Bay of Biscay– mixed-fisheries considerations

Mixed-fisheries considerations

Mixed-fisheries considerations are presented for black-bellied anglerfish (ank.27.78abd), 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).

Based on current fishing patterns and single-stock catch advice, the most limiting stock for Bay of Biscay demersal fisheries is pollack, whose quota is first reached for 15 of 22 defined fleets. The least limiting stock is black-bellied anglerfish (11 of 22 fleets).

Eight mixed-fisheries scenarios are presented to illustrate trade-offs in catches, fishing mortality, and SSB given stock interactions (descriptions in Table 1). The potential for quota over- and undershoot linked to the most and the least restrictive single-stock fishing opportunities for 2022 is presented in Figure 1. This analysis includes some pelagic species which are mainly caught outside of the Bay of Biscay. The assumptions used in the "SQ_E" scenario may not be appropriate for the fleets which target these species; hence, this scenario should be interpreted with caution for horse mackerel and other pelagic species.

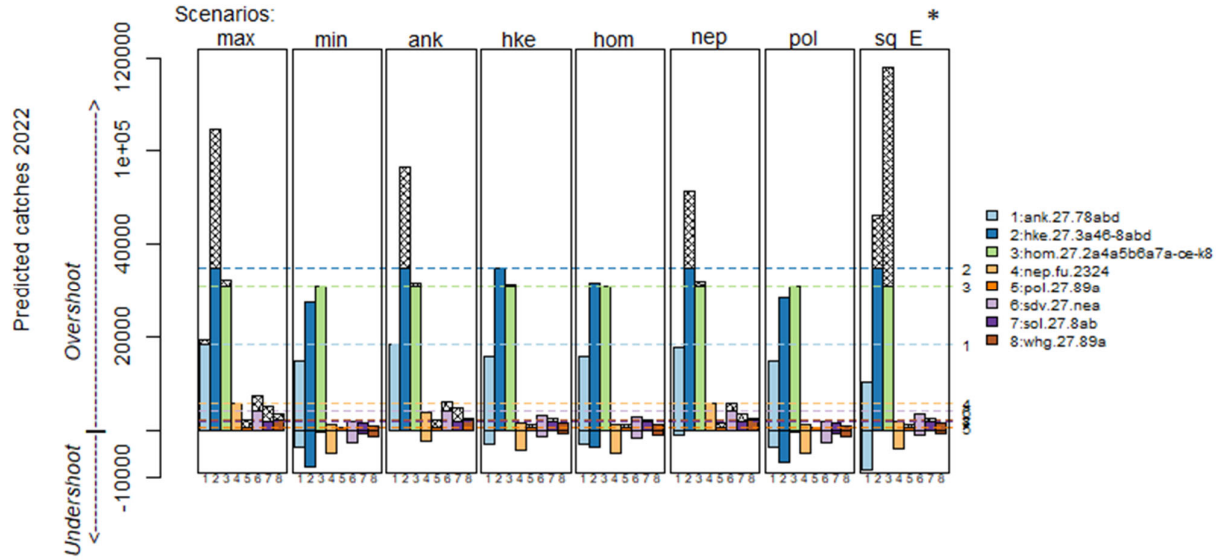

Figure 1 Mixed fisheries for the Bay of Biscay. Mixed-fisheries projections. Estimates of potential catches (in tonnes) by stock and scenario (described in Table 1). The horizontal lines correspond to the single-stock advice. The bars below the value of zero show undershoot (compared to single-stock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

Table 1 Mixed fisheries for the Bay of Biscay. Mixed-fisheries scenarios.

Scenario code	Scenario
max	**"Maximum":** For each fleet, fishing in 2022 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 in 2022 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, and can highlight some potential "choke species" issues.
ank	**"Black-bellied anglerfish PA approach":** All fleets set their effort in 2022 corresponding to their black anglerfish quota share, regardless of other catches. This option causes overfishing of some stocks and underutilization of others.
hke	**"Hake MSY approach":** All fleets set their effort in 2022 corresponding to their hake quota share, regardless of other catches. This option causes overfishing of some stocks and underutilization of others.
hom	**"Horse mackerel MSY approach":** All fleets set their effort in 2022 corresponding to their horse mackerel quota share, regardless of other catches. This option causes overfishing of some stocks and underutilization of others.**
nep	**"Norway lobster MSY approach":** All fleets set their effort corresponding to their Norway lobster quota share, regardless of other catches. This option causes overfishing of some stocks.
pol	**"Pollack PA approach":** All fleets set their effort in 2022 corresponding to their pollack quota share, regardless of other catches. This option results in an underutilization of the single-stock advice possibilities of other stocks.
sq_E	**"*Status quo* effort":** The effort of each fleet in 2022 is set equal to the average effort in the most recent three years recorded for which landings and discard data are available (2018–2020).

***** 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 2022 and the historical proportion of the stock landings taken by the fleet (2018–2020).

** 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 advice regimes based on the fishing patterns of the various fleets in recent years (2018–2020). Scenario assumptions for the intermediate year (2021) and forecast year (2022) are listed in Table 2. These assumptions may differ from those used in the single-stock forecasts.

Table 2 Mixed fisheries for the Bay of Biscay. Assumptions made in the intermediate year (2021) and in the forecast year (2022)

Variable	Value
Effort per fleet (2021)	Days at sea: average of most recent years (2018–2020)
Fishing patterns (2021-2022)	Catchability by stock and metier: average of most recent years (2018–2020) Effort-share by métier: average of most recent years (2018– 2020)
Quota allocations (2022)	Catch-share by fleet: average of most recent years (2018–2020)
Catches outside of the Bay of Biscay (2022)	Associated with a single additional fleet per stock ("OT_*_-9"), which follows the fleet effort control rules used by other fleets for a given scenario.

The ICES single-stock catch advice for demersal stocks in 2022 is based on either existing management plans, ICES MSY approach, or ICES precautionary approach (PA). Mixed fisheries catch scenarios can take specific management priorities into account. These catch scenarios are described in Table 1. The resulting catch by scenario in the advice year (2022) is provided in Table 3, along with the single-stock advice for reference. The resulting fishing mortality (F) value for 2022 is shown in Table 4 and spawning-stock biomass (SSB) at the beginning of 2023 in Table 5. Scenario results show that it is not possible to achieve all management objectives simultaneously under the current fishing patterns. For instance, if decreasing fishing mortality for pollack is the major objective and fleets stop fishing after exhaustion of their pollack catch advice, this would mean that the catch advice for other species in the mixed fisheries may not be fully utilized. As a

consequence, scenarios that result in under- or overutilization are useful in identifying the main mismatches between the fishing opportunities for the various stocks, where limiting catch advice can create potential “choke species” effects at fleet level. Such scenarios indicate the direction in which fleets may have to adapt to more fully utilize these catch opportunities without increasing the risk of unwanted catch.

The “min” scenario is based on the assumption that the fishery stops for a fleet once one of the stock quotas is exhausted, representing a full implementation of the EU’s landings obligation. For 2022, the results of the "pol“ scenario are similar to the “min” scenario, indicating that the pollack (“pol”) is the limiting stock for the majority of fleets. The pollack and horse mackerel (“hom”) 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 2022, the results in none of the scenarios are similar to the “max” scenario, indicating that the least limiting stock varies from fleet to fleet. The black-bellied anglerfish (“ank”), smooth-hound (“sdv”), and megrim ("meg”) scenarios generate the highest overshooting of the TACs, indicating that they are among the less limiting stocks.

Pollack is estimated to be the most limiting stock in the Bay of Biscay mixed-fisheries model. The catch advice for this stock has suffered a sharp reduction in 2022 (39%). For 2022, assuming a strictly implemented landing obligation (corresponding to the “min” scenario), the pollack (“pol”) scenario is estimated to constrain fifteen out of 22 fleet segments (Figure 2). Horse mackerel is the next most limiting stock, constraining three fleet segments (Figure 2). Conversely, in the “max” scenario, black-bellied anglerfish, smooth-hound, and Norway lobster would be the least limiting for eleven, four, and three fleet segments, respectively.

The *status quo* “sq_E” scenario sets the effort of each fleet in 2021 and in 2022 equal to the average of the effort in the most recently recorded three years for which data are available (2018–2020). 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 2022 TAC overshoot for hake, pollack, and sole. Substantial overshoots are also indicated for horse mackerel and blue whiting. However, these are associated with targeted pelagic fleets fishing mainly outside of the area. The assumption of *status quo* effort is likely to be unrealistic for these fleets, hence the results for the pelagic stocks should be treated with caution.

Horse mackerel, mackerel, and blue whiting are included in these analyses as they are potential choke species for some demersal fleets. 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, blue whiting, and horse mackerel is negligible.

Table 3 Mixed fisheries for the Bay of Biscay. Catch scenarios for 2022 for single-stock advice (in tonnes) and mixed-fisheries scenarios (Figure 1, Table 1).

Stock	Single-stock catch advice 2022*	Catches per mixed-fisheries scenario 2022							
		max	Min	ank	hke	hom	nep	pol	sq_E**
ank.27.78abd	18661	19494	15134	18661	16015	15837	17795	15142	10312
hke.27.3a46-8abd	75052	104569	67421	96460	75052	71696	91472	68378	86348
hom.27.2a4a5b6a7a-ce-k8**	71138	72384	71057	71894	71337	71138	72218	71089	117915**
mac.27.nea**	794920	796259	794391	795678	794804	794505	795848	794435	775104**
meg.27.7b-k8abd	22964	27250	20988	25869	22187	21744	25064	21004	22064
mon.27.78abd	34275	37759	32531	36705	33661	33467	35841	32534	30965
nep.fu.2324	6075	6075	1293	3926	1880	1405	6075	1293	2206
pol.27.89a	905	2517	905	2351	1421	1393	1786	905	1540
sdv.27.nea	4441	7588	2054	6240	3209	2981	5898	2073	3545
sol.27.8ab	2233	5441	1606	4923	2706	2542	3666	1612	2736
whb.27.1-91214**	752736	752756	752734	752750	752737	752734	752750	752734	980101**
whg.27.89a	2276	3553	1025	2833	1739	1417	2844	1056	1864

* Advised catches of no more than the indicated value.

** The assumptions used in the "SQ_E" scenario may not be appropriate for the fleets which target pelagic species, hence this scenario should be interpreted with caution for horse mackerel and other pelagic species.

Table 4 Mixed fisheries for the Bay of Biscay. TAC year (2022) fishing mortality forecast by scenario (Figure 1, Table 1) The F range is averaged across the same ages as those used for the single-stock assessment and is not presented for category 3 stocks or Norway lobster.

Stock	Single-stock advice F(2022)	Basis for the advice	F(2022) resulting from mixed-fisheries scenario							
			max	min	ank	hke	hom	nep	pol	sq_E**
hke.27.3a46-8abd	0.26	MSY approach	0.362	0.234	0.334	0.260	0.248	0.317	0.237	0.299
meg.27.7b-k8abd	0.191	MSY approach	0.227	0.175	0.215	0.185	0.181	0.208	0.175	0.184
mon.27.78abd	0.28	MSY approach	0.308	0.266	0.300	0.275	0.273	0.293	0.266	0.253
sol.27.8ab	0.33	MSY approach	0.804	0.237	0.728	0.400	0.376	0.542	0.238	0.404

Legend

	$F_{2022} \leq F_{MSY}$
	$F_{2022} > F_{MSY}$, $< F_{pa}$
	$F_{2022} > F_{pa}$
	$F_{2022} > F_{lim}$

Table 5 Mixed fisheries for the Bay of Biscay. Spawning-stock biomass (SSB) results from single-stock advice and different mixed-fisheries scenarios (Figure 1, Table 1). SSB is ot presented for category 3 stocks. Weights are in tonnes.

Stock	Single-stock advice SSB 2023	SSB (2023) resulting from mixed-fisheries scenarios							
		max	min	ank	hke	hom	nep	pol	sq_E**
hke.27.3a46-8abd	207398	183804	219311	191671	212137	215341	196214	218381	201123
meg.27.7b-k8abd	138512	131774	138970	133408	137676	138160	134324	138952	137801
mon.27.78abd	82203	76702	82966	78188	82180	82301	79366	82964	84107
sol.27.8ab	9372	6091	10111	6634	8958	9131	7952	10105	8927

Legend

	$SSB_{2023} > B_{pa}$ or MSY $B_{trigger}$
	$SSB_{2023} > B_{lim}$, no B_{pa} defined
	$SSB_{2023} > B_{lim}$
	$SSB_{2023} < B_{lim}$

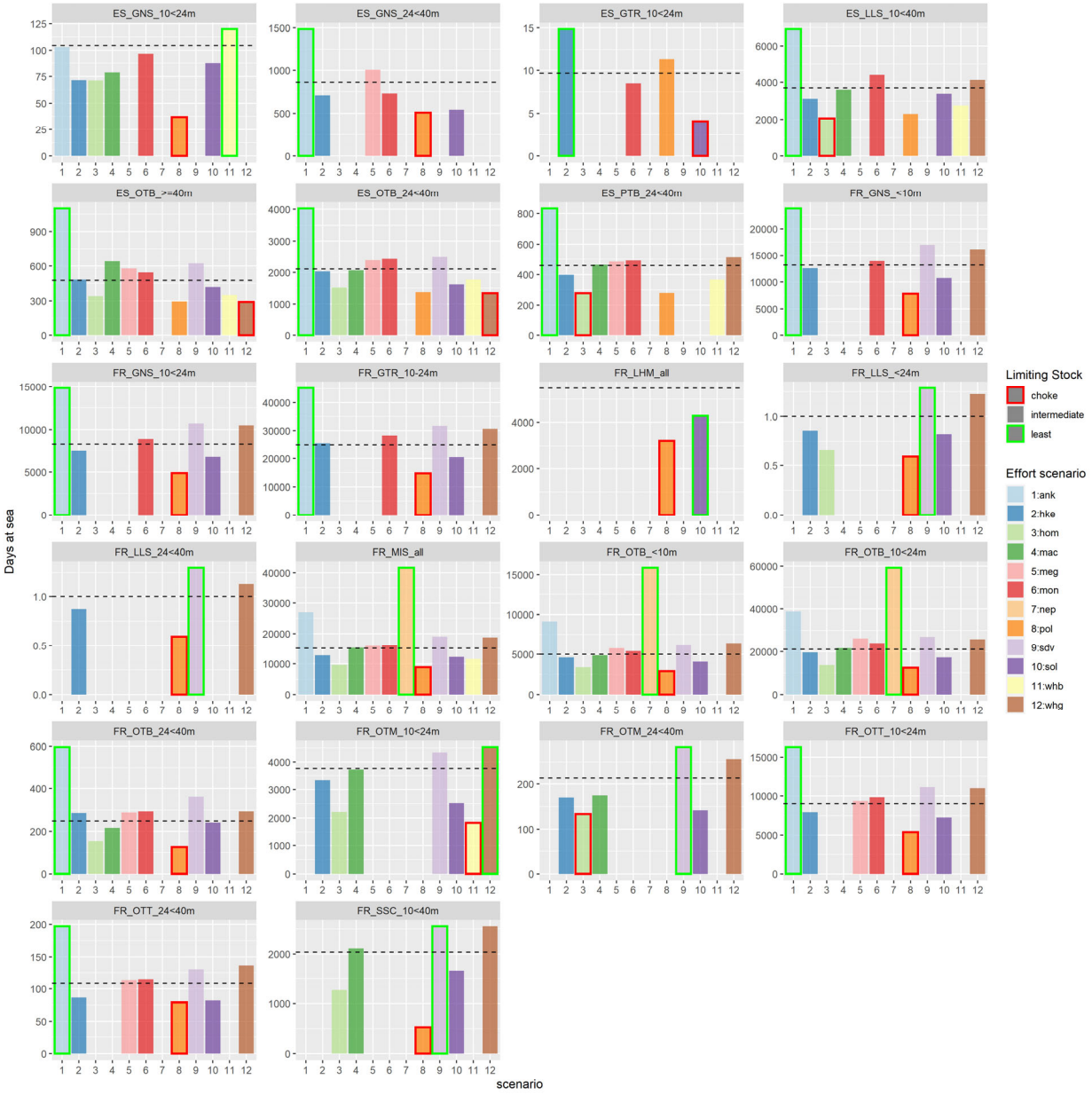

Figure 2 Mixed fisheries for the Bay of Biscay. Estimates of effort by fleet needed to reach the advice for the single stocks. The bars highlighted with a red border correspond to the most limiting species for that fleet in 2022 (choke species), whereas the bars highlighted with a green border correspond to the least limiting species. Fleet names are given by country (FR = France, 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. The *status quo* effort for each fleet (2020 values) is shown as a dashed line for reference.

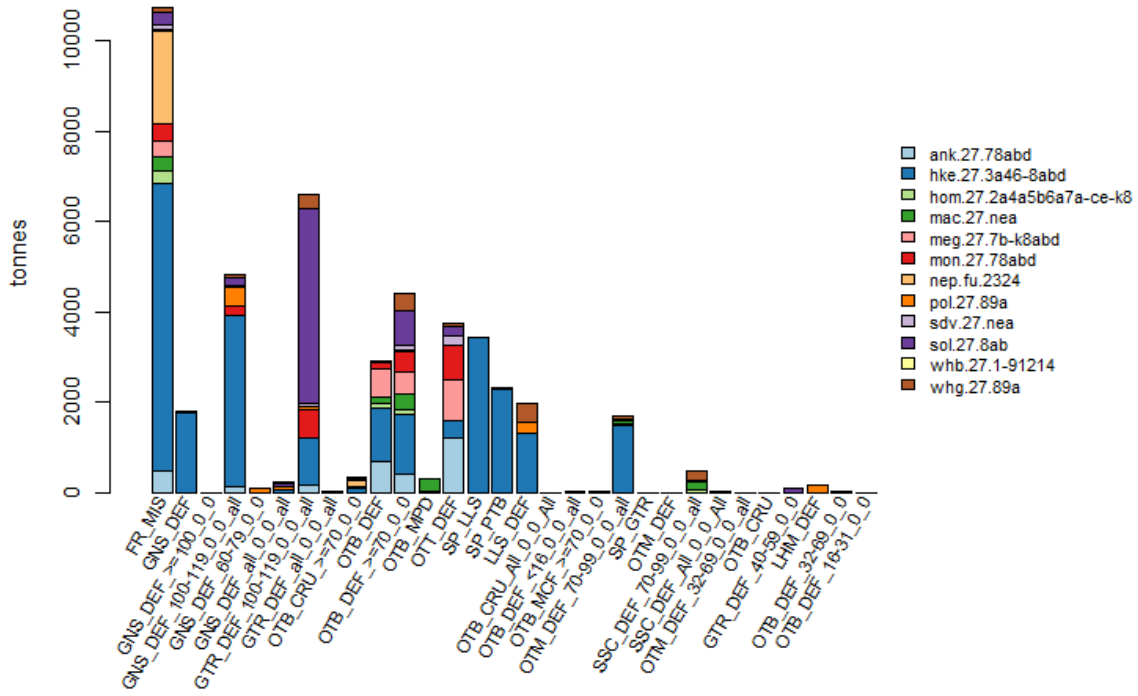

Figure 3 Mixed fisheries for the Bay of Biscay. Description of the distribution of species landed by métier in 2020. The métiers used are described in Table 8, according to the group of target species and the technical characteristics of the fishing gear.

Quality considerations

Due to methodological differences between the stochastic forecasts conducted during ICES Working Group for the Bay of Biscay and Iberian Waters Ecoregion (WGBIE) and the Working Group on Widely Distributed Stocks (WGWIDE) for several stocks (i.e. hake, megrim, horse mackerel and blue whiting) and the deterministic forecast done within WGMIXFISH (ICES, 2021a), some discrepancies are to be expected between the single-stock advice and the baseline run reproducing this advice at WGMIXFISH. Despite these methodological differences, the differences observed this year were small (< 12%) for all stocks, and the WGMIXFISH deterministic forecast was considered close enough to the single-stock advice to be used as a basis for the mixed-fisheries projections.

The fleet segments used in the mixed-fisheries analysis are defined by combining the country and the fishing gear group (Figure 3). These gear groupings differ to those used last year due to a change in the methods used by France to allocate metiers, which resulted in more than half of French catch and effort being allocated to a miscellaneous fleet (FR_MIS [Figure 3]).

Table 6 Mixed fisheries for the Bay of Biscay. The basis of the assessment.

ICES stock data categories	1, 3, 5, and 6 (ICES, 2021b)
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 (WGBIE; ICES, 2021c), Working Group on Elasmobranch Fishes (WGEF; ICES, 2021d) and Working Group on Widely Distributed Stocks (WGWIDE; ICES, 2021e); 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	WGBIE (ICES, 2021c), WGEF (ICES, 2021d), WGWIDE (ICES, 2021e), and the Working Group on Mixed Fisheries Advice (WGMIXFISH-ADVICE; (ICES, 2021a)

Methods and data

Mixed-fisheries considerations are based on 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 2021 and 2022 as in the most recent year. 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 (2018–2020) covers the period during which the EU landing obligation was introduced so the input data reflect recent changes in fishing pattern over this period. It has not been possible to predict further changes in fishing patterns over the projection period.

The species considered here as part of the Bay of Biscay demersal mixed-fisheries are black-bellied anglerfish, hake, horse mackerel, mackerel, megrim, white anglerfish, Norway lobster, pollack, smooth-hound, sole, blue whiting, 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 2020 relative catch distribution is shown by stock and by métier in Figures 3 and 4, respectively. In the analysis, the catch and effort for category 3 and category 5 stocks is forecasted under the assumption that the product of the catchability and biomass in the forecast years (2021 and 2022) can be approximated by the mean of the product in the historical years (2018–2020 [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.

Pollack has been included in the analysis for the first time this year. As a category 5 stock it is included in the mixed-fisheries forecasts here; however, no single-stock forecasts are available.

Mean total landings (2018–2020) of all species considered in the mixed fisheries advice in the Bay of Biscay demersal fishery were 42 438 tonnes, with:

- 27% by otter trawls;
- 29% by gill- and trammel nets;
- 13% by set longlines and handlines;
- 5% by pair trawls; and
- 26% by a miscellaneous group of gears.

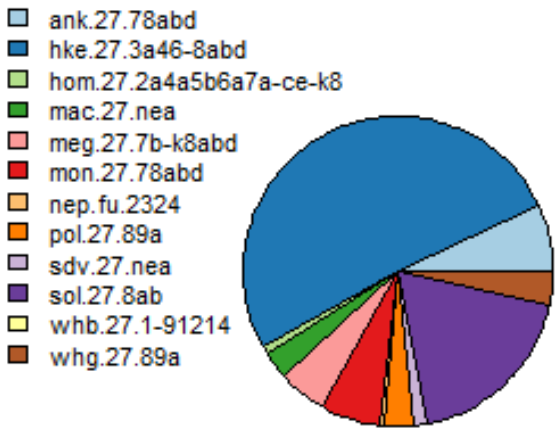

Figure 4 Mixed fisheries for the Bay of Biscay. Catch distribution by species

Table 7 Mixed fisheries for the Bay of Biscay. ICES single-stock advice area and management areas for the species considered.

Species	ICES single-stock advice area	Management area
Black-bellied anglerfish	Subarea 7 and divisions 8.a–b and 8.d (Celtic Seas, Bay of Biscay)	Combined TAC for anglerfish stocks. Subarea 7 Divisions 8.a, 8.b ,8.d, 8.e
Hake	Subareas 4, 6, and 7, and divisions 3.a, 8.a–b, and 8.d, Northern stock (Greater North Sea, Celtic Seas, and the northern Bay of Biscay)	Division 3a EU and UK waters of Division 2.a and Subarea 4 Subareas 6 and 7; EU, UK and international waters of Division 5.b; international waters of subareas 12 and 14 Divisions 8.a, 8.b, 8.d , and 8.e
Horse mackerel	Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k (Northeast Atlantic)	EU and UK waters of Division 2.a, Division 4.a; Subarea 6, divisions 7.a-c, 7.e-k, 8.a, 8.b, 8.d and 8e; EU and international waters of Division 5.b; international waters of subareas 12 and 14 Division 8.c
Mackerel	Subareas 1–8 and 14, and in Division 9.a (Northeast Atlantic and adjacent waters)	Norwegian waters of divisions 2.a and 4.a Division 3.a and Subarea 4; EU and UK waters of divisions 2.a, 3.b, 3.c and subdivisions 22–32 Subareas 6 and 7, divisions 8.a, 8.b, 8.d and 8.e; EU, UK and international waters of Division 5.b; international waters of Division 2.a, subareas 12 and 14 Division 8.c, subareas 9 and 10; EU waters of CECAF 34.1.1
Megrim	Divisions 7.b–k, 8.a–b, and 8.d (west and southwest of Ireland, Bay of Biscay)	Combined TAC for megrim stocks. Subarea 7 Divisions 8.a, 8.b, 8.d and 8.e
White anglerfish (monkfish)	Subarea 7 and divisions 8.a–b and 8.d (Celtic Seas, Bay of Biscay)	Combined TAC for anglerfish stocks. Subarea 7 Divisions 8.a, 8.b ,8.d, 8.e
Norway lobster	Divisions 8.a and 8.b, functional units 23–24 (northern and central Bay of Biscay)	Divisions 8.a, 8.b, 8.d and 8.e
Pollack	Subarea 8 and Division 9.a (Bay of Biscay and Atlantic Iberian waters)	Divisions 8.a, 8.b, 8.d and 8.e Division 8.c Subareas 9 and 10; EU waters of CECAF 34.1.1
Smooth-hound	Subareas 1–10, 12, and 14 (Northeast Atlantic and adjacent waters)	No TAC
Sole	Divisions 8.a–b (northern and central Bay of Biscay)	Divisions 8.a and 8.b
Blue whiting	Subareas 1–9, 12, and 14 (Northeast Atlantic and adjacent waters)	Norwegian waters of subareas 2 and 4 EU, UK and international waters of subareas 1, 2, 3, 4, 5, 6, 7, divisions 8.a, 8.b, 8d, 8.e, subareas 12 and 14 EU and UK waters of Subarea 2, Division 4.a, subareas 5 and 6 north of 56° 30’ N and Subarea 7 west of 12° W Division 8.c, subareas 9 and 10; Union waters of CECAF 34.1.1 Faroese waters
Whiting	Subarea 8 and Division 9.a (Bay of Biscay and Atlantic Iberian waters)	Subarea 8

Table 8 Mixed fisheries for the Bay of Biscay. Métier categories used in the analysis.

Acronym	Definition
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	Trammel net targeting demersal fish with mesh sizes > 100 mm
GTR_DEF_40-59_0_0	Trammel net targeting demersal fish with mesh sizes 40–59 mm
GTR_DEF_all_0_0_all	Trammel net targeting demersal fish
LHM_DEF	Handline targeting demersal fish
LLS_DEF	Set longline targeting demersal fish
FR_MIS	Other gear types
OTB_CRU	Norway lobster bottom otter trawl
OTB_CRU_>=70_0_0	Norway lobster bottom otter trawl with mesh sizes ≥ 70 mm
OTB_CRU_All_0_0_All	Norway lobster bottom otter trawl
OTB_DEF	Bottom otter trawl directed to demersal fish
OTB_DEF_<16_0_0_all	Bottom otter trawl directed to demersal fish with mesh sizes < 16 mm
OTB_DEF_>=70_0_0	Bottom otter trawl directed to demersal fish with mesh sizes ≥ 70 mm
OTB_DEF_16-31_0_0	Bottom otter trawl directed to demersal fish with mesh sizes 16–31 mm
OTB_DEF_32-69_0_0	Bottom otter trawl directed to demersal fish with mesh sizes 32–69 mm
OTB_MCF_>=70_0_0	Bottom otter trawl directed to mixed cephalopods and demersal fish with mesh sizes ≥ 70 mm
OTB_MPD	Bottom otter trawl directed to mixed pelagic and demersal fish with mesh sizes ≥ 70 mm
OTM_DEF	Medium water otter trawl directed to demersal fish
OTM_DEF_32-69_0_0_all	Medium water otter trawl directed to demersal fish with mesh sizes 32–69 mm
OTM_DEF_70-99_0_0_all	Medium water otter trawl directed to demersal fish with mesh sizes 70–99 mm
OTT_DEF	Twin otter trawl directed to demersal fish
SP_GTR	Spanish trammel net
SP_LLS	Spanish longliners
SP_PTB	Spanish bottom pair trawl directed to demersal fish with mesh sizes ≥ 70 mm
SSC_DEF_70-99_0_0_all	Fly shooting seine with mesh sizes 70–99 mm
SSC_DEF_All_0_0_All	Fly shooting seine

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. There are also issues with assumption of *status quo* for pelagic fleets operating mainly outside of the Bay of Biscay which merit further investigation.

Some important stocks for the Bay of Biscay demersal fisheries have not been included because of several issues. These stocks are sea bass (bss.27.8ab), thornback ray (rjc.27.8), cuckoo ray (rjn.27.678abd), and undulate ray (rju.27.8ab). The sea bass has not been included as it was not possible to reproduce the advice; this is probably related to the way the recreational catches are introduced in the model not being properly clarified to the WGMIXFISH members. Rays have not been included this year because of suspected problems with species labelling.

Pollack has been included in these analyses for the first time because it is caught by most fleets. It has been identified as a potential major choke species. This result is due to the relatively high reduction in catch advice indicated for 2022 (41% reduction compared to 2020 catches).

Catches of three large pelagic stocks (blue whiting, 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.

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. 2018. Working Group on Mixed Fisheries Advice Methodology (WGMIXFISH-METHODS). ICES Scientific Reports, 1:58. 56 pp. http://doi.org/10.17895/ices.pub.5576.

ICES. 2021a. Advice on fishing opportunities. *In* Report of the ICES Advisory Committee, 2021. ICES Advice 2021, section 1.1.1. https://doi.org/10.17895/ices.advice.7720.

ICES. 2021b. Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE). ICES Scientific Reports, 3:48. 1101 pp. https://doi.org/10.17895/ices.pub.8212.

ICES. 2021c. Working Group on Elasmobranch Fishes (WGEF). ICES Scientific Reports, 3:59. 822 pp. https://doi.org/10.17895/ices.pub.8199.

ICES. 2021d. Working Group on Widely Distributed Stocks (WGWIDE) ICES Scientific Reports, 3:95. 874 pp. http://doi.org/10.17895/ices.pub.8298.

ICES. 2021e. Working Group on Mixed-fisheries Advice (WGMIXFISH-ADVICE). ICES Scientific Reports, http://doi.org/10.17895/ices.pub.9094. In preparation.

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