

SCOPING WORKSHOP ON NEXT GENERATION OF MIXED FISHERIES ADVICE (WKMIXFISH; outputs from 2020 meeting)

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SCOPING WORKSHOP ON NEXT GENERATION OF MIXED FISHERIES ADVICE (WKMIXFISH; outputs from 2020 meeting)

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Editor

Paul Dolder



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i Executive summary

This meeting brought together managers, stakeholders, and scientists to identify future priorities for mixed fisheries advice and research. The key aim of the workshop were to establish a joint understanding of the current approach to mixed-fishery advice, review recent developments in mixed fisheries analysis and modelling, and identify key future challenges and drivers for future mixed fisheries advice given the changing policy landscape.

The workshop highlighted the breadth of research fields that mixed fisheries considerations synthesised and noted that as an increasingly central part of advice for annual fisheries management decisions, there was a need for national laboratories to prioritise funding to develop approaches to address the emerging management challenges and bring the different areas together. The importance of timely, clear advice supported by more detailed fleet disaggregated information so the interactions could be understood at the national and fleet level was also a clear message from managers.

Key challenges identified at the workshop included the operationalisation of MSY ranges to reduce over-quota catches in mixed fisheries, scenario-based advice taking account of changing regulations (e.g., landing obligation rules in the EU), and consideration of technical measures (spatial or real-time closures and gear based selectivity improvements) in advice scenarios. Such approaches would ideally be extended for consideration in an MSE setting to evaluate long-term management plans.

There was also general support for supplementary advice that could take the form of more descriptive and less data intensive approaches. This supplementary advice would provide a greater understanding of how spatiotemporal changes in fishing patterns affect catch compositions, and how target fisheries affect bycatch and vulnerable species. This sort of information would complement TAC-based advice in tackling specific management challenges faced in reducing catches of a stock which required large reductions in catches but is caught as part of a mixed fishery.

It was agreed that further technical work should take place to progress the areas discussed during the workshop; this report should be considered the Chairs' summary and synopsis of the workshop outcomes to take forward.

ii Expert group information

Expert group name	Scoping workshop on next generation of mixed fisheries advice (WKMIXFISH)
Expert group cycle	Annual
Year cycle started	2021
Reporting year in cycle	1/1
Chair	Paul Dolder, UK
Meeting venue and dates	3-5 March 2020, ICES HQ, Copenhagen, Denmark (33 participants)

1 Introduction

A scoping workshop (WKMIXFISH) was organised to bring together scientists, fisheries managers, and stakeholders to identify future priorities and research needs in support of mixed fisheries advice. There have been significant policy developments since the introduction of mixed fisheries advice, particularly in the EU with the introduction of the landing obligation, and the overall objective of the workshop was to identify future direction for research given the changing needs of the advisory system. The workshop took place over three days (lunchtime to lunchtime) and included presentations on the latest research and breakout discussions to identify priority areas and future work.



WKMIXFISH participants, ICES HQ, Denmark.

1.1 Background

ICES has provided advice on the implications of mixed-fishery interactions given single-stock management advice since 2012. This advice has been in the form of scenarios of predicted catches given current understanding of technical interactions (who is catching what) and a range of assumptions about the limiting ('choke') stock effect. The approach, initially restricted to the Greater North Sea, has now expanded to cover the Celtic Sea, Bay of Biscay, and Iberian waters implemented with the Fleet and Fishery Forecast approach (FCube; Ulrich *et al.*, 2011) and Fisheries Library Bioeconomic Impact Assessment (FLBEIA; Garcia *et al.*, 2017) modelling frameworks (Table 1.1).

Table 1.1 Introduction of ICES mixed fisheries considerations across subcoregions

Region	First published	Modelling approach
North Sea (3A, 4 and 7D)	2012	FCube
Celtic Sea (7BC, E-K)	2015	FCube
Bay of Biscay (8AB,D)	2020	FLBEIA
Iberian waters (8C, 9A)	2016	FLBEIA

Mixed fisheries considerations are having increasing prominence in fisheries management. There is a changing policy landscape, particularly in EU fisheries under the landing obligation that requires taking account of mixed fishery interactions to achieve policy outcomes related to Maximum Sustainable Yield (MSY) and discard reductions and elimination. The workshop was an opportunity to review progress in ICES scientific advisory capacity to support management

of mixed fisheries and in particular review outputs from research programmes and assess how they can be applied in an advisory context.

1.2 Methods and approach

The workshop was split into four parts:

1. Reviewing current methods and approaches to delivery of mixed fisheries considerations, including understanding and interpretability from managers and stakeholders;
2. Identify novel ways of presenting the rich layers of information that mixed fisheries analyses can provide, for example, use of ShinyApp's to present data on catch compositions and effort trends for combinations of fleet and metier;
3. Reviewing the latest scientific developments and analyses that inform on the consequences and potential solutions to address management challenges caused by mixed fisheries interactions. This included presentations and discussions on:
 - a. What target and bycatch species are in a mixed fisheries context?
 - b. Spatial dynamics of exploitation in mixed fisheries;
 - c. Technical gear-based solutions to reduce unwanted catch;
 - d. Potential for integration of economic considerations in mixed fisheries advice; and
 - e. Longer-term management strategy evaluation (MSE) of mixed fisheries management plans.
4. Subgroup work based on the five topics presented in session 3 to identify future advice needed to support management decisions. A focus was given to:
 - Key policy questions and drivers;
 - Gaps in evidence;
 - Priority research/recommendations required to make operational advice in these areas;
 - Data needs and availability;
 - Timelines and roadmap.

Presentations and statements were invited from the managers and stakeholders present at the workshop. A presentation was received from the main recipient of the advice which provided useful context and insight into the needs of managers to support end-year decisions on fisheries measures in response to updated ICES stock advice. This highlighted the complex number of factors required to be considered to achieve the range of policy outcomes and highlighted the value of mixed fisheries considerations in supporting these decisions.

Interventions and statements were invited from managers and stakeholders, including the fishing industry and environmental NGOs, throughout. This included an interactive polling session to clarify understanding of mixed fisheries advice (responses in Annex 4). This session enabled the workshop to understand different perspectives on the approaches available and types of advice, which served as useful context for more in-depth discussions during breakout groups.

1.3 ICES code of conduct

WKMIXFISH was seen as a scoping workshop and participants were expected and encouraged to speak from their own experiences and positions. Thus, the workshop was covered by the code of conduct as *'ICES may run meetings which are intended to solicit stakeholder views. For these meetings, ... participants will be asked to represent specific professional interests.'*

2 ToR A. Review scientific developments on mixed fisheries analysis

2.1 Target and bycatch species

A presentation and discussion on work arising from the PROBYFISH research project demonstrated how we can understand the effect of target fisheries on bycatch – identifying interactions and impacts. The presentation highlighted the distinction between target, valuable bycatch and unwanted catch and the varied reasons for these categories. It also highlighted how significantly different numbers of target species could exist in different regions, and that these vary spatially.

The utility of analytical correlations in catches among bycatch species was highlighted to describe interactions for stocks that could not necessarily be incorporated fully in mixed fisheries models. The question posed whether this could provide a way to manage bycatch stocks based on their interactions with specific fleets and métier in different spatial units. A way to do this could be:

- To describe the key spatial interactions both among target species in fisheries and target and bycatch species, and how those lead to the technical interactions we identify as choke points in the fisheries;
- Use this information can be used to highlight potential consequences of changing fishing opportunities for target stocks on catches of bycatch stocks, as a qualitative advice on impacts of different management choices.

2.2 Spatial dynamics in mixed fisheries

A presentation and discussion on the complexity of the spatial dimension of mixed fisheries highlighted the need to understand within métier variability in catch compositions and to understand how fishers respond to management measures and have utilised these differences to adapt to quota imbalances in past.

It was recognised that predicting fishers' response to regulatory change was challenging due to the range of scope of adaptation fishers can make. Focus could be first on understanding the range of potential adaptations, their impact on mixed fisheries scenarios and how to take account of these uncertainties in management advice. Past information could be used to:

- Recognise that due to the complexities modelling fishers' behavioural response to regulation and changing quotas, advice is provided as scenarios that highlight trade-offs in different management approaches;
- These complexities mean while we are unable to predict how exactly how fleets respond to combination of measures and options, need to take in account range of responses to better understand impact of measures (scenarios);
- Understanding of fleet dynamics (use of space, gears) is central to understanding mixed-fisheries interactions – progress, but still work to do to understand impacts of different assumptions on advice;
- Within that characterise our uncertainty about the future relationship between species based on past variability in catches (or catchabilities) for different stocks caught together in mixed fisheries;

- Take account of these uncertainties in scenarios-based advice, where possible. It was important in this regard to retain clarity of advice in what was already a complex scenario-based structure and not confuse end-users while communicating the evidence and story.

2.3 Gear-based solutions

A presentation and discussion highlighted the impressive amount of work ongoing in collaboration between gear technologist and industry to find technical solutions to separate out unwanted catches. Some ideas work well, some less well and depends on objects and circumstances in fishery. Key messages included:

- There was understanding that gear-based solutions exist and are increasingly being developed by gear technologists including in conjunction with industry innovation;
- No one-size-fits-all approach exists, and that consideration needed to be given to the specifics of the fishery;
- A challenge is how we can incorporate this information into advice in a way that shows how or whether these solutions can help to mitigate choke issues. This is particularly challenging where a gear affects retention of multiple stocks, which can include both target and bycatch stocks (some of which may be valuable);
- There was value in assessment and mixed-fisheries scientists working with gear technologists to understand how incorporation of gear-based solutions could be taken forward in mixed fisheries advice.

2.4 Integration of economic advice

There was a presentation and discussion on how economic considerations might be incorporated in mixed fisheries considerations. The work showed how economic information can be incorporated in evaluations of different management approaches: highlighting the trade-offs between transition costs and medium term outcomes. Key messages from the presentation and discussion included:

- There remain significant data challenges in incorporating economic information in ICES mixed fisheries models but there has been progress in streamlining these processes. A particular challenging is timing of data collection, and consistency with the fleet and métier definitions used elsewhere, i.e. MIXFISH. STECF has been undertaking work to improve the consistency in definitions;
- There exist bioeconomic models for some but not all regions. There is value in incorporating economic considerations both in existing MIXFISH models (e.g. FLBEIA was designed with this in mind), but also in the advice and how it is communicated (i.e. what is the unit of interest when considering trade-offs among management options);
- Challenge there is that the data processes need to be worked on to deliver timely advice that can supplement that already given through WGMIXFISH;
- It was highlighted that while optimisation routines are possible the most likely path to integrating economic information in mixed fisheries considerations was through an Impact Assessment type approach, where the scenarios were communicated in a parallel economic context;
- However, to support the management processes in developing management options it was considered that this should take not only a short-term perspective but where possible consider the long-term bio-economic trade-offs between short-term and long-term benefits.

2.5 Management strategy evaluations

A presentation and discussion on management strategy evaluations (MSEs) in the context of mixed fisheries highlighted the need to model static processes dynamically to understand the impact of longer-term dynamics on management outcome. There are many options to do this, and the presentation highlighted:

- Need to model several biological processes across stocks, including biological (predator-prey) interactions alongside technical;
- For fleets, the allocation of effort across métier is a key determinant of outcome, and this requires high resolution technical and economic data;
- Entry/Exit modelling for fleets is also important – linked to the evolution of the fleets over time in response to economic conditions of the fisheries;
- It is possible to evaluate impact of TACs for target species on bycatch stocks from a mixed-fishery perspective;
- Need to evaluate management strategies from a long-term perspective. What are the key aspects that affect our ability to understand management system and provide robust advice? Global sensitivity analysis highlighted the key processes that affect outcome, including influence of natural mortality and growth, fleet effort, métier catchabilities and TAC for choke stocks.

3 ToR B-D. Identify policy questions and prioritise research recommendations, processes, and timetables.

3.1 Policy drivers and questions

For this session there was a general discussion around the policy questions and drivers for mixed fisheries advice followed by specific topic breakout groups. In particular, the following policy drivers were highlighted:

- Policy framework recognises need to take account of mixed-fishery interactions in TAC setting framework. There is now a question of how to operationalise MSY ranges and scientific advice can support this process. Need to consider both the short-term and long-term implications (i.e. through MSE),
- For the EU, the landing obligation has resulted in several discard plans in place, but currently not considered in mixed fisheries advice. It was considered these were complex to translate to models, with very specific rules on exemptions and derogations. How do we translate into advice (do we need to)?
- The fact that the development of management plans was increasingly becoming fishery-based meant there was a need to understand trade-offs and consequences of approaches from a mixed-fishery perspective.
- Increasing recognition of the importance of flanking technical measures to support implementation of TACs in mixed fisheries: need for evidence-base to understand mixed-fishery dimension and support decisions.

3.2 Breakout sessions on topic areas

The breakout groups were organised around the topics described under ToR A (section 2). Due to overlap, the target and bycatch and spatial dynamics topics were combined. Participants in the workshop rotated round each of the topics, with care taken to ensure a mix of researchers, managers, and stakeholders in each group. A rapporteur was assigned to each group to capture discussion and report back to the workshop.

- What are your example policy/evidence questions?
- Identify:
 - Gaps in evidence?
 - Priority research areas and recommendations
 - Where should this work take place (MIXFISH, other ICES group or elsewhere)?
 - What type of advice would be able to be provided?
 - What data is required (already available?)
 - What (realistic) timetable (short, medium, long-term) to incorporate in advisory processes + steps

3.3 Breakout 1: Target, bycatch, and spatial dynamics

Policy / Evidence Question	Impact of spatial dynamics on catch of target and bycatch stocks
Gaps in evidence	Understanding impact of changing spatial use on catchability and technical interactions, Understanding of links between catches of target and bycatch stocks,
Priority research areas and recommendations	Fine scale distribution of retained catch and spatial patterns in targeting, Defining métier incorporating spatial considerations, Correlations among catches of target and bycatch stocks in métier.
Links with advisory groups	ICES Spatial Fisheries Data (SFD)
Type of advice	Maps of retained catch, discards and spatial correlations among species are useful for understanding spatial dynamics and could be used to provide qualitative information (example: fishery A increasing, impact on species X, Y, Z). May not require annual production, but could be updated periodically, i.e., key runs.
Data requirements	VMS linked catch information, Observer data Where possible trip-by-trip data for assess correlations
Indicative timetable	1 – 3 years

3.4 Breakout 2: Economics

Policy / Evidence Question	What are the economic impacts of different policy or management choices on fleets?
Gaps in evidence	Economic impact of management decisions, Economically optimal policies
Priority research areas and recommendations	Favoured Impact Assessment approach – evaluate current advice rather than optimisation. Some of the models already use an economic part, could this be more utilised? Short term vs long term (basic indicators vs full models), Identification of key stocks to include in models, Spatial distributional effects of management? Including behavioural changes is complicated – can we look to the past? May be a role for WGSOCIAL. Need to clarify role of ICES in economics advice – develop more specific ToR for WGECON? Policy had broad objectives, but not specific measurable targets, so need to establish how work contributes.
Links with advisory groups	WGECON, WGSOCIAL
Type of advice	Impact assessment of mixed fisheries scenarios.
Data requirements	Fleet and métier based data at right resolution and in time for advisory process.
Indicative timetable	1 – 3 years

3.5 Breakout 3: Gear-based solutions

Policy / Evidence Question	Both short-term and long-term: avoid choke, reduce discards.
Gaps in evidence	Métier definition and reporting of selectivity measures, Are gear trials representative? How to scale up. Addressing Unaccounted mortality Converting length-based trials to age-based assessment impacts.
Priority research areas and recommendations	ICES process to assess large scale biological and economic impact. Post implementation monitoring and performance review
Links with advisory groups	WGFTFB
Type of advice	Impact on yield and biomass
Data requirements	Gear trial data, métier disaggregated catch with selectivity measures recorded, age-length keys
Indicative timetable	3-5 years

3.6 Breakout 4: Management Strategy Evaluations of mixed-fishery management plans

Policy / Evidence Question	How to take account of key stocks and technical measures
Gaps in evidence	Impact of alternative (supplementary) measures to TACs - gears, spatial, etc.
Priority research areas and recommendations	Understanding sensitivity of results to different assumption about fleet behaviour, How changes in catchability affect mixed-fisheries advice, Identify stocks representative for fisheries, How to translate gear-trials to scenarios.
Links with advisory groups	WGMIXFISH-Methods
Type of advice	Management Plan evaluations
Data requirements	Fleet and métier disaggregated data, Management scenarios,
Indicative timetable	3 – 5 years

4 ToR E. Communication tools for mixed fisheries advice and analyses

4.1 Current understanding of mixed fisheries advice

Current understanding of mixed fisheries considerations and scenario-based advice was established through an interactive session to identify common wants and themes from scientists, managers, and stakeholders at the workshop (Annex 4). Ten questions were posed and revealed a range of views, with general support and recognition of the utility of the way advice is currently presented, to evaluate trade-offs in management options. However, there was a feeling that parts of the advice sheet could better “tell the story” for the challenges faced in managing the mixed fisheries. As such, more contextualised scenarios could help better understand the tensions and imbalances, and potential solutions. The session provided:

- A common understanding on the scenario-based approach to mixed-fisheries considerations, methods and current applications and limitations;
- Discussion with managers and stakeholders on the types of advice, the importance of timing to support the advisory process (understanding the work-flow and trade-offs). The need for the “timely” provision of advice to support end-year management decisions and processes was emphasised as of key importance;
- The recognition that there were a range of interests in the advice and different aspects of it (stock level, fleet level) and different methods could be used to present these different levels of information, such as interactive web-tools where users could delve into the details of specific fleets, métier and stocks (see ToR E on communication);
- There were a range of opinions on the number and types of scenarios presented, but in any case, a need to ensure they were communicated in a clear and focussed way and relevant to the current management challenges for the fisheries.

4.2 Development of interactive communication tools

There was discussion of the levels of detail provided in the current advice sheets. While complex, it was recognised that the fleet and métier based information had layers of detail that were likely to be of interest to different users and at different levels of detail. There was general support for exploring new ways of presenting data and outputs from models to understand where pinch points and imbalances of quota exist in the mixed fisheries.

A presentation and discussion of an interactive “Shiny” tool to visualise the data and modelling results compiled each year by WGMIXFISH was made. The presentation highlighted the rich source of information that could be utilised to inform management decisions, and potential to use such interactive tools to supplement traditional advisory products was recognised as a useful area to develop. To progress this there was considered a need to embed development within the ICES procedure and test streamlining of the data and resources to support its development and maintenance.

5 Conclusions

The workshop identified several promising avenues to develop and expand on current approaches to delivering mixed fisheries advice. It was noted that there were significant resource implications for progressing the research and method development, and there was a need for identification of research projections and national resources to support this endeavour.

There would be future workshops to look in more detail at specific issues identified during the scoping workshop, including joint workshops with other advisory and science groups to harness expertise from the wider ICES community as needed. Recommendations on specific workshops to develop these initiatives have been communicated to the ICES Secretariat and ACOM.

Annex 1: List of participants

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Annex 2: Resolution

2019/2/FRSG28 **The scoping workshop on next generation of mixed fisheries advice** (WKMIXFISH), chaired by Paul Dolder*, UK, will meet on 3–5 March 2020 in ICES HQ, Copenhagen to:

- a) Review recent scientific developments on mixed fisheries analysis, modelling and visualization to create awareness of what is currently achievable and identify potential approaches for the future.
- b) With advice recipients and stakeholders, identify a range of questions on mixed fisheries in the context of policy objectives such as achieving MSY, spatial management, discard reduction (landings obligation), improving selection and ecosystem approach;
- c) Prioritize recommendations for research to lead to future improvements of the mixed fisheries advice;
- d) Consider potential process and timetables by which new data and methods can be incorporated into the advice system
- e) Consider methods to improve communication of mixed fisheries information and advice.

WKMIXFISH-Scope will report by 19 March 2020 to the attention of the ACOM Committee.

Supporting Information

Priority	The current activities of this Group will enable ICES to respond to advice requests from a number of clients. Consequently, these activities are considered to have a high priority.
Scientific justification	<p>ToR [a] The ICES mixed fisheries advice using Fcube is focused on the short term consequences of different advice scenarios. While this approach is useful to look at short term trade-offs and conflicts with the single stock advice both understanding and utilisation of this advice has been low. There have been a number of research project looking new ways to analyse, visualise and model mixed fisheries data. It would be very useful to demonstrate these to advice recipients and clients.</p> <p>ToR [b] There is a need for a wide dialogue among the scientific community, advice recipients and stakeholders on the scope of current and future advice requirements linked to current and emerging policy needs.</p> <p>ToR [c] Based on the types of questions identified in b) prioritise the research needed.</p> <p>ToR [d] Consider the how new mixed fisheries advice can be developed in practice e.g. will this be possible with existing EG or are new groups needed? Timing and frequency of the advice etc.</p> <p>ToR [d] The current mixed fisheries advice is complex and the communication of future mixed fisheries information and advice needs to be simple.</p>
Resource requirements	Some support will be required from the ICES Secretariat
Participants	The Group is normally attended by some 15–20 members and guests.

Secretariat facilities	None, apart from WebEx and SharePoint site provision.
Financial	No financial implications.
Linkages to advisory committees	ACOM is the parent committee
Linkages to other committees or groups	WKMIXFISH-Scope will be linked with WGMIXFISH-Methods and WGMIXFISH-advice
Linkages to other organizations	STECF – Fisheries Dependent Information expert group.

Annex 3: Agenda

WKMIXFISH: Scoping workshop on future mixed fisheries advice

3-5 March, Atlantic Room, ICES HQ, Copenhagen

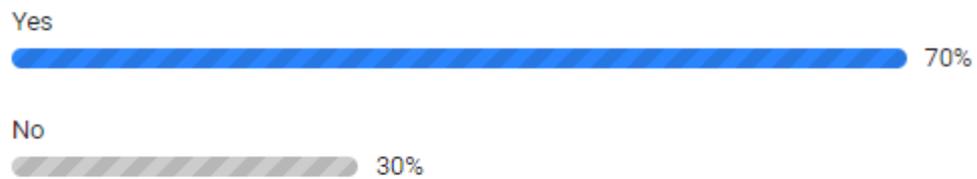
AGENDA

Tuesday 3 March (12.30 for 13:00 start)	
13.00 – 13.30	0. Introductions
13:30 – 15:30	1. <u>Review of ICES mixed fishery considerations:</u> Understanding, interpretation, and ability to address current management challenges. [invitation for presentations from managers and stakeholders]
15:30 – 16:00	Coffee break
16:00 – 17:00	2. <u>Advice communication / Data visualisation:</u> Review clarity, meaning and level of detail with a demonstration of online tool for advice dissemination.
Close day 1	
Wednesday 4 March (09.00 start)	
09:00 – 10:30	3. <u>Presentations: recent developments and potential applications:</u> Opportunity for other presentations as requested. a. Target and bycatch species in advice [Youen Vermard, IFREMER] b. Spatial dynamics in mixed fisheries [Paul Dolder, Cefas] c. Gear based technical measures and impacts [Daragh Browne, BIM]
10.30 – 11.00	Coffee
11.00 – 12.00	d. Management strategy evaluation incorporating mixed fisheries considerations [Dorleta Garcia, AZTI Tecnalia] e. Incorporating economics [Ralf Döring, Thünen-Institut]
12:00 – 13:00	Lunch
13:00 – 17:00	4. <u>Breakout groups on morning topics:</u> [coffee break and feedback at 4pm with chance to swap groups] Future advice needed to support management decisions: <ul style="list-style-type: none"> - Gaps in evidence <ul style="list-style-type: none"> - Priority research/recommendations required to make operational, - Data needs and availability, - Timelines and roadmap
Close day 2	

Thursday 5 March (09:30 start, 12:40 close)	
09:30 – 11:30	5. Feedback from groups: Present and discuss conclusions in plenary.
11:30 – 12:00	Coffee
12:00 – 13:00	6. Conclusions and next steps

Annex 4: Responses to the interactive polling session.

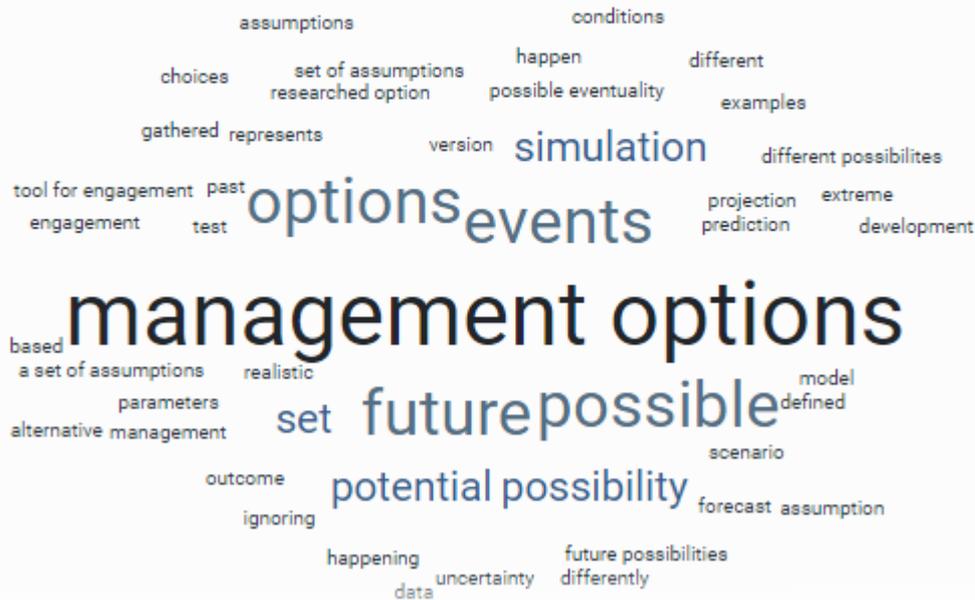
Q1 - Do you any use the current mixed fisheries advice sheets?



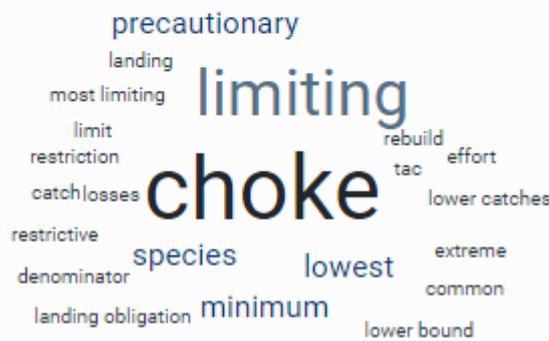
Q2 - Does the advice sheet tell a useful story?



Q3 - What does the word 'scenario' mean to you?



Q4 - What key words/phrases would you use to describe the 'min' scenario?



safe band to balance several issues

flexibility

Cod Fupper

trade-offs

inbetween flexibility

Unused

that even with lower range TACs for two species, upper range is exceeded for the choke

ranges

optimal possibility

winners-&-losers

flexibility without compromising MSY

flexibility

minimize differences between quotas

trade-off

consistency

Q 7 - Would you like less on the advice sheet?

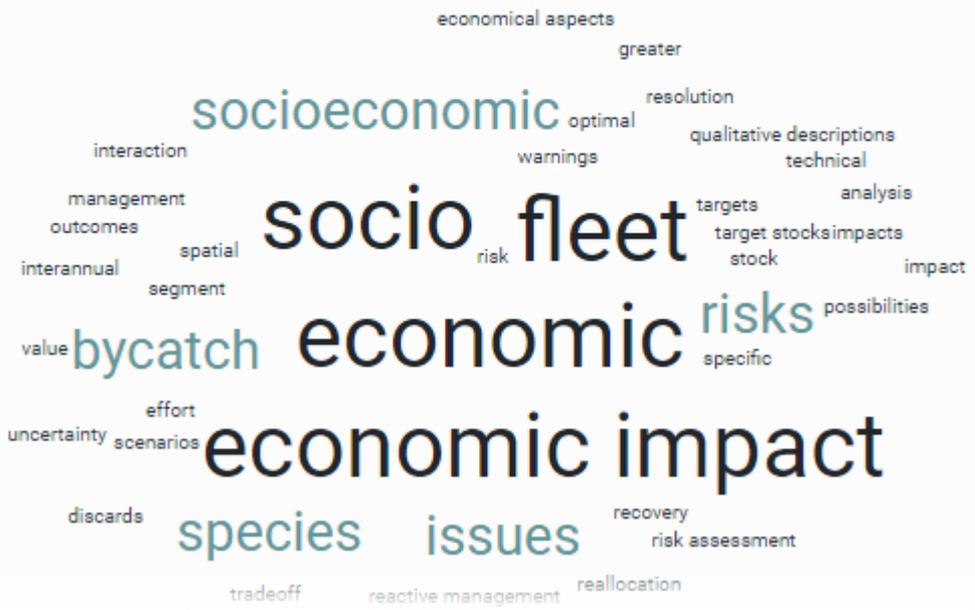
Yes



No



Q 8 - What key words/phrases would describe scenarios that you would like to add to the advice sheet?



Q 9 - Would you prefer to see more descriptive advice or catch options?

Descriptive advice



Catch options



