

SUPERCOBAM WORKSHOP

NEA
PANACEA

North East Atlantic project
on biodiversity and eutrophication
assessment integration
and creation of effective measures

Workshop Report

20-22 October 2021

Online & at Rijkswaterstaat LEF Future Center, Utrecht (NL)



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Preface

You are reading the report of NEA PANACEA's SuperCOBAM workshop, which was held from 20 to 22 October 2021 at Rijkswaterstaat's LEF Future Center in Utrecht, the Netherlands. Participation of this workshop consisted of 25 persons that were physically present and an online group of 40 persons.

During these three days the participants worked towards the delivery of assessments of the status of biodiversity in the North East Atlantic Ocean for [OSPAR](#)'s Quality Status Report due in 2023. These assessments in turn can be used to feed into the reporting for EU's Marine Strategy Framework Directive for those OSPAR Contracting Parties that are also EU member states.

The workshop was organized by the NEA PANACEA project (funded by EU's DG Environment) with support from Rijkswaterstaat and the LEF future center. The organizing team consisted of NEA PANACEA's Activity 5 (Evert Jan van den Berg, Lyke Bosma, Lisette Enserink and Jos Schilder, during the workshop kindly supported by René Dekeling) with professional support from moderator Marinda Hall.

Table of contents

1	Background and Aims of the workshop	5
1.1	NEA PANACEA.....	5
1.2	SuperCOBAM.....	5
1.3	Aims of the Workshop.....	6
1.4	Structure of the workshop	7
1.4.1	Cross-cutting discussions.....	7
1.4.2	Interaction with other OSPAR bodies.....	8
1.4.3	Activity 2 Café.....	8
1.5	In this report.....	9
2	Assessment scales and spatial integration.....	10
2.1	Expert group meetings	10
2.1.1	Marine Birds	10
2.1.2	Pelagic Habitats	11
2.1.3	Benthic Habitats & Non-indigenous species	12
2.2	Mixed expert groups and plenary wrap-up.....	13
3	Integration of indicator assessments.....	15
3.1	Expert group meetings	15
3.1.1	Marine Birds	15
3.1.2	Pelagic Habitats	16
3.1.3	Benthic Habitats & Non-indigenous species	19
3.2	Mixed expert groups and plenary wrap-up.....	21
4	Threshold values	23
4.1	Expert group meetings	23
4.1.1	Marine Birds	23
4.1.2	Pelagic Habitats	24
4.1.3	Benthic Habitats & Non-indigenous species	24
4.2	NEA PANACEA's Activity 2 session on Threshold Values.....	27
4.2.1	Session results	28
5	General expert group output	31
5.1	Marine Birds	31
5.2	Pelagic Habitats	32
5.3	Benthic Habitats & Non-indigenous species	34
6	Activity 2 world cafés	36
6.1	Introduction.....	36

6.2	Models to investigate food webs, biotic-abiotic interactions & cumulative pressures	38
6.3	Assessment scales developed for eutrophication assessments.....	41
6.4	Remote sensing data on primary productivity	42
7	Interaction with other OSPAR bodies	45
7.1	OSPAR secretariat, Lena Avellan	45
7.2	ICG-EcoC, Adrian Judd: Addressing the DAP in DAPSIR.....	46
7.3	Emily Corcoran: Addressing the R in DAPSIR.....	46
8	General outcomes: Plenary closing discussion	48
9	Annexes	52

1 Background and Aims of the workshop

1.1 NEA PANACEA

NEA PANACEA is an EU-funded project in which 8 partners from 5 OSPAR Contracting Parties (Germany, France, the United Kingdom, Spain and the Netherlands) collaborate to deliver biodiversity assessments for OSPAR's Quality Status Report ([QSR](#)) 2023. Our focus lies specifically on pelagic habitats, benthic habitats, food webs and marine birds assessments. These assessments can be used by EU member states in the North East Atlantic region to inform their reporting to the EU for the Marine Strategy Framework Directive ([MSFD](#)). We work on the development of new biodiversity indicators as well as on the improvement of existing ones, for example in terms of data flow, indicator operability, expansion of geographical coverage or the development of threshold values. In addition, we explore what the best ways are to integrate multiple indicators to deliver a single integrated assessment of a specific ecosystem component (e.g. pelagic habitats).

NEA PANACEA also pays special attention to the coherence between state (biodiversity) and pressure (most notably eutrophication and climate change) assessments. Examples of questions we address are: Do we assess state and pressure on similar (comparable) scales? Are the threshold values (below or above which "good status" is achieved) for pressure and state compatible? Does the information from state indicator assessments optimally flow into the (integrated) state assessments? To this end OSPAR's biodiversity experts join forces in this project with OSPAR's eutrophication modelling experts.

NEA PANACEA also aims to have value for those members of the OSPAR family that are not directly involved. In addition to delivering assessments that are of use to all OSPAR Contracting Parties, and especially for those that are also EU Member States, NEA PANACEA will organize two 3-day workshops in which the wider OSPAR community can interact and work together on the QSR products. We also aim to organize a workshop dedicated to the exchange of experience and information about marine birds between the 4 [European regional sea conventions](#).



1.2 SuperCOBAM

SuperCOBAM is one of the two abovementioned workshops NEA PANACEA delivers in order to facilitate the delivery of OSPAR's biodiversity assessments. It is inspired by 2019's S.U.P.E.R. COBAM workshop in Paris, where all seven expert groups¹ under OSPAR's Intersessional Correspondence Group on Coordination of Biodiversity Assessment and Monitoring (ICG-COBAM) convened to discuss

¹ Marine birds, Marine mammals, Fish and cephalopods, Food webs, Non-indigenous species, pelagic habitats & Benthic habitats

cross-cutting issues and exchange knowledge, experiences and views (meeting report enclosed in Annex B, SuperCOBAM Resource Library). The present edition of SuperCOBAM also aimed to discuss cross-cutting issues amongst ICG-COBAM expert groups, with a special view to deliver assessments for the upcoming QSR, albeit somewhat hampered by the Covid-related travel and meeting restrictions. SuperCOBAM also provided an opportunity for the OSPAR secretariat to bring the QSR guidance, requirements and instructions under the attention of the biodiversity experts and for a conversation between biodiversity experts and experts involved in delivering the Drivers, Activities, Pressures and Response sections of the DAPSIR framework (see Annex G) used to write the Thematic Assessments for the QSR. Finally, interaction between eutrophication and biodiversity experts to further the achievement of NEA PANACEA deliverables was on the agenda.

1.3 Aims of the Workshop

The general aim of the workshop, also reflected in the NEA PANACEA project proposal, is to promote interaction between experts working on the ICG-COBAM biodiversity assessments, allow for exchange between the eutrophication & physical conditions experts from NEA PANACEA and the ICG-COBAM community and promote interaction with other OSPAR groups. While the main focus for this workshop was on delivery of the indicator assessments (there is another workshop scheduled for the thematic assessments), the thought and exchange process on thematic topics such as integration and state-pressure relationships were also to be kickstarted at SuperCOBAM.

In addition to the general aims set beforehand, the physical participants discussed at the start of the workshop what would be methods and outcomes they envisioned. In Annex D the resulting whiteboard can be viewed. While dealing with all mentioned elements in the three days was never feasible, it does provide a good overview of the state of the art of many processes the ICG-COBAM community is dealing with. Moreover, it might serve as a starting point and check list for future initiatives in the community. Highlights from this discussion include:

The ICG-COBAM community should:

- Shift gear, there's a lot of work ahead towards QSR 2023
- Obtain (and maintain?) an overview from each expert group per topic:
 - Where are we?
 - What are stumbling blocks?
 - What is our ambition (next steps)?
 - What can we learn from other groups?
 - What are common themes / stumbling blocks?
 - Develop common approach to tackle issues
- Develop narratives for Threshold Value development and develop strategies to effectively engage policy makers in this process
- Consider compatibility of OSPAR assessments with MSFD reporting requirements
 - Further develop concepts
 - Explore limitations
 - Develop holistic view of marine ecosystems and translate that to common/policy language

- Develop a storyline for the thematic assessments
- Perform reality checks, what is feasible and then: prioritize
- Send messages to ICG-COBAM/BitA/BDC/CoG
 - What can and will we deliver?
 - Keep on stressing the resourcing issue

1.4 Structure of the workshop

1.4.1 Cross-cutting discussions

The workshop programme can be found in Annex A. In consultation with the expert group leads, three main cross-cutting themes were identified:

- Assessment scales and spatial integration
- Integration of indicator assessments
- Threshold values

Each day of the workshop was dedicated to one of these themes, to be addressed by a “train” of sub-meetings (see Figure 1). A brief discussion among expert group leads to align thinking and aims of discussion between groups, an online expert group meeting on the topic, a physical discussion with groups of mixed experts and then a plenary, physical wrap-up discussion at the end of the day. For practical reasons, members of the NIS expert group were joined with the Benthic Habitats expert group during the expert group meetings and the members of the Food Webs expert group were distributed amongst the other expert groups in accordance with the expertise of each Food Webs expert group member. The physical meetings had a slight hybrid character because the leads of the expert groups not directly involved in NEA PANACEA (Fish and cephalopods, Non-indigenous species, Marine mammals and Food webs) as well as one of the co-conveners of ICG-COBAM were invited but not able to travel to the Netherlands. They therefore joined the discussions via Zoom.

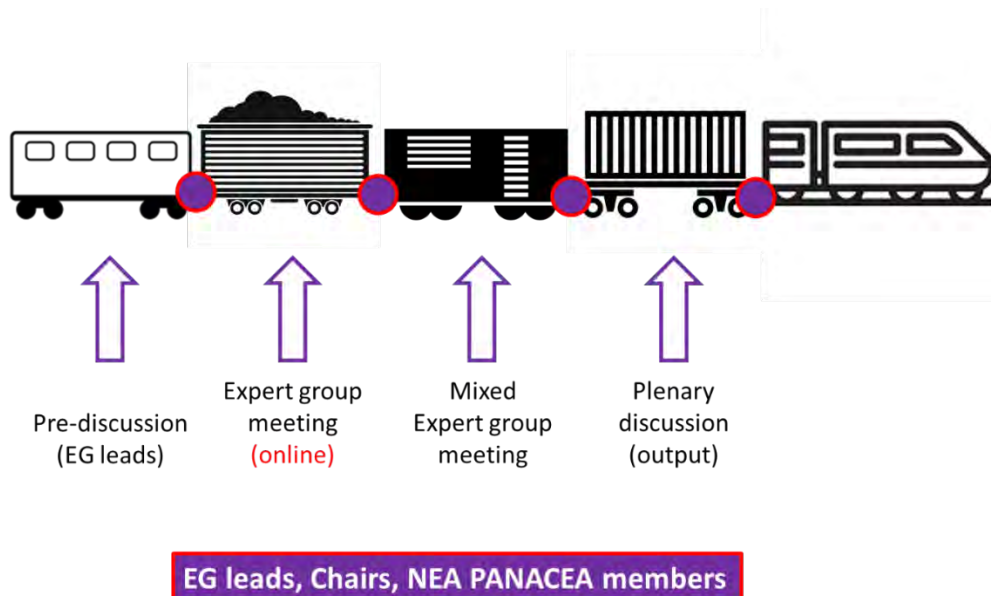


Figure 1. All 3 main cross-cutting themes were addressed through a “train” of sub-meetings, where the expert groups leads and those physically present were responsible for bringing information from one “coach or car” to the next (see text above for more information).

1.4.2 Interaction with other OSPAR bodies

During the online part of the workshop (daily from 11:00 – 15:00) there were, in addition to the online expert group meetings, sessions during which other bodies in OSPAR could interact with the ICG-COBAM expert community. On day 1 and 3, Lena Avellan (deputy secretary at the OSPAR secretariat) talked the expert community through the QSR resources that are available for writing the assessments, the requirements associated with a coherent production of the QSR and answered questions that were raised during the session. On day 2 Adrian Judd (representing ICG-EcoC, Ecosystem Assessment Outlook – Cumulative Effects Assessment) introduced the attendants to the DAPSIR approach used to shape the Thematic Assessments in the QSR, with a specific focus on the DAP (Drivers, Activities, Pressures) section and then had a session with expert group leads on how DAP and S (state) are connected. On day 3 Emily Corcoran, who is contracted to deliver the R (Response) section of the DAPSIR framework, introduced herself and the work she plans to do, and she could reach out to the ICG-COBAM community to lay a foundation for future cooperation.



A view from the control room during an online session

1.4.3 Activity 2 Café

On day 2 and 3 we dedicated a couple of hours to interaction between the various NEA PANACEA project work packages (called Activities). Activity 2 is dedicated to exploring and promoting the use of products and outcomes from the OSPAR eutrophication assessments in the biodiversity assessments and using modeling approaches to link physical conditions (also, for example, climate change in addition to nutrients) to status (biodiversity) changes. In a world café setting those attending the meeting physically (with some NEA PANACEA members attending remotely) could discuss and exchange at three themed tables: 1) Assessment scales developed for eutrophication assessments, 2) Remote sensing data on primary productivity and 3) Model approaches to investigate food web characteristics, biotic-abiotic interactions and cumulative pressures (LiAcAT: Literature analysis and Cumulative Assessment Tool, and ENA: Ecological Network Analysis). In addition, on day 3 we held a session to align the thinking in the process of threshold value setting, also based on the EU MSFD Horizontal Issues: Threshold Values workshop [preread document](#) and [report](#).

1.5 In this report

The most important activity during these three days was intensive face-to-face interaction within the expert community in various compositions, often many occurring parallel. Many unanticipated gems, which include both the scientific and the social aspects, have therefore not been recorded on paper or whiteboard but will no doubt be reflected in the future works of the different expert groups. The discussion and expert group leads / NEA PANACEA Activity leads have been asked to keep record of outcomes as well as possible in the high-paced sequence of events and sub-meetings. Below you can find the notes and key messages recorded during the workshop. They are ordered by topic (e.g. assessments scales and spatial integration) and discussion type (e.g. expert group meeting). The presenters have also been asked to summarize their message and provide a copy of their presentation to be attached to this report.

In the main body of this report, the outputs from all the expert group meetings are ordered by topic. The integral expert group minutes for the benthic habitats expert group, the pelagic habitats expert group and the marine birds expert group can be found in Annexes L, M and N. Leads of the other expert groups did not submit minutes.



Joining remotely does not mean your presence is not prominent!

2 Assessment scales and spatial integration

2.1 Expert group meetings

2.1.1 Marine Birds

Birds GP Leads discussed Key points to consider for the EG discussion:

- Assessment scales for Marine Birds are defined (cannot change boundaries)
- Ideally, we want to do Bird Indicators assessments at subdivision level but we need to account of practicalities issues (e.g. time to apply species models for B3 indicator at subdivision level will cause delays with the timeline)
- Consider QSR guidance:
 - o choose the assessment scale for your component for indicators
 - o Thematic assessment should be done at OSPAR region scale
 - o Integrated assessments within the thematic assessment are done at feature level (i.e. species group)
- Consider differences between OSPAR and MSFD assessment scales
- There are going to be gaps, these needs to be flagged
- Outcome: what we think we can deliver
- Can we make a table with what we assess in what area for each indicator, what is practical?

Birds GP Leads joined online discussion with some members of JWGBIRD

And discussed options for assessments of the common indicators Marine Bird Abundance (B1) and Marine Bird Productivity (B3).

Stefano presented an overview of data obtained from data call

The following points were considered:

- IA17 assessments based on subdivision but QSR23 will use Regions
- Germany will use assessment for IId for MSFD reporting
- B3 needs data from B1, there is a tie between the two indicators
- It is crucial to understand ASAP the assessment scale for B3 given that the indicator involves production of species-specific models which is very time consuming
- The use of smaller subdivision would be more accurate but the downside is that quality of the data would be lower (as there are less sites/datapoints available at subdivision scale)
- It would be useful to do a checklist of breeding & non-breeding data available for each country so we understand the type of national assessments that each country will deliver

OSPAR vs MSFD assessment scales:

- Fredrik Haas (Sweden): Good idea to use the OSPAR assessment for MSFD reporting, but question on geographical scale. Regional scale might not be accurate from Sweden
- Ib Krag Petersen (DK) –there are no particular guidance from the government on the scale to use
- Most CPs would use MSFD data where they can, so for QSR do we really need to align or not.
- Ib Krag Petersen (DK) mentioned that non-breeding data are on the way

Key messages

- Assessment Units are bird specific and defined (no need to modify boundaries)
- The indicator assessments ideally would be run at subdivision scale but not all indicators can be assessed in all subdivisions because of data gaps
- Indicator integration will only happen at regional level but we will also apply indicators to subdivision level to help interpretation of results, subdivision assessment only based on abundance data because of data availability
- OSPAR vs MSFD scales – main mismatches are for UK that will follow the approach done for OSPARIA17 and use the OSPAR regions also for MSFD reporting

2.1.2 Pelagic Habitats

- Spatial integration
 - o The thematic assessments should be at the OSPAR regional scale (In the Annex of the [QSR guidance doc](#))
 - o Outcome of Expert Group (EG): Figure out what we can deliver
- Spatial assessment units
 - o How can we quantitatively decide which assessment unit is best, COMP4 areas or gridded?
 - Using COMP4 areas is best aligned with eutrophication
 - o Is it possible to assign each COMP4 area to the MSFD water/habitat types? This could help clarify the diversity of pelagic landscapes and link more closely to the wording the Directive.
 - o **Action Arnaud (and to liaise with Matt):** we have testing to do on working out if we can link the wide pelagic habitats from the MSFD text to the areas, allowing us to rationalise areas to simplify assessment. We could then compare the indicators and pressures across areas of the same class.
- For PH3 how do we deal with different taxonomical units since not all species are definitively IDed and if you use genus level data the weighting is wrong since some genus have multiple species?
 - o Felipe – we use genus but still have the raw data to interrogate. LCBD highlights years of big change. Important Value Index (IVI) interrogate the data for years characterized by big changes and highlights the taxonomic units responsible for those changes.



2.1.3 Benthic Habitats & Non-indigenous species

Sander Wijnhoven (NL) gave a presentation on the Biogeographic subdivision proposal of marine assessment units for OSPAR and MSFD by TG Seabed and ICES.

During the discussion, it was recognised that subdivision based on pelagic and ICG-EUT marine landscapes would make sense for benthic habitats as it implies specific biogeographical context. The potential consequences for each indicator was discussed:

- BH3 and BH4: Assessment are done at (Broad) Habitat Types scales, for each OSPAR Region. Thus, further subdivisions will not affect the resulting disturbance/lost maps, but rather the percentage of disturbance/lost per habitat type and per assessment unit (Region versus subdivision of Region).
- BH2a: Assessment is done at the Water Framework Directive waterbodies scale. Further subdivision will thus not affect the resulting waterbodies quality status, but rather the number and proportions of GES/not GES waterbodies per assessment unit.
- BH1 and BH2b: These indicators are at even finer scales (benthic habitat communities), and the natural composition of the benthic communities may vary depending on the biogeographical context and area. It was not planned in the current Nea Panacea timeline, but it should be tested in the future, if sufficient data are made available, about the applicability and variation of results (including reference lists of species, biological traits) of these two indicators between biogeographical area (e.g. subdivision of Regions according to TG Seabed proposal).

As a first conclusion, it was agreed that subdivision of marine Regions, according to biogeographical areas influencing benthic communities (e.g. TG Seabed initiative), would make sense for benthic habitat assessments. Nevertheless, the exact delineation and source of subdivision have to be further

discussed during this workshop. These subdivisions should then be tested, notably by studying the variations of the results of fine scale indicators (BH1, BH2), to be able to conclude. This will be considered in the works on data planned, but this test at OSPAR maritime area scale is not planned currently and will need extra resources, data and time to be conducted.

2.2 Mixed expert groups and plenary wrap-up

There was a number of issues flagged on this topic during the discussions. Not having been able to meet in person has led to miscommunication on complex topics such as these. The layered character of most notably (but not necessarily exclusively) benthic habitats assessments complicates spatial integration. It was noted that MSFD regions and OSPAR regions do not align, which seems to make the work unnecessarily more complex (or at best requiring more effort). For some indicators, there is not sufficient data in some regions. During the discussion, we did manage to get an overview of the state of play / plans for the three ecosystem components present (see Table 1).

Table 1. Assessment scales and spatial integration discussion outcomes.

Group	Scale planning to use for assessment	Can you do a regional scale assessment?	What method of integrating up from small to big scale?
Pelagic	Either gridded or COMP4 areas. Both work, but which is better?	It doesn't make sense to combine our assessment units – we lose ecological meaning. The regions are big and the plankton are patchy.	None.
Benthic	MSFD subregions, COMP4 areas, ICES areas, or IA2017 units. Is it better to align with other ecosystem components or maintain the units used in IA2017? Might have different scales for different indicators. Need to do testing.	Should be possible with BH3. Don't know for other indicators.	BH3 - % area
Birds	Can assess a regional scale (for some indicators) and smaller scales (for others)	Will use all indicators.	Indicator integration will only happen at regional level but we will also apply indicators to subdivision level to help interpretation of results, subdivision assessment only based on abundance data because of data availability

For integration between biodiversity component, common or nested assessment units are prerequisites. It would be interesting to test the current overlapping of the different assessment units used for indicators of the different biodiversity components. The gaps in data coverage will probably limit this exercise, but some areas could be identified where to compare assessment units at finer scale. It would also help to identify areas which requires new data acquisition, notably in specific biogeographic areas, risk areas, or biodiversity hotspots.

It was recognised that this study was not planned initially for SuperCOBAM and requires more time, data and resources to be done properly. Its technical aspects and cooperation between experts should be identified and described for next steps and action plan resulting from Nea Panacea for QSR2023. Nevertheless, attending experts expressed the need to further progress this important step, even conceptually.

Key headlines

- Benthic and birds can assess at regional scale for some indicators. Some indicators can also be used at a smaller scale. Pelagic will use ecologically-appropriate assessment areas.
- What we don't know is at which scales contracting parties want to assess. Some may only want to assess at national scale. This would be useful info for us.
- More work is needed to conclude and especially define subdivisions of OSPAR regions relevant for all or several biodiversity components. The technical aspects were discussed and this task should be part of the action plan. Nevertheless, the conceptual and potential subdivision will be further worked during this workshop.
- The ground-truth data currently available limit the models and possibility to characterise relevant biogeographical assessment units for several components, notably for benthic and pelagic habitats' species communities.
- We feel that it is important to use the assessment scale appropriate for the biodiversity. Whatever the assessment units or integration methods developed, it will be important to clearly communicate underpinning ecological reasons, and limits, for MSFD and other management requirements.

3 Integration of indicator assessments

3.1 Expert group meetings

3.1.1 Marine Birds

Birds GP Leads joined online discussion with some members of JWGBIRD and discussed options for integrations of marine birds' indicators. Volker presented an overview of method for indicator integration.

The following points were considered:

- Marine bird for QSR 2023 and MSFD Article 8 assessments shall use indicators for 5 criteria: D1C1 (bycatch), D1C2 (abundance), D1C3 (demography), D1C4 (distribution), D1C5 (habitat for the species)
- MSFD differentiation between primary and secondary criteria
- D1C5 is a secondary criterium, the indicator has candidate status
- Integration is done at multiple levels: from indicators to criteria > from criteria to species > from species to species group > from species group to ecosystem component (not required by MSFD)
- In 2020 [JRC produced a report](#) reviewing different methods for aggregation from criteria to species and some recommendations. Methods considered are: One-out-all-out (OOAO), proportional method (75%), average, weighted average, probabilistic methods, conditional rules (ICES Advice)
- Pros and cons of each method was presented by Volker, alongside results from preliminary testing conducted on a selection of species in the German Baltic Sea (mixture of real data and estimates)
- JRC developed conditional rules for integration from criteria to species, considering the importance (expressiveness) of the individual criteria/indicators
- JRC recommendation for integration from species to species group is to apply proportional method (75%) if at least five species of a species group can be assessed and OOAO if not

For the conditional rules for integration from criteria to species, it was suggested to:

- Define where better data are needed for a criteria > this would help address whether the value of an indicator can be increased in the future
- The order of the criteria in the conditional rules can be modified to reflect importance of each criteria (i.e. Can secondary criteria be weighted differently?)
- According to Com Dec 2017/848, status of bycatch should be contributing to abundance but unclear how.

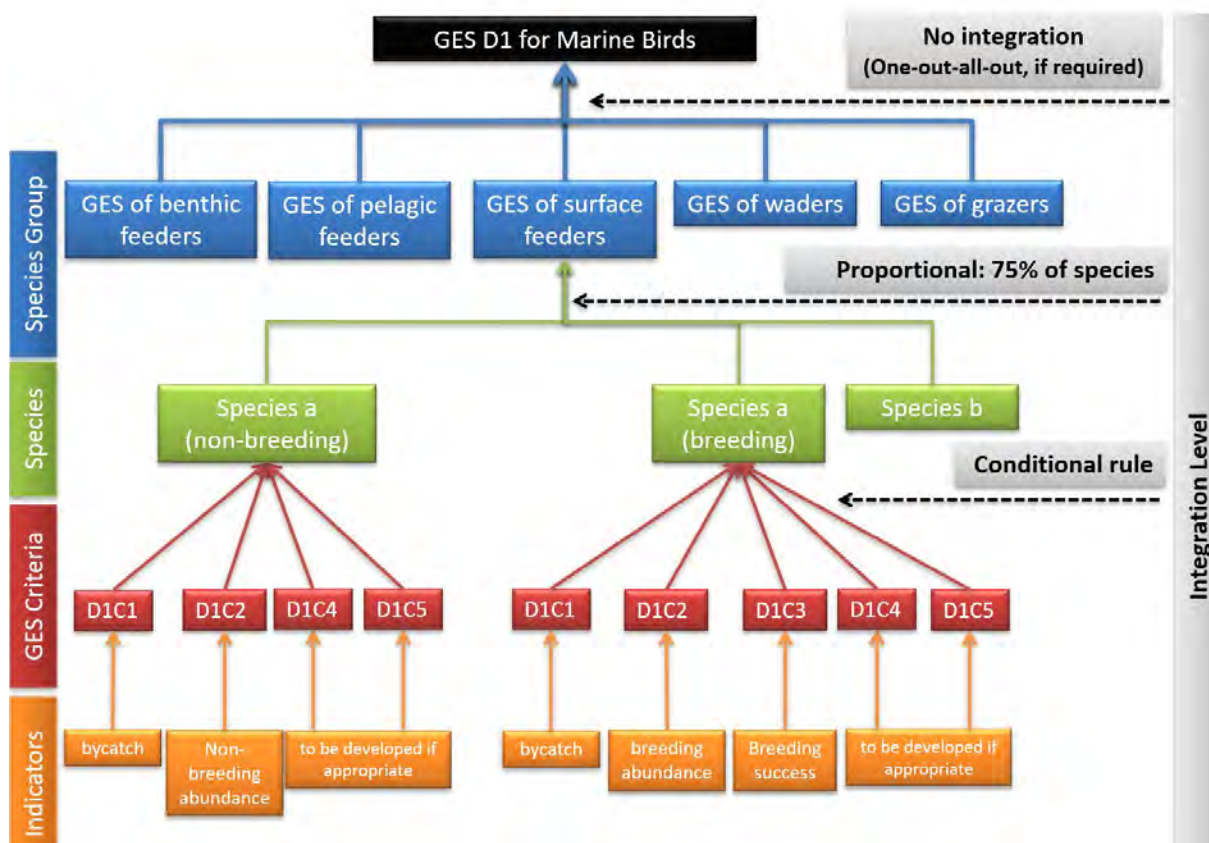


Figure 2. Integration of marine bird indicators: Tree of integration

3.1.2 Pelagic Habitats

Points to consider:

- Are all indicator components (e.g. lifeforms) weighted equally?
- Some taxa are in multiple lifeforms – double counting
- All three indicators are from the same data
- What if we normalise our data (as birds do)?
- Can we use approaches based on conditional or proportional rules (not one-out-all-out) to integrate?
- At what stage do we integrate?
- Do we lose all meaningful info if we integrate?
- How can the integrated info be used to inform management measures?
- How to go about testing?

PH1:

Let's think of what our final output should be to work out how far we want to go with integration. What do we want to show in reporting? Last time we showed a table of lifeform pair PIs by EHDs. The new COMP4 regions are even more complex, meaning this table would be more complicated. Alternately, we could show maps of change in lifeforms, or change in lifeforms linked to drivers of

change, which is probably more helpful for policy, but means we are leaving out the PI step. We could cover the PI step in the narrative?

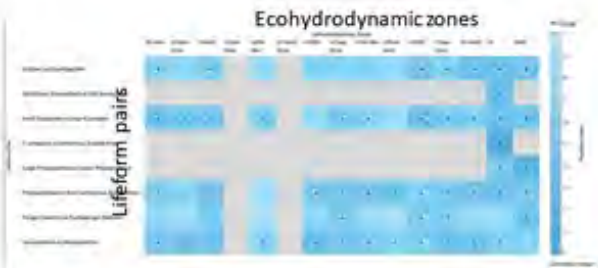
What do we want to show in assessment?

Maps of lifeform change (and/or correlations with SST)



- Skips PI part of our analysis
- Alignment with other indicators
- Succinct (one map per lifeform)
- Intuitive
- Can show links to drivers of change
- More useful for management measures

Or



- Can include in SOM
- Part of our protocol of PI -> change in LF time-series -> triggers further research in LF and component taxa
- We are unsure of ecological meaning of significant change in PI
- Consistent with IA2017 (though now we look at assessment period differently)

PH2 and PH3:

Suggests using table to report but can also map according to level of change

- Mike: Maps more clear for policy and placing management measures
- We will have assumptions either way so need to document those and be clear

If we detect sig change in part of an indicator, for each indicator, the more indicators (and parts of indicators) that show change gives more weight to the evidence that plankton are changing. We lose this information if we integrate to a single number per indicator or across indicators, and, not all datasets have all lifeforms, or both zoop and phyto, so the simplification hides nuance and can be misleading.

Are our indicators picking up the same thing (such as a bloom of a particular spp)? We need to be cautious about double counting through integration. For example if we have a *Karenia* bloom that could show up in all three indicators – that's not a bad thing, but we need to be clear about what it means. A narrative allows us to interpret via expert judgement so the nuance here can be articulated and the message clarified.

French approach for the ecological evaluation of the Pelagic Habitats: Use of the Ecological Quality Ratio (EQR).

- The EQR is a metric comparing two periods (ref. vs assess.) ranging between 0 (far from ref. conditions) and 1 (close to ref. conditions).

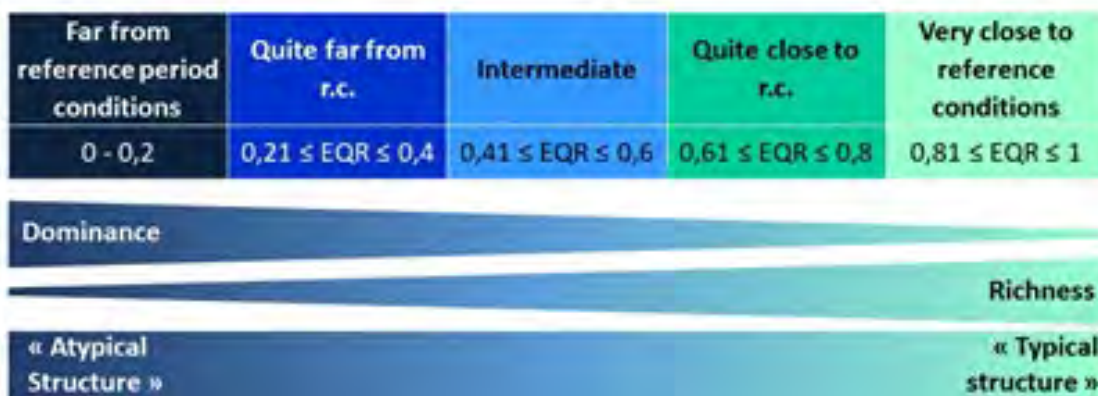


Figure 3 Ecological Evaluation of French Pelagic Habitats 2018 (Duflos et al., 2018), inspired from Facca et al. (2014). Duflos et al., 2018

- This approach turns continuous data into discrete. It can be mapped, but would it be better to show instead, on a continuous scale, this same information? We need to test this with PH1/FW5. We could map all indicators using this method for all datasets. This would encourage consistency between pelagic indicators and help the thematic assessment.

Felipe: For the thematic assessment, we could just very simply show the number of indicators which change in each assessment unit

- But what about direction of change – we need to capture this too?
- And are all indicators equal, or are data available for all indicators in all places, since not all stations have both phyto and zoop or all lifeforms.

Decision: We should focus on our key messages for each indicator for each report card and use the figures that best support those key messages.

Decision: We must keep our policy audience in mind and focus on what will help them most

Action Matt and Arnaud: to discuss consistent mapping of indicator results and test for discussion



Pelagic experts going with the flow

3.1.3 Benthic Habitats & Non-indigenous species

In light of the previous day's discussion (and today's sessions), and as new methodological elements to be considered for integration method between benthic habitats' indicators, it was decided to discuss around two recent national initiatives from UK (MarESA method) and Spain (integration of BH1 and BH3, according to Elliott et al, 2018).

Presentation by Liam Matear (UK): the UK initiative on the spatial aggregation of sensitivity of habitats: the MarESA method

This method is interesting as it proposes a compilation of known (and unknown) sensitivity categories, from species communities' level to Broad habitat types, which is one of the key methodological gaps highlighted in the current integration method (Elliot et al, 2018). It has the advantage to keep all finer scale information available, but the rule how to set a value (or range of values) to broader scales is still to be defined. Several options exist (OOAO, average, percentile, etc.) and would need more discussion depending of the aim and context of assessments.

These compiled sensitivity categories per habitat type may also contribute to define "confidence maps", based on the more or less complete level of knowledge, per habitat type, on species communities' sensitivities and variabilities. However, it was acknowledged that, whatever available and accurate would be a confidence map, in general, most of people will first look at the disturbance map, and few will make the effort to relativize the results according to the related confidence.

Before the next presentation on this integration methodological gap, a slide was presented to remind or present to new OBHEG members the method developed during EcApRHA and OBHEG, and as published in Elliot et al (2018).

Presentation by Laurent Guérin (co-chair): EcApRHA Benthic integration method

The Spanish colleagues presented a national initiative based on this method and recent indicators progress.

Presentation by José Manuel González (ES): The Spanish initiative on fine scale/wide scale integration between BH1 and BH3

This method, applied for Spanish MSFD assessment, and submitted for publication in Marine Policy, is also interesting as based on OBHEG previous works and proposing a simple and quantitative method for combining both indicators results. However, uncertainties linked to both indicators (sensitivities species lists, spatial resolution of state and pressure data, etc.) are also combined. With BH1, the species list used is a key element and depends of the (biogeographical) assessed area considered. For example, there is a need to include Region IV specific lists to BH3 matrices to enable its assessment in Region IV.

As a conclusion, it was acknowledged by the group that these two methods are both progressing the thoughts on the benthic indicators' integration methods, even if some methodological details still need to be clarified and tested to develop a fully operational methodology. These methods address different methodological gaps and could even be complementary if adapted in the integration method context. Respective UK and Spanish teams were encouraged to report progress on this at next OBHEG, where discussion on these aspects should be also progressed with the perspective of (sub)regional integrated assessments methods.

For MSFD, the recommendation discussed in TG Seabed should also be considered, and interactivity with OBHEG works facilitated. Each indicator, and integration methods, contribution to MSFD criteria should be clarified. A draft document was notably cited as important for integration rules.

- **Action:** OBHEG to propose and discuss during the next meetings, specific lists of species, related to sensitivities at defined pressure, or functional groups. UK and Activity 2 teams to interact to incorporate relevant sensitivity species lists, notably with Spanish, French and Portuguese teams for Region IV, and in general with experts from any relevant biogeographical (sub)region to be assessed by BH3.
- **Action:** Methods to be clearly described in each indicator CEMP document, and clearly highlighting for BH3 what is new compared to previously agreed BH3 CEMP guideline.
- **Action:** Further progress and application of these methods to be reported and discussed in the OBHEG future meetings, also with Nea Panacea tasks 3.2 (BH1), 3.4 and 3.5 (BH3 development and scenario) and 3.7 (thematic assessment).
- **Action:** Links between indicators, integrated methods and MSFD GES criteria to be clarified by indicator leads and OBHEG. Petra Schmitt (DE) to send the TG Seabed doc to all group + Silke: *SEABED_6-2021-03rev2_GDArt8-D6_short-draft_20210628.doc*

For benthic habitats, one of the common assessment units is the broad habitat (or other specific) type. The assessment units are thus nested in the assessment at Region or subregion levels. However, the biogeographical specificities of species communities (finer biological scale) and related sensitivities to each pressure type may influence each indicator assessment, per habitat type. Before any operational quantitative integration between indicators, the use of each of them and associated species and sensitivities lists should be tested and fixed. All indicator leads and teams are encouraged during their future works (short or longer term) to test this, notably between subdivision of the current OSPAR Region as discussed during this workshop and future works in OBHEG.

- **Action:** Indicator leads (and teams) to consider biogeographical variation (and related subdivision) of species communities and sensitivities lists of habitat types in each OSPAR (sub)Region when testing or assessing indicators, notably for BH1 and BH2 indicators, and sensitivity data underpinning BH3 and BH4 assessments. A coherence is needed to enable integration between indicators.

A discussion started about integration perspectives for non-indigenous species (NIS). An expert remind that this discussion took place during a previous mixed group workshop (SuperCOBAM, June 2019, Paris). A preliminary idea was to combine the distribution/abundances of targeted NIS invasive species (as MSFD D2C2 criteria, biological pressure) to habitat maps, with a similar approach that BH3 and Elliot et al (2018) integration method, to produce a disturbance maps of habitats (as MSFD D2C3 criteria). Some functional aspects and case studies by the Food Web expert groups were also discussed. This should be further discussed in both groups, or better, together, to check relevant data (or area with data) available, and additional resources and work plan to test this. The consideration of NIS in benthic communities' lists, both for sensitivity to pressure, resistance/resilience and related biotope structure, functional groups and dynamics. These technical works are not possible during Nea Panacea and OSPAR QSR2023 timelines, but is identified as a perspective for future inter-component and

experts' groups works. These perspectives could also be discussed and reported by experts in other working groups (e.g. TG Seabed, ICES, etc.)

- **Action:** Benthic, NIS and any other interested expert group lead to plan mixed discussion and potential resources for progressing conceptual integrated methods, based on current respective indicators and assessment methods, to assess the effect of NIS on biodiversity component (as part of biodiversity AND a biological pressure).

3.2 Mixed expert groups and plenary wrap-up

Birds GP Leads joined online discussion with other species EG and explored communalities with marine mammals (Anita Gilles)

- Bycatch: use precautionary approach if there is evidence of bycatch but not enough data to assess mortality
- Integration species to species group: marine mammals have difficulties in assessing the relevant scale as different species within the same group would have wide differences in the relevant assessment unit > suggestion to use the largest spatial scale available for assessing species groups

Methods for integration of indicators are well developed for Marine Birds. Points that other biodiversity component can consider when developing their methods:

- Integration method should reflect the importance of each indicator descriptor (criteria) i.e. should have ecological sense
- Other biodiversity components should look at criteria to develop integration methods
- Birds integration method consider breeding and non-breeding species as separate entities. Other biodiversity components can do something similar, e.g. fish: consider fish stocks as separate species.
- Recognise links between criteria (e.g. link between by-catch and abundance). This can also be done by other species groups interested by-catch?

While the species experts (birds, mammals, fish) discussed integration of indicator results in mixed groups, the habitats experts decided to focus more on the spatial assessment aspects. The COMP4 eutrophication assessment areas were projected and discussed. It was noted that especially for pelagic habitats these assessment units appear functional and practical. For benthic habitats, the assessment units (in which the broad habitat types are assessed) used in OSPAR's Intermediate Assessment of 2017 were reviewed. The discussion that followed led to a proposal for assessment units with just a few question marks to be worked out / decided upon (Figure 4, see also Annex L).

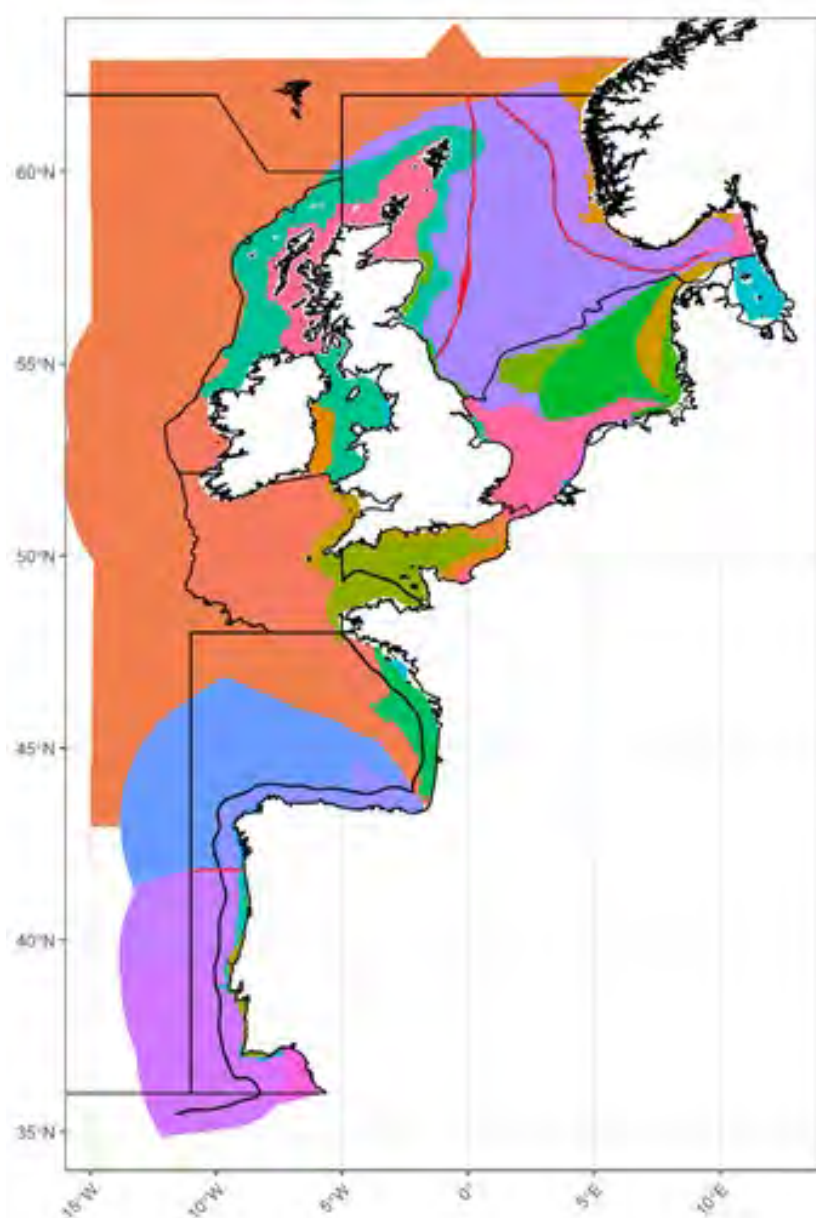


Figure 4. Sketch of conclusions from benthic habitats assessment unit discussion. Red lines need to be decided after further national consultation.

4 Threshold values

4.1 Expert group meetings

4.1.1 Marine Birds

Birds GP Leads joined online discussion with some members of JWGBIRD. Matt presented an overview of methods and threshold values used by different marine birds indicators: Marine Bird Abundance (B1), Marine Bird Breeding Success (B3), Marine Bird Bycatch (B5), Marine Bird Habitat Quality (B7).

The following points were considered:

- B1 and B3 are common indicators, B5 and B7 are being used for pilot studies
- Discussion around Bycatch Indicator (B5):
 - o is bycatch considered deliberate killing? No
 - o if you can't come up with level of bycatch use precautionary principle
 - o the current target approach used on the method is a further elaboration of what was discussed at the Copenhagen workshop (but it is agreed by CP)
 - o JWGBIRD in November to further discuss this indicator

Key outputs

Thresholds values for B1 and B3 indicators have already been defined and agreed. Further discussion needed with JWGBIRD to determine thresholds for candidate indicators B5 and B7

Threshold value inventory

Bird indicators were assigned to appropriate cells in the matrix of status of development and TV narrative, see also Table 2 in section 4.2.1.

indicator	Baseline/threshold value narrative	Status TV development
B1	Limit reference level	Policy acceptance
B3	Limit reference level	Policy acceptance
B5	Removal and conservation targets	Policy acceptance
B7	Acceptable deviation from historic or pristine state	Not started



Marine birds experts nesting comfortably in a quiet corner of the Threshold Value discussion room

4.1.2 Pelagic Habitats

- Our approach is to detect change and link to drivers of change to interpret meaning of change. It is important to consider different lengths of time periods (depending on the available data), as the observed changes may be lower in shorter time periods.
- The narrative is key in interpreting indicators.
- **Action UoP:** We need to test threshold options to evaluate if they are actually telling meaningful information, e.g. by defining upper and lower thresholds as a corridor of change or different percentages for short or long-term trends or quartiles. NEA PANACEA will test determining importance of change and quantify magnitude of change.
- Our current thinking:
 - o PH1/FW5 – two parts of indicator. Sig change in PI triggers interrogation of lifeforms and component taxa. Narrative interprets change. No TVs.
 - o PH2 – trend-based. Narrative interprets change. No TVs.
 - o PH3 – Indicator identifies important change, which is then investigated for component taxa. Narrative interprets change. No TVs.

4.1.3 Benthic Habitats & Non-indigenous species

Discussion started around the drawn draft proposal presented by Lena of the structure of the “State” part of the DAPSIR benthic habitats’ thematic assessment (Figure 5). In the light of previous discussion on assessment scales, subdivision of regions and integration, this proposal was received by the expert group as a very good structure, compatible with all indicators and previous discussions, and making also much clearer and concrete what to produce as a deliverable for the QSR2023. The main elements of this structure (also compatible with MSFD requirements) is about assessments per:

- OSPAR (sub)Region (sub to be further discussed through biogeographical previous are discussed)
- (Lines) Broad habitat types
- (Rows) Indicator results and/or related pressure type assessed (by each indicator)

According to the big gaps (data and common indicator) in Regions I and V, there are currently initiative to inform them respectively by contributions from the Arctic Council and ICG-POSH (for listed habitats).



NEA
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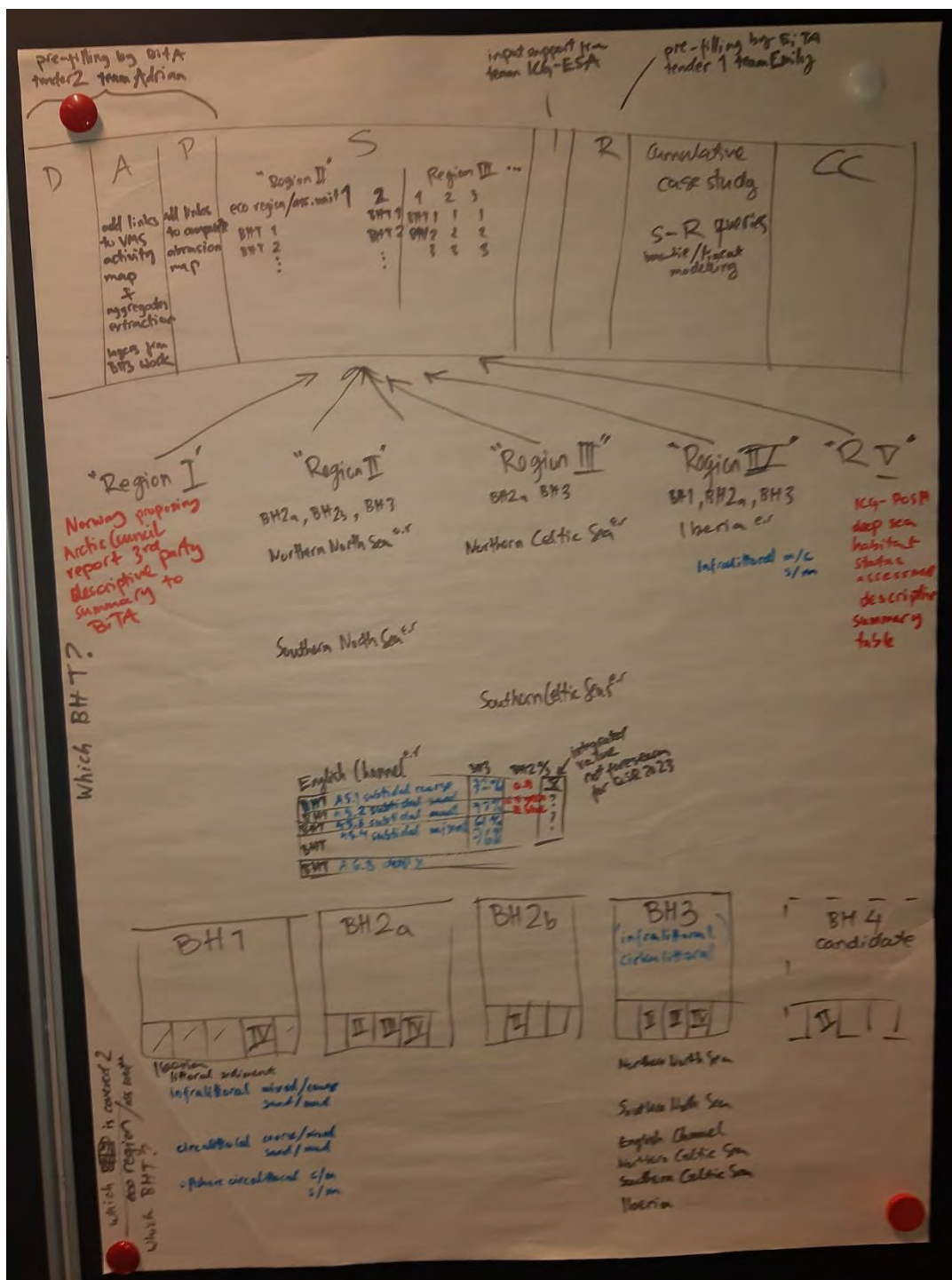


Figure 5 First and initial draws by Lena Avellan© of a proposed structure for the benthic habitats' thematic assessment

About combining indicators maps and assessments results (see the right part of Figure 5), by testing it conceptually in a subregion, it was recognised that there will be quite few overlaps, at least between BH2a (very coastal waterbodies) and BH3 (offshore abrasion by fisheries, with gaps on very coastal fishing boats activity). Assessment of BH1 (BISI), BH2b and BH4 will be limited to parts of the Region II and should be tested when available. Same for the BH1 (SoS) assessment in Region IV, where there is

already an initiative to combine BH3 and BH1 assessment here as a case study for integration between these indicators.

As a conclusion, this structure seems promising but should be further tested when all draft indicator assessment will be available, hopefully next Spring 2022.

- **Action:** Laurent and Cristina (OBHEG co-chairs) to progress (numerically) this Benthic habitats' thematic assessment draft and share with OBHEG (and Lena) to progress discussion and testing contents at next OBHEG and COBAM meetings.

4.2 NEA PANACEA's Activity 2 session on Threshold Values

This part of the workshop is related to NEA PANACEA Task 2.4 “Inventory of baseline and TV setting methods used or considered in D1 (pelagic, benthic, birds), D4 and D5 assessments”. Lisette Enserink introduced the topic. For a coherent assessment framework and where relevant (pressure-state relationships), the MSFD and also OSPAR asks us to look into the type of narrative (or philosophy) that is used to set the threshold value. If these narratives conflict, we may implement measures that steer in the wrong direction. For instance, if we take measures to reduce nutrient levels to reach good status for eutrophication (currently: historic pre-eutrophication level + 50%) and at the same time we aim for large populations of a specific species that flourishes in high productivity environments, this will be conflicting. This issue was discussed in an EU-level MSFD workshop called *Horizontal Issues – Threshold Values* (30 September 2020) and for that workshop a pre-read document was synthesized that was used as a source for this session (see Annex B for a link to that pre-read document). This document contains several types of narratives for setting TVs, but is still a work in progress. Comments and additions are much welcomed. For the present session the narratives that the Activity 2 group expects to be applicable to biodiversity indicators were selected (see below). SuperCOBAM's experiences and views are important to further develop a system that helps us to identify what type of narratives can be used and under which conditions, so as to harmonise approaches where this is useful.

The types of narratives that were considered are:

1. Acceptable deviation from historic or pristine state
 - o Similar to Water Framework Directive and the Habitats and Birds Directive, whereby TVs are set in relation to natural characteristics, such as the distributional range of a species, the extent of a habitat or the condition of its biological community.
 - o Example 1: OSPAR 50% deviation from background concentrations for eutrophication parameters such as nutrient concentrations.
 - o Example 2: Changes in occupancy rate and shifts in distribution from OSPAR's Changes in Harbour Seal and Grey Seal Distribution. Changes in seal distribution assessed between assessment period, against the baseline distribution, which is the potential distribution area or observed area in the baseline period.
2. Non-deterioration
 - o To maintain good status (Art. 1 MSFD).
 - o If scientific knowledge to set TVs is lacking, in combination with an improving trend (Art. 4(2) Commission Decision (EU) 2017/848).

3. Points-of-no-return and tipping points

- Points-of-no-return are system condition parameter values that indicate a level, which, when surpassed, will lead to irreversible alterations in system conditions. A point-of-no-return might be reached if, due to a pressure, an ecosystem component declines beyond recovery. This could also include declines as a result of cumulative effects of multiple pressures.
- Tipping points are system condition parameter values that indicate a level, which, when surpassed, will alter system conditions drastically.

4. Removal and conservation targets

- Removal targets are TVs based on “unacceptable mortality levels” caused by human activities for the indicator species.
- Example: HELCOM indicator on drowned mammals and waterbirds in fishing gear.
- Conservation targets are TVs relating to the state of biological management units (i.e. stocks or populations). A limit value for a safe human-induced mortality of marine species is usually the outcome of a simulation over a certain time period using a suitable population dynamic model. During the time period, the conservation target for the stock size is to be reached with a given certainty in a predefined fraction of the simulation time (e.g. at least 95% likelihood of reaching at least 80% of carrying capacity within 100 years).
- Example: FMSY (Fishing mortality under the overall aim of Maximum Sustainable Yield) in the management of commercial fish species.

5. Limit reference level

- Approach for defining TVs based on targeted estimated “optimal”, “favourable” or “acceptable” condition.
- Example: the Habitats Directive’s Favourable Reference Range and Favourable Reference Area: The threshold value indicates how much habitat is needed to maintain its specialised species in viable populations.

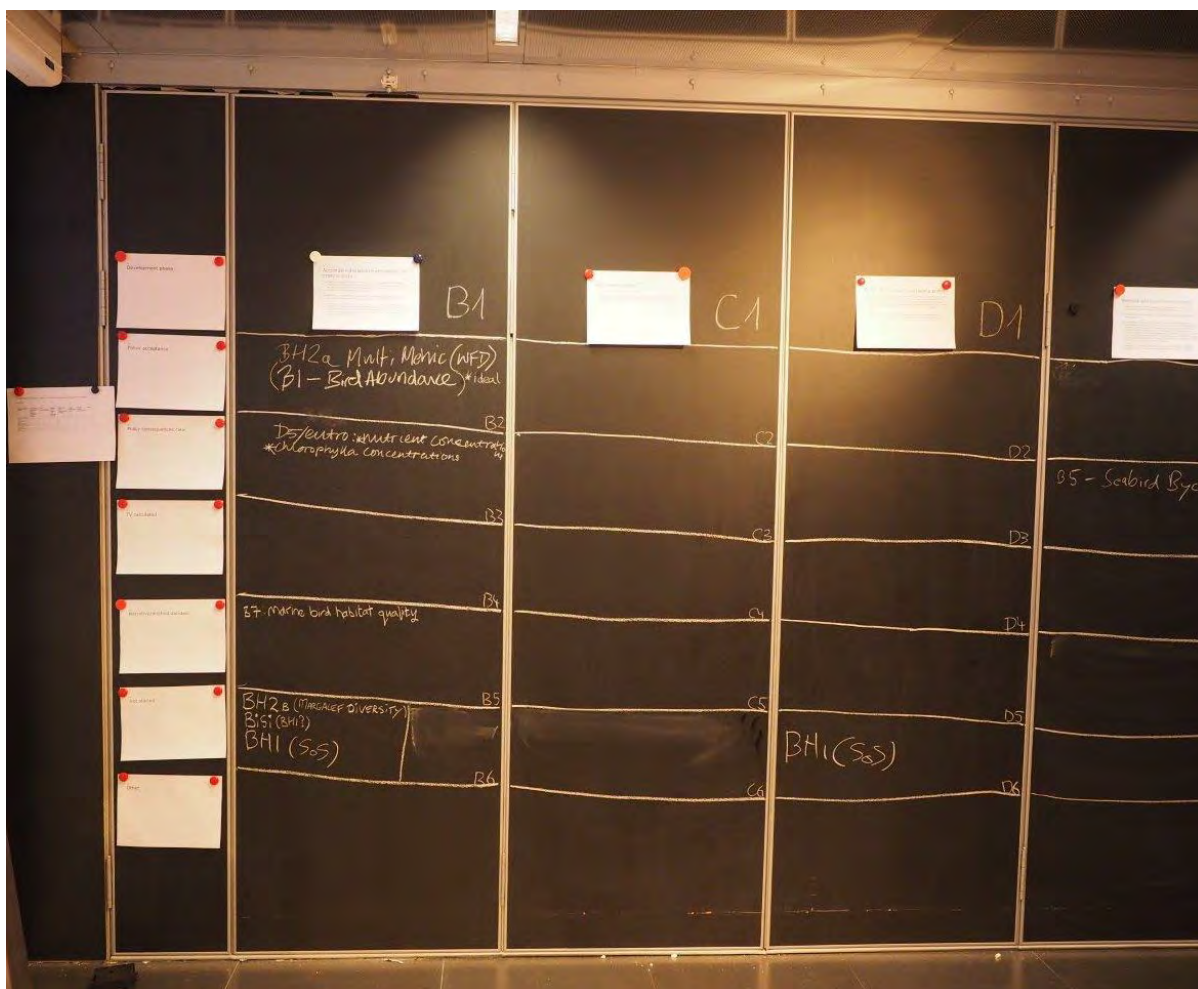
6. Trend-based approaches

- In the absence of knowledge of historic baseline and reference conditions and historical time-series, future state and trend-based approaches can be used individually or in combination with a baseline.
- Example: OSPARs intermediate assessment for Harbour Seal and Grey Seal Abundance, and OSPAR’s grey seal pup production.

About the timelines: the draft QSR 2023 was intended to be ready by the OSPAR Commission meeting in June 2022. Although we know that some NEA PANACEA indicator assessments will be delayed, deciding on TVs soon is important. Understanding how all these TVs fit together will contribute to drafting the thematic assessments and may help to communicate with the policy level in BDC 2022.

4.2.1 Session results

A large matrix was drafted on the wall of the meeting room, representing types of narratives (columns) and current development stage of TVs (rows), see picture below. Participants were invited to add the code of the indicator they are working on in the right cell. Table 2 gives the outcome of the exercise.



Furthermore, to better understand the reason for choosing a specific type of narrative, participants were invited to fill in a form, either on paper during the workshop or in digital version after the session. The results received so far are in Annex O. Unfortunately, there was not much time left to discuss the outcome of the inventory during SuperCOBAM. Lisette thanked the participants for their useful contribution to Task 2.4. The Activity 2 team will further develop and complete the outcome of this session under this Task.

Table 2 Threshold values: type of narrative and development phase. 16 indicators have been inserted: 5 benthic habitats, 3 birds, 2 pelagic habitats, 3 food webs, 3 eutrophication.

Development phase	Acceptable deviation from historic or pristine state	Non-deterioration	Points-of-no-return and tipping points	Removal and conservation targets	Limit reference level	Trend-based approaches	other
Policy acceptance	BH2a Multi Metric (WFD) (B1- Bird Abundance)*ideal				B1 (Bird Abundance)		
Policy consequences clear	D5/eutro: Nutrient concentrations Chlorophyll a concentrations			B5 (seabird bycatch)			
TV calculated					B3 (Bird productivity)	NIS3 (new introductions of species)	D5-eutro: O2 depletion near the seafloor (based on potential benthic impacts)
Narrative/method decided	B7: marine bird habitat quality				BH3 (extent physical damage) BH1 (SoS) ²	PH2 (changes in plankton biomass/abundance) FW2 (changes in PP) FW6 (changes in zooplankton biomass)	BH3 (condition/disturbance based on sensitivity) PH3 (plankton diversity) PH1/FW5 (plankton community)
Not started	BH2B (Margalev Diversity) BiSi (BH1?) BH1 (SoS)		BH1 (SoS)				
other							ICG-OA: no TV considered sensible

2 Explanation: can be used to determine limit reference level. Status of TV development not clear.

5 General expert group output

(not related to the three main themes) and other notes

5.1 Marine Birds

The analysis for DAPSIR chapter will be mostly qualitative (quantitative when possible)

Are we looking at things that are not in the bow-tie analysis

- **Action for Birds GP Leads:** consider whether to create an internal feeder report for the DAPSIR chapter

Discussion with Activity 2 on Assessment Scales:

- Activity 2 leads are defining new assessment areas using existing layers of chl-a, salinity, depth and stratification. These have been further refined by ECG-EMO to consider WFD areas and river catchment. Can the proposed assessment areas be used by other groups?
- The Activity 2 areas are smaller than the one used for marine Birds: implications on data availability (i.e. less data available for smaller units) and ecological meaning (birds subdivision were developed considering main oceanographic features and observed differences in seabirds' community structure and population trends). Smaller subdivision might not be adequate for some species that have wider habitat ranges

Action: Share shapefile with Birds regions and subdivision with Activity 2 leads

Discussion off the sessions (Birds – Activity 2):

- Can food web models predict “optimal” numbers of birds, which in turn can be used to define threshold levels and baselines (other than arbitrarily using the beginning of the time series of data as the baseline)?
- Assessment scales: Combination of pelagic/benthic/etc indicators with bird indicators scientifically more appropriate if using raw offshore bird data for the respective assessment units rather than combining indicator outcomes (which usually have different assessment scales).

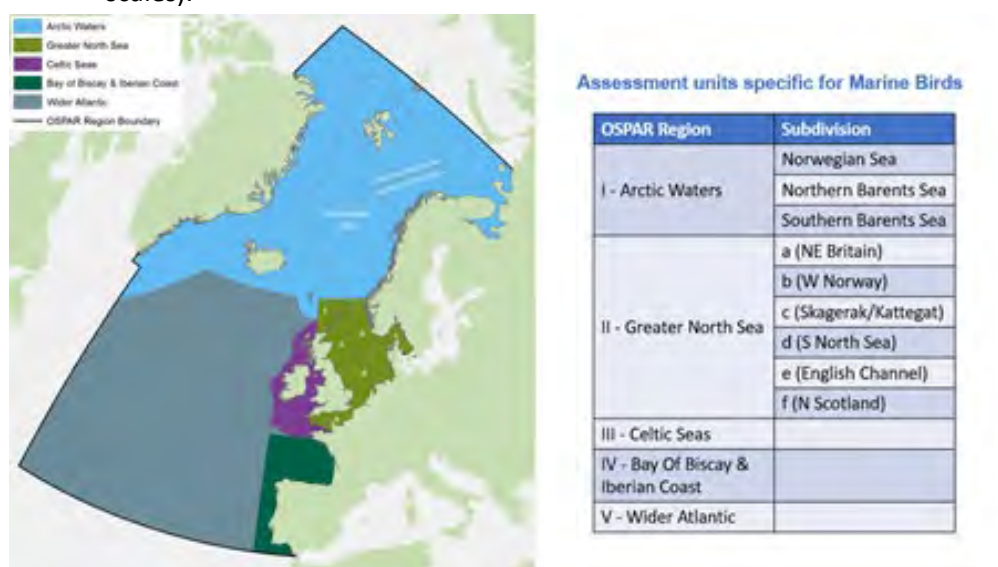


Figure 6. Assessment units specific for Marine Birds

Table 3. Theoretical example showing different data availability for B1 (bird abundance) and B3 (bird productivity) indicators. Regional scale assessment will be based on both indicators B1 and B3, assessment at subdivision scale will be only done for B1 as is the most data rich indicator

		UKIId	BE	NL	DE	DKIId	DKIIdc	SEIIdc
Breeding success		x	x	x	(x)			
Breeding abundance		x	x	x	x	x	x	x
Breeding status subdivision		IId = Abundance only					Abundance only	
Breeding status region		II = Abundance & Breeding success						

5.2 Pelagic Habitats

Plankton Lifeform Extraction Tool: <https://www.dassh.ac.uk/lifeforms/>

- We need to think carefully about our narrative – let's try to clarify this, this week
- Need to work on a common understanding of what is required to complete the QSR and to develop a common approach to addressing the problems rather than potentially repeating effort among research groups.
- Data call
 - o **Action** – Abigail to ask PH experts if we are expecting any more data, what the barriers are and if we can help facilitate through the Secretariat. Abigail to notify OSPAR PHEG of data call closure on 1 Dec.

ENA LIACAT

- Food web indicator FW9 integrates across ecosystem components
- Will use an integrated approach, combining bio-phys-chem parameters for some case study areas, linked to Deltares and LiACAT models.
- Data (mainly biomass) can be annual means or monthly, using time-series data
- How can pelagic indicators be integrated into FW9? We need to identify case study areas with data from benthic, pelagic, etc in the same spot.
- Are we connecting indicators or raw data? Lifeforms and biomass needed, not overall indicator results. We need to work out what the best spatial scale is – does ENA need this by station and/or by spatial area?
- Next step for FW group and Activity 2 of NEA-PANACEA project – overlay all data locations shp to find areas with good biodiv data
- **Action:** Abigail and Matt to help Ulrike and Thomas work this out

Reporting and assessment:

- We really need to work out what is 'GES' and what is 'not GES' so we can give a clear message to policy makers in the assessments.
- **Action Abigail and Felipe:** to look at indicator templates on QSR Sharepoint and identify things that will stay the same. Anything that we retain already has policy approval so it's advantageous to keep as much as we can.
- **Action Matt:** to arrange next pelagic NEA PANACEA for November

- **Action Abigail:** to populate table in BiTA Sharepoint with potential table of contents for state chapter of thematic assessment and get feedback from group
- **Action Abigail:** to engage with HoD from UK (Andrew Scarsbrook)
- **Action Matt and Arnaud:** We need to present some example results for December COBAM so we need to make good progress on these actions by December. I think the focus should be on mapping indicators so COBAM has an idea of what our draft QSR might look like. We can get some feedback on maps v tables, etc

Next steps and ways of working:

- We need to keep in touch with the wider group more regularly. Therefore we should have an interim meeting, even if it's just a Webex. We need to devise a format that is not just Abigail talking.
- **Action UoP:** Work out date of next live in person meeting (May?) and set up two-monthly Zoom check ins for wider EG
- Next steps:
 - o Nov 2021: GET YOUR DATA IN!!!!
 - o Dec 1, 2021: Data call closes
 - o Dec 2021: COBAM
 - o Feb 2022: Expect draft of QSR indicator assessments for feedback
 - o March 2022: Draft assessment submitted for policy feedback in
 - o April 2022: BDC
 - o May 2022: COBAM provides feedback on draft QSR
 - o June 2022: UltraCOBAM to focus on thematic assessment
 - o Summer 2022: Expect final QSR assessment for feedback
 - o Sept 2022: Expect thematic assessment draft for feedback
 - o Oct 2022: Final QSR assessment due
 - o Oct 2022: Special BDC
 - o Dec 2022: Thematic assessment due

Summary of Actions:

- **Abigail** to ask PH experts if we are expecting any more data, what the barriers are and if we can help facilitate through the Secretariat. Abigail to notify OSPAR PHEG of data call closure on 1 Dec.
- **Matt and Arnaud:** to discuss consistent mapping of indicator results and test for discussion in advance of Dec COBAM
- **Matt and Arnaud** – Obtain gridded data output from the Deltares model for examining drivers of change
- **Arnaud** – Process the PML primary production data into a format suitable for assessing as a driver of change
- **Abigail and Matt** to help Ulrike and Thomas work out candidate assessment areas with high resolution and long duration biodiversity data

- **Abigail and Felipe:** to look at indicator templates on QSR Sharepoint and identify things that will stay the same. Anything that we retain already has policy approval so it's advantageous to keep as much as we can.
- **Matt:** to arrange next pelagic NEA PANCEA for November
- **Abigail:** to populate table in BiTA Sharepoint with potential table of contents for state chapter of thematic assessment and get feedback from group
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- **UoP:** We need to test threshold options to evaluate if they are actually telling meaningful information, e.g. by defining upper and lower thresholds as a corridor of change or different percentages for short or long-term trends or quartiles.
- **UoP:** Work out date of next live in person meeting (May?) and set up two-monthly Zoom check ins for wider EG

5.3 Benthic Habitats & Non-indigenous species

The OSPAR Benthic Habitat Expert Group (OBHEG) had the opportunity to meet the day before and discuss the progress made for each indicator, notably on the data currently available and the work plans and progress made. Some work was done also to prepare SuperCOBAM sessions. It was decided notably to present and discuss the BH4 (by Petra), a TG Seabed document on assessment scales (by Sander) and the MarESA method (by Liam). About data, an action was already decided the previous day for indicator leads to state in a table on the data currently available (per country and data type), following OSPAR data calls. This will inform us on the real spatial coverage of the future assessment for each indicator.

During discussions during the workshop, the following actions were identified:

- **Action:** BH3 and BH4 leads to clarify with Danish and Swedish experts (Mats and Norbert) if data available (habitats and pressure) in the Kattegat and Skagerrak areas will enable respective assessments.
- **Action:** Laurent to contact urgently French responsible to provides the dates to which the French data could be made available for OSPAR.
- Some intersessional works was also done by some indicator leads to produce a table describing each indicator theoretical assessment scale and data requirement (See Annex L).
- **Action:** OBHEG to propose and discuss during the next meetings, specific lists of species, related to sensitivities at defined pressure, or functional groups. UK and Activity 2 teams to interact to incorporate relevant sensitivity species lists, notably with Spanish, French and Portuguese teams for Region IV, and in general with experts from any relevant biogeographical (sub)region to be assessed by BH3.
- **Action:** Methods to be clearly described in each indicator CEMP document, and clearly highlighting for BH3 what is new compared to previously agreed BH3 CEMP guideline.

- **Action:** Further progress and application of these methods to be reported and discussed in the OBHEG future meetings, also with Nea Panacea tasks 3.2 (BH1), 3.4 and 3.5 (BH3 development and scenario) and 3.7 (thematic assessment).
- **Action:** Links between indicators, integrated methods and MSFD GES criteria to be clarified by OBHEG. Petra Schmitt (DE) to send the TG Seabed doc to all group + Silke: SEABED_6-2021-03rev2_GDArt8-D6_short-draft_20210628.doc
- **Action:** Indicator leads (and teams) to consider biogeographical variation (and related subdivision) of species communities and sensitivities lists of habitat types in each OSPAR (sub)Region when testing or assessing indicators, notably for BH1 and BH2 indicators, and sensitivity data underpinning BH3 and BH4 assessments. A coherence is needed to enable integration between indicators.
- **Action:** Benthic, NIS and any other interested expert group lead to plan mixed discussion and potential resources for progressing conceptual integrated methods, based on current respective indicators and assessment methods, to assess the effect of NIS on biodiversity component (as part of biodiversity AND a biological pressure).
- **Action:** to all experts to review Emily's Excel file and identify gaps in the measures linked to them biodiversity component.
- **Action:** Laurent and Cristina (OBHEG co-chairs) to progress (numerically) this Benthic habitats' thematic assessment draft and share with OBHEG (and Lena) to progress discussion and testing contents at next OBHEG and COBAM meetings.



Benthic experts getting to the bottom of it

6 Activity 2 world cafés

6.1 Introduction

One key aspect of the NEA PANACEA project is the interaction between assessors of pressure (eutrophication and physical conditions) and of state/biodiversity. On one hand we aim to establish the exchange of products and lessons-learned, especially with a view to see if the products and knowledge developed by the OSPAR eutrophication experts and modelers can be of added value to the biodiversity community. On the other we aim to establish increased coherence between different elements in the QSR. This work is reflected in NEA PANACEA's Activity 2. The session started with an investigation of the knowledge level of the Activity 2 Tasks among participants. It appeared that the majority was only partly aware of the ambition and intended actions of this Activity. Perhaps the most complex Tasks involve the use of model approaches to better understand ecosystem functioning. An introduction to these model approaches was given as an oral (online) plenary presentation by Ulrike Schückel and Silke Eilers (see Annex K). This was used to set the scene for break-out sessions on these topics in a world café set up.

Silke Eilers presented the LiACAT model. One major aim of activity 2 is the quantification of the impact of eutrophication and climate change on ecosystem components as well as on the food web. For the analysis of eutrophication effects, we will apply the newly defined threshold values for the COMP4 assessment areas. For the analysis of climate change effects, we will apply different regional climate change scenarios and several aspects of climate change such as increased temperature, increased storminess and acidification. Moreover, cumulative interaction effects will be assessed in specialized models. The Deltares model will deliver spatial data of environmental parameters for the years 2009-2017. These model data will be input data for the models assessing the cumulative effects (Automated Cumulative Impact Model – ACIM and cumulative Dynamic Energy Budget Model – DEB model). Additionally, a literature search will be conducted to get data about interaction effects between stressors and between species. The Literature based Analysis and Cumulative Assessment Tool – LiACAT will be used to organize and visualize the literature data. The cumulative analyses will provide predictions about the combined effects of eutrophication and climate change scenarios on growth, reproduction, biomass, survival and other observations on selected ecosystem components. The results of these models will be integrated into the model for analysing impacts on the food web (Ecological Network Analysis). The Ecological Network Analysis (ENA) approach (OSPAR food web indicator FW9) can assess the status of food web in a holistic way. ENA allows (1) assessing the functioning of food webs based on the analysis of the interactions among all compartments/functional groups; (2) identifying the most important trophodynamic links between compartments/functional groups; (3) identifying limiting resources and keystone species in the food web; and (4) analysing the effect of specific pressures on ENA indices or biomass distribution of specific compartments/functional groups.

Biomass data of ecosystem components will be calculated all of these models and be compared between them and monitoring data for model validation. Model results will be linked to OSPAR indicators by providing the information about the magnitude of the influence of different scenarios on OSPAR indicators (e.g. on changes of phytoplankton biomass). ACIM can be combined with the Bow-Tie approach.

Ulrike Schückel explained that the Ecological Network Analysis (ENA) approach (OSPAR food web indicator FW9) can assess the status of food web in a holistic way. ENA allows (1) assessing the functioning of food webs based on the analysis of the interactions among all compartments/functional groups; (2) identifying the most important trophodynamic links between compartments/functional groups; (3) identifying limiting resources and keystone species in the food web; and (4) analysing the effect of specific pressures on ENA indices or biomass distribution of specific compartments/functional groups.

While common food web indicators (FW3, FW4) just focusing on one trophic guild/ecosystem component such as fish, this model-derived indicator represents the only ecosystem/food web indicator including all ecosystem compartments and trophic interactions (direct and indirect) within an ecosystem. FW9 comprises a set of five indices that best seem to be able to meet most of the requirements of different European Directives and wrap up most of the relevant MSFD criteria under Descriptor 4 (Safi et al., 2019, de Jonge and Schückel, 2021). The selection of these indices is based on (i) published results and expert judgement of the high sensitivity of these indices to capture changes in food webs, (ii) the fact that these indices assessing the structure, diversity and functioning of ecosystems, which is an important quest emerging from European Directives and (iii) the potential of these indices to be easily communicated to stakeholders.

The first step prior to calculating the ENA indices is the construction of the food web model for the targeted ecosystem. The complexity of the model (e.g. the number of species and trophic compartments) is related to the data availability and to the question that needs to be treated. In general, time-series data of the plankton biomass (i.e. phytoplankton, zooplankton) is required along with benthic organisms, fish and invertebrates, mammals, and bird biomass data. In addition, data of non-living compartments is required. Food web models are based on annually averaged values of biomasses (in carbon).

Once this information is available, the food web model is parameterized with biomasses per unit area, with several ratios of processes over biomass [such as production over biomass ratios (P/B), consumption over biomass ratios (C/B) or respiration over biomass (R/B)].

To gain a better understanding of the strength of the relationships occurring within a food web, a measure of the amount of each compartment representing a prey-item for another is needed (Who eats whom and at what rate?). In general, stomach content analysis and stable isotope analysis are used to account for these measures. If this information is not locally available, literature or online databases (e.g. DE database, fishbase.org, MARLIN BIOTIC) can be used to estimate these measures.

In order to facilitate exchange between experts, we held 3 world café sessions. In each session, 3 tables were available for participants to join and engage with Activity 2 representatives, each with its own theme and table hosts:

1. Model approaches to investigate food web characteristics, biotic-abiotic interactions and cumulative pressures (LiAcAT: Literature analysis and Cumulative Assessment Tool, and ENA: Ecological Network Analysis) (hosts Silke Eilers and Ulrike Schückel (both online) and Thomas Raabe).

2. Assessment scales developed for eutrophication assessments (host: Anouk Blauw).
3. Remote sensing data on primary productivity (hosts Gavin Tilstone (online) and Lisette Enserink).

Participants were encouraged to visit every table, but allowed to visit a specific table multiple times if they wanted. Below are the notes recorded during these sessions.

6.2 Models to investigate food webs, biotic-abiotic interactions & cumulative pressures

At this world café table, attendants could engage with Ulrike Schückel, Silke Eilers and Thomas Raabe to further discuss the model approaches that they presented.

Meeting day 2:

Role of LiACAT/ ENA in the project:

- Models will supplement Indicator assessment and include bowtie approaches to form a message regarding climate change/ eutrophication influences in general/as an addition to thematic assessments:
 - Giving answers in hindsight (“What *has* happened”)
 - Making projections for the future (“What *will* happen”)
- LiACAT and ENA modelling will connect to OSPAR thematic assessments via small area case studies

Model results shall flow directly into thematic analyses

Main Requests from Activity 2:

- Which areas/parameters should be included, according to the thematic groups? (benthic/pelagic...)
- Will it be possible to get a data call inventory from benthic? (Comparable to pelagic inventory introduced by Matt Holland)

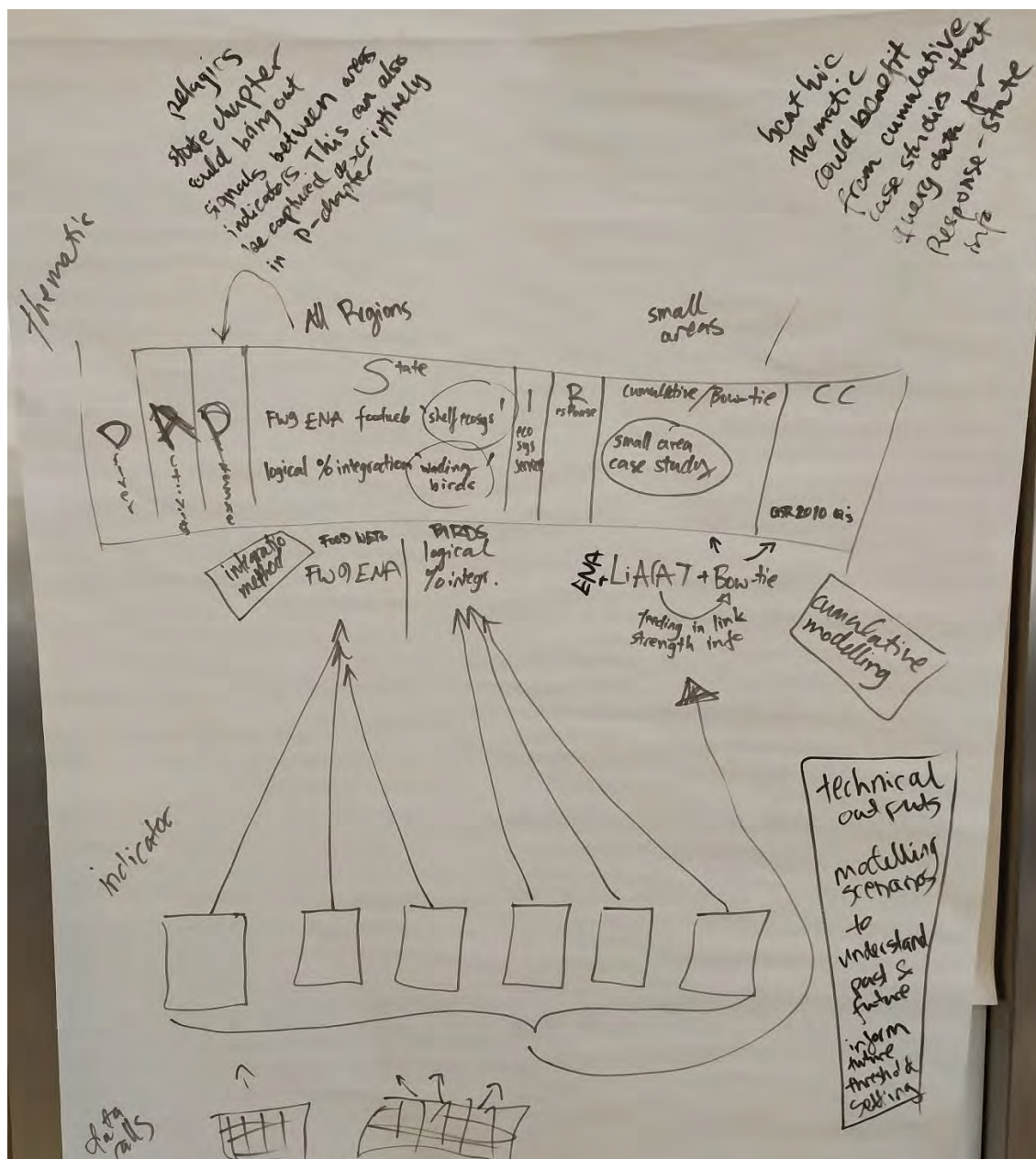


Figure 7 Where can Activity 2 be included in the OSPAR process? (Sketch by Lena Avellan, OSPAR secretariat)

Inputs from World Café participants:

- **Pelagic:** Areas with high biomass and harmful algae /microzooplankton are interesting for modelling, especially the main riverine plumes e.g., Elbe plume
- **Benthic:** Biogeography should be taken into account, data from Doggerbank area/UK will be sent to Ulrike Schückel

Questions answered in the collaborative session:

- **Question:** Are ACIM and ECOSEA parallel streams to send the same message or do they have different focus points/outcomes?

Answer: Depending on the Bowtie models that ECOSEA will use, they can be seen as supportive/ collaborative work going in a similar direction. Not all the pressures can be linked, management options are not going to be included.

- *Question:* The analysis is made based on a selection of case studies. What are the criteria for the use of data? Does the selection depend on specific areas or studies where biomass output is available?
Answer: Mostly depends on data availability, abundance information can also be converted into biomass input.
- *Question:* Is there always data needed for all of the thematic groups in a single region (e.g. birds, mammals, pelagic, benthic)?
Answer: Chemical and physical Information is always needed; ideally representative regions with good data availability are looked for but not every single data set is required.
- *Question:* How is benthic data going to be treated? Are flows being regarded, is there analysis on a species level?
Answer: Input is categorized for trophic guilds or functional groups, not on species level.

Meeting day 3:

(Strongly limited time frame due to technical problems with online communication)

- Short introduction to the links of Activity 2/ models to bowtie analysis
- General questions with regard to co-operation between all Activities:
 - o Areas
 - o Data
 - o Time
- Requests/ wishes from biological groups à overlay of assessment areas, find common areas for combined approach
- Pelagics group: Areas with high phytoplankton biomass would be interesting, this refers to OSPAR region 30
- Proposal of Doggerbank as further common area of interest à good data conditions
- Time series data will be needed for Activity 2 co-operations
- UK coast: continuous benthic data since 1958
- Birds: 30-40 years of data including abundance and breeding success
- Life form pairing for larger areas à benthic functional groups, depend on data availability

Idea and final conclusion:

All Activities:

- Create shape files for data availability (inventory):
 - o physical-chemical parameters (including model data)
 - o pelagic data (plankton, fishes et al)
 - o bird data
 - o benthos data

Overlay maps and find best spots for common analyses

6.3 Assessment scales developed for eutrophication assessments

At this world café table, we discussed how coherence in assessment areas between thematic assessments can be improved and/or how the COMP4 areas for eutrophication can be re-used for other indicators. In general, there is agreement that it is very useful to harmonize assessment areas across themes to enable linking and integration of results.

Comments received from pelagic habitats group:

The COMP4 assessment areas are already used for the pelagic indicators and have been compared to gridded data at different resolutions with CPR data. The experiences were so far positive, but there are a few concerns for further implementation:

- There are very many areas and not for each area data are available for the assessment. The CPR data used so far have been interpolated to improve the coverage. But still this is not a satisfactory solution and one would like to have other data as well in each area.
- 10 years have been spent to develop indicators and their representation in a table and this table does not accommodate so many areas. Maybe a map representation (like Matt showed in his presentation) would be more suitable, but then the people involved need to be convinced to change the system again and throw away the system that was so carefully designed. Another issue of concern is that red areas (i.e. significant decrease of indicator value) may be perceived as negative signals by policy makers, whereas that is not necessarily the correct interpretation of the result. So more work is needed to translate the indicator results to narratives that communicate the story correctly.
- One possible solution to reduce the number of areas (and increase the number of data per area) could be to aggregate some areas that show similar results for pelagic indicators (i.e. the lifeform pairs, not the chlorophyll and primary production where satellite data are available).

Comments from benthic habitats group:

- Laurent: We are planning to compare the COMP4 areas with existing assessment areas for benthic indicators. Liam can provide the shape files for those.
- Laurent: Similar to the pelagics groups there are concerns that for some areas no data are available for the assessment.
- José Manuel Gonzalez Irusta mentions a method available 'region common profiles' (?) that provides modelled distribution data per species (?) and is willing to compare these with EUNOSAT maps. There is ongoing scientific work using these methods that he can share. Practically we cannot do this type of work in NEA PANACEA but we can use what is available from others. So, it is more relevant to compare current maps that have been developed from earlier research and expert knowledge to determine what assessment areas to use and whether the COMP4 areas are suitable
- Sander Wijnhoven: TGSeabed is already making use of EUNOSAT maps and has done an analysis of how to use these for benthic work.
- Petra Schmitt: DE government is using EUNOSAT maps. For benthic reporting assessment areas are designed, these match well with EUNOSAT areas.

Comments from marine birds group:

- Current assessment areas made for birds are ecologically relevant. There are maps available and these could be compared with COMP4 areas. For biomass indicators it is no problem to change the current assessment areas (which are also already ecologically relevant). Just for some birds that cover large areas during their life it is not sensible to define smaller assessment areas than currently used.
- Other indicators, such as breeding success, require quite demanding modelling and computation work, so these cannot be run for so many areas. It would be too much work.

6.4 Remote sensing data on primary productivity

At this world café table, we discussed the remote sensing products that NEA PANACEA Activity 2 has to offer to the biodiversity assessment community. Gavin Tilstone from the Plymouth Marine Laboratory joined through a remote connection to hold a presentation and answer questions. Below is a point-by-point record by Gavin with his answers to and views on the issues raised during the discussion. This is followed by a paragraph with input from visitors of this world café table.

Which type of satellite model do you use?

The model is wavelength resolving and therefore fully spectral. The input terms are Chla, max Chla-specific absorption, quantum yield, phytoplankton useable radiation (PUR), PAR at the surface and propagated through the water column over wavelength and depth. All input parameters are integrated over wavelength, depth and time. It is based on the original work of one of your former French colleagues, Andre Morel (Morel, 1991 Prog. Oceanogr., 26, 263–306; Antoine and Morel et al. 1996 Global Biogeochem. Cycles, 10, 43–55) who I considered as a real ‘Guru’ in the (bio-)optics field.

We adapted the model to account for CDOM absorption and TSM scattering in coastal waters using the radiative transfer model HYDROLIGHT, and to speed up the computation by developing a look-up-table for these other light absorbing water constituents, so that we can more easily apply it globally. For further details please see the following papers: Smyth, Tilstone, Groom 2005 JGR-Oceans 110, C10014, doi:10.1029/2004JC002784; Tilstone et al 2005, J. Plankt. Res, doi:10.1093/plankt/fbi075).

Do you have a seasonal pattern of “functional” absorption of phyto (or a similar variable) different from biomass? Or is it impossible to compute such parameters that are really independent with the satellite approach?

The Chla-specific absorption spectrum is normalized to PUR using a KPUR function determined from temperature (which is obtained from satellite SST). This accounts for any seasonal specific variation in absorption.

Do you have relationships between PP sat and biomass, but also PPsat and PP measured in situ (as part of your model calibrations) that would be different between the periods before, during and especially after the spring bloom?

The biomass term comes from Chla. In their original work, Morel et al. did quite a lot of research on accounting for the variability in photosynthetic parameters and biomass under different Chla regimes (eutrophic, mesotrophic, oligotrophic; see -

<https://www.sciencedirect.com/science/article/pii/S0967063796000593?via%3Dihub>)

Stock-flow decoupling is an issue that seems to me to be addressed within the framework of our FW2 works, by different approaches. I would like also to evaluate whether with the photobiological parameters of FRRf: we get the same vision, a different result or an added value.

Reconciling FRRf to 14-C measurements under variable Chla biomass can be a tricky task (e.g. Robinson et al. 2009, doi: 10.3354/ame01250), due to the different response times of photosynthetic electron transfer and actual carbon fixation / assimilation, matching the action spectrum of O₂ (FRRf) to that of carbon (14-C P-E curves) to quantum yield and its variability in different phytoplankton groups and species.

Colleagues at PML are involved in the SCOR working group on FRRf and developing the necessary protocols to scale up to an integrated production rate. There has been some nice steps towards this (Oxborough et al. 2012 LO-Methods DOI 10.4319/lom.2012.10.142).

The caveat is that at the SCOR working group meeting, the originator of the instrument (Kolber) stated that the FRRf was never intended to be used as an instrument to determine primary production, but as a tool to assess variability in photo-physiology.

The use of all of these methods have benefits and limitations and the use and application of these depends on the research questions that are being addressed.

If the question is: what is the rapid photo-physiological response to an environmental driver (e.g. Fe;)? Then FRRf is the most appropriate method / tool to answer it.

If the question is: what are the threshold indicators and reference baseline for primary production for a particular area? Then 14-C is probably more applicable at this point of time, as there are a long time series and history of measurements going back to the 1960's.

However, all of these in situ measurements are still limited both spatially and temporally in providing sufficient coverage over large areas. This is where ocean colour remote sensing and estimates of primary production can really fill in these gaps.

Overlaid on this, the majority of satellite PP algorithms are calibrated using 14-C measurements and using the most accurate algorithms the differences between satellite and 14-C measurements are lower than the current differences between FRRf and 14-C based techniques.

As I highlighted in my presentation, developing satellite models of PP really has the potential to fill the gaps in spatial and temporal in situ measurements, but the estimates obviously have to be accurate. I have been doing a lot of work on validating and improving the wavelength resolving model over the years (e.g. Tilstone et al. 2005 doi:10.1093/plankt/fbi075 , 2009 doi:10.1016/j.dsr2.2008.10.034, 2014 <http://dx.doi.org/10.1016/j.rse.2013.04.021>, 2015a doi: 10.1016/j.rse.2015.03.017, 2015b doi:10.1016/j.rse.2014.10.013, Barnes et al. 2014 doi: 10.3354/meps10751, Curran et al. 2018 doi:10.3390/rs10091389, Lobanova et al. 2018 <https://doi.org/10.3390/rs10071116>, Ford et al. 2021 <https://doi.org/10.1016/j.rse.2021.112435>) and also deriving phytoplankton size-fractionated production rates from satellite, new, export and

net community production (but that is a different subject!!!). Our WRM PP satellite model is generally within 20% of in situ 14-C values.

Our adapted Morel model, always came in the top 4 most accurate models during the NASA PPAR3 inter-comparisons ([Carr et al., 2006](#); [Friedrichs et al., 2009](#); [Saba et al., 2010, 2011](#)).

Insights from other participants

All these considerations are interesting to discuss openly and are important for the future. Indeed, the production of phytoplankton estimated by the satellite tool is appropriate in offshore waters (this is also a very practical approach given the size of ocean basins such as the North Atlantic or the North Sea), but in coastal environments, where biomass can be very high and subject to river inputs (related to local meteorology and anthropogenic impacts), other approaches may be of considerable interest.

High-frequency active fluorescence (FRRf) measurement approaches, for example, have shown their usefulness even in the problem of production, not only that of physiology. Progress has been made on understanding active fluorescence and carbon fluxes. They make it possible to consider estimating flows (at least locally) with this method using parallel empirical models for the calculation of carbon equivalents. Automated buoy-based coastal FRRf approaches are underway and are expected to develop in the near future. Given the cycles of physiology and the photoacclimation processes that can occur on the scale of a few minutes and/or hours, this approach is to be supported, particularly in the context of the study of the decoupling between biomass and microalgae production.

Moreover, in areas with maximum deep chlorophyll, studies also show that photoacclimation can occur and why not affect short-term production flows.

7 Interaction with other OSPAR bodies

Please find below and especially in the attachments mentioned in the text information shared by Lena Avellan (OSPAR secretariat), Adrian Judd (ICG-EcoC) and Emily Corcoran (contractor) during SuperCOBAM. While we had scheduled and hoped for a session with Stephen Dye of the Climate Change Expert Group (CEEG), we have not been able to make this happen.

7.1 OSPAR secretariat, Lena Avellan

On day 1 Lena Avellan, deputy secretary at the OSPAR secretariat, talked the ICG-COBAM expert network through the many resources available to them for delivering the QSR (indicator and thematic) assessments and pointed out various requirements the assessments need to meet. Many relevant resources are listed in Annex B: SuperCOBAM Resource Library, but the below ones are the ones that Lena drew our attention specifically to.

An overview of the indicator assessments that are going to be delivered by ICG-COBAM can be found in Annex E, which is also published as an Annex to the BDC 2021 meeting Summary Record.

All OSPAR assessments are published on the OSPAR Assessment Portal (OAP). The QSR2023 assessments will be presented under a tile that is presented next to previous QSR assessments <https://oap.ospar.org/en/ospar-assessments/quality-status-reports/>.

Templates for the common indicators are available on the QSR resources page: <https://www.ospar.org/work-areas/cross-cutting-issues/qsr2023/assessment-templates>. The common indicator template includes fields for text and a metadata section which provides a link to the associated 'snapshot data set' and the Addendum 1 file to the template which provides results in a format compatible with MSFD electronic reporting.

The common indicator assessment methodology should be provided as a technical document setting out the calculation protocol in a CEMP Guideline (Coordinated Environmental Monitoring Programme). The CEMP Guideline should be published at the same time as the indicator. Current CEMP Guidelines are available online: <https://www.ospar.org/work-areas/cross-cutting-issues/cemp>

Writing and style guides are available here: <https://www.ospar.org/work-areas/cross-cutting-issues/qsr2023/style-and-writing-guides>

The QSR drafting process is managed through the QSRSharePoint site: <https://osparcsp.sharepoint.com/sites/QSR>

There are dedicated folders for each assessment, including tailored templates. If you cannot access the SharePoint (but should be able to), please contact the secretariat to request to access.

7.2 ICG-EcoC, Adrian Judd: Addressing the DAP in DAPSIR

On day 2 Adrian Judd, the co-convenor of ICG-EcoC, updated the ICG-COBAM expert community on the work that is in place to address the DAP in DAPSIR (Drivers, Activities, Pressures, State, Impact, Response) and used the SuperCOBAM platform to further the discussion on how the workflows on this very cross-cutting work are optimized and how the COBAM community might contribute to the effort.

In Annex G an overview document can be found that details the use of the DAPSIR framework in the OSPAR QSR thematic assessments, and the presentation that Adrian held can be found in Annex F. Some questions were put in the meeting chat which were answered during the session, and Adrian was so kind to answer these (again) in writing, see Annex H. After the plenary exchange, Adrian and the expert group / thematic assessment leads had a session using a Miro board to inventory how (pathway) various pressures affect the different state components and how this is measured (see Figure 3, larger version in Annex I).

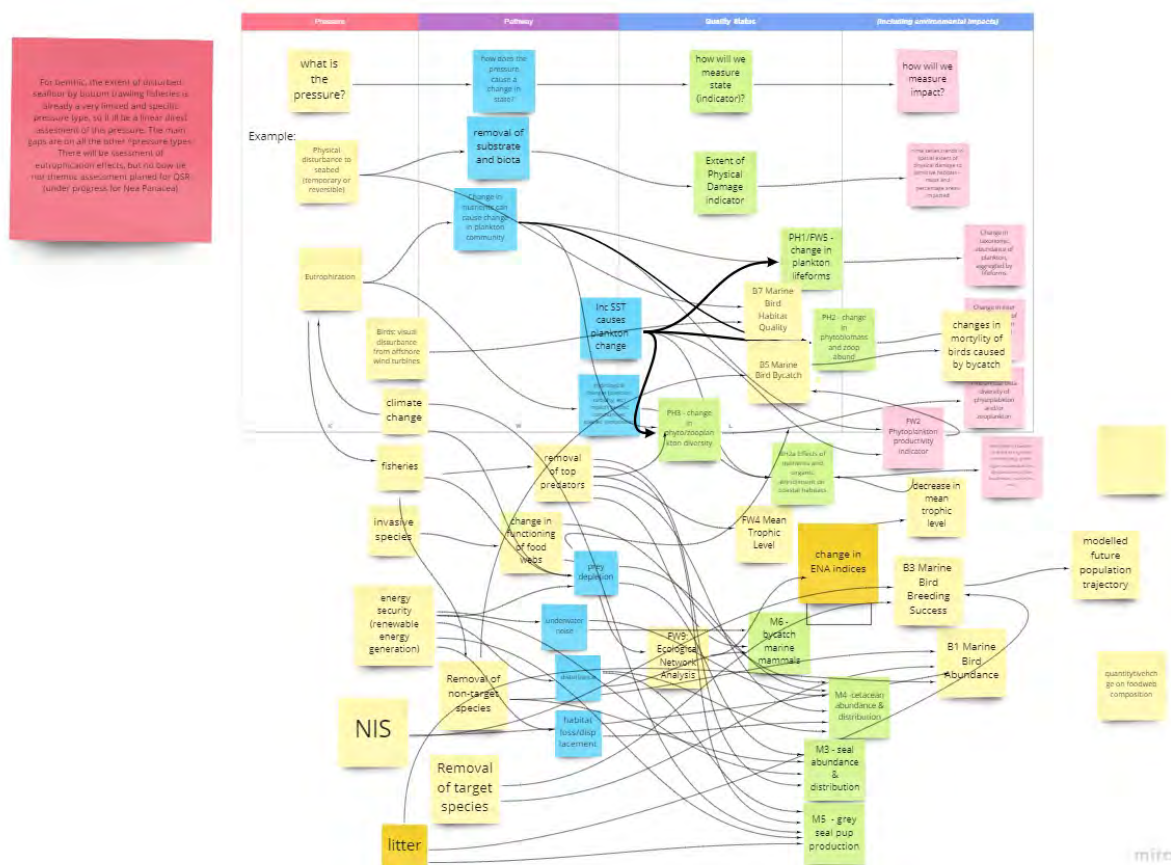


Figure 8. Results of the Miro board session between Adrian Judd and Expert Group and Thematic Assessments leads, see Annex I for a larger version

7.3 Emily Corcoran: Addressing the R in DAPSIR

On day 3 Emily Corcoran, who has been contracted until April 2021 by OSPAR to provide technical support to the development of the R (Response) component of the DAPSIR (see above) framework being applied to structure the Thematic Assessments, introduced herself and the work she plans to

do to the ICG-COBAM expert network. The purpose of her contract is to help develop a coordinated approach for the development of the Response chapters, and work with the relevant expert groups within ICG-COBAM, ICG-POSH and ICG-MPA to develop initial text for consideration by BDC 2022.

The purpose of the presentation (Annex J) was to provide SuperCOBAM with an overview of the intention of the chapters, progress to date and to ensure the appropriate contacts were made within the different expert groups. It was also the intent to make sure that the consultant could establish contact with all of the expert groups for picking up future discussions. The discussion, facilitated by "Mentimeter" helped share information on the experts that were able to contribute to this work, and when. These outputs are available as part of the presentation.

8 General outcomes: Plenary closing discussion

To wrap up the workshop, we replaced the plenary Threshold Values discussion with a tour-de-table to identify outcomes and share experiences. Unavoidably, this discussion had a strong focus on the three expert groups active in NEA PANACEA and NEA PANACEA's Activity 2 (eutrophication and physical conditions).



Closing tour-de-table theater

General remarks

- Joining and mixing groups (such as biodiversity and eutrophication) in a physical meeting was very successful, this should be taken into account in the future and that such meetings should be resourced from OSPAR Contracting Parties.
- It was considered extremely fruitful to have mixed expert group discussions. We should consider back-to-back meetings for expert groups to allow for more mixing.
- Topics are dense and complex, difficult to come to closure on all topics so maybe need to focus on one topic that can be closed and concluded on in the future.
- QSR timelines are pressed, important to remember that NEA PANACEA should also have time and space to explore new approaches for example on food webs and be part of the project deliverables even if not QSR 2023 products.
- Come forward with proposals for what topics can be best handled at ultraCOBAM by those who will be invited to that meeting. UltraCOBAM will be physical meeting with biodiversity experts.
- Hybrid superCOBAM has been inclusive which is good, but it is also dragging down the live physical event. The ultraCOBAM would be fully live.

Pelagic habitats

- D1C6 is inappropriate for pelagic. It reduces ecosystem complexity so much that ecological meaning is lost. The pelagic habitat does not have consistent boundaries – water bodies move and plankton move within and between the water bodies. Pelagic habitats are 3 dimensions. For these reasons it doesn't make sense to give a percent of 'good' or 'bad' – would that be percentage of surface area? Water column? Finally, we don't support threshold values at this time, so it is impossible to arrive at a meaningful percentage of good or bad. We hope to bring this to the attention of the EU, through the OSPAR channels.
- Threshold values. Right now we feel that TVs probably won't work but we have some ideas to test around Ecological Quality Ratios or p values in trends, etc, that will allow us to interpret observed changes in relation to reference conditions or baselines compared to the current assessment period. Either way, the narrative is key in linking drivers of change to indicator change.
- Spatial assessment areas. We are going to use the COMP4 assessment areas (based on subdivisions proposed by the JMP EUNOSAT project) for the upcoming OSPAR eutrophication assessment, but there are 64 in total (distributed in OSPAR Regions II, III and IV) and we would like to simplify due to data availability. However, we have testing to do on working out if we can link the wider pelagic habitats from the MSFD text (e.g., variable salinity, coastal, shelf) to the areas, allowing us to rationalise areas to simplify assessment. We may then be able to compare the indicators and pressures across areas of the same class.
- Integration between indicators. Integration to a single number (or GES/notGES) would 1) hide nuance, 2) obscure ecological meaning, and 3) double count certain taxa as all three of our indicators come from the same data. However, our indicators have multiple parts across multiple spatial areas, which can be overwhelming for policy. It's important that we retain the ecological meaning necessary to inform management measures and to interpret change in other indicators (through the food web). We will therefore start from a position of 'what would be useful for policy makers to know?' and test out some ways of displaying and interpreting data to simplify communication of our message.

Benthic habitats

- The stocktaking of data that is available was progressed and will enable when completed to clearly define area which will be really assessed (and start all indicators draft assessment!).
- Spatial assessment units: First proposal developed, shapefile to be created in next step. Aiming to align for all indicators which will make it easier to present information at the next level, notably the Benthic habitats' thematic assessment and explore links with other components, notably pelagic habitats' thematic assessment.
- Integration of indicators: The conceptual method exists to combine indicators exists (Elliot et al, 2018), and some methodological gaps were also progressed, but in terms of MSFD criteria integration, there is still a conclusion that the Broad habitat type is the last relevant integrated reporting unit, and that there is currently no sense to integrate the different information and results between different pressure type in a single value (D6C5). A dashboard of results of all other criteria contributing to D6C5 would be more relevant, both ecologically, scientifically and for management issues.

- **Thresholds Values:** this is a very challenging task, further work is foreseen on next steps, but it is not foreseen that Threshold Values will be fully developed by QSR2023. Different regions are at different level of development, both science and policy based questions need to be addressed. BH2a is the only benthic indicator with an agreed threshold. A 'Narrative' for a BH3 threshold has been described, and will be discussed in the next OSPAR relevant meetings.
- We will need to clearly indicate what will be each NEA PANACEA product and what could be a QSR input, because an agreement has to be reached at several OSPAR committees levels and this can be challenging according to QSR2023 timeline. Nevertheless, the Nea Panacea timeline is currently fitted to submit all products end 2022, which would enable submission of all products to end 2022 COBAM and BDC meetings, and agreement in Spring 2023 for QSR production.
- There is substantial progress expected in the benthic habitat OSPAR QSR outputs compared to previous (2017) assessment outputs, recognizing that some state-pressure relationships are still not yet developed.

NEA PANACEA Activity 2

- A plan has now been fully developed to formulate requirements from modelling side to the biodiversity side and also to physical-chemical data providers.
- Will overlap maps of available data to identify the best regions to be worked on and at what time-scales.
- DELTARES has provided modelled data for the whole region with high resolution for spatial and temporal scales. Content with the outputs and confident that outputs will be delivered.
- The "selling" of eutrophication tools has been successful. Have been able to clarify that the tools are to understand spatial and temporal aspects of plankton which can be a basis for understanding food webs.
- To have shared the assessment units for eutrophication for use in biodiversity indicators and assessments is considered a very good outcome.

Marine birds

- JWGBIRD is well placed for QSR assessment and good progress made
- Spatial scales: agreed B3 breeding success indicator to be the regional level, this will be communicated to the contractor to produce models for this spatial scale, contractor to do this under NEA PANACEA funding.
- Integration: similarities of birds and fish approach, thinking of species at different times of the year comparable to fish stock assessments, thus potential read-across possibility between groups.
- Thematic assessments: better understanding of how bird work streams will link up with work by contractors from BiTA on the thematic assessment. Modelling of cumulative chapter on pilot assessment was a good development and look forward to feeding in.
- Learned a lot from the other groups. Interesting with spatial scales to compare. For the future it could be good to compare the boundaries of sub-divisions between topics. Some bird results could maybe be explained if there was a spatial read-across to other assessments of other topics in the same area

Other

- BiTA query on State chapter content: Structure and components has been discussed and clarified. Post-meeting, would be good if experts could go into the 0301_doc in BiTA on sharepoint to fill it in.
- Bow-tie / ICG-EcoC and LiACAT approach, good discussion to clarify how they link up, follow-up on the agenda to continue the discussion.

9 Annexes

- A. SuperCOBAM 2021 programme
- B. SuperCOBAM resource library
- C. Opening presentation by Jos Schilder
- D. Whiteboard opening discussion
- E. BDC2021 Annex 5: ICG-COBAM assessments to be delivered
- F. Adrian Judd's presentation
- G. Adrian Judd: document on DAPSIR and OAP
- H. Adrian Judd's answers to questions
- I. Adrian Judd & EG leads: Miro board
- J. Emily Corcoran's presentation
- K. Silke Eilers and Ulrike Schückel's presentation: LiACAT & ENA
- L. OBHEG (benthic habitats) minutes
- M. OPHEG (pelagic habitats) minutes
- N. JWGBIRD (marine birds) minutes
- O. Activity 2 threshold value inventory
- P. List of participants