The Healthy Biologically Diverse Seas Evidence Group response to the UK Technical Advisory Group Consultation on the Water Framework Directive Proposed recommendations on biological standards, December 2012.

General comments:

The Healthy Biological Diverse Seas Evidence Group welcomes the opportunity to comment upon the Revised Biological Method Statements for the Water Framework Directive. The standards therein represent an important milestone toward assessing the achievement of Healthy Biologically Diverse Seas in our inshore and estuarine waters. We would like to acknowledge the large amount of work that has been put in to the development of these tools, defining status class boundaries and metrics to calculate 'confidence of class' undertaken by the competent authorities; the Environment Agency, the Scottish Environmental Protection Agency and the Northern Ireland Environment Agency.

As well as providing assessment tools that allow us, in part, to assess the government vision in estuarine and near shore coastal waters, these tools also have significant relevance to help us assess targets and objectives for a range of other legislation such as the Habitats and Species Directive and the Marine and Coastal Access Act. Whilst it is recognised that there may be many reasons relating both to the scale of assessment (e.g. water bodies for WFD and Special Areas Conservation for Habitats Directive) or the thresholds applied that may prevent them from being directly applicable (e.g. the good / moderate boundary may be insufficient to protect favourable condition), there should be a continued effort to ensure we assess the overall ecological status of our seas using a collective endeavour from the tools that have been developed for these different drivers. In particular many of the individual parameters collected under the WFD may be used directly to inform attributes of specific habitats or species especially where temporal trends in these parameters can be assessed over time. Some of the tools may also be useful for the Targets and Indicators of the Marine Strategy Framework Directive in coastal waters. HBDSEG will continue to support this integration.

A number of tools purport to provide a status assessment for a particular biological element. For example, when assessing benthic invertebrates, the tool relies upon soft sediments and ignores large tracts of hard and coarser substrates where anthropogenic pressures may be impacting upon benthic invertebrates. Another example is angiosperms where an intertidal tool is used to assess seagrass. Seagrasses are well known to inhabit large areas of soft sediments in the subtidal environment and by focussing on the intertidal there is potential to miss impacts in the subtidal environment where submerged seagrass are more susceptible to anthropogenic pressures such as nutrients and physical pressures such as fishing. In this regard, the current set of tools provide status assessments that are limited by the habitats in which they are applied and also in some cases, such as the benthic invertebrate tools, they lack a spatial context with which to judge the significance of some pressures e.g. physical pressures. This should be acknowledged in the standards and gaps clearly identified. This will help inform further research and

development needs. Further work should be considered to see how the current assessment methods could be broadened out to ensure a more complete assessment of status is carried out in a given water body.

The links between the WFD Marine Task Team and HBDSEG need to be strengthened to ensure that WFD tools are integrated with other drivers. This is now recognised as a key work area for HBDSEG and we will continue to work with the MTT. This response is the first step to assist with this integration.

Comments on the general Consultation Document: proposed recommendations on biological standards

Section 2.3 (p10) Coastal Waters; Overview

Table: Benthic Invertebrates
As an overview of the current methods the summary table is fine but for benthic invertebrates the assessment tools are clearly skewed toward chemical contamination and whilst smothering is included the physical impact of important pressures in coastal waters are not acknowledged such as seabed fishing pressure, aggregate extraction, sediment dumping. These were all characterised pressures with water bodies shown as at risk of failing good status in the first River Basin Management Plans at least in England and Wales. What is being done to adapt the tools to assess these pressures?

Section 5.3 Coastal Waters: Benthic Invertebrates

Paragraph 1, sentence 2 suggests benthic invertebrates are largely sedentary and relatively long lived. "Largely" over-states the fact that benthic invertebrate life-spans are short compared to many vertebrate species and respond to short term perturbations e.g. quick change in community composition as a response to short disturbance events like oil spills (proliferation of short-lived opportunists). We suggest that this is re-worded to "some benthic invertebrates".

Page 37 Para1

This paragraph should acknowledge the gaps in the pressures being assessed by the current tools as they do not address spatial physical pressures and the impacts of fishing gear on the seabed in coastal waters.

Para 4

"Where a few taxa dominate, this indicates that the invertebrate community has been disturbed." This is not necessarily true. Healthy communities can be biomass dominated by large, long-lived sensitive species. Disturbed communities can be numerically dominated by small, opportunistic species (ABC curves in the Warwick and Clarke literature). A definition is needed here about what type of dominance the text refers to.

Section 6.4 Estuaries benthic invertebrates

Page 43 Para 1

This paragraph should acknowledge the gaps in the pressures being assessed by the current tools as they do not address spatial physical pressures and the impacts of fishing gear on the seabed in estuarine waters (the latter is not expected to be widespread in estuaries but some of the larger estuaries will have some pressure).

The following are more specific comments relating to the biological method statements.

Annex 15 Transitional and coastal waters Macroalgae, Opportunistic macroalgal blooming tool

Overall HBDSEG concluded that this tool is well written and thought through supported by a significant amount of research and development work.

Our detailed comments are as follows:

Section 1.1 Tool Overview:

List of 5 metrics – points (iii) & (iv) suggest need to say 'biomass of opportunistic macroalgae within AIH / AA'.

Section 1.2 Applicability: When: 'the maximum growth period' should be defined, typically how wide is this window from point of peak extent?

Section 2.1 References for deleterious effects should be cited if available particularly in relation to changing the feeding behaviour of wading birds.

Section 2.3 Second paragraph in the section on Spatial Extent: This paragraph seems to be unclear – firstly it is not clear what threshold is being referred to in the first sentence. Secondly, the next sentence does not appear to follow from the first. That said the inclusion of the additional metric seems entirely sensible but the underpinning reasoning is not communicated very clearly.

Section 2.5 Class boundaries: page 7, 3rd paragraph. This paragraph is very helpful in describing the cover thresholds for the different status classes and how they were arrived at. However, it seems to fall short of a clear explanation for all thresholds – simply stating that 'thresholds for the levels of ecological quality are provided in Table 3.' This feels like a missed opportunity to explain the justification for all thresholds?

Table 3: Based on the wording in table 3, and perhaps not helped very much by the wording in section 2.3 highlighted above it is initially quite difficult to understand the difference between the metrics: '% cover of AIH' (which we understand to be quadrat derived based on information on page 14?) and 'AA/AIH (%)' which we understand to be considered at a larger scale? We suggest that the difference between these metrics needs to be better explained both in the text and where these 'shorthand' headings are used.

Figure 5: It would be helpful to better explain what is meant by 'two index' scores in this figure.

Annex 16 Transitional and coastal waters Angiosperms, Intertidal Seagrass

The WFD Intertidal Seagrass Tool is well researched and sets out a practical approach to providing a water-body level assessment of aquatic angiosperm cover. There is significant scope in applying the tool to assess favourable conservation status for SAC or MCZ features. Many of individual metrics in the tool are parallel to intertidal seagrass attributes listed in SAC favourable condition tables.

It is less clear why the tool cannot be used for subtidal seagrass and why WFD focuses attention in the intertidal when the subtidal seagrass may be subjected to significant pressure. This is a god example of where assessments for Habitats Directive and WFD could be brought together. For example Natural England has many subtidal beds to monitor, and such a tool would facilitate assessment. In doing so, issues such as reduced taxonomic composition in subtidal beds would have to be considered. HBDSEG recommends that the statutory nature organisations should assist in further tool development through collaborative surveys and data sharing so that the tool and resulting classifications for WFD could be applied to the subtidal environment.

It is a misconception that there are three *Zostera* species in the UK. Genetic analysis has shown that *Z. angustifolia* is not a separate species.

We agree that measuring extent and density are important but suggest the metrics chosen are very limited in their ability to measure the potential stressors of *Zostera* beds. It also, incorrectly, seems to mix density with % cover which are very different measures and are not linked in a simple linear way. A simple example is to look at two beds. Bed A could have 100% cover with 150 plants per square meter where the same number of plants in bed B may only represent 50% cover. The difference is that Bed A has plants with 4-5 leaves per plant and a mean maximum plant length of 80-100cms whereas Bed B has 2-3 leaves per plant and a mean maximum plant length of 20-30 cms. It would be helpful to describe how this source of variability has been considered in developing the tool. Monitoring of Z. noltii is usually by measuring extent and % cover as this is a short species with high plants counts per unit area. Monitoring of Z. marina beds can be done by % cover but in many studies is supplemented with a density count.

The reliance on extent within the tool could be considered to make it particularly sensitive to water bodies which only have small fragmented seagrass beds (e.g. the total area of all intertidal seagrass in the Orwell estuary in 2012 was only 0.36 ha). Would a situation where significant destruction (say due to development) of a small intertidal seagrass beds in an estuary lead to 5 years of Bad Status due to the rolling mean data set? Here the tool could have a disproportionate effect on the Ecological Status of the water body. As the use of the tool expands into non-surveillance water bodies through increasing use of third-party data, this may be an important consideration where minor patches of seagrass exist.

The tool does not include attributes that can assist in better understanding the health of the beds and potential responses to changes in turbidity, nutrient loading, sea level rise and changes in temperature. Measuring infection levels and epiphyte cover is considered helpful in addressing such questions and should be routinely recorded.

Annex 17 Transitional and coastal waters Angiosperms, Saltmarsh Index

Our main comments on this tool relate to the different zones. There are 5 zones identified, Pioneer/Spartina anglica/mid-low/high/reedbed. There is a note on page 7 that suggests not all of these may be present due to local morphological conditions, but it doesn't indicate what these may be, nor how the adjustment should be made? It would be helpful to clarify what information would this be based upon and how recently would vegetation data need to be to have confidence in the adjustment?

On page 8, where there is reference to the lack of NBN data for some locations, there is no reference to the use of data from the NVC surveys, which could provide a useful reference point. The NBN does not always have complete or up to date coverage, as it relies on volunteers and Local Recording Centres to input information. Will the competent authorities for WFD make it a requirement to submit records from this surveillance to the NBN?

We are also not sure how the dynamic changes that might happen in a saltmarsh will be addressed, especially in relation to Spartina anglica changes. Not all sites will have a Spartina zone, and we would usually say that is a good thing, but how would an absence of this zone be factored in and how would an expansion be assessed through the tool? There are also geographic variations to consider, with some areas experiencing die-back. It seems that some ecological interpretation of the classification is needed at the end of the process, based on known issues and background information at a site level and this should be expanded upon in the method statement of how to do this and what to consider. A plan to update the method statement to take account of this is needed.

As a means of obtaining information in a consistent way to help identify change and direction of change, the tool looks to be useful, though it is recognised that no classifications have yet been published and as such the tool is untested.

Annex 18 Transitional and coastal waters Invertebrates, IQI

In general we consider that the process is sound and provides a very useful tool for soft sediments. More specific comments are outlined below. In considering the join up of assessments for WFD and the Habitats Directive the WFD, the statutory nature organisations and WFD competent authorities should look to see how the power to detect change for WFD and for SAC / SSSI monitoring could be joined together in a more strategic way considering for example whether it would be appropriate to increase the power to detect change by a specific margin in these areas.

The reference point for Biological Assessment.

Normative definitions of each Biological Quality Element's (BQE) health are referenced against a minimally disturbed reference site. It is not clear from the document itself whether this is located within each Water Body, or is a derived reference condition. Can this be explained more clearly? If the former;

- How do the EA ensure that this represents a true highest level condition target?
- Is there a process to compare between water bodies?
- Will the EQR calculation allow for the possibility of a >1 score – i.e. to show the location of a site in better condition or improvement over time? Also with the lowest nominative definition of 'bad', this does not seem to allow recording that the habitat is either temporarily or permanently destroyed in a particular location. Is this a valid concern at this stage or is the element of overall biological resource picked up by cross- referencing with LiDAR, aerial analysis of feature extent? A clearer explanation of how/ whether this is calculated and reported would be helpful.

Accounting for Seasonal bias.

- Can the more information be provided on how seasonal bias calculations are applied to data collected out with the February – May inclusive period? In particular, statutory nature conservation bodies may wish to target infaunal surveys of coastal Special Protection Areas in October to ascertain food resource and projected carrying capacity/health of overwintering bird species. How would data collected in this period be used?

- It is known that some intertidal species are susceptible to prolonged winter cold periods (both in terms of local mortalities and in terms of increased burial depths during cold spells). How is the impact of seasonal variation minimised?

IQI sensitivity to different pressures.

The IQI is clearly aimed at assessing response to hazardous substances, organic enrichment and smothering.

- How will the competent authorities ascertain its effectiveness in picking up the impacts of for example recreational pressures (vehicular use – compaction), or fishing activities such as cockle harvesting, inter-tidal brown shrimp fisheries, etc?
- With a subset of contaminants/ pressures (identified as encompassing the majority of variability within the metric), being taken forward in the later calculations, is there not a risk that novel and new contaminants, which may have a more targeted effect, are missed?
- Is there a process by which the competent authorities test the impacts of new pollutants and can revise the key contaminants used if required? If for example a molluscicide was washed on to mudflats, how would the IQI pick these impacts up which would cover limited taxa?

Sampling strategy

The sample strategy (section 3.3) generally use single samples spread across suitable habitats. The text in this section appears imprecise and implies that multiple

samples from a single location, out with suitable habitats, may be acceptable on occasion.

- How is a suitable habitat more specifically defined so as to avoid collating samples from significantly different biological communities?
- Particle size samples are taken adjacent to each EQR sample – are these used to ensure that averaged EQR is calculated from as homogenous group of sites as possible?
- Is standardisation applied to samples from different salinity regimes? It may be that this is part of the IQI workbook, but we were unable to find this on the WFD UKTAG site as indicated.

Sample Analysis

As stated, the EQR is calculated at an individual sample level, and then averaged to provide an EQR for the water body as a whole. As also stated, this method will be unsuitable for heterogeneous sites (unless sample density is greatly increased), and more localised deleterious impacts, whilst detected at a specific sample location, may well be lost when reporting averaged water body EQR.

- How do the competent authorities ensure that localised impacts are picked up, and that sample specific EQR 'outliers' are investigated further?
- Power analysis is undertaken at the averaged EQR level. What mechanism is in place to quality assure this process? Is power analysis conducted after each water body survey, to refine the number of samples required for the next survey?
- If power analysis reveals that insufficient samples have been taken for a particular water body, how is this lower level of confidence reported & does this feed into a re-prioritisation for resurvey?
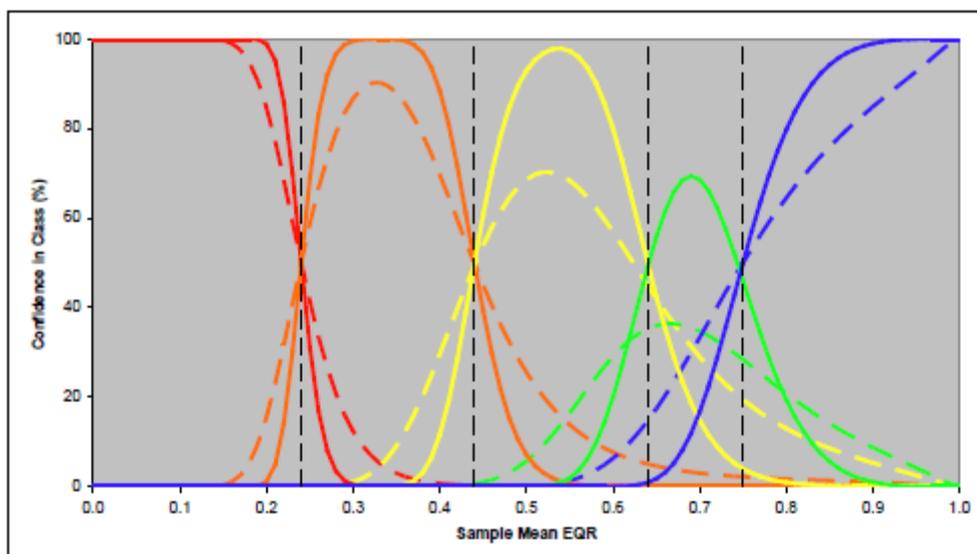

Fig. 7: The Confidence of Class (CofC) over the EQR scale for values based on 3 (dashed lines) and 15 samples (solid lines). Blue = CofC at high status, green = CofC at good status, yellow = CofC at moderate status, orange = CofC at poor status, Orange = CofC at poor status, Red = CofC at bad status.

In figure 7 (above), the bell-shaped confidence curves for each EQR class are skewed slightly to the left meaning that there is a higher statistical change of an EQR value (Risk of Miscalculation) being assigned to a higher class than to a lower class. Is there a reason for this approach? Would it not be more precautionary to err on the side of over-recording a poorer class?

References materials

Within the document, the IQI workbook was identified as a source of further explanation for assigning reference conditions etc – as this is not yet published – can the reference express this fact. Likewise with Philips *et al* 2012

Annex 20 Transitional waters Macroalgae, Fucoid Extent

Section 1.2 Applicability states that where there are known to be high levels of turbidity, this assessment may not be applicable. However, this is incongruous with the assumption in "Responses to Pressure" that any changes in fucoid levels are due to "a broad range of toxic substances…" which seems to ignore the possibility that changes may be the result of changes in turbidity? Coastal deforestation, industrialisation / urbanisation, and altered farming practices can all have impacts in estuarine turbidity as can dumping / aggregate extraction and construction. This possible explanation and impact should be included and in the same way salinity is an important supporting parameter so could be turbidity?

 Also in this section, it states that sampling can take place at any time of year. Fucoid extent can vary with seasons, especially at the margins. We would suggest it makes more sense to monitor in late spring / summer when fucoid extent is likely to be at its widest.

Section 2.1 lists the 4 fucoid species that might be present. We appreciate that it is not a fucoid, but it would be helpful to explain why the tool excludes Ascophyllum?

Annex 21 Transitional waters Fish, TFCI

Whilst some members of HBDSEG were interested in commenting on this tool none had been received by close of play on the 28th of February. HBDSEG would like to be able to table further comments once they are available but appreciate that the consultation is now closed.