

1 Introduction

Working Group for the Bay of Biscay and the Iberian Waters Ecoregion

1.1 Stock-by-stock summary

1.1.1 Anglerfish (*Lophius piscatorius* and *L. budegassa*) in Subarea 7 and divisions 8.a, 8.b, and 8.d

Both species are caught on the same grounds and by the same fleets and are usually not separated by species in the landings. Anglerfish is an important component of mixed fisheries taking hake, megrim, sole, cod, plaice, and *Nephrops*. France contributes to most of the landings for the combined species in this area and has done so since 1990. Since 2011, the landings of both species combined have been above the average of the time-series. The TAC for both species combined was set at 57 967 t for 2023 (EU, 2023) which is very close to the combined catch/landings corresponding to advice for the two species of 61 081 t.

Age determination problems and an increase in the uncertainty in the discard levels have prevented the performance of an analytical assessment since 2007. Since then, the assessments were based on examining commercial LPUEs and survey data (biomass, abundance indices and length distributions from surveys). In 2018, both stocks were benchmarked (WKANGLER; ICES, 2018b) with *Lophius piscatorius* attaining an age-based analytical assessment with reference points and forecast and assessed following the category 1 framework (ICES, 2023a). *L. budegassa*, however, continued with assessing the status of the stock through examination of survey-based trends based on the framework for category 3 stocks until 2021 (ICES, 2021d). At the beginning of 2022, both stocks were benchmarked (WKANGHAKE; ICES, 2023b) and are now analytically assessed as length-based age-structured Stock Synthesis models (SS; Methot Jr. and Wetzel, 2013). *L. piscatorius* remains a category 1 stock while *L. budegassa* was upgraded from a category 3 (ICES, 2021d) to 1 (ICES, 2022d; 2023b).

Both stocks are under the EU multiannual management plan (EU MAP; EU, 2019a). However, there is no agreed shared Management Plan with the UK for this stock and ICES provides advice according to the ICES MSY approach. Catch scenario consistent with the MAP F_{MSY} ranges are provided.

For *L. piscatorius*, the available data indicate that the biomass has been increasing because of the good recruitment observed in 2001, 2004, 2009, 2014 and 2018. The F is calculated as the average annual F for ages 3–15 ($F_{ages\ 3-15}$). In 2022, ICES assessed that $F_{ages\ 3-15}$ of the stock is below F_{MSY} , which has been the case since 2010. The spawning stock size is above $MSY\ B_{trigger}$, B_{pa} , and B_{lim} . There is evidence of good recruitment in the more recent years until 2020, which was followed by a considerable decline in 2021.

The assessment for *L. budegassa* excludes Division 7.a as they are only found in very small numbers at the very southern edge of this area. The discarding rate is 16% of the total catch weight, slightly lower than the value estimated in 2022 (ICES, 2022c), but still is a significant change and increase from the 2021 value (ICES, 2021d). The discard rate revision in 2022 is due to a data revision of discards submitted by Ireland in 2020 (ICES, 2022c). A new assessment method was implemented during the WKANGHAKE (ICES, 2023b) for this stock. New reference points were also estimated. Like *L. piscatorius*, this stock is now assessed using the SS framework (Methot Jr. and Wetzel, 2013) and as a result, it was upgraded to category 1 (ICES, 2023b; e; h). The SS

assessment indicates that the biomass has increased and is now at its highest level of the time-series, like that observed using the previous assessment based on combined survey trends (ICES, 2021d). However, recruitment in 2020 increased significantly and is the highest value observed in the whole time-series which was followed by a considerable decline in 2021. The fishing mortality (F), calculated as the average annual F for ages 3–10, ($F_{\text{ages 3–10}}$) is below F_{MSY} and SSB is above $MSY B_{\text{trigger}}$, B_{pa} and B_{lim} .

Although the stocks are assessed separately, they are managed together.

For stock-specific reporting, see section 3.

1.1.2 Anglerfish (*L. piscatorius* and *L. budegassa*) in divisions 8.c and 9.a

Both species are caught in mixed bottom-trawl and artisanal fisheries using mainly fixed nets. The two species are usually landed together for most commercial categories and they are recorded together in port statistics. Total southern anglerfish landings increased in the early eighties reaching a maximum level in 1986 (9433 t) and 1988 (10 021 t) and decreased after that to a minimum of 1801 t in 2001. In the 2002–2005 period landings increased reaching 4757 t. This period was followed by a gradual decrease in landings which reached, in 2011, less than half of the 2005 amount (2105 t). From 2011 to 2014, landings slightly increased to 3030 t. Annual values then progressively decreased again to 1195 t in 2022, the lowest value recorded in the stocks' historical time-series.

Landings for *L. piscatorius* and *L. budegassa* in 2022 were 574 t and 621 t, respectively. The combined TAC was set at 3868 t for 2022 and 4335 t for 2023 (EU, 2023). The reported landings in 2022 were 31% of the established TAC. Both stocks are included in the EU MAP (EU, 2019a) in Western waters and adjacent waters. Although the stocks are assessed separately, they are managed together.

The two species were benchmarked in 2018 (WKANGLER; ICES 2018b) and are assessed separately using the Surplus Production in Continuous Time model (SPiCT; Pedersen and Berg, 2017), tuned with commercial LPUE series for *L. budegassa* following a category 2 approach (ICES, 2022a) and a length-based age-structured stock synthesis (SS; Methot Jr. and Wetzel, 2013) model following a category 1 approach (ICES, 2018b; 2023a; e; h) for *L. piscatorius*. *L. budegassa* was benchmarked again with SPiCT in WKMSYSPiCT in 2021 (ICES, 2021b) where a thorough evaluation of input data, model settings and diagnostics was performed. Although already assessed with SPiCT, this stock was upgraded from a category 3 to 2 stock (ICES, 2021b; 2022c), with relative reference points and the advice is based on projections performed with the model (ICES, 2022a; 2023e; h).

The biomass of *L. piscatorius* decreased during the 1980s and early 1990s but has progressively increased over the last two decades. The biomass has been estimated to be above the biomass reference point $MSY B_{\text{trigger}}$ since 2005. For 2023, spawning-stock biomass (SSB) is above $MSY B_{\text{trigger}}$, B_{pa} , and B_{lim} . The F is calculated as the average annual F for ages 3–15. $F_{\text{ages 3–15}}$ peaked during the late 1980s but has since declined and has been below F_{MSY} since 2010. Recruitment at age-0 has been relatively low in recent years with a slight increase in 2019 and 2021.

Trends in relative biomass of *L. budegassa* indicate a steady decrease from the beginning of the series until 2002 and an increasing trend was observed since then. For 2023, biomass is above $MSY B_{\text{trigger}}$ and B_{lim} . The F is calculated as the average annual F for ages 3–10. $F_{\text{ages 3–10}}$ remained at high levels between the late 1980s and late 1990s then progressively declined from 2000 onwards. $F_{\text{ages 3–10}}$ is below F_{MSY} since 2007.

For stock-specific reporting, see section 4.

1.1.3 Megrim (*Lepidorhombus whiffiagonis* and *L. boscii*) in divisions 7.b–7.k, 8.a, 8.b, and 8.d

Lepidorhombus spp. in divisions 7.b–7.k, 8.a, 8.b, and 8.d is caught in a mixed demersal fishery with anglerfish, hake and *Nephrops*. Both are targeted species and are also considered as valuable bycatch. The two species are landed and recorded together in port statistics. Information from landings is available since 2017 for *L. boscii* which provided a rough proportion for splitting the two species. Before 2017, all landings were assigned as *L. whiffiagonis*.

The highest landings in the time-series were observed in the year 1989 (19 233 t). Since 2013 (16 025 t), landings declined with no constant trend. Landings in 2022 declined to 10 821 t, the lowest in the whole time-series. Discarding of smaller megrim is substantial and also includes individuals above the minimum landing size (MLS) of 20 cm. The discards were variable, between 1966 t (2019) and 6243 t (2004). Discards in 2022 were 2340 t, around historical mean.

The *L. whiffiagonis* was benchmarked early this year (WKMEGRIM, 2023d) and is now assessed using the “assessment for all” framework (a4a; Jardim *et al.*, 2015; Millar and Jardim, 2019), replacing the previous Bayesian catch-at-age model (Plummer, 2003) which was used as a full analytical assessment since 2016 until 2021. During the WKMEGRIM benchmark (ICES, 2023d), a thorough evaluation of the input data, model settings and diagnostics was performed. Despite the re-estimation of new reference points and migration to a new assessment model, the overall perception of the stock remains the same (ICES, 2022c; 2023d). Catches, landings and discards data have varied without trend over the time-series, with a slight increase in 2017. Age-1 recruitment has fluctuated without trend over the time-series with 2017 to 2019 giving above-average values followed by a decline in the most recent years. In 2022, recruitment value is 140 647 t, the second lowest in the whole time-series. Biomass has steadily declined to its lowest level in 2006, keeping stable and increasing abruptly since 2017, with the most recent years SSB well above MSY $B_{trigger}$, B_{pa} , and B_{lim} . In 2023, SSB reached 95 559 t, which is the highest in the whole time-series. The average annual F for ages 3–6 ($F_{ages\ 3-6}$) decreased in recent years and is below F_{MSY} since 2019.

Before 2017, *L. boscii* in this area was unassessed. This stock was included in the ICES data call for the first time in 2018 and historical catch data were also requested. The *L. boscii* data on catches, landings, and discards for 2017–2020, were available to WGBIE and official landings are recorded under the combined species of *Lepidorhombus* spp. Data available from surveys did not provide adequate information to assess the status of the stock.

Sampling in 2020 was negatively affected by the COVID-19 pandemic and France could not estimate four-spot megrim catches for this year. LFDs for landings and discards were also not available from all countries due to the difficulty of accessing samples in 2020. For this reason, catches data from 2017 to 2019 are deemed to be the most reliable in the time-series and are used to determine recent average catches. The average discarding rate is around 17%.

Currently, *L. boscii* is classified as a category 5 (ICES, 2023a) data-limited stock (DLS) as only data on catch since 2017 is available with very limited information from surveys. The last advice for this stock under the precautionary approach was provided in 2022 where catches for each of the years 2023, 2024 and 2025 should be no more than 867 t.

ICES provides annual advice for *L. whiffiagonis* whereas the advice for *L. boscii* was provided for the first time in 2021. Catches in 2024 for *L. whiffiagonis* should be no more than 23 303 t when the MSY approach is applied (ICES, 2023a; e; h).

The combined TAC for *L. whiffiagonis* and *L. boscii* was set at 23 459 t for 2023 (EU, 2023).

Although the stocks are assessed separately, they are managed together.

For stock-specific reporting, see section 5.

1.1.4 Megrim (*L. whiffiagonis* and *L. boscii*) in divisions 8.c and 9.a

Southern megrims, *L. whiffiagonis* and *L. boscii*, are caught in mixed fisheries targeting demersal fishes including hake, anglerfish, and *Nephrops* and are not separated by species in landings. The majority of the catches are taken by Spanish trawlers. Landings of both species combined in 2022 were 954 t of which < 30% corresponds to *L. whiffiagonis*.

Both species were benchmarked in early 2022 during the WKMEGRIM (ICES, 2023d). Both were previously assessed separately, using the Extended Survivor Analysis model (XSA; Shepherd, 1999). Since 2022, the a4a framework (Millar and Jardim, 2019) is implemented as the analytical assessment for these stocks. During the WKMEGRIM benchmark (ICES, 2023d), a thorough evaluation of the input data, model settings and diagnostics was performed. The overall perception of the stocks remains quite similar despite the revision of the reference points for each of the two stocks (ICES, 2022c; 2023a; e; h).

For *L. whiffiagonis*, the assessment indicates that annual $F_{\text{ages 2-4}}$ (calculated as the average annual F for ages 2–4) has been erratic over time, ranging between 0.1 and 0.5, decreasing progressively since 2020 and is below F_{MSY} since 2020. The SSB values have fluctuated at a low level from 2000–2016 which was followed by a sharp increase since 2018 and is now estimated to be well above $\text{MSY } B_{\text{trigger}}$. Recruitment values for the stock have been high since 2015. In 2022, recruitment is the second highest for the whole time-series.

For *L. boscii*, the new assessment indicates that SSB decreased gradually from 1990 to 2001, the lowest value in the series, and has increased since then. The 2022 SSB was estimated to be the highest of the series, well above $\text{MSY } B_{\text{trigger}}$. Recruitment has fluctuated between 20 and 80 million. Top values were observed during the years 2014–2016 then decreased afterwards to low values from 2020 to 2022. Estimates of $F_{\text{ages 2-4}}$ values show two different periods: an initial period with values around 0.5 from 1989 to 1995 followed by a second period with an oscillating but overall decreasing trend. $F_{\text{ages 2-4}}$ has declined more sharply since 2016 and has been below F_{MSY} since 2017, with the lowest values in the whole time-series estimated during the last three years.

The agreed combined TAC for megrim and four-spot megrim in ICES divisions 8.c and 9.a was set at 2445 and 3250 t (EU, 2023) in 2022 and 2023, respectively. Management of catches of the two megrim species under a combined TAC prevents effective control of the single-species exploitation rates and could lead to the overexploitation of either species. Both stocks are included in the EU MAP for stocks in the Western waters and adjacent waters (EU, 2019a). A minimum conservation reference size (MCRS) set at 20 cm in this area was issued for this stock (EU, 2019b).

For stock-specific reporting, see section 6.

1.1.5 Sole in divisions 8.a and 8.b

The Bay of Biscay sole is caught in ICES divisions 8.a and 8.b. The fishery has two main components: one is a French gillnet fishery directed at sole (about two-thirds of total catch) and the other one is a trawl fishery (French otter or twin trawlers and Belgian beam trawlers). This is a category 1 stock (ICES, 2023a) assessed using an age-based Extended Survivor Analysis (XSA) model (Shepherd, 1999). The TAC was set at 2233 and 2685 t (EU, 2023) for 2022 and 2023, respectively. Landings show a declining trend since 1994 (7229 t) reaching 2306 t in 2022, the historical minimum value for this stock.

The 2022 ORHAGO survey was not used in this year's assessment because half of the hauls were missing due to bad weather conditions (ICES, 2023i). Details on this issue's impact to and

proposed resolutions based on additional analyses to support WGBIE decisions on how to proceed with the assessment and advice of this stock are provided in subsection 1.3 of this chapter, section 7 and by Lecomte, 2023 (WD 1 in this report; ICES, 2023h). Discards are not included in the assessment as these are considered to be negligible for the ages included in the assessment, which starts at age 2.

The F is calculated as the average annual F for ages 3–6. Since 1986, $F_{\text{ages 3-6}}$ has gradually increased, peaking in 2002 (~0.8, highest value of the whole time-series) and decreasing substantially afterwards to 0.26 in 2022, the lowest value for the whole time-series. The SSB trend in earlier years increased from 1984 to a high value in 1993 (~16 000 t) showing afterwards a continuous decrease until 2003 (9559 t), the lowest value of the series. After this drop, SSB showed an increase and fluctuated around and above $MSY B_{\text{trigger}}$. At the beginning of 2022, SSB is estimated to be below $MSY B_{\text{trigger}}$ and B_{pa} . The recruitment series for age 2 ($R_{\text{age 2}}$) shows a decreasing trend since 1991 (~40 million individuals) declining towards a minimum value in 2021 (<10 million individuals).

In addition to the EU MAP (EU, 2019a), the industry implemented a mesh size restriction of ≥ 80 mm for the bottom trawls for the periods from 1 January to 31 May and from 1 October to 31 December. A seasonal closure was also applied during the spawning period, 1 January to 31 March, for the directed fishery for common sole. This closure consists of three periods of seven consecutive days for a total of 21 days of closure.

Since 2015, the French sole fishery in the Bay of Biscay (ICES divisions 8.a and 8.b) has been subjected to additional management measures aimed at reducing F and improving the recruitment level of the stock. Since 2016, these measures have concerned at least a 15-day fishing activity suspension during the first quarter for netters and a reinforcement of the trawl selectivity for at least 8 months of the year (including the first quarter). In 2022, additional management measures were again applied by the French sole fishery committee in the Bay of Biscay. A mechanism of temporary cessation of fishing activities have been set up for the benefit of the French fleet of gillnetters and bottom trawlers, which contributes to >90% of total landings of this stock, in order to compensate for the socio-economic consequences of the drastic reduction of the 2022 TAC as well as the French fishery consideration of preponderant impact and role of environmental factors (i.e. water quality, global change, etc.) affecting the changes in stock dynamics, particularly on recruitment decline. The details of the mechanism implemented are available in Annex 4 in the report.

For stock-specific reporting, see section 7.

1.1.6 Sole in divisions 8.c and 9.a

The Portuguese and Spanish fisheries are mainly targeting the southern *Solea solea*. This stock is mainly caught with gillnets and trammelnets. In Portugal, *S. solea* is caught together with other similar species, *S. senegalensis* and *Pegusa lascaris*. However, in recent years the reported official catches are separated by species. Historical landings of *S. solea* were corrected during the Workshop on Selected Stocks in the Western Waters (WKWEST) benchmark (ICES, 2021a). For the period 2011–2021, *S. solea* represented on average 56% of the total sole species catches, while *S. senegalensis* represented on average 24% then *Pegusa lascaris* is around 19% and finally, *Solea* spp only about 1%.

This stock was recently benchmarked during the WKWEST workshop (ICES, 2021a) and the stock was upgraded to category 3 (ICES, 2022c). Currently, an advice specific for *S. solea* is provided based on trends from the combined biomass index between commercial Portuguese LPUE and Spanish bottom trawl survey index and length-based indicators (LBIs; ICES, 2015; 2022c; 2023e).

Catches for each of the years 2024 and 2025 should be no more than 209 t if an MSY approach is applied. The catch advice is 35% lower than the previous advice due to the decline in the biomass index, the low biomass safeguard and the use of the precautionary multiplier.

Management of all southern sole species under a combined species TAC prevents the effective control of the single-species exploitation rates and could lead to the overexploitation of either species. The 2023 MSY TAC for *Solea* spp is set at 652 t (EU, 2023) similar to that for 2022 (EU, 2022a). *S. solea* accounts for 55% of the catches in the last three years. A minimum conservation reference size (MCRS) set at 24 cm in this area was issued for this stock (EU, 2019b).

Fishing pressure on the stock is below $F_{MSY\ proxy}$ and the stock size indicator is below the MSY Btrigger proxy (Itrigger). Additional information suggest that the stock is in good status (LBSPR) and is exploited sustainably (MLZ) although these were not used to provide advice but only as ancillary information.

For stock-specific reporting, see section 8.

1.1.7 Hake in subareas 4, 6, and 7, and divisions 3.a, 8.a, 8.b, and 8.d

Northern hake is caught in nearly all fisheries in subareas 7 and 8, and in some fisheries in subareas 4 and 6. France accounts for the main part of the catches, followed by Spain and Scotland. Landings decreased steadily from 1989 to 1998. Up to 2003, landings fluctuated at around 40 000 t. Since then, landings have been increasing up to around 107 500 t in 2016 which is the highest value in the whole time-series. Since 2016, catches have been decreasing every year and are below both the TAC and the catch advice. TAC for 2023 is set at 31 422 t (EU, 2023). Catches in 2022 were 69 382 t. Discards are available since 2002. From 2003 until 2010, discards were provided as a total in all the divisions and subareas where the northern hake is caught. In 2014, discards were allocated to specific divisions where the highest discarding occurs in divisions 4 and 7. The discards had an increasing trend until 2013 and decreased steadily afterwards. In 2022, the total estimated discards were around 1951 t.

This stock was benchmarked in 2022 during the WKANGHAKE (ICES, 2023b). During this benchmark, the assessment model was updated under the same SS framework (Methot Jr. and Wetzel, 2013), using the most recent version of the software. The revised model includes an additional fleet (OTHER fleet disaggregated in trawlers and non-trawlers since 2013) and a new survey, the IE-IAMS (G3098). The population dynamics are now sex-separated with sex-dependent growth and natural mortality.

The assessment was carried out according to the Stock Annex, which was updated during the benchmark, and the group accepted the assessment as appropriate to providing advice. Catches in 2024 should be no more than 72 839 t if the MSY approach is applied. The advice for 2024 is 12% lower compared to 2023 due to the decreasing SSB trends. Compared to the 2022 assessment (ICES, 2022c), the retrospective pattern for 2023 showed significant and slight improvements for recruitment and F_{1-7} , respectively, while the female-only SSB is out of bounds.

The recruitment of age-0 ($R_{age\ 0}$) appears to fluctuate without a substantial trend over the years where the 2007 estimated value was the highest of the time-series (2177 million individuals) while the values since 2020 were slightly below the historical mean (~600 million individuals). From high levels at the start of the series (92 thousand t in 1980), the SSB decreased steadily to a low level at the end of the 1990s (~30 thousand t in 1998). Since then, SSB has increased to the highest value of the series in 2015 (~294 thousand t) then decreased progressively until 2023 (163 204 t). The F is calculated as the average annual F for ages 1–7. Values of $F_{ages\ 1-7}$ increased from values of around 0.30–0.37 in the late 1970s and early 1980s to values around 0.60 during

the 1990s. Between 2006 and 2013, $F_{\text{ages 1-7}}$ declined sharply. Since 2009, $F_{\text{ages 1-7}}$ remains below F_{MSY} (0.21). The $F_{\text{ages 1-7}}$ estimate for 2022 is 0.191.

The stock is considered under the EU MAP in the Western waters and adjacent waters (EU, 2019a). This plan is not adopted by Norway and the UK. Thus, it was not used as the basis of the advice for this widely distributed and shared stock. ICES was requested to provide an advice based on the MSY approach and to include the MAP as a catch option.

For stock-specific reporting, see section 9.

1.1.8 Hake in divisions 8.c and 9.a

Hake in divisions 8.c and 9.a is caught in a mixed fishery by Spanish and Portuguese trawlers and artisanal fleets. Spain accounts for the main part of the landings (~2/3), followed by Portugal (~1/3) and small amounts from France (~1%). Total catches were over 20 000 t in 1983 then decreased to 7 824 t in 2004. This was followed by an increase to 22 175 t in 2009 which decreased again afterwards to 7 582 t in 2022 (historical minimum). Total discards are decreasing since 2014 (2602 t), declining to a value of 595 t in 2022 (historical minimum).

The EU MAP for stocks in the Western waters and adjacent waters has been agreed by the EU for this stock (EU, 2019a). Hake is managed by a TAC and technical measures. The agreed TAC for southern hake in 2022 and 2023 were 14 429 and 15 925 t (EU, 2023), respectively, almost twice of the TAC value in 2021. A minimum conservation reference size (MCRS) set at 27 cm in this area was issued for this stock (EU, 2019b).

The southern hake stock was benchmarked in 2014 (WKSOUTH; ICES 2014) with the GADGET model (Begley and Howell, 2004). In 2020, the assessment was updated and the model was rejected due to its strong and persistent retrospective pattern which was not possible to resolve (ICES, 2020b). Thus, the stock was downgraded to category 3 and the advice produced in 2020 for 2021 was based on trends, following the rules of a category 3 stock (ICES, 2012a; 2018a; 2019a). The stock was benchmarked again in early 2022 during the WKANGHAKE (ICES, 2023b). The main objective was to change the assessment model used for the stock to the SS framework (Methot Jr. and Wetzel, 2013). New reference points were estimated and implemented in the new length-age-based SS approach. The stock was upgraded again as a category 1 stock (ICES, 2022c; 2023b).

Recruitment at age 0 ($R_{\text{age 0}}$) is highly variable with a minimum of 111 million (2012) and a maximum of 565 million (2005), with a mean value of around 250 million individuals. Values in 2020–2022 are around the historical mean.

F is calculated as the average annual F for ages 1–7. $F_{\text{ages 1-7}}$ increased from 1982 ($F_{\text{ages 1-7}} = 0.26$) and peaked in 1995–1997 to around 0.85–0.90, then decreased to 0.30 in 2006 and remained relatively stable until 2016. In recent years, $F_{\text{ages 1-7}}$ has been decreasing and reached a value of 0.164 in 2022, which is below F_{MSY} (0.221).

The SSB was very high in the early 1980s (40 000 t in 1982), then decreased to a minimum level of around 3000 t in 1998. After that, the biomass has been increasing with a peak value observed in 2011 (~20 000 t) then began to slightly decrease until 2017 (~13 000 t) after which the value started to increase again and attained a value of 21 905 t in 2023.

When the EU MAP (EU, 2019a) is applied, forecasted catches in 2024 that corresponds to the F ranges are between 9 119 and 17 445 t (ICES, 2023a). With F_{MSY} ($F_{\text{ages 1-7}} = 0.221$) the projected catches in 2024 would be 12 919 t, with 11 783 t of landings and 1136 t of discards, whereas the SSB_{2025} would be 26 726 t.

In September 2022, DGMARE requested a revision of the catch advice given for 2022 using the new modelling approach after WKANGHAK (ICES, 2023b). An updated advice for catches in 2022 was released on 12 October 2022¹ and Annex 10 (Cerviño *et al.*, 2022) was added to the WGBIE 2022 report to document this revision (ICES, 2022c).

For stock-specific reporting, see section 10.

1.1.9 Nephrops in divisions 8.a and 8.b (FUs 23–24)

There are two functional units (FUs) in ICES divisions 8.a and 8.b: FU 23 (Bay of Biscay North) and FU 24 (Bay of Biscay South), see Figure 1.2. *Nephrops* in these FUs are almost exclusively exploited by the French trawlers. Landings declined until 2000, from 5281 t in 1988 to 2848 t in 2000. After that year, they increased again to around 3421 t, remaining at levels > 3000 t until 2006. From 2007–2009, landings have been around 2800 t then increased to about 3200 t during the next 2 years. In 2012 and 2013, a reduction in the annual landings occurred (2290 t in 2012 and 2195 t in 2013) followed by an increase to 3425 t in 2015. In 2020, total nominal landings reached 2273 t, close to the historically lowest level of its time-series in 2018 (2125 t). In 2021, an increase of landings (3006 t) occurred which is an increase of 24% compared to 2020. This was followed by a 10% decrease in 2022 (2 694 t) compared to 2021.

The agreed TAC for 2022 was 3880 t and is fixed at 4 631 t for 2023 (EU, 2023).

A French regulation increased the minimum landing size in 2006 and several effort and gear selectivity regulations have also been put in place in recent years. The use of selective devices for trawlers targeting *Nephrops* became compulsory in 2008. All these measures are expected to be contributing in various ways to the change of landings and discard patterns recently observed. In general, discards values after 2000 have been higher than in earlier years, although sampling only occurred on a regular basis from 2003, so information about discards is considerably weaker for the earlier period. Since 2017, the use of a discarding quick-chute system onboard has become compulsory. This measure has a direct impact on the survival rate of discards. In 2019, a new survival rate of 50% was accepted for use in the assessment and advice of the stock during the WKNephrops workshop (ICES, 2020c).

This stock was benchmarked in WKNEP in 2016 (ICES, 2017b) which reviewed the methods proposed using an underwater television survey (UWTV). The outcome of this evaluation process classified the stock as a category 1 stock and the methods developed were considered appropriate to assessing the stock and provision of advice (ICES, 2023a).

In 2022, the survey area was revised and reduced by 10%, removing part of the grounds with rough bottom which systematically presents zero burrows density. This work, presented in Annex 6 (Fifas *et al.*, 2022) in the WGBIE 2022 report (ICES, 2022c) was validated by an appointed reviewer for the WGNPS (Working Group on *Nephrops* Surveys) in November 2019 (ICES, 2020c).

No quantitative analytical assessment was carried out during the WG in spring since the survey used for the assessment had not been completed yet. An update of the assessment and the report will be carried out after the WG and the advice will be provided in October 2023.

For stock-specific reporting, see section 11.

¹ ICES. 2022. EU request for an updated advice for hake (*Merluccius merluccius*) in divisions 8.c and 9.a, Southern stock (Cantabrian Sea and Atlantic Iberian waters) for catches in 2022. In Report of the ICES Advisory Committee, 2022. ICES Advice 2022, sr.2022.14, <https://doi.org/10.17895/ices.advice.21316344>

1.1.10 *Nephrops* in Division 8.c (FUs 25 and 31)

There are two FUs in Division 8.c (Figure 1.2): FU 25 (North Galicia) and FU 31 (Cantabrian Sea).

Nephrops are caught in a mixed bottom-trawl fishery in the North and Northwest Iberian Atlantic. Landings from both FUs have declined dramatically in recent years reaching less than 15 t in each FU in 2015 which was below the agreed TAC in recent years despite being non-restrictive. The TACs were set at 0 t for all of Division 8.c for each of the years 2017, 2018, 2019 and 2020. However, a scientific quota was established for *Nephrops* in each of the FUs in order to undertake an observer programme from 2018 to 2020.

Until 2020, these stocks were assessed based on the analyses of the LPUE series trends according to the ICES DLS approach (ICES, 2015), both stocks were considered as category 3.1.4 (ICES, 2023a). In 2021, these two stocks were benchmarked during the WKMSYSPICT (ICES, 2021b) and both were upgraded to category 2 stocks (ICES, 2022a; 2023a; e) based on the SPiCT model (Pedersen and Berg, 2017) assessment, that estimated the FU stock-specific relative reference points, and is now used as the basis for advice. For both stocks, catches and SpGFS-WIBTS-Q4 (G2784) bottom trawl survey abundance index time-series were used as input data. Since 2021, the ICES-specific advice for both FUs 25 and 31 were based on the SPiCT outputs (ICES, 2021b; 2022c; 2023h).

A recovery plan for southern hake and Iberian *Nephrops* stocks has been implemented in 2006 (EU, 2005) and was repealed in 2019 with the EU MAP for stocks in the Western waters and adjacent waters has been agreed by the EU for this stock (EU, 2019a).

In FU 25, F is below F_{MSY} since 2012 and the total biomass is below B_{lim} since 1997. ICES provided a zero-catch advice in 2022 for each of the years 2023, 2024 and 2025 (ICES, 2022a; 2023a; e) as the stock size has been below B_{lim} with no signal of recovery (ICES, 2022c; 2023h).

For FU 31, F is below F_{MSY} since 2009 and the total biomass is below B_{MSY} and $MSY B_{trigger}$ since 2000 and now it is above B_{lim} . Catch projections for 2024 should not be more than 12.4 t if the MSY approach is applied. This advice for 2024 is 29% lower this year than that provided in 2023 due to the downwards scaling of the stock size relative to the reference points. This year the new MSE of HCR is applied to the FU 31 assessment and advice (Method 1; ICES, 2022a).

A single TAC covers the entire ICES Division 8.c. In 2016, a zero TAC was set for *Nephrops* in ICES Division 8.c for each of the years 2017, 2018 and 2019. In 2019, this measure was advised again for each of the years 2020, 2021 and 2022. However, *Nephrops* agreed TAC for division 8.c was split by FU since 2022 based on the ICES advise that the management area should be consistent with the assessment area. Thus, a specific TAC was set for each FU since 2022 (ICES, 2022c). The agreed TAC in 2022 for 2023 based on the SPiCT assessment was 0 t for FU 25 and 17 t for FU 31 (EU, 2023).

For stock-specific reporting, see section 12.

1.1.11 *Nephrops* in Division 9.a (FUs 26–27, 28–29, and 30)

There are five FUs in Division 9.a (Figure 1.2): FU 26 (West Galicia), FU 27 (North Portugal), FU 28 (Alentejo, Southwest Portugal), FU 29 (Algarve, South Portugal) and FU 30 (Gulf of Cádiz). To ensure that the stocks in these FUs are exploited sustainably, ICES advises that management should be implemented at the FU level.

Landings from the five FUs combined were 207 t in 2021 and 148 t in 2022. The TAC set for the whole of subareas 9 and 10 and Union waters of CECAF 34.1.1 was 355 t for 2022 and 298 t (EU, 2023) for 2023, respectively.

A recovery plan for southern hake and Iberian *Nephrops* stocks had been in force since 2006. The recovery plan aims to rebuild the stocks within 10 years, with a reduction of 10% in F relative to the previous year and the TAC set accordingly (EU, 2005). In March 2019, the European Parliament and the Council have published the MAP for the Western Waters and adjacent waters (EU, 2019a) which repealed the previous recovery plan. This plan applies to demersal stocks including *Nephrops* in ICES Division 9.a.

1.1.11.1 FUs 26 and 27 (West Galicia and North Portugal)

The fishery shares the same characteristics as that in Division 8.c, described above.

The advice for these *Nephrops* stocks was triennial (ICES, 2023a). The last advice given in 2019 was valid for 2020, 2021 and 2022. However, as it is now considered a category 2 stock since 2022, a new advice according to this category was provided (ICES, 2022c). For *Nephrops* in FUs 26–27, ICES advised that when the precautionary approach is applied, there should be zero catch for each of the years 2022, 2023 and 2024.

Landings are reported by Spain and, in minor quantities, by Portugal. Since 2012, quantities have been similar and at very low levels (≤ 7 t). Spanish fleets fish in FU 26 and FU 27, whereas Portuguese artisanal fleet fish with traps in FU 27. Two periods can be distinguished in the landings time-series available from 1975–2020. During 1975–1989, the mean landing was 680 t, fluctuating approximately between 575 and 800 t. From 1990 onwards, there has been a marked downward trend in landings, being below 50 t from 2005 to 2011. In the last nine years, landings continued to decrease and are currently below 10 t. Discard rates are considered negligible.

This stock was considered as a category 3.1.4 according to the ICES data-limited approach since 2012 (ICES, 2012) and was assessed by the analysis of the LPUE series trend. *Nephrops* in FUs 26–27 were recently benchmarked during the WKMSYSPiCT (ICES, 2021b). In 2022, the stochastic production SPiCT model (Pedersen and Berg, 2017) was accepted for assessment and the stock was upgraded to a category 2 (ICES, 2021b; 2022c). Since 2022, this stock is being assessed using the SPiCT model (ICES, 2022c) and advice is provided accordingly (ICES, 2023a).

Nephrops landings in FU 2627 decreased to more than 95% along the time-series while the biomass survey indices indicate extremely low biomass. Biomass is below $MSY B_{trigger}$ since the end of the 1980s while F is below F_{MSY} since 2012.

For stock-specific reporting, see section 13.1.

1.1.11.2 FUs 28 and 29 (Southwest and South Portugal)

Nephrops are taken by a multispecies and mixed bottom-trawl fishery. The trawl fleet is comprised of two components: one targeting fishes that operates along the entire coast while the other targeting crustaceans but operates mainly in deep waters along the southwest and southern areas. There are two main target species in the crustacean fishery, Norway lobster and deep-water rose shrimp, with different but overlapping depth distributions. In years of high rose shrimp abundance, the fleet directs its effort to this species as a preference.

The advice for this stock is biennial and is valid for each of the years 2024 and 2025. Based on the ICES approach for DLS, catches in 2022 for FUs 28 and 29 should be no more than 213 t in each of the years 2024 and 2025 if the precautionary approach is applied (ICES, 2023a). The catch advice is 20% lower than the previous advice due to the decline in biomass index (ICES, 2023h). To ensure that the stock in FUs 28 and 29 is exploited sustainably, ICES advises that management should be implemented at the FU level.

For the period 1984–1992, the recorded landings from FUs 28 and 29 have fluctuated between 420 and 524 t, with a long-term average of about 480 t followed by a declining period in 1990–1996 down to 132 t. From 1997 to 2005, landings increased to levels observed during the early

1990s, decreasing again in recent years. The landings in 2009–2011 were stable at around 150 t, increasing to 299 t over the years 2014–2018. Landings in 2021 and 2022 were 207 and 148 t, respectively. There are no discards of *Nephrops* in the fishery (ICES, 2023h).

According to the ICES DLS approach, this stock is classified as category 3.2.0 (ICES, 2015) and the advice is based on standardized CPUE and effort trends (ICES, 2023a). Standardized effort shows a consistent declining trend until 2010, fluctuating at low levels since. The standardized CPUE model, used as an index of biomass, was reviewed during WKMSYSPiCT (ICES, 2021b) and presents a slightly increasing trend since 2014 with some fluctuations. Proxy reference points were estimated using the Mean-Length Z (MLZ) approach as defined in WKLIFE V (ICES, 2015) with the standardized effort. The results indicate that the stock is exploited at levels below the F_{MSY} reference point.

This stock was last benchmarked during the WKMSYSPiCT in early 2021 (ICES, 2021b) where the SPiCT method (Pedersen and Berg, 2017) was implemented for assessment and to produce the advice. However, given the available input data for the stock, the proposed stochastic production SPiCT model during the WKMSYSPiCT workshop was rejected. Thus, the stock remains in category 3 (ICES, 2022c; 2023a; e; h).

This year, the ICES framework for application of the ‘*rbf*’ rule category 3 stocks (Method 2.1 in ICES, 2022a) was not applied as the fishing pressure indicator from the MLZ issued from WKMSYSPiCT (ICES, 2021b) provides a more complete information compared to the value estimated using the new ‘*rbf*’ rule (Method 2.1 in ICES 2022a; 2023a; e; h). Further details and supporting arguments are provided in the specific report section for the stock.

For stock-specific reporting, see section 13.2.

1.1.11.3 FU 30 (Gulf of Cádiz)

Nephrops in the Gulf of Cádiz are caught in a mixed fishery by the trawl fleet. Landings are markedly seasonal with high values from April to September. Landings were reported by Spain and, in minor quantities, by Portugal. Landings in 1995 was 131 t which significantly decreased in 1996 (49 t). Higher levels were observed at the beginning of the 2000s and reached 307 t in 2002 which is the highest value for the whole time-series. Landings decreased again until 2008 fluctuating at around 100 t from 2008 to 2012. In 2013–2015, landings dropped to around 20 t, due to a sanction applied by the European Commission for Spain having exceeded the quota in 2012 so that the *Nephrops* fishery was closed with vessels only fishing for *Nephrops* for a few days during summer and winter periods. From 2016, effort and landings have resumed back to levels seen prior to this period, with the inclusion of the unreported landings. Estimates since 2016 are considered the best information available.

According to the ICES DLS approach, this stock is classified as category 3.2.0 (ICES, 2015) and the advice is based on the underwater TV survey (UWTV) series trends. Qualitative evaluation suggests declining B with F unknown. No quantitative analytical assessment was carried out during the WG in spring since the survey used for the assessment had not been completed yet. The UWTV survey was not conducted in 2020 due to the COVID-19 disruption which led to the absence of an abundance index estimate for 2020. The advice for 2021 was produced based on the survey trends assuming for 2020 the same abundance estimate as 2019. The results from the 2021 survey indicate that the biomass of the stock was reduced. Following the rules for advice of category 3, ICES advises that when the precautionary approach is applied, catches in 2024 should be no more than 32 t. The 2023 catch advice is 36% lower than 2022 due to the decrease in the abundance estimate and the application this year of the precautionary buffer (ICES, 2023a; e; h).

In 2022, a review of the survey area has been carried out, removing areas of no occurrence of Norway lobster based on the seabed morphological, sediment, and habitat updated information as well as on bottom trawl survey data and beam trawl hauls carried out during UWTV surveys

in this FU (ICES, 2022c). The area was reduced by approximately 22% with minor effect on the abundance estimates. The UWTV survey index time-series has been updated, taking into account the new survey area. The 2022 survey results indicate that the biomass is at the lowest level of the series.

This report will be updated in autumn when the 2023 UWTV survey results are available and the advice for 2024 is proposed.

For stock-specific reporting, see section 13.3.

1.1.11.4 General comments

The five *Nephrops* FUs (assessed as 3 separate stocks) are managed jointly, with a single TAC set for the whole of subareas 9, 10 and CECAF 34.1.1. Since 2018, a maximum limit on landings from FU 30 is included in the TAC regulation. This may lead to unbalanced exploitation of individual stocks. The northernmost stocks (FUs 26–27) are at extremely low levels, whereas the southern ones (FUs 28–29 and FU 30) are in better condition.

The TAC set for the whole Division 9.a was 374 t for 2021, of which no more than 6% may be taken in FUs 26 and 27, and no more than 65 t may be taken in FU 30. For 2022, the TAC for Division 9.a was set as 355 t, with a maximum of 50 t for FU 30. The TAC set for the whole division 9.a for 2023 was set at 298 t, with a maximum of 32 t for FU 30 (EU, 2022c). No catches are allowed to be taken in FUs 26 and 27.

A single TAC covers the entirety of ICES subareas 9 and 10, and EU waters of CECAF 34.1.1. Since 2022, the regulation has different catch limits for each FU in this area.

1.1.12 Sea bass in divisions 8.a and 8.b

Sea bass in the Bay of Biscay is targeted by France (more than 97.9% of international landings in 2021) by line fisheries (handlines and longlines) which take place mainly from July to October. Other exploitations such as nets, pelagic trawlers, and mixed bottom-trawl fisheries occur from November to April, the period when pre-spawning and spawning grounds when sea bass aggregate. Since the late 1990s, total landings were stable with an average of around 2600 t over time. Landings of netters are highly dependent on weather conditions and have increased since 2011 due to a decrease of sole quotas from 2011 and a redistribution of effort towards this species combined with good weather conditions in 2014. In 2022, total landings decreased slightly compared to 2021. Recreational removals are an important part of the total fisheries but these are not accurately quantified. Discards are known to take place but are not fully quantified. The available data suggests that discards can be considered negligible (< 5%).

The sea bass stock in the Bay of Biscay was benchmarked in 2017 (WKBASS, ICES 2018c), and 2018. Currently, the assessment of the stock relies on a short data time-series: length composition time-series started in 2000; age-at-length time-series started only in 2008 (with a proper sampling after 2010); recreational data were surveyed for only one year in 2010. In addition, there is no scientific survey for adult sea bass to scale the model to an appropriate level of abundance. There is no survey for recruits either. All these elements introduce uncertainties in the assessment. The stock is being benchmarked in 2023 and 2024 addressing some of these problems. The stock identification workshop held early this year was already discussed (WKSEABSSID; ICES, 2023b) above which included both the recreational removals and commercial landings and is tuned by commercial landings per-unit-effort series.

The only available tuning index fluctuates without trend with the years 2012 to 2016 showing a decline and then an increase in 2017. The SSB fluctuated around 20 000 t. SSB is currently around $MSY B_{trigger}$ and B_{pa} and well above B_{lim} . The recruitment for age 0 ($R_{age 0}$) series was variable and

is ~ 30 million individuals per year. Below average R_{age0} were observed for each of the years 2010, 2015 and 2016. F is estimated as the average of ages 4–15 ($F_{ages\ 4-15}$), has fluctuated without trend over the time-series. Currently, $F_{ages\ 4-15}$ is decreasing and is below F_{MSY} .

Sea bass in the Bay of Biscay is not subjected to the EU TACs and quotas but is ruled by an EU multiannual plan (MAP; EU, 2019a) for the Western waters and adjacent waters since 2019. When the EU MAP (EU, 2019a) is applied, catches (include both commercial catch and recreational removals) in 2023 that correspond to the F ranges in the MAP are between 2897 and 3398 t, and catches corresponding to F_{MSY} are 3464 t.

For stock-specific reporting, see section 14.

1.1.13 Sea bass in divisions 8.c and 9.a

Spanish and Portuguese vessels represent almost all the total annual landings in divisions 8.c and 9.a. Commercial landings represented 815 t in 2021 and 816 t in 2022, values lower than in 2020 (896 t). A peak in landings was observed in 1989–1990 and again in 2013, reaching a value of 1046 t while the lowest landings have been observed in 1980, 1981, and 1985 and in 2003. Landings in 2003 is the lowest in the entire time-series (466 t). Discards from observer programmes show that discarding is negligible for this stock. Recreational removals are not quantified but considered not negligible.

This stock was last benchmarked in 2012 (ICES, 2012c). No stock assessment is carried out as the stock is considered as a DSL category 5.2.0 (ICES, 2012a; 2023e). Advice is given every two years. Information on abundance and exploitation are not yet available and the update of the landings data does not change the perception of the stock.

This stock is included in the EU MAP for Western Waters and adjacent waters (EU, 2019a) but not subjected to EU TACs and quotas. Advice for this stock is based on the precautionary approach. Commercial catches in each of the years 2024 and 2025 should be no more than 382 t if ICES rule is applied since the precautionary buffer was already applied in 2021. Landings are well above the advised catch since 2014.

For stock-specific reporting, see section 15.

1.1.14 Plaice in Subarea 8 and Division 9.a

Plaice (*Pleuronectes platessa*) are caught as bycatch by various fleets and gear types covering small-scale artisanal and trawl fisheries. Portugal and France are the main participants in the fishery with Spain playing a minor role. Present fishery statistics are considered to be preliminary as there are concerns about the reliability of data. Landings may also contain misidentified flounder (*Platichthys flesus*) as they are often confounded at sales auctions in Portugal. The quantity of discarding is uncertain. For these reasons, the landings are unlikely to be a good indicator of total removals and ICES considers that it is not possible to quantify the catches.

This stock is ranked as a DLS in category 5.2.0 (ICES, 2012; 2022c; 2023a; e) as only landings data are available. In 2022, the stock catch data were updated and the perception of the stock has not changed. The development of a SPiCT model was explored during the WKBMSYSPiCT2 workshop in late 2022 but was rejected (ICES, 2023g). Thus, this remains as category 5 stock.

This stock is included in the EU MAP for Western Waters and adjacent waters (EU, 2019a) and is under the EU landing obligation since 2016. The advice for this stock is biennial (ICES, 2023a) and the last advice was released in 2021 (ICES, 2021d). This year, ICES advises that landings should be no more than 124 t for each of the years 2024 and 2025 if the precautionary approach is applied.

The TAC for this stock is set at 155 t (EU,2023). A minimum conservation reference size (MCRS) set at 30 cm in this area was issued for this stock (EU, 2019b).

For stock-specific reporting, see section 16.

1.1.15 Pollack in Subarea 8 and Division 9.a

Pollack is mainly caught by France (77%) and Spain (18%) by several types of gears such as nets, lines and trawls. Most of the landings are from gillnets (53%) followed by the line (37%) fisheries. Since the early 2000s, the landings have been relatively stable between around 1500 and 2200 t. The recreational removals are unquantified but considered non-negligible. Discards by Spanish netters indicate that the discards are considered negligible. Discards by French netters and liners are about 1.2% and 0.1% of their catches, respectively.

The advice for this stock is biennial (ICES, 2023a) and the last advice was released in 2021 (ICES, 2021d) and, thus remains valid for this year. ICES advises that catches should be no more than 905 t for each of the years 2022 and 2023.

The stock was classified as a DLS in category 5.2.0 (ICES, 2012; 2022c) as the only available information is on catches. This year, the stock was benchmarked during the WKBMSYSPiCT2 (ICES, 2023g) meeting at the end of 2022 to explore the feasibility of using a surplus production model for assessment and provision of advice. The developed SPiCT model (Pedersen and Berg, 2017) was explored but was rejected during the WKBMSYSPiCT2 workshop (ICES, 2023g). During the WGBIE meeting this year, the ICES framework for category 3 stocks and the 'rfb' rule (Method 2.1 in ICES 2022a) were applied to provide an MSY advice on commercial catches (ICES, 2023h). Standardized LPUEs and a length-based spawning potential ratio (LBSPR) were used in the assessment and as an indicator of stock development to provide a category 3 advice (ICES, 2023a) using assessment of trends from biomass index from commercial FRANCE_GNS LPUEs, length compositions of commercial catches (2010–2022) and life-history parameters to produce assessment trends from biomass index from commercial FRANCE_GNS LPUEs and LBIs (ICES, 2023h). This proposition will be reviewed and the decision for upgrade from a category 5 to 3 will be taken during the WGBIE ADG in June 2023.

An advice based on a category 3 stock is proposed which indicates that commercial catches should be no more than 872 t in each of the years 2024 and 2025 if the MSY approach is applied under the 'rfb' rule. This catch advice is 36% lower than the reference catch and is due to the decreasing trend of the biomass index, the application of the biomass safeguard and the precautionary multiplier (ICES, 2023a; e; h).

The TAC for this stock is only set at 1648 t (EU, 2023) in Subarea 8. For Division 9.a, ICES is not aware of any precautionary management plan in this area. A minimum conservation reference size (MCRS) set at 30 cm in this area was issued for this stock (EU, 2019b).

For stock-specific reporting, see section 17.

1.1.16 Whiting in Subarea 8 and Division 9.a

Whiting (*Merlangius merlangus*) are caught in mixed demersal fisheries primarily by France and Spain. Present fishery statistics are considered to be preliminary. Total landings have fluctuated around an average of 2000 t since 2010. The 2016 landings (2525 t) are reported to be one of the highest of the time-series and decreased afterwards. In 2022, both landings and discards increased and were estimated at 1197 and 370 t, respectively. Discards and bycatch were about 27% in the period 2016–2022. Whiting has never been recorded in Spanish discards and is negligible

in Portuguese discards. However, there are indications that discarding occurs in the French fleet (ICES, 2022c).

This species is at the southern extent of its range in the Bay of Biscay and the Iberian Peninsula. It is not clear whether this is a separate stock from a biological point of view. A minimum conservation reference size (MCRS) set at 30 cm in this area was issued for this stock (EU, 2019b).

The stock was classified as a DLS in category 5.2.0 (ICES, 2012; 2022c) as the only available information is on catches. Last year, the updated time-series of landings and discards including the 2022 data did not change the perception of the stock (ICES, 2022c). In 2022, the LBI (ICES, 2017c; 2018a; b) analysis suggests that F is below the proxies of the MSY reference points (ICES, 2022c).

This year, the stock was benchmarked during the WKBMSYSPiCT2 (ICES, 2023g) meeting at the end of 2022 to explore the feasibility of using a surplus production model for assessment and provision of advice. However, the developed SPiCT model (Pedersen and Berg, 2017) was explored but rejected during the WKBMSYSPiCT2 workshop (ICES, 2023g). However, during the WGBIE meeting this year, the ICES framework for category 3 stocks and the '*rfb*' rule (Method 2.1 in ICES 2022a) were applied to provide an MSY advice on commercial catches (ICES, 2023h). The precautionary approach was applied in previous years when providing the advice for the stock (ICES, 2022c). Standardized LPUEs and a length-based spawning potential ratio (LBSPR) were used in the assessment of trends from biomass index of the commercial LPUEs and LBIs and as an indicator of stock development (ICES, 2023h). WGBIE accepted the new assessment method and agreed to provide a landings advice for a category 3 stock (ICES, 2022a; 2023a; e; h). As a category 3 stock, ICES advises that commercial landings should be no more than 1880 t in each of the years 2024 and 2025 if the MSY approach is applied.

The TAC for this stock is only set at 2276 t (EU, 2023) in Subarea 8. For Division 9.a, the TAC is delegated to the Member States.

For stock-specific reporting, see section 18.

1.2 Available data

Catch (totals and/or age-length structured) and effort data according to species, country, area and *métier* were requested in the ICES standard data call for WGBIE. A deadline of 5th April 2023 was set to prepare the datasets for the WG and progress on the use of InterCatch.

For most of the stocks assessed by WGBIE, InterCatch was used mainly to extract catch, landings, and discards data. The data delivered to accessions via worksheet format were, for some stocks, used as the primary data source and compared to the data submitted on InterCatch.

The main data problems previously detected by WGBIE was the delay in the data submission via InterCatch or accessions of catch and associated length and age samples and survey and commercial indices. However, all data were received before the WGBIE meeting without no time to perform the assessment before the WGBIE started for most stocks.

Several stocks assessed by the WG are managed employing TACs that apply to areas different from those corresponding to individual stocks, notably in Subarea 7, as well as for the *Nephrops* FUs in 8.c and 9.a, or to a combination of species in the cases of anglerfish and megrim.

1.3 Stock data problems relevant to data collection

WGBIE was made aware early this year of issues relevant to the incomplete 2022 survey for the Bay of Biscay due to bad weather conditions (see Annex 7.1 in ICES, 2023i) by the WGBEAM, affecting the estimation of the Bay of Biscay sole (sol.27.8ab) abundance. Analyses were

performed to explore the impacts of considering or not the 2022 survey (Lecomte, 2023; see WD 1 in this report). Based on results from these analyses, WGBIE decided to exclude the 2022 survey for this year's assessment. WGBIE decided to reduce the period considered for computing the geometric mean (GM) of the recruitment, considering only the years 2019–2021. The new value obtained and used for the recruitment projection resulted to a more realistic scenario where recruitment has been low in recent years (see WD 1 for detailed information).

WGBIE also suggested to the Bay of Biscay stock coordinator to explore ways to “fill-in” the missing survey year index through a model-based approach such as the vector autoregressive spatio-temporal (VAST; Thorson 2019) model that can be implemented using the publicly available VAST (www.github.com/james-thorson/VAST) package which is an approach that has been primarily implemented in 2019 in the case of Black anglerfish in Subarea 7 and divisions 8.a–b and 8.d (ank.27.78abd) due to the absence of the 2018 EVHOE-WIBTS-Q4 (G9527) abundance survey index (Gerritsen and Minto, 2019; ICES, 2019c) and since then has been accepted by ICES as a reliable approach to resolve the absence of survey abundance series issue. However, due to time constraints the stock coordinator will explore this approach intersessionally after this year's meeting and present the results as a WD at the 2024 WGBIE meeting for review and validation.

1.4 Use of InterCatch in WGBIE 2023 stock assessments

This year, most of the WGBIE SCs is still using the ICES InterCatch web-based system where national data submitters upload national fish catches, official catch statistics and survey data which are then accessed by SCs to download necessary data for their respective stock assessments. Submitted and collected information on national inputs and ICES data processing are documented and stored on this online databank and after more than a decade, progress has been made by the group with regards to the use of InterCatch for their respective assessments. Several stocks are still only partly using InterCatch in this process but as a place to hold all the raw data with the files being processed and raised externally. Currently, ICES is developing a new web-based framework that will replace InterCatch. Further details about this new data portal is provided below (see 1.13 of this section).

1.5 TAF-based stock assessments

In 2020, two WGBIE stock assessments were implemented to a Transparent Assessment Framework (TAF): the northern hake and the Bay of Biscay sole and where the two stock coordinators and/or assessors were nominated as TAF ambassadors for WGBIE.

The facility of the implementation seems to be linked with the assessment model used for each stock. The Bay of Biscay sole assessed using an age-structured XSA (Shepherd, 1999) model demanded less time and effort for coding and integration into TAF while the northern hake SS (Methot Jr. and Wetzel, 2013) assessment model required some more work (i.e. coding and data tables reformatting) for its implementation.

WGBIE considers that TAF is quite a useful tool and supports the implementation of additional stocks. The general objective is to implement the TAF-based assessment to most, if not all, of the WGBIE stocks as this process will also be complementary with the migration from InterCatch to the new ICES web data portal discussed below. However, no other stock assessment has been implemented in TAF in 2023.

1.6 Assessment and forecast auditing process

WGBIE carried out the standard audits of individual assessments and forecasts where available for all stocks assessed. Following a template provided by the ICES secretariat, the choice of assessment model, the model configuration, and the data used in the assessments have been checked against the corresponding settings described in the Stock Annex. Not all audits could be completed by the end of the WGBIE meeting specifically for three *Nephrops* stocks (nep.fu.2324, nep.fu.2627 and nep.fu.30) as the 2023 UWTW survey data needed to complete their respective assessments and advice will only be collected during the summer. The audit of these remaining stocks will be done after the meeting before the ADGNEPH in autumn.

In general, for all stocks audited during the WGBIE meeting, only minor corrections were raised by the auditors and these were corrected accordingly.

1.7 Mohn's rho

As standard practice, for each of the stocks assessed using a full analytical assessment of a category 1 of stock assessment, the Mohn's rho (Mohn, 1999) values were calculated using a 5-year peel for ten category 1 and four category 2 stocks (Figure 1.3). WGBIE assesses ten stocks that fall into this category of assessment using a combination of age and/or length structured models, either SS (Methot Jr. and Wetzel, 2013) or a4a (Millar and Jardim, 2019), and four stocks that are assessed with the SPiCT model (Pedersen and Berg, 2017). As can be observed in Figure 1.3, only three category 1 stocks (northern hake, southern white anglerfish and the Bay of Biscay sole) and two category 2 stocks have F and SSB Mohn's rho values within the 20% threshold. For the northern hake, F and SSB values showed slight retrospectivity but still along acceptable limits. Recruitment Mohn's rho values for five (northern black and white anglerfish, Bay of Biscay sea bass, southern four-spot megrim and northern megrim) out of the ten WGBIE category 1 stocks shows high retrospective bias suggesting that recruitment is not easily estimated by each of these stocks' respective assessment models.

1.8 Application new harvest control rules (HCRs) and stock assessments for categories 2 and 3

Until 2021, the ICES technical guidelines for category 3 stocks (Annex III in WKLIFE VIII; ICES, 2020) applied the revised 2-over-3 rule (ICES, 2012a; 2018a; 2019a) as the basis for the catch scenarios for providing advice. This year, this was replaced by the new '*rbf*' rule (Method 2.1 in ICES, 2022a) which is specifically used for category 3 stocks as a part of the new ICES technical guidance for HCRs and stock assessment for categories 2 and 3 stocks (ICES, 2022a). WGBIE observed that the new '*rbf*' rule does not use the available information coming from DLS methods such as LBI, LBSPR, and MLZ and the indicators used named *r*, *b* and *f*, suggest a different stock and fishery status compared with DLS methods. WGBIE suggest the development of inter-seasonal work to explore ad-hoc methods that consider the most relevant information in each case.

During the WGBIE meeting this year, these new '*rbf*' rule were applied to three stocks, namely the pollack (pol.27.89a) and whiting (whg.27.89a) in subarea 8 and division 9a as well as the sole in divisions 8c and 9a (sol.27.8c9a).

However, with regards to the *Nephrops* stock in FU 2829 (nep.fu.2829), the '*rbf*' rule was not applied for the advice in 2023 and 2024. It should be noted that in 2021, the *Nephrops* in FU 2829 stock was classified as a DLS category 3.2.0 and provided advice based on:

- the trends of the standardized commercial CPUE series (since 1998), used as the index of stock development;
- the fishing pressure determined by sex, using the Mean Length-Z with effort (THoG), defined in WKLIFE V (ICES, 2015), accepted and approved during the WKProxy (ICES, 2015), and reviewed in WKNEPS (ICES, 2020c).

The input data for this method includes the length composition of the catches, the effort series derived from the standardized commercial CPUEs, and the life-history parameters. The basis for the assessments is documented in the stock annex of the *Nephrops* stock in FU 2829 (nep.fu.2829).

WKLIFE X (ICES, 2020a) recommends that the advice for category 3 stocks should be based on the most complete information available. Based on this rationale, an advice using the new ICES 'rfb' rule (Method 2.1 in ICES, 2022a) was considered by WGBIE as a step back on the basis of the assessment for this stock as it only considers the LBI F_{MSY} proxy indicator, which in turn ignore the consideration of the effort series. Also, although both indicators suggest that the fishing pressure is below the F_{MSY} , the perception from the MLZ is that F is at a lower level than when using the LBI. For these reasons, WGBIE suggested to keep and apply the previously used advice methodology in 2021 for the years 2022 and 2023 (ICES, 2021d). Please refer to section 13.2 in this report for further details.

For the *Nephrops* in FU 30 (nep.fu.30), which is also a category 3 stock, will apply the new ICES guideline for HCRs and assessment (ICES, 2022a). The advice for this stock will be drafted, reviewed and released in autumn. It should be noted that nep.fu.30 is one of the five *Nephrops* FUs (assessed as 3 separate stocks with nep.fu.2627 and nep.fu.2829) stocks which are managed jointly with a single TAC set for the whole of subareas 9, 10 and CECAF 34.1.1. Since 2018, a maximum limit on *Nephrops* landings from FU 30 is included in the TAC regulation. Please refer to section 13.3 in this report for further details.

1.9 Stock annexes

WGBIE identified that some of the existing Stock Annexes available on the ICES sharepoint need to be updated with the revised versions which describes and defines all the current parameters and conditions used for assessment and advice. Although this seems to concern mainly those stocks that were recently benchmarked, all stock coordinators was requested to check and verify that the most recent version of the stock annex for each of their respective stocks are uploaded and available on the sharepoint.

1.10 DGMARE special request for zero catch advice

During the meeting, WGBIE was made aware of a DGMARE special request to explore alternatives to zero catch for stocks that are caught in mixed fisheries. Currently, two WGBIE stocks are concerned by this request: the *Nephrops* stocks in FUs 25 and 26–27. However, these stocks are not required to provide catch advice this year. The latest advice for each of these two stocks were released in 2022 and these catch advices remain valid for each of the years 2023, 2024 and 2025. Furthermore, the task would require mixed fishery analysis and these FUs are not implemented in the current mixed fishery model. WGBIE requested for more information and clarifications from ICES but DGMARE failed to provide sufficient details which led to an ICES decision that WGBIE is not obliged to address this request this year.

1.11 Updates on some WGBIE stocks genetic studies

In 2021, WGBIE wrote a recommendation with regards to the stock structure of white anglerfish and hake in the areas northern shelf (463a), the southern shelf north (78abd) and the southern shelf south (8c9a). Having the current ICES stock definitions in mind and reflecting upon any needs for revisions of those, WGBIE agreed that the science and the work on the assessments of these stocks have advanced sufficiently to such a stage that it was an opportune time to make a request to SIMWG and WGAGFA in 2021 to review the existing and recent literature (i.e. Aguirre-Sabairia *et al.*, 2021 and a WD by Abad *et al.*, 2021 in ICES, 2021d) with regards to the stock structure of the white anglerfish and hake in the northern shelf (463a), southern shelf north (78abd) and southern shelf south (8c9a) areas considering the current ICES stock definitions in mind and reflecting upon any needs for revisions of those, based on the new findings observed.

In 2022, WGAGFA responded positively to this request and presented some of their ongoing studies related and which may be of great interest to the WGBIE requests to the WG, specifically works that are being and/or may be conducted on the WGBIE stocks enumerated above.

This year, WGAGFA presented some preliminary results of three of their on-going genetic analyses on (1) hake genetic connectivity (Rodríguez-Ezpeleta, N. *et al.*, 2023a; WD 4 in this report), (2) anglerfish stock ID and hybridization (Rodríguez-Ezpeleta, N. *et al.*, 2023b; WD 5 in this report) (3) the exploration of using the close-kin mark-recapture (CKMR) methods to estimate accurate spawning-stock biomass for hake (Rodríguez-Ezpeleta, N. *et al.*, 2023c; WD 6 in this report) during the WGBIE meeting. Future research needs and planned genetic studies relevant to WGBIE are detailed further in this section.

WGBIE will renew request to SIMWG for further review of the northern and southern anglerfish stock IDs and population structure.

1.12 WKREBUILD2 and WKNEWREF

Two ICES workshops on rebuilding plans (WKREBUILD2) and re estimation of reference points (WKNEWREF) which were recently approved by ACOM were presented to the WG during the WGBIE meeting. These workshops are scheduled in late 2023 and early 2024 and the presentations were made not only to provide information to ACOM expert groups (EGs) but also to request the EGs to nominate stock/s in their respective WGs to participate in one or both of the two future workshops. However, the candidate stock/s that will be nominated in each ACOM EG must fulfill some of the workshop-specific requirements for potential stock consideration/participation in each workshop.

The ICES WKREBUILD2 which is already scheduled on November 2023 aims at developing guidelines and methods for the evaluation of rebuilding plans. One of the most pertinent requirements is that the stock's SSB should be below B_{lim} . WGBIE has some stocks that could be very good candidates for this workshop, mainly the *Nephrops* in FU 25 (nep.fu.25). However, due to time constraints and substantial workload of the SCs, a potential participation to this workshop will require considerable intersessional supplementary tasks especially for the nep.fu.25 SC who already has an annual WGNEP workshop scheduled in autumn. Thus, WGBIE will not be able to nominate a potential candidate stock for consideration in this workshop.

For the WKNEWREF which is scheduled in February 2024 and where the number of participants will be limited to about 25 stocks, stocks for consideration must include those that cover a wide range of geographical areas, life-history types, exploitation histories and assessment characteristics. As this workshop will occur early next year, there is a lesser risk of time constraint. Therefore, WGBIE agreed to propose four stocks to this workshop whose respective SCs are very

interested to participate and raised no issues on allotting supplementary intersessional time to prepare and perform tasks necessary for workshop participation. The four selected stocks include the northern and southern hakes and the northern white-bellied and black-bellied anglerfish.

1.13 Future implementation of the Regional Database and Estimation System (RDBES) on WGBIE stock assessments

Currently, ICES is strongly pushing through the database migration towards the RDBES framework (ICES, 2022b) as a replacement to InterCatch. The RDBES has been developed to increase transparency, ensure harmonization and enhance data quality at a regional level to facilitate fisheries assessment (ICES, 2022b). This tool, which is still under development but already usable and operational, centralizes detailed commercial fisheries sampling data and aggregated effort and landings data. This data portal aims to assist in the regional approach to survey and data collection. Currently, most stock submitters and coordinators are still using InterCatch but ICES aims that future stock assessments be carried out using the RDBES for regional data call and submissions. This gradual and successful transition from InterCatch to RDBES is ensured by continuous and collective testing and exploration of the portal. The capabilities and efficiency of this tool on estimations and raising are still being compared with InterCatch, as the latter is gradually being phased out and is planned to be completely replaced by the RDBES once explorations and testing are fully validated in 2025.

1.14 Recent benchmarks of single-species assessments

In 2022, the benchmark issues lists were completed for five stocks (two category 1 and three category 5 stocks) in preparation for potential future benchmarks and to review future research needs. The WG reviewed the stocks to be benchmarked using the benchmark prioritization scoring sheet. There are five scoring categories (with different weights) each with a score of 0, 2 to 5 (5 being the highest priority). These scores are combined and the final selection of stocks to benchmark is determined via a system of ranking all stocks assessed by ICES.

In late 2022 and early 2023, four WGBIE stocks were benchmarked, distributed between two separate benchmark workshops: WKBSEABASSID (ICES, 2023b) and the WKBMSYSPiCT2 (ICES, 2023g), respectively.

Three separate workshop benchmarks were approved by ACOM for the Bay of Biscay sea bass (bss.27.8ab) for 2023 and 2024. This first benchmark on stock identification (WKBSEABASSID) was held in January 2023 (ICES, 2023b). The workshop's objective was to review information on sea bass stock identification for the Celtic Sea (bss.27.4bc7ad-h) and the Bay of Biscay (bss.27.8ab) stocks, and conduct a comparative review of Atlantic sea bass population structure, including critical evaluation of inferences from each source of information, to build up a picture of sea bass stock structure in Celtic Sea, Bay of Biscay and adjacent areas. Some of the general conclusions established during the WKBSEABASSID workshop were (i) a substantial evidence of the stock's identity were achieved compared to the previous process made, (ii) some gaps were identified which includes the ICES division 8.b should be affiliated with, can the area of mixing be narrowed down, were all the regionally-specific Single nucleotide polymorphisms (SNPs) identified for the areas of interest and how does Scottish and Irish stocks interact with other ICES units for advice. Some highlights will be provided in section 14 of this report. However, the complete details and information on this workshop can be found on the WKBSEABASSID report (ICES, 2023b).

The WKBMSYSPiCT2 (ICES, 2023g) benchmark was held last December 2022. There were three WGBIE category 5 stocks that were included in this workshop: plaice, pollack and whiting. The objective of the workshop was to test and evaluate the feasibility of each of these three stocks to be assessed using the SPiCT method (Pedersen and Berg, 2017). During the benchmark process, the application and development of a SPiCT model was explored integrating new and revised data, when available, and newly standardized LPUes. The main conclusion from the recent WKBMSYSPiCT2 workshop was that all three SPiCT assessment models developed were not appropriate to the assessment of these stocks and, thus, all three stock-specific SPiCT model was rejected (ICES, 2023g). However, the pollack and whiting stocks applied and explored the used of trends from biomass index and commercial LPUes and/or LBIs assessment methods (ICES, 2023a; e; h) with the implementation of the new '*rbf*' rule for providing category 3 advice (Method 2.1 in ICES, 2022a) during the WGBIE meeting this year. Consequently, the revisions of the previous assessment models for each of the pollack and whiting stocks which included (i) the integration of new standardized LPUes, (2) the use of LBSPR and/or LBIs from (commercial) catches (ICES, 2023h) and (3) the implementation of the new '*rfb*' rule for category 3 stocks (Method 2.1 in ICES, 2022a) allowed to give MSY advice. Further details can be found in sections 17 and 18, respectively (ICES, 2023h). If the proposed methods for these two stocks are accepted, both the WGBIE pollack and whiting will be upgraded to category 3 stocks this year (ICES, 2023h) and the 2023 ICES advice for each of these two stocks for release will be drafted accordingly for the ADG review in June 2023.

Otherwise, the plaice remains as a category 5 stock using the same LBI method (ICES, 2015) for the evaluation of this stock (ICES, 2022c; 2023h).

1.14.1 Future benchmarks

The table below summarizes some information on the recently completed benchmarks with the respective conclusions reached for each workshop as well as the stocks for future benchmarks from the second semester of 2023 to 2025, specifying their respective objective/s and needs for a benchmark recommendation. Several stocks with their respective assessment models were benchmarked in 2022.

Three separate benchmark workshops scheduled for 2023 and 2024 were approved by the ACOM for the Bay of Biscay sea bass (bss.27.8ab). As mentioned above, WKBSEABASSID (ICES, 2023b) was held at the beginning of the year while the two other benchmarks will be held during the end of the year and another in 2024. The second phase in this multi-benchmark process will be the data collection workshop in 2023 followed by the third workshop on assessment model revision in 2024. Although there are still some outstanding issues with regards to the WKBSEABASSID meeting, a significant progress was achieved in terms of what is currently known on genetic connectivity and distributions. The upcoming benchmarks will be focused on the improvement of the current SS assessment model for the stock and the integration of recently collected or available data. These future benchmark workshops could also be an avenue to resolve other issues such as (a) the work on stock identification, (b) the estimation of new recruitment estimates from scientific surveys in three estuaries directly connected to the Bay of Biscay, (b) development of drift models to identify spawning and recruitment grounds, (c) evaluation of stock mixing and spatial dynamics, (d) integration of genetic and tagging results and (e) further analyses to identify bias and resolution schemes to increase the accuracy of age data. WGBIE considers that the revision of the existing analytical SS assessment model for the northern stock would be important in resolving the assessment quality issues and improving the advice for this stock.

The fourth benchmark approved by ACOM this year is for the WGBIE Bay of Biscay sole in divisions 8.a and 8.b which will be held in 2024. This stock has not been benchmarked since 2011

(ICES, 2011). The main reasons for organizing this benchmark are to test the implementation of a new assessment method for this stock which is currently using a deterministic model (XSA; Shepherd, 1999) for the assessment and to work on the nominal standardization of the LPUEs. For the upcoming benchmark for this stock, the objective is to migrate to a stochastic assessment model, potentially an a4a assessment model (Millar and Jardim, 2019), with standardized LPUEs to improve the current assessment. Furthermore, biological parameters such as the maturity ogive, have not been updated since 2000 and the integration of these data will also be tested during the next benchmark

Name	Assessment status	Latest Benchmark	Benchmark next year	Planning Year +2	Comments/Issues
Black-bellied anglerfish in divisions 8.c and 9.a	SPiCT trends (Pedersen and Berg, 2017)	WKANGLER (ICES, 2018c); WKMSYSPICT (ICES, 2021b)	–	Yes	Exploration and development of the preliminary SS assessment model explored in WKTaDSA (ICES, 2021g).
Hake in subareas 4, 6, and 7 and divisions 3.a, 8.a,b,d	Update SS model (Methot Jr. and Wetzel, 2013)	WKSOUTH (ICES, 2014); IBPFAKE (ICES, 2019b); WKANGHAKE (ICES, 2023b)	Yes	–	IBP was recommended by WGBIE during the 2022 meeting to explore and solve issues with the 2022 retrospective patterns (ICES, 2022c). Issues to be resolved intersessionally by WGBIE, following the new benchmark guidelines (ICES,2023f)
Megrim in divisions 8.c and 9.a	a4a model (Millar and Jardim, 2019)	IBPMEGRIM (ICES, 2016); WKMEGRIM (ICES, 2023d)	Yes	–	IBP was recommended during WGBIE meeting in 2022 to organize a specific workshop with a4a assessment model expert/s to improve the configuration and fix the retro bias issue observed during the WKMEGRIM (ICES, 2023d) and WGBIE meeting in 2022 (ICES, 2022c). Issues to be resolved intersessionally by WGBIE, following the new benchmark guidelines (ICES,2023f)
Plaice in Subarea 8 and Division 9.a	Category 5. LBI as fishing pressure indicator (ICES, 2015).	WKBMSYSPICT2 (ICES, 2023g)	–	–	SPiCT model was rejected during WKBMSYSPICT2 (ICES, 2023g).
Pollack in Subarea 8 and Division 9.a	Category 5. LBI as fishing pressure indicator (ICES, 2017c; 2022c; 2023a; e) but may be upgraded to category 3 if LBI and HCR advice (ICES, 2022a; 2023a; e; h) are accepted by external reviewers.	WKBMSYSPICT2 (ICES, 2023g)	–	–	SPiCT model developed during WKBMSYSPICT2 was rejected (ICES, 2023g). Explored statistical models to standardize commercial LPUEs (ICES, 2023a; e; h). Collect or estimate missing data and consolidate existing data: time-series data of (a) catch, (b) length structure, (c) commercial CPUEs, and (d) consolidated discards. Review biological parameters. Explored statistical models to standardize FR-GNS>90mm-8a-2s abundance index and CPUEs. Evaluate stock distribution. Used DLS (LBI and HCR for Category 3) methods for stock assessment and advice for category 3 stocks (under review after WGBIE 2023 meeting; ICES, 2023a; e; h).

Name	Assessment status	Latest Benchmark	Benchmark next year	Planning Year +2	Comments/Issues
Sea bass in divisions 8.a and 8.b	Update SS (Methot Jr. and Wetzel, 2013)	WKBASS (ICES, 2018c); IBPBASS (ICES, 2018d); WKSEABASSID (ICES, 2023c)	Yes	–	<p>Progress achieved during the stock structure identification workshop in early 2023 (WKSEABASSID; ICES, 2023c) but will need further studies.</p> <p>Explore the integration of new recruitment indices, improve ALK data accuracy, spatial dynamics and distribution and estimate new/robust abundance indices.</p> <p>The benchmark workshops are jointly organized with the other sea bass stocks in the Celtic Sea.</p>
Sole in divisions 8.a and 8.b	XSA (Shepherd, 1999) deterministic.	WKFLAT (ICES, 2011)	Yes	–	<p>Change of assessment model to a stochastic model (a4a or SAM). LPUEs standardization will improve model assessment. Biological parameters have not been updated since the last benchmark (maturity ogive has not been updated since 2000).</p>
White-bellied anglerfish in divisions 8.c and 9.a	Update SS model (Methot Jr. and Wetzel, 2013)	WKANGLER (ICES, 2018c)	–	Yes	<p>Remaining issues (tuning fleets, length composition). Absence of large-size individuals. Improvement of standardized LPUEs. SS model update.</p>
Whiting in Subarea 8 and Division 9.a	Category 5. LBI as fishing pressure indicator (ICES, 2017c; 2022c; 2023a; e) but may be upgraded to category 3 if LBI and HCR advice (ICES, 2022a; 2023a; e; h) are accepted by external reviewers.	WKBMSYSPICT2 (ICES, 2023g)	–	–	<p>SPICT model developed during WKBMSYSPICT2 was rejected (ICES, 2023g).</p> <p>Explored statistical models to standardize commercial LPUEs (ICES, 2023a; e; h).</p> <p>Used DLS (LBI and HCR for Category 3) methods for stock assessment and advice for category 3 stocks (under review after WGBIE 2023 meeting; ICES, 2022a; 2023a; e; h).</p> <p>Collect or estimate missing data and consolidate existing data: time-series data of (a) catch, (b) length structures, (c) commercial CPUEs, and (d) consolidated discards. Review biological parameters.</p> <p>Evaluate stock distribution.</p>

1.15 Fisheries overviews

Some progress on the development of a mixed-fishery analysis has been made in WGMIXFISH-ADVICE (ICES, 2021e) and WGMIXFISH-METHODS (ICES, 2021f) using some Iberian stocks and some Bay of Biscay stocks in a separate analysis. The group has contributed in 2022 to the review of the fisheries description and provided the inputs from the stocks assessment for the analyses carried out in these two groups. This year, the latest version of this document was reviewed by the group during the meeting, some comments, suggestions and corrections were raised which will be communicated to the WGMIXFISH. It was, however, suggested that the WGBIE chairs request to be updated and/or have a member of the group invited in the WGMIXFISH annual meeting leading to the update of this document for future relay to the rest of the WGBIE members. It was also suggested that the review process the document be reviewed by the chairs and/or expert members before the release of the final version covering the WGBIE ecoregion.

1.16 Ecosystem overviews

No progress has been made on this term of reference as the latest version of this document was not reviewed by the group due to time constraints. WGBIE decided that the review process for the document on the Bay of Biscay and Iberian waters ecoregion be done after the ADGBBI and publication of the 2023 WGBIE report. Comments and suggestions on the text will be communicated to the WGEAWESS.

1.17 WGBIE comments on potential creation of *Nephrops*-specific WG in 2024

This year, the WG discussed an ICES proposition of regrouping all the *Nephrops* stocks from different advisory working groups into one where experts of these stocks will collectively meet and work together on assessments and advice and will potentially be scheduled every April each year. Currently, *Nephrops* stocks in this WG includes 6 stocks separated into functional units (FUs). WGBIE sees both advantages and disadvantages with regards to this proposed reorganization.

WGBIE acknowledges the interests on the prospect of having a single annual WG for all the *Nephrops* stocks (like WGCRAb, WGEF, WGEEL, etc) such as (1) the facilitation of data compilation, standardization and knowledge exchange, (2) the rapid development, improvement, identification and explanation of gaps in current ICES *Nephrops* assessment methods and (3) the opportunity to identify specific challenges and/or develop species-specific tools for evaluation, particularly for DLs.

However, being an integral part of WGBIE has also allowed these *Nephrops* stocks to gain wider perspectives on each of these stocks' respective assessment and evaluation considering that these stocks are caught in mixed-fisheries. Also, the interest of having these stocks assessed during the WGBIE corresponds to the ICES framework as their evaluation at the ecoregional level facilitates and supports the transfer and enrichment of knowledge provided to the fisheries (WGMIXFISH) and ecosystem (WGEAWESS) overviews expert groups as well as the current opportunities of their integration into the MSFD assessment (i.e. evaluation of SBL).

In terms of practicality, two of the WGBIE *Nephrops* stocks (nep.fu.2324 and nep.fu.30, potentially will include nep.fu.25 in future) using UWTV data surveys can only proceed to the complete assessment of these stocks once these survey data are available, usually during summer, such

that the advice can only be drafted and reviewed during a designated ADG in autumn. It should also be noted that aside from this meeting, a specific annual WGNEPS is held in November for the international coordination group of the UWTV and trawl surveys. If the potential new WG regrouping all *Nephrops* stocks will be scheduled in April each year, this WG sees no real advantage for the evaluation of these *Nephrops* stocks especially those using UWTV surveys in their assessments and advice. WGBIE feels that the proposed period of annual meeting for this new specific WG seems to be less convenient and presents a high risk of failure of completely achieving the generic and future WG-specific ToRs as some *Nephrops* stocks will still not have access to all data needed for the assessment in April and the stock coordinators of this new WG may not be able to finish their assessments in time for the meeting due to severe time constraints.

It should be noted that the potential dates or period for assessment of the *Nephrops* stock that will migrate into this new WG must take into consideration the feasibility of this WG to continue their annual data provision to the WGMIXFISH on time.

1.18 Research needs of relevance for the expert group

1.18.1 Recruitment indices for adult populations

Many of the stocks have recruitment indices available with limited indices for the adult population (e.g. hake and anglerfish). Therefore, it would be advantageous to develop and use adult biomass indices to help reduce the uncertainty in the spawning-stock biomass (SSB) estimates. Further research and appropriate evaluation are recommended in the development of such indices for stocks where standard surveys are not appropriate due to catchability issues.

1.18.2 Absence of relevant biological parameters

For the stocks of hake, megrim, four-spot megrim, anglerfish, sea bass, and some of the *Nephrops* Functional Units, further studies are required to better understand the mixing between areas and the biology over time such as growth, maturity, length-weight, sex-ratio, and natural mortality. To fully make use of new research on these stocks it would be beneficial to focus on developing appropriate assessment methods and reviewing the performance of such models through comprehensive sensitivity analyses.

1.18.3 Improvement and validation of population structure identification from genetic analyses

1.18.3.1 Anglerfish stocks identification and hybridization (collaboration with WGAGFA)

The WGBIE recognizes the significance the implementation of a regular monitoring network for white and black anglerfish genetic material collection for standardized genetic analyses to minimize misidentification and hybridization between black and white anglerfish. A recent study has shown that white and black anglerfish hybridize and that the most used morphological diagnostic characteristic for species identification is equivocal (Aguirre-Sarabia *et al.*, 2021; Rodríguez-Ezpeleta *et al.*, 2023b; WD 5 in this report). Further analyses based on an increased dataset and improved methodology have confirmed this and revealed that:

- i. hybrids constitute about 9% of white anglerfish samples overall and up to 12% in the Northern stock; and
- ii. that misidentification is high in the southernmost locations.

Although those analyses were based on more than 1000 and 500 white and black anglerfish samples, the number of samples in some locations was small and thus more samples also covering more years are necessary to further understand the abundance and distribution of hybrids. Additionally, little is known about the hybrids and although so far, only first-generation hybrids and backcrosses (hybrids reproducing with hybrids) have been found, which indicates no or lower fitness of hybrids, this must be confirmed with more samples. Knowing the abundance and distribution of hybrids and their viability is important for improving the species assessment because if hybrids cannot reproduce, this should be reflected in the evaluation and if they can, analyses on their fate should be performed.

1.18.3.2 Sea bass stock ID

A joint WGBIE-WGCSE WKBSEABASSID benchmark (ICES 2023c) for the sea bass population structure identification was held early this year to review and discuss the most recent studies, data analyses and future research needs for the stock identification. The main conclusions and findings from this workshop were mentioned before and further detailed in the WKBSEABASSID workshop report (ICES, 2023c). However, like the anglerfish stocks, WGBIE recognizes the relevance of the implementation of regular monitoring and analyses to increase dataset for validation and improvement of current ICES stock definitions.

1.18.3.3 European hake connectivity

A genome-wide based population structure study was conducted on European hake to identify differentiation of Mediterranean and Northeast Atlantic regions. The study showed that hake in the Norwegian Sea has higher differences from the rest of the locations/regions considered in the study while hakes from the eastern Bay of Biscay and the northwestern Iberian Peninsula are genetically more similar (Leone *et al.*, 2019). A pilot study on the hake genetic analyses of samples collected from different ecoregions showed a clearly scattered stock population structure, with close similarity between close regions but a very distinct gradient across the geography (Rodríguez-Ezpeleta *et al.*, 2023a; WD 4 in this report). Further studies are needed to determine and evaluate how the hake genetic population structure coincide with the assessment units or ecoregions as these will improve future stock exploitation and management.

1.18.3.4 Estimation of hake and anglerfish spawning-stock biomass (SSB)

WGBIE recognizes the significance of having an accurate estimation of hake and anglerfish SSB to improve the quality of the assessment and advice for these stocks. Currently, preliminary collaboration work with WGAGFA shows that the Close-Kin Mark-Recapture (CKMR) is a candidate procedure to collect data for in support of the estimations of SSB (Rodríguez-Ezpeleta *et al.*, 2023c; WD 6 in this report). Future applications of this method that will be explored in collaboration with WGAGFA is the relevance of this method in hake and anglerfish stocks species characterization of hake and anglerfish and provide accurate age estimations.

1.18.4 Develop (generic) integration procedures of stock or population structure data for Category into the SS assessment models

WGBIE needs to develop standardized procedure/s for the integration of these newly derived information on stock IDs, CKMR analyses and population structure into the SS assessment model framework of some category 1 stocks with which data collected from genetic analyses are available and, potentially, routinely performed as the WG recognizes the pertinence of this development for the improvement of future assessment and advice.

1.19 Recommendations, proposals for future benchmark and workshop

1.19.1 Request RCG to assist in the implementation of routine collection of genetic materials for some WGBIE stocks through the DCF

WGBIE recommends that the RCG NANSEA supports the implementation of an annual data collection framework of genetic material of hake and monkfish to: (1) determine hake and white anglerfish metapopulation structure; (2) estimate hake and white anglerfish spawning-stock biomass through Close-Kin Mark-Recapture (CKMR); (3) monitor species misidentification and hybridization between black and white anglerfish.

Sample collection

It is proposed to collect sufficient samples on existing trawl surveys.

- Anglerfish (*Lophius* spp): up to 9,000 individuals per year
- Hake: up to 23,000 individuals per year

WGBIE is aware of 13 RCG NANSEA-coordinated annual sample collection surveys for measuring for the two anglerfish (about 50 000 yr⁻¹) and hake (about 110 000 yr⁻¹) species, and where 6 (FR-EVHOE, IE-IAMS, IE-IGFS, PT-IBTS, NS-IBTS and SP-NORTH) of these surveys are relevant to provide the needed genetic samples to provide or improve current knowledge of stock identification, estimation of population size and/or structure (Roldán *et al.*, 1998; Leon *et al.*, 2019; Abad *et al.*, 2021), kinship probabilities and SSB for this WG.

The effort in collection of genetic samples is like that of collecting otoliths, but apart from this staff time there will be no cost to the participating institutes. The analysis of the samples will be done by AZTI and is funded under a PhD project for the next few years. Sampling kits will be prepared and sent to survey coordinators. The surveys identified above have already provided more than 2,000 genetic samples to AZTI on an ad-hoc basis for previous genetics projects.

Scientific background

Population structure and SSB: Preliminary simulations of CKMR modelling in hake and anglerfish suggest that this method could represent an alternative for accurate Spawning-stock biomass estimation in these species. Application of CKMR requires many samples in the order of thousands per year (Aguirre-Sarabia *et al.*, 2021), which can only be achieved as part of a regular monitoring network collecting tissue samples for genetic analyses. CKMR cannot only be used for SSB but can also provide information about movements of individuals and thus the metapopulation structure, which is invaluable for complementing current population structure analyses suggesting panmixia in white anglerfish (Aguirre-Sarabia *et al.*, 2021) and isolation by distance in hake (Rodríguez-Ezpeleta *et al.*, 2023a; WD 4 in this report).

Misidentification and hybridization: Recently, Aguirre-Sarabia *et al.* (2021) showed that hybridization occurs between white and black anglerfish and that the most used morphological diagnostic characteristic for species identification is equivocal and that unequivocal species identification requires genetic analysis. Further analyses based on an increased dataset and improved methodology have confirmed these findings and revealed that i) hybrids constitute about 9% of white anglerfish samples overall and up to 12% in the Northern stock and ii) that misidentification is high in the most southern locations. However, it should be noted that these rates were from analyses based on about more than 1000 and 500 white and black anglerfish samples and in some locations the sample number collected was low. Thus, more samples, covering more

years are necessary to further understand abundance and distribution of hybrids. Currently, little is known about the hybrids and although so far only first-generation hybrids and backcrosses (hybrids reproducing with pure individuals) have been found, suggesting no or lower fitness of hybrids, this must be confirmed with more samples. Estimating the abundance and distribution of hybrids and their viability is important for improving the species assessment because if hybrids cannot reproduce, this should be reflected in their evaluation and if possible, additional analyses on their fate should be performed.

1.19.2 Benchmark for the southern white and black anglerfish

WGBIE recommends that an ICES benchmark workshop with relevant experts be organized, as soon as possible, for the development of new and improved assessments with the SS framework (Methot Jr. and Wetzel, 2013) for the southern black (ank.27.8abd) and white (mon.27.8c9a) anglerfish stocks, respectively. The main reasons for supporting a new benchmark for the two southern anglerfish stocks relates with issues identified and conclusions made for both stocks during previous WGBIE meetings (ICES, 2020b; 2021d; 2022c; 2023h), the ICES Workshop on Tools and Development of Stock Assessment Models Using a4a and Stock Synthesis (WKTADSA; ICES, 2021a) and WKMSYSPiCT benchmark for the southern black anglerfish in 2021 (ICES, 2021b). In the case of the southern black anglerfish (ank.27.8c9a) last benchmarked in 2021 currently uses the SPiCT assessment model (Pedersen and Berg, 2017). However, following the suggestion of reviewers during WKMYSPiCT (ICES, 2021b), the potential of replacing this SPiCT model with a SS integrated model (Methot Jr. and Wetzel, 2013) should be tested and explored. If this new assessment model is validated and accepted, the stock will move from a category 2 to 1 and, will make use of the same assessment methodology as the three WGBIE anglerfish stocks. In the case of the southern white anglerfish (mon.27.8c9a) which was last benchmarked in 2018 (ICES, 2018c), the configuration of the current SS model needs to be improved to better track the large size population. The main reasons for supporting a benchmark aside from the change of assessment model in the case of the southern black anglerfish also includes the need to estimate new or improved standardized LPUEs for commercial fleets (and exploitable sizes), following the most adequate methods (e.g. see ICES, 2021b for conclusions for ank.27.8c9a and ICES, 2023g for standardization guidelines) and the experience gained in the recent WKANGHAKE (ICES, 2023b) where both the northern black (ank.27.78abd) and white (mon.27.78abd) anglerfish were also benchmarked with SS. Both the southern anglerfish stocks were part of the Workshop on Tools and Development of Stock Assessment Models Using a4a and SS, where different SS model configurations were tested (WKTaDSA; ICES, 2021g).

1.19.3 Resolve quality issues in assessment models.

WGBIE recommended last year for two separate IBP workshops for northern hake (hke.27.3a46-8abd) and the megrim stock in divisions 8.c and 9.a (meg.27.8c9a) to resolve some outstanding issues in the parametrization of these stocks respective assessment models which were identified during the 2022 meeting but were not resolved due to time constraints and need of external a4a experts, respectively (ICES, 2022c). These IBPs were planned to be organized in late 2022 or early 2023. The main reason was the consistent out-of-bounds retrospective patterns observed. This year, additional stocks have been identified as out-of-bounds (Figure 1.3) which WGBIE considers pertinent to explore, review and validate intersessionally.

No progress has been made for the resolutions of these issues in 2022 and plans for 2023 are unclear, especially since the benchmark process has recently changed in 2022 and where the IBP workshop is no longer considered (ICES, 2023f).

Following the new benchmark guidelines (ICES, 2023f), WGBIE plans to hold intersessional works among WGBIE relevant expert members to resolve these issues and improve the quality of the assessment by testing and validating scenarios within the WG. Once significative progress and resolutions are achieved by the WGBIE and if/when needed, a recommendation for specific benchmark workshops will be done to request for reviews and validation by external experts, following the new ICES benchmark guidelines (ICES, 2023f).

1.19.4 Workshop on CKMR standardized protocols and analyses for WGBIE demersal stocks

WGBIE plans to organize a CKMR workshop on demersal species in collaboration with WGAGFA with the potential participation of other renowned genetics research experts either this year or in 2024. Among the workshop's primary ToRs would include (i) the development of a standardized CKMR protocols for sample collection and analyses (ii) explore and review the methods application for accurate age and SSB estimations on European hake and anglerfish stocks (ii) development and exploration of potential and effective integration procedures of collected genetic data into the assessment models.

1.19.5 Development and improvement of standardized CPUE/LPUE series

WGBIE recommends the development and/or improvement of standardized CPUE/LPUE series for the following stocks:

- **Category 1 stocks:** northern sea bass (bss.27.8ab), Bay of Biscay sole (sol.27.8ab); southern white anglerfish (mon.27.8c9a);
- **Category 2 stocks:** southern black anglerfish (ank.27.8c9a);
- **Category 3 stock:** *Nephrops* in FUs 2829 (nep.fu.2829), Pollack in Subarea 8 and Division 9.a, (pol.27.89a), whiting in Subarea 8 and Division 9.a (whg.27.89a);
- **Category 5 stocks:** sea bass in divisions 8.c and 9.a (bss.27.8c9a); plaice in Subarea 8 and Division 9.a (ple.27.89a).

1.19.6 Issues for improvement of category 5 stocks evaluation

The southern sea bass (bss.27.8c9a) is considered a category 5 DLS stock as opposed to the northern stock which is considered a category 1 stock. Lack of relevant data are the main reason for this status, like the two other WGBIE category 5 stocks: plaice (ple.27.89a) and northern four-spot megrim (ldb.27.7b-k8abd).

Contrary to plaice and northern four-spot megrim, WGBIE is aware of ongoing projects on southern sea bass species in Portugal and Spain. WGBIE is trying to contact these researchers to collaborate on establishing an approach that can help to improve the knowledge for this stock through an exchange of available information or the development of feasible data collection approaches. Furthermore, the ongoing sea bass benchmarks may identify and provide new or additional information, especially in the productivity process (i.e. growth, maturity, M, etc.) and, if possible, on its stock identity. WGBIE considers that a future benchmark will be an advantage for the southern stock as soon as new information become available.

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1.21 Tables

Table 1.1.a. Biological sampling levels by stock and country. Number of individuals measured and aged from landings in 2022.

	Number	Anglerfish (<i>L. piscatorius</i>)		Anglerfish (<i>L. budegassa</i>)		Megrim (<i>L. whiffiagonis</i>)		Megrim (<i>L. boscii</i>)		Sole (<i>S. solea</i>)	
		7.b–k & 8.abd	8.c & 9.a	7.b–k & 8.abd	8.c & 9.a	7.b–k & 8.abd	8c & 9a	7.b–k & 8.abd	8.c & 9.a	8.a,b	8.c & 9.a
Belgium	Lengths	5086		5196		21550				11955	
	Ages					1132				208	
	Samples**	27		27		27					
E & W (UK)	Lengths	19866		5964		30320					
	Ages					1265					
	Samples*	366		154		627					
France	Lengths	6450		3585		7508				22097	
	Ages					NA				2650	
	Samples*	5140		235		NA					
Portugal	Lengths		307		1214		248		510		1701
	Ages***		0								
	Samples*		91		100		10		19		116
Republic of Ireland	Lengths	4977		2883		12428					
	Ages					NA					
	Samples**	133		93		NA					

	Number	Anglerfish (<i>L. piscatorius</i>)		Anglerfish (<i>L. budegassa</i>)		Megrim (<i>L. whiffiagonis</i>)		Megrim (<i>L. boscii</i>)		Sole (<i>S. solea</i>)	
		7.b–k & 8.abd	8.c & 9.a	7.b–k & 8.abd	8.c & 9.a	7.b–k & 8.abd	8.c & 9.a	7.b–k & 8.abd	8.c & 9.a	8.a,b	8.c & 9.a
Spain	Lengths	13249	3732	16947	4554	33606	17507		30443	1765	2634
	Ages		0		0	NA	848		751		
	Samples	92	284	88	269	NA	187		211		183
Denmark	Lengths										
	Ages										
	Samples										
Total	Lengths	49628		34575	5768	105412	17765		30953		
	Ages					2397					
Total nb. in international landings ('000)		6760	155	7176	4472	45198	2140		5161		
Nb. measured as % of annual nb. caught		0.73	2.60	0.48	0.13	0.23	0.83		0.60		

* Vessels

** Categories

*** Ages, surveys

**** Boxes/hauls (for sampling on board)

***** Otoliths collected and prepared but not read

Table 1.1a. (continued)

	Number	Hake		Nephrops			Sea bass		Pollack		Whiting		Plaice		
		3.a, 4, 6, 7 & 8.ab	8.c & 9.a	8.ab FU 23–24	8.c FU 25–31	9.a FU 26–30	8.ab	8.c & 9.a	8 & 9.a	8 & 9.a	8 & 9.a	8 & 9.a			
Scotland (UK)	Lengths	4164													
	Ages														
	Samples*	100													
E & W (UK)	Lengths	8568													
	Ages														
	Samples*	196													
France	Lengths	17740		13122			14822		5296						
	Ages*****						865		0						
	Samples****	771		304			1235		553						
Portugal	Lengths			7423					?						
	Ages***								?						
	Samples*			151					?						
Republic of Ireland	Lengths	5318													
	Ages*****														
	Samples*	112													
Spain	Lengths	62649		58013			6268		2498		1637				
	Ages						-		1		?		3	0	4

	Number	Hake	Nephrops			Sea bass		Pollack	Whiting	Plaice
		3.a, 4, 6, 7 & 8.ab	8.c & 9.a	8.ab FU 23–24	8.c FU 25–31	9.a FU 26–30	8.ab	8.c & 9.a	8 & 9.a	8 & 9.a
	Samples*	291	731		29 ^a		6	106	8 137	9 10
Denmark	Lengths	20733								
	Ages									
	Samples*	321								
Belgium	Lengths	818								
	Ages									
	Samples*	26								
Germany	Lengths	434								
	Ages									
	Samples*	60								
Sweden	Lengths	49								
	Ages									
	Samples*	5								
Total	Lengths	120473	65436				14822	2498	6933	
	Ages						1235			
Total No. in international landings ('000)			14755	116190	94		?	?	694	
Nb. meas. as % of annual nb. caught			0.4400	0.0113	6.6000				1.0000	

* Vessels

** Categories

*** Ages, surveys

**** Boxes/hauls (for sampling on board), (a) hauls

***** Otoliths collected and prepared but not read

Table 1.1.b. Biological sampling levels by stock and country. Number of individuals measured and aged from discards in 2022.

	Number	Anglerfish (<i>L. piscatorius</i>)		Anglerfish (<i>L. budegassa</i>)		Megrim (<i>L. whiffiagonis</i>)		Megrim (<i>L. boscii</i>)		Sole (<i>S. solea</i>)	
		7.b–k & 8.abd	8.c & 9.a	7.b–k & 8.abd	8.c & 9.a	7.b–k & 8.abd	8.c & 9.a	7.b–k & 8.abd	8.c & 9.a	8.a,b	8.c & 9.a
Belgium	Lengths	4957		7210		11274				1240	
	Ages					1196					
	Samples	27		27		27					
E & W (UK)	Lengths	6322		1620		7259					
	Ages					7					
	Samples	376		74		36					
France	Lengths	688		257		558				417	
	Ages										
	Samples	261		83							
Portugal	Lengths										
	Ages										
	Samples ¹										
Republic of	Lengths	1952		749		2367	799				

	Number	Anglerfish (<i>L. piscatorius</i>)		Anglerfish (<i>L. budegassa</i>)		Megrim (<i>L. whiffiagonis</i>)		Megrim (<i>L. boscii</i>)		Sole (<i>S. solea</i>)	
		7.b-k & 8.abd	8.c & 9.a	7.b-k & 8.abd	8.c & 9.a	7.b-k & 8.abd	8.c & 9.a	7.b-k & 8.abd	8.c & 9.a	8.a,b	8.c & 9.a
Ireland	Ages										
	Samples	152		35			238				
Spain	Lengths	6	34	226	268	5005			2221	1	
	Ages										
	Samples	150	291	322	300				297		
Denmark	Lengths										
	Ages										
	Samples										
Total	Lengths	13925		10062		26463			2221	542	
	Ages					1232					
Total no. in international discards ('000)		3508	NA	8365	4	18351					
Nb. meas. as % of annual nb. discarded		0.027	NA	0.120	6.500	0.144					

Table 1.b (continued).

	Number	Hake	Nephrops			Sea bass		Pollack	Whiting	Plaice
		3.a, 4, 6, 7 & 8.a,b	8.c & 9.a	8.ab FU 23–24	8.c FU 25 & 31	9.a FU 26–30	8.ab	8.c & 9.a	8 & 9.a	8 & 9.a
Scotland (UK)	Lengths	1012								

	Number	Hake 3.a, 4, 6, 7 & 8.a,b	Nephrops			Sea bass		Pollack	Whiting	Plaice
			8.c & 9.a	8.ab FU 23–24	8.c FU 25 & 31	9.a FU 26–30	8.ab	8.c & 9.a	8 & 9.a	8 & 9.a
E & W (UK)	Ages									
	Samples	88								
	Lengths	551								
	Ages									
France	Samples	83								
	Lengths	3607		1885			568		65	
	Ages								0	
Portugal	Samples	419		54			398		210	
	Lengths									
	Ages									
Republic of Ireland	Samples ¹									
	Lengths	1908								
	Ages									
Spain	Samples	188								
	Lengths	3031	3637		97					
	Ages									
	Samples	498	516		71 ²					

	Number	Hake	Nephrops			Sea bass		Pollack	Whiting	Plaice	
		3.a, 4, 6, 7 & 8.a,b	8.c & 9.a	8.ab FU 23–24	8.c FU 25 & 31	9.a FU 26–30	8.ab	8.c & 9.a	8 & 9.a	8 & 9.a	8 & 9.a
Denmark	Lengths	330									
	Ages										
	Samples	74									
Belgium	Lengths	4496									
	Ages										
	Samples	26									
Sweden	Lengths	261									
	Ages										
	Samples	15									
Total	Lengths	15196	3637	1885	97		568		65		
	Ages										
Total no. in international discards ('000)			10349	85841	66				NA		
Nb. meas. as % of annual nb. discarded			0.0350	0.0022	0.1470				NA		
Trips											

1.22 Figures

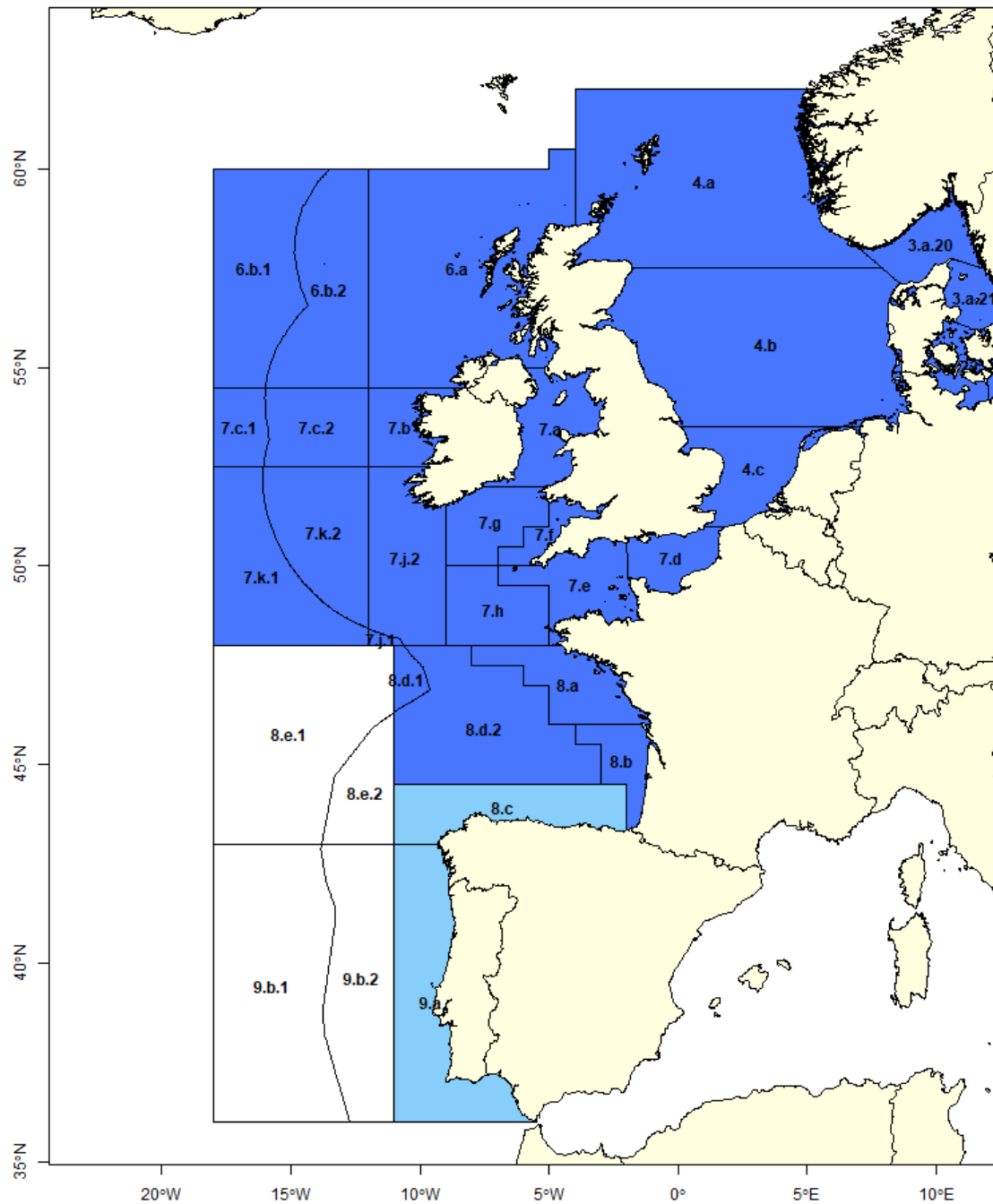


Figure 1.1. Map of ICES divisions. Northern (3.a, 4, 6, 7. and 8.a, 8.b, 8.d) and southern (8.c and 9.a) divisions are shown with different blue shading.

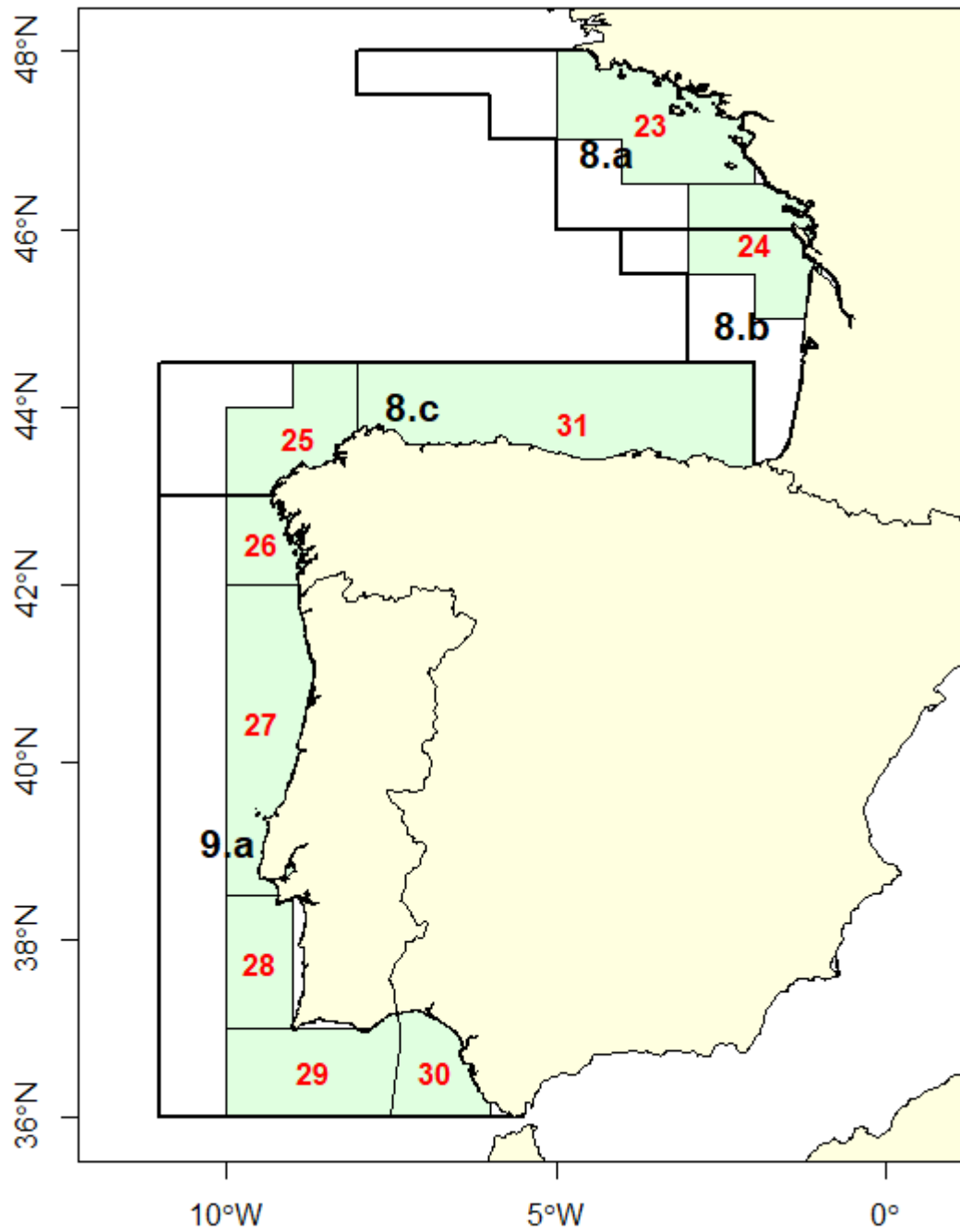


Figure 1.2. ICES divisions 8 and 9.a with *Nephrops* functional units (FUs). Divisions 8.a and 8.b: FUs 23/24. Division 8.c: FUs 25 and 31. Division 9.a: FUs 26–30.

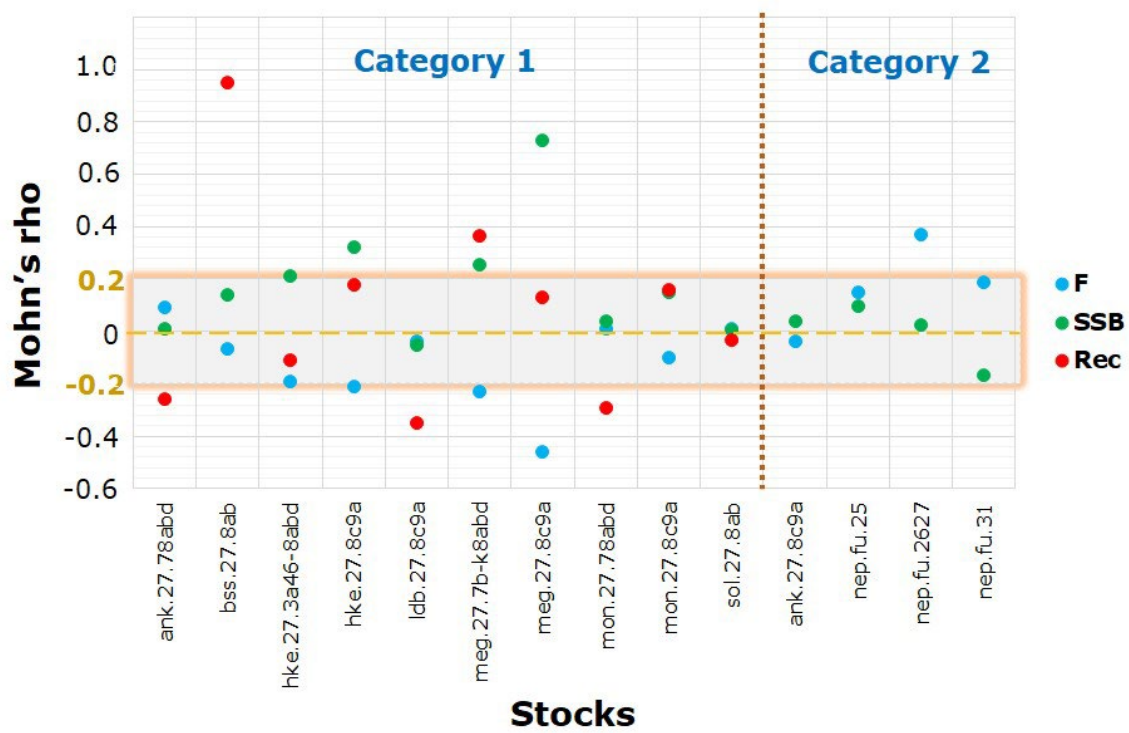


Figure 1.3. Mohn's rho 2023 values for ten WGBIE category 1 stocks with full analytical assessment (stock synthesis [Merthot Jr. and Wetzel, 2013] or a4a [Millar and Jardim, 2019]) models and for four category 2 stocks assessed using the SPiCT (Pedersen and Berg, 2017) approach.

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