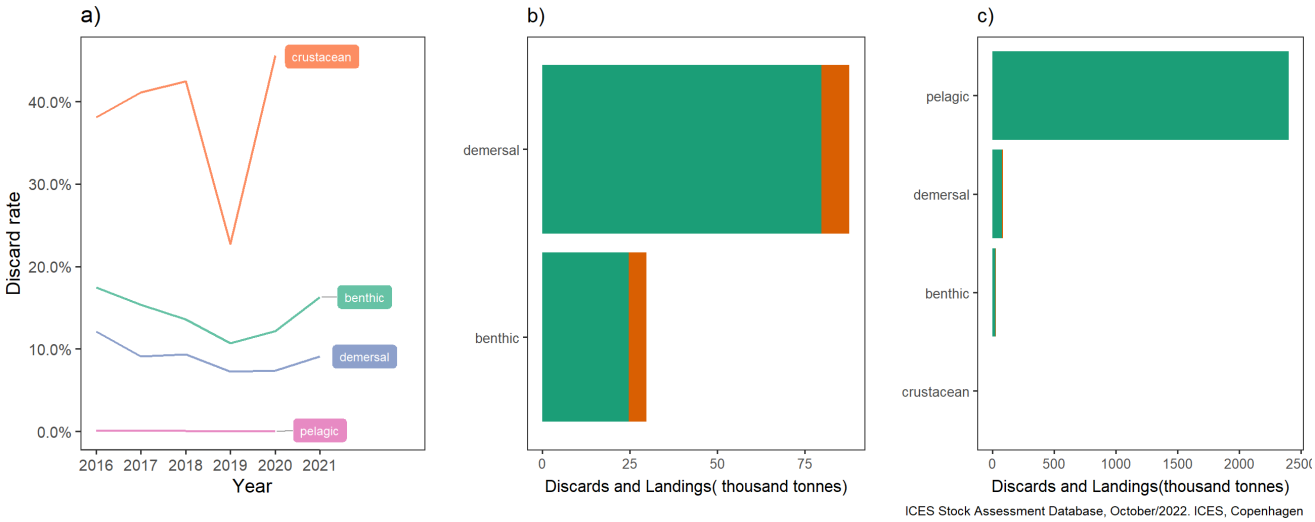


Figure 6 ICES subareas 8 and 9. Left panel (a): discard rates 2016–2021 by fish category, shown as percentages (%) of the total annual catch in that category. Middle panel (b): landings (green) and discards (orange) in 2021 by fish category (in thousand tonnes) only of those stocks with recorded discards. Right panel (c): landings (green) and discards (orange) in 2021 by fish category (in thousand tonnes) of all stocks, including stocks with zero discards or without discard information. There is uncertainty over the elasmobranch data, so they are not presented here.

Description of the fisheries

Fisheries operating within the Bay of Biscay and Iberian Coast ecoregion catch a wide range of different species, including those considered to be demersal, pelagic, wide-ranging, and deep-sea. Various elasmobranch species are also caught.

Demersal otter trawls operate throughout the shelf areas of the ecoregion (Figure 7). Static gears also operate throughout the shelf area, but there are some instances of them operating further offshore.

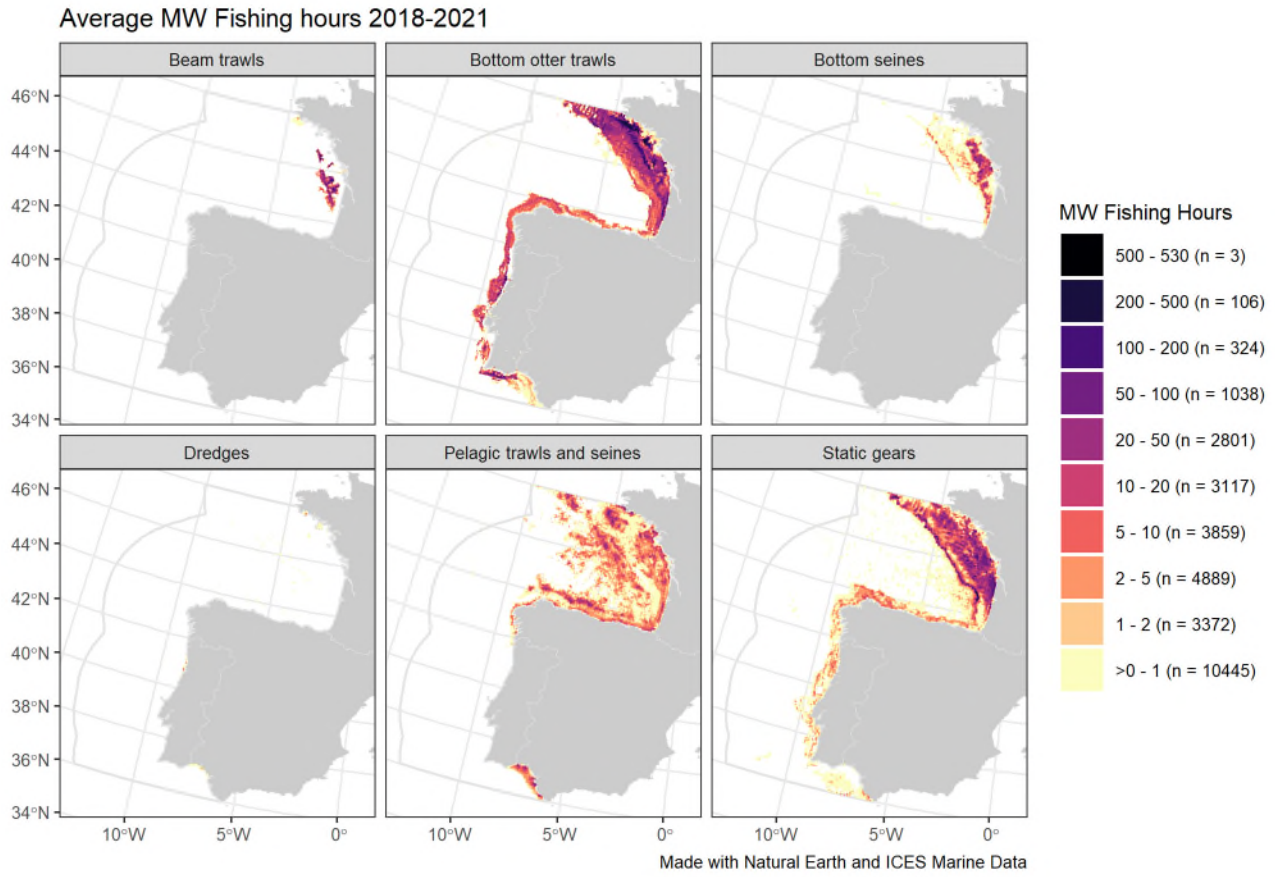


Figure 7 Spatial distribution of average annual fishing effort (mW fishing hours) in the Bay of Biscay and Iberian Coast ecoregion, by gear type. Fishing effort data are only shown for vessels > 12 m in length that have vessel monitoring systems (VMS); this will bias the distributions, particularly in coastal areas. Portuguese purse-seine data are not available[1].

Otter trawl

Otter trawl is the main gear used in demersal fisheries in the ecoregion. The species caught depends on the area and on the range of depths range fished, as well as on the cod-end mesh size, but in all cases the catches consist of a mixture of different species.

Hake is an important target species; other species caught as targets in these fisheries are anglerfishes, megrims, Norway lobster, horse mackerel, mackerel, blue whiting, sea bass, pollack, and red mullet. This targeting typically utilizes, although not exclusively, 70–100 mm mesh; other species taken as bycatch in relatively low levels include cuttlefish and squids.

Gillnet

Three fleets of gillnetters operate within the Iberian Coast area. A fleet called *Beta* uses a mesh size of 60 mm targeting hake, while the *Volanta* fleet uses a mesh size of 90 mm and also targets hake. The *Rasco* fleet uses a mesh size of 280 mm for targeting anglerfish.

In the Bay of Biscay, the main gillnet fishery involving Spanish and French vessels targets hake along the continental slope. In shallower waters, target species include sole and sea bass.

[1] Details on countries submitting data can be found at https://data.ices.dk/accessions/allaccessions.aspx?search=vms

Purse-seine

Purse-seiners in the ecoregion are mainly targeting sardine, anchovy and chub mackerel.

Longline and line

Longliners target hake along the continental slope, with bycatches of deep-water species**.**

Pelagic trawl

The pelagic trawls mainly targe anchovy and sardine in divisions 8.a–b.

Artisanal

Artisanal fisheries are small-scale inshore fisheries targeting demersal, benthic, and crustacean stocks. As well as those stocks assessed by ICES, a number of non-assessed stocks are targeted throughout the ecoregion. These include, for example, shellfish such as a mix of clam species, cockles, and oysters, which are caught by dredge. There are also important pot and trap fisheries for crabs and octopus. Some coastal waters in the ecoregion have fisheries targeting resident immature European eels or migrating spawners. In addition, in some transitional waters there are also fisheries targeting resident or migrating European eel.

Fisheries management measures

The ecoregion includes all or parts of the exclusive economic zones (EEZs) of three current EU Member States (France, Spain, and Portugal). Within EU waters, management is conducted in accordance with the EU Common Fisheries Policy (CFP), and catching opportunities for stocks under EU competency are agreed upon during meetings of the Council of Ministers. Under the CFP's regionalization policy, proposals on certain issues (for example discard plans) are made by the South Western Waters Regional Fisheries Group. National authorities manage activities in coastal waters (i.e. within 12 nautical miles). The fisheries for some stocks are managed based on agreements by the North-East Atlantic Fisheries Commission (NEAFC) and by coastal states. Salmon fisheries are managed nationally, based on agreements at the North Atlantic Salmon Conservation Organization (NASCO), and fisheries for large pelagic fish are managed based on agreements at the International Commission for the Conservation of Atlantic Tunas (ICCAT). International fisheries advice is provided by ICES, STECF, and the Standing Scientific Committee of ICCAT.

Total allowable catch (TAC) is the main fishery management tool in the ecoregion. TACs were introduced for most stocks in the 1980s, but were generally not restrictive (nor were quotas) until the early 1990s. The 2013 reform of the CFP aimed to eliminate discarding through the introduction of the EU landing obligation (LO). The LO was introduced for pelagic species in 2015 and has been phased in for demersal TAC species since 2016. From 2019 the LO applies to all TAC species, although there are some exemptions.

A new multiannual plan (MAP) was implemented in 2019 for 11 management units/stocks. The objectives of the plan are to minimize bycatch and the fishing impacts on the marine ecosystem and to contribute to the elimination of discards as while encompassing the CFP objectives and MSY approach.

A large number of technical measures are in place. These include measures to improve the selectivity of towed gears (partly in order to reduce bycatch) and gear restrictions.

Spatial management also occurs, both for fisheries and for ecosystem reasons. Closed areas/seasons are used to protect spawning and juvenile fish, for example. Protected areas have also been designated for habitats and species listed by EU Nature Directives. Fishery regulations are in place to restrict certain fisheries that may affect vulnerable habitats.

Status of the fishery resources

Within ICES, the scientific assessments of the stocks relevant to this ecoregion are the responsibility of several expert groups – namely WGBIE, WGWIDE, WGHANSA, WGDEEP, and WGEF.

Within these groups fishing mortalities and spawning-stock sizes have been evaluated against maximum sustainable yield (MSY) and precautionary approach (PA) reference points; the status of these stocks has also been assessed relative to safe biological limits, i.e. $F < F_{pa}$ and $SSB > B_{pa}$ (Figure 8). Around 30% of the stocks have full analytical assessment. Around 85% of the stocks with full analytical assessments, reference points, and forecast are fished at or below F_{MSY} target levels.

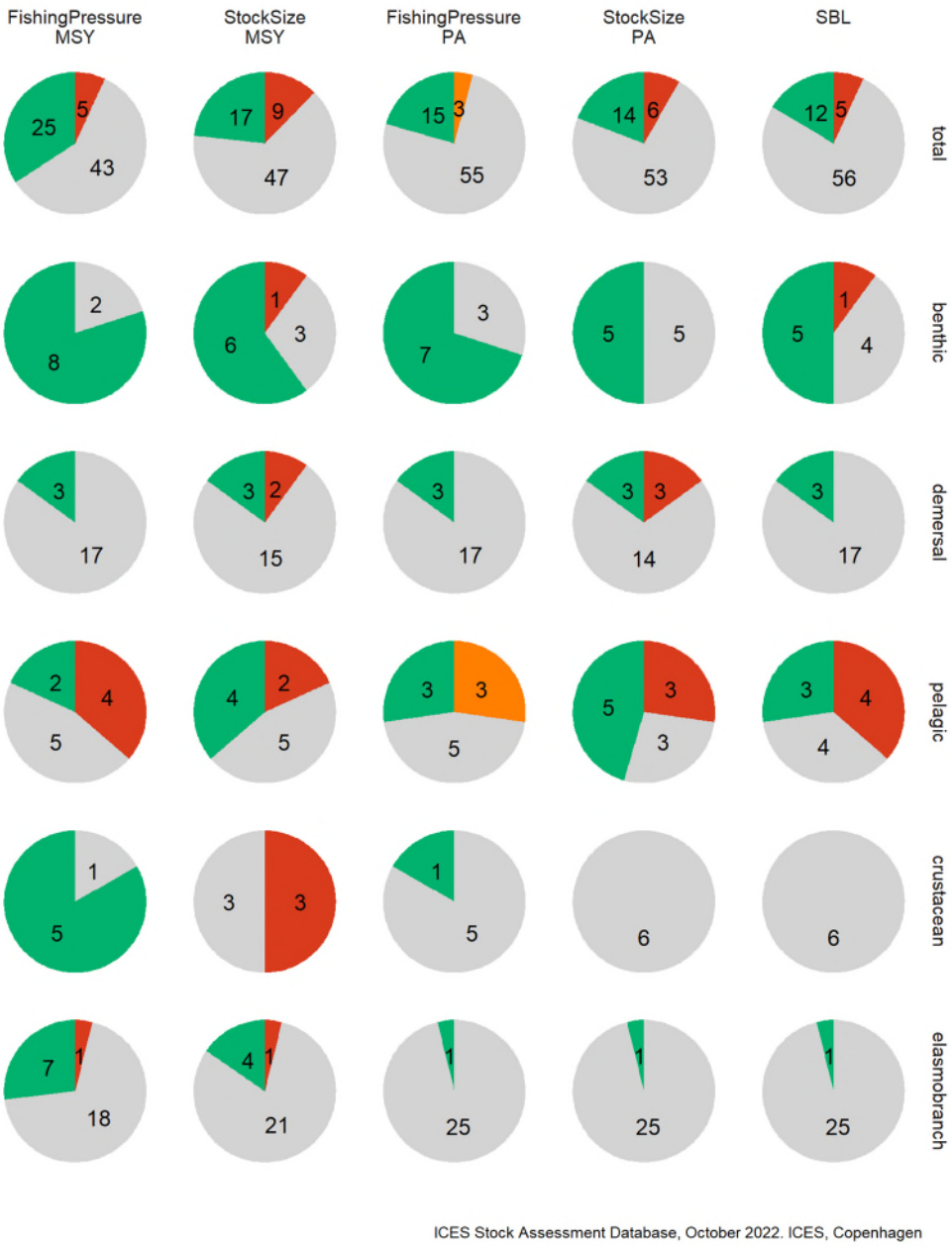
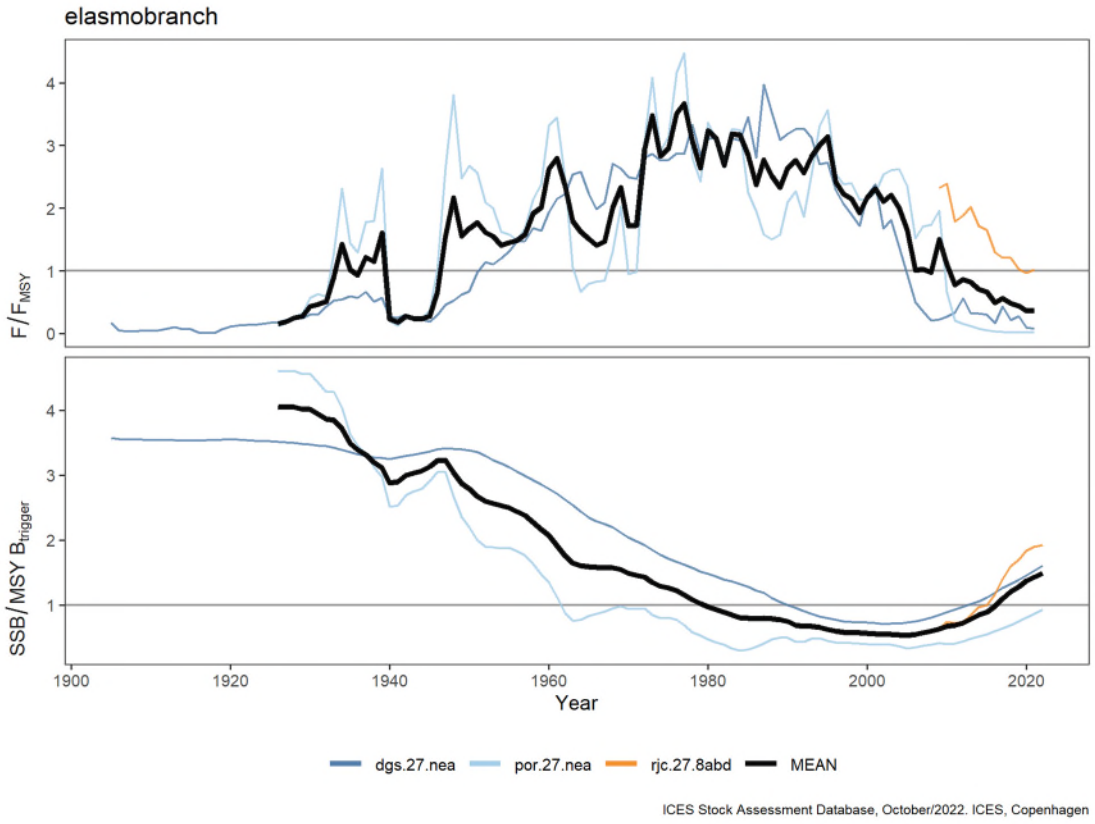


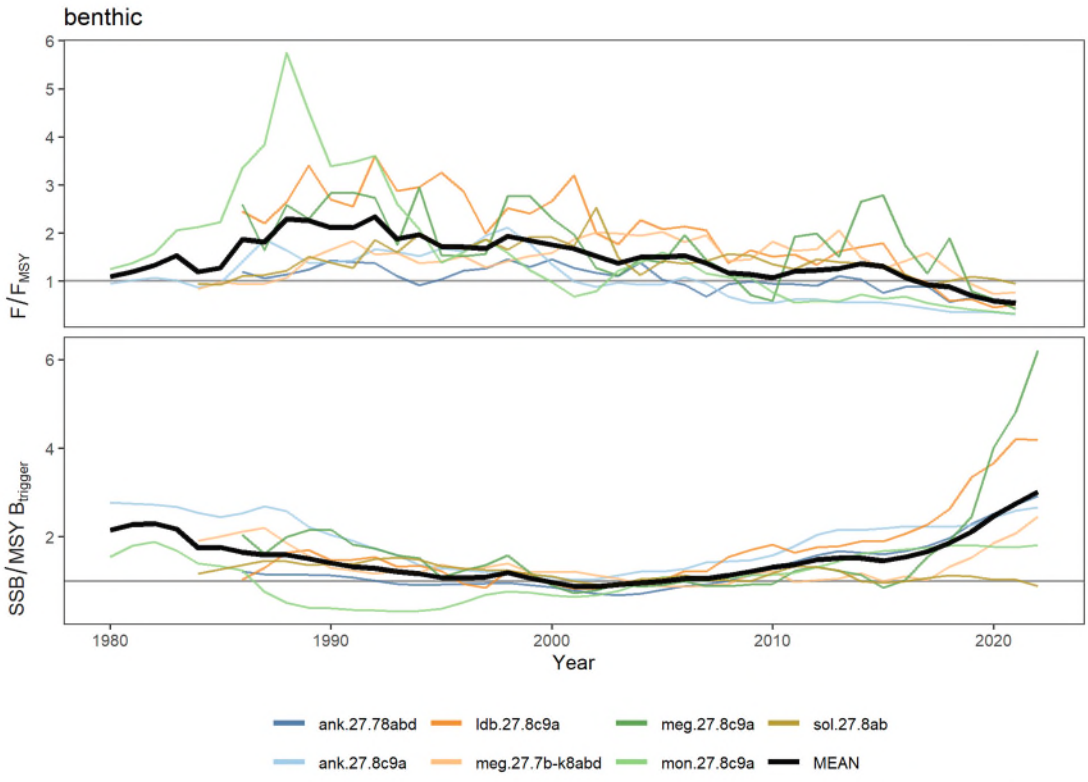
Figure 8 Status summary of Bay of Biscay and Iberian Coast stocks in 2022 (excluding European eel, salmon, and sea trout), relative to ICES maximum sustainable yield (MSY) approach and precautionary approach (PA). For the MSY approach: green represents a stock that is either fished below F_{MSY} or whose size is greater than MSY $B_{trigger}$; red represents a stock that is either fished above F_{MSY} or whose size is lower than MSY $B_{trigger}$. For the PA: green represents a stock that is fished at or below F_{pa} while its size is equal to or greater than B_{pa}; orange represents a stock that is either fished between F_{pa} and F_{lim} or whose size is between B_{lim} and B_{pa}; red represents a stock that is fished above F_{lim} or whose size is less than B_{lim}. Stocks with a fishing mortality at or below F_{pa} and a stock size above B_{pa} are defined as being inside safe biological limits. If this condition is not fulfilled, the stock is defined as being outside safe biological limits. Grey represents unknown reference points. For stock-specific information, see Table A1 in the Annex.

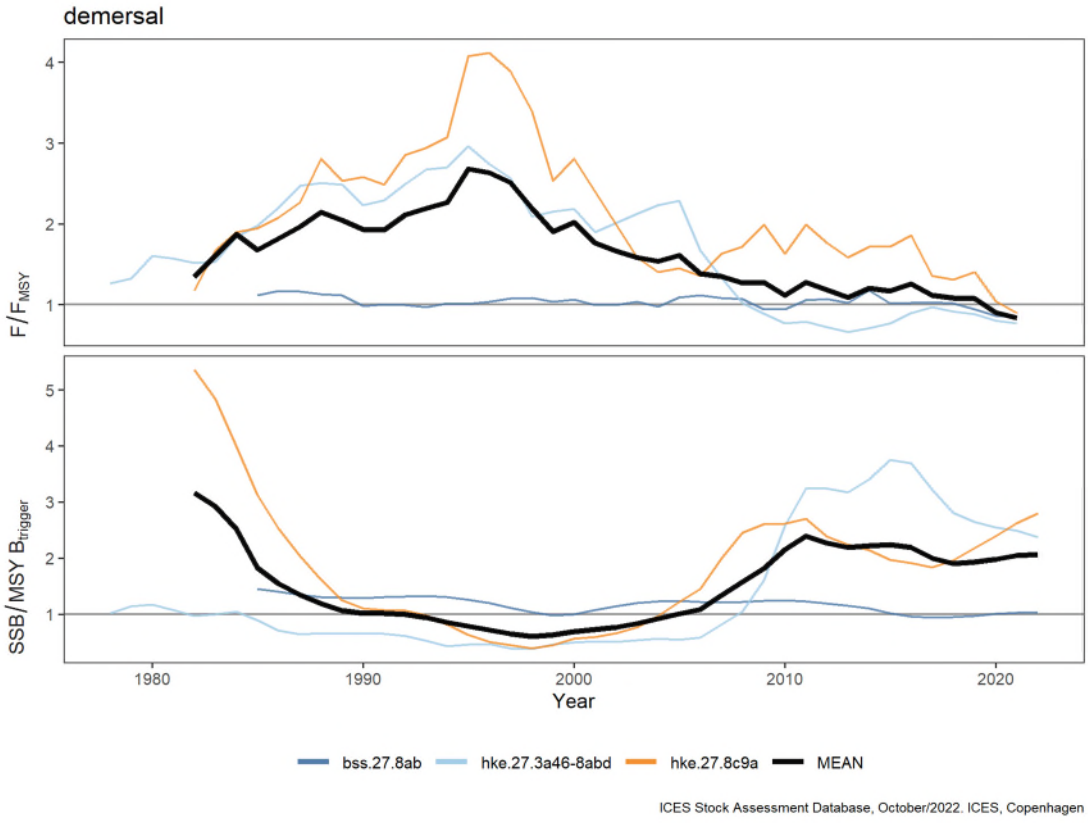
Figure 9 Status summary of Bay of Biscay and Iberian Coast stocks in 2022, relative to the EU Marine Strategy Framework Directive (MSFD) assessment criteria of the level of pressure of fishing activity (D3C1) and reproductive capacity of the stock (D3C2). Green represents the proportion of stocks that are either fished below F_{MSY} or whose size is greater than MSY $B_{trigger}$, for criteria D3C1 and D3C2. Red represents the proportion of stocks that are either fished above F_{MSY} or whose stock size is lower than MSY $B_{trigger}$, for criteria D3C1 and D3C2. Grey represents the proportion of stocks without MSY reference points. For stock-specific information, see Table A1 in the Annex.

ICES provided advice in 2022 on 73 stocks within the Bay of Biscay and Iberian Coast ecoregion. These are categorized into: ten benthic, six crustacean (Norway lobster), 20 demersal, 26 elasmobranch, and 11 pelagic stocks. Out of these categories the pelagic, Norway lobster, and benthic stocks are the best known, as they have the highest number of quantitative assessments with forecasts (ICES data category 1 stocks). Approximately 85% of stocks with full analytical assessment are sustainably fished (i.e. D3C1 where F < F_{MSY}); these account for 45 % of the total landings (Figure 9). For other groups, such as the elasmobranchs, there is a more limited knowledge base. These limited data mean there can be no forecasts, so these stocks are placed in ICES categories 3, 5, and 6. While these data-limited stocks account for a large proportion of stocks (70%), they only account for 4% of the total landings (Figure 9). Around 60 % of the stocks with full analytical assessment were assessed to be above MSY $B_{trigger}$ (D3C2); these accounted for around 92% of the total biomass caught.

A declining trend in the fishing mortality ratio for category 1 stocks is shown for both demersal and crustacean stocks since the late 1990s (Figure 10), as well as for the benthic stocks to a lesser extent. The mean fishing mortality is now at or below the F_{MSY} target. The SSB ratio shows an increasing trend over the same period, and the mean values are now above MSY $B_{trigger}$, with the exception of the elasmobranch. Note that although the mean fishing mortality and biomass ratios are in a desirable condition for most species categories, this does not imply that all stocks are in that condition.




benthic
F/F_MSY
SSB/MSY B_trigger
Year
1980
1990
2000
2010
2020
ank.27.78abd
ank.27.8c9a
ldb.27.8c9a
meg.27.7b-k8abd
meg.27.8c9a
mon.27.8c9a
sol.27.8ab
MEAN
ICES Stock Assessment Database, October/2022. ICES, Copenhagen


demersal
F/F_MSY
SSB/MSY B_trigger
Year
1980
1990
2000
2010
2020
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hke.27.8c9a
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ICES Stock Assessment Database, October/2022. ICES, Copenhagen

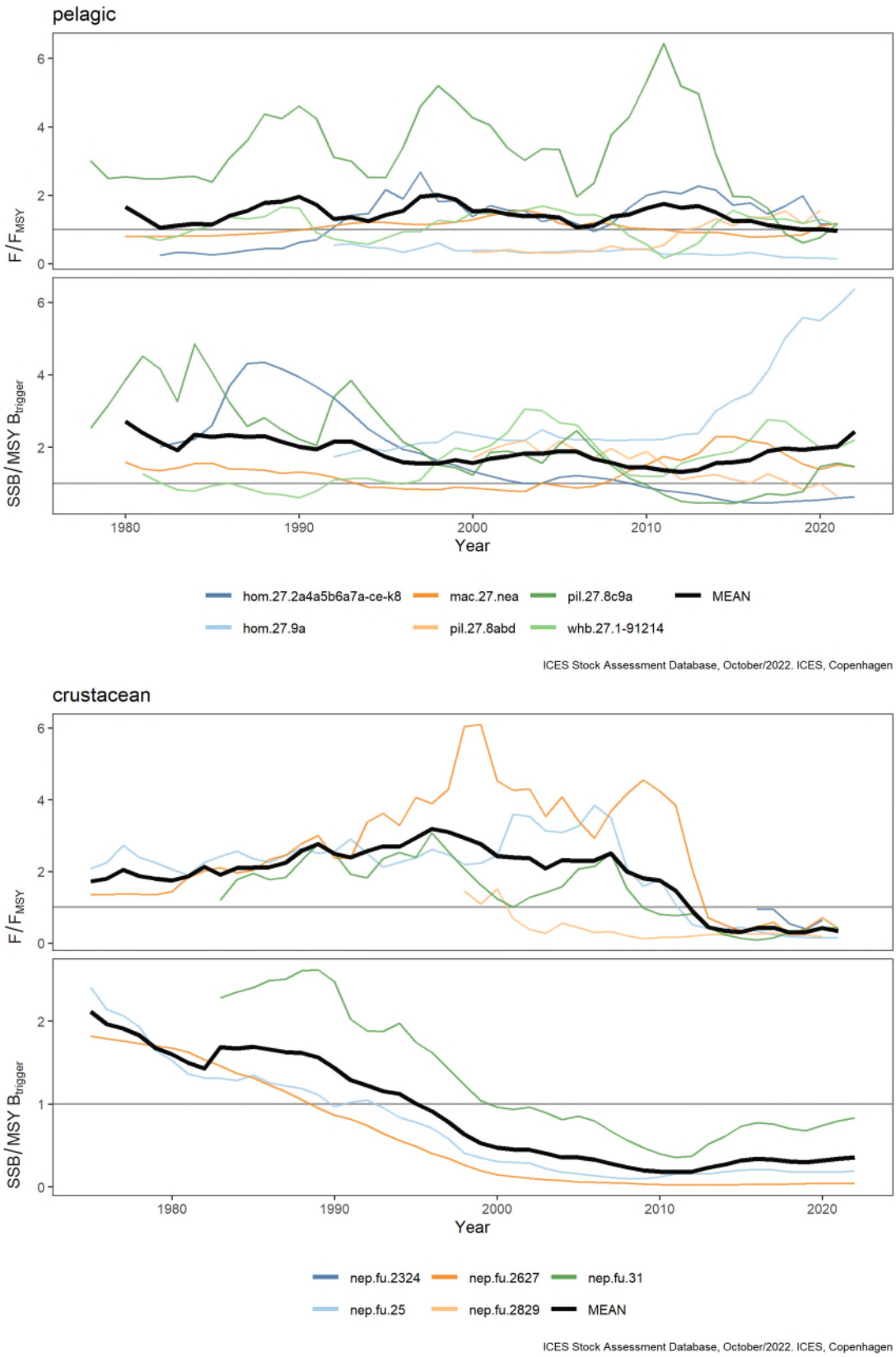
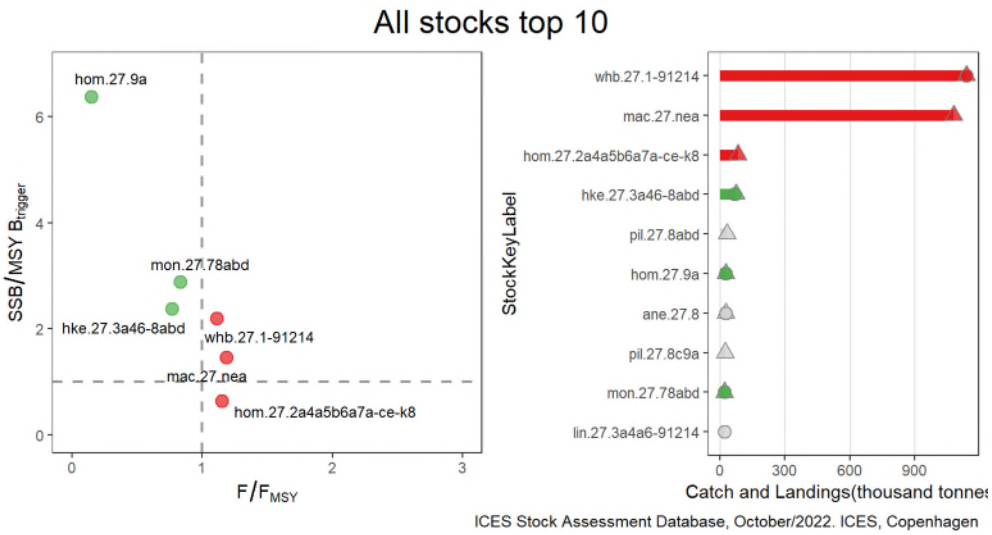
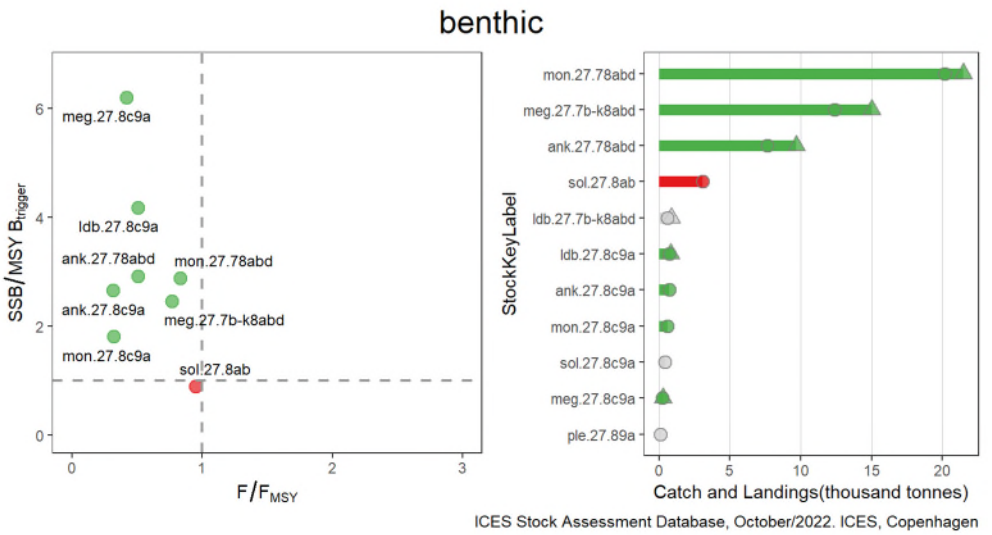
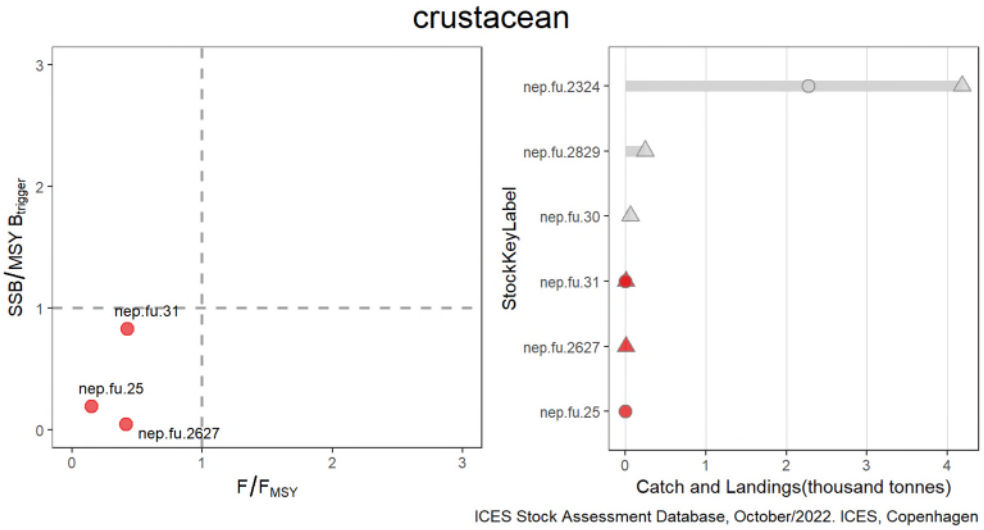


Figure 10 Temporal trends in F/F_{MSY} and SSB/MSY $B_{trigger}$ for Bay of Biscay and Iberian Coast benthic, crustacean, demersal, and pelagic stocks. Only stocks with defined MSY reference points are considered. Stocks for which only proxy reference points are available are not shown. For full stock names, see Table A1 in the Annex.

The stock status relative to F_{MSY} and MSY $B_{trigger}$ are shown for stocks with reference points and partitioned by stock groups in Figure 11. This figure shows that the horse mackerel stock in Division 9.a has the best status among all stocks (almost six times MSY $B_{trigger}$ and fished below F_{MSY}). Blue whiting and mackerel account for the highest landings, but most of the landings of these stocks are not made in this ecoregion. In general, the benthic stocks have a better stock status than the other stock groups.






crustacean
SSB/MSY B$_{trigger}$
F/F$_{MSY}$
nep.fu.31
nep.fu.25
nep.fu.2627
StockKeyLabel
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nep.fu.31
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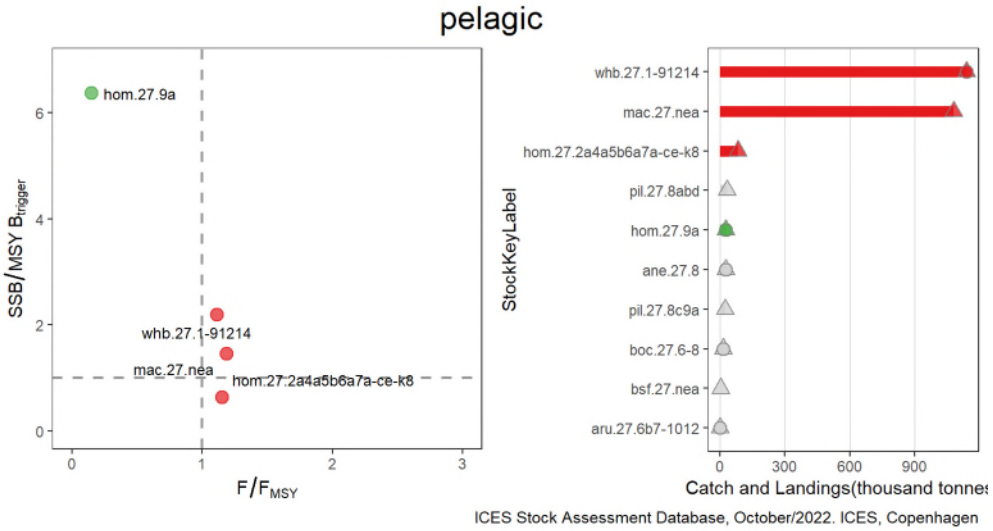
nep.fu.25
Catch and Landings(thousand tonnes)
ICES Stock Assessment Database, October/2022. ICES, Copenhagen


pelagic
SSB/MSY B$_{trigger}$
F/F$_{MSY}$
hom.27.9a
whb.27.1-91214
mac.27.nea
hom.27.2a4a5b6a7a-ce-k8
StockKeyLabel
whb.27.1-91214
mac.27.nea
hom.27.2a4a5b6a7a-ce-k8
pil.27.8abd
hom.27.9a
ane.27.8
pil.27.8c9a
boc.27.6-8
bsf.27.nea
aru.27.6b7-1012
Catch and Landings(thousand tonnes)
ICES Stock Assessment Database, October/2022. ICES, Copenhagen

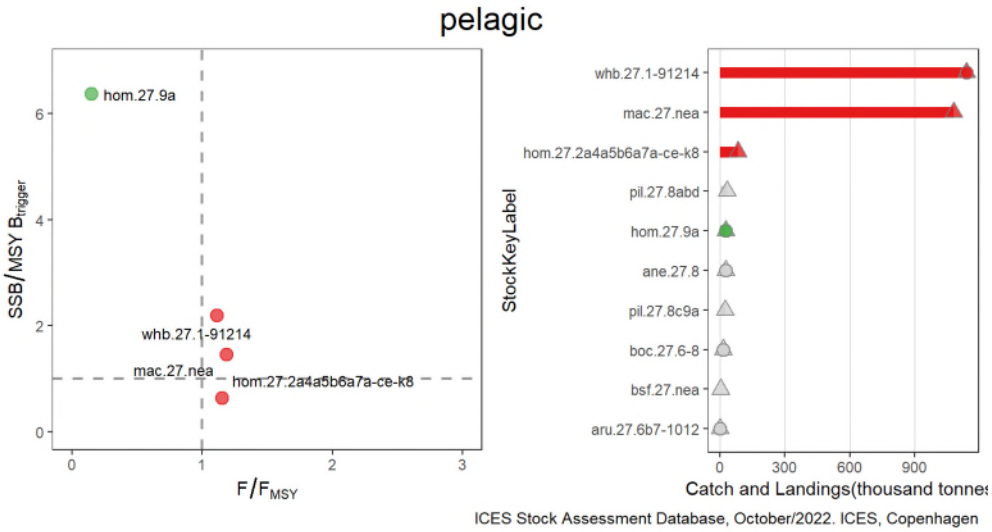


Figure 11 Status of Bay of Biscay and Iberian Coast stocks relative to the joint distribution of exploitation (F/F_{MSY}) and stock size (SSB/ MSY $B_{trigger}$ [left panels, by individual stocks]) and catches (triangles)/landings (circles) from the latest advice of these stocks [right panels]. The left panels only include stocks for which MSY reference points have been defined (MSY where available). Stocks for which only proxy reference points are available are not shown on the left plots. Stocks in green are exploited at or below F_{MSY} while their size is at or above MSY $B_{trigger}$. Stocks in red are either exploited above F_{MSY} or their size is below MSY $B_{trigger}$, or both. Stocks in grey have unknown/undefined status in relation to reference points or they have not updated advice this year. "All stocks" refers to the ten stocks with highest catch and landings across fisheries guilds in 2021. For full stock names, see Table A1 in the Annex.

European eel cannot be assessed against any PA or MSY reference points. While stock-size reference points are undefined, it is considered that the stock size is well below potential biological reference points. Recruitment of European eel has declined sharply in recent decades. Anthropogenic impacts other than fishing are substantial, and these are: (a) hydropower, pumping stations, and other water intakes; (b) habitat loss or degradation; (c) pollution, diseases, and parasites; and (d) other management actions that may affect levels of predation (e.g. conservation vs. control of predators).

Bay of Biscay and Iberian waters mixed fisheries

Mixed-fisheries advice considerations

Iberian waters

Mixed-fisheries considerations are presented for black-bellied anglerfish (ank.27.8c9a), hake (hke.27.8c9a), four-spot megrim (ldb.27.8c9a), megrim (meg.27.8c9a), and white anglerfish (mon.27.8c9a) in Atlantic Iberian waters. The forecasted effort variation for 2023 based on current fishing patterns and single-stock catch advice is shown in Figure 12. Apart from hake, full uptake of the catch quotas implies significant effort increase in almost all stock scenarios considered in the Iberian waters mixed-fisheries analysis, black-bellied anglerfish being the least limiting stock in 10 of the 11 fleets (the stock where catch advice implies the lowest level of effort by the fleets). This is a consequence of anglerfish and megrim stocks having a historical catch/TAC ratio below 1 (undershoot), and an increase in the catch advice for the four stocks in 2023. Hake is a limiting stock for Atlantic Iberian waters, and its TAC has been historically overshot. Not exceeding the hake catch advice in 2023 implies reducing effort at different levels in all the fleets, hake being the most restrictive stock for all of them (the stock where catch advice implies the lowest level of effort by the fleets, Figure 12). Furthermore, based on mixed-fisheries

considerations, it would produce an undershoot of the advised catch for the other stocks considered in the mixed-fisheries analysis because all fisheries operating in the area with demersal gears catch hake.

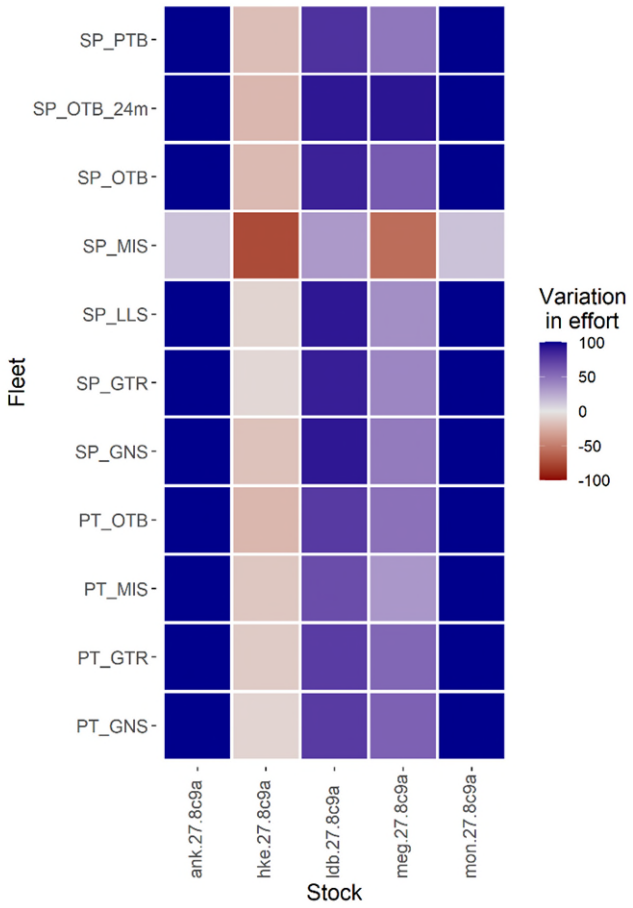


Figure 12 Iberian waters mixed fisheries. Percentage difference between *status quo* fishing effort and forecast 2023 effort for full quota uptake by fleet and stock. Visual presentation is restrained to ±100%. Empty squares indicate zero catch by that fleet.

Bay of Biscay

Mixed-fisheries considerations are presented for black-bellied anglerfish (ank.27.78abd), sea bass (bss.27.8ab), hake (hke.27.3a46-8abd), horse mackerel (hom.27.2a4a5b6a7a-ce-k8), mackerel (mac.27.nea), megrim (meg.27.7b-k8abd), white anglerfish (mon.27.78abd), Norway lobster (nep.fu.2324), pollack (pol.27.89a), smooth-hound (sdv.27.nea), sole (sol.27.8ab), blue whiting (whb.27.1-91214), and whiting (whg.27.89a). This analysis includes some pelagic species due to their potential as "choke species" and their economic importance for some of the demersal fleets including in the analysis. However, the contribution of these fleets to the total catch of these stocks is low The forecasted effort variation for 2023 based on current fishing patterns and single-stock catch advice is shown in Figure 13. The advised catches for these stocks imply very different changes in effort level in 2023 relative to *status quo* situation. The most limiting stock for Bay of Biscay demersal fisheries (the stock where catch advice implies the lowest level of effort by the fleets) is horse mackerel due to the zero-catch advice. When excluding horse mackerel as a restrictive stock, the most limiting stock is pollack, whose quota is first reached for eight of the 22 defined fleets. The least limiting stock is whiting (eight of 22 fleets).

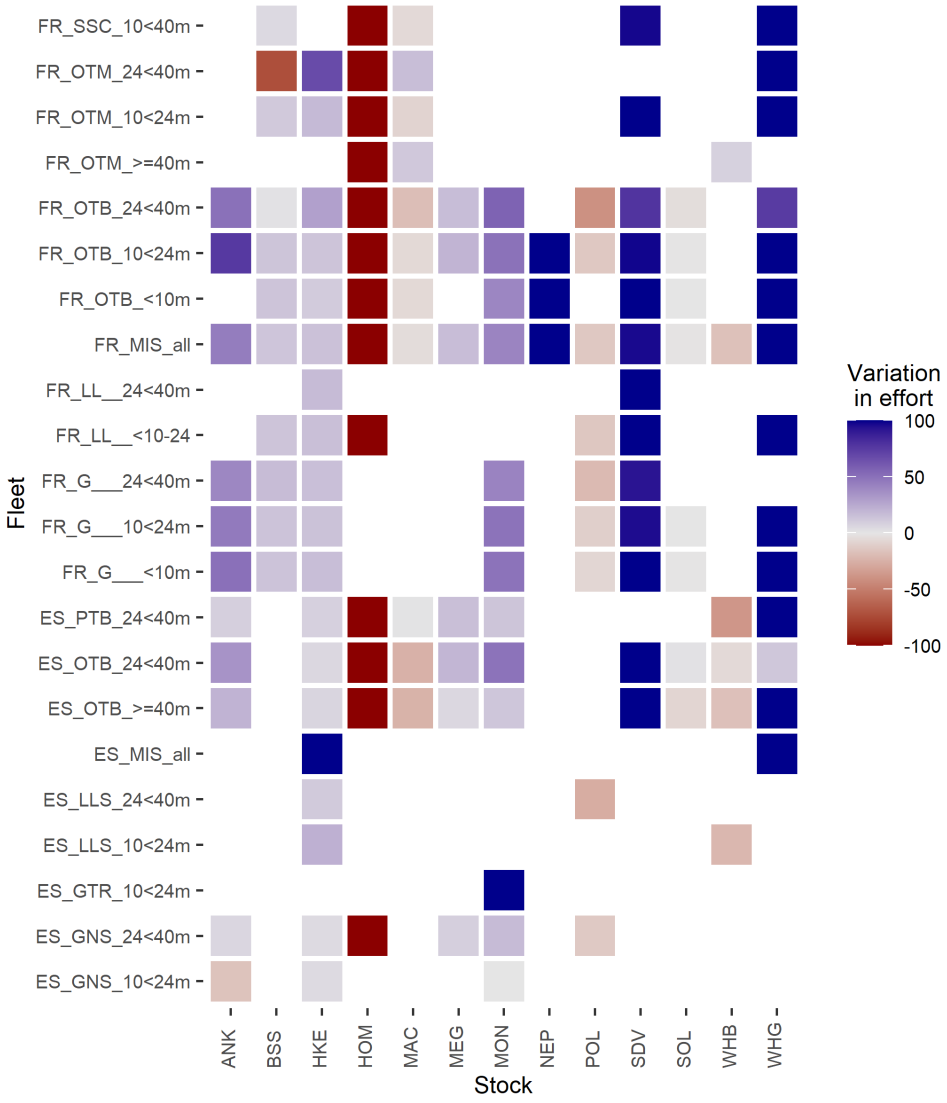


Figure 13 Bay of Biscay mixed fisheries. Percentage difference between *status quo* fishing effort and forecast 2023 effort for full quota uptake by fleet and stock. Visual presentation is restrained to ±100%. Empty squares indicate zero catch by that fleet.

Mixed-fisheries description

Fishing operations typically catch more than one species at a time (mixed fisheries), although some gears are more selective than others. For example, individual hauls from pelagic trawling and purse-seining consist mainly of a single species with small proportions of bycatch; gillnetters, and longliners catch few species, while demersal trawling catch several species simultaneously. The species interactions and relative proportions of catches in mixed fisheries are not likely to change greatly between years. Generally, the interactions between species and the selectivity of fisheries change gradually over time.

In the Bay of Biscay and Iberian waters, fisheries target a large range of species with different gears. Trawl fisheries (using otter, beam, or pelagic trawls) take place for Norway lobster, hake, anglerfishes, megrims, sole, and sea bass as well as some pelagic species (blue whiting, mackerel, and horse mackerel) and cephalopods (cuttlefish and squid). Gillnet fisheries target sole, hake, pollack, sea bass, and anglerfishes, while longline fisheries target mainly hake. In the Bay of Biscay, the fisheries are mainly carried out by French and Spanish vessels, though some Belgian beam trawl vessels target sole and, in Iberian waters, by Portuguese and Spanish vessels, with a small participation of French vessels.

The catch composition resulting from any fishing activity is described as a technical interaction. The analysis has been carried out at national level because it allows the incorporation of the effects of market considerations and quota availability on technical interactions. For this analysis, an average of the 2019, 2020, and 2021 data on métier was used, and results are presented separately for the Iberian waters (divisions 8.c and 9.a) and the Bay of Biscay (divisions 8.a and 8.b only).

Iberian waters

Analyses of the Spanish demersal fleets in divisions 8.c and 9.a show that the main target species are blue whiting, mackerel, hake, horse mackerel, anglerfishes, and megrims. Three pelagic/semi-pelagic species (blue whiting, mackerel, and horse mackerel) constitute 61% of the total landings in these demersal métiers (Figure 14). Hake is present in almost all métiers analysed and is a target species for longline and gillnet fisheries. Blue whiting is also present in most métiers and is the main target species for the small mesh demersal trawls. Mackerel is caught together with horse mackerel and is the main species of otter trawls with mesh sizes > 55 mm (OTB_MPD_> = 55_0_0; Figure 14); they are also caught with other pelagic and demersal species in eight other métiers. The trammelnet métier lands a large variety of demersal species, but pollack and sole are of the highest economic importance.

The same analysis performed for the Portuguese demersal métiers indicate that the most important species caught by the demersal fish trawlers are horse mackerel, mackerel, hake, and blue whiting (Figure 15). The three pelagic/semi-pelagic species (blue whiting, mackerel, and horse mackerel) constitute 41% of the total landings in these demersal métiers. The crustacean trawlers target mainly Norway lobster, rose shrimp, and blue whiting. Hake, anglerfishes, sole, and rays are present in trawl catches but they are mainly caught by artisanal métiers using gill- and trammelnets (Figure 15).

There is a large small-scale multigear fleet operating in the area which uses a diversity of gears that allow exploitation of ecological communities in different habitat types, depths, and substrata. The composition of the landings depends largely on the fishing gear used and on the ecological community of the fishing grounds visited, which may change seasonally. Segmentation of these large small-scale fishing fleets presents a challenge in the area.

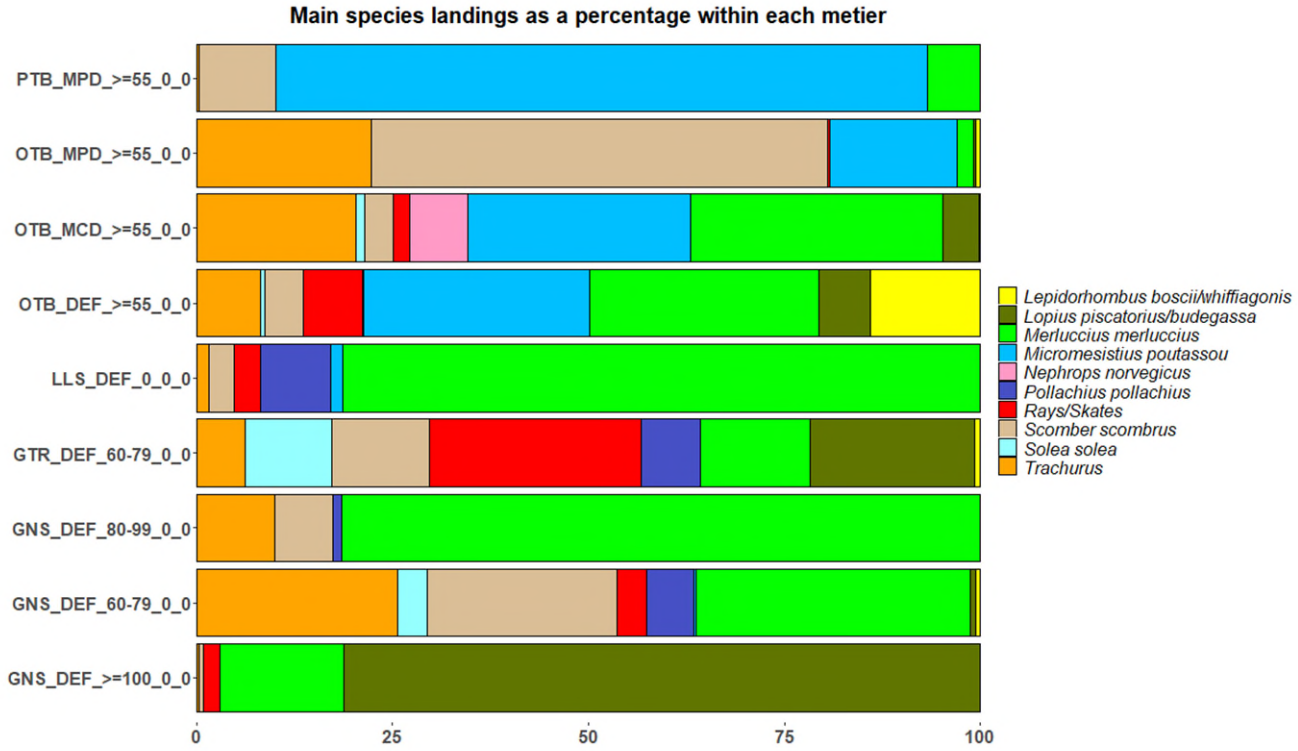


Figure 14 Main species landings as a percentage within each Spanish demersal métier in divisions 8.c and 9.a for 2019-2021.

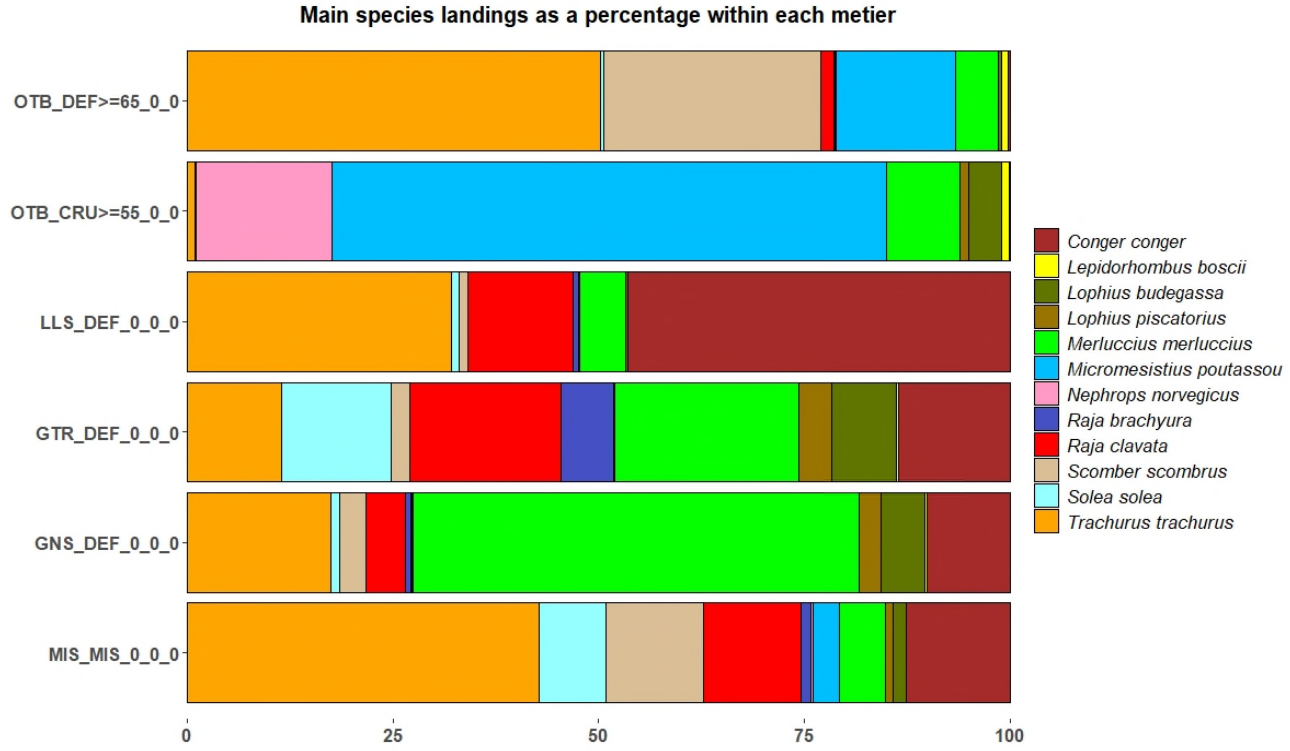


Figure 15 Main species landings as a percentage within each Portuguese demersal métier in divisions 8.c and 9.a for 2019–2021.

Bay of Biscay

The Bay of Biscay also has highly diverse mixed fisheries (Figure 16). Eight demersal TAC stocks dominate the landings (hake, anglerfish, sea bass, sole, *Nephrops*, megrim, whiting and pollack). Rays and some pelagic stocks are also caught in mixed demersal fisheries in this area. These are landed by mostly two nations (France and Spain) using 12 métiers (GNS_DEF, OTT_CRU, GTR_DEF, LLS_DEF, OTB_DEF, OTM_DEF, OTT_DEF, PTB_DEF, OTM_SPF, SSC_DEF, OTB_SPF and PS_SPF).

Hake is the main species landed by the Bay of Biscay mixed fishery (mean 20 565 tonnes year^{-1}). It is primarily targeted by longliners (LLS_DEF), gillnetters (GNS_DEF) and pair trawlers (PTB_DEF), but it is also caught by the majority of rest of the métiers to varying extents (Figure 16). Among demersal stocks, Anglerfish is the next with highest landings (4147 tonnes year^{-1}). It is primarily caught by trawlers (OTB_DEF and OTT_DEF) which also land megrim, hake, and rays. Anglerfish is also landed by gillnetters (GTR_DEF). Sea bass and pollack (3499 and 1126 tonnes year^{-1}) are caught by a diversity of gears (LLS_DEF, OTB_DEF GNS_DEF, and GTR_DEF). Sole is mostly caught in gillnet fisheries (GTR_DEF) and Norway lobster are caught in crustacean trawl fisheries with hake as bycatch. Whiting (1245 tonnes year^{-1}) is caught by trawlers (OTB_DEF), longliners (LLS_DEF), and seiners (SSC_DEF). The catch of pelagic species is high and in recent years the mackerel catch (4884 tonnes year^{-1}) has been even higher than anglerfish catch. Mackerel is caught together with horse mackerel (2509 tonnes year^{-1}) and is the main species of otter trawls targeting small pelagic fish (OTM_SPF and OTB_SPF). These pelagic stocks are also caught with other demersal species in many other métiers.

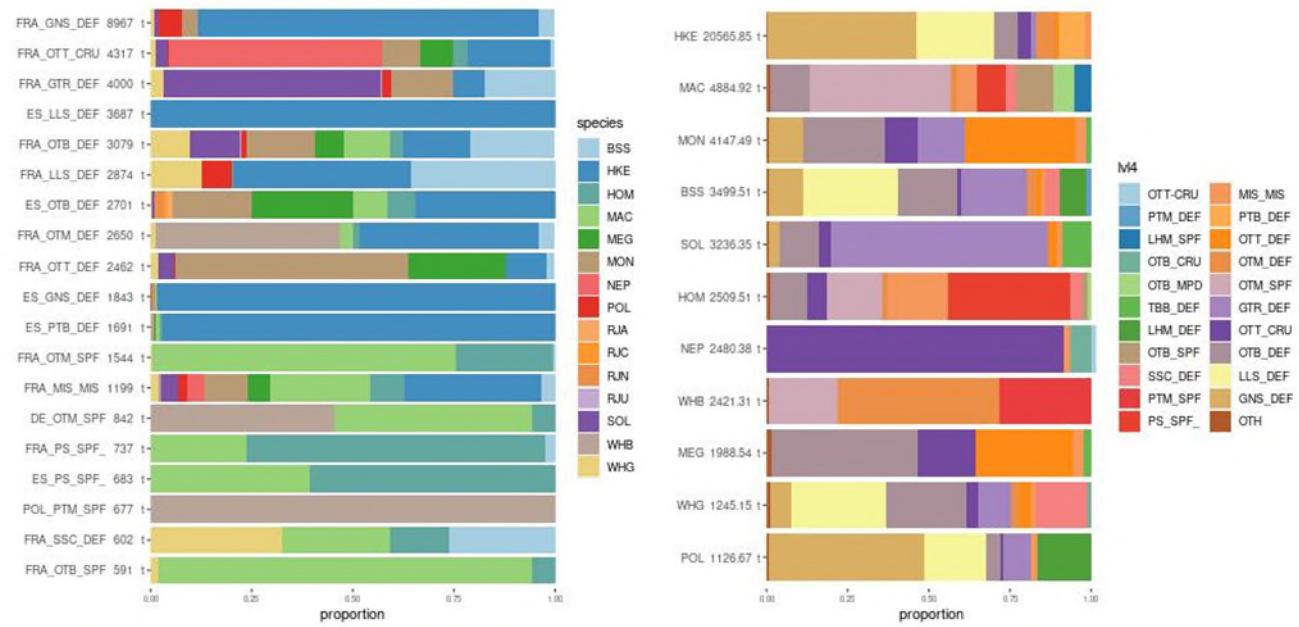


Figure 16 Description of technical interactions of demersal and pelagic TAC species in the Bay of Biscay (8.a and 8.b). The left panel (a) shows the species composition of the main demersal métiers operating in the Bay of Biscay. The label incorporates the country code, métier, and mean annual (2019–2021) landings (tonnes). The right panel (b) shows the composition of the landings of each species accounted for by the different demersal métiers. The label includes the mean annual landings (2019–2021).

Species interaction

Fish species are part of the marine foodweb and interact in various ways, including through predation and competition. Natural mortality is becoming proportionately more significant in the ecoregion because fishing mortality has been reduced on many stocks. Predation mortality can occur from other fish, seabirds, and marine mammals.

For this ecoregion, foodweb modelling studies indicate that yields of many commercially exploited stocks are affected by the abundance of main fish species predators such as hake and anglerfish. Changes in fishing mortality on these species therefore influences the abundance and yield of the pelagic fish stocks that are their main prey, such as blue-whiting, mackerel, horse mackerel, sardine, and anchovy; this depends on their spatial distribution across the ecoregion. Predation mortality cannot be fully quantified as there are not specific multispecies modelling or simulations of the interactions of species in this ecoregion.

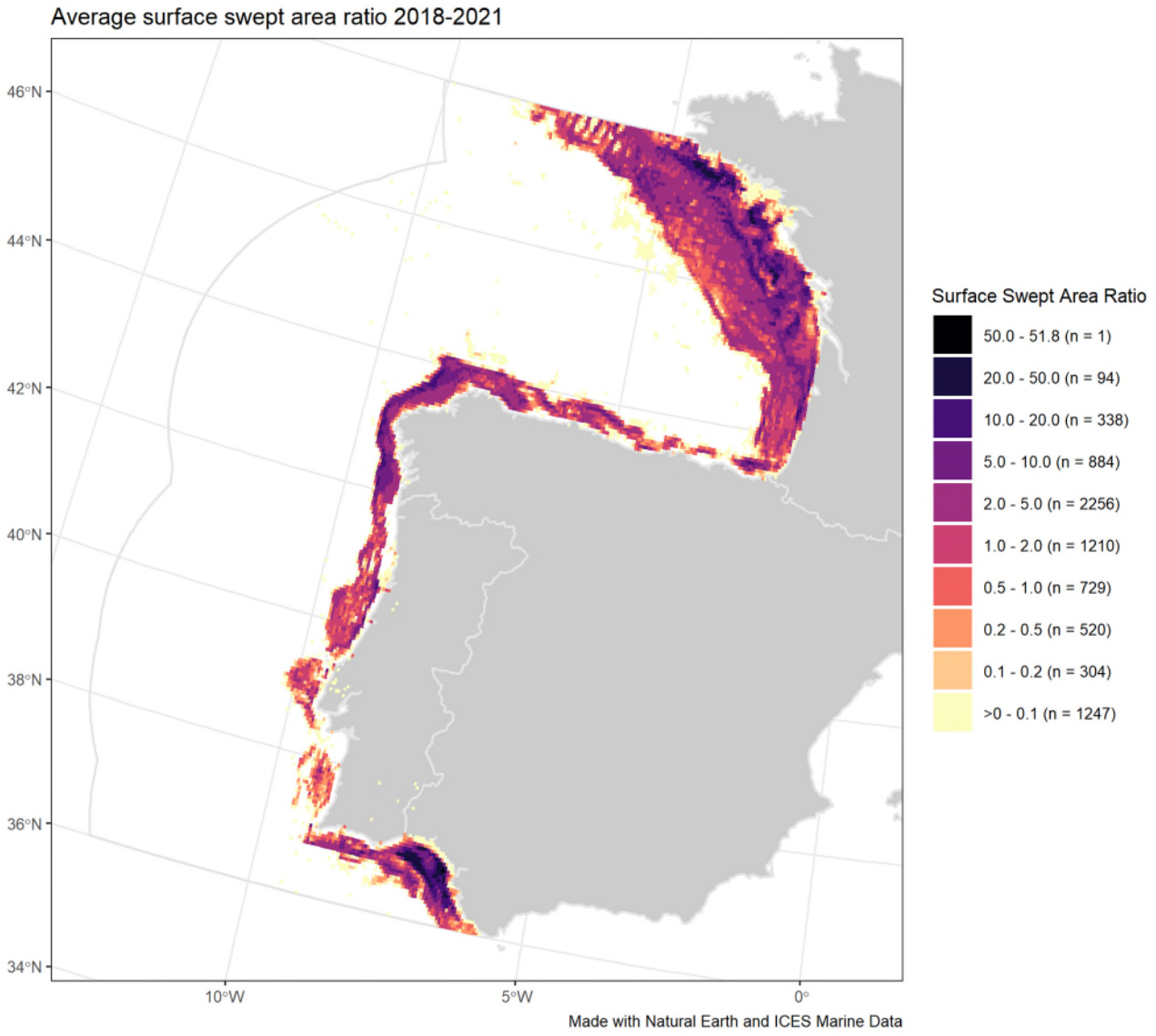
Effects of fisheries on the ecosystem

Fishing can disturb the foodweb. Predator–prey relationships can change, depending on the species and on the amount of food (prey) that is available for a given predator. Poor management of fishing for one species could have an adverse effect on the whole foodweb. Multispecies assessment methods can account for some of these interactions and guide appropriate management measures.

Physical disturbance of benthic habitats by mobile bottom-contacting fishing gear

Fishing also affects the seabed habitats and benthic species and it is associated with bottom-contacting mobile fishing gear, in particular beam trawling and otter trawling. The extent, magnitude, and impact of mobile bottom-contacting fishing gear on the seabed and benthic habitats varies geographically across the ecoregion (Figure 17). These maps are calculated in terms of a swept-area ratio. Swept area is calculated as hours fished × average fishing speed × gear width. Values for each of these factors were derived from VMS data and from other sources. The swept-area ratio is calculated for all 0.05 × 0.05 degree grid cells and is the sum of the swept area divided by the area of each grid cell. The resultant values indicate the theoretical number of times the entire grid cell area would have been swept if effort had been evenly

distributed within each cell. The swept-area ratio is calculated separately for surface- and subsurface contact. Different gear types interact with the seabed in different ways and thus exert different levels of physical disturbance, in terms of the substrate areas affected and the penetration depth. Surface abrasion is defined as the damage to seabed surface features; subsurface abrasion as the penetration and/or disturbance of the substrate beneath the seabed surface. For further information on these effects, see the Bay of Biscay and Iberian Coast ecosystem overview (ICES, 2019h).


Average surface swept area ratio 2018-2021
46°N
44°N
42°N
40°N
38°N
36°N
34°N
10°W
5°W
0°
Made with Natural Earth and ICES Marine Data
Surface Swept Area Ratio
50.0 - 51.8 (n = 1)
20.0 - 50.0 (n = 94)
10.0 - 20.0 (n = 338)
5.0 - 10.0 (n = 884)
2.0 - 5.0 (n = 2256)
1.0 - 2.0 (n = 1210)
0.5 - 1.0 (n = 729)
0.2 - 0.5 (n = 520)
0.1 - 0.2 (n = 304)
>0 - 0.1 (n = 1247)

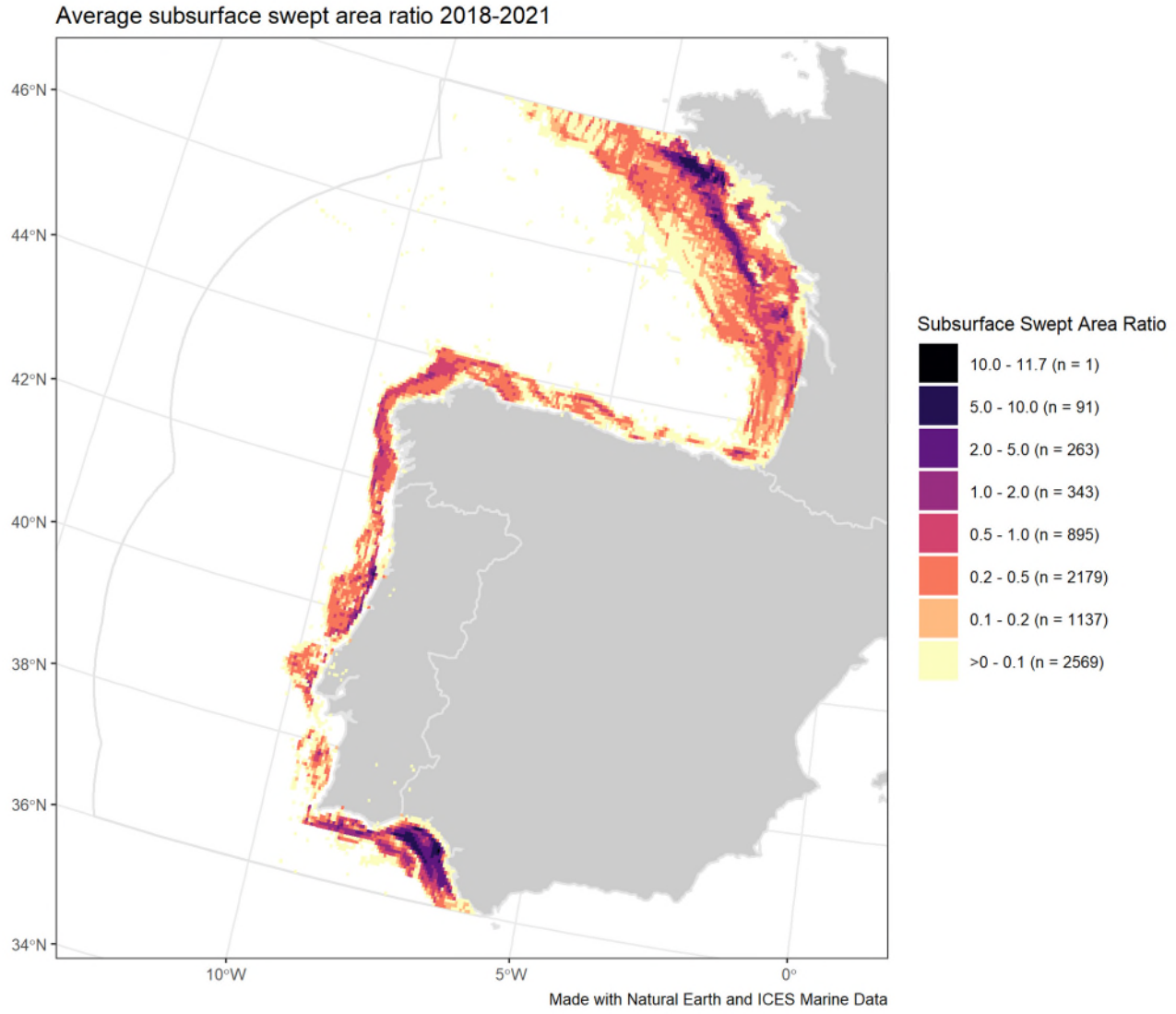


Figure 17 Average annual surface (top) and subsurface (bottom) disturbance by mobile bottom-contacting fishing gear (bottom otter trawls, bottom seines, dredges, beam trawls) in the Bay of Biscay and Iberian Coast Ecoregion, expressed as average swept-area ratios (SAR)[2].

Bycatch of protected, endangered and threatened species

All fisheries have the potential to catch protected, endangered, or threatened species, such as seabirds and marine mammals, as non-targeted bycatch. During 2017 –2021, approximately 20 000 monitoring days were undertaken, primarily by at-sea observers, in a variety of static and mobile gears and on vessels ranging from under 6 m to over 40 m (ICES, 2022a). Most bycatch data collection in the ecoregion is carried out within multipurpose programmes under the DCF and through dedicated bycatch monitoring programmes. Bycatch data collection in the ecoregion is carried out by at-sea observers, vessel crew observers, logbooks, and port observers. Some of these monitoring methods (logbooks, port observers) are not generally considered suitable for accurately quantifying bycatch rates.

Bycatch records in 2021

A total of five marine mammal species were reported as bycatch with common dolphin as the main species (Table 1). Bycatch of seabirds was observed for ten species from three families and reported primarily in nets. Bycatch of fish species

[2] Details on countries submitting data can be found at https://data.ices.dk/accessions/allaccessions.aspx?search=vms

was recorded for three taxa (*Actinopteri, Elasmobranchii*, and *Holocephali*) and 34 species. The highest number of specimens obtained were from commercial species – blackbelly rosefish *(Helicolenus dactylopterus)*, conger (*Conger conger)*, and tub gunard (*Chelidonichthys lucerna)*.

Table 1 The five most frequently reported marine mammal, seabird, fish, and turtle species in the Bay of Biscay and the Iberian Coast ecoregion during 2021 based on data submitted through ICES data call and held in the bycatch database of ICES Working Group on Bycatch of Protected Species (WGBYC).

Marine mammals		Seabirds	
Species	Number reported	Species	Number reported
Common dolphin *Delphinus delphis*	200	Common guillemot *Uria aalge*	163
Common bottlenose dolphin *Tursiops truncatus*	8	Northern gannet *Morus bassanus*	143
Harbour porpoise *Phocoena phocoena*	4	*Larus*	66
Long-finned pilot whale *Globicephala melas*	2	*Alcidae*	44
Grey seal *Halichoerus grypus*	1	Leach's petrel *Oceanodroma leucorhoa*	2
Fish		Turtles	
Species	Number reported	Species	Number reported
Tub gurnard *Chelidonichthys lucerna*	15871	Leatherback sea turtle *Dermochelys coriacea*	4
European conger *Conger conger*	14718	Loggerhead turtle *Caretta caretta*	4
Blackbelly rosefish/bluemouth rockfish *Helicolenus dactylopterus*	10854		
John Dory *Zeus faber*	4884		
Meagre *Argyrosomus regius*	1387		

Multiannual bycatch rates

The highest marine mammal bycatch rates (pooled data 2017–2021) were observed for common dolphin (*Delphinus delphis*) in the fisheries using bottom pair trawl (PTB) and pelagic pair trawl (PTM; Figure 18). Lower levels of bycatch of common dolphin were also observed in the static nets (GNS and GTR) and purse seine (PS). Long-finned pilot whale (*Globicephala melas*) bycatch was recorded in the bottom pair trawl (PTB) and pelagic pair trawl (PTM) fishery, common bottlenose dolphin (*Tursiops truncatus*) in the bottom pair trawl (PTB) and harbour porpoise (*Phocoena phocoena*) in the trammel nets (GTR) fishery.

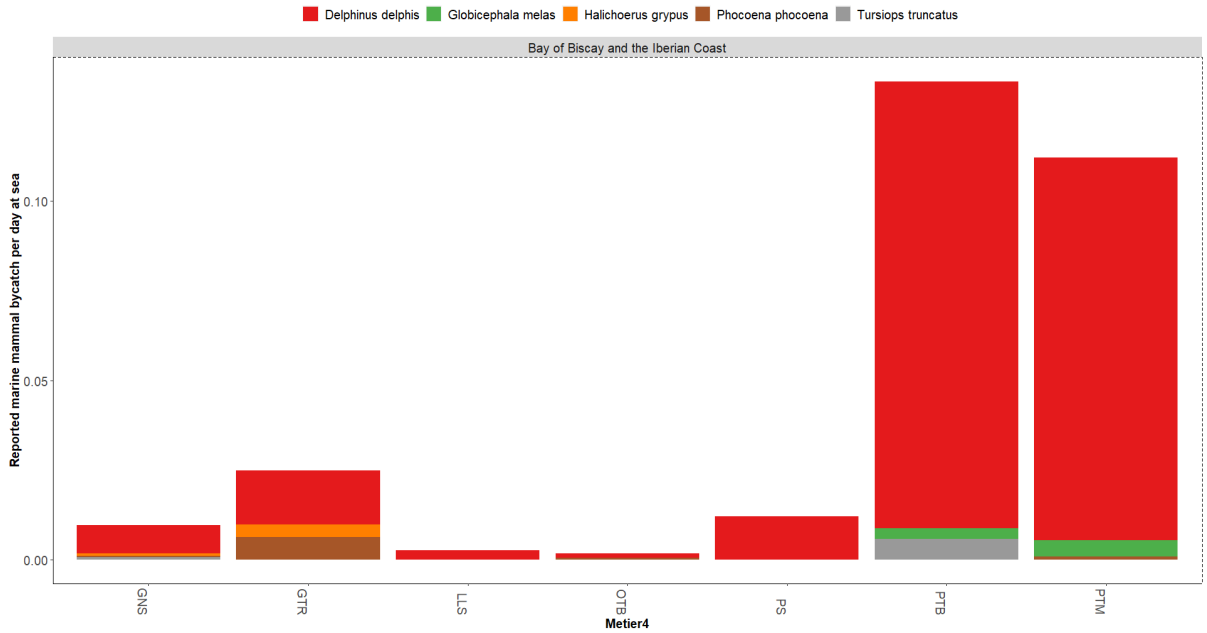


Figure 18 Reported marine mammal bycatch rates in the Bay of Biscay and the Iberian Coast ecoregion 2017–2021 by level 4 métier. Here and below: data used for the calculation of bycatch rates were selected based on the following criterion: monitoring coverage within a métier (level 4) was above an arbitrarily set limit of 50 days-at-sea[3].

The highest seabird bycatch rates (pooled data 2017–2021) were observed for common guillemot (*Uria aalge*) in two static net métiers (GNS and GTR) and for the northern gannet (*Morus bassanus*) in the longline fisheries (LLS and LLT), the bottom otter trawl (OTB) and the bottom pair trawl metier (PTB; Figure 10). Some bycatch of yellow-legged gull (*Larus michahellis*) was also reported in the purse-seine fishery (PS).

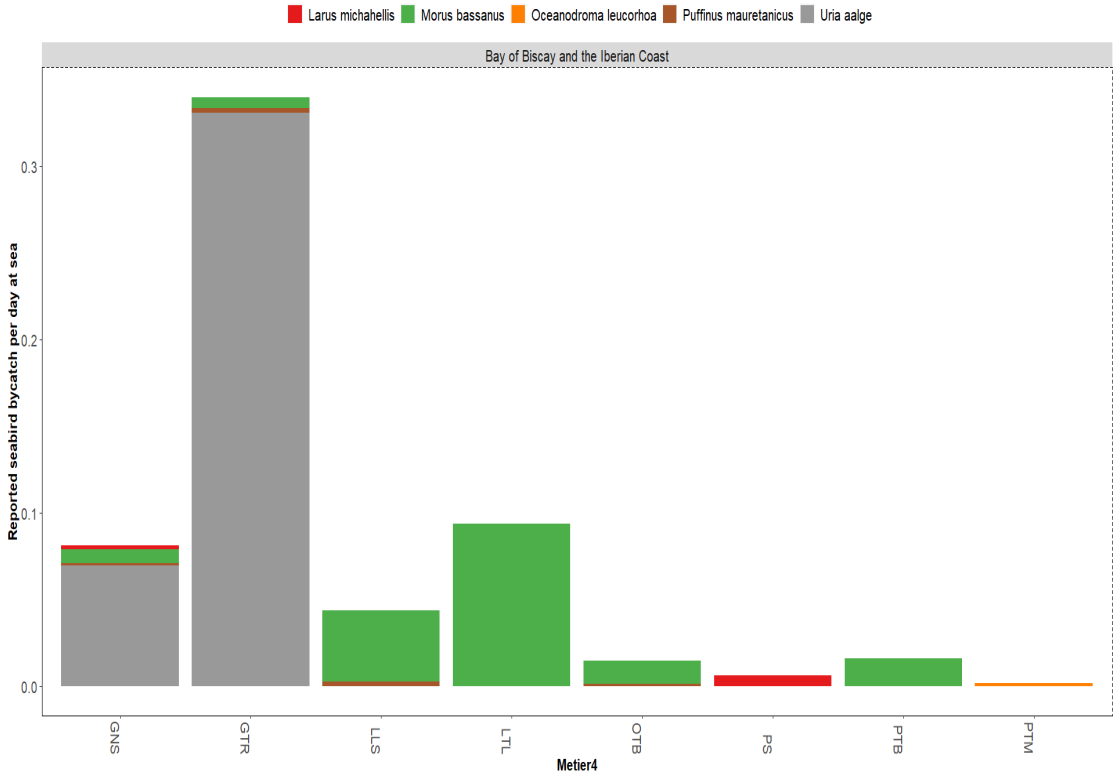


Figure 19 Reported seabird bycatch rates in the Bay of Biscay and the Iberian Coast ecoregion 2017–2021 by level 4 métier.

[3] A description of métiers can be found at https://vocab.ices.dk/?ref=1498

Based on the pooled data during 2017–2021, static nets ware responsible for the bycatch of marine turtles in the ecoregion with loggerhead sea turtle being the only species reported (Figure 20).

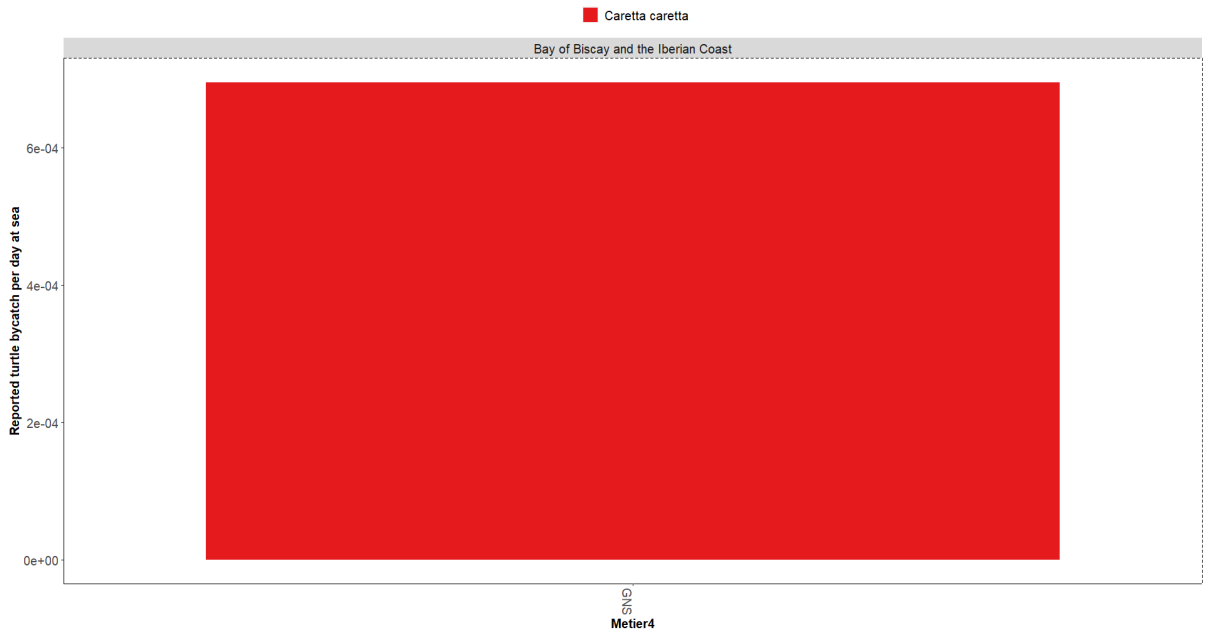


Figure 20 Reported marine turtle bycatch rate in the Bay of Biscay and the Iberian Coast ecoregion 2017–2021 by level 4 métier.

Fishing effort

The highest fishing effort was reported in static nets (GNS; Figure 21). Although this gear has generally lower bycatch rates of marine mammals than the bottom pair trawl (PTB) and pelagic pair trawl (PTM), because of the high levels of fishing effort this can result in high total bycatch estimates.

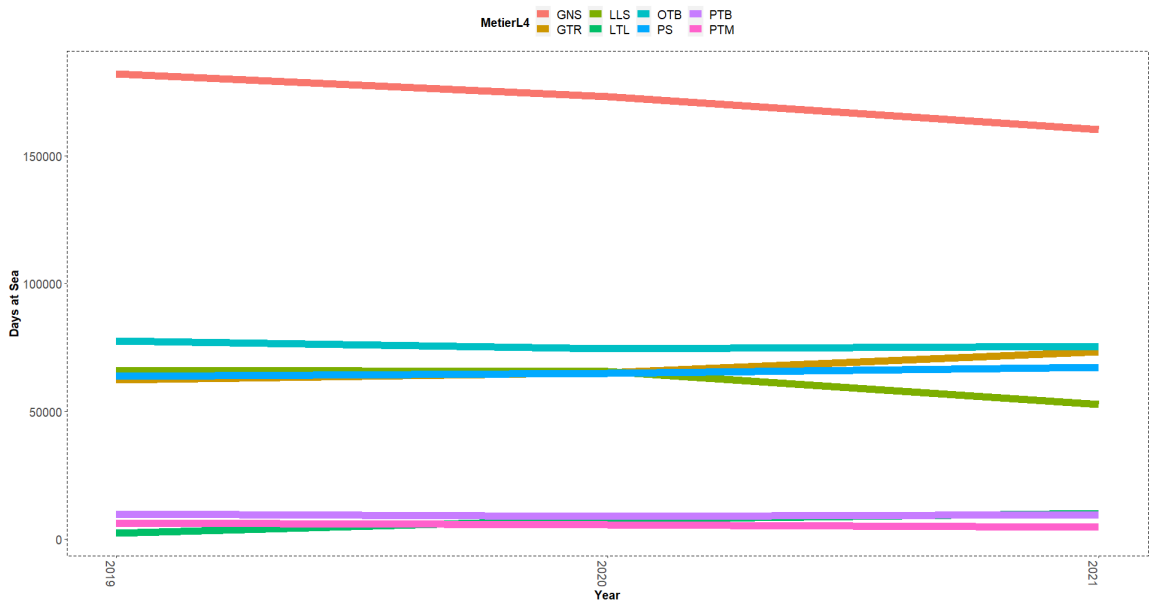


Figure 21 Fishing effort in days-at-sea by year for the level 4 métiers with reported bycatch in the Bay of Biscay and the Iberian Coast ecoregion (data prior to 2019 were incomplete and are not shown). GNS = set gillnets, GTR = trammelnets, LLS = longlines, LTL = troll lines, OTB = otter trawls, PS = purse-seine, PTB = bottom pair trawl, PTM = pelagic pair trawl.

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Annex

Table A1 Status summary of the Bay of Biscay and Iberian Coast ecosystem stocks in 2022, relative to maximum sustainable yield (MSY) and the ICES precautionary approach (PA) (excluding salmon and sea trout). Grey represents unknown reference points. For MSY: green represents a stock that is fished below F_{MSY} or the stock size is greater than MSY $B_{trigger}$; red represents a stock that is fished above F_{MSY} or the stock size is lower than MSY $B_{trigger}$. For PA: green represents a stock that is fished below F_{pa} or the stock size is greater than B_{pa}; yellow represents a stock that is fished between F_{pa} and F_{lim} or the stock size is between B_{lim} and B_{pa}; red represents a stock that is fished above F_{lim} or the stock size is less than B_{lim}. Stocks having a fishing mortality below or at F_{pa} and a stock size above B_{pa} are defined as being inside safe biological limits. Grey represents stocks for which reference points are unknown. MSFD = EU Marine Strategy Framework Directive; D3C1 = MSFD indicator for fishing mortality; D3C2 = MSFD indicator for spawning-stock biomass; SBL = safe biological limits; GES = good environmental status. Stock codes contain a hyperlink for the most recent ICES advice.

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
agn.27.nea	Angel shark in subareas 1-10, 12 and 14	*Squatina squatina*	Angel shark	Elasmobranch	6.3	2019	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
alf.27.nea	Alfonsinos in subareas 1-10, 12 and 14	*Beryx*	Alfonsinos	Demersal	5.2	2022	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
ane.27.8	Anchovy in Subarea 8	*Engraulis encrasicolus*	Anchovy	Pelagic	1	2021	MP	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	✓	?	✓		
ane.27.9a	Anchovy in Division 9.a	*Engraulis encrasicolus*	Anchovy	Pelagic	3	2022	PA	Maximum sustainable yield	?	?	?	?	✗	✗
								Precautionary approach	?	✗	?	✗		
ank.27.78abd	Black-bellied anglerfish in Subarea 7 and divisions 8.a-b and 8.d	*Lophius budegassa*	Black-bellied anglerfish	Benthic	1	2022	MSY	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
ank.27.8c9a	Black-bellied anglerfish in divisions 8.c and 9.a	*Lophius budegassa*	Black-bellied anglerfish	Benthic	2.11	2022	MSY	Maximum sustainable yield	✓	✓	✓	✓	?	?
								Precautionary approach	?	?	?	?		
aru.27.6b7-1012	Greater silver smelt in subareas 7-10 and 12, and Division 6.b	*Argentina silus*	Greater silver smelt	Pelagic	3.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
bli.27.nea	Blue ling in Subareas 1, 2, 8, 9, and 12, and Divisions 3.a and 4.a	*Molva dypterygia*	Blue ling	Demersal	5.3	2019	PA	Maximum sustainable yield	?	✗	?	✗	✗	?
								Precautionary approach	?	✗	?	✗		
boc.27.6-8	Boarfish in subareas 6-8	*Capros aper*	Boarfish	Pelagic	3.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
bsf.27.nea	Black scabbardfish in subareas 1, 2, 4-8, 10, and 14, and divisions 3.a, 9.a, and 12.b	*Aphanopus carbo*	Black scabbardfish	Pelagic	3.2	2022	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
bsk.27.nea	Basking shark in Subareas 1-10, 12 and 14	*Cetorhinus maximus*	Basking shark	Elasmobranch	6.3	2019	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
bss.27.8ab	Seabass in divisions 8.a-b	*Dicentrarchus labrax*	Seabass	Demersal	1	2022	MP	Maximum sustainable yield	✓	✓	✓	✓	✓	✓

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
								Precautionary approach	✓	✓	✓	✓		
bss.27.8c9a	Seabass in divisions 8.c and 9.a	*Dicentrarchus labrax*	Seabass	Demersal	5.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
cyo.27.nea	Portuguese dogfish in subareas 1-10, 12 and 14	*Centrophorus squamosus, Centroscymnus coelolepis*	Portuguese dogfish	Elasmobranch	6.3	2019	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
dgs.27.nea	Spurdog in Subareas 1-10, 12 and 14	*Squalus acanthias*	Spurdog	Elasmobranch	1.2	2022	MSY	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		
ele.2737.nea	European eel throughout its natural range	*Anguilla anguilla*	Eel	Demersal	3.14	2021	PA	Maximum sustainable yield	?	✗	?	✗	✗	?
								Precautionary approach	?	✗	?	✗		
gag.27.nea	Tope in subareas 1-10, 12 and 14	*Galeorhinus galeus*	Tope	Elasmobranch	5.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
gfb.27.nea	Greater forkbeard in subareas 1-10, 12 and 14	*Phycis blennoides*	Greater forkbeard	Demersal	3.2	2022	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
guq.27.nea	Leafscale gulper shark in	*Centrophorus squamosus*	Leafscale gulper shark	Elasmobranch	6.3	2019	PA	Maximum sustainable yield	?	?	?	?	?	?

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
	subareas 1-10, 12 and 14							Precautionary approach	?	?	?	?		
gur.27.3-8	Red gurnard in subareas 3-8	*Chelidonichthys cuculus*	Red gurnard	Demersal	3	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
hke.27.3a46-8abd	Hake in subareas 4, 6, and 7, and divisions 3.a, 8.a-b, and 8.d, Northern stock	*Merluccius merluccius*	Hake	Demersal	1	2022	MSY	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		
hke.27.8c9a	Hake in divisions 8.c and 9.a, Southern stock	*Merluccius merluccius*	Hake	Demersal	1	2022	MP	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		
hom.27.2a4a5b6a7a-ce-k8	Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a-c,e-k	*Trachurus trachurus*	Horse mackerel	Pelagic	1	2022	MSY	Maximum sustainable yield	✗	✗	✗	✗	✗	✗
								Precautionary approach	o	✗	o	✗		
hom.27.9a	Horse mackerel in Division 9.a	*Trachurus trachurus*	Horse mackerel	Pelagic	1	2022	MSY	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		
ldb.27.7b-k8abd	Four-spot megrim in divisions 7.b-k, 8.a-b, and 8.d	*Lepidorhombus boscii*	Four-spot megrim	Benthic	5.2	2022	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
ldb.27.8c9a	Four-spot megrim in divisions 8.c and 9.a	*Lepidorhombus boscii*	Four-spot megrim	Benthic	1	2022	MP	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		
lin.27.346-91214	Ling in subareas 3,4, 6–9, 12, and 14	*Molva molva*	Ling	Demersal	3.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
mac.27.nea	Mackerel in subareas 1-8 and 14 and division 9.a	*Scomber scombrus*	Mackerel	Pelagic	1	2022	MSY	Maximum sustainable yield	✗	✓	✗	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		
meg.27.7b-k8abd	Megrim in divisions 7.b-k, 8.a-b, and 8.d	*Lepidorhombus whiffiagonis*	Megrim	Benthic	1	2022	MSY	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		
meg.27.8c9a	Megrim in divisions 8.c and 9.a	*Lepidorhombus whiffiagonis*	Megrim	Benthic	1	2022	MP	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		
mon.27.78abd	White anglerfish in Subarea 7 and divisions 8.a-b and 8.d	*Lophius piscatorius*	White anglerfish	Benthic	1	2022	MSY	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		
mon.27.8c9a	White anglerfish in divisions 8.c and 9.a	*Lophius piscatorius*	White anglerfish	Benthic	1	2022	MP	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
mur.27.67a-ce-k89a	Striped red mullet in subareas 6 and 8, and divisions 7.a-c, 7.e-k, and 9.a	*Mullus surmuletus*	Striped red mullet	Demersal	5.2	2020	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
nep.fu.2324	Norway lobster in divisions 8.a and 8.b, Functional Units 23-24	*Nephrops norvegicus*	Norway lobster	Crustacean	1	2021	MSY	Maximum sustainable yield	✓	?	✓	?	?	?
								Precautionary approach	?	?	?	?		
nep.fu.25	Norway lobster in Division 8.c, Functional Unit 25	*Nephrops norvegicus*	Norway lobster	Crustacean	2.13	2022	MSY/PA	Maximum sustainable yield	✓	✗	✓	✗	?	?
								Precautionary approach	?	?	?	?		
nep.fu.2627	Norway lobster in Division 9.a, Functional Units 26-27	*Nephrops norvegicus*	Norway lobster	Crustacean	2.13	2022	MSY/PA	Maximum sustainable yield	✓	✗	✓	✗	?	?
								Precautionary approach	?	?	?	?		
nep.fu.2829	Norway lobster in Division 9.a, Functional Units 28-29	*Nephrops norvegicus*	Norway lobster	Crustacean	3.2	2021	PA	Maximum sustainable yield	✓	?	✓	?	?	?
								Precautionary approach	✓	?	✓	?		
nep.fu.30	Norway lobster in Division 9.a, Functional Unit 30	*Nephrops norvegicus*	Norway lobster	Crustacean	3.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
nep.fu.31	Norway lobster in Division 8.c,	*Nephrops norvegicus*	Norway lobster	Crustacean	2.11	2022	MSY	Maximum sustainable yield	✓	✗	✓	✗	?	?

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
	Functional Unit 31							Precautionary approach	?	?	?	?		
ory.27.nea	Orange roughy in subareas 1-10, 12 and 14	*Hoplostethus atlanticus*	Orange roughy	Demersal	6.3	2020	PA	Maximum sustainable yield	?	?	?	?	✗	?
								Precautionary approach	?	✗	?	✗		
pil.27.8abd	Sardine in divisions 8.a-b and 8.d	*Sardina pilchardus*	Sardine	Pelagic	1	2021	MSY	Maximum sustainable yield	✗	✗	✗	✗	✗	✗
								Precautionary approach	o	✗	o	✗		
pil.27.8c9a	Sardine in divisions 8.c and 9.a	*Sardina pilchardus*	Sardine	Pelagic	1	2021	MSY	Maximum sustainable yield	✓	✓	✓	✓	✓	✓
								Precautionary approach	✓	✓	✓	✓		
ple.27.89a	Plaice in Subarea 8 and Division 9.a	*Pleuronectes platessa*	Plaice	Benthic	5.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
pol.27.89a	Pollack in Subarea 8 and Division 9.a	*Pollachius pollachius*	Pollack	Demersal	5.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
por.27.nea	Porbeagle in subareas 1-10, 12 and 14	*Lamna nasus*	Porbeagle	Elasmobranch	2	2022	MSY	Maximum sustainable yield	✓	✗	✓	✗	?	?
								Precautionary approach	?	?	?	?		
raj.27.89a	Other rays and skates in	*Rajidae*	Rays and skates	Elasmobranch	5.9	2022	No advice	Maximum sustainable yield	?	?	?	?	?	?

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
	Subarea 8 and Division 9.a							Precautionary approach	?	?	?	?		
rhg.27.nea	Roughhead grenadier in the Northeast Atlantic	*Macrourus berglax*	Roughhead grenadier	Demersal	6.3	2020	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
rja.27.nea	White skate in subareas 1-10, 12 and 14	*Rostroraja alba*	White skate	Elasmobranch	6.3	2019	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
rjb.27.89a	Common skate complex and flapper skate in Subarea 8 and Division 9.a	*Dipturus batis*	Common skate	Elasmobranch	6.3	2022	No advice	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
rjc.27.8c	Thornback ray in Division 8.c	*Raja clavata*	Thornback ray	Elasmobranch	3.2	2022	Catches	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
rjc.27.9a	Thornback ray in Division 9.a	*Raja clavata*	Thornback ray	Elasmobranch	3	2022	MSY	Maximum sustainable yield	✗	✓	✗	✓	?	?
								Precautionary approach	?	?	?	?		
rjh.27.9a	Blonde ray in Division 9.a	*Raja brachyura*	Blonde ray	Elasmobranch	3	2022	MSY	Maximum sustainable yield	✓	✓	✓	✓	?	?
								Precautionary approach	?	?	?	?		

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
rjm.27.8	Spotted ray in Subarea 8	*Raja montagui*	Spotted ray	Elasmobranch	3	2022	MSY	Maximum sustainable yield	✓	?	✓	?	?	?
								Precautionary approach	?	?	?	?		
rjm.27.9a	Spotted ray in Division 9.a	*Raja montagui*	Spotted ray	Elasmobranch	3	2022	MSY	Maximum sustainable yield	✓	✓	✓	✓	?	?
								Precautionary approach	?	?	?	?		
rjn.27.678abd	Cuckoo ray in subareas 6-7 and divisions 8.a-b and 8.d	*Leucoraja naevus*	Cuckoo ray	Elasmobranch	3.2	2020	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
rjn.27.8c	Cuckoo ray in Division 8.c	*Leucoraja naevus*	Cuckoo ray	Elasmobranch	3	2022	MSY	Maximum sustainable yield	✓	?	✓	?	?	?
								Precautionary approach	?	?	?	?		
rjn.27.9a	Cuckoo ray in Division 9.a	*Leucoraja naevus*	Cuckoo ray	Elasmobranch	3	2022	MSY	Maximum sustainable yield	✓	?	✓	?	?	?
								Precautionary approach	?	?	?	?		
rju.27.8ab	Undulate ray in divisions 8.a-b	*Raja undulata*	Undulate ray	Elasmobranch	6	2022	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
rju.27.8c	Undulate ray in Division 8.c	*Raja undulata*	Undulate ray	Elasmobranch	6.9	2022	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
rju.27.9a	Undulate ray in Division 9.a	*Raja undulata*	Undulate ray	Elasmobranch	6.9	2022	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
rng.27.1245a8914ab	Roundnose grenadier in subareas 1, 2, 4, 8, and 9, Division 14.a, and in subdivisions 14.b.2 and 5.a.2	*Coryphaenoides rupestris*	Roundnose grenadier	Demersal	6.2	2019	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
sbr.27.6-8	Blackspot seabream in subareas 6-8	*Pagellus bogaraveo*	Blackspot seabream	Demersal	6.3	2022	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
sbr.27.9	Blackspot seabream in Subarea 9	*Pagellus bogaraveo*	Blackspot seabream	Demersal	3.2	2022	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
sck.27.nea	Kitefin shark in subareas 1-10, 12 and 14	*Dalatias licha*	Kitefin shark	Elasmobranch	6.3	2019	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
sdv.27.nea	Smooth-hound in subareas 1-10, 12 and 14	*Mustelus asterias*	Smooth-hound	Elasmobranch	3.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
sho.27.89a	Black-mouth dogfish in Subarea 8 and Division 9.a	*Galeus melastomus*	Black-mouth dogfish	Elasmobranch	3.9	2021	PA/Stock status only	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
sol.27.8ab	Sole in divisions 8.a-b	*Solea solea*	Sole	Benthic	1	2022	MP	Maximum sustainable yield	✓	✗	✓	✗	?	✗
								Precautionary approach	✓	?	✓	?		
sol.27.8c9a	Sole in divisions 8.c and 9.a	*Solea solea*	Sole	Benthic	3	2021	MSY	Maximum sustainable yield	✓	?	✓	?	?	?
								Precautionary approach	✓	?	✓	?		
syc.27.8abd	Lesser spotted dogfish in divisions 8.a-b and 8.d	*Scyliorhinus canicula*	Lesser-spotted dogfish	Elasmobranch	3.9	2021	PA/Stock status only	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
syc.27.8c9a	Lesser spotted dogfish in divisions 8.c and 9.a	*Scyliorhinus canicula*	Lesser-spotted dogfish	Elasmobranch	3.9	2021	PA/Stock status only	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
tsu.27.nea	Roughsnout grenadier in subareas 1-2, 4-8, 10, 12, 14 and Division 3a	*Trachyrincus scabrus*	Roughsnout grenadier	Demersal	6.3	2020	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		
usk.27.3a45b6a7-912b	Tusk in subareas 4 and 7-9 and divisions 3.a,	*Brosme brosme*	Tusk	Demersal	3.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		

Stock Code	Stock Description	Species Scientific Name	Species Common Name	Fisheries Guild	Data Category	Assessment Year	Advice Category	Approach	Fishing Pressure	Stock Size	D3C1	D3C2	GES	SBL
	5.b, 6.a, and 12.b													
whb.27.1-91214	Blue whiting in subareas 1-9, 12, and 14	*Micromesistius poutassou*	Blue whiting	Pelagic	1	2022	MP	Maximum sustainable yield	✗	✓	✗	✓	?	✗
								Precautionary approach	o	✓	o	✓		
whg.27.89a	Whiting in Subarea 8 and Division 9.a	*Merlangius merlangus*	Whiting	Demersal	5.2	2021	PA	Maximum sustainable yield	?	?	?	?	?	?
								Precautionary approach	?	?	?	?		

Table A2 Scientific names of species.

Common name	*Species name*
Albacore tuna	*Thunnus alalunga*
Anchovy	*Engraulis* sp.
Anglerfish	*Lophius* sp.
Blackmouth catshark	*Galeus melastomus*
Balearic shearwater	*Puffinus mauretanicus*
Black-bellied anglerfish	*Lophius budegassa*
Black scabbardfish	*Aphanopus carbo*
Blackspot seabream	*Pagellus bogaraveo*
Blue jack mackerel	*Trachurus picturatus*
Blue whiting	*Micromesistius poutassouu*
Boarfish	*Capros aper*
Chub mackerel	*Scomber japonicus*
Clams:	
Solid surf clam	*Spisula solida*
Donax clam	*Donax trunculus*
Razor clam	*Ensis siliqua*
Stipped venus clam	*Chamelea gallina*
Common dolphin (Long-finned)	*Delphis delphinus*
Common guillemot	*Uuria algae*
Cuttlefish	*Sepia officinalis*
European conger	*Conger conger*
European eel	*Anguilla anguilla*
Deepwater rose shrimp	*Parapenaeus longirostris*
Four-spot megrim	*Lepidorhombus boscii*
Hake	*Merluccius merluccius*
Harbour porpoise	*Phocoena phocoena*
Herring	*Clupea harengus*
Horse mackerel	*Trachurus trachurus*
Mackerel	*Scomber scombrus*
Megrim	*Lepidorhombus* sp.
Monkfish	*Lophius* sp.
Norway lobster	*Nephrops norvegicus*
Pilot whale	*Globicephala* sp.
Pollack	*Pollachius pollachius*
Pout	*Trisopterus luscus*
Red mullet	*Mullus* sp.
Sandy ray	*Leucoraja circularis*
Sardine	*Sardina pilchardus*
Sea bass	*Dicentrarchus labrax*
Sole	*Solea solea*
Undulate ray	*Raja undulata*
White anglerfish	*Lophius piscatorius*
Whiting	*Merlangius merlangus*

Table A3 Métier categories used in the Iberian waters mixed-fisheries analysis.

Acronym	Definition	Description
GNS_DEF_> = 100_0_0	Set gillnet targeting demersal fish with mesh sizes > 100 mm	Spanish set gillnet ("*rasco*") targeting white anglerfish in ICES Division 8.c with a mesh size of 280 mm
GNS_DEF_0_0_0	Set gillnet targeting demersal fish	Artisanal Portuguese fleet using set gillnets
GNS_DEF_60-79_0_0	Set gillnet targeting demersal fish with mesh sizes 60–79 mm	Spanish small set gillnet ("*beta*") targeting a variety of demersal fish in northwestern Spanish waters
GNS_DEF_80-99_0_0	Set gillnet targeting demersal fish with mesh sizes 80–99 mm	Spanish set gillnet ("*volanta*") targeting hake with nets of 90 mm mesh size in northwestern Spanish waters
GTR_DEF_0_0_0	Trammelnet targeting demersal fish	Artisanal Portuguese fleet using trammelnets
GTR_DEF_60-79_0_0	Trammelnet targeting demersal fish with mesh sizes 60–79 mm	Spanish trammelnet targeting a variety of demersal species in northwestern Spanish waters
LLS_DEF_0_0_0	Set longline targeting demersal fish	Spanish set longline targeting a variety of demersal fish in Spanish Iberian waters
MIS_MIS_0_0_0_HC	Miscellaneous	Portuguese and Spanish artisanal fleet not covered by other métiers
OTB_CRU_> = 55_0_0	Bottom otter trawl targeting crustaceans, with mesh sizes > 55 mm	Portuguese bottom otter trawl targeting *Nephrops* and rose shrimp