

WORKING GROUP FOR THE CELTIC SEAS ECOREGION (WGCSE)

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i Executive summary

The Working Group for the Celtic Seas Ecoregion (WGCSE) performs stock assessments on demersal stocks in Rockall, West of Scotland, Irish Sea, West of Ireland, Western English Channel, Bristol Channel, Celtic Sea and Southwest of Ireland. In this report, the group provides updated fisheries data and assessments for twelve *Nephrops* stocks, five sole and plaice stocks, four cod and whiting stocks, three haddock stocks, two each of megrim and seabass, one anglerfish, one saithe and one pollack stock. For most of the stocks advice is drafted in May, but for *Nephrops*, anglerfish and Rockall megrim it is not issued until autumn to take account of the 2020 survey information. However, due to the COVID-19 pandemic, the most up to date survey information could not be included for anglerfish and Rockall megrim. This year advice for the Celtic Sea gadoids (cod.27.7e-k, had.27.7b-k and whg.27.7b-ce-k) was delayed until autumn due to extension of the Benchmark workshop on Celtic Sea stocks (WKCELTIC) to allow evaluation of the French data processing and resubmission of a full dataset. For a number of other stocks (ple.27.7h-k, whg.27.6b and whg.27.7a), no new advice was provided this year. Last year advice for pok.27.7-10 was requested for the first time, and was postponed until 2021 after a benchmark workshop. Since the last Working Group meeting, seven stocks have gone through a benchmark procedure; cod.27.6a, whg.27.6a, sol.27.7h-k, sol.27.7fg, cod.27.7e-k, had.27.7b-k and whg.27.7b-ce-k, the results of which were presented to the group. In light of the disruptions caused by COVID-19 in 2020, abbreviated advice sheets were drafted for the majority of stocks, except for the stocks that went through a benchmark. Analytical assessments using age-structured models were conducted for 11 of the 24 demersal fish stocks. A surplus-production model and a Depletion-Corrected Average Catch model, without age or length structure, was used to assess lez.27.4a6a and pol.27.67 respectively. The state of the eleven fish stocks for which no analytical assessment could be performed was inferred from examination of catch/landings data or the use of a survey index or biomass index as indicator of stock development. UWTV survey based assessments were conducted for ten of the twelve *Nephrops* stocks. Overall the stock status across the ecoregion is very similar to that presented last year. Of the 36 stocks assessed this year, 19 were fished below F_{MSY} , six stocks were fished above F_{MSY} and eleven stocks had unknown status relative to F_{MSY} ; 15 were above $MSY B_{trigger}$, and seven were below $MSY B_{trigger}$, with 14 unknown relative to $B_{trigger}$.

ii Expert group information

Expert group name	Working Group for the Celtic Seas Ecoregion (WGCSE)
Expert group cycle	Annual
Year cycle started	2020
Reporting year in cycle	1/1
Chairs	Sofie Nimmegeers, Belgium
	Mathieu Lundy, Northern Ireland
Meeting venue and dates	6–15 May 2020, web conference meeting (28 participants)
	21–25 September 2020, By correspondence (17 participants)

1 Introduction

1.1 Terms of reference

1.1.1 Generic ToRs for Regional and Species Working Groups

2019/2/FRSG01 The following ToRs apply to: AFWG, HAWG, NWWG, NIPAG, WGWIDE, WGBAST, WGBFAS, WGNSSK, WGCSE, WGDEEP, WGBIE, WGEEL, WGEF, WGHANSA and WGNAS.

The working group should focus on

- a) Consider and comment on Ecosystem and Fisheries overviews where available;
- b) For the aim of providing input for the Fisheries Overviews, consider and comment for the fisheries relevant to the working group on:
 1. descriptions of ecosystem impacts of fisheries;
 2. descriptions of developments and recent changes to the fisheries;
 3. mixed fisheries considerations; and
 4. emerging issues of relevance for the management of the fisheries.
- c) Conduct an assessment on the stock(s) to be addressed in 2020 using the method (analytical, forecast or trends indicators) as described in the stock annex and produce a **brief** report of the work carried out regarding the stock, summarising where the item is relevant:
 1. Input data and examination of data quality;
 2. Where misreporting of catches is significant, provide qualitative and where possible quantitative information and describe the methods used to obtain the information;
 3. For relevant stocks (i.e. all stocks with catches in the NEAFC Regulatory Area) estimate the percentage of the total catch that has been taken in the NEAFC Regulatory Area in 2019;
 4. Estimate MSY proxy reference points for the category 3 and 4 stocks;
 5. The developments in spawning-stock biomass, total stock biomass, fishing mortality, catches (wanted and unwanted landings and discards) using the method described in the stock annex;
 6. The state of the stocks against relevant reference points;
 7. Catch scenarios for next year(s) for the stocks for which ICES has been requested to provide advice on fishing opportunities;
 8. Historical and analytical performance of the assessment and catch options with a succinct description of quality issues with these. For the analytical performance of category 1 and 2 age-structured assessment, report the mean Mohn's rho (assessment retrospective (bias) analysis) values for R, SSB and F. The WG report should include a plot of this retrospective analysis. The values should be calculated in accordance with the "Guidance for completing ToR viii) of the Generic ToRs for Regional and Species Working Groups - Retrospective bias in assessment" and reported using the ICES application for this purpose.

- d) Produce a first draft of the advice on the stocks under considerations according to ACOM guidelines;
- e) Review progress on benchmark processes of relevance to the Expert Group;
- f) Prepare the data calls for the next year update assessment and for planned data evaluation workshops;
- g) Identify research needs of relevance for the work of the Expert Group.
- h) Review and update information regarding operational issues and research priorities and the Fisheries Resources Steering Group SharePoint site.
- i) Take 15 minutes, and fill a line in the audit spread sheet 'Monitor and alert for changes in ecosystem/fisheries productivity'; for stocks with less information that do not fit into this approach (e.g. higher categories >3) briefly note in the report where and how productivity, species interactions, habitat and distributional changes, including those related to climate-change, have been considered in the advice.

Information of the stocks to be considered by each Expert Group is available [here](#).

Adaptions to expert groups' generic terms of reference for spring 2020.

In light of the disruptions caused by COVID-19 in 2020, the generic terms of reference for the FRSG stock assessment groups have been re-prioritised. This applies to expert groups that feed into the spring advice season process¹. ACOM is encouraging expert groups to use virtual meetings (e.g. WebEx) and subgroups to deliver the high priority terms of reference.

High Priority for spring 2020 advice season

- c) Conduct an assessment on the stock(s) to be addressed in 2020 using the method (analytical, forecast or trends indicators) as described in the stock annex and produce a brief report of the work carried out regarding the stock, summarising where the item is relevant. **Check the list of the stocks to be done in detail and those to roll over.**
 - i) Input data and examination of data quality;
 - ii) Where misreporting of catches is significant, provide qualitative and where possible quantitative information and describe the methods used to obtain the information;
 - iii) For relevant stocks (i.e. all stocks with catches in the NEAFC Regulatory Area) estimate the percentage of the total catch that has been taken in the NEAFC Regulatory Area in 2019.
 - v) The developments in spawning–stock biomass, total stock biomass, fishing mortality, catches (wanted and unwanted landings and discards) using the method described in the stock annex;
 - vi) The state of the stocks against relevant reference points;
 - vii) Catch scenarios for next year(s) for the stocks for which ICES has been requested to provide advice on fishing opportunities;
 - viii) Historical and analytical performance of the assessment and catch options with a succinct description of quality issues with these. For the analytical performance of category 1 and 2 age-structured assessment, report the mean Mohn's rho (assessment retrospective (bias) analysis) values for R, SSB and F. The WG report should

¹ These do not apply to WGNAS.

include a plot of this retrospective analysis. The values should be calculated in accordance with the "Guidance for completing ToR viii) of the Generic ToRs for Regional and Species Working Groups - Retrospective bias in assessment" and reported using the ICES application for this purpose.

- d) Produce a first draft of the advice on the stocks under considerations according to ACOM guidelines. Check list to confirm whether the stock requires a concise advice sheet or a traditional advice sheet.
- f) Prepare the data calls for the next year update assessment and for planned data evaluation workshops;
- j) Audit all data and methods used to produce stock assessments and projections.

Medium Priority for spring 2020 advice season

- a) Consider and comment on Ecosystem and Fisheries overviews where available;
- b) For the aim of providing input for the Fisheries Overviews, consider and comment for the fisheries relevant to the working group on:
 - i) descriptions of ecosystem impacts of fisheries;
 - ii) descriptions of developments and recent changes to the fisheries;
 - iii) mixed fisheries considerations; and
 - iv) emerging issues of relevance for the management of the fisheries;
 - e) Review progress on benchmark processes of relevance to the Expert Group; High for application;

Low Priority for spring 2020 advice season

- c.iv) Estimate MSY proxy reference points for the category 3 and 4 stocks
- g) Identify research needs of relevance for the work of the Expert Group.
- h) Review and update information regarding operational issues and research priorities and the Fisheries Resources Steering Group SharePoint site.
- i) Take 15 minutes, and fill a line in the audit spread sheet 'Monitor and alert for changes in ecosystem/fisheries productivity'; for stocks with less information that do not fit into this approach (e.g. higher categories >3) briefly note in the report where and how productivity, species interactions, habitat and distributional changes, including those related to climate-change, have been considered in the advice. ACOM would encourage expert groups to carry out this term of reference later in the year through a WebEx.

1.1.2 Specific ToRs

WGCSE – Working Group for the Celtic Seas Ecoregion

2019/2/FRSG09 The Working Group for the Celtic Seas Ecoregion (WGCSE), chaired by Mathieu Lundy, UK and Sofie Nimmegeers, Belgium will meet in Ghent, Belgium*, 6–15 May 2020 and by correspondence September / October 2020 to:

- a) Address generic ToRs for Regional and Species Working Groups;
- b) Report on reopened advice as appropriate;

The assessments will be carried out on the basis of the stock annex. The assessments must be available for audit on the first day of the meeting.

Material and data relevant for the meeting must be available to the group on the dates specified in the 2020 ICES data call.

WGCSE will report by 25 May 2020 for the attention of ACOM, and by 1 October 2020 for *Nephrops* stocks, anglerfish, megrim in Rockall and the Celtic Sea gadoids. Concerning ToR b) the group will report on the ACOM guidelines on reopening procedure of the advice before xx October and will report on reopened advice before xx October.

Only experts appointed by national Delegates or appointed in consultation with the national Delegates of the expert's country can attend this Expert Group.

* the venue changed to online meeting due to Covid-19 disruption

1.2 Participation

Due to the COVID-19 pandemic, all ICES assessment physical meetings were suspended and held remotely. Nevertheless, an adequate participation could be achieved with representation of the different institutes that are generally involved.

1.3 Methods

The type of final assessments presented at the WG are summarised as follows:

Category 1 age-based assessments and forecasts were conducted for bss.27.4bc7ad–h, cod.27.6.a, cod.27.7.e–k, had.27.6.b, had.27.7.a, had.27.7.b–k, ple.27.7.a, sol.27.7.a, sol.27.7.e, sol.27.7.fg and whg.27.7.b–ce–k;

Category 1 Bayesian surplus production model for lez.27.4.a6.a;

Category 1: UWTV survey based assessments and advice were used for nep.fu.11, nep.fu.12, nep.fu.13, nep.fu.14, nep.fu.15, nep.fu.16, nep.fu.17, nep.fu.19, nep.fu.2021 and nep.fu.22. Fisheries data were updated at the May meeting and survey data were updated in the autumn;

Category 3: Catch-at-age based assessments with caveats i.e. used for trends only and without forecasts for ple.27.7.e;

Category 3: SPICT used to provide biomass trend for ple.27.7fg and whg.6a;

Category 3: Analysis of the trends in survey data are used as the basis for advice for anf.27.3a46, cod 27.7.a and lez.27.6b;

Category 4: Depletion corrected average catch was used for pol.27.67;

Category 5 and 6: bss.27.6a7bj, cod.6b, nep.27.6aoutFU, nep.27.7outFU, ple.27.7bc, sol.27.7bc and sol.27.7h–k.

For the stocks for which a full analytical assessment was possible, the WG used either Extended Survivor's Analysis (XSA), Time-Series Analysis (TSA), Age-Structured Assessment Program (ASAP) or state-space assessment model (SAM). These approaches and procedures for using them are discussed in further detail in the relevant stock annexes.

1.4 Data issues

Data were generally submitted in a timely fashion through the InterCatch database for landings and discards data, and through the accessions database for other sources of data. There was a minimal delay in the upload of French data into InterCatch because a thorough review and modification of the data processing was needed (Vigneau *et al.*, 2020). This originates from the modifications made in the French data processing in 2019, which deemed an improvement of the procedure and not anticipated to be a step change from historical datasets. In agreement with

ACOM it was decided that the use of the multinomial model for ALK gap filling and the omission of the use of fishing days as an auxiliary variable for raising discards, was the way forward. The 2020 data submission consisted of updating InterCatch with 2018 and 2019 datasets for all stocks. These issues have also impacted the Celtic Sea benchmark (WKCELTIC) and consequently the advice for cod.27.7e–k, had.27.7b–k and whg.27.7b–ce–k that was delayed until autumn. A full dataserie with a consistent approach as described above was provided for those benchmarked stocks.

1.5 Transparent Assessment Framework (TAF)

TAF is a new framework, currently in development, to organize all ICES stock assessments. Using a standard sequence of R scripts, it makes the data, analysis, and results available online, and documents how the data were pre-processed. Among the key benefits of this structured and open approach are improved quality assurance and peer review of ICES stock assessments. Furthermore, a fully scripted TAF assessment is easy to update and rerun later, with a new year of data. A number of assessments are being scripted in standard TAF scripts. See <http://taf.ices.dk> for more information.

Last year, the following stocks made progress running their assessments on TAF: anf.27.3a46, cod.27.6a, cod.27.6b, cod.27.7a, had.27.6b, had.27.7b–k, nep.fu.11, nep.fu.22, ple.27.7e, ple.27.7h–k, pol.27.67, sol.27.7e, sol.27.7fg, sol.27.7h–k, whg.27.6a, whg.27.6b, whg.27.7b–ce–k. This year, sol.27.7a can be added to this list. Overall, the 2020 update for most of the stocks is not yet completed.

1.6 Internal auditing and external reviews

As in previous years the WG carried out its own internal audit process using the standard ICES template. Given the workload of many of the scientists at WGCSE (sometimes with one scientist responsible for two or more stocks), many of the reports were not finalized until after the WG meeting. Audits were therefore typically carried out by correspondence after the WG and not completed for some stocks.

All stocks for which advice was provided in June and October 2020 were audited by the WG and audit reports were produced for most of these. Issues discovered during the audit process were corrected in the WG report.

1.7 Generic ToR e: WGCSE recommendations for stocks to be benchmarked

whg.27.6a was benchmarked in 2020 at the WKDEM. During the benchmark process, it became clear that running TSA with new data and changed survey configuration in conjunction with excessive running times, were a major obstacle to complete the assessment successfully. In these circumstances, it was decided to run the benchmark assessment using an alternative method, the SPiCT model. At the same time, the stock was downgraded to category 3 according to the ICES guidelines for data-limited stocks (ICES, 2019b). Finally, ACOM decided to downgrade the stock to category 5, because the confidence intervals of the SPiCT model estimates were very wide and as such, the reference points were not considered to determine stock and exploitation status. The model is basically too uncertain to be used for advice. As there was a lot of disappointment with this outcome, there was an initiative to try and fast track this stock into a benchmark in 2021. The most suitable approach was to add this stock to the scheduled benchmarks in 2021. For whg.27.6a, the focus will be to agree on the most appropriate combination of survey indices to

include in any assessment and to move to an alternative assessment method such as SAM, for example.

In 2021, WKMSYSPiCT is scheduled to evaluate the appropriateness of data and the use of the Surplus Production in Continuous Time (SPiCT) to provide MSY advice for ple.27.7fg, ple.27.7e, lez.27.6b and cod.27.7a. WGCSE recommend that pol.27.67 and pok.27.7–10 should be benchmarked together. Currently, both stocks are categorized as category 4 data-limited and the DCAC method is applied to provide advice. As the DCAC method only uses long time-series of official landings, it may not reflect recent stock fluctuations or changes in the fisheries, smoothed by the length of the time-series. So new computations of DCAC are always very close to the previous year's results, even if recruitment or SSB highly fluctuate. Therefore, it is relevant to explore new assessment models. Furthermore, this is the first year advice was provided for the pok.27.7–10 stock.

WGCSE recommend that ple.27.7h–k and ple.27.7fg should be scheduled for a benchmark and dependent on the outcome of the WKMSYSPiCT issue lists, updated and prioritisation re-evaluated. For those plaice stocks, the focus is to examine alternative assessment models to XSA (e.g. A4A, ASAP, SAM, CASAL), explore the impact of all available tuning fleets, reconsider available life-history and catch data.

Further details are given in the stock sections.

Every year a prioritization exercise for the stocks that need to be benchmarked is done. The sum of the weighting scores (1–5) for each of the five criteria will determine the urgency for a benchmark. Those criteria are related to the quality of the previous assessments, the opportunity to improve the assessment, the management importance, the perceived stock status and the time since the previous benchmark.

To have an overview of this information, an issue list is requested for every stock.

1.8 Specific ToRs

1.8.1 c(ii): Estimation of MSY proxy reference points for category 3 and 4 stocks

The Terms of reference contained a list of six stocks for which proxy reference points should be considered. The Working Group addressed this Tor as follows.

Category 3 stocks

For two stocks (ple.27.7e and ple.27.7h–k) age-based assessments are performed, although only used as relative indicators of stock status. For these stocks, most of the reference points were estimated using the package EqSim, and the method of WKMSYREF4 at WGCSE 2017. The extra data available at this year's Working Group, did not warrant recalculation of the reference points.

For ple.27.7fg, a SPiCT assessment using survey and lpue data, combined with a hind-cast of discards was used to estimate the stock status relative to reference points.

For lez.27.6b, a SPiCT assessment using survey data is normally conducted to estimate the stock status relative to reference points. However, this year it was not possible to provide information on the stock size in relation to the reference points because the SIAMISS-Q2 survey was not completed in 2020 due to the COVID-19 pandemic.

For anf.27.3a46, which was benchmarked in 2018, none of the DL approaches for estimating proxy reference points were entirely satisfactory.

Last year, the assessment of cod.27.7a was evaluated to be not of sufficient quality to be retained as a category 1 assessment. Therefore, the reference points previously defined for this stock were not considered appropriate for providing advice. As a result, the advice is based on the survey index as indicator of stock size and the category 3 precautionary approach.

Following the benchmark workshop WKDEM 2020, whg.27.6a was downgraded to category 3 and the assessment was carried out using SPiCT with catch and survey data. Finally, ACOM decided to downgrade the stock to category 5 because the confidence intervals of the SPiCT model estimates were very wide and as such the reference points were not considered to determine stock and exploitation status.

Category 4 stocks

For pol.27.67 and pok.27.7–10, no reference points are defined.

1.8.2 c(viii): Calculation of Mohn's Rho

Through this additional ToR, the working group was requested to report the assessment bias statistic Mohn's rho for each of the category 1 stocks. For the following stocks, the Mohn's rho data were uploaded to the "Retro-bias-2020" SharePoint: bss.27.4bc7ad–h, cod.27.6.a, had.27.7.a, lez.27.4a6a, ple.27.7.a, sol.27.7.a, sol.27.7.e and sol.27.7.fg.

The assessments of *Nephrops* stocks do not revise the perception of previous years, and so there is no retrospective assessment.

The guidance on calculating Mohn's Rho seems unclear about whether the SSB for the intermediate year should be used for the calculation of rho in XSA and ASAP models. Some members considered that the SSB in 2019 was a consequence of the known numbers and catch in 2018 and should therefore be included, while others took the view that the SSB in 2019 depends on a 2019 recruitment assumption where the recruitment has some proportion mature. Furthermore, the SSB 2019 also depends on the assumed stock weights-at-age for 2019. In the latter case, the SSB 2019 is not directly derived from the assessment model, and should therefore be excluded from the Mohn's rho calculation.

WKFORBIAS that took place in November 2019 was tasked to quantify the extent and possible causes for retrospective bias. As this is still a work in progress, ICES has provided guidance (based on a paper of Hurtado *et al.*, 2015), that suggests downgrading stocks from category 1 if the Mohn's Rho value of the SSB retro is outside the range -0.15 to 0.2.

Last year, the retrospective biases in cod.27.7e–k and had.27.7b–k were outside the limits of the rule of thumb of Hurtado-Ferro (2015). The benchmark in 2020 (WKCELTIC) resulted in a revised perception of the Celtic Sea gadoids. This year's assessments in SAM are more robust and show no definite bias.

There is some evidence of a retrospective pattern for bss.27.4bc7ad–h as the Mohn's Rho value for SSB and F are just within the tolerance threshold. However, if recreational catches were re-estimated at every peel using a later version of SS, Mohn's Rho values of 0.137 and -0.113 for SSB and F_{bar} were noted. This is because recreational catches are unknown - what is "known" is the F multiplier which corresponds to the management measures in place compared to F_{2012} for the recreational fleet. So recreational catches have to be estimated iteratively at every new assessment at the moment. By peeling years of the latest assessment, the F multiplier will not match its expected value anymore, unless recreational catches were estimated again. The remaining pattern might be caused by the gradual change in selectivity of the fishery due to management regulations that is not captured in the model in its current form.

With a Mohn's Rho value for SSB of -0.15, there is also some retrospective pattern for had.27.6b.

1.9 References

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