6.2 Bay of Biscay and Iberian Coast ecoregion – Fisheries overview, including mixed-fisheries considerations

Table of contents

Executive summary

This fisheries overview contains details of mixed-fisheries considerations for the Bay of Biscay and Iberian waters demersal stocks, as well as a description of the fisheries and their interactions within the ecoregion.

As examples of these mixed-fisheries considerations, eight scenarios are presented of fishing opportunities for five stocks fished within ICES divisions 8.c and 9.a: black anglerfish (ank.27.8c9a), hake (hke.27.8c9a), four-spot megrim (lbd.27.8c9a), megrim (meg.27.8c9a), and white anglerfish (mon.27.8c9a). The single-stock advice for those species is also taken into account. The mixed-fisheries projections show that for 2020 the limiting stock for fishing opportunities is hake; black anglerfish, conversely, is the least limiting stock.

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 the UK. The most common gear used in the area is bottom trawls that 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, 71 stocks are evaluated by ICES for spawning-stock biomass (SSB) size and fishing pressure. Twenty-two stocks have been evaluated against maximum sustainable yield (MSY) or precautionary approach (PA) reference points for fishing mortality, and 72% of these are fished below F_{MSY}. Only 22 stocks have been evaluated against biomass reference points, of which 72% are at or above MSY $B_{trigger}$.

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, aimed at reducing the impact of fishing on the ecosystem.

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:

- 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. Deepwater currents composed of Mediterranean water have a strong influence on the southwest Iberian and Gulf of Cadiz circulation patterns.

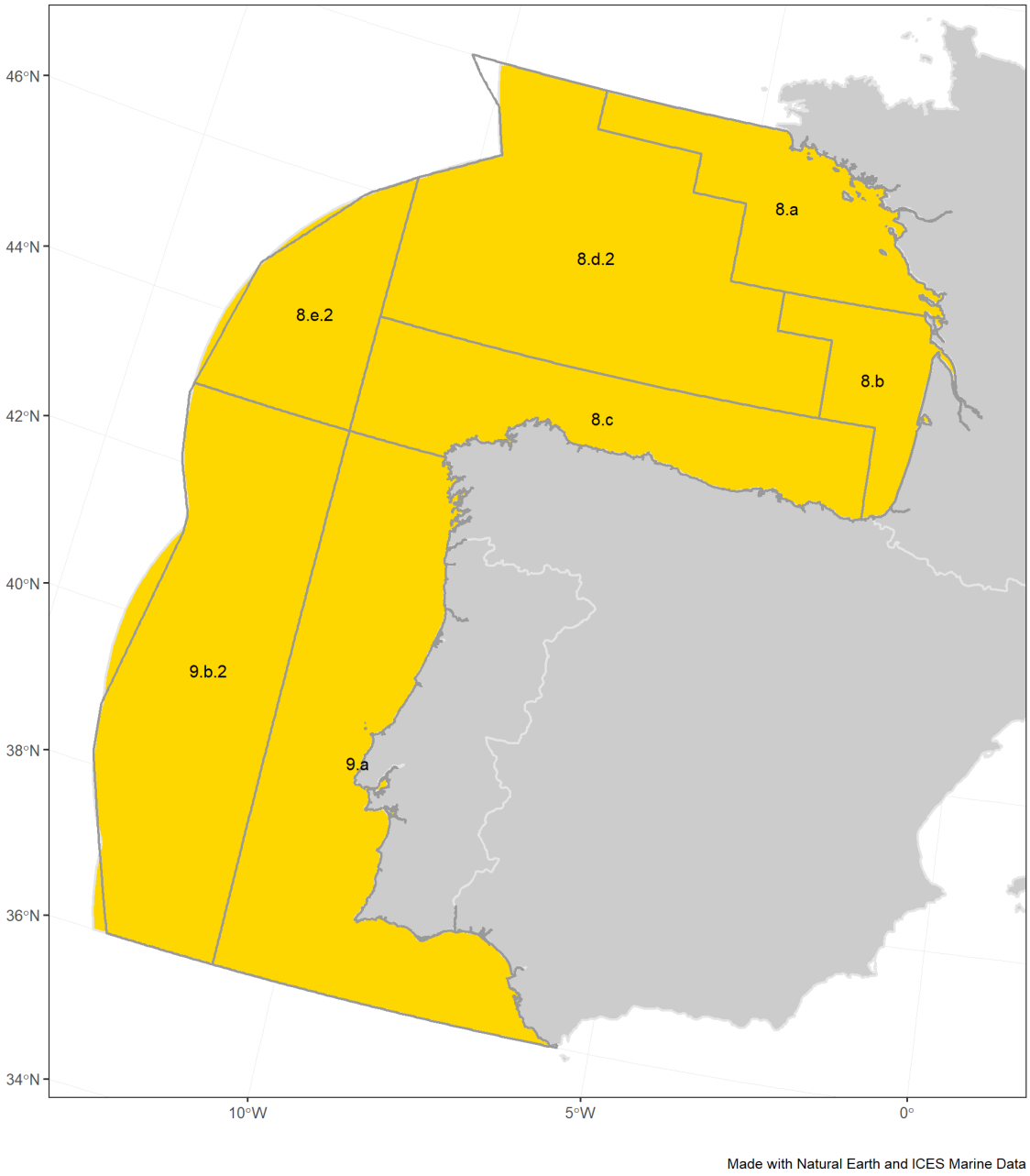


Figure 1 The Bay of Biscay and Iberian Coast ecoregion (highlighted in yellow) and ICES statistical areas.

Mixed-fisheries considerations Bay of Biscay

Mixed-fisheries considerations are based on the single-stock assessments combined with knowledge of the species composition in Bay of Biscay fishery catches. Mixed-fisheries scenarios are based on central assumptions that fishing patterns and catchability for individual fleets remain the same in 2020 and 2021 as in the most recent year (similar to procedures in single-stock forecasts).

Ten example scenarios of fishing opportunities considering mixed fisheries are presented (Figure 2), taking into account the single-stock advice for fisheries catching black anglerfish (ank.27.78abd), seabass (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), thornback ray (rjc.27.8), cuckoo ray (rjn.27.678abd), undulate ray (rju.27.8ab), smooth-hound (sdv.27.nea), sole (sol.27.8ab), and whiting (whg.27.89a). Without specific mixed-fisheries management objectives, ICES cannot recommend any specific scenario.

Mixed-fisheries projections for 2021 are presented in terms of catch. There is no single stock that restricts all fleets. However, horse mackerel and undulate ray are restrictive for 13 fleets out of 24, corresponding to an undershoot of the advised catch for the other stocks considered in the mixed-fisheries analysis. Conversely, smooth-hound, Norway lobster and both anglerfishes are the least limiting stocks, corresponding to an overshoot of the advised catch for the other considered stocks.

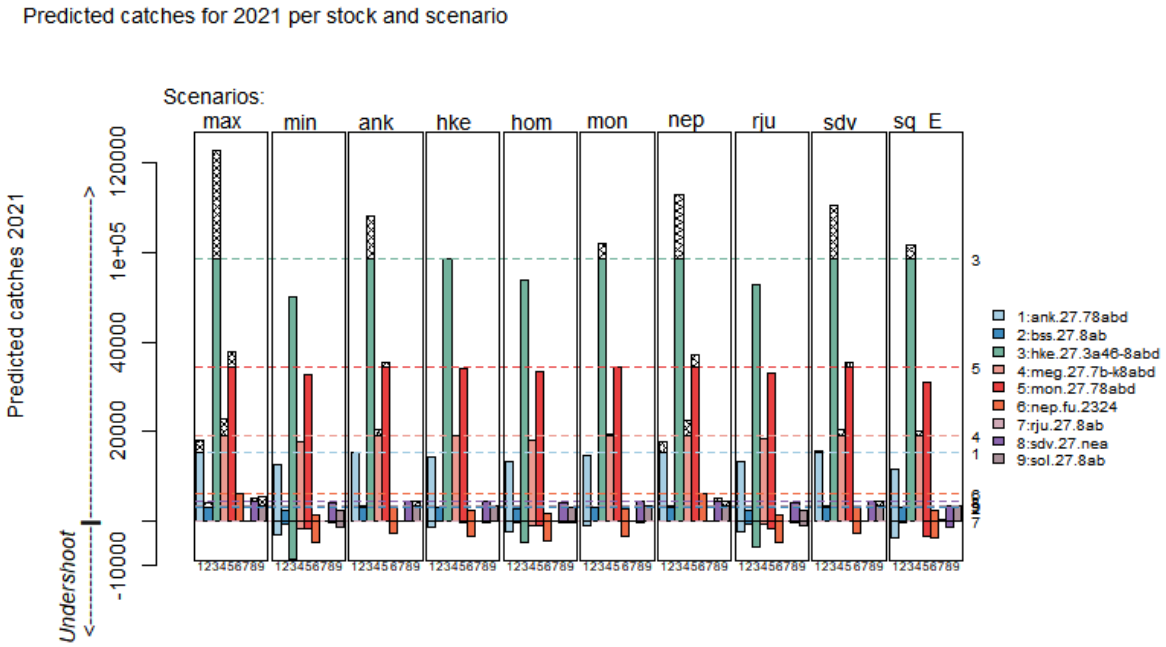


Figure 2 Mixed-fisheries projections for the Bay of Biscay. Estimates of potential catches (in tonnes) by stock and scenario (described in Table 1). The horizontal lines correspond to the single-stock advice. The columns below the value of zero show undershoot (compared to single-stock advice) where catches are predicted to be lower when applying the scenario. Hatched columns above zero represent catches overshooting the single-stock advice. Only stocks considered the most relevant due to their impact on fleet activity are shown.

The scenarios

Table 1 Mixed fisheries for the Bay of Biscay. Scenarios.

	Scenario
max	**"Maximum":** For each fleet, fishing stops when all stocks have been caught up to the fleet's stock shares *. This option causes overfishing of the single-stock advice possibilities for most stocks.
min	**"Minimum":** For each fleet, fishing stops when the catch for any one of the stocks meets the fleet's stock share *. This option is the most precautionary, causing underutilization of the single-stock advice possibilities of other stocks.
ank	**"Black anglerfish PA approach":** All fleets set their effort corresponding to their black anglerfish quota share, regardless of other catches.
hke	**"Hake MSY approach":** All fleets set their effort corresponding to their hake quota share, regardless of other catches.
hom	**"Horse mackerel MSY approach":** All fleets set their effort corresponding to their horse mackerel quota share, regardless of other catches. **
mon	**"White anglerfish MSY approach":** All fleets set their effort corresponding to their white anglerfish quota share, regardless of other catches.

	Scenario
nep	**"Norway lobster MSY approach":** All fleets set their effort corresponding to their Norway lobster quota share, regardless of other catches.
rju	**"Undulate ray PA approach":** All fleets set their effort corresponding to their undulate ray quota share, regardless of other catches.
sdv	**"Smooth-hound PA approach":** All fleets set their effort corresponding to their smooth-hound quota share, regardless of other catches.
sq_E	**"*Status quo* effort":** The effort is set equal to the average effort in the most recent three years recorded for which landings and discard data are available (2017– 2019).

***** Throughout this document, the term "fleet's stock share" or "stock share" is used to describe the share of the fishing opportunities for each particular fleet, which has been calculated based on the single-stock advice for 2020 and the historical proportion of the stock landings taken by the fleet.
** Horse mackerel is a potential choke species for some of the fleets included in the analysis. However, the quota-share of the fishery is lower than 1%.

Catch scenarios

Mixed-fisheries advice considers the implications of mixed-fisheries operating under single-stock catch limits, taking into account the fishing pattern and catchability of the various fleets in recent years (2017– 2019). The scenarios, therefore, do not assume any amount of quota balancing through adaptation of fishing behaviour. Scenarios that result in under- or overutilization are useful in identifying the main mismatches between the fishing opportunities of the various stocks. They indicate the direction in which fleets may have to adapt to fully utilize their catch opportunities.

Catch, fishing mortality, and SSB for each scenario in Table 1 are presented in tables 2, 3, and 4, respectively. The "min" scenario is based on the assumption that the fishery stops for a fleet when any of the stock quotas is exhausted, representing a full implementation of the EU's landings obligation. For 2021, the results in none of the scenarios are similar to the "min" scenario, indicating that the limiting stock varies from fleet to fleet. The horse mackerel ("hom") and undulate ray ("rju") scenarios generate the highest loss of fishing opportunities, indicating that they are among the most limiting stocks.

The "max" scenario is included to demonstrate the upper bound of potential fleet effort and stock catches, because it assumes all fleets continue fishing until all their stock shares are exhausted, irrespective of economic viability, legality, or fleet capacity. For 2021, the results in none of the scenarios are similar to the "max" scenario, indicating that the least limiting stock varies from fleet to fleet. Norway lobster ("nep"), the anglerfishes ("ank" and "mon"), and smooth-hound ("sdv") scenarios generate the highest overshooting of the TACs, indicating that they are among the less limiting stocks.

Undulate ray is estimated to be the most limiting stock in the Bay of Biscay mixed-fisheries model. The catch advice for this stock has remained constant since 2018. For 2021, assuming a strictly implemented landing obligation (corresponding to the "min" scenario), the undulate ray ("rju") scenario is estimated to constrain ten out of 24 fleet segments (Figure 4). Horse mackerel is the next most limiting stock, constraining three fleet segments (Figure 4). Conversely, in the "max" scenario, smooth-hound, seabass, and Norway lobster would be the least limiting for eight, four, and four fleet segments, respectively.

The *status quo* "sq_E" scenario sets the effort of each fleet in 2020 and in 2021 equal to the average of the effort in the most recently recorded three years for which data are available (2017– 2019). This scenario investigates the mixed-fisheries outcomes if the situation remains the same in terms of total effort and effort allocation among métiers. This situation presents a potential 2021 TAC overshoot for hake, megrim, whiting, and thornback and undulate rays.

Horse mackerel and mackerel are included in these analyses as they are potential choke species for some fleets. However, catches taken by these fleets represent very low proportions of the overall catches from these stocks, so the impact of these fleets on the dynamics of the stocks of mackerel and horse mackerel is negligible.

Table 2 Mixed-fisheries scenarios for the Bay of Biscay. Catch scenarios for 2021 for single-stock advice (in tonnes) and mixed-fisheries scenarios (see Figure 1 and Table 1).

Stock*	Single-stock catch advice 2021	Catches per mixed-fisheries scenario 2021									
		max	min	ank	hke	hom	mon	nep	rju	sdv	sq_E
ank.27.78abd	15551	18270	12596	15551	14298	13272	13797	17744	13216	15654	11697
bss.27.8ab**	3108	4085	2358	3414	3020	2673	3162	3596	2389	3615	2961
hke.27.3a46-8abd	98657	122758	90290	108259	98657	93811	103332	112999	92950	110511	101720
meg.27.7b-k8abd**	19184	22995	17626	20404	19264	18234	19763	22585	18394	20497	20050
mon.27.78abd**	34579	37784	32820	35499	34314	33514	34579	37199	33041	35520	31147
nep.fu.2324**	6105	6108	1520	3380	2579	1736	2941	6105	1522	3418	2552
rjc.27.8	389	407	374	403	392	384	398	394	394	406	471
rjn.27.678abd	3150	3186	3074	3177	3138	3110	3157	3146	3146	3186	2985
rju.27.8ab	202	221	202	213	209	205	211	217	202	215	307
sdv.27.nea	4626	5090	4209	4617	4437	4288	4511	5038	4219	4626	3456
sol.27.8ab**	3483	5486	2340	4521	3409	3208	3744	4563	2352	4653	3457
whg.27.89a	2276	3822	1641	2794	2361	1870	2523	3386	1703	3044	2356

* Advised catches of no more than the indicated value.

** Single-stock advice based on F ranges in accordance with the EU multiannual plan (MAP) for demersal stocks in the western waters (EU, 2019). The value presented here is for catches corresponding to F_{MSY}.

Table 3 Mixed-fisheries scenarios for Bay of Biscay. TAC year (2021) fishing mortality forecast by scenario (see Figure 1 and Table 1).* The F range is averaged across the same ages as those used for the single-stock assessment.

Stock	Single-stock advice F(2021)	Basis for the advice	F per mixed-fisheries scenario in 2021									
			max	min	ank	hke	hom	mon	nep	rju	sdv	sq_E
bss.27.8ab	0.123	MSY approach	0.162	0.093	0.135	0.120	0.106	0.123	0.142	0.095	0.143	0.117
hke.27.3a46-8abd	0.26	MSY approach	0.324	0.238	0.285	0.260	0.247	0.269	0.298	0.245	0.291	0.268
meg.27.7b-k8abd	0.191	MSY approach	0.229	0.175	0.203	0.192	0.182	0.195	0.225	0.183	0.204	0.200
mon.27.78abd	0.28	MSY approach	0.306	0.266	0.287	0.278	0.271	0.280	0.301	0.268	0.288	0.252
sol.27.8ab	0.33	MSY approach	0.520	0.222	0.428	0.323	0.304	0.342	0.432	0.223	0.441	0.328

* Not presented for category 3 stocks or Norway lobster.

Legend

$F_{2021} \leq F_{MSY}$

$F_{2021} > F_{MSY}, < F_{pa}$

$F_{2021} > F_{pa}$

$F_{2021} > F_{lim}$

Table 4 Mixed-fisheries for the Bay of Biscay. Spawning-stock biomass (SSB) results from single-stock advice and different mixed-fisheries scenarios (see Figure 1 and Table 1).* Weights are in tonnes.

Stock	Single-stock advice SSB 2022	SSB (2022) resulting from mixed-fisheries scenarios applied in 2021									
		max	min	ank	hke	hom	mon	nep	rju	sdv	sq_E
bss.27.8ab	16964	16958	18327	17490	17802	18078	17731	17346	18302	17331	17849
hke.27.3a46-8abd	249402	234841	267951	249663	259519	264401	255878	244891	265261	247357	256354
meg.27.7b-k8abd	115734	112117	118594	115379	116812	117943	116373	112629	117755	115263	115825
mon.27.78abd	80416	66906	71907	69654	70924	71456	70741	67511	71731	69630	72978
sol.27.8ab	12759	10720	14303	11819	13085	13315	12860	11772	14289	11668	13030

* Not presented for category 3 stocks.

Legend

$SSB_{2022} > B_{pa}$ or MSY $B_{trigger}$

$SSB_{2022} > B_{lim}$, no B_{pa} defined

$SSB_{2022} > B_{lim}$

$SSB_{2022} < B_{lim}$

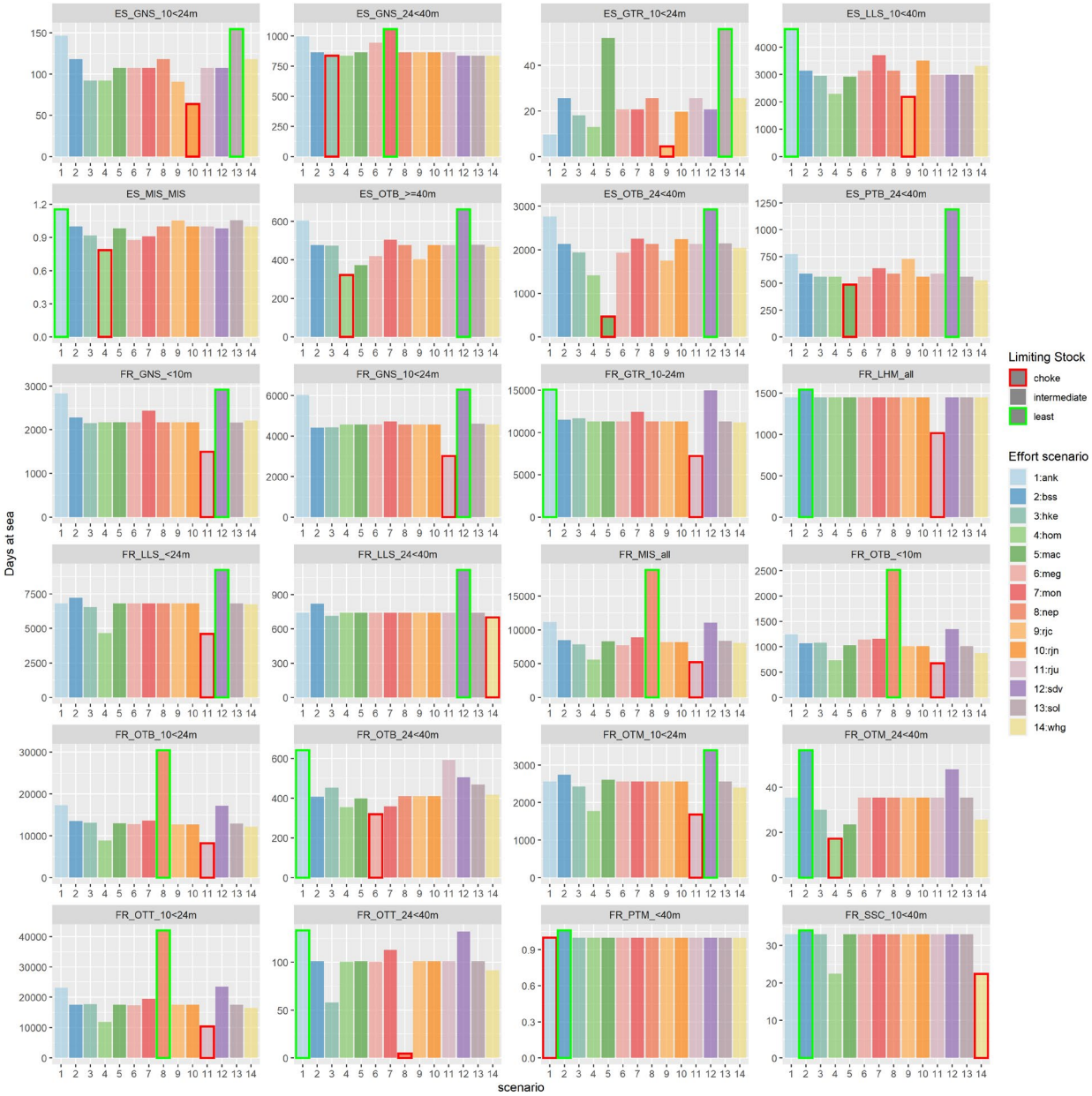


Figure 3 Mixed-fisheries for the Bay of Biscay. Estimates of effort by fleet needed to reach the advice for the single stocks. The bars highlighted in red correspond to the most limiting species for that fleet in 2021 (choke species), whereas the bars highlighted in green correspond to the least limiting species. Fleet names are given by country (FR = France, SP = Spain) and by combinations of main gear and vessel size differing across countries and based on homogeneous average fishing patterns. Vessels in the various fleet segments can engage in several fisheries (métiers) over the year.

Quality considerations

There are some differences between the single-stock fishing mortality and SSB values from single-stock short-term forecast and the values obtained from the mixed-fisheries scenarios, where all fleets are considered to set their effort corresponding to their quota shares for each given species. For fishing mortality, the difference is around 7% for monkfish, 5% for hake, and lower for the rest of the stocks. For SSB, the difference for hake and seabass was around 5%; for the rest of the stocks it was lower than 5%. Differences are to be expected for hake because the length-based seasonal models used in the stock assessments are approximated with annual age-based models in the mixed-fisheries analysis.

A key assumption in the projections is that catchability by stock and métier and effort distribution (relative proportion of time spent by each fleet in the various métiers) in 2020 and 2021 remain constant at their recent mean level (20172019). In reality, fishing patterns may change over time – particularly in response to significant changes in policy, such as the implementation of the landing obligation and revision of technical measures. In practice, such changes could affect the outcomes of mixed-fisheries projections. The year range used as a recent mean (2017–2019) covers the period during which the EU landing obligation has been introduced so the data reflect changes in fishing pattern over this period. It has not been possible to predict further changes in fishing pattern over the projection period.

Methods and data

Mixed-fisheries considerations are based on the single-stock assessments combined with knowledge of the species composition in the Bay of Biscay fishery catches. Mixed-fisheries scenarios are based on central assumptions that fishing patterns and catchability for individual fleets remain the same in 2020 and 2021 as in the most recent year.

The species considered here as part of the Bay of Biscay demersal mixed-fisheries are black anglerfish, seabass, hake, horse mackerel, mackerel, megrim, white anglerfish, Norway lobster, thornback ray, cuckoo ray, undulate ray, smooth-hound, sole, and whiting. The projections are presented in terms of catch. The reference points for the included stocks can be found in the single-stock advice sheets, and the 2019 relative catch distribution is shown by métier in Figure 5. In the analysis, the catch and effort for category 3 stocks is forecasted under the assumption that the product of the catchability and biomass in the forecast years (2020 and 2021) can be approximated by the mean of the product in the historical years (2017–2019) (ICES, 2018). In the historical years the product of catchability and biomass can be calculated at métier level using the catch and effort data available at métier level and assuming catch is equal to the product of catchability, biomass, and effort.

Total landings (2019) of all species considered in the mixed-fisheries advice in the Bay of Biscay demersal fishery were 37 737 tonnes, with:

- ~ 41% by otter trawls;
- ~ 27% by gill- and trammelnets;
- ~ 12% by set longlines;
- ~ 7% by pairtrawls; and
- ~ 14% by a miscellaneous group of gears.

Total discards were 4698 tonnes (11% by weight of total catch).

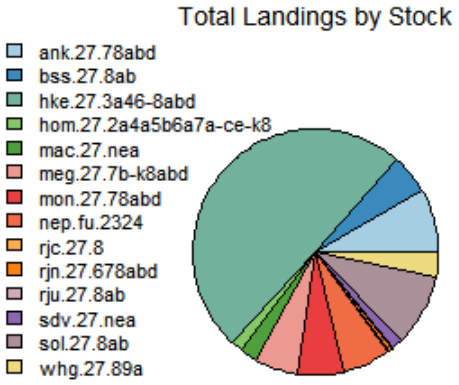


Figure 4 Mixed-fisheries for the Bay of Biscay. Catch distribution by species: < 1% ank.27.7abd, < 1% bss.27.8ab, 7% hke.27.3a46-8abd, 11% hom.27.2a4a5b6a7a-ce-k8, 8% mac.27.nea, 1% meg.27.7b-k8abd, 2% mon.27.78abd, < 1% nep.fu2324, < 1% rjc.27.8, < 1% rjn.27.678abd, < 1% rju.27.8ab, < 1% sdv.27.nea, < 1% sol.27.8ab, < 1% whg.27.89a.

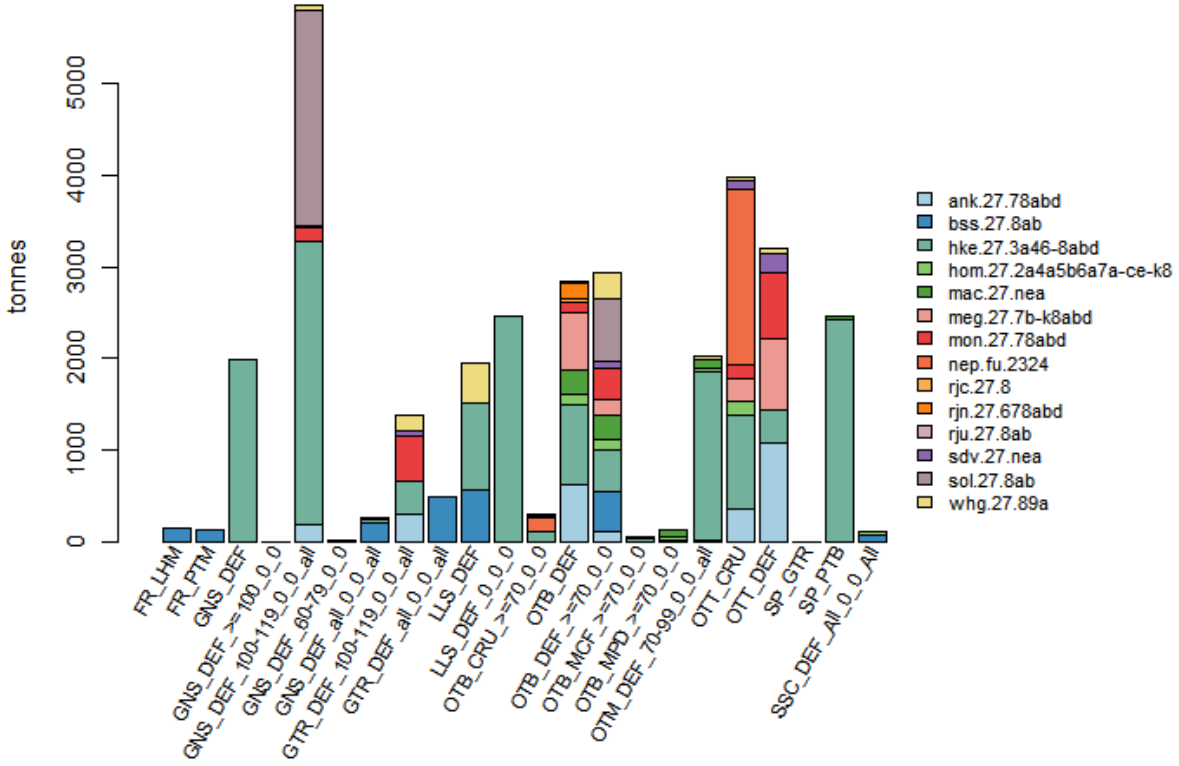


Figure 5 Mixed-fisheries for the Bay of Biscay. Description of the distribution of species landed by métier in 2019. The métiers used are described in Table 4, according to the group of target species and the technical characteristics of the fishing gear.

There are 22 métiers used in the mixed-fisheries analysis, according to the group of target species and the technical characteristics of the fishing gear. With respect to the fleet segments used in the mixed-fisheries analysis, these were defined combining the country and the fishing gear group.

Table 4 Bay of Biscay mixed-fisheries. Métier categories used in the analysis.

Acronym	Definition
FR_LHM	Handline
FR_PTM	Twin otter trawl directed to demersal fish
GNS_DEF	Set gillnet targeting demersal fish
GNS_DEF_> = 100_0_0	Set gillnet targeting demersal fish with mesh sizes > 100 mm
GNS_DEF_100-119_0_0_all	Set gillnet targeting demersal fish with mesh sizes > 100 mm
GNS_DEF_60-79_0_0	Set gillnet targeting demersal fish with mesh sizes 60–79 mm
GNS_DEF_all_0_0_all	Set gillnet targeting demersal fish
GTR_DEF_100-119_0_0_all	Trammelnet targeting demersal fish with mesh sizes > 100 mm
GTR_DEF_all_0_0_all	Trammelnet targeting demersal fish
LLS_DEF	Set longline targeting demersal fish
LLS_DEF_0_0_0	Set longline targeting demersal fish
OTB_CRU_> = 70_0_0	*Nephrops* bottom otter trawl with mesh sizes ≥ 70 mm)
OTB_DEF	Bottom otter trawl directed to demersal fish
OTB_DEF_> = 70_0_0	Bottom otter trawl directed to demersal fish with mesh sizes ≥ 70 mm)
OTB_MCF_> = 70_0_0	Bottom otter trawl directed to mixed cephalopods and demersal fish with mesh sizes ≥ 70 mm)
OTB_MPD_> = 70_0_0	Bottom otter trawl directed to mixed pelagic and demersal fish with mesh sizes ≥ 70 mm)

OTM_DEF_70-99_0_0_all	Medium water otter trawl directed to demersal fish with mesh sizes 70–99 mm
OTT_CRU	*Nephrops* twin otter trawl
OTT_DEF	Twin otter trawl directed to demersal fish
SP_GTR	Spanish trammelnet
SP_PTB	Spanish bottom pair trawl directed to demersal fish with mesh sizes ≥ 70 mm)
SSC_DEF_All_0_0_All	Fly shooting seine

Table 5 Mixed-fisheries for the Bay of Biscay. The basis of the assessment.

ICES stock data categories	1, 3, 5, and 6 (ICES, 2019a).
Assessment type	FLBEIA (FLR) (Garcia *et al.*, 2017; ICES, 2018).
Input data	Assessments on the relevant stocks by the Working Group for the Bay of Biscay and Iberian Coast Ecoregion (ICES, 2020a), Working Group on Elasmobranch Fishes (ICES, 2020b) and Working Group on Widely Distributed Stocks (ICES, 2020c); catch and effort by fleet and métiers.
Discards and bycatch	Included for both anglerfishes, hake, megrim, and whiting as in the respective single-stock assessments.
Indicators	None.
Other information	This assessment was presented for the first time in ICES advice in 2020.
Working groups	Working Group for the Bay of Biscay and the Iberian Coast Ecoregion (WGBIE), Working Group on Elasmobranch Fishes (WGEF), Working Group on Widely Distributed Stocks (WGWIDE), and Working Group on Mixed Fisheries Advice (WGMIXFISH-ADVICE)

Issues relevant for the advice

The model includes two stocks (mon.27.78abd and meg.27.7b-k8abd) that are also included in the mixed fisheries advice for the Celtic Sea. Catches of these stocks outside of the Bay of Biscay are included in the model as an "OTH" fleet and are subject to the same fleet behaviour assumptions ('min', 'max' etc…) as the other fleets. This may create some inconsistencies between the scenarios for the Celtic Sea and Bay of Biscay for these stocks; in future years consideration will be given to splitting the presented catch advice between the respective areas.

Catches of two large pelagic stocks (horse mackerel and mackerel) are included in the data for these analyses. These are minor compared to overall catches of these stocks so have negligible impact on the dynamics of these stocks.

Mixed-fisheries considerations Iberian waters

Summary

Mixed-fisheries considerations are based on the single-stock assessments combined with knowledge of the species composition in the fishery catches of Atlantic Iberian waters. Mixed-fisheries scenarios are based on central assumptions that fishing patterns and catchability for individual fleets remain the same in 2020 and 2021 as in recent years (similar to procedures in single-stock forecasts, where growth and selectivity are assumed constant).

Eight example scenarios of fishing opportunities considering mixed-fisheries are presented (Figure 6 and Table 6), in comparison with the single-stock advice for black anglerfish (ank.27.8c9a), hake (hke.27.8c9a), four-spot megrim (lbd.27.8c9a), megrim (meg.27.8c9a), and white anglerfish (mon.27.8c9a). Without specific mixed-fisheries management objectives, ICES cannot recommend any specific scenario(s).

Mixed-fisheries projections for 2021 are presented in terms of catch. The limiting stock for fishing effort will be the hake stock, corresponding to an undershoot of the advised catch for the other stocks considered in the mixed-fisheries analysis. Conversely, anglerfish stocks are the least limiting stocks, corresponding to an overshoot of the advised catch for the other considered stocks.

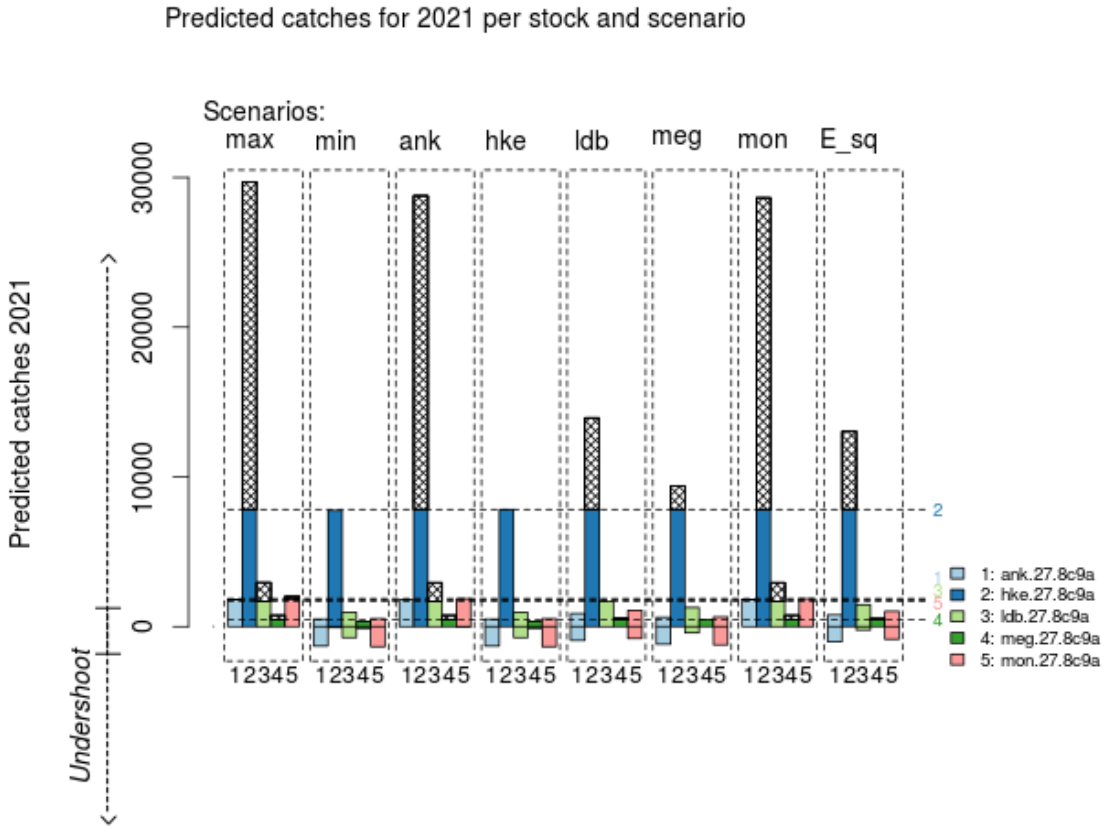


Figure 6 Mixed fisheries for the Atlantic Iberian waters. Predicted catches (in tonnes) by stock and scenario (described in Table 1). Horizontal lines correspond to the single-stock advice. Bars below the value of zero show undershoot (compared to single-stock advice) where catches are predicted to be lower when applying the scenario. Hatched columns represent catches in overshoot of the single-stock advice.

The scenarios

Table 6 Mixed fisheries scenarios for the Atlantic Iberian waters.

	Scenarios
max	**"Maximum":** For each fleet, fishing effort in 2021 stops when all stocks have been caught up to the fleets´ stock shares*. This option causes overshooting of the single-stock advice possibilities for most stocks.
min	**"Minimum":** For each fleet, fishing effort in 2021 stops when the catch of any of the stocks meets the fleets' stock share*. This option is the most precautionary option, causing underutilization of the single-stock advice possibilities of other stocks.
ank	**"Black anglerfish":** All fleets set their effort in 2021 corresponding to their black anglerfish quota share, regardless of other catches.
hke	**"Hake":** All fleets set their effort in 2021 corresponding to their hake quota share, regardless of other catches.
ldb	**"Four-spot megrim":** All fleets set their effort in 2021 corresponding to their four-spot megrim quota share, regardless of other catches.
meg	**"Megrim":** All fleets set their effort in 2021 corresponding to their megrim quota share, regardless of other catches.
mon	**"White anglerfish":** All fleets set their effort in 2021 corresponding to their white anglerfish quota share, regardless of other catches.
sq_E	***"Status quo* effort":** The effort is set equal to the average effort in the most recent three years recorded for which landings and discard data are available (2017–2019).

***** Throughout this document, the term "fleet´s stock share" or "stock share" is used to describe the share of the fishing opportunities for each particular fleet, which has been calculated based on the single-stock advice for 2020 and the historical proportion of the stock landings taken by the fleet.

Catch scenarios

Mixed-fisheries advice considers the implications of mixed fisheries operating under single-stock catch limits, taking into account the fishing pattern and catchability of the various fleets in recent years. The scenarios therefore do not assume any adaptation of fishing behaviour. Scenarios that result in under- or overutilization are useful in identifying the main mismatches between the fishing opportunities of the various stocks. They indicate the direction in which fleets may have to adapt to fully utilize their catch opportunities.

Catch, fishing mortality, and SSB for each scenario described in Table 1 are presented in tables 7, 8, and 9, respectively. The scenarios are based on the assumption of a strictly implemented discard ban. For 2021, the "min" scenario results are very similar to those of the "hke" scenario, indicating that hake is the most limiting stock for most fleets. The "max" scenario is included to demonstrate the upper bound of potential fleet effort and stock catches because it assumes all fleets continue fishing until all the stock shares are exhausted, irrespective of the economic viability of such actions. For 2021, the "max" scenario is very similar to the "ank" and "mon" scenarios, indicating that both anglerfish stocks are the least limiting for most fleets. In these scenarios, the F estimates in 2021 are above the F_{MSY} levels for megrim and four-spot megrim. For white anglerfish, the estimated F is above F_{MSY} in the "max" scenario and at F_{MSY} in the "ank" and "mon" scenarios (Table 8).

In 2022, SSB estimates are above MSY $B_{trigger}$ in all scenarios and for all stocks except for megrim (Table 9). The SSB of megrim is estimated to be below MSY $B_{trigger}$ (980 t) in 2022 in scenarios "max", "ank", and "mon". Forecast SSB resulting from the effort of each of the scenarios is presented in Figure 2. SSB estimates for scenarios "min", "hke", "meg", and "sq_E" are similar to the estimates of the single-stock advice. The largest differences were found in scenarios "max", "ank", and "mon", where SSB was estimated to be lower than the single-stock advice because of large TAC overshoot.

Table 7 Mixed-fisheries for the Atlantic Iberian waters. Catch scenarios for 2021 for single-stock advice (in tonnes) and mixed-fisheries scenarios (see Figure 6 and Table 6).

Stock*	Single-stock catch advice 2021	Catches per mixed-fisheries scenario 2021							
		max	min	ank	hke	ldb	meg	mon	sq_E
ank.27.8c9a	1800	1825	510	1800	510	882	627	1812	794
hke.27.8c9a	7825	29699	7772	28770	7825	13942	9384	28633	13040
ldb.27.8c9a**	1690	2946	957	2940	957	1690	1279	2935	1465
meg.27.8c9a**	468	753	349	753	349	559	468	751	534
mon.27.8c9a**	1872	2010	534	1866	534	1087	657	1872	1031

*** Advised catches of no more than the indicated value.**

****Single-stock advice based on F ranges in accordance with the EU multiannual plan (MAP) for demersal stocks in the western waters (EU, 2019). The value presented here is for catches corresponding to F_{MSY}.**

Table 8 Mixed fisheries for Atlantic Iberian waters. TAC year (2021) fishing mortality forecast by scenario (see Figure 6 and Table 6). The F range is averaged across the same ages as those used for the single-stock assessment.

Stock	Single-stock advice F (2021)	Basis for the advice	F per mixed-fisheries scenario in 2021							
			max	min	ank	hke	ldb	meg	mon	sq_E
ank.27.8c9a	na	Precautionary approach	na	na	na	na	na	na	na	na
hke.27.8c9a	na	Precautionary approach	na	na	na	na	na	na	na	na
ldb.27.8c9a	0.19	MSY approach	0.34	0.11	0.34	0.11	0.19	0.15	0.34	0.17
meg.27.8c9a	0.19	MSY approach	0.31	0.14	0.31	0.14	0.23	0.19	0.31	0.22
mon.27.8c9a	0.24	MSY approach	0.26	0.07	0.24	0.07	0.14	0.08	0.24	0.13

na: not applicable

Legend:

	$F_{2021} \leq F_{MSY}$
	$F_{MSY} < F_{2021} < F_{pa}$
	$F_{2021} > F_{pa}$
	$F_{2021} > F_{lim}$

Table 9 Mixed fisheries for the Atlantic Iberian waters. SSB results from single-stock advice and different mixed-fisheries scenarios (see Figure 1 and Table 1). Weights are in tonnes.

Stock	Single-stock advice SSB (2022)	SSB (2022) resulting from mixed-fisheries scenarios applied in 2021							
		max	min	ank	hke	ldb	meg	mon	sq_E
ank.27.8c9a	na	na	na	na	na	na	na	na	na
hke.27.8c9a	na	na	na	na	na	na	na	na	na
ldb.27.8c9a	7955	4724	8708	4736	8708	7851	8331	4744	8114
meg.27.8c9a	2231	824	2304	824	2304	1477	2153	828	1704
mon.27.8c9a	10647	9828	11596	10000	11596	10934	11449	9992	11002

na: not applicable

Legend:

	$SSB_{2022} > B_{pa}$ or MSY $B_{trigger}$
	$SSB_{2022} > B_{lim}$, no B_{pa} defined
	$B_{lim} < SSB_{2022} < B_{pa}$
	$SSB_{2022} < B_{lim}$

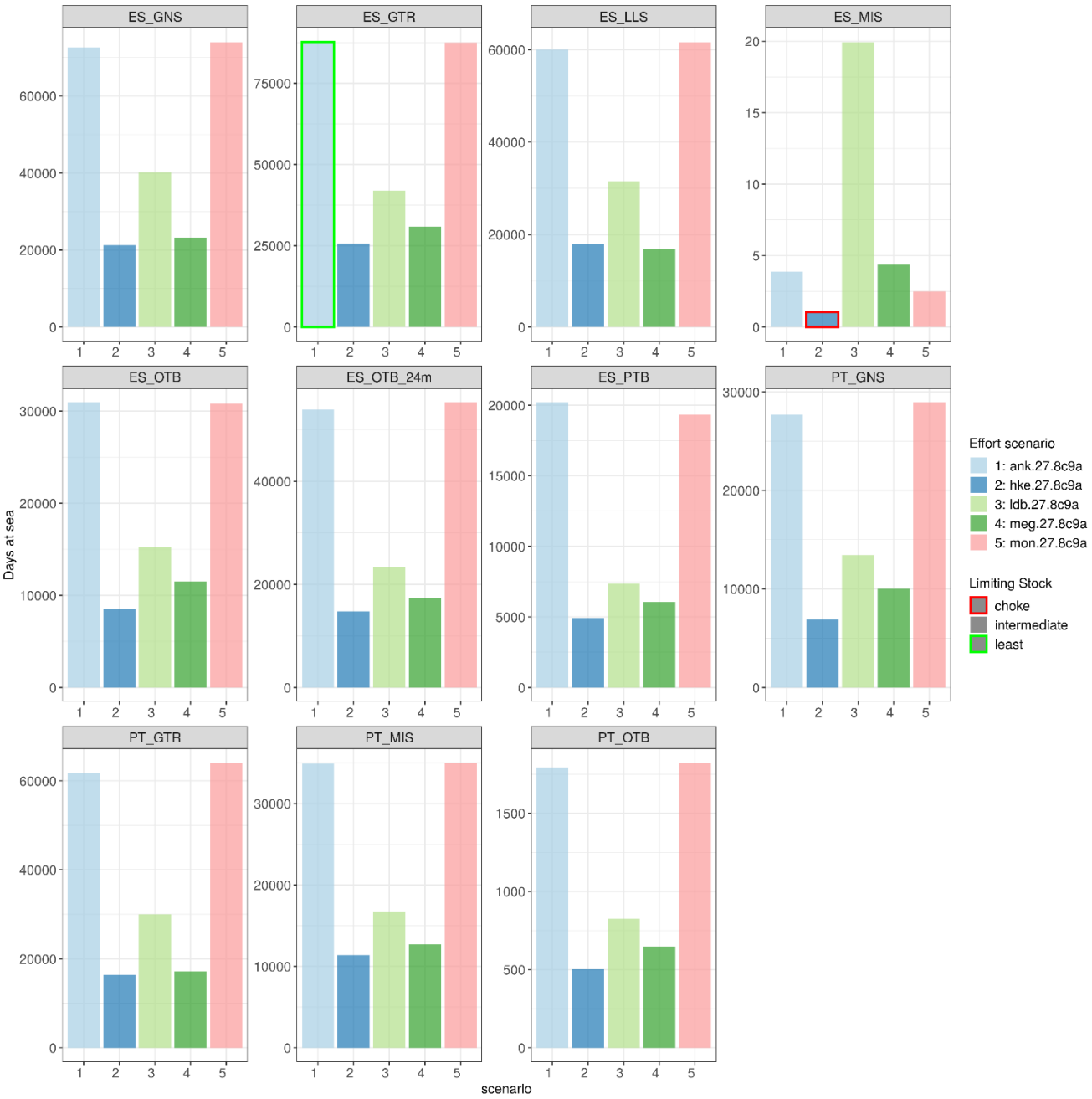


Figure 7 Mixed fisheries for the Atlantic Iberian waters. Estimates of effort by fleet needed to reach the single-stock advices. The bars highlighted in red correspond to the most limiting species for that fleet in 2021 (choke species), whereas the bars highlighted in greencorrespond to the least limiting species. Fleet names are given by country (PT = Portugal, ES = Spain) and by combinations of main gear and vessel size differing across countries and based on homogeneous average fishing patterns. Vessels in the various fleet segments can engage in several fisheries (métiers) over the year.

Quality considerations

To validate the results, the analysis checks to ensure that it can reproduce the single-stock projection without accounting for mixed-fishery effects. This process identified some minor differences between the single-stock catch and SSB values and the values obtained from the mixed-fisheries model. The estimates at the start of the advice year were all consistent with the single-stock forecasts with negligible differences. The largest observed difference was 6% for the SSB of white anglerfish at the start of 2022. All other differences were less than 5%. These differences are considered acceptable for modelling the technical interactions between stocks and fleets in the mixed-fisheries scenarios.

A key assumption in the projections is that catchability by stock and métier and effort distribution (relative proportion of time spent by each fleet in the various métiers) in 2020 and 2021 remain constant at their recent mean level (2017–2019). In reality, fishing patterns may change over time, particularly in response to significant changes in policy, such as the implementation of the EU landing obligation and revision of technical measures. In practice, such changes could affect the outcomes of mixed-fisheries projections. The year range used as a recent mean (2017–2019) covers the period during which the landing obligation has been introduced so the data reflect changes in fishing pattern over this period. It has not been possible to predict further changes in fishing patterns over the projection period.

The-single species assessment for hake, which is now a category 3 stock has been implemented in mixed-fisheries scenarios with the methodology described in ICES, 2018 and ICES, 2020f. This methodology is already in use for black anglerfish but it would be desirable to further develop mixed-fisheries analyses to include stocks without short-term forecasts. Despite the change in stock category for hake, the projected mixed fisheries scenarios resulted in similar trends when compared with last year's advice when the hake was a category 1 assessment.

Methods and data

Mixed-fisheries considerations are based on the single-stock assessments combined with knowledge of the species composition in fishery catches of Atlantic Iberian waters. Mixed-fisheries scenarios are based on central assumptions that fishing patterns and catchability for individual fleets remain the same in 2020 and 2021 as in recent years.

The species considered here as part of the Atlantic Iberian demersal mixed-fisheries are black anglerfish, hake, four-spot megrim, megrim, and white anglerfish. The results are presented in terms of catch (projected landings and projected discards). The reference points for the included stocks (except for hake) can be found in the single-stock advice sheets (ICES, 2020a, 2020b, 2020c, 2020d); the 2020 relative catch composition by species is shown in Figure 8 and the landings by species and métier in Figure 9. In the analysis, the catch and effort of category 3 stocks is forecasted under the assumption that the product of the catchability and biomass in the forecast years (2020 and 2021) can be approximated by the mean of the product in the last three years (2017–2019) (ICES, 2018a, 2019f). In historical years the product of catchability and biomass can be calculated at métier level using the catch and effort data available at métier level assuming catch is equal to the product of catchability, biomass, and effort.

Total landings (2019) of all species considered in the mixed-fisheries advice were 14363 tonnes with:

- ~ 34% landed by otter trawls;
- ~ 33% by gill- and trammelnets;
- ~ 23% by bottom pairtrawls;
- ~ 8% by set longlines; and
- ~ 2% by a miscellaneous group of gears dominated by small-scale vessels.

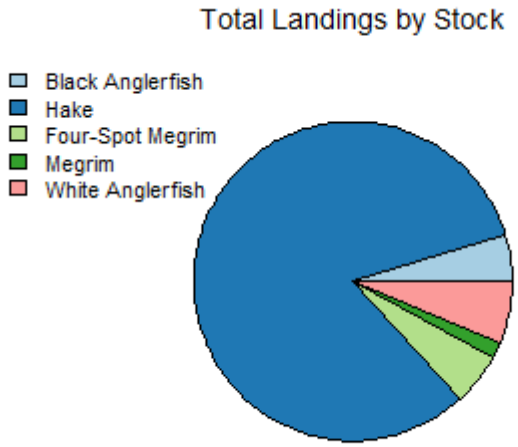


Figure 8 Mixed fisheries for the Atlantic Iberian waters. Catch distribution by species: 5% for black anglerfish, 82% hake, 5% megrim, 2% four-spot megrim, and 6% for white anglerfish.

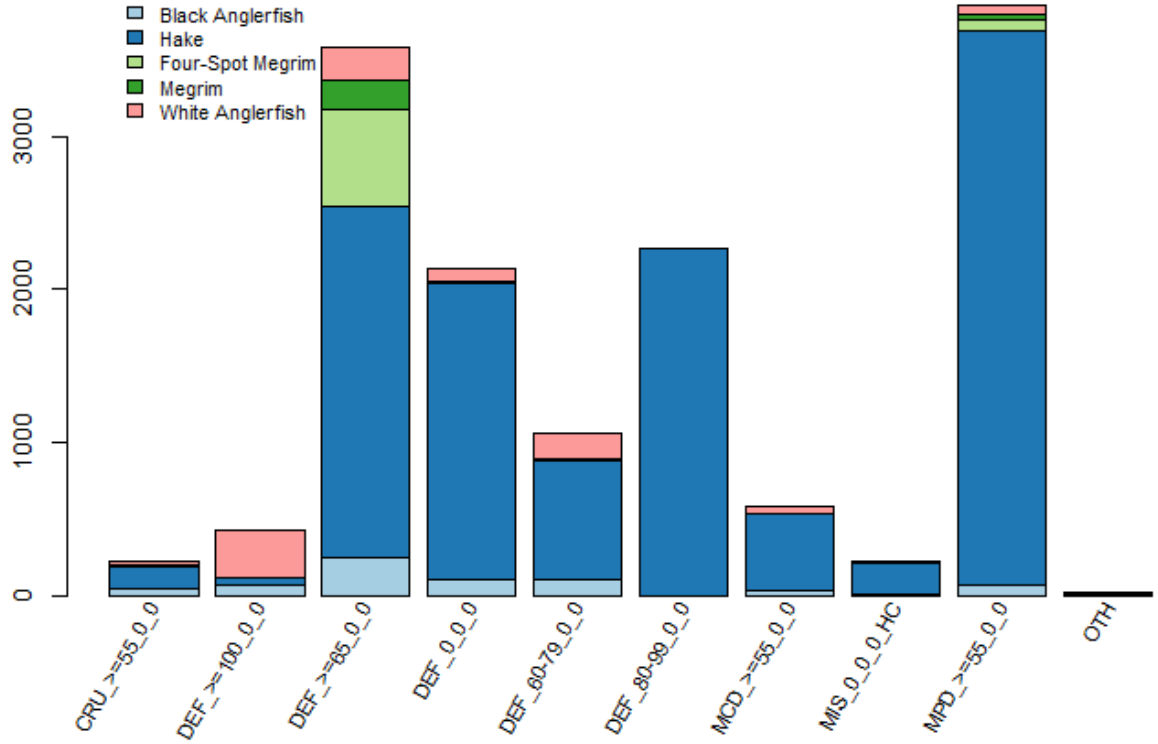


Figure 9 Mixed fisheries for the Atlantic Iberian waters. Description of the distribution of species landed by métier in 2019. The métiers used are the result of regrouping the DCF métiers described in Table 5 according to the target assemblage and the technical characteristics of the fishing gear.

Fleet and métier categories used in the mixed-fisheries analysis are based on the EU Data Collection Framework (DCF) level 6 categories (Table 10) provided by Spain and Portugal. These 14 métiers were regrouped into ten métiers for the mixed-fisheries analysis according to the target assemblage and technical characteristics of the fishing gear. With respect to the fleet segments used in the mixed-fisheries analysis, these were defined combining the country and the fishing gear group.

Table 10 Mixed fisheries for the Atlantic Iberian waters. Métier groupings used in the Iberian Waters mixed-fisheries analysis.

Acronym	DCF definition	Métier grouping
GNS_DEF_> = 100_0_0	Set gillnet targeting demersal fish with mesh sizes > 100 mm	DEF_> = 100_0_0
GNS_DEF_0_0_0	Set gillnet targeting demersal fish	DEF_0_0_0
GNS_DEF_60-79_0_0	Set gillnet targeting demersal fish with mesh sizes 60–79 mm	DEF_60-79_0_0
GNS_DEF_80-99_0_0	Set gillnet targeting demersal fish with mesh sizes 80–99 mm	DEF_80-99_0_0
GTR_DEF_0_0_0	Trammelnet targeting demersal fish	DEF_0_0_0
GTR_DEF_60-79_0_0	Trammelnet targeting demersal fish with mesh sizes within the range of 60–79 mm	DEF_60-79_0_0
LLS_DEF_0_0_0	Set longline targeting demersal fish	DEF_0_0_0
MIS_MIS_0_0_0_HC	Miscellaneous	MIS_0_0_0_HC
OTB_CRU_>=55_0_0	Bottom otter trawl targeting crustaceans, using mesh sizes larger than 55 mm	CRU_>=55_0_0
OTB_DEF_>=55_0_0	Bottom otter trawl targeting demersal fish, using mesh sizes larger than 55 mm	DEF_>=55_0_0
OTB_DEF_>=65_0_0	Bottom otter trawl targeting demersal fish, using mesh sizes larger than 65 mm	DEF_>=65_0_0
OTB_ MCD_>=55_0_0	Bottom otter trawl targeting mixed crustaceans and demersal fish, using mesh sizes larger than 55 mm	MCD_>=55_0_0
OTB_MPD_>=55_0_0	Bottom otter trawl targeting mixed pelagic and demersal fish, using mesh sizes larger than 55 mm	MPD_>=55_0_0
PTB_ MPD _>=55_0_0	Bottom pair trawl targeting mixed pelagic and demersal fish, using mesh sizes larger than 55 mm	MPD_>=55_0_0

Table 11 Mixed fisheries for the Atlantic Iberian waters. The basis of the assessment.

ICES stock data category	1 and 3 (ICES, 2019a).
Assessment type	FLBEIA (FLR) (Garcia *et al.*, 2017; ICES, 2018).
Input data	Assessments on the relevant stocks by the Working Group on the Bay of Biscay and Iberian Waters Ecoregion (ICES, 2020e); catch and effort by fleet and métiers.
Discards and bycatch	Included for hake and both megrims as in the respective single-stock assessments.
Indicators	None.
Other information	None.
Working groups	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE) and Working Group on Mixed Fisheries Advice (WGMIXFISH-ADVICE).

Issues relevant for the advice

A limitation of this work is that historical catch shares by fleet are used as an indication of quota shares by country. This may be overly restrictive for countries that do not catch all of their quota. In this case the model results may indicate that the relevant quotas will be more limiting than is the case in practice.

In these mixed-fishery analyses, all scenarios apart from the "hke" and "min" scenarios, are indicated to lead to the single-stock catch advice being exceeded. The other scenarios could lead to compliance issues in the context of the EU's landing obligation.

The present analysis includes only five stocks. Other species are caught in these fisheries and could influence fishing activity. Further stocks may be included in the future.

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 10).

Portugal

The fleet is comprised of otter trawls, purse-seine, deep-water longline, and small-scale fisheries; 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 to 800 m, while 55 catch finfish in waters shallower than 500 m. The majority of the vessels are between 18 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 and 100 m, and traditionally target sardine. The fleet comprises around 150 vessels, between 9 and 27 m in overall length. They contribute to more than 50% of the total catch, and mainly harvest sardine, chub mackerel, anchovy, horse mackerel, and blue jack mackerel.

The small-scale fishery is composed of around 2000 vessels smaller than 12 m in length, operating within 30 miles of the Portugese coast. They are licensed for several gears, namely gillnet (80 mm mesh size), trammelnet (100 mm mesh size), hand- and longlines, pots and dredges, small purse-seines, and other gears. This small-scale fleet catches, among others, hake, anglerfish, octopus, pout, horse mackerel and clams.

A deep-water longline fleet, composed of 15 vessels with an average of 20 m length, operates offshore at the slope 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. 71% 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, nephrops, sardines, cuttlefish, albacore, squids, pollack, and anchovy.

Spain

There are around 4500 vessels in this fleet, operating mainly in the Northern Spanish waters. The fleet comprises artisanal vessels, trawlers, purse-seiners, demersal longliners, and gillnetters. Around 4000 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 are targeting mackerel, clams and octopus. The trawlers (75 vessels of 29 m average length) use bottom- and pairtrawl to target horse mackerel, mackerel, blue whiting, and hake. The purse-seiners (250 vessels of 22 m average length) target mackerel, anchovy, horse mackerel, and sardine. The demersal longliners (55 vessels of 16 m average length) target hake as main species, as well as European conger. The gillnetters (65 vessels of 18 m average length) catch mainly hake and anglerfish.

Around 700 vessels operate mainly in the Gulf of Cadiz Spanish waters. The fleet comprises artisanal vessels, trawlers, and purse-seiners. Around 500 vessels are operating in the artisanal fishery (of 9 m average length) using artisanal gears including dredges, trammelnets, gillnets, bottom longline, and handline; they are targeting blackspot seabream, stripped venus, octopus and cuttlefish. The trawlers (130 vessels of 19 m average length) target shellfish and cephalopods. The purse-seiners are composed of 80 vessels of 17 m average length.

The fleets operating in Iberian waters comprise trawlers, trollers, pelagic longliners, and purse-seiners. Around ten vessels are operating in the trawl fishery (of 25 m average length). The trolling fleet targets albacore.

Around 57 vessels operate mainly in the Bay of Biscay. The fleet comprises trawlers and passive gears (bottom longline and gillnet). 15 vessels are operating in the trawler fleet targeting hake, anglerfish, and megrim. 42 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 their fishing rights in the Bay of Biscay for quota swaps with Belgium; the Dutch quota in the Bay of Biscay in exchange 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 8 large vessels (> 40 m in length) targeting small pelagic fish, mainly boarfish, horse mackerel, and mackerel. Approximately 40 vessels target albacore tuna, with paired mid-water 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 7 to 13 vessels over the last 4 years. The pelagic trawlers are the larger of the vessels, with an overall total length of between 50 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 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.

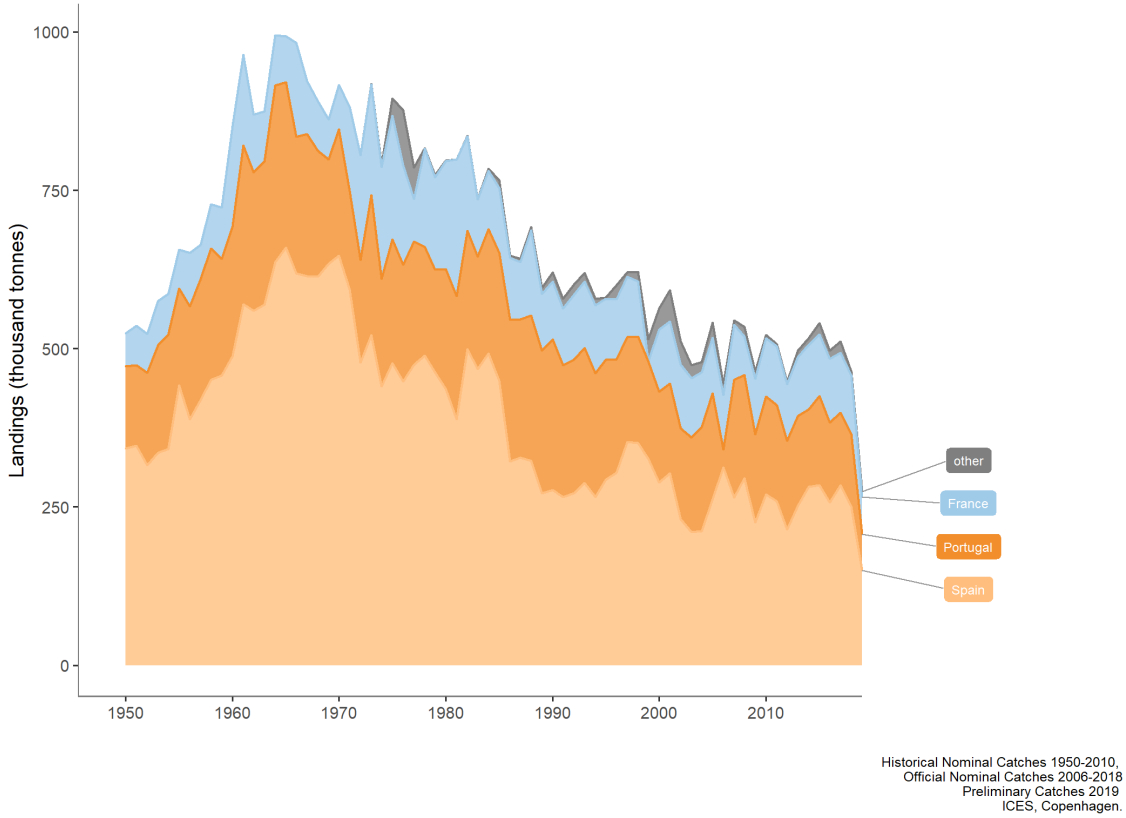


Figure 11 Landings (thousand tonnes) from ICES subareas 8 and 9, between 1950 and 2019. The three countries with the highest landings over the period are shown individually, while the remaining countries are aggregated and displayed as "other".

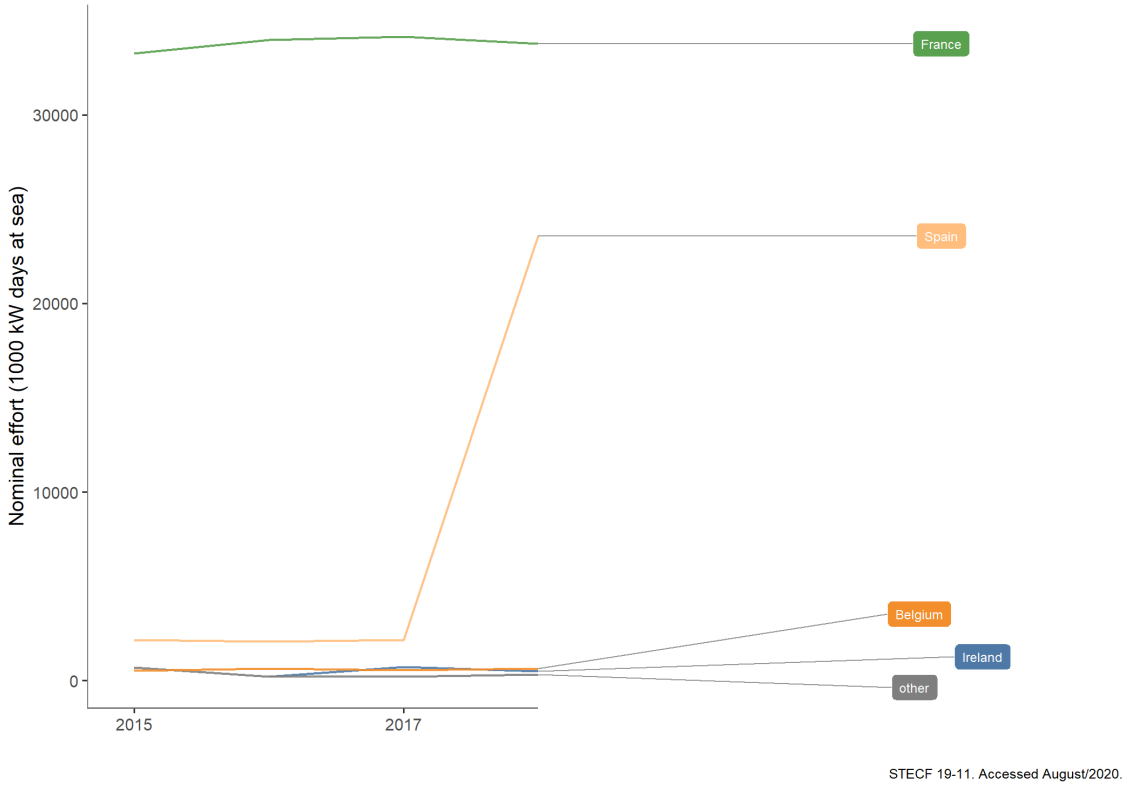


Figure 12 ICES subareas 8 and 9. Fishing effort (1000 kW days-at-sea) in 2015–2018 for EU Member States. Some confidential values reported by France, Belgium and Ireland.

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 12). 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 13).

Of the species presented in Figure 8, 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 80's whereas the other main species landings fluctuate without trends. Other notable species in the area include mackerel, hake, and anchovy. As a large proportion of the landings are comprised of pelagic species, it follows that the pelagic gears also give the highest landings (Figure 14). Static gears such as nets, lines, and pots are also important in this ecoregion.

.

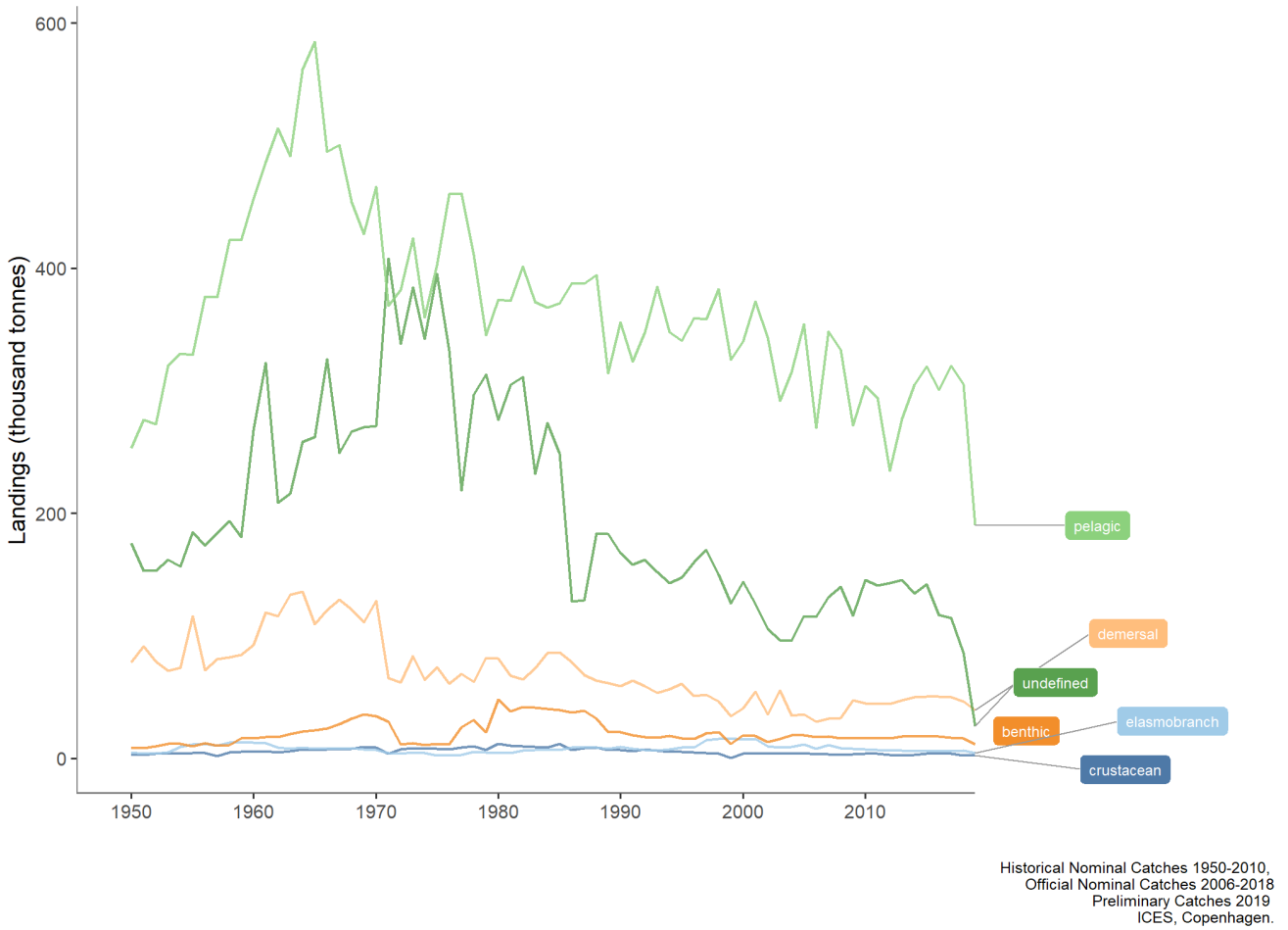


Figure 12 Landings (thousand tonnes) from ICES subareas 8 and 9 in 1950–2019, by fisheries guild. Table A1 in the Annex details the species that belong to each fish category.

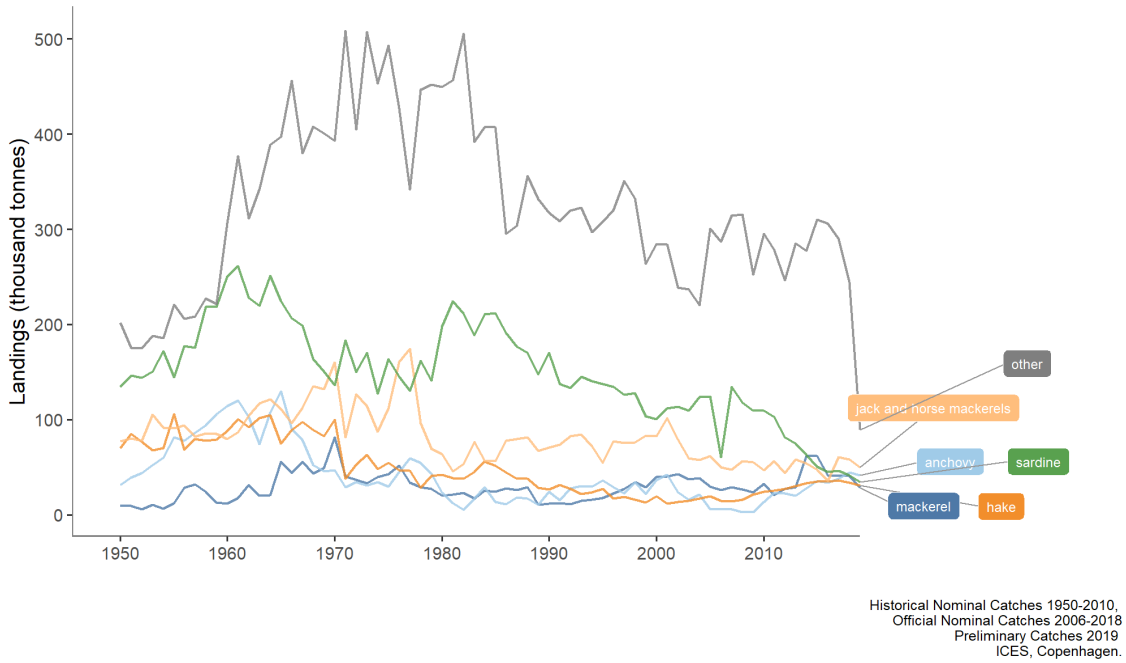


Figure 13 Landings (thousand tonnes) from ICES subareas 8 and 9 in 1950–2019, by species. The species groupings with the highest cumulative landings over the entire time-series are displayed separately; the remaining species are aggregated and labelled as "other".

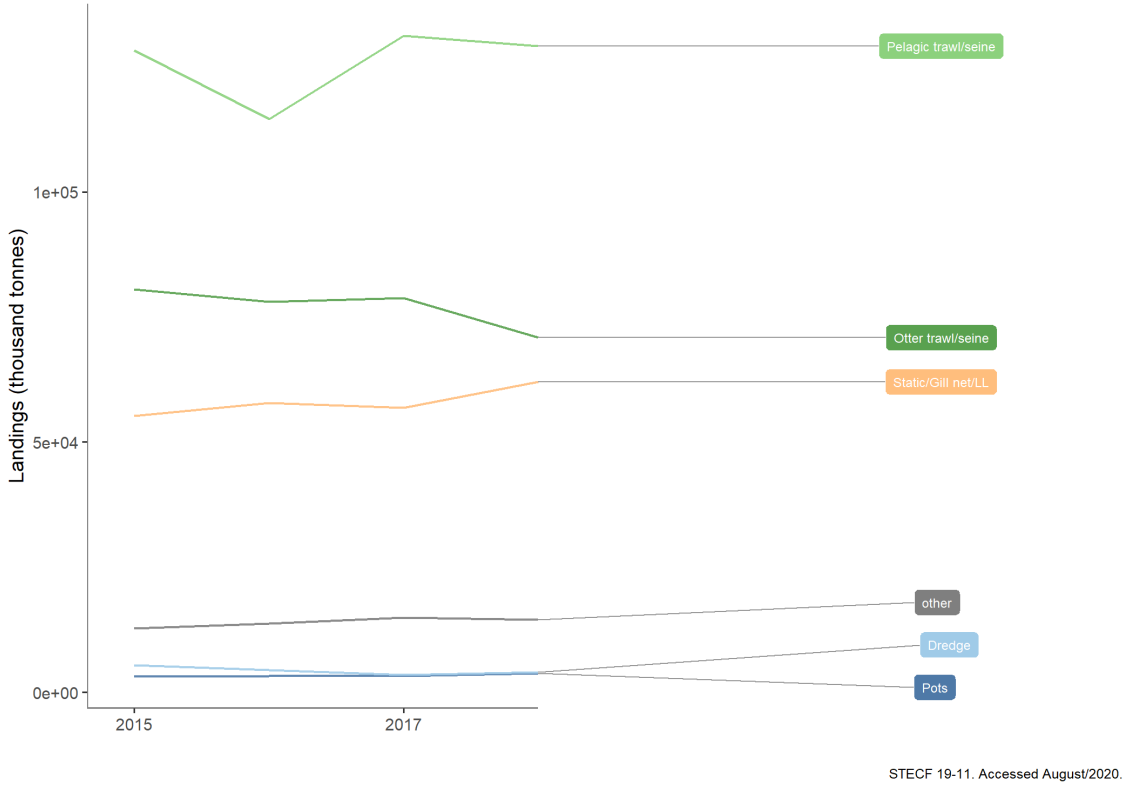


Figure 14 Commercial landings (thousand tonnes) from ICES subareas 8 and 9 from 2015–2018, by gear type for EU Member States. Some confidential values reported by France, Belgium, and Ireland.

Discards

The percentage of pelagic species discarded is estimated to be very low (Figure 15), 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.

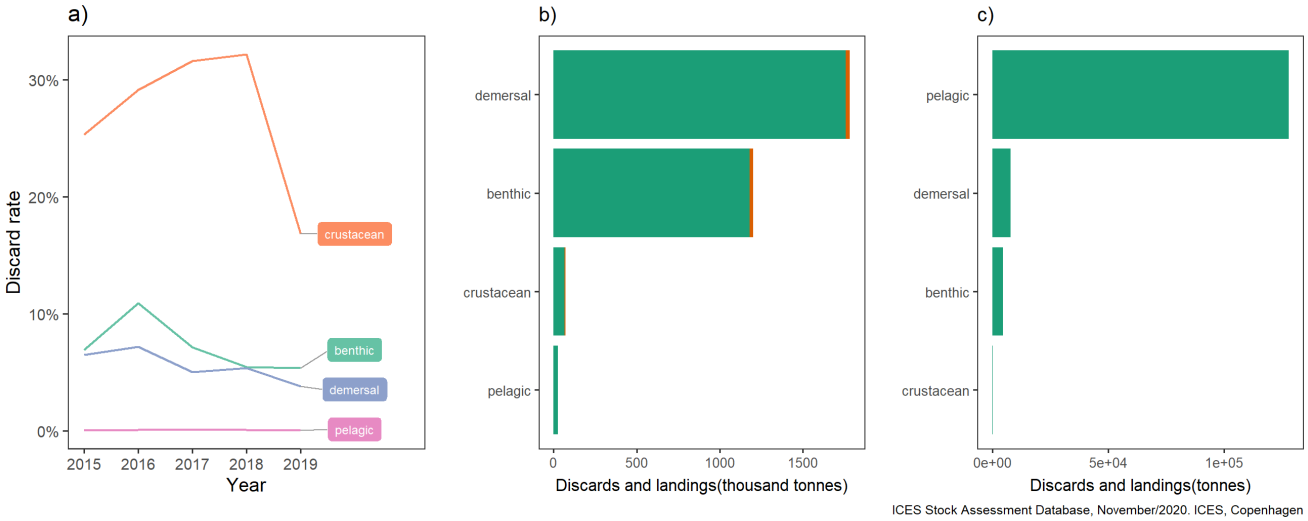


Figure 15 ICES subareas 8 and 9. Left panel (a): Discard rates in 2015–2019 by fish category, shown as percentages (%) of the total annual catch in that category. Middle panel (b): Landings (green) and discards (orange) in 2019 by fish category (in thousand tonnes) only of those stocks with recorded discards. Right panel (c): Landings (green) and discards (orange) in 2019 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 account for a large proportion of the fishing effort in the ecoregion, followed by static gears. Demersal trawls have shown a decline in recent years, but still operate throughout the shelf areas of the ecoregion (Figure 16). Static gears also operate throughout the shelf area, but there are some instances of them operating further offshore.

† Version 2: Figure and legend updated

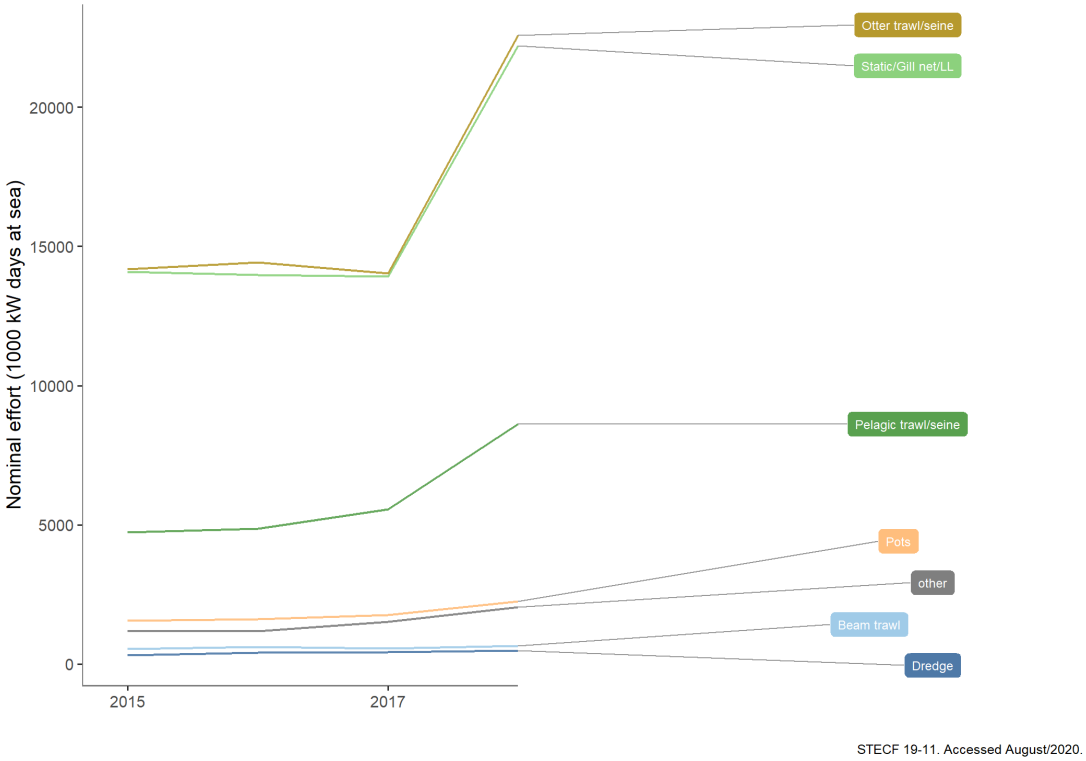


Figure 16 ICES subareas 8 and 9. Fishing effort (thousand kW days-at-sea) in 2015–2018 by EU vessels, by gear type. Some confidential values reported by France, Belgium and Ireland.

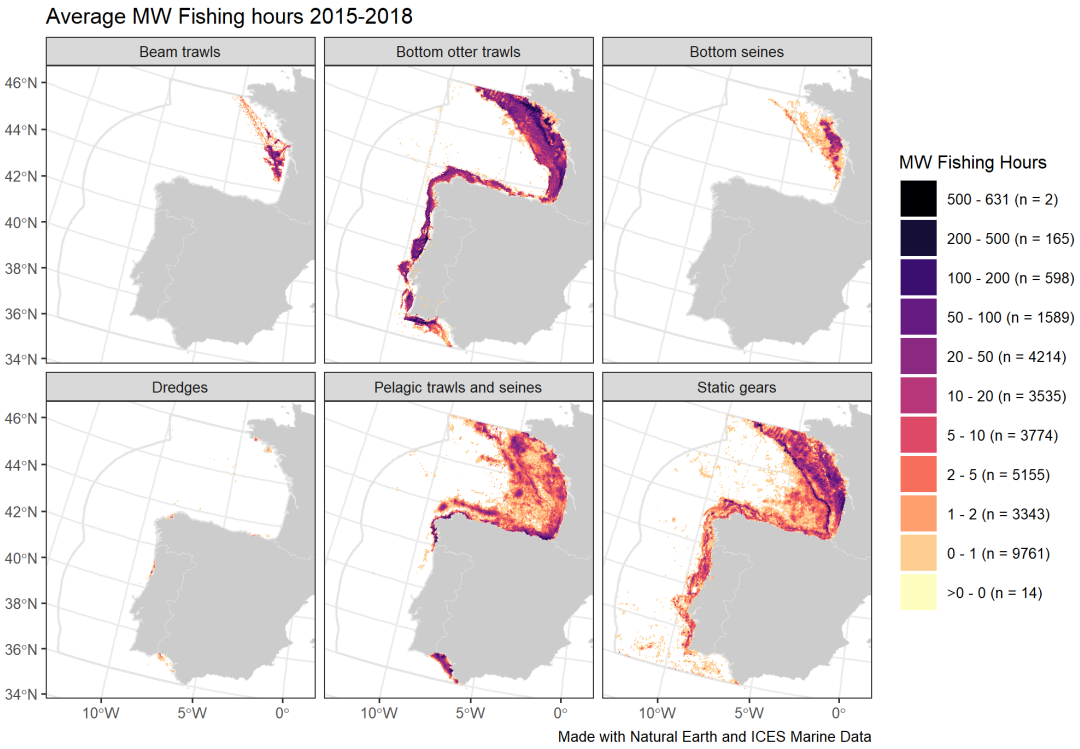


Figure 17 Spatial distribution of average annual fishing effort (mW fishing hours) in the Bay of Biscay and Iberian Coast ecoregion from 2015 to 2018, by gear type. Fishing effort data are only shown for vessels > 12 m in length that have vessel monitoring systems (VMS); this will bias the distributions, particularly in coastal areas. Portuguese purse-seine data is not available.

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 fisheries

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.

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

Longline and line fisheries

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

Pelagic trawls

The pelagic trawls are mainly targeting 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-assesed stocks are targeted throughout the ecoregion. These include, for example dredging for shellfish such as a mix of clam species, cockles, and oysters. 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 the International Council for the Exploration of the Sea (ICES), the European Commission's Scientific Technical and Economic Committee for Fisheries (STECF), and the Standing Scientific Committee of ICCAT.

Total allowable catch (TAC) is the main fishery management tool in the ecoregion. These were introduced for most stocks in the 1980s, but the TACs (and quotas) were generally not restrictive until the early 1990s. The 2013 reform of the Common Fisheries Policy 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 will apply 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 well as 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 resource

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 18). Around 60% of the stocks with full analytical assessments, reference points and forecast are fished at or below F_{MSY} target levels.

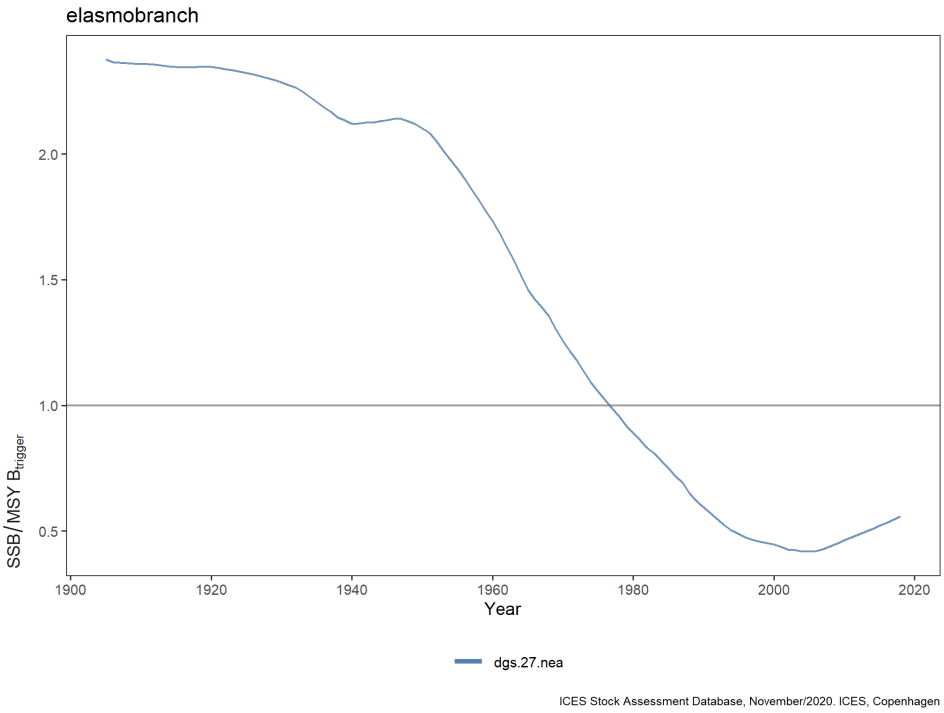
ICES Stock Assessment Database, November 2020. ICES, Copenhagen

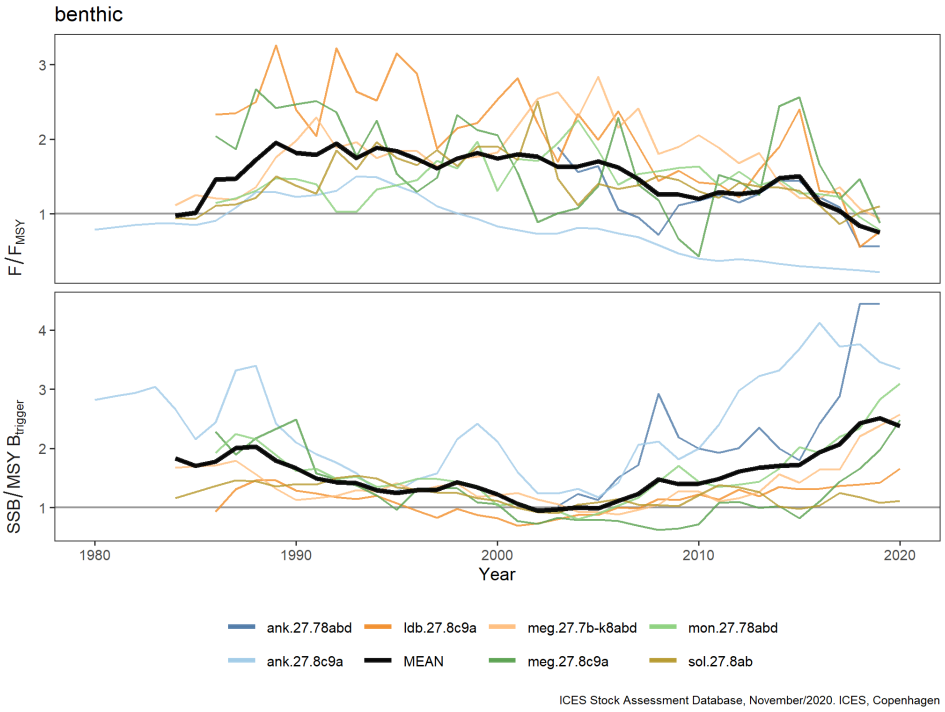
Figure 18 Status summary of Bay of Biscay and Iberian Coast stocks in 2020, relative to the ICES maximum sustainable yield (MSY) approach and precautionary approach (PA) (excluding European eel, salmon, and sea trout). Grey represents unknown reference points. *For the MSY approach*: green represents a stock that is either fished below F_{MSY} or where the stock size is greater than MSY $B_{trigger}$; red represents a stock status that is either fished above F_{MSY} or where the stock size is lower than MSY $B_{trigger}$. *For the PA*: green represents a stock that is fished at or below F_{pa} while the stock size is equal to or greater than B_{pa}; orange represents a stock that is either fished between F_{pa} and F_{lim} or where the stock size is between B_{lim} and B_{pa}; red represents a stock that is fished above F_{lim} or where the stock size is less than B_{lim}. Stocks with a fishing mortality below or at 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. For stock-specific information, see Table A1 in the Annex.

Figure 19 Status summary of Bay of Biscay and Iberian Coast stocks in 2020, 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 where the stock 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 where the 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.

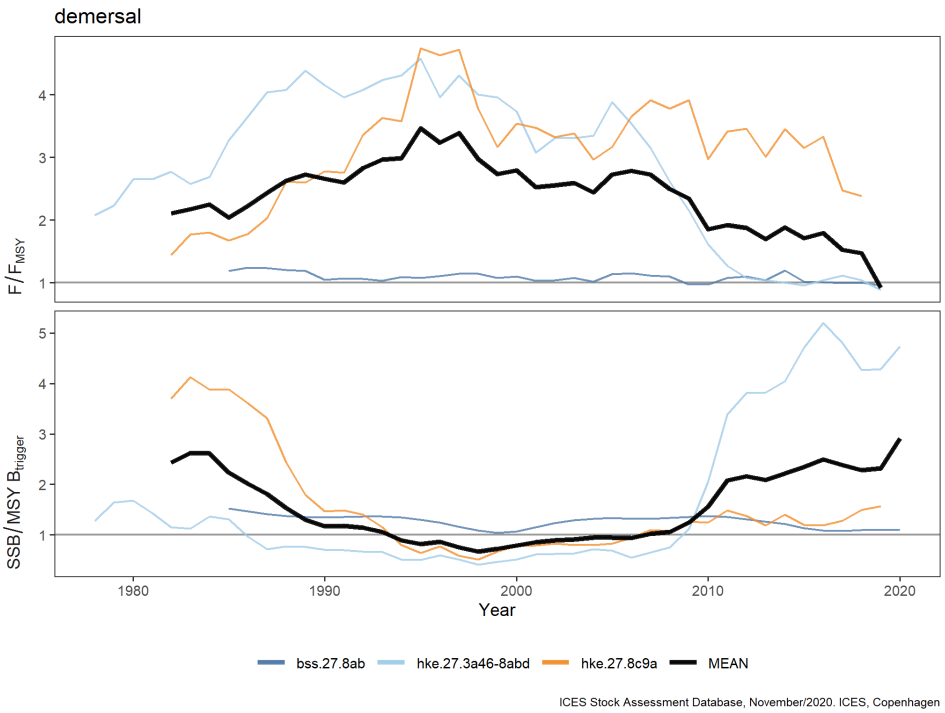
ICES provided advice in 2020 on 71 stocks within the Bay of Biscay and Iberian Coast Ecoregion. These encompass the following categories: 10 benthic, 6 crustacean, 20 demersal, 24 elasmobranch, and 11 pelagic stocks. Out of these categories the pelagic, *Nephrops*, and demersal stocks are the best known, as they have the highest number of quantitative assessments with forecasts (ICES data category 1 stocks). Approximately 72% are sustainably fished (i.e. D3C1 where $F < F_{MSY}$); these account for 37% of the total landings (Figure 19). Other groups, such as the elasmobranchs, have 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 2% of the total landings (Figure 19). Around 75% of the stocks were assessed to be above MSY $B_{trigger}$ (D3C2); these accounted for around 91% 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 20), 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; only one stock remains below MSY $B_{trigger}$ for the whole of the time-series. Note that although the mean fishing mortality and biomass ratios are in a desirable condition for most species categories, this does not infer that all stocks are in that condition.





ICES Stock Assessment Database, November/2020. ICES, Copenhagen



ICES Stock Assessment Database, November/2020. ICES, Copenhagen

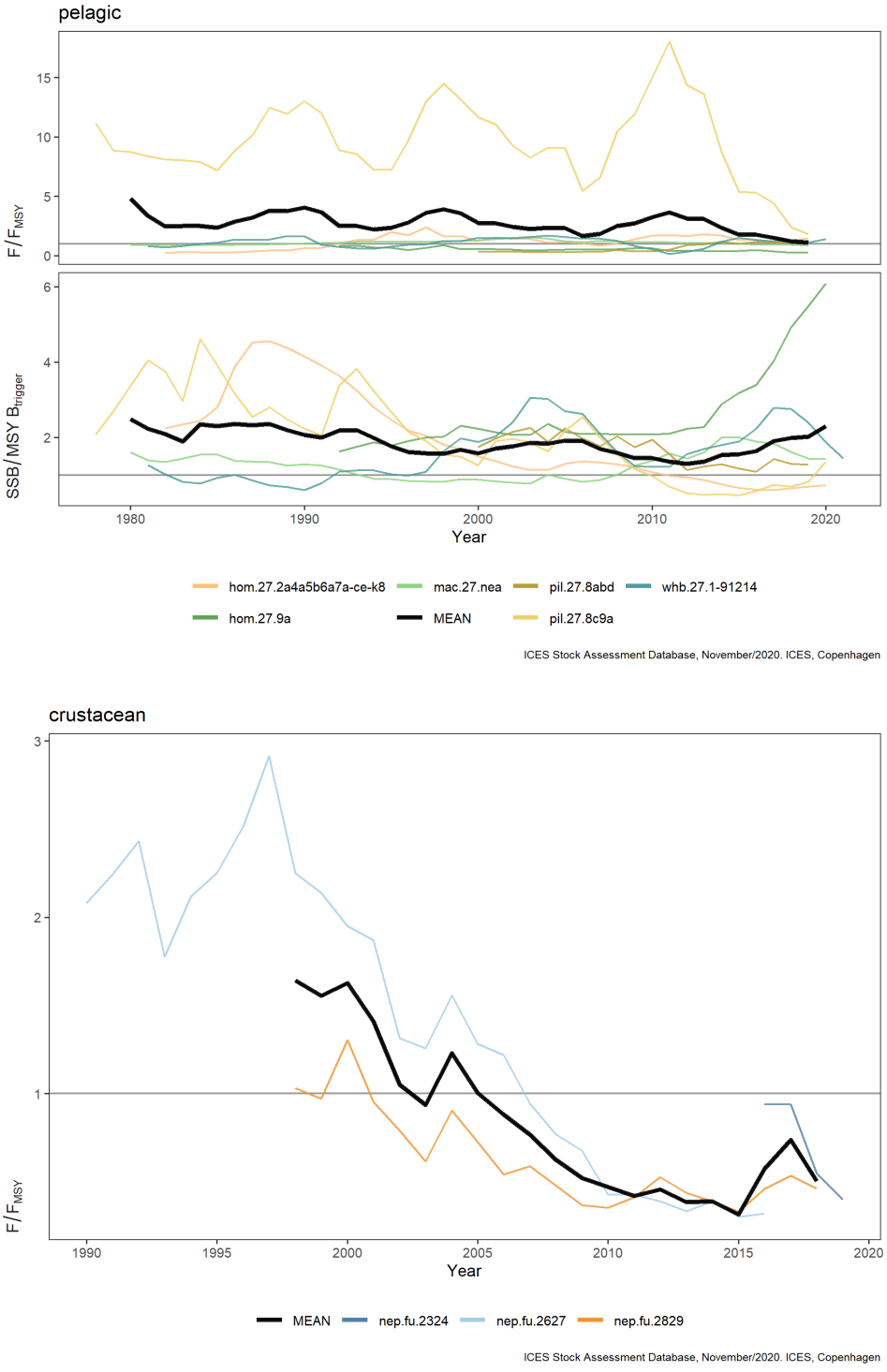
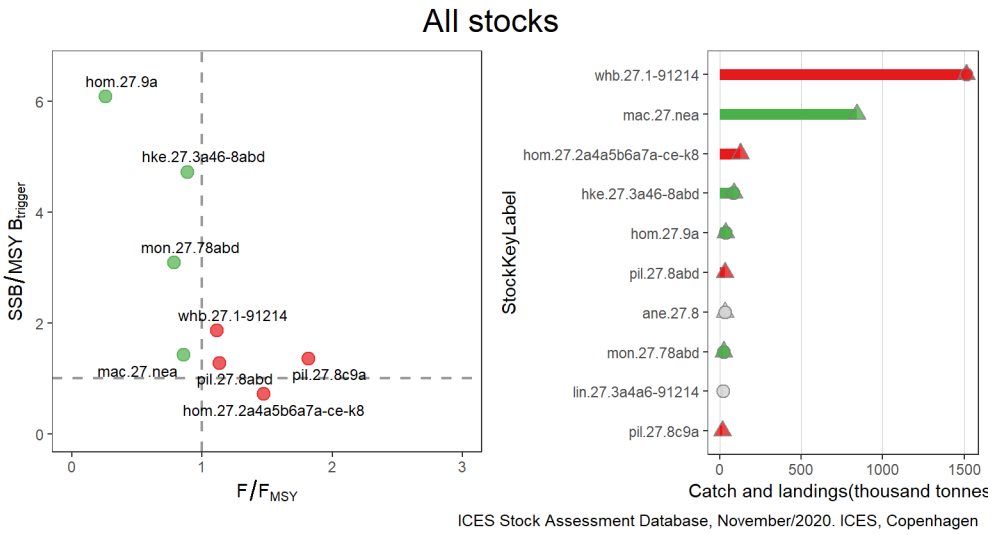
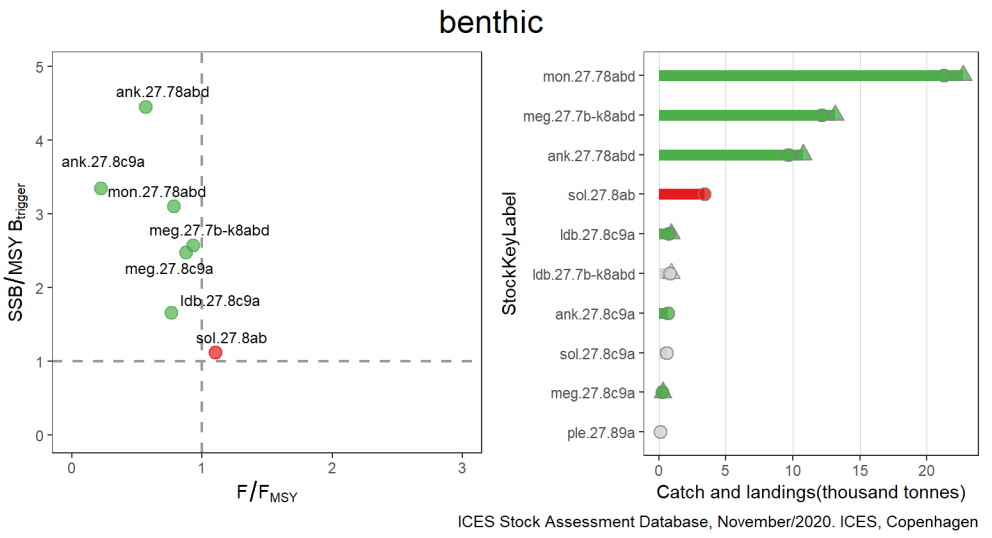


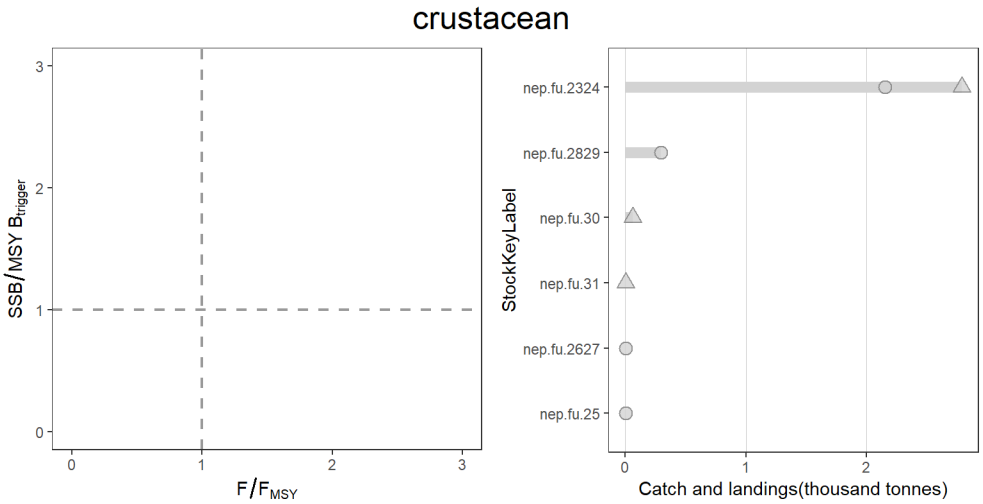
Figure 20 Temporal trends in F/F_{MSY} and SSB/MSY $B_{trigger}$ for Bay of Biscay and Iberian Coast benthic, crustacean, demersal, and pelagic stocks. Only stocks with defined MSY reference points are considered. Stocks for which only proxy reference points are available are not shown. For full stock names, see Table A1 in the Annex.

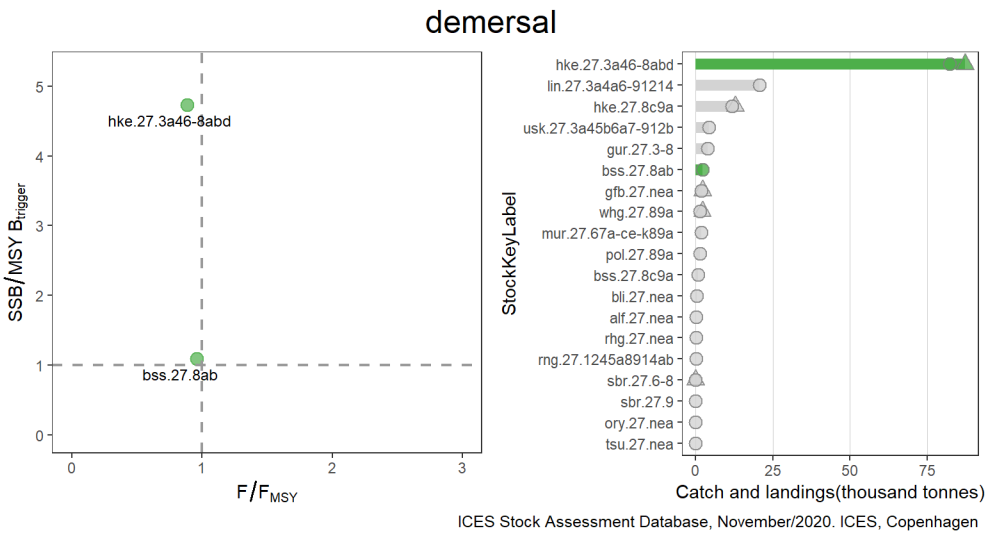
The stock status relative to F_{MSY} and MSY $B_{trigger}$ is shown for stocks with reference points, and partitioned by stock groups in Figure 21. This shows that the horse mackerel stock in ICES Division 9.a has the best status among all stocks (almost six times MSY $B_{trigger}$ and fished below F_{MSY}). Sardine in divisions 8.c and 9.a has the worst stock status, being fished almost two times higher than 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. The position of Western horse mackerel relative to reference points, in the bottom

right quadrant of the pelagic stock status plot (Figure 16), indicates that they need to be rebuilt and that fishing mortality remains too high. In general, the benthic stocks have a better stock status than the other stock groups.






crustacean
SSB/MSY B$_{trigger}$
F/F$_{MSY}$
StockKeyLabel
nep.fu.2324
nep.fu.2829
nep.fu.30
nep.fu.31
nep.fu.2627
nep.fu.25
Catch and landings(thousand tonnes)
ICES Stock Assessment Database, November/2020. ICES, Copenhagen


demersal
SSB/MSY B$_{trigger}$
F/F$_{MSY}$
hke.27.3a46-8abd
bss.27.8ab
StockKeyLabel
hke.27.3a46-8abd
lin.27.3a4a6-91214
hke.27.8c9a
usk.27.3a45b6a7-912b
gur.27.3-8
bss.27.8ab
gfb.27.nea
whg.27.89a
mur.27.67a-ce-k89a
pol.27.89a
bss.27.8c9a
bli.27.nea
alf.27.nea
rhg.27.nea
rng.27.1245a8914ab
sbr.27.6-8
sbr.27.9
ory.27.nea
tsu.27.nea
Catch and landings(thousand tonnes)
ICES Stock Assessment Database, November/2020. ICES, Copenhagen

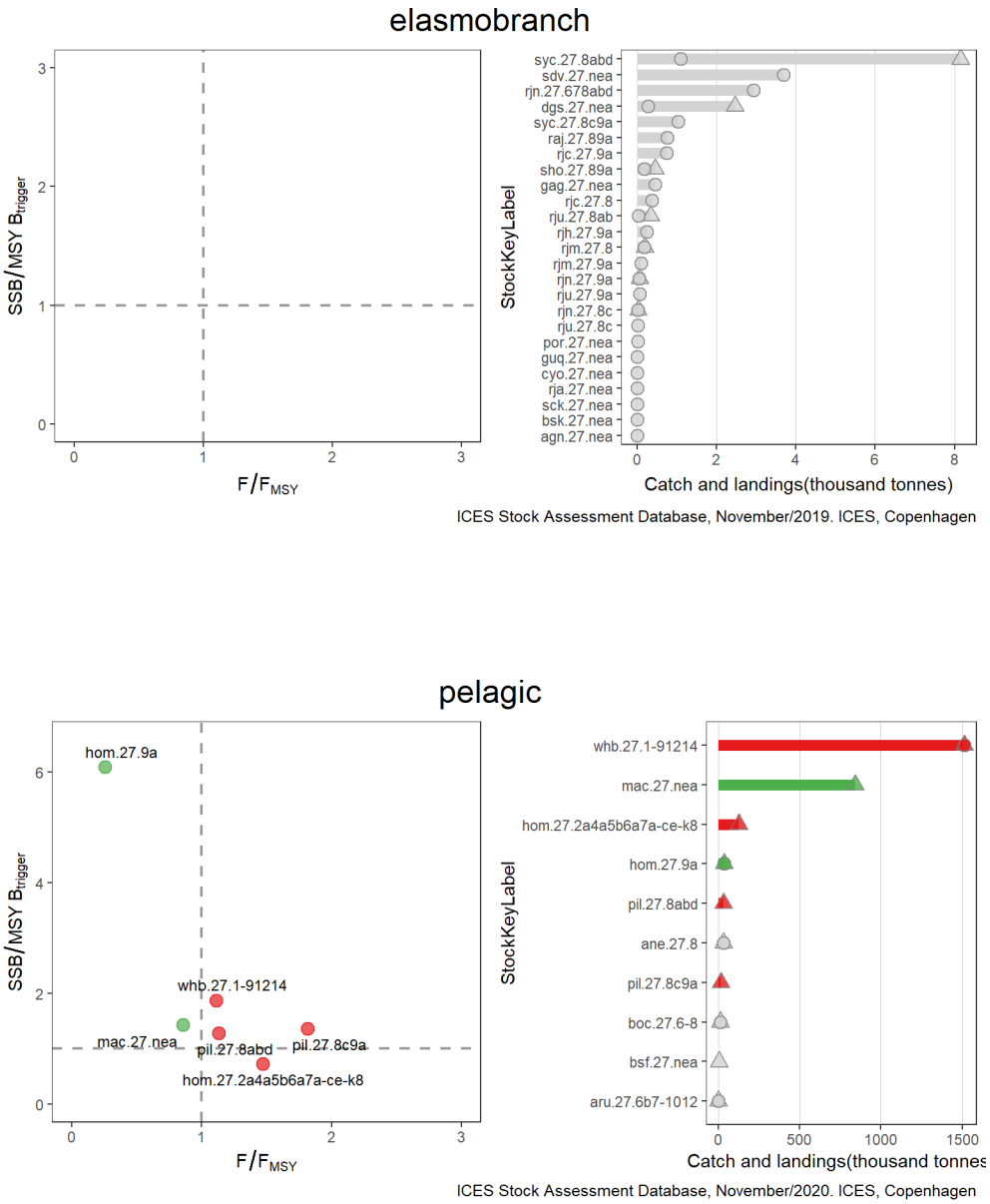


Figure 21 Status of Bay of Biscay and Iberian Coast stocks relative to the joint distribution of exploitation (F/F_{MSY}) and stock size (SSB/ MSY $B_{trigger}$) [left panels, by individual stocks] and catches (triangles) / landings (circles) from these stocks in 2020 [right panels]. The left panels 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 the stock size is also at or above MSY $B_{trigger}$. Stocks in red are either exploited above F_{MSY} or the stock size is below MSY $B_{trigger}$, or both. Stocks in grey have unknown/undefined status in relation to reference points. "All stocks" refers to the ten stocks with highest catch and landings across fisheries guilds in 2019. For full stock names, see Table A1 in the Annex.

European eel cannot be assessed against any PA or MSY reference points. Recruitment of European eel has declined sharply in recent decades, because of a range of potential threats.

Mixed-fisheries

Fishing operations typically catch more than one species at a time (mixed-fisheries), although some gears are more selective than others. Pelagic trawling and purse-seining, for example, typically only catch one species with small proportions of bycatch; demersal trawling, bottom seining and longlining normally catch several species simultaneously.

In the Bay of Biscay, fisheries target a large range of species with different gears. Trawl fisheries (using otter, beam or pelagic trawls) take place for *Nephrops*, hake, anglerfishes, megrims, sole, and sea bass as well as cephalopods (cuttlefish and squid). Gillnet fisheries target sole, hake, pollack, sea bass, and anglerfishes as well as some crustacean species, while a longline fishery targets hake. The fisheries are mainly carried out by French and Spanish vessels, though some Belgian beam trawl vessels target sole.

Analyses of the Spanish demersal fleets in divisions 8.c and 9.a show that the main target species are hake, anglerfishes, megrims, *Nephrops*, horse mackerel, mackerel, and blue whiting. Three pelagic/semi-pelagic species (blue whiting, mackerel, and horse mackerel) constitute 65% of the total landings in these demersal métiers. The same type of analysis performed for the Portuguese demersal métiers indicate that the most important species caught by the demersal fish trawlers are horse mackerel, blue whiting, and hake. 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.

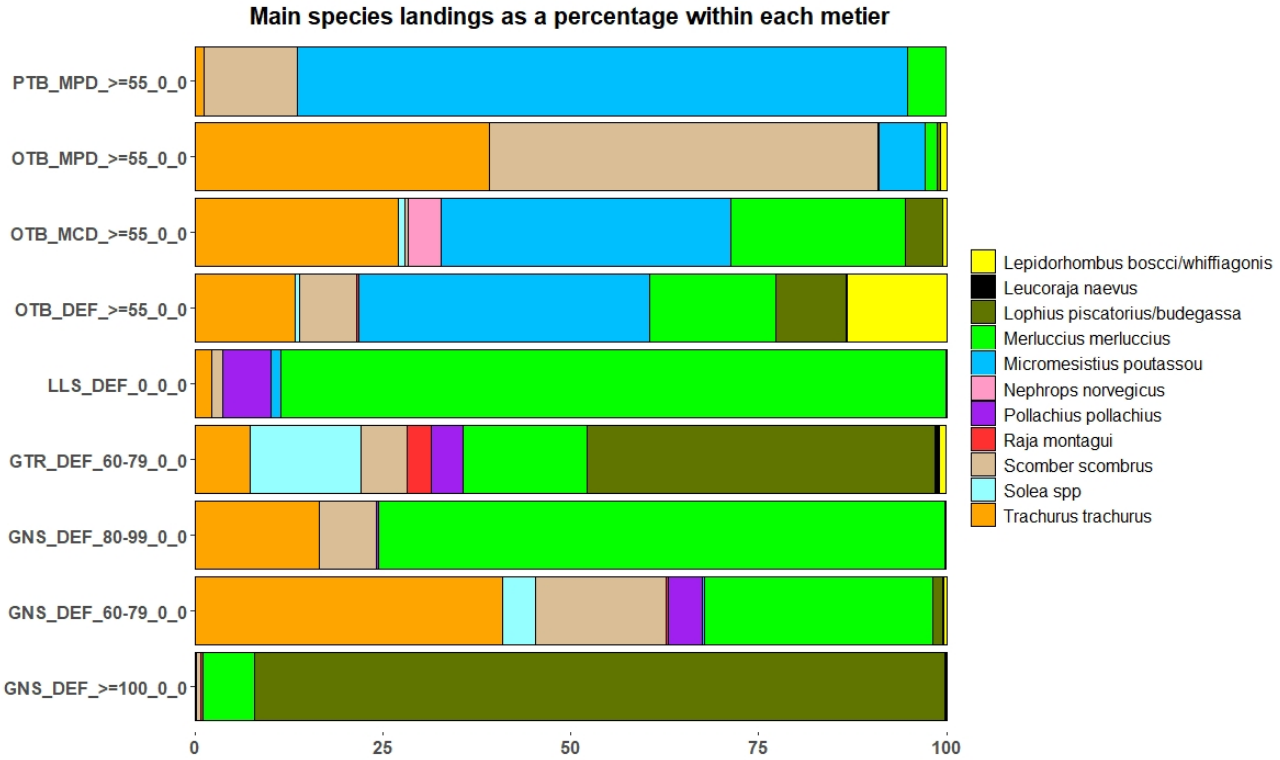


Figure 22 Main species landings as a percentage within each Spanish demersal métier in divisions 8.c and 9.a.

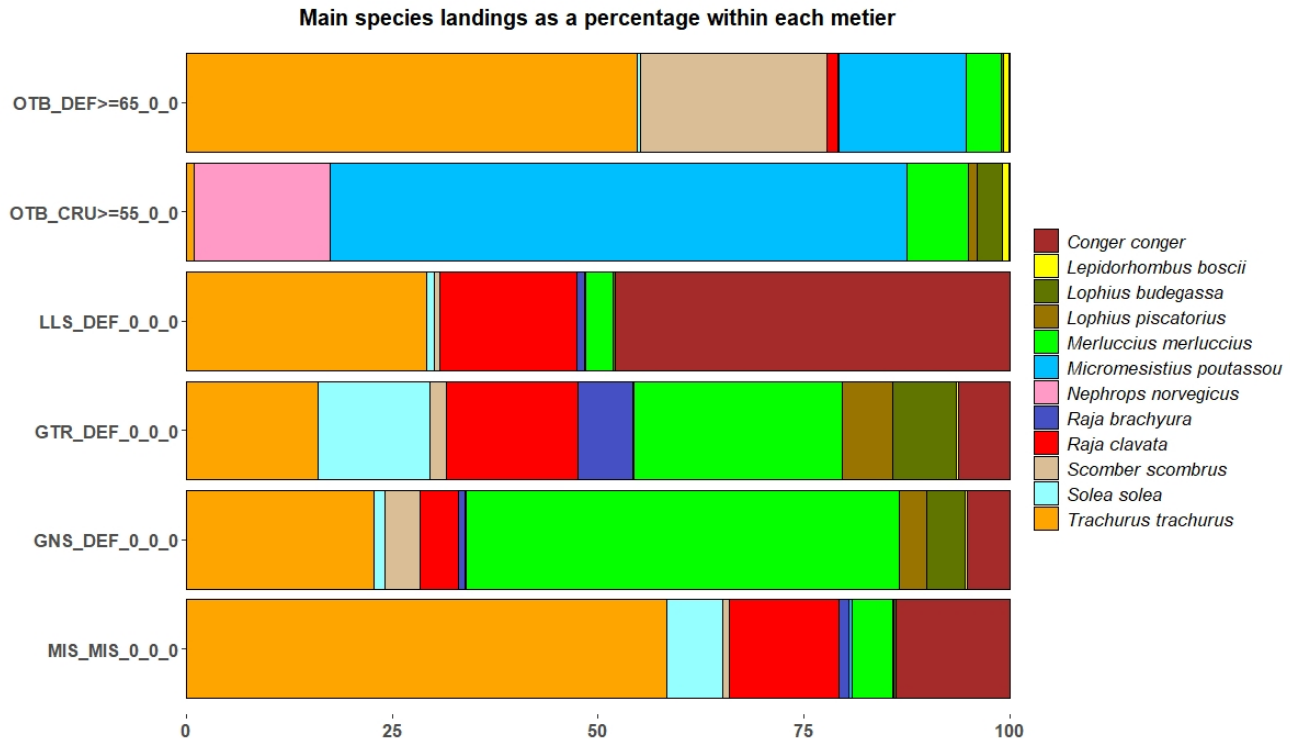


Figure 23 Main species landings as a percentage within each Portuguese demersal métier in divisions 8.c and 9.a.

Hake is present in all the métiers analysed and is a target species for longlines and gillnets fisheries.

Blue whiting is present in most métiers and is the main target species for the small mesh demersal trawls.

Two stocks of horse mackerel (Table A1 in the Annex) are defined in divisions 8.c and 9.a; both are key stocks in mixed-fisheries considerations.

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 15); they are also caught with other pelagic and demersal species in eight other métiers. Métier definitions are presented in Table A4 in the Annex.

The trammelnet métier lands a large variety of demersal species, but pollack and sole are of the highest economic importance.

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.

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 influence 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 food web. 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 food web. Multispecies assessment methods can account for some of these interactions and guide appropriate management measures.

Fishing also affects the seabed habitats and benthonic 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 24). 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 was 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).

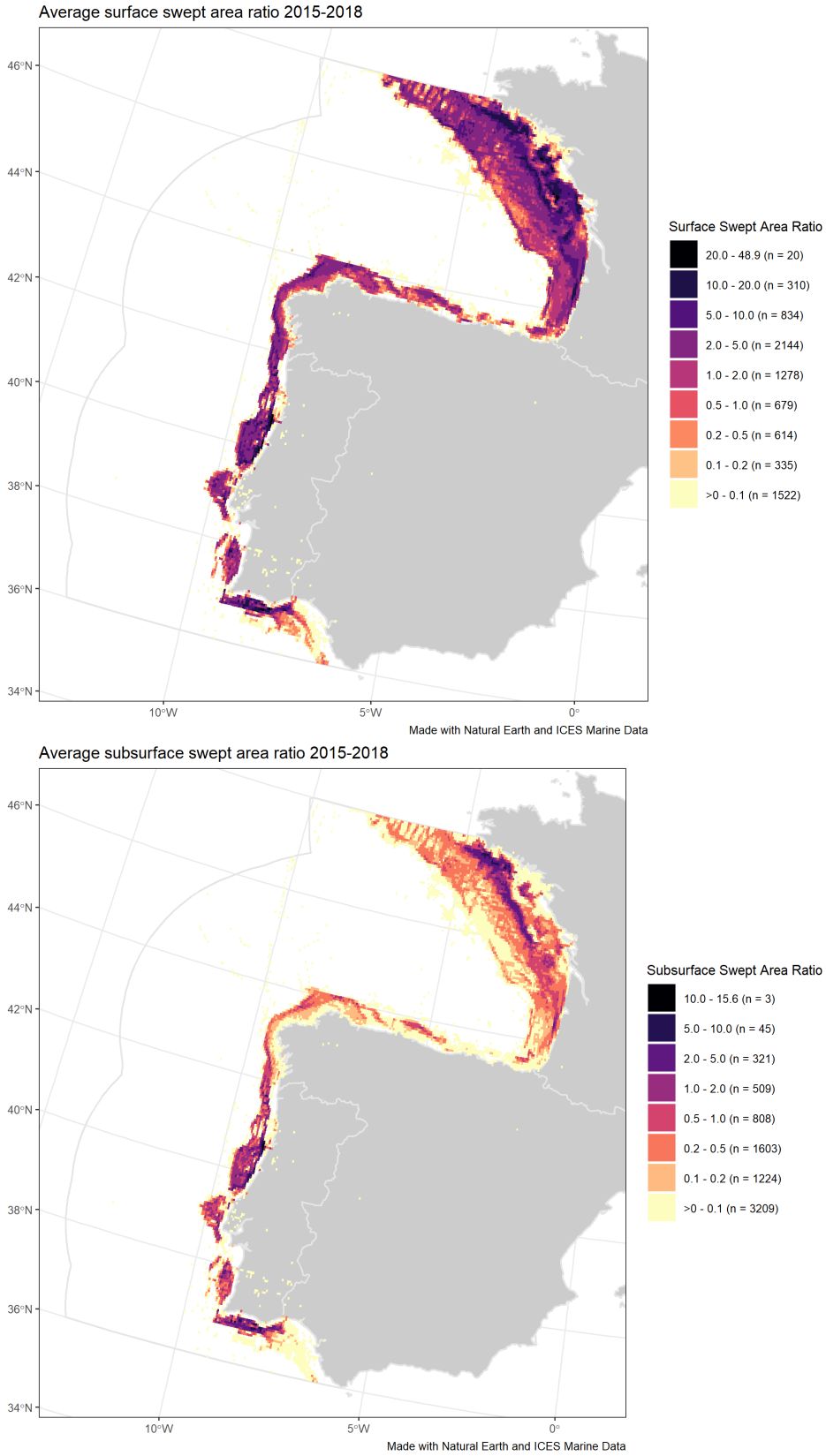


Figure 24 Average annual surface (top) and subsurface (bottom) disturbance by mobile bottom-contacting fishing gear (bottom otter trawls, bottom seines, dredges, beam trawls) in the Bay of Biscay and Iberian Coast Ecoregion during 2015–2018, expressed as average swept-area ratios (SAR).

Bycatch of protected, endangered, and threatened species

ICES evaluated bycatch mortality across métiers for the common dolphin in the Celtic Seas, in the Bay of Biscay and the Iberian Coast, and in the western English Channel. Based on limited information, the at-sea monitoring point estimate of bycatch mortality is just below the potential biological removal while the point estimate from strandings data exceeded it.

The mean annual bycatch estimated from at sea observations for 2016–2018 across all métiers amounted to 3973 (95% CI 1998–6599) dolphins, with trammelnets accounting for the largest bycatch. Common dolphin bycatch mortality estimated from stranded animals along the French coastlines of the Bay of Biscay and the western English Channel was 5800–17 900 individuals in 2017 and 3400–10 500 individuals in 2018. The estimated bycatch rate of common dolphin in pelagic trawls in the ICES statistical area 27.8.c in 2018 was relatively high relative to other monitored métiers/ecoregions – 0.091 specimens per monitored days-at-sea.

A number of bird species groups are known to be susceptible to bycatch in various types of fishing gear. Bycatch risk is generally considered to be closely linked to species-specific foraging behaviour. Bycatch rates of birds in the ecoregion are mostly unknown. For the Bay of Biscay, bycatch rates are only available for common guillemot in the gillnet fishery and for the Balearic shearwater in gillnets and trammelnets; they are at generally comparable levels to other ecoregions in the Northeast Atlantic.

The high numbers of bycaught animals (birds and marine mammals) recorded on the shores of the ecoregion indicate that a dedicated bycatch observer programme is required for relevant fisheries in this area.

Bycatch of elasmobranchs is common in the ecoregion, with notably high bycatch rates of sandy ray in nets, but also undulate ray and blackmouth catshark in bottom trawls.

Sources and references

Garcia, D., Sanchez, S., Prellezo, R., Urtizberea, A., and Andreas, M. 2017. FLBEIA: a simulation model to conduct bio-economic evaluation of fisheries management strategies. SoftwareX, 6: 141–147. https://doi:10.1016/j.softx.2017.06.001.

ICES. 2019a. Bycatch of protected and potentially vulnerable marine vertebrates – review of national reports under Council Regulation (EC) No. 812/2004 and other information. *In* Report of the ICES Advisory Committee, 2019. ICES Advice 2019, byc.eu. 14 pp. https://doi.org/10.17895/ices.advice.5564.

ICES. 2019b. Working Group on Bycatch of Protected Species (WGBYC). ICES Scientific Reports, 1:51. 163 pp. http://doi.org/10.17895/ices.pub.5563.

ICES. 2020a. Black-bellied anglerfish (*Lophius budegassa*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters). *In* Report of the ICES Advisory Committee, 2020. ICES Advice 2020, ank.27.8c9a. https://doi.org/10.17895/ices.advice.5923.

ICES. 2020b. Four-spot megrim (*Lepidorhombus boscii*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters). *In* Report of the ICES Advisory Committee, 2020. ICES Advice 2020, ldb.27.8c9a. https://doi.org/10.17895/ices.advice.5859.

ICES. 2020c. Megrim (*Lepidorhombus whiffiagonis*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters). *In* Report of the ICES Advisory Committee, 2019. ICES Advice 2020, meg.27.8c9a. https://doi.org/10.17895/ices.advice.5861.

ICES. 2020d. White anglerfish (*Lophius piscatorius*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters). *In* Report of the ICES Advisory Committee, 2020. ICES Advice 2020, mon.27.8c9a. https://doi.org/10.17895/ices.advice.5924.

ICES. 2020e. Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE). ICES Scientific Reports, 2:49. 845 pp. http://doi.org/10.17895/ices.pub.6033.

ICES. 2020f. Working Group on Mixed Fisheries Advice (WGMIXFISH-ADVICE). ICES Scientific Reports, 2:113. http://doi.org/10.17895/ices.pub.7598. In preparation.

ICES. 2020g. Working Group on Elasmobranch Fishes (WGEF). ICES Scientific Reports, 2:77. 789 pp. http://doi.org/10.17895/ices.pub.7470.

ICES. 2020h. Working Group on Widely Distributed Stocks (WGWIDE). ICES Scientific Reports, 2:82. 1019 pp. http://doi.org/10.17895/ices.pub.7475.

ICES. 2020i. Working Group on Bycatch of Protected Species (WGBYC). ICES Scientific Reports, 2:81. 209 pp. http://doi.org/10.17895/ices.pub.7471.

ICES. 2020j. Bay of Biscay and the Iberian Coast ecoregion – Fisheries overview Data Outputs. http://doi.org/10.17895/ices.data.7609

Recommended citation: ICES. 2020. Bay of Biscay and Iberian Coast ecosystem – Fisheries overview. *In* Report of the ICES Advisory Committee, 2020. ICES Advice 2020, section 6.2. https://doi.org/10.17895/ices.advice.7604.

Annex

Supporting data used in the Bay of Biscay and Iberian Coast Fisheries Overview is archived at ICES (2020j).

Table A1 Status summary of the Bay of Biscay and Iberian Coast ecosystem stocks in 2019, in regards to the ICES maximum sustainable yield (MSY) approach and precautionary approach (PA) for stocks within the Bay of Biscay and Iberian Coast ecoregion. Grey represents unknown reference points. *For the MSY approach*: green represents either a stock that is fished below F_{MSY} or the stock size is greater than MSY $B_{trigger}$; red represents either a stock status that is fished above F_{MSY} or the stock size is less than MSY $B_{trigger}$. *For the PA*: green represents either a stock that is fished below F_{pa} or the stock size is greater than B_{pa}; yellow represents a stock that is either 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}. SBL = Safe Biological Limits; MSFD = EU Marine Strategy Framework Directive; D3C1 = MSFD indicator for fishing mortality; D3C2 = MSFD indicator for spawning-stock biomass; GES = good environmental status.

Stock	Stock description	Fisheries guild	Data category	Assessment year	Advice category	SBL	GES	Reference point	Fishing pressure	Stock size	D3C1	D3C2
ane.27.8	Anchovy in Subarea 8	Pelagic	1	2019	MP	?	?	MSY	?	?	?	?
								PA	?	✓	?	✓
ane.27.9a	Anchovy in Division 9.a	Pelagic	3	2020	PA	?	?	MSY	?	?	?	?
								PA	?	✓	?	✓
ank.27.78abd	Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d	Benthic	3.2	2020	PA	?	?	MSY	✓	?	✓	?
								PA	✓	?	✓	?
ank.27.8c9a	Black-bellied anglerfish in divisions 8.c and 9.a	Benthic	3.2	2020	PA	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
bss.27.8ab	Sea bass in divisions 8.a–b	Demersal	1	2020	MP	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
dgs.27.nea	Spurdog in subareas 1–10, 12, and 14	Elasmobranch	1.2	2020	MSY/PA	?	?	MSY	✓	✗	✓	✗
								PA	✓	?	✓	?
hke.27.3a46-8abd	Hake in subareas 4, 6, and 7, and divisions 3.a, 8.a–b, and 8.d; Northern stock	Demersal	1	2020	MSY	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
hom.27.2a4a5b6a7a-ce-k8	Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k	Pelagic	1	2020	MSY	✗	✗	MSY	✗	✗	✗	✗
								PA	✗	o	✗	o

Stock	Stock description	Fisheries guild	Data category	Assessment year	Advice category	SBL	GES	Reference point	Fishing pressure	Stock size	D3C1	D3C2
hom.27.9a	Horse mackerel in Division 9.a	Pelagic	1	2019	MSY	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
ldb.27.8c9a	Four-spot megrim in divisions 8.c and 9.a	Benthic	1	2020	MP	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
lin.27.3a4a6-91214	Ling in subareas 6–9, 12, and 14, and divisions 3.a and 4.a	Demersal	3.2	2019	PA	?	?	MSY	✓	?	✓	?
								PA	✓	?	✓	?
mac.27.nea	Mackerel in subareas 1–8 and 14 and Division 9.a	Pelagic	1	2020	MSY	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
meg.27.7b-k8abd	Megrim in divisions 7.b–k, 8.a–b, and 8.d	Benthic	1	2020	MP	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
meg.27.8c9a	Megrim in divisions 8.c and 9.a	Benthic	1	2020	MP	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
mon.27.78abd	White anglerfish in Subarea 7 and divisions 8.a–b and 8.d	Benthic	1	2020	MP	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
mon.27.8c9a	White anglerfish in divisions 8.c and 9.a	Benthic	1	2020	MP	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
nep.fu.2324	Norway lobster in divisions 8.a and 8.b, functional units 23–24	Crustacean	1	2020	MSY	?	?	MSY	✓	?	✓	?
								PA	✓	?	✓	?
nep.fu.2829	Norway lobster in Division 9.a, functional units 28–29	Crustacean	3.2	2019	PA	?	?	MSY	✓	?	✓	?
								PA	✓	?	✓	?

Stock	Stock description	Fisheries guild	Data category	Assessment year	Advice category	SBL	GES	Reference point	Fishing pressure	Stock size	D3C1	D3C2
pil.27.8abd	Sardine in divisions 8.a–b and 8.d	Pelagic	2.11	2019	MSY	✓	✗	MSY	✗	✓	✗	✓
								PA	✓	✓	✓	✓
pil.27.8c9a	Sardine in divisions 8.c and 9.a	Pelagic	1	2020	MSY	✓	✗	MSY	✗	✓	✗	✗
								PA	✓	✓	✓	✗
sol.27.8ab	Sole in divisions 8.a–b	Benthic	1	2020	MP	✓	✗	MSY	✗	✓	✗	✓
								PA	✓	✓	✓	✓
usk.27.3a45b6a7-912b	Tusk in subareas 4 and 7–9 and divisions 3.a, 5.b, 6.a, and 12.b	Demersal	3.2	2019	PA	✓	✓	MSY	✓	✓	✓	✓
								PA	✓	✓	✓	✓
whb.27.1-91214	Blue whiting in subareas 1–9, 12, and 14	Pelagic	1	2020	MP	✓	✗	MSY	✗	✓	✗	✓
								PA	✓	✓	✓	✓
whg.27.89a	Whiting in Subarea 8 and Division 9.a	Demersal	5.2	2019	PA	?	?	MSY	✓	?	✓	?
								PA	✓	?	✓	?

Table A2 List of those stocks in the Bay of Biscay and Iberian Coast ecoregion in 2019 that do not have a full set of reference points.

Stock	Stock description	Fisheries guild	Data category	Assessment year	Advice category
agn.27.nea	Angel shark in subareas 1–10, 12, and 14	Elasmobranch	6.3	2019	PA
alf.27.nea	Alfonsinos in subareas 1–10, 12, and 14	Demersal	5.2	2020	PA
aru.27.6b7-1012	Greater silver smelt in subareas 7–10 and 12, and Division 6.b	Pelagic	3.2	2019	PA
bli.27.nea	Blue ling in Subareas 1, 2, 8, 9, and 12, and divisions 3.a and 4.a	Demersal	5.3	2019	PA
boc.27.6-8	Boarfish in subareas 6–8	Pelagic	3.2	2019	PA
bsf.27.nea	Black scabbardfish in subareas 1, 2, 4–8, 10, and 14, and divisions 3.a, 9.a, and 12.b	Pelagic	3.2	2020	PA
bsk.27.nea	Basking shark in subareas 1–10, 12, and 14	Elasmobranch	6.3	2019	PA
cyo.27.nea	Portuguese dogfish in subareas 1–10, 12, and 14	Elasmobranch	6.3	2019	PA
ele.2737.nea	European eel throughout its natural range	Demersal	3.14	2018	PA
gag.27.nea	Tope in subareas 1–10, 12, and 14	Elasmobranch	5.2	2019	PA
gfb.27.nea	Greater forkbeard in subareas 1–10, 12, and 14	Demersal	3.2	2018	PA
guq.27.nea	Leafscale gulper shark in subareas 1–10, 12, and 14	Elasmobranch	6.3	2019	PA
gur.27.3-8	Red gurnard in subareas 3–8	Demersal	6.2	2019	PA
hke.27.8c9a	Hake in divisions 8.c and 9.a; Southern stock	Demersal	1	2020	MP
ldb.27.7b-k8abd	Four-spot megrim in divisions 7.b–k, 8.a–b, and 8.d	Benthic	5.9	2019	PA/Stock status only
mur.27.67a-ce-k89a	Striped red mullet in subareas 6 and 8, and divisions 7.a–c, 7.e–k, and 9.a	Demersal	5.2	2017	PA
nep.fu.25	Norway lobster in Division 8.c, Functional Unit 25	Crustacean	3.14	2019	PA
nep.fu.2627	Norway lobster in Division 9.a, functional units 26–27	Crustacean	3.14	2019	PA
nep.fu.30	Norway lobster in Division 9.a, Functional Unit 30	Crustacean	3.2	2019	PA
nep.fu.31	Norway lobster in Division 8.c, Functional Unit 31	Crustacean	3.14	2019	PA
ory.27.nea	Orange roughy in subareas 1–10, 12, and 14	Demersal	6.3	2020	PA
pol.27.89a	Pollack in Subarea 8 and Division 9.a	Demersal	5.2	2019	PA
por.27.nea	Porbeagle in subareas 1–10, 12, and 14	Elasmobranch	6.3	2019	PA
raj.27.89a	Rays and skates in Subarea 8 and Division 9.a	Elasmobranch	5.9	2020	No advice
rja.27.nea	White skate in subareas 1–10, 12, and 14	Elasmobranch	6.3	2019	PA
rjc.27.8	Thornback ray in Subarea 8	Elasmobranch	3.2	2020	PA
rjc.27.9a	Thornback ray in Division 9.a	Elasmobranch	3.2	2020	PA

Stock	Stock description	Fisheries guild	Data category	Assessment year	Advice category
rjh.27.9a	Blonde ray in Division 9.a	Elasmobranch	3.2	2020	PA
rjm.27.8	Spotted ray in Subarea 8	Elasmobranch	3.2	2020	PA
rjm.27.9a	Spotted ray in Division 9.a	Elasmobranch	3.2	2020	PA
rjn.27.678abd	Cuckoo ray in subareas 6–7 and divisions 8.a–b and 8.d	Elasmobranch	3.2	2020	PA
rjn.27.8c	Cuckoo ray in Division 8.c	Elasmobranch	3.2	2020	PA
rjn.27.9a	Cuckoo ray in Division 9.a	Elasmobranch	3.2	2020	PA
rju.27.8ab	Undulate ray in divisions 8.a–b	Elasmobranch	6	2020	PA
rju.27.8c	Undulate ray in Division 8.c	Elasmobranch	6.9	2020	PA
rju.27.9a	Undulate ray in Division 9.a	Elasmobranch	6.9	2020	PA
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	Demersal	6.2	2019	PA
sbr.27.6-8	Blackspot seabream in subareas 6–8	Demersal	6.3	2020	PA
sbr.27.9	Blackspot seabream in Subarea 9	Demersal	3.2	2020	PA
sck.27.nea	Kitefin shark in subareas 1–10, 12, and 14	Elasmobranch	6.3	2019	PA
sdv.27.nea	Smooth-hound in subareas 1–10, 12, and 14	Elasmobranch	3.2	2019	PA
sho.27.89a	Black-mouth dogfish in Subarea 8 and Division 9.a	Elasmobranch	3.9	2019	PA/Stock status only
sol.27.8c9a	Sole in divisions 8.c and 9.a	Benthic	5.9	2019	PA
syc.27.8abd	Lesser spotted dogfish in divisions 8.a–b and 8.d	Elasmobranch	3.9	2019	PA/Stock status only
syc.27.8c9a	Lesser spotted dogfish in divisions 8.c and 9.a	Elasmobranch	3.9	2019	PA/Stock status only

Table A3 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 name	*Species name*
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 A4 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