Draft Progress Report 3 July 2014

Olivia Langmead (MBA)

Task 2.1 Identification of species and species attributes information

This task identifies the species which are protected by EU Directives and international conventions, and also those to be used as indicators of relevant MSFD descriptors. The focus of the activity to date has been on the MSFD element of this work as it was quickly discovered that the Pan-European Species directories Infrastructure (PESI) project (http://www.eu-nomen.eu/portal/search.php?search=adv) already contains much of this information for older legislation, notably:

- CITES;
- Habitats Directive;
- Birds Directive;
- OSPAR; and
- IUCN.

However, identification of species that will comprise indicators or components of indicators for the MSFD is a large and complex task in itself. The MSFD has 11 descriptors, of which it was decided early on to focus on the biodiversity descriptors together with commercial fish and non-indigenous species. Thus the descriptors being addressed in this task are:

- Descriptor 1: biological diversity;
- Descriptor 2: Non –indigenous species;
- Descriptor 3: Population of commercial fish and shellfish;
- Descriptor 4: Elements of marine food webs; and
- Descriptor 6: Sea floor integrity.

Of these the most emphasis initially was on descriptors 1, 4 and 6, but contacts have now been identified and contacted for descriptors 2 and 3.

Work was focussed on gathering information both at a Regional Seas scale i.e. identifying species that were linked to indicators that were agreed between member states through a regional process via the regional seas commissions.

Some of the regional seas are subdivided into subregions, namely the North-East Atlantic and Mediterranean Seas, while the Baltic and Black Seas are not divided into subregions (Fig X):

North-east Atlantic

- Greater North Sea including the Kattegat, and the English Channel
- Celtic Seas
- Bay of Biscay and Iberian Coast
- Macaronesian biogeographic region (waters surrounding the Azores, Madeira and the Canary Islands)

Baltic Sea

Mediterranean Sea

- Western Mediterranean Sea
- Adriatic Sea
- Ionian Sea and the Central Mediterranean Sea
- Aegean-Levantine Sea

Black Sea

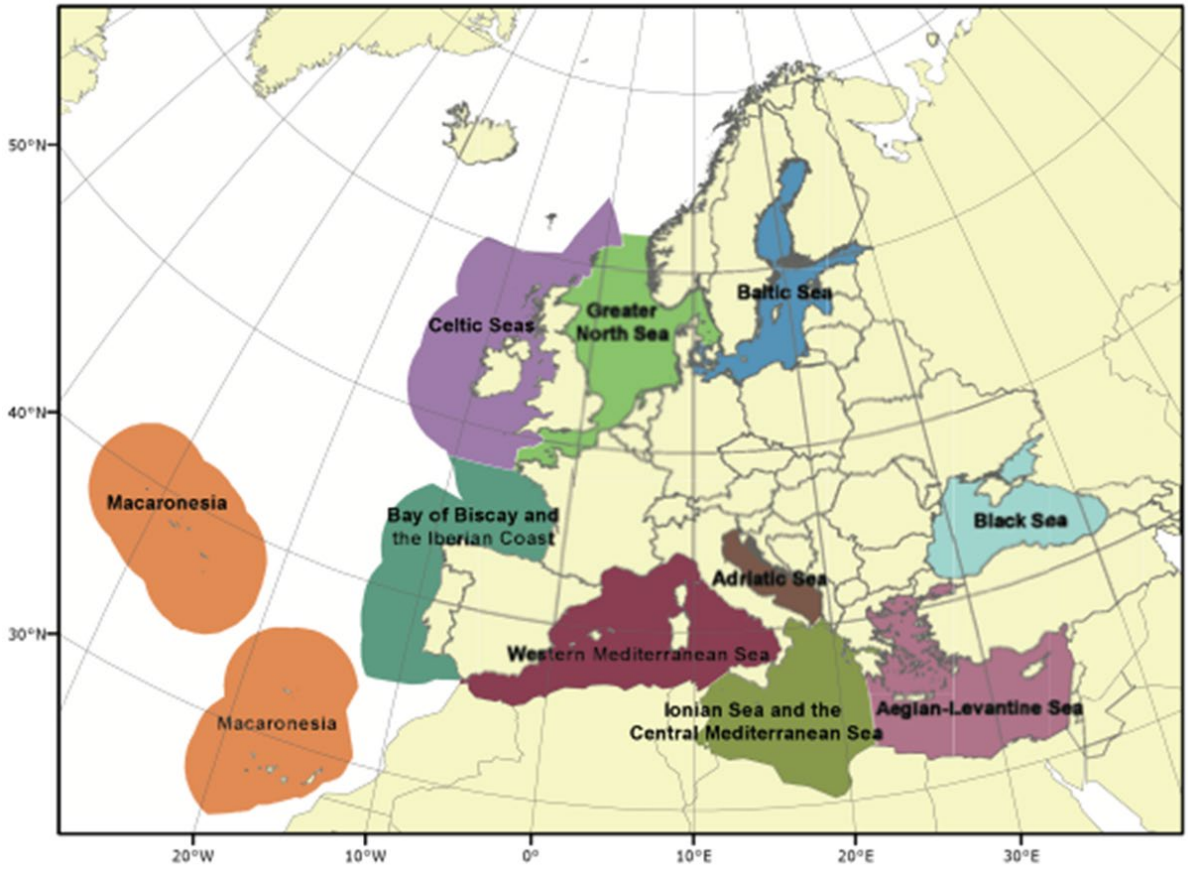

Figure X. Map of the regional seas and subregions defined within the MSFD.

While the most emphasis has been placed on the OSPAR region since this appears to be furthest forward in the process, contact has also been made with the MSFD leads in the other regional seas commissions to

1) identify at what stage in the process they are at

2) ask for lists of agreed indicators.

It is important to also mention that each member state selected indicators and submitted these to the European Commission in July 2012. Many of these indicators have not been adopted at the regional level but are may possibly be valid and potentially will be used by the member state to assess good environmental status within their EEZ.

North-east Atlantic

Within the OSPAR area, MSFD indicator development has been through ICG-COBAM. Of the indicators put forward by member states in 2013, a list of Common and Candidate Indicators has been defined (September 2013, updated April 2014). Common indicators are those adopted either 1) OSPAR wide (regions II, III and IV) or 2) adopted in one or more indicated OSPAR regions. Candidate indicators are still in development and amongst these there are priority indicators and those that are not priority.

Subregions and how they correspond with OSPAR regions:

- Greater North Sea – OSPAR region II
- Celtic Seas – OSPAR region III
- Bay of Biscay and Iberian Coast – OSPAR region IV
- Macaronesia – not included here as information not yet available

The OSPAR list of common and candidate indicators was used to devise a framework for collating information on the policy relevant species (ref spreadsheet). The main body of the work has been to resolve group indicators to species level. For example some indicators concern seabirds, and only after correspondence with the COBAM lead has information been gained on exactly which seabird species this concerns. Also as different indicators are at various stages in their development, it may be that the indicative lists collated here change slightly in the future, and the species lists targeted by indicators in development may become resolved (e.g. NIS)

Descriptor 1 – Biological diversity

D1 has been subdivided into species indicators and habitats indicators and then further categorised as below:

Species indicators

- Mammals (cetaceans & seals)
- Birds (seabirds, wading birds & waterfowl)
- Fish and cephalopods

Habitats indicators

- Benthic habitats (rocky and biogenic reef and sedimentary)
- Pelagic habitats

Each indicator group has several indicators that have been included in the list of common and candidate indicators – some of which are common indicators, some candidates and some priority indicators, showing the different stages of development of these indicators. Most of these groups have a lead scientist who is responsible for the development of the indicators for the group, but not all. Notably benthic habitats do not have a lead. Contact has been made with each of the group

leads to determine for which indicators target species lists are available, or if these have not yet been agreed, indicative lists have been requested.

Table X. Biodiversity indicators (Source: OSPAR Common and Candidate Indicators: updates reported to ICG MSFD April 2014)

Indicator name	Indicator title	Priority indicator	Common indicator (subregions)	Likely to deliver to 2017*	Possible to resolve to target species?	Target species (T) or indicative (I) obtained	comments
D1 Mammals 1	Distribution seals	N					Not priority
D1 Mammals 2	Distribution cetaceans		II				Incorporated into M4. Removed.
D1 Mammals 3	Abundance of seals	Y	II	Y	Y	T	
D1 Mammals 4	Abundance of cetaceans	Y	II	Y	Y	I	These have to be agreed by CPs in early 2015
D1 Mammals 5	Seal pup production	Y	II	Y	Y	T	
D1 Mammals 6	Mammals bycatch	Y	II	N	Y	I	Overlap with CFP is delaying development, indicative species likely to remain unconfirmed until after 2017.
D1 Birds 1	Abundance of marine birds	Y	II (proposal to include III)	M	Y	I	These have to be agreed by CPS in early 2015
D1 Birds 2	Breeding success of kittiwake	N	Possibly III	Y	Y	T	
D1 Birds 3	Breeding status of marine birds	Y	Proposal to common in II and II	M	Y		No lists obtained to date, reflecting status of indicator development
D1 Birds 4	Non-native/invasive mammal presence on island seabird colonies	N					Not priority indicator
D1 Birds 5	Marine bird bycatch	N					Not priority indicator

D1 Birds 6	Distribution marine birds	N	II	M/N			May be demoted to candidate indicator due to lack of progress in development – will be decided 2015
D1 Fish Ceph 1	Abundance fish	Y	II, III	Y	Y		No information gathered on this indicator to date
D1 Fish Ceph 2	Proportion of large fish (large fish index)	Y	II, III	Y	Y	T	Also species list received for Bay of Biscay although not common there yet
D1 Fish Ceph 3	Mean maximum length of demersal fish and elasmobranchs	Y		Y	Y		No information to date although has been applied and tested in regions II, II & IV.
D1 Fish Ceph 4	Bycatch rates of Chondrichthyes	N					Not a priority indicator
D1 Fish Ceph 5	Conservation status of elasmobranch and demersal bony fish species (IUCN)						Not a priority indicator
D1 Fish Ceph 6	Proportion of mature fish						Not a priority indicator
D1 Fish Ceph 7	Distributional range of fish						Not a priority indicator
D1 Fish Ceph 8	Distributional pattern of fish						Not a priority indicator
D1 Bent Hab 1	Typical species composition	Y		M	Y		No species lists available reflecting development status of indicator
D1 Bent Hab 2	Multi-metric indices	Y	II, III & IV	M	N		Not possible to resolve to target species
D1 Bent Hab 3	Physical damage of predominant and special habitats	Y		M	Y		In development – testing will be complete by end 2014.

D1 Bent Hab 4	Area of habitat loss	Y		N			Delayed development, may not be possible to resolve to species.
D1 Bent Hab 5	Size frequency distribution of bivalve or other sensitive/indicator species	N					Not priority indicator
D1 Pel Hab 1	Changes of plankton functional types (life form) index ratio	Y	III & IV	M	Y		Indicative lists will be available August 2014
D1 Pel Hab 2	Plankton biomass and/or abundance	N	II	Y	N		Not possible to resolve to species level
D1 Pel Hab 3	Changes in biodiversity index(s)	N	IV	Y	N		Not possible to resolve to species level

*this indicates the level of development needed – Y = yes, M = maybe, N = no.

Mammals currently has six indicators, of which four are priority indicators and common in at last one subregion. One indicator has candidate status and is not a priority (D1 Mammals 1 – Distribution of seals). D1 Mammals 2 – Distribution of cetaceans has been combined with D1 Mammals 4 – Abundance of cetaceans. Details of indicative target species lists have been obtained for the four priority indicators: D1 Mammals 3 – Abundance of seals; D1 Mammals 4 – Abundance of cetaceans; D1 Mammals 5 – Seal pup production; and D1 Mammals 6 – Mammals bycatch. However the latter indicator is unlikely to deliver to the 2017 assessment. This is because an identical process of indicator development is being undertaken within the EU Common Fisheries Policy, which is outside the influence of OSPAR. Technical specifications between the MSFD indicator and the CFP indicator for mammals bycatch may differ and this requires resolution before this indicator can be progressed.

Birds also currently has six indicators, but of these only two of these are common indicators in at least one OSPAR subregion. These are D1 Birds 1 – Abundance of marine birds and D1 Birds 6 – Distribution of marine birds. However the latter indicator is not a priority and as such may not be included in 2017 assessments. There is a further priority indicator: D1 Birds 3 Breeding status of marine birds which is proposed as common to OSPAR region II Greater North Sea, and may deliver to the 2017 assessment. Indicative target species lists have only been received for D1 Birds 1, since the other two developing indicators have not yet been resolved to identify target species at the current time. A further indicator D1 Birds 2 – Breeding success of kittiwake may become common to one subregion but is not a priority indicator. It has been included in the assessment since it obviously targets only one species and may become operational and deliver to the 2017 assessment.

Fish and cephalopods currently comprises seven indicators, of which two are common indicators in both the Celtic Seas and Greater North Sea: D1 Fish Ceph 1 – Abundance of fish and D1 Fish Ceph 2 – Proportion of large fish (large fish index (LFI)). In addition a further candidate indicator has priority status: D1 Fish Ceph 3 – Mean maximum length of demersal fish and elasmobranchs. To date information on the fish species targeted by these indicators has only been received for D1 Fish Ceph 2 – LFI, but this has been obtained for the Greater North Sea, Celtic Seas and Bay of Biscay (the latter is not a common subregion yet). In addition this indicator overlaps with D4 Foodweb 3.

Benthic habitats currently has one common indicator (common to all OSPAR areas): D1 Bent Hab 2 – Multi-metric indices. This is a very difficult indicator to resolve to species level as this comprises biotic indices such as the AMBI index which can be applied to any biological community and categories species assemblages into functional groups. As such it does not specifically target any species, rather all species present. In addition two further indicators are considered priority: D1 Bent Hab 1 – Typical species composition and D1 Bent Hab 3 – Physical damage of predominant and special habitats. Both are currently in development and may deliver to the 2017 assessment. It is clear though that it would be possible to resolve these to species level, once the indicators have been developed and tested. A further indicator D1 Bent Hab 4 – Area of habitat loss, although it is a priority indicator, will not delivery to the 2017 assessment. Thus to date no species targeted by benthic habitats have been included in the spreadsheet.

Pelagic habitats currently has three indicators, all of which are common in at least one subregion: D1 Pel Hab 1 – changes of plankton functional types (lifeform) index ratio; D1 Pel Hab 2 – Plankton biomass and/or abundance; and Pel Hab 3- Changes in biodiversity indices. Of these, only one is

suitable for inclusion since it is possible to resolve to species level and this is the first of these indicators. However, this work has not yet been completed but will be included here when available (McQuatters-Gollop ICG-COBAM pelagic habitats lead, pers. comm. July 2014).

Descriptor 2 – Non-indigenous species

Development of the D2 indicators is some way behind the biodiversity indicators. The original two D2 indicators (D2 NIS 1 - Pathways management measures and D2 NIS 2 - Rate of new introductions of NIS) have been combined into D2 NIS 3. Currently the target species lists have not been resolved but are likely to be by December 2014. The approaches for identifying target species have not been identified yet either, and may follow either 1) the GB Non-Native Species Secretariat (GB NNSS)[1] approach or 2) HELCOM/OSPAR ballast water approaches, or alternatively neither approach may be used and MSFD specific methods will be developed (Paul Stebbing, D2 COBAM lead, pers. comm. July 2012).

Descriptor 3 - Commercially exploited fish and shellfish

D3 – commercial fish species in the OSPAR area is heavily dependent on the Common Fisheries Policy (CFP) reporting framework, the Data Collation Framework (DCF).

Descriptor 4 - Foodwebs

There is considerable overlap between the biodiversity indicators and those proposed for foodwebs: in fact the two common indicators with priority status are both also D1 indicators. These are D4 Foodweb – Size composition in fish communities (LFI) which is the same as D1 Fish Ceph 2, and D4 Foodweb 5 – Change in plankton functional types which is the same as D1 Pel Hab 1. (although many of these overlap with D1 indicators). None of the other indicators proposed for foodwebs are likely to contribute to the 2017 assessment aside from D4 Foodweb 4 – Changes in average trophic level of marine predators (cf MTI).

[1] http://www.nonnativespecies.org/home/index.cfm

Table X. Food web indicators (Source: OSPAR Common and Candidate Indicators: updates reported to ICG MSFD April 2014)

Indicator name	Indicator title	Priority indicator	Common indicator (subregions)	Likely to deliver to 2017*	Possible to resolve to target species?	Target species (T) or indicative (I) obtained	comments
D4 Foodweb 1	Reproductive success of marine birds in relation to food availability	N					Not priority indicator
D4 Foodweb 2	Production of phytoplankton	N					Not priority indicator
D4 Foodweb 3	Size composition in fish communities	Y	III	Y	Y	I	Same as D1 Fish Ceph 2 (uncertain why subregions are different though)
D4 Foodweb 4	Changes in average trophic level of marine predators (cf MTI)	N	Proposed to promote to common in region IV	Y	Y		Indicator in development, no target species lists available
D4 Foodweb 5	Change in functional plankton types	Y		M	Y		Same as D1 Pel Hab 1 – see previous table
D4 Foodweb 6	Biomass, species composition and spatial distribution of zooplankton	N					Not priority indicator
D4 Foodweb 7	Fish biomass and abundance of dietary functional groups	N					Not priority indicator
D4 Foodweb 8	Biomass trophic spectrum	N					Not priority indicator
D4 Foodweb 9	Ecological Network Analysis (diversity)						Not priority indicator

Descriptor 6 – Seafloor integrity

Indicators are not required for seafloor integrity since this information is captured within the suite of indicators proposed for benthic habitats within Descriptor 1.

Baltic Sea

HELCOM have proposed the HELCOM core indicators to form the critical set of indicators that are needed to regularly assess the status of the Baltic Sea marine environment against targets that reflect good environmental status. These were designed with consideration of both the ecological objectives of the HELCOM Baltic Sea Action Plan and the qualitative descriptors and associated criteria of the MSFD. The indicators cover the Baltic Sea marine ecosystem, the main contaminants in it and address all the HELCOM ecological objectives and the MSFD qualitative descriptors for biodiversity, non-indigenous species, food web, sea-floor integrity and contaminants in the environment and seafood. HELCOM core indicators for descriptor 5 (Eutrophication) and Descriptor 3 (Commercially exploited stocks of fish and shellfish) were developed with eutrophication experts under HELCOM MONAS and ICES respectively.

The work in the CORESET project was divided into two expert groups: biodiversity and hazardous substances. Biodiversity was also subdivided into six teams who focussed on:

- Mammals
- Birds
- Fish
- Pelagic habitats (including associated communities)
- Seabed habitats (including associated communities)
- Non-indigenous species

The HELCOM core indicators do not exactly map onto the MSFD descriptors, criteria and indicators; many of the HELCOM core indicators cover multiple aspects e.g. Population growth rate, abundance and distribution of marine mammals clearly informs on all three species level criteria (1.1 Species distribution, 1.2 Population size and 1.3 Population condition).

Descriptor 1 – Biodiversity

The HELCOM core indicators that inform on the MSFD Descriptor 1 Biodiversity are shown in the table below. All of the species level indicators have been resolved to species by the HELCOM expert groups, though in one case it is likely that the list of species will increase with further development of the indicator (Abundance of waterbirds in the breeding season). The HELCOM core indicator *Extent, distribution and condition of benthic biotopes* was not possible to readily resolve to species level and is not included in the spreadsheet. Also there are no species associated with the HELCOM core indicator *Lower depth distribution limit of macrophyte species* because detail on the indicator was not available.

Table X. Comparison of the proposed HELCOM core indicators with the Descriptor 1 Biodiversity indicators of the EC Decision 477/2010/EC (Source: HELCOM 2013)

MSFD Criteria	Proposed MSFD Indicator	Proposed HELCOM core indicators
Species level		
1.1 Species distribution	Distributional range	Population growth rate, abundance and distribution of marine mammals
	Distributional pattern	
	Area covered by the species	
1.2 Population size	Abundance	Population growth rate, abundance and distribution of marine mammals Abundance of salmon spawners and smolt Abundance of sea trout spawners and parr Abundance of waterbirds in the wintering season Abundance of waterbirds in the breeding season
	Biomass	Abundance of key fish species Abundance of fish key functional groups
1.3 Population condition	Population demographic characteristics	Pregnancy rate of marine mammals Nutritional status of seals White-tailed eagle productivity
Habitat level (including associated communities)		
1.4 Habitat distribution	Distributional range	Extent, distribution and condition of benthic biotopes
	Distributional pattern	
1.5 Habitat extent	Habitat area	Extent, distribution and condition of benthic biotopes Lower depth distribution limit of macrophyte species
	Habitat volume	
1.6 Habitat condition	Condition of typical species and communities	Population structure of long-lived macrozoobenthic species Extent, distribution and condition of benthic biotopes
	Relative abundance and/or biomass	
	Physical, hydrological and chemical conditions	
Ecosystem level		
1.7 Ecosystem structure	Ecosystem structure: composition and relative proportions of ecosystem components	

<u>Descriptor 2 – Non-indigenous species</u>

The HELCOM core indicators include *Trends in arrival of new non-indigenous species*, which is not possible to resolve to species level at this time. In addition there are a number of Baltic Sea Environment Fact Sheets that contribute to this descriptor. Some of these are related to the abundance and distribution of particular species (Zebra mussel, Marenzelleria worms (3 congeneric species) and Round goby), while others do not define species (*Observed non-indigenous and cryptogenic species in the Baltic Sea*).

Table X. Comparison of the proposed HELCOM core indicators with the Descriptor 2 Non-indigenous species indicators of the EC Decision 477/2010/EC (Source: HELCOM 2013)

MSFD Criteria	Proposed MSFD Indicator	Proposed HELCOM core indicators
2.1 Abundance and state characterisation of non-indigenous species, in particular invasive species	Trends in abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly invasive non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading such species	Trends in arrival of new non-indigenous species Abundance and distribution of the Zebra mussel (Dreissena polymorpha) Abundance and distribution of Marenzelleria species in the Baltic Sea
2.2 Environmental impact of invasive non-indigenous species	Ratio between invasive non-indigenous species and native species in some well-studied taxonomic groups (e.g. fish, macroalgae, molluscs) that may provide a measure of change in species composition (e.g. further to the displacement of native species)	Observed non-indigenous and cryptogenic species in the Baltic Sea
	Impacts of non-indigenous invasive species at the level of species, habitats and ecosystem, where feasible	Biopollution level index

Descriptor 3 - Commercially exploited fish and shellfish

[to follow]

Descriptor 4 – Food webs

Of the HELCOM core indicators that can inform on Descriptor 4 – Foodwebs, many are also indicators of biodiversity (those informing on 4.1). In addition though there is an indicator on the *Proportion of large fish in the community* and *Abundance of fish key functional groups*. The indicator on *Zooplankton mean size and total abundance* could not be resolved to species level.

Table X. Comparison of the proposed HELCOM core indicators with the Descriptor 4 Foodwebs indicators of the EC Decision 477/2010/EC (Source: HELCOM 2013)

MSFD Criteria	Proposed MSFD Indicator	Proposed HELCOM core indicators
4.1 Productivity of key species or trophic groups	Performance of key predator species (mammals, seabirds) using their production per unit biomass (productivity)	Population growth rate, abundance and distribution of marine mammals White-tailed eagle productivity Abundance of salmon spawners and smolt Abundance of sea trout spawners and parr
4.2 Proportion of selection species at the top of food webs	Large fish (by weight)	Proportion of large fish in the community (by length)
4.3	Abundance trends of	Abundance of fish key functional groups

Abundance/distribution of key trophic groups and species	functionally important selected key trophic groups/species	Zooplankon mean size and total abundance

Descriptor 6 – Seafloor integrity

There are six HELCOM core indicators proposed to inform on MSFD Descriptor 6 – Seafloor integrity. Out of these 6, only two can be resolved to species level since the others either concern habitats or are based on multi-metric indices. However the indicator *Population structure of long-lived macrobenthic species* can inform on both MSFD 6.2.3 and 6.2.4 (Proportion of biomass or number of individuals in macrobenthos above some specified length/size and Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community, respectively). Incidentally these are also able to inform on Descriptor 1 Biodiversity habitat level indicators as well.

Table X. Comparison of the proposed HELCOM core indicators with the Descriptor 6 Seafloor integrity indicators of the EC Decision 477/2010/EC (Source: HELCOM 2013)

MSFD Criteria	Proposed MSFD Indicator	Proposed HELCOM core indicators
6.1 Physical damage, having regard to substrate characteristics	Type, biomass and areal extent of relevant biogenic substrate	Extent, distribution and condition of benthic biotopes
	Extent of the seabed significantly affected by human activities for the different substrate types	Cumulative impacts on benthic biotopes
6.2 Condition of the benthic community	Presence of particularly sensitivity and/or tolerant species	A parameter embedded in the indicator 'State of the soft-bottom macrofauna communities'
	Multi-metric indices assessing benthic community condition and functionality, such as species diversity and richness, proportion of opportunistic to sensitive species	State of the soft-bottom macrofauna communities
	Proportion of biomass or number of individuals in macrobenthos above some specified length/size	Population structure of long-lived macrobenthic species
	Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community	Population structure of long-lived macrobenthic species

Mediterranean Sea

[to be completed but no indicators available yet – but detail on process, approach and timeline will follow]

Black Sea

[to be completed but no indicators available yet – but detail on process, approach and timeline will follow]

Timescale for incorporation of more information

North-east Atlantic

- D1 - Biodiversity
    - Mammals – complete
    - Birds – indicative list for D1 Birds 3 to follow – unsure of timescale
    - Fish and Cephalopods – awating species lists for D1 Fish Ceph 1 (mid July) & possibly 3 (not sure when)
    - Benthic habitats – can start to resolve 'special' habitats to characterising species and add to database for D1 Bent Hab 3 (end July), have new contact to follow up for D1 Bent Hab 4 – may get species list
    - Pelagic habitats – species list for D1 Pel Hab 1 (=D4 Foodweb 5) available end of July
- D2 - Non-indigenous species
    - Species list for D2 - NIS 3 may be available by December 2014
- D3 - Commercially targeted fish and shellfish
    - Species lists will to reflect CFP reporting through DCF – available now
- D4 – Foodwebs
    - See Pelagic habitats
- D6 – Seafloor integrity
    - See Benthic habitats

Baltic

- D1 – Biodiversity
    - need information on species used in 'Lower depth distribution limit of macrophyte species' HELCOM core indicator
- D2 – Non-indigenous species – need to follow up on HELCOM biopollution index
- D3 – Commercially targeted fish and shellfish – to be completed – unsure about status of information
- D4 – Food webs – complete
- D6 – Seafloor integrity - complete

Mediterranean

- Need to get an update on the status of the process – it is unlikely that any indicators are sufficiently developed to include species here

Black Sea

- Need get an update on the status of process – it is unlikely that any indicators are sufficiently developed to include species here. However there are species that are regionally agreed as conservation priorities (e.g. through BS Biodiversity Protocol) and these can be included in spreadsheets under 'other legislation' (and are likely to be included in MSFD indicators).

References

[to be completed]