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Introduction

BalticBOOST project is a HELCOM coordinated EU co-financed project aimed to develop assessment tools and set up data arrangements to support indicator-based assessments of the state of and pressures on the Baltic Sea (Baltic Sea project to boost regional coherence of marine strategies through improved data flow, assessments and knowledge base for development of measures, September 2015-December 2016).

Within Theme 3, BalticBOOST addresses physical loss and impacts to the sea floor. This theme explores ways to determine how much disturbance from different activities that specific seabed habitats can tolerate while remaining in Good Environmental Status (GES). A tool for assessing the impacts of fishing gear on specific habitat types and species is also being developed. Guidance for Theme 3 is provided by HELCOM groups GEAR and FISH.

Theme 3 partners are the Finnish Environment Institute (SYKE), the Technical University of Denmark (DTU Aqua), the Swedish University of Agricultural Sciences (SLU Aqua), the Thünen Institute, the Leibniz Institute for Baltic Sea Research Warnemünde (IOW) and the International Council for Exploration of Seas (ICES).

Workshop

The workshop was held on 28-29 November 2016 at the premises of the HELCOM Secretariat, Helsinki, Finland.

The general aim of workshop was to further work on defining shared principles to define environmental targets, examining a broad range of pressures and drawing from Baltic Sea test case scenarios examined during the project work.

More specifically the workshop focused on:

- Evaluating the results of the project test cases on effects of different human activities and pressures on benthic habitats,
- Considering and further developing the draft guidelines for setting environmental targets for pressures affecting benthic habitats.

The agenda of the Meeting is contained in **Annex 1**.

The Meeting was attended by representatives of Lithuania and Denmark, as well as the partners of Theme 3 BalticBOOST project and observers to HELCOM according to the list of Workshop Participants which is included as **Annex 2**.

The Workshop was chaired by Mr. Samuli Korpinen, Finland, coordinator of WP 3.1 under Theme 3.

Ulla Li Zweifel, Professional Secretary, and Marco Milardi, Project Coordinator, HELCOM Secretariat, acted as secretaries to the workshop.

On the first meeting day, the main outcomes from case studies and activities under the Theme were showcased and discussed. On the second meeting day, the Meeting discussed the conclusions that could be drawn from case studies in terms of comparison of impacts on seabed and thresholds for pressures. In particular, the Meeting was divided into smaller groups and discussed specifically the impacts on density and species richness from fisheries (and comparison with other activities) and the validation of the longevity approach with actual data, respectively. During the last part of the second meeting day, the Meeting discussed the draft guidelines as proposed by the project and agreed on additional principles to be followed.

Introduction to the Workshop.

1. The HELCOM Secretariat welcomed the Meeting and presented the general aims and themes of the BalticBOOST project with particular focus on Theme 3, Physical loss and damage to seabed habitats.
2. The Chair introduced the workshop aims and the agenda for the workshop (**Presentation 1**). The presentation introduced as well the concept of GES threshold arising from MSFD art. 9 and the revised Commission Decision on GES criteria and methodological standards. GES is usually defined by state parameters but it can also be linked to pressures. The term 'maximum allowable pressure', was introduced by the 14th meeting of HELCOM GEAR and this is the pressure level at which GES can be achieved (or maintained). Related to this level, the environmental target (according to the MSFD art. 10) refers to the reduction of the pressure necessary to reach the maximum allowable pressure. The pressure reduction can be spatial, temporal or in the intensity of impacts on seabed (see also paragraphs 41, 46 and 49).
3. The Chair also introduced to the workshop the revised GES criteria (D6C1, D6C2, D6C3) of the Commission decision. In particular, the decision states that MS should establish threshold values for pressure impacts. In this context, physical disturbance has been defined as a temporary (or reversible) change to the seabed by human activities which could be recovered if the pressure is relieved within the span of maximum 12 years (2 assessment cycles). Physical loss was defined as a permanent change to the seafloor induced by direct or indirect human activities which cannot be recovered in 12 years.
4. It was clarified that physical disturbance can arise from multiple activities, which all contribute to the pressure. There is thus a need to combine data from specific disturbances in order to fulfil D6C2 and D6C3 but this is not an easy process. In order to do that, an estimate of the magnitude of pressure and impacts of each human activity should be performed, before combining all the activities in a single pressure.
5. One of the goals of the workshop was to look for evidence (from test cases) for environmental targets (referring to the reduction of the pressure) by evaluating thresholds of pressures for each activity. It was also clarified that the Meeting or the BalticBOOST project is not supposed to define such thresholds precisely, but only to work on defining the methodologies used to undertake such an assessment.
6. The Meeting discussed comments which focused on the definition of spatial scale of assessment, as the focus of the D6 is on spatial extent. The Meeting agreed that measures could both address the extent and distribution but also the intensity of the pressure, which may refer to the term 'adverse effects' in the Commission Decision.

Test cases of the BalticBOOST Theme 3:

Fisheries effects on benthic habitats;

7. Katja Norén, SLU Aqua, presented the main conclusions of the fisheries case study in 4 sea areas in Swedish waters (Document 1-1, **Presentation 2**)
8. This case study used the BalticBOOST Tool to calculate fishing pressure in areas where benthic fauna sampling was available. Using multivariate and univariate methods, the linkage between several biological parameters (species abundance, species richness, benthic biomass, BQI, etc.) originating from the national benthic Swedish monitoring programme and fishing pressure was examined for year 2010 and 2012.

9. In general, sea areas had to be analysed separately, as they had significant different environmental characteristics. As a result, 3 out of 4 sea areas did not show a consistent linkage between the pressure (fishing) and the variables examined (e.g. assemblage structure, biodiversity or BQI) for the two years. In these sea areas depth was the main factor affecting species abundance and distribution. In Blekinge both years and Scania 2012 the lack of environmental monitoring stations without fishing intensity in deeper waters made it impossible to disentangle effects from depth and fishing intensity. In one sea area (Gotland), monitoring stations captured the range of required environmental conditions and a wide range of fishing pressures. The fishing pressure was shown to have a significant effect on the number of species in this sea area.
10. One difficulty in this work was that for many sea areas national monitoring stations did not include stations without fishing intensity at the same depths as were fishing is occurring which introduces issues of co-linearity. This is not strange, as the national monitoring programme is not stratified to assess effects of fishing intensity. It was also clarified that depth is a strong predictor of assemblage structure which is not surprising as it acts as a proxy for many other environmental variables (e.g. salinity, sediment structure and disturbance).
11. The Meeting welcomed the presentation and noted that the results on fishing pressure effects are not immediately transferrable to all areas in the Baltic Sea but might be representative for at least some areas (those similar to Gotland). The significant result is based on samples with fishing intensity from 0 to high levels but indications of a change is shown already at very low levels of fishing intensity.
12. J. Rasmus Nielsen, representative of Technical Lead partner DTU Aqua in BalticBOOST Theme 3 WP 3.2, presented an overview of the tools and test cases for the assessment of impacts from fishing activities, including the main conclusions of the fisheries case study in the Femern Belt, as developed under BalticBOOST (Document 1-2, **Presentation 3**).
13. This case study looked at the short term effects (per quarter-year) of varying fishing pressure, calculated with the methodology of the BalticBOOST Tool, on density, species richness and biomass of benthic fauna. The analyses were performed on three EUNIS level 3 habitats (Sublittoral sand (A5.2), Sublittoral mud (A5.3) and Sublittoral mixed sediments (A5.4) and included also hydrographical parameters such as salinity, oxygen and currents, and water depth. Fishing pressure in the analyses was ranging from low to high and had a moderate but significant negative effect on species richness and density for all three habitats with a tendency towards higher impacts on the more coarse sediment. Seasonal effects were also present, derived from the seasonal distribution of fisheries (fishing behaviour) but probably also from seasonally higher sensitivities of benthic communities: this is explanatory of the complexity of the system and level of interaction of the factors involved.
14. Biodiversity (number of species) and density (individuals/biomass), but not the benthic biomass, seemed to be rather strong indicators for impacts of fishery on the benthic invertebrate community.
15. The Meeting welcomed the presentation and noted that the approach was comparable to the Swedish test case, even if the timescale was different.
16. Sebastian Valanko, ICES, presented the main conclusions from the work on reference status of Baltic benthic communities and the extension of the so-called longevity approach for the fishing pressures acting on the seafloor (Document 1-3, **Presentation 4**).
17. This work was also using longevity as a measure of sensitivity of benthic communities to pressures, under the assumption that pressure (e.g. fishing pressure) would change the community composition according to longevities of species in the benthic communities. In the eastern and northern parts of the Baltic Sea, benthic communities' biomass comprises many

short-living species (less than 5 years). Other communities consist of many long-living animals; with 10 communities having at least 25% of the biomass in taxa with longevities over 10 years. The longevity compositions varies between the surface and subsurface layer, with relatively more short-lived animals in the upper layer.

18. It is possible to model fishing impact by assuming (with a precautionary approach) that mortality would occur if the trawl sweeps the community at least once in their lifetime. In general, animals living deeper in the sediment are longer living but would be also less likely to be impacted by a trawl sweep as they burrow below the sediment affected by fishing.
19. Pressure layers with similar effects could be combined through the longevity approach, as long as they act in a similar way. This approach allows to distinguish areas with different sensitivities, locate them on the map and to define what constitutes an adverse effect. The comparison with test cases result could give information on whether there is agreement between the results of this model and the data from case studies.
20. The Meeting discussed the comment from Denmark on the shortcomings of the longevity approach (differences between species, life-stages specific sensitivity, vertical movement inside the substrate) and the concept of protecting mature communities rather than individuals. It was suggested that coupling density with longevity could help to integrate and refine the model.
21. The Meeting also noted the comment that some species (e.g. epifaunal corals) might not have been included in assessments of benthic communities, which were derived from the study by Gogina et al. (2016). It was also noted that heavily impacted communities (e.g. 94% impacted community 14 in the Gogina et al. study) show the limitations of this approach as the community isn't necessarily wiped out by pressure. The reasons are that some organisms do not exhibit the 100% mortality assumed in the model and that it is very hard to establish reference conditions if communities have been intensively trawled.
22. The Meeting welcomed the presentation and noted that a next step would consist in addressing specific mortality for groups to further polish the approach, before it could be used. However, the specific way to do it needs to be further discussed.

Recommendations from fisheries test cases:

- Benthic environmental monitoring has not been designed to detect impacts of fishing but the current monitoring data could still be utilized by using statistical techniques, for instance, to provide validation points for theoretical models. The Meeting could not agree on a definite conclusion on whether the benthic monitoring data is currently sufficient for detecting impacts, but no new sampling setups are expected in the near future so it remains a challenge to define ways to utilize this data for the purpose of assessment and to avoid the potential risk of falling back on expert judgement.
- The BalticBOOST FIT tool approach (Document 1.7) seemed to be a consistent method to predict seafloor impact from fisheries pressure.
- It was difficult to define a specific level of fishing intensity at which the impact is detectable in the status of the benthic communities. In general, adverse impacts were detected but further work, using Baltic Sea specific parameters, will be needed to disentangle the impacts from natural variation and detect thresholds of adverse effects.

Effects of other sea-floor disturbances on benthic habitats

23. Kai Hoppe, IOW, introduced the work in two case study areas in the German waters for non-fisheries pressures affecting seabed habitats including loss from construction, sand extraction, disposal of dredged material and dredging (Document 1-4, **Presentation 5**).
24. Mecklenburg Bight was chosen as a case study covering a probable HOLAS II assessment area (sub-basin) on a broad habitat scale. Even on this scale it was demonstrated, that one activity (sand extraction) can have a substantial effect in regard to physical loss, whereas others are negligibly small. For instance, the most extensive sediment type, sublittoral sand, was affected to a comparably large extent (about 8%) by sand extraction, dredge dumping, wind farms and cables.
25. In the Plantagenetgrund area more detailed data from EIAs were compared on the broad scale habitat level versus a HELCUM Hub level 6. The results showed that the total area designated for sand extraction would cause – in the worst case - even 50% loss of some biotope types (HUB level 6 habitats), but the current practice and environmental legislation have limited the physical loss of habitats to a maximum of 8% at the moment. Rare communities have so far been spared from damage. According to the current definition, the sand extraction sites are classified to cause physical loss of seabed and impacts may reach a magnitude where the Good Environmental Status is compromised, but more detailed analysis may require better access to spatial data at the activity sites.
26. In general, with the exception of sublittoral sand, habitat loss seems to be spatially very limited and could be relevant only if it targets some spatially limited habitats or communities. Extraction of a certain grain size of sand is carried out through sucking and sieving the sediment and thus provokes marked changes in the substrate, which may not recover to its original form.
27. The Meeting considered the definitions of 'physical loss' and 'physical disturbance' and noted that their differences – in terms of recovery – are in some cases not clear and some practical assumptions are required. For instance, sand extraction, dredging and disposal of dredged material, as well as built structures, cause 'physical loss' at the site of the activity, whereas spill-over effects of siltation cause 'physical disturbance'. Also demersal fishing was considered to cause only physical disturbance.
28. Henrik Nygård, representative of Lead partner SYKE for BalticBOOST Theme 3 WP 3.1, presented the main outcomes of the Gulf of Finland test case. The work focused on the effects of the siltation produced by harbour construction in Vuosaari, Helsinki, where capital dredging, disposal of dredged material, sand extraction and land claim took place during the period of 5 years (Document 1-5, **Presentation 6**).
29. The impacts of the turbidity induced by the harbour construction were short lived (2 hours – 2 days) but extended to several kilometres distance from the site. Strongest impacts on state parameters were detected in the benthic macrofauna (Brackish Benthic Index, related to BQI, the Benthic Quality Index) and the growth limit of *Fucus* zone at a distance of about 2 km from the coast. Suspended solid accounted for 58% of the variation in BBI, whereas Secchi depth explained 56% of the variation in the growth limit of *Fucus* zone. In general, the environmental status in the vicinity of the harbour seemed to be weakened along the increasing suspended solid matter and turbidity gradient, but the data set was limited and monitoring did not capture a full pressure gradient.
30. Impacts from disposal of dredged sediment were partly (50%) recovered in 4 years but at the dredging site impacts were not fully recovered even after 6 years.
31. The Meeting welcomed the presentations by Mr. Hoppe and Mr. Nygård and noted that the case studies also provided detailed information of the impacts to the literature review (c.f. Document 2).

Recommendations from non-fisheries test cases:

- Physical loss is caused by sand extraction, dredging and disposal of dredged material, as well as built structures, at the site of the activity. Physical disturbance is caused by the spill-over effects of siltation from the above mentioned activities as well as from other activities causing siltation (e.g. resuspension from shipping and demersal trawling), and abrasion by demersal fishing.
- When considering habitat loss the intensity of the pressure is not relevant, because habitat loss equals to a full impact in any case.
- Extent of habitat loss was generally small in test cases, but this depends heavily on the spatial scale of the assessment. Spatial scale should not be set too broad that habitat hotspots or rare habitats are not adequately protected.
- The data available is often insufficient to assess the impacts. Further test cases should be selected on the basis of best data available, whereas in less relevant cases a rule-of-thumb approach could be sufficient.

What is the basis for environmental targets for human activities affecting benthic habitats?

32. The Chair introduced the aims of the synthesis work done under BalticBOOST (Document 2, **Presentation 7**) where literature was reviewed to understand and compile information available in the Baltic Sea on impacts deriving from non-fisheries activities. Based on this, some broad conclusions on the magnitude of these impacts could be drawn. Document 2 also includes a synthesis of pressure levels from different activities.
33. The Meeting discussed the concepts introduced and agreed that it is important to use a consistent terminology as fisheries and non-fisheries studies might not use the same terms.
34. The Meeting discussed and clarified that recoverability is only considered as a discrimination factor to exclude permanent loss and distinguish it from disturbance (which can be recovered in a time period smaller than two assessment cycles, 12 years).
35. The Meeting discussed the challenges of defining a level of fishing pressure causing adverse effects in all habitats. There are indications that there could be habitat specific sensitivities (deeper habitats or low energy habitats versus habitats of shallower areas or with higher wave and wind energy) but it was not possible to define sensitivities at such level and the BalticBOOST case studies could not provide information on a common threshold across different habitats, but further analysis could improve that. In this regard, the Meeting welcomed the offer by Mr. Nielsen to make additional graphs of fishing impacts on benthic species richness and density separately for three EUNIS 3 habitats.
36. The Meeting agreed that, for fisheries impacts, it is worthwhile to focus on habitats, where fishing actually occurs in the Baltic Sea (not usually at depths <25m), while other activities occur in shallower waters. This will limit the focus and simplify the work as fishing and non-fishing activities might, in large scale, not act on the same habitats.
37. The Meeting noted that siltation is caused by both fishing and non-fishing activities but it may not be a good red-line connecting them, because the literature on siltation resulting from fishing is relatively poor and therefore does not allow for meaningful comparisons. The Meeting however, took note of the manuscript presented by Mr. Mattias Sköld, SLU, where events of resuspension of sediments from bottom-trawling and natural wind-driven events are compared. The Meeting recommended that future efforts could aim to model the fishery siltation in ecologically meaningful way.

38. The Meeting divided in two discussion groups focusing on the validation of the longevity approach with actual data (Group 1) and finding impacts on density and species richness from fisheries (and comparison with other activities) (Group 2). Group 1 concluded that robust assessment results can be seen in rather broad time windows of fishing data (average of six years of fishing), whereas more detailed fishing data is needed in order to make analyses against environmental parameters. Moreover, Group 1 concluded that there is reasonably good coherence in the results between the longevity approach (see Document 1.3) and the Gotland case study and that the longevity approach could be tested also in other test areas in the Baltic Sea. Group 2 concluded that direct comparison of fishing and non-fishing activities as source of physical disturbance is not possible at the moment but it could be attempted after seeing updated figures from the Femern Belt case study (see para 29) and the Gotland case study (see para 3). Outputs of discussion between groups are reported in **Annex 3**.
39. The Meeting discussed in plenary the various approaches and agreed that a yearly assessment of pressures data (both fisheries and non-fisheries) and their trend over an assessment period (6 years) would be the most consistent approach.

Recommendations from the workshop

- The comparison of pressures from fishing and other activities could be made on the basis of impacts rather than pressure levels.
- Current longevity-based models seem to agree with actual data but further analysis is needed to validate this.
- Further analysis is also needed to increase the correlation between models and real data in order to define thresholds. This work should use also richness and density (abundance) in combination with longevity to improve the sensitivity estimates by accounting for more parameters.
- A yearly assessment of pressures data (both fisheries and non-fisheries) and their trend over an assessment period (6 years) or even longer timespans would be the most consistent approach to evaluate pressures.

Towards guidelines for environmental targets of seabed

40. The Chair introduced the concepts of pressure reduction to achieve a certain environmental status and the draft guidelines as proposed in the preliminary document submitted as a background for the meeting (Document 3, **Presentation 8**).
41. There are different ways to achieve a maximum allowable pressure: spatial reductions, temporal closures or limiting intensity. Alternatives to this approach are to reduce the impacts, i.e. reaching the same result without limiting the activity through the use of less damaging technology (i.e. Best Available Technology, BAT), protective measures (e.g. sediment curtains) or temporal/spatial shifts of activities.
42. The methodological approach was as follows: As the first step, the need to define an environmental target has to be identified on the basis of GES not being reached or alternatively with a risk based approach. In principle, environmental targets should be set only when a GES assessment indicates problems. A risk based approach could be used as a substitution of the GES approach for those cases where a GES boundary has not been set (e.g. seabed, underwater noise).
43. As the second step, a linkage framework is built to connect the impacts to pressures and to single activities that are causing it. In the third step, these activities are assessed via GIS data layers, on a successive step, to identify their impact in relation to the environmental status (habitats, species and threatened features). In the fourth step, these state parameters and the pressure

parameters are analysed to find out thresholds of Maximum Allowable Pressure. If these are lacking or not found, an alternative approach (e.g. risk based, expert judgement, qualitative approaches) could be used as well. Mitigation and remediation techniques were considered to belong to the set of measures and not included in the guidelines.

44. The Meeting discussed the basis for setting environmental targets, i.e. the reduction in pressure that is required to achieve GES. The ultimate aim of the HELCOM BalticBOOST WP 3.1 is to propose a step-wise guidance for Contracting Parties to the Helsinki Convention to develop environmental targets for human activities and pressures affecting the benthic habitats that can also be used for EU Member States under the MSFD article 10.
45. The Meeting discussed the connection between maximum allowable pressure and GES according to the wording of the revised GES criteria D6C1-C3 of the Commission Decision as it seems to be unclear of the terms ‘spatial extent’ and ‘distribution’ and it does not mention the pressure intensity (except in D6C3 where the term ‘adverse effect’ is introduced).
46. The Meeting discussed the term ‘Maximum Allowable Pressure’ and noted that this may be problematically misleading in the case where the environmental target is set for a spatial extent, rather than intensity of the pressure.
47. The Meeting agreed that environmental targets need to be set for habitat types and that the EU minimum requirement is the EUNIS level 2 (broad habitats) whereas many environmental targets may be needed for more detailed habitat types (e.g. sand/gravel substrates which aggregate industry is targeting at) or some functional habitats which are hot spots for wider environmental well-being (e.g. spawning areas).
48. The Meeting discussed the relevant spatial scale which would be most meaningful for the environmental targets. The sub-basin scale is used for the assessment of benthic habitats and also for the core indicator ‘cumulative benthic impacts’. The spatial scale at which the environmental target should be set should consider the habitat types and therefore the spatial scale may be defined, inter alias, on basis of the habitat distribution.
49. When setting environmental targets, at least three factors could be taken into account: spatial extent of the pressure, intensity of the pressure and connectivity of the impacted benthic habitats. A suitable environmental target may be a mixture of these three factors, where for example, a set of areas is left unaffected (target for spatial extent), maximum intensity of an activity is defined for another set of areas (target for intensity of the pressure) and the unaffected areas should be interconnected to each other (target for connectivity).
50. Pressure reduction scenarios could be produced as a result of target setting in order to offer the decision makers with a series of options to evaluate when setting targets. Displacement of activities should take into account multiple socio-economic factors.
51. The Meeting also noted that there might be a need to evaluate the currently used techniques at sea. Especially for cable laying, there seems to be a lack of implementation of BAT in the Baltic area.

Recommendations from the workshop

- The term “maximum allowable pressure” is not entirely accurate, as it should also consider the aspects of maximum allowable extent of adverse effects as indicated in the sea-floor related criteria in the revised EU Commission Decision.
- Environmental targets should be set per habitat type. The broad habitats (EUNIS 2) may not be the sufficient level of detail for some habitats which are (directly or indirectly) targeted by human activities. Hence, more detailed habitats types and hot spot habitats (such as functional habitats) should be considered.

- Assessments and environmental targets do not need to have the same scale. The scale of environmental target may depend on the distribution of the habitat type.
- Environmental targets should consider spatial extent (area of minor or no pressure), pressure intensity (e.g. limits for pressures) and connectivity of unaffected features. This would result in a suite of zones (no pressure, intermediate pressure, maximal use), which should be spatially allocated based on connectivity and taking into account maritime spatial planning.
- Technical management measures to achieve maximum allowable pressure goals could also include technological advances such as less damaging gear types or protective measures of various kind (spatial/temporal protection).

Outcomes of the project

52. The draft final report from the project to the EC is due in January 15 and further comments from the EC could lead to a revision which will be completed by February 14. Project partners are invited to provide timely inputs to the coordinators in order to compile a harmonized report.
53. A comprehensive report of the activities undertaken under Theme 3, and of the main outcomes of the project, will be prepared. The main output of WP 3.1 will be a document on the guidelines for environmental targets and the main output of WP 3.2 will be the fisheries impact evaluation tool.
54. All case studies will be annexed to the report and further work on summarizing case studies and identifying thresholds should be finalized by the end of the year in order to meet the reporting deadline.
55. The full report, the outputs and a summary of the case studies will also be published electronically on the HELCOM website.
56. The outputs of the project can be proposed for the use and endorsement by relevant HELCOM groups (e.g. the FIT tool for endorsement by FISH). The outputs of the FIT tool, i.e. spatial maps of fisheries and impacts, could be hosted on the HELCOM Map Service.

Any other business

57. The ICES Secretariat informed that continued synergies should be worked upon in order to integrate the outputs of BalticBOOST in ongoing processes within the ICES community. Communication and coordination will be ensured through a series of workshops with open participation, of which the Meeting participants will be informed.

Annex 1 – Workshop Agenda

Monday November 28	
13:00-16:00	**Setting the scene:** - Arrival, words of welcome and practicalities, - Short introduction to the HELCOM 2nd Holistic Assessment process, the BalticBOOST project and its Theme 3. **Test cases of the BalticBOOST Theme 3:** - Effects of fishery on benthic habitats; - What is the basis for environmental targets for fishery pressures affecting benthic habitats?
16.00-16.20	- *Coffee break*
16.20-18.00	**Test cases of the BalticBOOST Theme 3 (continued)** - Effects of other sea-floor disturbance on benthic habitats; - What is the basis for environmental targets for other activities affecting benthic habitats?
Tuesday November 29	-
9:00-11.00	**Comparing pressure magnitudes and effect levels from different human activities:** - Data-based comparison from the case studies; - Literature-based comparison.
11.00-12.30	**Draft guidelines for setting environmental targets** - Presentation of proposed guidelines for setting environmental targets for pressures affecting the benthic habitats - Discussion on most relevant pressures for setting environmental targets
12:30-13:30	*Lunch break*
13:30-16:30	**Draft guidelines for setting environmental targets; continued** - Discussion on relevant scale for setting environmental targets - Further development of guidelines for setting environmental targets. **Wrap up** **Any other business**
16:30	*Meeting ends*

Annex 2 – Participant list

Representing	Name	Organization	Email address
Chair			
	Samuli Korpinen	Finnish Environment Institute	samuli.korpinen@ymparisto.fi
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Annex 3 - Outcomes of the workgroups discussions

Group 1

The workgroup focused on validating the predictions from the model based on longevity.

The group checked, in particular:

- That the pressure layer from fishing used in the model is reasonable, as fishing pressure largely drives the results (impacts) predicted by the model.
- That the distribution of communities in Gogina et al. 2016 corresponds to the communities sampled in the Swedish case studies
- That the results of the modelled approach are comparable to the results from the test case by comparing community traits and their distance from the reference states

The group concluded that:

Even though there are indications that sensitivities can vary seasonally, ultimately the project will not be able to define meaningful seasonal sensitivities.

Average fishing intensity, calculated on a period of 1 year, is consistent with assessment needs and that it is a reasonable compromise for the needs and purposes of the project. There was a promising correspondence between average fishing pressure over 6 years on a broad scale and locally and temporally detailed fishing pressure (250m radius, 4 years timespan accounting for decrease of temporal effects) in the case study from Gotland, Sweden. The quantitative modelled approach and the data from the field are consistent with each other, but further validation is warranted to compare directly the longevity composition of the modelled and data driven approach.

Group 2

The group found out that Swedish case studies showed a significant negative relationship between fishing intensity and species numbers for both years in Gotland. The significant result is based on an analysis of values from zero to quite high fishing intensity but when plotting the non-linear relationship an effect seem to occur already at low levels of fishing. The number of data points is however low, therefore it was not possible to reach a conclusion during the discussion on what is a threshold value at which fisheries causes a degradation of seabed habitats.

DTU Aqua will also try to compose a figure of density and species richness, per EUNIS level 3 habitats, along a gradient of fishing pressure with the objective to define a threshold.

The group concluded that analyses should focus on stations at greater depths, as there are few fishing activities occurring at shallower depths where other activities occur.

Resuspension was discussed and it was noted that fishing-caused resuspension is taking place mainly on soft bottom. More test cases could help address this and a model developed in Scotland could guide future work on fisheries-siltation linkages.

Models to be developed in the future should use also richness and density in combination with longevity to improve the sensitivity estimates by accounting for more parameters. Another alternative is to exclude bivalves (or analyse them separately) from future analysis in order to limit the shortcomings of the longevity assumptions (100% mortality).