APPENDIX G: South Coast Marine Aggregate Regional Environmental Assessment – Synthesis of RAG comments

<table>
<tr><th></th><th>Section</th><th>Issue</th><th>EMU Ltd. Response (Addendum 1)</th><th>Issue still outstanding? Yes / No and details</th><th>EMU Ltd. (Addendum 2)</th><th>Issues still outstanding? Yes/No and details</th><th>Needs to be addressed at EIA level/ REA level</th><th>Changes to final version</th></tr>
<tr><td colspan="9">Chapter 3. Methodology for Assessing Regional Cumulative and In-Combination Impacts</td></tr>
<tr><td>1</td><td>Chapter 3. Methodology for Assessing Regional Cumulative and In-Combination Impacts</td><td><u>Natural England Comment:</u> Predicting Effect Magnitude: Whilst it is acknowledged that the present method is subjective, it should be stated that in the absence of fully objective and quantitative methods to assess the magnitude of regional scale impacts there remains a level of uncertainty associated with the conclusions presented in the report.</td><td><u>EMU Response:</u> It is acknowledged that is important to establish the uncertainty in the data that are used to predict the magnitude of effects and the vulnerability of receptors, as the level of confidence in the decisions made on significance depend on it. There are three levels of uncertainty used within the MAREA, namely:
Low uncertainty: Interactions are well understood and documented. Predictions are modelled and maps based on interpretations are supported by a large volume of data. Information/data have very comprehensive spatial coverage/resolution;
Medium uncertainty: Interactions are understood with some documented evidence. Predictions are modelled but not validated and/or calibrated. Mapped outputs are supported by a moderate degree of evidence. Information/data have relatively moderate spatial coverage/resolution; and
High uncertainty: Interactions are poorly understood and not documented. Predictions are not modelled and maps are based on expert interpretation using little or no quantitative data. Information/data have poor spatial coverage/resolution.

The uncertainties associated with each assessment are reported within the relevant impact assessment chapters.
Table A3.1 below shows the overall magnitude categories determined for each of the effects of dredging. These magnitudes were taken forward into the impact assessment Chapters.

Table A3.1: Magnitude Categories for the Physical Effects of Dredging
<table>
<tr><th>Effect</th><th></th><th>Extent</th><th>Duration</th><th>Frequency</th><th>Magnitude</th></tr>
<tr><td>Seabed removal</td><td></td><td>Site specific</td><td>Medium term</td><td>Routine</td><td>Medium</td></tr>
<tr><td>Vessel Displacement</td><td></td><td>Site specific</td><td>Temporary</td><td>Routine</td><td>Low</td></tr>
<tr><td rowspan="2">Noise and vibration</td><td>Strong behavioural response</td><td>Site specific</td><td>Temporary</td><td>Routine</td><td>Low</td></tr>
<tr><td>Mild behavioural response</td><td>Local</td><td>Temporary</td><td>Routine</td><td>Low</td></tr>
<tr><td rowspan="3">Suspended plume</td><td>20 mg/l plume</td><td>Local</td><td>Temporary</td><td>Routine</td><td>Low</td></tr>
<tr><td>50 mg/l plume</td><td>Local</td><td>Temporary</td><td>Routine</td><td>Low</td></tr>
<tr><td>100 mg/l plume</td><td>Site specific</td><td>Temporary</td><td>Routine</td><td>Low</td></tr>
<tr><td rowspan="2">Fine sand dispersion</td><td>Bedforms</td><td>Local</td><td>Short term</td><td>Routine</td><td>Low</td></tr>
<tr><td>Changes to particle statistics</td><td>Local</td><td>Short term</td><td>Routine</td><td>Low</td></tr>
<tr><td>Bathymetry change</td><td></td><td>Site specific</td><td>Long term</td><td>Routine</td><td>Medium</td></tr>
<tr><td rowspan="2">Sediment flux</td><td>500-1000 kg/m/tide</td><td>Sub-regional</td><td>Long term</td><td>Routine</td><td>Medium</td></tr>
<tr><td>1000-3000 kg/m/tide</td><td>Local</td><td>Long term</td><td>Routine</td><td>Medium</td></tr>
<tr><td rowspan="2">Tidal currents</td><td>5-10% change</td><td>Local</td><td>Long term</td><td>Routine</td><td>Medium</td></tr>
<tr><td>10-15% change</td><td>Local</td><td>Long term</td><td>Routine</td><td>Medium</td></tr>
<tr><td rowspan="4">Waves</td><td>1 in 200 year > 5% change</td><td>Local</td><td>Long term</td><td>Rare</td><td>Low</td></tr>
<tr><td>1 in 200 year 2-5% change</td><td>Local</td><td>Long term</td><td>Rare</td><td>Low</td></tr>
<tr><td>5% exceedance > 5% change</td><td>Site specific</td><td>Long term</td><td>Occasional</td><td>Low</td></tr>
<tr><td>5% exceedance 2-5% change</td><td>Local</td><td>Long term</td><td>Occasional</td><td>Low</td></tr>
</table>
Determining the overall magnitude of an effect incorporates a degree of subjectivity as decisions are based on professional judgment and experience, although underpinned by a strong evidence-base.</td><td>Natural England response: The presentation of the vulnerability and magnitude of effect matrices, with an explanation of the various permutations/combinations does not appear to have been provided. Steve Freeman had agreed (at the 2nd Feb meeting) to present these matrices to enable transparency in peer-reviewing the significance determinations. This has not been presented. Therefore we require further clear explanation on how the ‘overall outcome’ values are determined at steps 2 and 5 in figure 3.3.

Whilst not disagreeing with the explanation provided in the response above, the SCDA & EMU has presented a figure of the magnitude determination matrices in the original draft MAREA and the limitations in this presentation have still not been presented. Until such time that they are, then it is very difficult for any external stakeholder to assess the validity of the determinations, or not.</td><td><u>EMU Response:</u> We propose the following text and Tables to be inserted within version 2 of the SC MAREA. The following relates to Section 3.2.5 of the current MAREA.

3.2.5 Step 5: Quantify ‘sensitivity of receptor’

Sensitivity of a receptor is defined by combining three variables: ‘tolerance’, ‘adaptability’, and ‘recoverability’ (Box 4 for definitions).

TOLERANCE is the ability to be either unaffected or affected (temporary and/or permanently) by the effects of dredging.

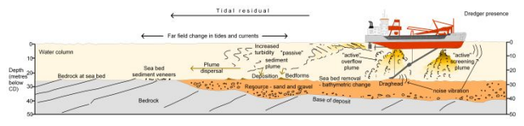
ADAPTABILITY refers to how well a receptor can avoid or adapt to an effect.

RECOVERABILITY has a temporal element that ranges from full recovery within less than a year to over ten years.

Sensitivity is the benchmark against which changes and levels of exposure can be compared to evaluate significance. Where scientific information is available, the sensitivity can be expressed numerically. When sensitivity is less well understood the assessment is based on scientific literature and professional judgement. Receptor sensitivity may change spatially. For example, suspended sediment concentrations associated with plumes are more concentrated closer to its source and so less likely to affect potentially sensitive receptors further away where concentrations are substantially reduced. Where possible, GIS was used to examine differences in magnitude for each effect and its spatial relationship to potential receptor sensitivities. The term ‘sensitivity of receptor’ provides an indication of the degree of change and is summarised in the sensitivity matrix B (see Figure 3:3).

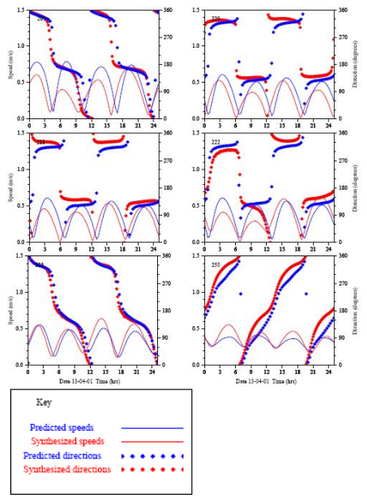
The outputs of the Sensitivity matrix (based on all possible Tolerance, Adaptability, and Recoverability combinations are presented in Table x.x below.

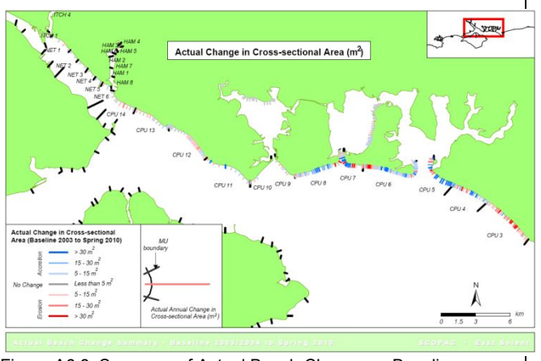
Table x.x Outputs of the Sensitivity matrix - based on all possible Tolerance, Adaptability and Recoverability combinations.
<table>
<tr><th>Tolerance</th><th>Adaptability</th><th>Recoverability</th><th>Overall Output</th></tr>
<tr><td>Low</td><td>Low</td><td>Low</td><td>Low</td></tr>
<tr><td>Low</td><td>Low</td><td>Medium</td><td>Low</td></tr>
<tr><td>Low</td><td>Medium</td><td>Low</td><td>Low</td></tr>
<tr><td>Low</td><td>Low</td><td>High</td><td>Medium</td></tr>
<tr><td>Low</td><td>High</td><td>Low</td><td>Medium</td></tr>
<tr><td>Low</td><td>Medium</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Low</td><td>Medium</td><td>High</td><td>Medium</td></tr>
<tr><td>Low</td><td>High</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Low</td><td>High</td><td>High</td><td>High</td></tr>
</table></td><td>English Heritage response: We note that a table has been provided detailing the outputs of the Sensitivity matrix - based on all possible tolerance, adaptability and recoverability combinations. It is our opinion that this additional information in conjunction with Table A3.1: ‘Magnitude Categories for the Physical Effects of Dredging’ in the original SC addendum (letter dated 30th May), provide the level of detail required to give confidence in the methodology that has been used to assign sensitivity and magnitude scores, and in reaching the final determinations of impact significance.</td><td>REA</td><td>Methodology chapter amended with Table 3.1 and 3.2 updated and relevance clarified.</td></tr>
</table>

					Medium Low Low Low Medium Low Medium Medium Medium Low High Medium Medium Medium Low Medium Medium High Low Medium Medium Medium Medium Medium Medium Medium High Medium Medium High Medium Medium Medium High High High High Low Low Medium High Low Medium Medium High Low High High High Medium Low Medium High High Low High High Medium Medium Medium High Medium High High High High Medium High High High High High It should be noted however that the outputs of the Sensitivity matrix may be modified by consideration of the Value of the receptor. The Value determination can therefore be used to aid expert judgement. The value of individual receptors is considered within the baseline sections and is used to inform the impact assessment as an integral part of sensitivity. Value is not standardised with other MAREA studies. For the south coast MAREA, value is defined as having three key components: Importance: Level of protection or threatened status and whether it provides an important ecosystem service (e.g. keystone species or important habitats for fish stocks); Rarity: Spatial extent relative to the potential area impacted, where <10% of its total area is impacted is considered Low, 10-50% Medium and >50% High. GIS is used to calculate the spatial extent of receptors (note: not all receptors are assessed in this way); and Worth: Considers receptors on basis of its socioeconomic, cultural and amenity value.			
Chapter 5. Potential Effects of Dredging: Conceptualisation								
2	**Figure 5.1**	**<u>Natural England Comment:</u>** Figure 5.1. The diagram shows physical effects on the environment from the dredging. It is not clear whether tidal residual and far field change in tides and currents are limited to the areas within the arrows in the diagram, there is a possibility of misleading readers into assuming that (for example) far field change in tides and	**<u>EMU Response:</u>** Figure 5.1 is a purely conceptual diagram designed to illustrate the physical effects on the environment as a result of the dredging process. The diagram is not intended to mislead readers into assuming that far field changes are bounded by the arrows on the diagram and therefore the figure has been amended to remove the horizontal scale and licence boundary for any future usage (Figure A5.1).  	**Natural England response:** Content that issue is addressed.	**<u>EMU Response:</u>** The revised conceptual Figure and additional information provided in RAG response 25th August 2011 will be used to update version 2 of the MAREA.	**Issue resolved**	**REA**	**Figure 5.1 amended**

		currents are limited to the area encompassed by the arrows on the diagram.	Figure A5.1 Conceptualisation of aggregate dredging and its associated physical effects on the environment.					
3	**Section 5.3.3, page 2**	**Natural England Comment:** Section 5.3.3, page 2 - this could be made clearer "Typically ~30 cm of sediment will be removed in a single pass (BMAPA, 2010)". I presume that this is meant to read that depth of sediment removed will be ~30cm?	**EMU Response:** Acknowledged. Typically ~30cm depth of sediment will be removed in a single pass (BMAPA, 2010).	**Natural England response:** Content that issue is addressed.	**EMU Response:** The revised conceptual Figure and additional information provided in RAG response 25th August 2011 will be used to update version 2 of the MAREA.	**Issue resolved**	**REA**	**Text amended**
4	**Section 5.5.3 – Sediment flux page 6**	**Natural England Comment:** Section 5.5.3- Sediment flux, page 6. Throughout this section it is discussed how unlikely it is that dredging will impact sediment flux, they highlight an example of how areas with coarse sediment, or areas with little or no sediment are unlikely to be affected by a change in current speed. They do not however mention any effects that may be felt in areas with finer grained sediment or areas with higher sediment availability. If this is because these areas are unlikely to be dredged then this should be mentioned to make this clear, or any impacts that may be felt on these types of environments need to be mentioned so that this report is balanced and covers all possible issues. "In previous studies the effects of aggregate dredging on sediment transport have been found to be localised and are only significant within, or very close to the particular dredging area. More importantly, the effects of aggregate dredging in changing tidal flows and associated sediment transport have not previously been predicted to affect UK coastlines (HR Wallingford, 2009)". This does not rule out the fact that changes may not be felt or predicted in the	**EMU Response:** EMU acknowledges that where areas of finer grained sediment are found they are likely to be more affected by changes in hydrodynamics than coarser sediments. EMU also acknowledges that even though the effects of aggregate dredging in changing tidal flows and associated sediment transport have not previously been predicted to affect UK coastlines this does not rule out the fact that changes may not be felt or predicted in the future. EMU also concurs with Natural England that this is unlikely.	**Natural England response:** Does this mean that the revised version will have a sentence or paragraph acknowledging the possible, yet unlikely, effects? The addendum letter cannot stand as it is, so this response will need to be incorporated fully into an acceptable format.	**EMU Response:** The possible, yet unlikely effects, as described in the RAG response 25th August 2011 will be acknowledged within version 2 of the MAREA.	**Issue resolved**	**REA**	**Text amended**

		future, however unlikely this may be it still needs to be mentioned.						
Chapter 6. Potential Effects of Dredging: Modelling								
5 +6	**Chapter 6 - In general**	**Cefas Comment:** Chapter 6 General. Cefas appreciate the use of the up to date SWAN modelling; however we are concerned that the flow model was not calibrated with measured data. Section 5 of Appendix A – Plume Study, states that "The flow model has not been calibrated in detail in the area of interest using measured data as this was not requested by the client to be included in the scope of this high-level assessment". Given this REA is to be a major reference document for all future site specific EIAs in the region during the renewal process, we believe this is a serious omission, especially since there are available data from BODC and/or NOC. We believe the model should be calibrated with measured data and an addendum produced. **Natural England Comment**: Chapter 6 General. NE is pleased to see that the report has taken conservative views of sediment plumes and sand movement. However within the sections on modelling very little information is given about the uncertainties within the models, although it mentions that the models are validated it does not give any details on how effective the models are at predicting other issues. Both this validation issue and the issue of uncertainty should be dealt with in more detail.	**EMU Response:** The REA is to be a major reference document for all future site specific EIAs in the region during the renewal process. Its strength lies in the fact that many, if not all, of the issues arising from proposed aggregate dredging can be dealt with at a higher regional level. The REA process is therefore able to reduce the requirement for detailed studies at the EIA level. However, where there are sensitivities regarding the potential effects of dredging, it is quite likely that these sensitivities will need to be examined at a more detailed level – particularly as the nature of the different dredging operations, the circumstances (tides and waves) under which sensitive sites could be potentially affected etc., will vary across the region. In this context the REA has to be seen to be delivering a representative assessment of the footprint (and the intensity) of impact resulting from dredging and it is in this context that it needs to be a major reference document. There are two particular areas where the validation of the flow model could potentially influence the conclusions of the REA: the identification of the footprint resulting from the plume modelling and the identification of the footprint resulting from changes in background sediment transport. Cefas has already received a detailed discussion (HR Wallingford, 2011a) outlining the fact that the plume modelling for the Southern Coast REA was conservative and indicating that the level of conservatism implemented far outweighs any small inherent flow modelling error. It is therefore clear that the plume model predictions remain valid. Further, the footprint of changes in background sediment transport is confined to the perimeter of the proposed dredging areas and it is clear here also that small errors in the flow model would have little effect on the identification of this footprint. Whilst no new tidal data were collected as part of the REA in order to further calibrate the SWAN model, this does not mean that no measured data were used in model calibration and validation. Calibration and validation of the model has been carried out for previous studies. The calibration was designed to tune the bed friction term and the co-efficient for eddy diffusivity of momentum (e.g. turbulent mixing). The flow model was calibrated against tide curves based on published tidal harmonics, against current measurements and tidal diamond information. Calibration was carried out by comparing tidal levels and currents for a spring tide and used seabed roughness lengths, k_s of 0.1m (which is appropriate for sand); 0.01m (which is appropriate for finer material on the bed), and also for a synthesised distribution of k_s with a corresponding variable roughness over the domain. An assessment of the model tidal level predictions was carried out by comparing with predicted tidal levels generated with the TIDECALC package. TIDECALC is a propriety package produced by the Admiralty that generates tidal levels from supplied tidal harmonics. HR Wallingford acknowledged that TIDECALC does not reproduce the tidal response well in complex estuaries, however the South Coast MAREA region does not encompass any complex estuaries and the package is generally accurate on the open coast around the UK. In the calibration exercise the model reproduced the form of the tidal profile well. The modelled currents with k_s of 0.1m, for the same simulation, were also compared with reconstituted currents based on Cefas harmonic data derived from their archive of field measurements. The agreement in magnitude and directions was good, although there was a phase lag between the two data sets. Following calibration the model was also validated by running a neap tide simulation, without further model tuning (using ks of 0.1m), and comparing tidal levels and currents as for the calibration exercise. Again, the tidal propagation throughout the study area was well reproduced, and the model generally agreed well with the predictions at most locations. The validation against neap tide currents is presented in Figures A6.1 and the	**Cefas Response:** We welcome the clarification that calibration and validation of the model has been carried out for previous studies. However, references of these specific studies must be provided to determine whether previous calibration and validation is relevant to the South Coast MAREA region. Validation is presented using 'Cefas harmonic data', full reference should be provided to clarify the exact source of the data. It unclear where this data was sourced from and it is thought that this is actually from a Cefas model, and the validation is based upon comparing two sets of modelled/predicted data (A6.1). Cefas do not consider that this is appropriate validation and with some notable differences between the data sets we do not agree with the statement that the modelled data generally agree well with the Cefas data. It is also unclear what location these plots represent. We consider that validation using measured data is still required and that this should use both tidal elevation data (tide gauge data from primary ports – i.e. Poole and Portsmouth), and tidal current data (historical impeller data available from BODC). We note that very little recent current data is available and that EMU have investigated our suggestion to source data from NOC/BODC. However, we consider that the available data (impeller data) is of use as it represents measured data and can still be assessed for suitability and quality despite its age. We recommend that this data should be used within a validation exercise, as a first point to inform the need for additional measured data or further calibration. The data should be filtered to obtain data that it a suitable time series (i.e. > 14 days). The records can then be plotted to assess quality and any indications of biofoulling. Putting together a number of records an idealised month of measured data can be produced. This should be undertaken for both the West and East IOW region. It is disappointing that this data gap was not picked up and	**EMU Response:** SCDA propose new survey to acquire sufficient oceanographic data for validation purposes in consultation with RAG.	**Cefas response:** Discussion has been held between Cefas, MMO and HR Wallingford to discuss the data validation requirements. I am satisfied that the additional work to address our comments is being undertaken, and we are currently awaiting the results for discussion and incorporation into the Version 2 report.	**REA**	**HR Wallingford Validation work included as an appendix 6A with additional data included as Appendix 6b to the chapter**

			magnitudes and directions generally agree well with the Cefas data.  Figure A6.1: Validation curves, comparing predicted outputs against reconstituted currents based on Cefas harmonic data derived from their archive of field measurements There is a further concern that the flow model has not been calibrated in detail in the area of interest. It is acknowledged that no new tidal data were collected as part of the REA in order to further calibrate the SWAN model; however as regards validation of the model generally in the English Channel, the model has been validated as follows: • The model was validated to tidal diamond data in the Eastern English Channel for the Eastern English Channel Regional Assessment and the EIAs for West Bassurelle and Area 473; and • The model has since been validated to a month of ADCP at Hastings Shingle Bank for the detailed Area 460 studies. Cefas took great interest in this assessment and approved the model. It is incorrect that quality flow data is available from the BODC/NOC. In the vicinity of the Isle of Wight the BODC web site only provides impeller current data time series 25-35 years old. The NOC web site directs the reader to the BODC website so the conclusion is that NOC does not have datasets close to the Isle of Wight or that that they are not at present willing to make them available. Since there are no ADCP datasets in the vicinity of the Isle of Wight available at present, and since the provenance of the flow model is generally of a good standard, it would seem that the most sensible course of action is to identify specific issues arising at the EIA level which require more detailed calibration at a specific location. This will prevent unnecessary additional work if no such issues arise, and provide a means of better targeting of future ADCP measurements.	discussed at an earlier stage of the REA. This is an important consideration for other REA sites. Following consideration of the historical data, measured data may need to be obtained for the site specific EIAs in the South Coast MAREA region. **Natural England response:** Clear reference of these Cefas archive data should be presented within the revised version report. Fig A6.1 provides some good validation, but is weak in places. Additional commentary may assist the presentation of the validation. Certainly much of EMU's response above will need to be incorporated within the revised version. Suggest close reference to Cefas' response to this letter.				
7	**Chapter 6 – Specific concerns about Area 122/2**	**Cefas Comment:** We also have concerns with Area 122/2, with regards the wave height predictions. Changes in	**EMU Response:** EMU has not stated that there is no significant impact at the 5% exceedance level because of the error parameters of the model – EMU understands that the accuracy of the model is within ± 2.0% as stated in the HR Wallingford report. As a result EMU has shown changes in waves greater than ±2.0%	**Cefas Response:** We are concerned about the potential significant impact of Area 122/2 and note that the response provided below highlights that the	**EMU Response:** Effects on wave height and associated impacts at Area 122/2 will require specific investigation as part of future EIAs. The new survey proposed under comment 5 and 6 above is expected to provide relevant data to support future assessment in this regard.	**EIA**	**EIA**	**Additional data included in Appendix 6b**

		significant wave height at the coast of 5% were noted (it could be higher, but the colour scale chosen does not allow a more accurate assessment). However, there is a discrepancy in the significance assessment of this figure. While the conclusions in the report state no significance at the 5 % level as it is within the error parameters of the model; the HR Wallingford feeder report (Appendix A – Wave study, p6) states that 2 – 3% is the error percentage of the model.	in our Figures. We have acknowledged a predicted increase (2 – 5 cm) in wave heights for the 5% exceedance scenario reaching the shoreline near Hayling Island and applying a precautionary approach have assessed this as a ***Minor Significance*** for the East Isle of Wight sub-region coastline in Chapter 19: Impact Assessment: Coastline.	modelling undertaken at the MAREA level are not sufficient to give confidence in the impacts of dredging at Area 122/2. Further work and assessment will be required at the site specific EIA stage for this area.				
8	**Figure A6.2**	**Cefas Comment**: It is not just the impacts at the coast that are of concern, Figure A6.2 below shows that the nearshore area is an active sediment transport zone. Wave height changes will be higher nearer the site and given the water depths are only between 5 and 10 m, wave height changes could affect sediment pathways.	**EMU Response:** It is acknowledged that the nearshore zone is an active zone of sediment transport and that wave height changes have the potential to affect sediment transport. With regards to sediment transport in the region, Figure 6:10 in the MAREA illustrates potential changes in sediment flux (which is a proxy for sediment transport) and indicates no predicted changes in sediment flux reaching the shoreline and no changes in sediment flux generated inshore of 122/2 (and hence in the area of nearshore sediment transport pathways shown in Figure A6.2). The same is also true for changes in peak tidal currents. Despite this the MAREA acknowledges that model outputs indicate that Area 122/2 is an area of particular significance. Furthermore the MAREA recognizes that the model outputs are not sufficient to give confidence in the impacts of dredging from 122/2 and that further investigation of potential coastal and nearshore impacts should be undertaken for this licence area as part of any future site specific EIA.	**Cefas Response:** We welcome the clarification provided and that changes in sediment flux have been assessed. However, we note that the MAREA does not present the same caveats noted above in terms of confidence in the assessment of Area 122/2 (note conclusions provided in chapter 19, page 4, discuss high confidence and do not recognise any uncertainty in relation to Area 122/2).	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Included in Appendix 6b**
9	**Swell and locally generated waves**	**Cefas Comment:** Lastly, this stretch of the coastline is known to have issues with erosion, therefore our concerns will need to be addressed at the site specific level if not within an addendum. Further work will need to partition the wave spectra, looking at swell and locally generated waves. There are wave climate data available from the CCO which should be used. The wave climate data should also identify if easterly waves could impact on Bembridge ledges.	**EMU Response:** The MAREA acknowledges that Area 122/2 is an area of particular significance and further investigation of potential coastal and nearshore impacts should be undertaken for this licence area as part of any renewal EIA. EMU also feels that the REA contains sufficient information to conclude that there are no significant impacts on the coastline from any other licence areas in the region. An assessment of the potential impacts of dredging on the inshore banks contained within this Addendum, does highlight some significant impacts on an inshore bank receptor (see the section of this Addendum dealing with Chapter 19 of the REA). Figure A6.3 is reproduced from the Channel Coastal Observatory Annual Survey Report 2010 and shows beach profile changes from 2004-2010 within the sub-region. Figure A6.3 shows that the situation is complicated with this short stretch of coastline showing both accretionary and erosive trends.  Figure A6.3: Summary of Actual Beach Changes – Baseline	**Cefas Response:** We welcome the additional evidence and discussion that has been provided on this issue. We concur that this issue should be further assessed at the site specific EIA stage for 122/2, 122/3 and 372/1.	**EMU Response:** The additional discussion and new information provided within RAG response 25th August 2011 will be incorporated within version 2 of the MAREA as an Appendix at the end of the relevant Chapter.	**Issue resolved**	**REA (EIA – 122/2, 122/3 and 372/1)**	**Additional data included in Appendix 6b**

2003/2004 to Spring 2010 (Source: CCO, 2010).

Specific unit summaries indicate that for CPU6 (South Hayling and Chichester Harbour Entrance), the eastern end has shown relative stability since 2004 with several profiles along the central section of the unit experiencing significant increases in volume as a result of the capital recharge that took place here in the summer of 2009. To the west of the unit from Inn On The Beach to the unit boundary, the majority of the profiles show losses, typically reflecting the sediment extraction that takes place here annually as part of the recycling operations. Within unit CPU7 (Langstone Harbour Entrance) significant erosion has been observed across the three profiles at the unit with significant accretion evident along the rest of the frontage.

Emu acknowledges that there is a vast amount of wave information, including wave spectra available from the CCO. Since there are inherent difficulties in generating a time series of wave spectra (in order to combine time, wave height, period and direction) EMU has provided two examples of wave spectra collected from the Hayling Wave Buoy. This wave buoy, which collects directional data, is also closest to the area of interest - i.e. Portsea Island and East coast of the Isle of Wight.

The first wave spectrum presented (Figure A6.3) is from November 14th, 2009 – identified as one of the biggest wave events on record (CCO, 2010). This was a swell event from the Atlantic with wave heights exceeding 3.0 m and wave energy of ~ 7 m^2s and a peak period of 8.3 s. In contrast, the second wave spectrum (Figure A6.4) records a recent wind-sea event from the southeast, with a peak period of 5.3 seconds and reveals significantly lower energy (~ 0.1 m^2s).

Sea and Swell Summary for (14/11/2009 12:10 GMT)	
Significant Wave Height (m)	3.14
Wave zero up crossing period (Spectrum Tz) (s)	6.1
Wind Wave Significant Wave Height (m)	2.13
Wind Wave Peak Period (s)	7.1
Wind Wave Peak Period Direction (°)	181
Swell Significant Wave Height (m)	2.33
Swell Peak Period (s)	8.3
Swell Peak Period Direction (°)	187
% Swell	54.4

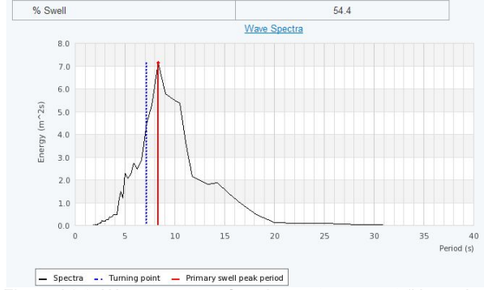
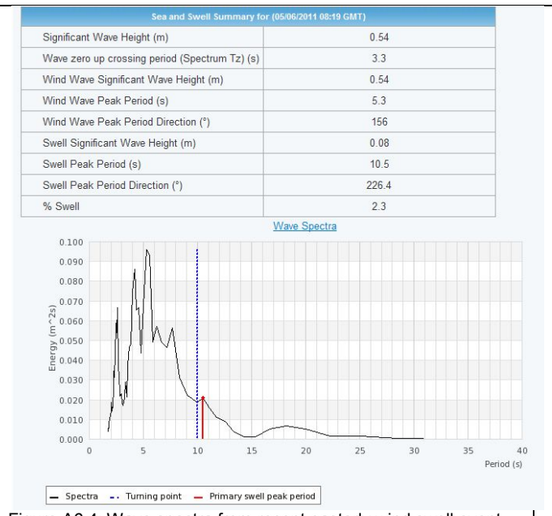


Figure A6.3: Wave spectrum from large storm event (November 14th, 2009). Source: channelcoast.org.

			 Figure A6.4: Wave spectra from recent easterly wind swell event (June 5th, 2011). Source: channelcoast.org. Table A6.1 below summarizes the largest storm events within the region in 2009 and 2010. It should be noted that all the largest storm/wave events approached from ~ 200° (CCO, 2010). EMU does agree that wave spectra should be looked at in more detail for site-specific EIAs. Table A6.1: Highest storm events 2009/2010 near Portsea Island. Source: CCO – Annual survey report, Selsey Bill to Southampton Water, 2010. With reference to the potential impacts of waves on the Bembridge Ledges in the East Isle of Wight sub-region, Figures 26 and 27 in Appendix A – MAREA Wave Study show that predicted changes in wave heights for 1 in 200 year events, approaching from 120° and 150° (southeast), do not reach within 4 km of the Isle of Wight coastline. Predicted changes to waves from these directions are mostly limited to within and immediately adjacent to, Licence Areas 122/3 and 372/1.				

Date / Time	H_s (m)	Tp (s)	Tz (s)	Dir (deg)	Water level elevation (OD)	Tidal stage (hrs re: HW)	Tidal range (m)	Tidal surge (m)
23/11/09 13:00	3.83	10.5	6.7	203	1.06	HW -1	2.18	0.45
14/11/09 19:30	3.70	13.3	7.4	204	0.89	HW -1	2.56	0.14
29/11/09 18:00	3.49	10.0	6.8	198	0.52	HW -2	2.41	0.53
31/3/10 09:30	3.46	10.0	6.3	198	-0.89	HW -4	3.53	0.00
18/11/09 12:00	3.27	9.1	6.0	208	1.92	HW	3.46	-0.01

10		**Cefas Comment:** While impacts to the coastline have been dealt with in detail within the REA, there will need to be clear and auditable validation of these results within the site specific EIA process. It will be important to validate the site specific dredging scenario against 15 year future	**EMU Response:** EMU would stress that a maximum offtake scenario has been used in model inputs. The actual depth changes due to dredging will likely be significantly less than have been modelled and impacts will be smaller than those modelled.	**Cefas Response:** We note that a maximum offtake scenario has been used in modelled outputs for the REA. However it is still important that the site specific EIAs validate the site specific depth changes in terms of depth and location against the REA modelled parameters. As no site specific depth or tonnage information is provided in the REA this needs to be picked up at the EIA stage.	**EMU Response:** No further action. Issue will be addressed at EIA stage.	**Issue resolved**	**EIA**	**No change**

		bathymetry modelled within the REA. Where there are likely differences in future bathymetry, and in particular in location it will need to be proven that the results and conclusions are still valid.						
11	**Section 6.21 (Figure 6.1)**	**Cefas Comment Section 6.21 (Figure 6.1):** The wave rose is taken as absolute – However, it is a model and as such should be caveated with appropriate limitations and conditions. The model results should have been augmented with observational data (from CCO) to provide evidence/justification of the worst case scenarios chosen in 6.21, especially with regards to each sub-region, as the worst case may change. Justification / evidence for worse case scenarios should be provided within an addendum.	**EMU Response:** EMU does not agree with this comment, and believes that the REA acknowledges that Figure 6.1 is based on modelled data when it states that "outputs from the Met Office's regional numerical wave forecasting models were used". It is also important to note, however, that the UK Met Office has 50 years' worth of hindcasted wave data, using the most sophisticated and up-to-date forecasting/hindcasting methods. As such, EMU feels that these data are appropriate to use in model inputs. The CCO real time data only extend back as far as 2003 and CCO wave buoys are predominantly located in nearshore locations. Model inputs for SWAN require wave conditions along the offshore (deep water) boundary of the model grid in order to examine wave transformation processes towards the coast. EMU would, however, point out that the Met Office model results have been augmented with observational data from the CCO, with Tables 7.1 and 7.2 and Figure 7.1 in MAREA Chapter 7 - Regional Hydrographic Environment presenting observational data. These results indicate that measured maximum annual significant wave heights (3 – 5 m) and wave directions (S to SW), measured from CCO buoys, are similar to the input conditions for the 5% exceedance scenario, which is expected to occur approximately 6 days/year. These therefore provide support for the worst case model scenarios.	**Cefas Response:** We agree that CCO is limited to nearshore locations, but consider that the data is still valid. We also note that there are some relevant caveats in the use of the UK met office data in relation to it being based on oceanographic models and is less accurate at a small scale. We do consider it is appropriate to use the data, however this should not be taken as an absolute. While table 7.2, 7.1 does provide average conditions, it would be more useful to understand the annual statistics with wave rose data. We recommend that a wave rose taken from the met ocean model is compared to wave rose data from observations to provide confidence in the met office model at this specific location.	**EMU Response:** The new survey proposed under comment 5 and 6above is expected to further inform assessment in this regard.	**Cefas response:** Discussion has been held between Cefas, MMO and HR Wallingford to discuss the data validation requirements. I am satisfied that the additional work to address our comments is being undertaken, and we are currently awaiting the results for discussion and incorporation into the Version 2 report.	**REA**	**HR Wallingford report included as Appendix 6A**
12	**Section 6.3.2**	**Cefas Comment 6.3.2:** No measured data used to calibrate flow model – only tidal diamonds have been used. These data are very old, and have several limitations, for example, the weather conditions when the measurements were undertaken is unknown, have abnormal conditions been taken into account? Wave conditions and the bathymetry will have changed, and there are potential problems with diurnal inequality and timings of measurements with regards flow speeds. Industry to check with HR with regards calibration. This work should be redone at the REA level and incorporated into an addendum, with tidal diamonds calibrated with high resolution acoustic current meter data. There are plenty of data available – from BODC and/or NOC. Storm data should also be used – to input into the sediment flux results.	**EMU Response:** EMU does not agree with the comment that no measured data have been used to calibrate the flow model. The model has been fully calibrated and validated for previous studies. This involved comparison of modelled outputs against not only tidal diamonds but also tide curves based on published tidal harmonics, and against current measurements (including reconstituted currents based on Cefas harmonic data derived from their archive of field measurements). A more detailed explanation can be found as a response to comments 5 and 6 in this Addendum. For the South Coast MAREA study the overall tidal flow model was run by supplying a time history of water levels along the two open boundaries – north and east in the North Sea and in the South-West approaches of the English Channel. These water levels were determined from a harmonic analysis using published information from the national BODC database.	**Cefas Response:** Please refer to comments provided under "Chapter 6 – in general" above	**EMU Response:** The new survey proposed under comment 5 and 6above is expected to further inform assessment in this regard.	**Cefas response:** Discussion has been held between Cefas, MMO and HR Wallingford to discuss the data validation requirements. I am satisfied that the additional work to address our comments is being undertaken, and we are currently awaiting the results for discussion and incorporation into the Version 2 report.	**REA**	**HR Wallingford report included as Appendix 6A**

13	**Section 6.5**	**<u>Cefas Comment Section</u>**: Section 6.5 Fine sand dispersion. We are not satisfied with the plume modelling until our comments and issues from the 1st November meeting with HR Wallingford, BMAPA and MMO have been addressed. Whilst this plume model is sufficiently robust to establish the relative impacts of two differing aggregate extraction scenarios, we are not confident that it establishes the absolute impact footprint. Particular concerns are with the calibration and the changes to the flow regime during non-tidal events, i.e. storms. – We have received comments from HR and will advise separately. This is a key concern with regard to accepting the predicted impacts and subsequent assessment within the REA. To confirm the adequacy of the model a sensitivity test is required to investigate the influence of each parameter (i.e. q, V and H). This should be applied at the regional level.	**<u>EMU Response:</u>** Cefas's comments make 3 points: - Cefas is not satisfied with the plume modelling until its comments and issues from the 1st November (2010) meeting with HR Wallingford, BMAPA and MMO have been addressed; - Cefas accepts that the plume model is sufficiently robust to establish the relative impacts of two differing aggregate extraction scenarios, but is not confident that the modelling establishes the absolute impact footprint. Particular concerns are with the calibration and the changes to the flow regime during non-tidal events, i.e. storms; and - To confirm the adequacy of the model a sensitivity test is required to investigate the influence of each parameter (i.e. q, V and H). This should be applied at the regional level. - Whilst Cefas is not satisfied with the plume modelling, it accepts that it has received the information requested (a fuller description of the plume modelling and a sensitivity analysis). This information was provided by HR Wallingford in February 2011. Cefas is not convinced that the plume modelling established the absolute impact footprint. The comment seems not to be addressed at the plume methodology itself, which is based on evidence from a large number of field studies by different bodies including Cefas, but instead is based on a concern that the dispersion of fine sediment plumes could be different under storm conditions, owing to changes in the flow regime compared to that under normal conditions. The plume modelling is conservative (HR Wallingford, 2011a) and background suspended sediment concentrations are substantially enhanced under storm conditions, thus reducing the impact of dredging plumes. HR Wallingford have submitted the sensitivity analysis (HR Wallingford, 2011b; submitted in February 2011) and this corroborated the results of the plume modelling already undertaken.	**Cefas Response:** As noted in our comments Cefas had not been able to review the revised discussion and sensitivity test from HR Wallingford at the time of providing these comments on the South Coast REA, and it is not clear why discussion has been provided here on Cefas' behalf. As noted in our response to TEDA (dated 6th May 2011) –Cefas recognise the work that has been undertaken by HR Wallingford in terms of undertaking a sensitivity analysis as requested. However, this has only been submitted as part of the Thames REA addendum and should also be referenced as part of the South Coast REA. In relation to the information submitted with the Thames REA addendum, appropriate tests have been undertaken and support the conclusions made, and the appropriateness of the plume model. Cefas are happy for the continued use of this plume model approach for regional assessments. However, it is recognised within the report that this is a relatively limited dataset, in particular for long distance plume measurements for large dredgers operating in deep water at high velocity. There should be a continued effort to update the dataset where relevant data is available. We recommend that there is investigation into whether current or future data is available from international studies e.g. Netherlands, France or the US.	**<u>EMU Response:</u>** SCDA / EMU are currently waiting for advice from HR Wallingford on this matter.	**Cefas response:** Discussion has been held between Cefas, MMO and HR Wallingford to discuss the data validation requirements. I am satisfied that the additional work to address our comments is being undertaken, and we are currently awaiting the results for discussion and incorporation into the Version 2 report.	**REA**	**HR Wallingford report included as Appendix 6A**
Chapter 7. Regional Hydrographic Environment								
14	**Section 7.4 – Tidal currents (Figure 7.2)**	**<u>Cefas Comment: Section 7.4 – Tidal currents (Fig 7.2):</u>** In this figure, the modelled data should have been used (once calibrated) rather than the tidal diamonds. It would have also been of use to see the residual flows. See previous comment above – issues with the use of tidal diamonds – Modelled data must be calibrated and used within this figure – and added to the addendum.	**<u>EMU Response:</u>** The modelled peak tidal currents (Figure 6.6 in the MAREA) have been overlain with MAREA Figure 7.2 for locations where Admiralty Tide data were available. The output is shown in Figure A7.1 below. As can be observed, tidal current directions match very well and peak tidal currents are a similar scale to the modelled results. The only exception is off the south coast of the Isle of Wight where modelling results indicate lower current speeds than those indicated on Admiralty Charts. Figures A7.2, A7.3 and A7.4 show the tidal residuals for a site in each sub-region.	**Cefas Response:** We welcome the provision of figure A7.1 but note that this indicates that the modelled peak flow results are lower than the tidal diamond data – can any additional comment be provided on the potential significance of this in terms of confidence in the predicted impact footprint? We also consider that the residual current flow should be looked at in determining the direction of resuspended sediment. If the impeller current data as noted in comment 5 & 6 can be found to be of reasonable quality then this will provide the residual current flow. This should be presented in the form of a PVD diagram. The residual current flow will provide further context in terms of longer term impact pathways.	**<u>EMU Response:</u>** The new survey proposed under comment 5 and 6 above is expected to further inform assessment in this regard.	**Cefas response:** Discussion has been held between Cefas, MMO and HR Wallingford to discuss the data validation requirements. I am satisfied that the additional work to address our comments is being undertaken, and we are currently awaiting the results for discussion and incorporation into the Version 2 report.	**REA**	**HR Wallingford report included as Appendix 6A** **Figure A7.1 replaces original Figure 7.2 in the chapter**

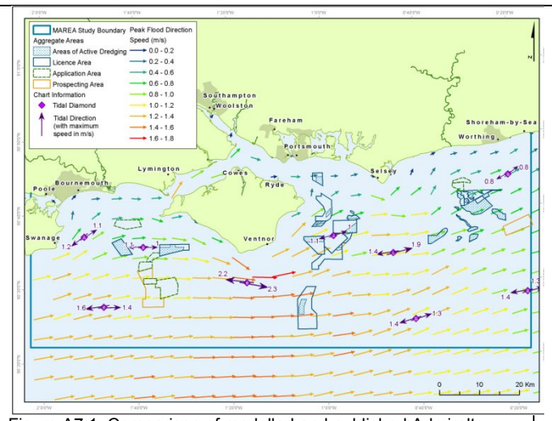
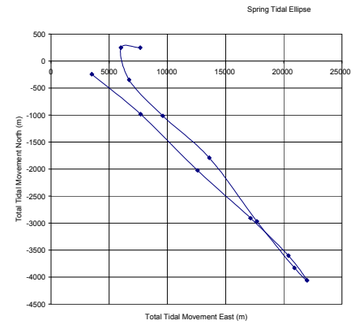
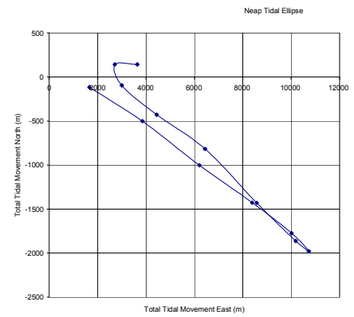


Figure A7.1: Comparison of modelled and published Admiralty Chart peak tidal current speeds for the South Coast MAREA region.

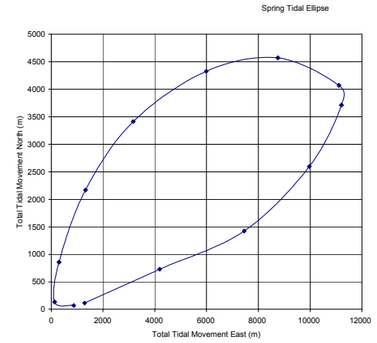


Spring mean drift = 0.09 m/s to 083°

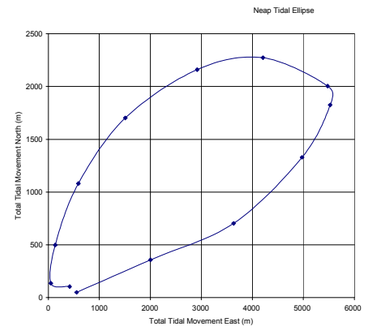


Neap mean drift = 0.04 m/s to 258°

Figure A7.2: Tidal residual at Tidal Diamond SN004F West of the Isle of Wight sub–region Area 124/2.

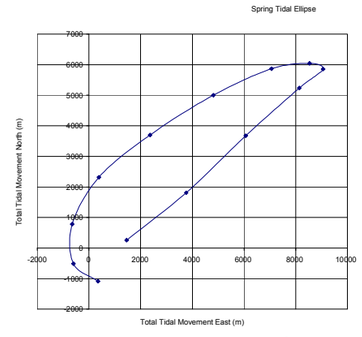


Spring mean drift = 0.009 m/s to 264°

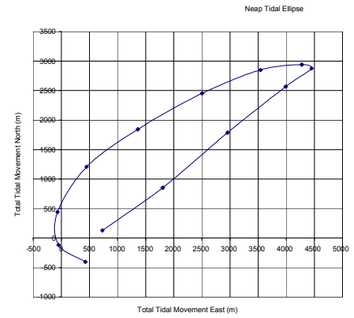


Neap mean drift = 0.003 m/s to 315°

Figure A7.3: Tidal residual at Tidal Diamond SN007C East of Isle of Wight sub-region Nab Tower.



Spring mean drift = 0.037 m/s to 219°

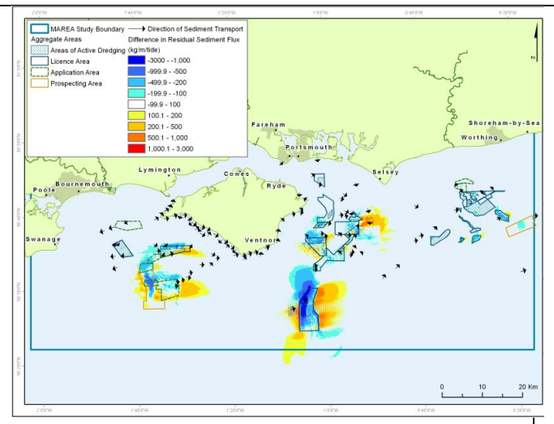
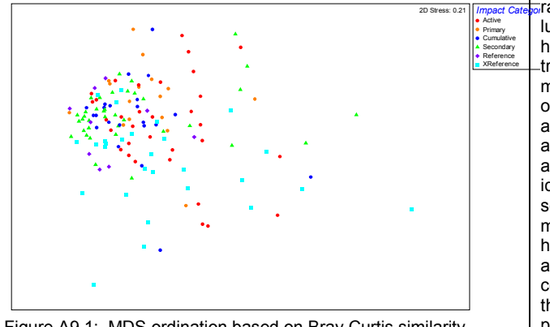
			 Neap mean drift = 0.013 m/s to 210° Figure A7.4: Tidal residual at Tidal Diamond SN008B Owers sub-region 4 km northeast of 435/2.					
15	**Section 7.9**	**Cefas Comment**: Section 7.9 – suspended sediment concentrations. This section is not very well discussed. There is not enough background information to support the conclusions made. This will require a level of detail at the sub regional level, rather than an average over the entire south coast zone. Work has been undertaken by the Fluxmanche project (NERC funded project between UK and France). One of the lead researchers was A.F. Velegrakis. One example paper – Sources sinks and resuspension of suspended particulate matter in the Eastern English Channel, (1999), Velegrakis *et al*., Continental Shelf Research, Vol 19, issue 15-16, pp. 1933 – 1957. Must be done at REA level – to validate regional conclusions – especially when looking at cumulative plume effects.	**EMU Response:** EMU acknowledges that published information on suspended sediments is limited. EMU (unpublished data) collected suspended sediment data from November 2010 to May 2011 for locations near the Owers aggregate areas. Data were collected simultaneously with both optical (OBS – 50° 41'N and 00° 09'W) and acoustic (AWACS – 50° 41'N and 00° 19'W) sensors. The following data were recorded - on November 11-13th 2010 a large storm event, with significant wave heights of up to 4.0 m, resulted in significant resuspension and current perturbation. Near bed suspended sediment values of ~ 150-200 mg/l were recorded with an (acoustic) AWACS and near bed suspended sediment values of up to 50 mg/l were recorded with an OBS. Data collected during calm weather conditions revealed average suspended sediment concentrations of approximately 10-20 mg/l with the OBS and values of ~ 40-60 mg/l with the AWACS. These values are in line with those recorded by Velegrakis *et al*., (1999), Cefas (2001b) and South Coast Shipping (1994), which have been cited in the South Coast MAREA report.	**Cefas Response:** We welcome the provision of measured data from the Owers area and acknowledge the general lack of SSC data. However in the interest of providing the most up to date data for the site specific EIA renewals we recommend that newly available data such as Dolphin et al (2011)[1] is used to provide information of the geographical distribution of SSC variability. The data is available online (*www.marinealsf.org.uk*) and could be used to produce a chart/figure incorporating the data with the location of the measured data noted above.	**EMU Response:** The new survey proposed under comment 5 and 6 above is expected to further inform assessment in this regard.	**Cefas response:** Discussion has been held between Cefas, MMO and HR Wallingford to discuss the data validation requirements. I am satisfied that the additional work to address our comments is being undertaken, and we are currently awaiting the results for discussion and incorporation into the Version 2 report.	**REA**	**HR Wallingford report included as Appendix 6A** **Additional text provided in Emu response included within section 7.9**
Chapter 8. Regional Coastal and Geological Environment								
16	**Section 8.2.1**	**Natural England Comment:** Section 8.2.1 Durlston and Swanage Bays. Some of the data used are quite dated (e.g. "There has been a subsequent net loss of sediment and	**EMU Response:** More recent observations of the area, reported in West (2007), suggested that erosion of cliff sediment had slowed in recent years. The conclusions were anecdotal and based on the fact that significant mudslides, that occurred prior to 2002, have stabilised and vegetation has re-established on the cliff slope. Garvey (2007) indicates that erosion of the soft sediment cliffs is initiated by water percolating through permeable upper strata and	**Natural England response:** Content that the response more fully details the issue.	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Additional text included within section 8.2.1**

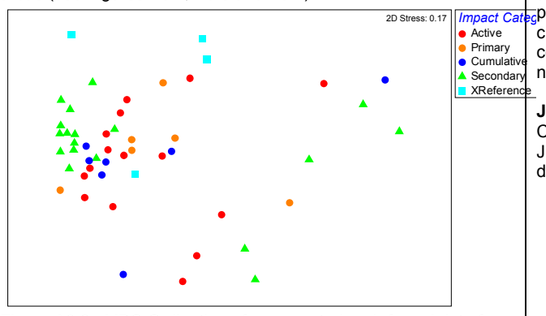
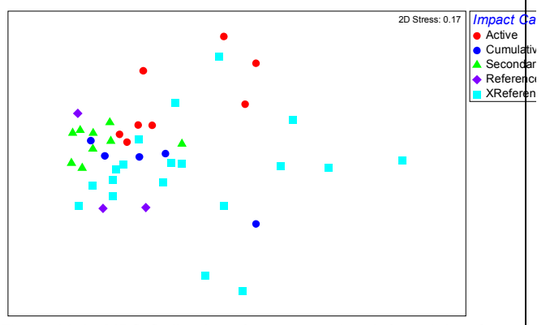
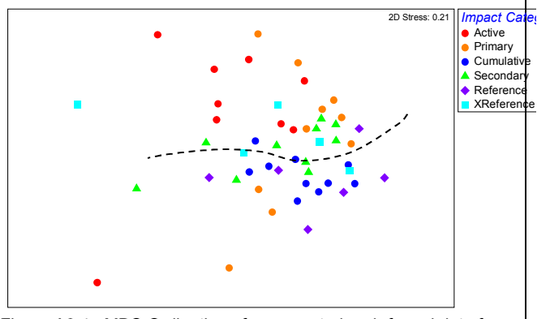
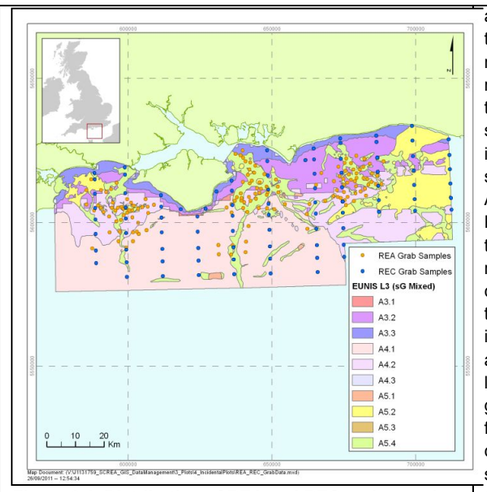
[1] T.J. Dolphin, T.A.M. Silva, Rees, J.M., (2011) Natural Variability of Turbidity in the Regional Environmental Assessment (REA) Areas. MEPF-MALSF Project 09-P114, Cefas, Lowestoft, 41 p.

		comparison of beach volumes between May 1998 and April 2002 shows a cumulative loss of 34,000 m^3 over this period (Halcrow, 2002)"). Are there any more recent data that could be used here? There could have been a change to this loss over the intervening time.	accumulating on less permeable strata. If this water cannot drain efficiently it elevates pore pressures in the clay, destabilises the slopes and initiates landslides. The landslide toe can then potentially be attacked by wave action, transporting sediment offshore. Royal Haskoning (2011) notes that complex cliff landsliding processes, rather than direct marine erosion due to waves and tides, provides sediment to the system. Although these non-marine influences deliver much of the material to the beaches, coastal processes are integral in removing this material from the base of cliffs and transporting it along the frontage (Royal Haskoning, 2011). The Durlston Bay area is crossed by a large east-west extensional (normal) fault which downthrows south to the extent of about 30 m. On the south side there are north-dipping shales and thin limestones, some of which are permeable and may act as pathways for water flow. This means that water flow through the north dipping strata can be blocked by the fault plane and the northerly dip and the extension of the fault inland (westward) probably channels groundwater into this area. West (2007) concludes that further erosion of the cliff is expected although there may be significant intervals when erosion is minimal. The recent Shoreline Management Plan (SMP2) for Poole and Christchurch Bay (Royal Haskoning, 2011) reports that erosion rates for Durlston Bay are estimated at 0.65 m/yr, while for central Swanage Bay the estimated erosion rate is 0.60 m/yr.					
17	**Section 8.7**	**<u>JNCC Comment:</u>** Section 8.7, Seabed sediments. This section would have benefited from a more thorough presentation of the result from the recent seabed survey. For example, analysis of the seabed images taken during the survey revealed a high degree of local spatial heterogeneity of surface sediments at a number of locations with various substrate types, mostly relating to sand and mixed sand, gravel and coarse sediments being recorded within only a few metres of each other (Annex B - Macrobenthic Ecology Survey). It would be useful including this type of information in the main report in order to provide a basis for the Habitat & Biotopes sections and the impact assessment. The REA would benefit if this issue is addressed.	**<u>EMU Response:</u>** EMU does not agree with this statement. It is acknowledged that seabed sediment types can vary within a few metres of each other; however this is not an appropriate scale on which to define seabed sediment boundaries at a regional scale. It is, however, also acknowledged that at site-specific EIA scale more detailed delineation of seabed sediment types will be undertaken using data collected during REA and REC surveys.	**JNCC Response:** Content with response provided	**<u>EMU Response:</u>** No further action.	**Issue resolved**	**EIA**	**No change**
18	**Section 8.7 - Seabed Sediments**	**<u>Cefas Comment:</u>** Section 8.7, Seabed sediments. There is no reference to REC data. The bedrock platform can be split into different habitat types – for example – gravel – which could be impacted. This will influence the impact assessment chapters. - Meeting with Industry on the 2nd Feb stated that	**<u>EMU Response</u>**: Acknowledged. The paragraph has been redrafted. The seabed of the MAREA region is sediment starved and data interpreted for the MAREA suggested that where seabed sediments are present, they are dominated by discontinuous, thin layers of coarse-grained sediment overlying bedrock and patches of sandy sediments overlying channel fills. This confirms earlier studies such as Hamblin *et al.* (1992) who found that the gravelly sediments were generally less than 1 m thick. The seabed sediment interpretation map (Figure 8:7) is based on recent seismic, sidescan and grab sample data collected for the REA and REC surveys, supplemented by other data sources (e.g. BGS,1989).	**Cefas Response:** We welcome the response, however it is unclear whether the redrafted paragraph will be published as an addendum or as a revised version of the South Coast MAREA.	**<u>EMU Response:</u>** The re-drafted paragraph as presented in the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Revised text incorporated within section 8.7**

		the “baseline data” was from the REC – but the REC is never mentioned or referenced.						
19	**Section 8.7**	**Cefas Comment:** Section 8.7 There is also more information that can be used from the REC data to differentiate “bedrock platform” into habitat types. More information is also required on what habitat types are present south of IoW – as that is where the plume will travel from the East IoW licences. Bedrock platform must be differentiated into habitat types – further use of REC data will help. Overlay with figure 8.7 and sensitive benthic receptors (fig 20.5) – However discussion is needed on what has generated the significance in figure 20.5.	**EMU Response:** EMU does not agree with the comment that the bedrock platform should be differentiated into habitat types, since Chapter 8 deals specifically with geological characteristics and does not discuss Benthic Ecology (which is discussed in Chapter 9). The generation of significance will be discussed further in this addendum within Section 20 – Benthic Impacts.	**Cefas Response:** We agree with the response and welcome that further information is provided within Section 20.	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**No change**
20	**Section 8.8 – Seabed Sediment Transport**	**Cefas Comment:** Section 8.8, Seabed sediment transport: The diagrams present within the SCOPAC website are different to those presented in the report (see example Figure A8.1 below). It was stated in the meeting that there was no transfer of sediment from Dolphin Bank (as an example) to the coast – however arrows O1 in Figure A8.1 below clearly show shoreward transport. This section should be used this against the outputs of the model. Evidence is required at REA level to back up conclusions made – especially with regards to Figure A8.1.	**EMU Response:** At the review meeting it was stated by EMU that there was little evidence for a transfer of sediment from the nearshore banks of the MAREA region to the coastline. EMU does not agree that Figure A8.1 clearly shows transport of sediment from the offshore banks to the coast. Figure A8.1 indicates that there is clockwise circulation of sand around Dolphin Bank and some of this sand is transported west to Dolphin Sand. Figure A8.1 also shows a clockwise circulation of gravel around Shingles Bank which may then go on to supply the western end of Hurst Spit and into the west Solent (Dyer, 1971). Some sand on the Shingles Bank may derive from Dolphin Bank and Velegrakis and Collins (1993) argue that superficial sand deposits that accumulate during the winter months, over parts of the Shingles Bank, derive from the eastern part of Dolphin Bank. They also suggest that the finer texture and better sorting of sand on the eastern flank of Shingles Bank, compared with its western margin, is taken as a strong implication of a west to east transport pathway over the crest (also indicated in pathway O1). Velegrakis and Collins (1993) also conclude that once sand has moved across the crest line of The Shingles Bank, it is temporarily deposited on its eastern flank before being moved offshore. This suggests that if sand is derived from Dolphin Sand, and feeds into pathway O1, much of this is not transferred to the coast. There are no sediment transport pathways indicating direct inshore transport of sand from either Dolphin Sand or Dolphin Banks into Christchurch Bay. There are, however, further indications of an offshore transport of sand from the coast towards the offshore banks. Indeed a number of research studies indicate that transport of sediments tends to be offshore. Velegrakis (1994) identified bedforms to the south of Dolphin Bank which indicated northward transport onto the bank (Velegrakis 1994), in addition to westwards movement, also determined by Dyer (1970). Velegrakis also concluded that southward sand transport is indicated by bedforms several kilometres to the north of Dolphin Bank which suggests that a sediment sink should exist in the central - east part of Christchurch Bay. Results from seabed sampling in Velegrakis (1994) indicate a transition in seabed morphology and materials south of Dolphin Bank and Sand. Both banks are characterised by predominantly sandy glauconite-rich sediments with bedforms indicating a net overall westward transport while further offshore, in deeper water, gravel bedform features indicate southward transport, and limonite-rich sediments suggest a possible feed	**Cefas Response:** We welcome the additional discussion and evidence that has been presented. However, we have concerns that the conclusions appear to disagree with the SCOPAC work. It would be good to discuss this further with SCOPAC to see if a consensus can be reached. Further discussion on this issue can be addressed at the site specific EIA stage for areas 122/2, 122/3 and 409.	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA. Suggest that this forms an Appendix to be inserted at the end of the relevant Chapter with appropriate references made in the main text of the MAREA document.	**Issue resolved**	**REA (EIA – 122/2, 122/3 and 409)**	**Included AS Appendix 8A**

			from the nearshore/offshore zone of southwest Wight. Sediment transport between the two areas appears extremely limited, and Velegrakis (1994) concludes that output from Christchurch Bay appears much more likely than input. Work by Dyer (1970), Nicholls (1985), and Velegrakis (1994) also indicate that the major sediment flux appears to be southwest, from Hurst Spit, and feeds the Shingles and Dolphin Banks, and Dolphin Sand via the Needles Channel – and this is represented by transport pathway EO2 in Figure A8.1. SCOPAC (2004) concludes that gravel transport is apparently confined to the Needles Channel and The Shingles Bank. And that the Shingles Bank - and arguably the Dolphin Bank - constitutes a large ebb delta established at the exit of the West Solent. HR Wallingford (2008) also concludes that sediment in this area is unlikely to be transported onshore due to the strength of currents in the nearshore part of Christchurch Bay. East of the Isle of Wight, offshore of Portsmouth and Hayling Island, evidence for sediment feed to the coast from the nearshore banks and for sediment transport from further offshore to the banks is similarly constrained, however there is onshore sediment transport from the ebb tidal deltas at the mouths of Chichester, Langstone and Portsmouth Harbours. Net drift operates primarily westwards and delivers shoreline sediments to the inlets of Chichester, Langstone and Portsmouth Harbours where the sediment is then flushed seaward by tidal currents and stored within large ebb tidal deltas. This sediment may then be driven back ashore from the deltas by wave action. Cycling of shoreline sediments occurs between beaches, tidal inlets and tidal deltas with most materials being stored within the deltas (SCOPAC, 2004). The offshore bank of Horse Tail does not appear to supply sediment onshore to the coast. Harlow (1980) and HR Wallingford (1997) conclude that sediment from the Southsea frontage is transported to Horse Tail Sand and it is probable that Horse and Dean Sand is the sediment sink for the Bracklesham, Hayling and Portsea cell (Harlow, 1980). Supply volumes have not been computed for this pathway but contemporary supply to Horse and Dean Sand is thought to be minimal because: (a) littoral drift is very weak at Southsea, so input to the tidal channel by westward drift must be negligible (Grontmij, 1973; Harlow, 1980; Webber, 1982; Halcrow Maritime, 2000); (b) the entrance and approach channel is frequently dredged to maintain a depth of at least 12 m, thereby entailing output of sediment from the transport pathway. Further east, tidal gyres either side of Selsey Bill may result in transport of sediment towards Medmery Bank. The weight of research studies therefore strongly suggests that sediment is generally moved offshore into the bank areas where it appears to be transported in a shore-parallel direction, and not towards the coast. The exception would appear to be sediment in ebb tidal deltas which cycles between the coast and the deltas. Analysis of sidescan sonar images from the East of the Isle of Wight sub-region, reported in the MAREA supports the hypothesis of limited transport of sediment between the dredging areas and the nearshore banks, and also limited sediment transport between the banks and the coastline. Figures 8.8 and 8.9 in the MAREA show examples of sidescan and sub-bottom profile data crossing Medmery Bank. These clearly indicate a lack of bedforms between the dredging areas and the bank as well as a further lack of bedforms between Medmery Bank and the coast.					
21	**Figure 8.7 - Sediment Transport and Figure 12 in Appendix A – Sediment Flux**	**Cefas Comment**: Figure 8.7 sediment transport and Figure 12 in Appendix A sediment flux. Cross referencing should occur between these figures – to provide more confidence in the model.	**EMU Response:** Figure A8.2 below overlays the inferred sediment transport directions on the outputs of the sediment flux model. In general it shows that where it was possible to infer sediment transport by analysis of bedform asymmetries, these inferred sediment transport directions (dominantly approximately easterly) agree well with areas of identified flux which also tend to extend to the east. This provides confidence that the model outputs are in accordance with natural processes.	**Cefas Response:** OK, we welcome this addition.	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Appendix 8a**

								
22		**Cefas Comment:** Just the 0.3 mm fraction sand was chosen. Evidence is required on this decision.	**EMU Response:** 0.3 mm sand (medium sand) was chosen within the tidal flow and sediment transport models since it will present a worst case footprint scenario. Essentially much of the MAREA region is comprised of (coarser) sandy gravels/gravelly sands. For example the BGS (Wight - Sea Bed Sediments and Quaternary, 1990) conclude that "Over almost the whole area, apart from the eastern Solent and in Poole and Christchurch Bays, the seabed sediments consist of a discontinuous cover of coarse lag deposits less than 0.5 m thick. The lag deposits are mostly gravels and sandy gravels". In practice these coarser sediments will be more difficult to transport than the 0.3 mm sands used in the model, and hence actual changes in sediment transport will be within the envelopes predicted by the model.	**Cefas Response:** OK, we welcome this addition.	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Clarified in modelling chapter section 6.3.2**
Chapter 9. Benthic Ecology								
23 + 24	**Chapter 9 – In general**	**Cefas Comment:** Chapter 9 General. The report currently suffers from a major omission, namely the lack of hypothesis testing in relation to the benthic data. Whilst Table 2.1, (App B_scMAERA Benthic Technical Survey.pdf) clearly shows that sample stations have been assigned to various treatments (e.g. PIZ, SIZ, CIZ, RZ, XRZ), the data do not appear to have been analysed in this way. As such, there is no objective assessment, using the full multivariate dataset, of whether there are differences between these areas. This is key to understanding the effect of aggregate dredging at both the local and the regional level. **Cefas Comment:** Chapter 9 General. In this section, data from the REA and REC data have been combined. However, analyses are	**EMU Response:** Both of these comments relate to the same issue and, therefore, will be dealt with together. Whilst the principal aim of the REA was to collate contemporaneous physical and ecological datasets for assessment of potential cumulative effects EMU appreciates the comment and recognises the opportunity to assess differences between treatments. The following presents the results and interpretations of a series of multivariate analyses undertaken to test the hypothesis that habitats and communities within the influence of dredging are different from reference areas outside the footprint of aggregate extraction. Figure A9.1 below is a MDS ordination of all enumerated grab data from all stations across the region overlaid by the different dredging treatments. No clear separation between samples was discernible. This may be a consequence of the spatially variable nature of the south coast region which may give rise to different communities responding in different ways to different levels of dredging intensity. As such, distinct "impact groups" may not exist at the level of the south coast region and the hypothesis is rejected at this scale.  Figure A9.1: MDS ordination based on Bray Curtis similarity measure. South Coast REA enumerated grab faunal data 4th root	**Cefas Response:** We welcome the additional work undertaken and the analyses presented are informative and go a long way to assessing whether there is an impact on the macrofauna at the regional, and sub-regional level. However, we recommend that this work is taken one step further by repeating the assessment (comparison of different treatments) within each of the broadscale strata identified from the REC. The strata should be based on physical characteristics (e.g. figure 7.4 from S. Coast REC), unless a biotope map can be produced without utilising impacted sampling stations. The rationale for this request is that the lumping of samples from different habitats into each of the impact treatments has the potential to mask possible impacts at the level of individual habitat / biotope. The additional analyses requested will allow this concern to be addressed. In addition, it might identify differences in the sensitivity of the different macrofaunal communities, thus helping to identify where impacts are likely to be of more or less concern. This could really help in the forthcoming licence renewals process, particularly in relation to any possible screening opinions.	**EMU Response:** Agreed - taking the analyses one step further, as described, could help elucidate community differences between treatments within selected broad-scale strata. EMU support the suggestion that this might help categorise the sensitivities of the different communities within each strata. Accordingly, we have undertaken a series of multivariate comparisons (MDS sample ordination and ANOSIM) between treatments (impact categories) within each EUNIS level 3 biotope classification as described in the South Coast REC (see below). The REC high level habitats were selected in preference to REA biotopes in this instance as the latter are largely based on data collected from areas potentially affected by dredging and which may caveat subsequent conclusions. We acknowledge and welcome the advice provided in this respect. This new assessments uses combined REA/REC data (total 211 samples). In response to the secondary query under this comment, previous assessments excluded REC data as the REC sample design was based on a grid pattern for characterisation purposes rather than stratified according to impact category. Therefore, and subject to further RAG comment, the following information and analyses will be incorporated within version 2 of the MAREA and suggest that this be achieved as an Appendix to be inserted at the end of the relevant Chapter. Figure 9.1 illustrates the distribution of REC and REA samples within the classified EUNIS level 3 habitats. Table 9.1 summarises the numbers of samples representing each EUNIS habitat type.	**Cefas Comments:** The additional south coast REA addendum has addressed the comments raised by Cefas (advice dated 26th July 2011), additional analysis have been undertaken and these will be incorporated into a final iteration of the report. The additional work shows no pattern of dredging effects except in sublittoral sand deposits, based on the samples and analysis undertaken. The addendum recognises that there may be many factors masking dredging effects, and this is an important consideration when applying the results to the site specific EIA. The additional work does provide useful results and an improved understanding of the associated communities. However, at the site specific stage additional work will always be required to consider historical impacts on benthic communities, the coarse regional biotope assessments are not suitable to draw robust conclusions on a site specific basis. **JNCC comment:** We welcome the attempt to analyse community differences between treatment groups within selected broad-scale strata. However, it is noted that	**REA + EIA**	**Incorporated as requested as an Appendix 9B and cross reference made in V 2 of the REA doc.** **Cefas comments reflected in the text of the Appendix. Suitable caveats have been applied to the discussion and these can be taken forward to the EIA level.** **Comments addressed in Appendix 9B. Taking into account JNCC's concerns, the data was reviewed again. The analyses of broad strata using the regional approach is unsuitable for more statistical scrutiny due to the complexity of the habitats in the area, targeted nature of resource, inadequate representivity of sample types at the regional level, and an obvious sub-regional bias. To back up discussion, cross reference is made to REA technical report**

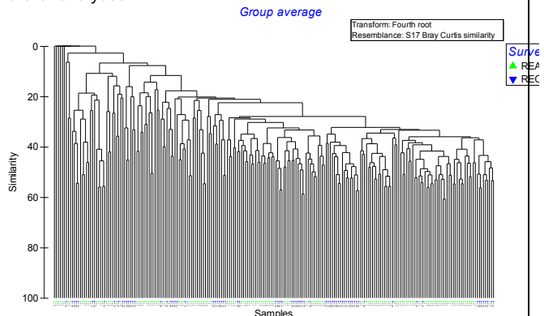
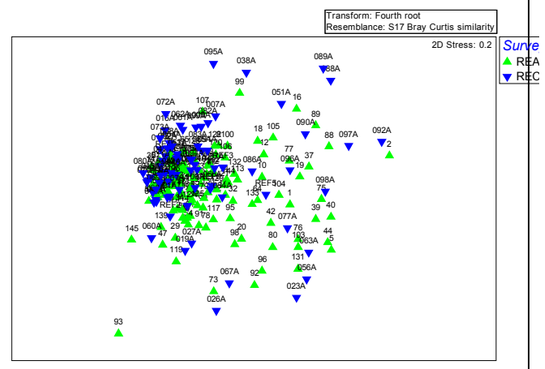
		focused on biotopes. I suggest the combined REC/REA dataset should be analysed following the approach taken in Appendix B Tech report (sample stations assigned to various treatments (e.g. PIZ, SIZ, CIZ, RZ, XRZ)), and the data analysed according to these treatments against testable hypotheses. At the present time, there is no objective assessment, using the full multivariate dataset, of whether there are differences between these areas. Must be addressed at the REA stage – to ensure significance matrices are appropriate.	transformed. In an attempt to overcome the potential spatial variability at regional level, the multivariate analyses were repeated at sub-regional level i.e. West Isle of Wight, East Isle of Wight and Owers areas (see Figures A9.2, A9.3 and A9.4).  Figure A9.2: MDS Ordination of enumerated grab faunal data from the East Isle of Wight sub-region.  Figure A9.3: MDS Ordination of enumerated grab faunal data from the West Isle of Wight sub-region.  Figure A9.4: MDS Ordination of enumerated grab faunal data from the Owers sub-region. Again, no clear separation between sample groupings was observed although a broad separation between samples collected in active dredge areas and cumulative effect areas within the Owers sub-region was apparent. A subsequent ANOSIM test however remained unconvincing (r = 0.418) (see Figure A9.4). Further ANOSIM testing within each sub-region did not identify any significant differences between sample groupings. Comparable multivariate comparisons of sediment particle size data (Euclidean distance) similarly showed no distinct treatment groupings at regional or sub-regional level. EMU has also tested	We would request that the combined REA/REC dataset is used for this analysis. We also request that a table of R-values and associated p-values for the ANOSIM tests complete is provided, and would welcome clarification as to why the combined REA/REC dataset was not used in this assessment? **JNCC Response**: Agree with Cefas' response and this links into JNCC's original comments detailed in point 31.	 **Figure 9.1 Distribution of REA and REC grab samples within EUNIS level 3 habitats.** **Table 9.1 Numbers of grab samples representing each EUNIS habitat type** | EUNIS code | EUNIS Name | No. samples | |---|---|---| | A3.2 | Moderate energy infralittoral rock | 23 | | A3.3 | Low energy infralittoral rock | 5 | | A4.1 | High energy circalittoral rock | 28 | | A4.2 | Moderate energy circalittoral rock | 41 | | A4.4 | Baltic exposed circalittoral rock | 1 | | A5.2 | Sublittoral sand | 22 | | A5.3 | Sublittoral mud | 1 | | A5.4 | Sublittoral mixed sediment | 90 | MDS sample ordinations (data square root transformed) showing sample relationships within each EUNIS habitat type are presented below. Samples are classified according to predicted impact category as described in Technical Annex B. Summary results of an ANOSIM are presented alongside each of the MDS plots. Due to the low number of representative samples no assessment for EUNIS A3.3, A4,4 and A5,3 strata is provided. In general, results fail to show any pattern that might otherwise indicate potential dredging effects. The spread of samples from impacted sites fall largely within the spread of reference and Xreference stations suggesting any dredging effects were comparable to the effects of natural variation (Xreference stations being those stations which fall outside current predicted effects of dredging but may become affected due to the granting of new licences in the future). In addition, sample statistics and global R values were generally such that further investigation of the comparative tests was not warranted, the results of which are presented nevertheless.	assignment of sampling stations to the different broad-scale strata revealed a very low level of replication in some strata and treatment groups; for example, some treatment groups only include one sample point per selected broad-scale strata, e.g. Active and Primary in A3.2 and Primary in A4.1. This will influence the results of the analysis and may restrict certain statistical comparisons. The constraints of the analysis should be discussed in the text. This should include an assessment as to whether the level of replication is adequate to generate sufficient permutations for the global tests and pairwise comparisons to produce statistical significance. If the power of the analysis is not adequate to detect significant differences or if the assumptions of the selected test are not met then the test should not be carried out and alternative approaches should be considered. **JNCC comment:** Of the five strata analysed for differences in community structure between treatments, at least two (A4.1 and A5.2) should have been investigated in more detail based on the global test results (low to mid range values of R and significant levels of $p < 0.003$ and $p < 0.001$, respectively).		**As above.** **On closer inspection, significance values such as those highlighted by JNCC at the regional scale appear to be artefacts of the regional complexity, poor sample representivity with regards to comparable habitat types inside and outside the licence blocks and a clear sub-regional bias to the data.** **The MAREA proposes a site specific level approach for licence blocks contained within the SCMAREA.**

			the semi-quantitative video data within ANOSIM which although it suggested that the Owers sub-region could differ slightly from the east and west Isle of Wight sub-regions (more sandy), showed no separation between treatments. In conclusion, the hypothesis is unsupported and there do not appear to be any differences in communities or sediments from different treatment areas at regional or sub-regional level. The impacts of aggregate extraction have been extensively researched and are well understood with site specificity often emerging as an important factor determining community sensitivity characteristics. Given the high local variability in benthic habitats and associated communities within the south coast region it is likely that a range of different community trends and responses to the effects of dredging exists. As a result, grouping "like for like" samples within treatments at regional and sub-regional levels may not be possible. Furthermore, the variability in dredging intensities across the region introduces additional variability and further confounds sample clustering techniques and associated interpretations. Despite the difficulties in assessing spatial trends future regional monitoring will enable assessment of temporal trends related to dredging activities.		There may be a number of factors overlying dredging effects and which may mask or interfere with the otherwise clear impact patterns including; - differences in depths, salinity and bottom temperatures (thermal stability) at the regional level; - sub-regional differences in community responses to dredging; and - variable fishing (or other) pressures across the south coast aggregate licences. The possible exception to this was the comparison between samples collected from active dredge sites and reference sites in sublittoral sand deposits (EUNIS A5.2) (highlighted below). Both the MDS and ANOSIM suggested a degree of separation between these treatments. (Note that most of the reference samples were collected during the REC survey whilst all of the samples from active dredge zones were collected during REA survey and so temporal differences may be attributable). A SIMPER analysis revealed that the largest contributors to the apparent dissimilarity between treatments were an absence of or reduction in typical sand fauna such as Spiophanes bombyx, Nepthys cirrosa, Nepthys spp., Echinocyamus pusillus, Magelona johnstoni, Bathyporeia spp., Lanice conchilega, Lagis koreni and Opheliidae together with the apparent loss or reduction of other fauna such as Crepidula fornicata, Pomatoceros lamarcki and Balanus crenatus, Spionidae and Ophiuriidae. Conversely, Notomastus spp. and Spisula elliptica had increased in abundance. Impacts of dredging in sand deposits are reasonably well understood (e.g. Poiner & Kennedy, 1984; Sardá et al., 2000) and typically include reductions in species diversity, abundance and biomass compared to reference conditions. Observations are therefore consistent with potential dredging effects although temporal effects need also be considered. The REC and REA surveys employed comparable sampling techniques and so methodological differences between surveys are unlikely. Only 6 samples were collected from sand deposits in actively dredged zones and these were compared with just 12 reference samples. Despite the paucity of samples within this habitat type, the data suggest that assessment and monitoring of effects of dredging in sublittoral sand (EUNIS A5.2) habitats may be undertaken at the regional level although further study with greater sample numbers is warranted. Dredging impacts on other habitat types, however, may be more difficult to discern at the level of the south coast region and may require careful selection of representative reference sites which better replicate the range and local complexities of site level mixed and coarse habitat conditions and community composition than currently achieved. The introduction of standard tools or criteria to appraise acceptability of selected reference stations at site level, such as those adopted by the Comprehensive Studies Task Team during High Natural Dispersion Area (UWWTD) investigations for the water industry may have utility in this regard. Given the apparent lack of evidence of impacts within EUNIS 3 level habitats (with the exception of sublittoral sand habitats), we have also attempted to identify differences between treatments at the biotope level. In this instance we have selected epifaunal (bryozoan and hydroid) dominated biotopes (including XFa, FluHyd and ScupHyd biotopes). These biotope types were selected because they were considered to be more sensitive to primary and secondary dredging effects than those dominated by sediment infauna and so any patterns relating to dredging impacts may be more easily detected.	**JNCC comment:** Examining the pairwise comparison for each broad-scale strata suggests the community differences between treatment groups may not only be present in the sublittoral sand deposits. For example, the pairwise comparison for the high energy circalittoral rock data (A4.1) revealed a mid range value of R (= 0.471) for the Secondary versus XReference comparisons at a significant level of $p < 0.001$ indicating statistically significant differences between these two treatments. The relevance of these results should be discussed in the text. **JNCC comment:** The analyses undertaken for this (and other) REAs raises some question as to the most appropriate ways of assessing historic dredging impacts at regional/sub-regional scale, particularly in the absence of historic datasets (i.e. prior to dredging) and low levels of temporal replication. It also raises the question as to the amount of sampling required to detect predicted impacts at both site specific and regional/sub-regional scale in an environment, such as the South Coast region, that is characterised by a high degree of heterogeneity and complexity in terms of their physical/chemical environment and their biological components. We think this matter requires further discussion between industry, their consultants and RAG members (outside of the REA sign off process). To add confidence in the benthic results presented, it would have been useful if the report had included an assessment of the sensitivity of the statistical techniques that were applied in detecting change at regional and local scale with the data available. **JNCC comment:** The ANOSIM test results for the epifaunal dominated biotopes showed mid-range R-values of 0.586 and 0.527 for the Active versus Reference and the Secondary versus Reference comparisons		**EMU agrees with JNCC comment, more discussion is needed across a variety of groups.** **The issue is very complex and the SC MAREA process does raise questions about the validity and statistical analyses using data from a complex heterogeneous environment with clear sub-regional differences. The issues and concerns were flagged up in the Appendix 9B but not discussed at length within this version of the SCMAREA as the conclusion was that for this region, a site specific approach was recommended as too many confounding factors were acting at the regional level to make any significance statements.** **Acknowledged, indeed, all results should be treated with caution. See discussion above.** **As no firm conclusions were drawn from the analyses, and taking into account the current knowledge of habitat sensitivity from published works, the opinion is that the sensitivities should remain as they were originally set as they were taken from a general consensus about effects on habitats and species from published/industry approved standards by outside parties such as Marlin and from the Genus Traits manual.**

					Again, both the REC and REA datasets were used, compatibility being achieved by classifying all samples within the combined dataset on the basis of the Marine Habitat Classification system (Connor et al., 2004). MDS and summary ANOSIM outputs for epifaunal biotopes are provided below. Only 21 samples were confidently classified to the level of an epifaunal biotope but all impact categories were nevertheless represented. These biotope types were grouped together and subjected to a single MDS ordination and comparative testing via ANOSIM. The resulting MDS ordination (below) did not show any clustering or separation patterns that might otherwise identify any dredging effects - this is supported by the summary ANOSIM data which showed no significant differences between impact categories. The wide separation between samples within the ordination suggested a high degree of biological variability which could have masked dredging effects. *See comment 23, 24 and 31 in SCREA EMU responses 181011 for statistical outputs.*	respectively at significant levels of $p < 0.022$ and $p < 0.012$. However, there is a very low level of replication in the Active and Secondary impact zone so the results should be treated with caution. **JNCC response:** We would welcome clarification from Emu whether the significance statements in relation to historic and potential future impact on benthic habitats have been revisited taking account of the results of the additional benthic analysis.		
25	**Chapter 9 – In general**	**Cefas Comment:** Significant sections of the report present the results of subjective analyses assessing various interactions between human activities and different biological and physical receptors in the form of matrices. Whilst this is not unreasonable (due to the present lack of more routine objective methodology to assess such interactions), it must be clearly understood (and acknowledged in the report) that there remains, in some instances, considerable uncertainty in the conclusions reached.	**EMU Response:** Although not stated within the text, a key component to this assessment has been the application of peer-reviewed biological sensitivity data (to various potential effects of aggregate extraction, such as substratum loss, increased suspended sediment, turbidity) available on the MarLIN website (http://www.marlin.ac.uk/biotic) to the characteristic species of benthic habitats (biotopes) based the Marine nature Conservation Review (MNCR) habitats classification scheme. The marine ALSF-funded genus traits handbook (MES, 2008) was used to provide supporting information on overall effects of dredging and indicators of potential recovery. The genus traits handbook was used as a secondary source of information in order to define potential sensitivity when gaps in the MarLIN data were identified, or where there was a low proportion of biotope characteristic taxa with sensitivity data and hence where there would otherwise have been a relatively high level of uncertainty. This was because the MarLIN dataset provides sensitivities to specific effects (e.g. relating to sediment removal, sediment plume), whereas the Genus traits handbook is limited to estimating sensitivity to overall dredging effects and recoverability. In this way the potential tolerances of recorded biotopes to specific effects of aggregate extraction could be used to identify key sensitivities and potential cumulative effects from models generated by HR Wallingford (HR Wallingford, 2010).	**Cefas Response:** Acknowledged.	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Information provided in RAG response now incorporated into Appendix 9B and V 2 of the MAREA**
26	**Chapter 9 – In general**	**Cefas Comment:** Given the current problems with offshore Marine Habitat classification (see App B_scMAERA Benthic Technical Survey.pdf, page 40, section 3.7), we believe that too much emphasis has been placed on this approach, and the strong conclusion that there are no significant impacts on biotopes should be treated with caution.	**EMU Response:** This significance assessment is aimed at the regional context – and hence spatial resolution plays a big part in the significance level. At local scales, this methodology is more sensitive, highlighting significance that does not show up at regional scales. The methodology (and use of biotopes) therefore allows sensitivity assessments to be made over a range of scales (in this case local, sub-regional and regional scales). The regional scale sensitivity assessment of "little or no significant impacts" fits with what's thought to be happening in the SCREA region as a whole. Obviously, this assessment is tempered by the fact that dredging has been occurring in this area for around 30 years – there is no baseline data upon which a more thorough assessment can be based. In addition, long-term dredging is also likely to have resulted in reduced sensitivities of local benthic habitats to the effects of dredging over time. If no prior dredging had occurred in this region, the assessment would have likely been different. It has been noted that some analyses appear incomplete – this is due to the volume of data derived from this assessment, and therefore it was not appropriate to present all analyses in the final South Coast MAREA document. Only those analyses of direct interest to the final report were provided.	**Cefas Response:** OK, see above in relation to the need for additional analyses to provide a clear indication of whether there are any broadscale regional effects or sensitive communities.	**EMU Response:** See point 23 and 24 above.	**Cefas Comments:** The additional south coast REA addendum has addressed the comments raised by Cefas (advice dated 26th July 2011), additional analysis have been undertaken and these will be incorporated into a final iteration of the report. The additional work shows no pattern of dredging effects except in sublittoral sand deposits, based on the samples and analysis undertaken. The addendum recognises that there may be many factors masking dredging effects, and this is an important consideration when applying the results to the site specific EIA. The additional work does provide useful results and an improved understanding of the associated communities. However, at the site specific stage additional work will always be required to	**EIA**	**Effects on broad scale habitats have been incorporated as requested and are in Appendix 9B.**

						consider historical impacts on benthic communities, the coarse regional biotope assessments are not suitable to draw robust conclusions on a site specific basis.		
27	**Chapter 9 – In general**	**Cefas Comment**: Some explanation is required as to why the MAREA boundary extends further west than REC boundary.	**EMU Response:** The boundaries of the REA region were based on tidal excursion distances, which extend beyond the REC boundary.	**Cefas Response:** OK	**EMU Response:** No further action	**Issue resolved**	**REA**	**No change**
28	**Chapter 9 – in general**	**JNCC Comment:** Biotopes are described that represent low-lying Sabellaria crusts. The report continually describes that these aggregations do not represent Annex I habitat. However, the baseline chapter describes that the survey methodology was not adequate for identifying reef. Therefore it is inconclusive whether reef exists within the survey area.	**EMU Response:** EMU disagrees that the survey methodologies were inadequate for identifying reef. The REA states correctly that historic data reviews and current sampling surveys have not identified *Sabellaria* reef in the region.	**JNCC Response:** Content with response provided	**EMU Response:** No further action	**Issue resolved**	-	**No change**
29	**Section 9.1**	**Natural England Comment:** Section 9.1. Exotic species is better defined as invasive non-native. Also, this is quite a clear statement that surely is supported by some evidence but no references are given?	**EMU Response:** Acknowledged. One invasive, non-native species, has successfully established to an extent that it outcompetes indigenous species causing large scale habitat changes (i.e. the American slipper limpet *Crepidula fornicata*) (Collins and Mallinson, 2000). In the REA study it was found that where present in sufficient numbers, the shells of this species increased sediment complexity and provided attachment sites for various encrusting sessile species such as the bryozoans *Escharella* spp., *Electra pilosa* and *Alcyonidium* spp., *Dendrodoa grossularia*, the sponge *Cliona* sp. and the barnacle *Balanus crenatus* (see Figure A9.5 below). As such, the abundance and diversity of colonial sessile taxa could be enhanced in areas where *Crepidula fornicata* shells are present in sufficient quantity compared to the surrounding seabed. As well as contributing to the coarser elements of sediments, dense aggregations of slipper limpets are also known to increase the fines content of local substrates as a result of the accumulation of pseudofaeces on the seabed (Barnes, Coughlan and Holmes, 1973). The authors allude to habitat change, as characterized by an increase in mud, rendering oyster habitat unsuitable for spat settlement. An example of this may be Reference station 8, located in Christchurch Bay (Figure A9.5). Here dense *Crepidula* was associated with a silty gravelly sand sediment.	**Natural England response:** Content with the revised text.	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Included text in section 9.1.1**

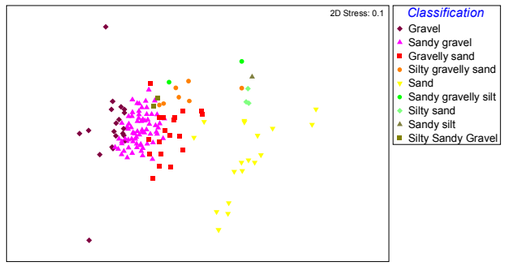
			 Figure A9.5: Seabed image at grab sample station Ref8 (Chistchurch Bay) showing dense slipper limpet shells and associated attaching fauna and silty substrate.					
30	**Section 9.3**	**JNCC Comment:** Section 9.3. A considerable effort has been made by the authors to analyse the benthic data collected during the REC and MAREA surveys (Annex B). Section 9.3 would have benefited from a summary of this analysis.	**EMU Response:** In order to address data gaps, and provide consistency of survey methodology, two major regional surveys were commissioned; the South Coast Regional Environmental Characterisation 2007 (SCREC) conducted by Gardline / MES Ltd and the South Coast Regional Environmental Assessment 2008 (SCREA) conducted by Emu Ltd. Both surveys involved benthic grab sampling for macrofaunal and sediment particle size analyses, 2 m beam trawling and drop-down or towed video work. In order to understand the composition and distribution of the benthic communities across the MAREA region, the raw SCREC and SCREA physical and biological datasets were integrated, rationalised for taxonomic comparability and statistically analysed so they could be treated as one overall survey. The rationalised data were also used as part of the independent SCREA macrobenthic survey technical report.	**JNCC Response:** Content with response provided	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Information provided in RAG response now incorporated into V 2 of the MAREA pg 9.5**
31	**Section 9.3**	**JNCC Comment:** Section 9.3. It would be useful to include a discussion if, at the regional scale, any differences in benthic community composition and structure have been detected between licence areas that have been dredged historically, their plume footprints, and reference sites.	**EMU Response:** The species macro-invertebrate community structure and sediment distributions were investigated by employing a number of univariate and multivariate statistical measures drawn from the PRIMER v6 suite of programs (Clarke and Gorley, 2006; Clarke and Warwick, 2001). Prior to analyses, the faunal grab datasets were rationalised by removing species for which quantitative sampling by grab techniques is not appropriate such as nematodes and zooplankton, and allocating entries denoted by sp. or juv. into the higher taxonomic level. Rationalisation and further reconciliation were also necessary to account for any taxonomic inconsistencies resulting from using different laboratories to analyse the SCREA and SCREC grab samples. Where more detailed speciation was encountered in one dataset, the other was taken up to a matching taxonomic level. This was performed by expert taxonomists with full understanding of current taxonomic nomenclature. This technique reduces the problem of statistical bias driven purely by laboratory differences. The rationalised data were imported into PRIMER and 4th root transformed to down-weight the dominant species taking a much greater account of the less frequently occurring species and allowing the underlying community structure to be assessed. The transformed data were subjected to hierarchical clustering during which the relative similarities between every pair of samples were calculated. Macrofaunal data were compared using the Bray-Curtis similarity measure whilst physical data were compared using the Euclidean distance measure of similarity. Cluster analysis combined with a permutation test (SIMPROF) was used to identify the presence of significant clusters within the dataset which are revealed on a 2 D dendrogram. Calculated pair-wise similarities were then used to group the faunal and sediment samples using a Multi Dimensional Scaling (MDS) plot to highlight the association of significant SIMPROF clusters. The results of PRIMER were used initially to check if the SCREA and SCREC data were comparable post-rationalisation and that no bias between surveys existed that could not be explained	**Cefas Response:** The response does not appear to address the comment provided by JNCC? **JNCC Response:** This point links into point 24, please see Cefas' comments at point 24 for more detailed comments.	**EMU Response:** See points 23 and 24 above.	**Cefas Comments:** The additional south coast REA addendum has addressed the comments raised by Cefas (advice dated 26th July 2011), additional analysis have been undertaken and these will be incorporated into a final iteration of the report. The additional work shows no pattern of dredging effects except in sublittoral sand deposits, based on the samples and analysis undertaken. The addendum recognises that there may be many factors masking dredging effects, and this is an important consideration when applying the results to the site specific EIA. The additional work does provide useful results and an improved understanding of the associated communities. However, at the site specific stage additional work will always be required to consider historical impacts on benthic communities, the coarse regional biotope assessments are not suitable to draw robust conclusions on a site specific basis.	**EIA**	**The rationalisation procedure and methodologies have been incorporated into Appendix 9A and cross referenced in V 2 of the SCMAREA.**

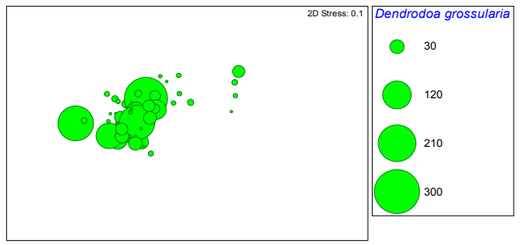
			ecologically. This could be seen from the amount of overlap between sites sampled from the two different surveys (shown in the cluster dendrogram in Figure A9.6 and the corresponding MDS plot in Figure A9.7). From these analyses it was then decided that the species datasets were suitable to be viewed as one in any further analyses.  Figure A9.6: Cluster dendrogram of combined rationalised SCREA and SCREC data.  Figure A9.7: MDS plot of combined rationalised SCREA and SCREC data. The idea of the PRIMER analyses is to identify statistically similar groupings that can be related to actual communities and then classified as to biotope accordingly. However, because of the geographical spread of the samples across the south coast MAREA region and the natural heterogeneity of the sediments across the south coast, the clustering of groups was not deemed adequate for biotoping purposes. To this end, the PRIMER route of allocating biotopes to SIMPER groups was attempted, however the samples were also reviewed independently of each other and using video and sediment data to gain more confidence in biotope allocation. This means that some samples that grouped together were allocated very different biotopes when all environmental information was reviewed. This approach should be considered when using data from a geographically large area covering an extensive number of habitats containing a high degree of local heterogeneity.			
32	**Section 9.3**	**<u>JNCC Comment:</u>** Section 9.3 It is noted that no reference is made to the historic benthic data that were reviewed and analysed in Appendix B. We would have expected these data (where applicable) to be compared with the recent survey data and	**<u>EMU Response:</u>** In terms of detection of potential impacts, direct comparison between previous and current REA survey data is not considered entirely appropriate because of the different scales over which the respective surveys have been undertaken. Whilst sufficient to gain a broad understanding of the benthic ecology and likely gradients of dredging impacts at regional level, the intensity of the sampling undertaken during the current REA was inadequate to provide further insight of dredging related trends at any one particular aggregate licence area. In general, impacts associated with aggregate extraction on benthos have been well documented and assessed over many years both through site specific monitoring and as a result of experimental dredging	**JNCC Response:** Content with the response provided, but this has to be included in the updated version of the version of the South Coast MAREA	**<u>EMU Response:</u>** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Information provided in RAG response now incorporated into V 2 of the MAREA pg 9.1**

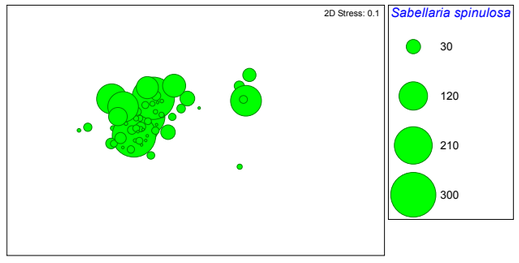
		discussed in the main report to provide further information on potential changes (or not) in and around existing licence areas and over the region as a whole. This information could then have been used to inform the assessment and discussion of how historical impacts compare to potential effects of future dredging considering likely future dredging scenarios. The REA would benefit from presentation of this information or justification as to why it has not being done.	studies in the south coast region. There are also considerable amounts of information on the expected responses of biotopes to a range of physical effects that can be attributed to dredging. As a result, the consequences of future dredging scenarios can be predicted with a degree of confidence as presented within the current study. It is also important to note that the historic data presented in Appendix B is collated from a large number of disparate datasets. This introduces considerable spatial, temporal and methodological variation so that precise interpretations at the broad scale are generally not possible. Appendix B spells this out and states that with regard to historic species abundance data, these span 10 years and so to provide a clear and uncomplicated overview of abundance over the total survey period of the dataset, faunal abundances were presented without indicating trends over time. The value of the REA, together with the REC, is that it avoids the temporal and methodological variations inherent within previous sub-regional and regional investigations providing a reliable baseline picture of the physical and biological trends over the south coast region upon which subsequent regional monitoring programmes can be based. On a site by site or species by species basis, some comparison between historic and current data can be made although the value of this is questionable given the different spatial scales used and the inherent temporal and methodological variations which will caveat firm conclusions. Figure 9.1 of the REA shows that the most intensive sampling has historically occurred within and around Areas 395, 372/1, 372/2, 407, 351, 396, 435 and the complex of sites associated with Area 122 although some limited sampling has taken place in other areas such as application areas 488 and 453, 451 and the 122, 123 & 124 complex of aggregate licences. No historic survey data were available for aggregate sites to the west of the Isle of Wight. Historically, the seabed sediment within the east of the Isle of Wight sub-region has been described as predominantly comprising gravel although these were often bordered by gravelly sands. This highlighted the local variability and gradation of sediment types possibly relating to the mobility of sediments in the gravel dominated central region compared to the sandier sediments further east and in the Owes sub-region. The REA generally confirmed this picture of coarse sediments within the eastern Isle of Wight region and particularly within and around Areas 351, 340 and 122/3 from which the greatest number of REA grab samples were collected. Gravelly sand sediments observed outside the boundaries of licence areas and within the potential cumulative effects of sediment plume movement between 340, 341 and 351 may be consistent with a fining of previously coarser substrates, as a result the re-mobilisation and deposition of fine sediments arising from active dredge areas, although this may equally be an artefact of the current survey design. A programme of regional monitoring against the current baseline is expected to elucidate cumulative effects between aggregate extraction sites. The REA also confirmed the presence of comparatively sandy sediments to the south of Hayling Island, aligning with previous observations. The general eastward movement of mobile sands from Selsey Bill, which would result in sandier sediments in the eastern region and more gravelly sediments to the south of Selsey Bill, was discussed in the review and appears to have been confirmed by the current study. In general, sediments collected from the east of the sample array and in the Owers sub-region comprised more sand than those further west Licence areas 122/1G, 123G & 124/1G, 396, 122/1 and 122/1A were found to comprise sandy and gravelly sand substrates matching previous descriptions of sediment conditions for these areas. Some stations within the Owers sub-region, however also comprised coarser sandy gravel substrates presenting a picture of local heterogeneity. Whilst a coarsening of sediments within active dredge zones is well documented, no dredging related effect can be confirmed in these instances. No evidence of adverse impacts on fauna were detected from comparison of current and historic review data. In response to					

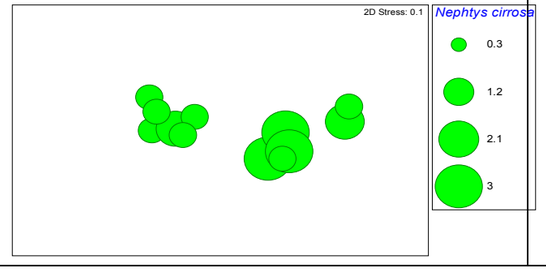
Cefas' first comment concerning the benthic environment, a series of multivariate (clustering & MDS) analyses have been performed to detect trends in psd and faunal data that might be indicative of potential dredging effects. Results were inconclusive and no distinct sample groupings relating to dredging treatments were found.

The distribution of macrofauna appeared to be related to sediment types although correlations (BIOENV & RELATE) were poor suggesting other factors may be attributable in this respect. Sediment/faunal relationships were further explored through the overlay of abundances of key taxa onto the ordination of sediment data (Figure A9.8). This suggested that *Dendrodoa grossularia*, *Sabellaria spinulosa* and *Pomatoceros lamarcki* appear to have a close association with gravel and mixed sand and gravel sediment but were infrequently found in finer grained sand and silty sands.









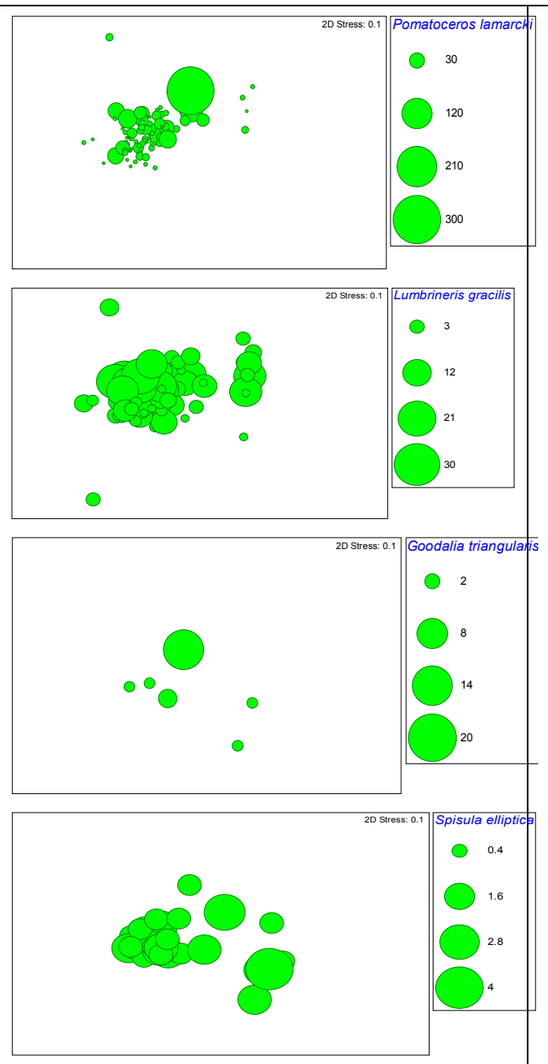
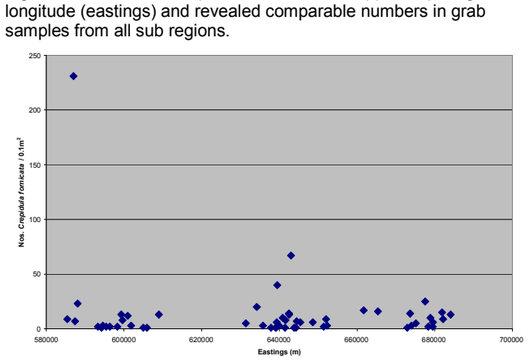


Figure A9.8. Non-transformed species abundances overlaid onto the PC ordination of sediment grab sample data. The plots highlight species preference and avoidance of certain sediment habitat types.

The bivalves *Goodalia triangularis*, *Spisula elliptica* and the cat worm *Nepthys cirrosa* on the other hand showed an apparent avoidance of the coarsest gravel sediments and a preference for gravelly sand and sand sediments. The polychaete *Lumbrineris gracilis* was more cosmopolitan and did not exhibit any sediment preference other than avoidance of the coarse clean sands found west of the Isle of Wight.

Current data showed a zonation of macrofauna across the MAREA study area suggesting the presence of distinct sub-regional communities of infauna. Group G, for example was the dominant community type towards the east of the region around the Owers group of licences and appeared to be exclusive to this general area. It was associated with mixed sand and gravel substrates and was characterised by a comparatively diverse macrofauna including the polychaetes *Lumbrineries gracilis*, *Pomatoceros* spp., *Notomastus* spp. and *Caulleriella alata* together with the barnacle

			Balanus crenatus and the sea urchin, *Echinocyamus pusillus*. Group H, on the other hand was the dominant infaunal community type to the west of the region and was only represented by a few sample stations east of the Isle of Wight. It was not present at the Owers group of licences. Group H comprised predominantly coarser sandy gravel substrates supporting the baked bean sea squirt *Dendrodoa grossularia*, and the polychaetes *Notomastus* spp., *Aonides paucibranchiata* and *Glycera lapidum*. Group D, was another relatively large group of samples and comprised mixed sand and gravel sediments with some small amounts of silt/clay. The macrofauna was the richest and most diverse of any infaunal group and included the polychaetes *Sabellaria spinulosa*, *L. gracilis*, *P. lamarcki*, the sea squirt *D. grossularia* and the bivalve *Nucula nucleus*. This grouping was notably well represented to the east and west of the Isle of Wight but only occurred infrequently at the Owers group of aggregate licences. Group D was differentiated from the principal Owers macrofaunal grouping (Group G) as a result of greater abundances of *Sabellaria spinulosa*, barnacles *Balanus crenatus* and *Verruca stroemia*, sea squirt Dendrodoa grossularia, nut shell Nucula nucleus and keel worm Pomatoceros lamarcki in Group D. These species are typical of coarse gravel substrates and so match the general picture of the distribution of sediment types across the region. The review of historic data showed that the slipper limpet, Crepidula fornicata, was well distributed throughout the survey area and that it had spread well outside of the Solent area, and was now prevalent in this region, out towards the 12-mile limit in places (i.e. to the south of Area 407). REA data generally confirmed the widespread nature of this species as shown in Figure A9.9 below which plots abundance of slipper limpet against longitude (eastings) and revealed comparable numbers in grab samples from all sub regions.  Figure A9.9: Distribution of Crepidula fornicata abundance in grab within the south coast REA region. The REA also generally confirmed earlier observations concerning the distribution of barnacles suggesting that greatest abundances were recorded to the east of the REA area (Figure A9.10). Overall, these barnacles were associated with gravelly sands or sandy gravels. Note that whilst eastern areas comprised generally less gravel, this distribution does partially relates to (but is not limited to) the distribution of *Aequipecten opercularis*, whose shell is a platform for attachment for barnacles. Whilst current sampling methods were not adequate for accurate determination of the distribution of scallop abundance historical records suggested that greatest abundances (no. individuals / m^2) were recorded around License Areas 122/1 A and B, 123 A and B, and 124/1 A and B.			

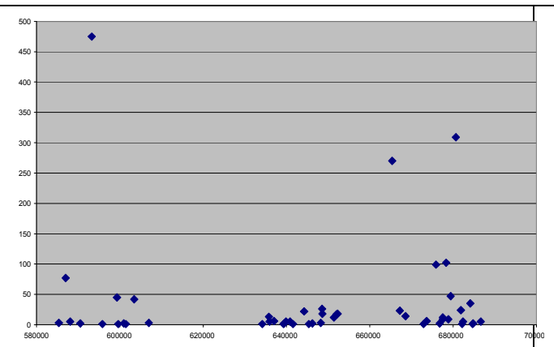


Figure A9.10: Distribution of *Balanus crenatus* abundance in grab samples within the south coast REA region.

Interestingly, the REA did reveal a strong distributional trend for the polychaete *Sabellaria spinulosa*. (Figure A9.11) not apparent from the historical data. Highest numbers were found within the eastern Isle of Wight and Owers sub regions within and around dredging licences. In contrast only low numbers were found within the west IoW sub region. The eastern distribution pattern of *Sabellaria spinulosa* corresponded to the occurrence of Group F at the Owers and east of the Isle of Wight. This faunal grouping was not represented to the west of the Isle of Wight where abundance of *S. spin*ulosa is comparatively low.

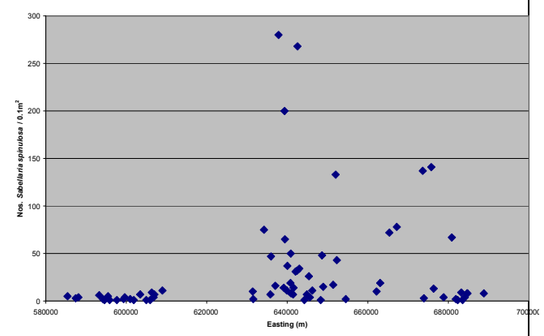


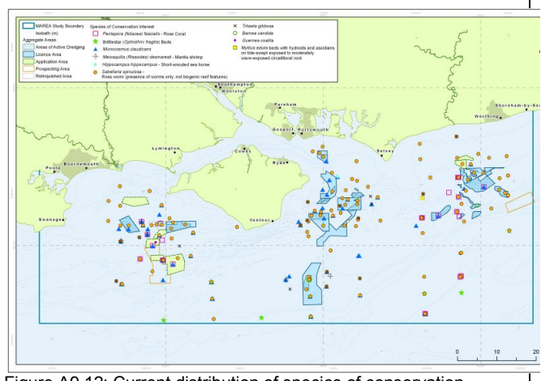
Figure A9.11: Distribution of *Sabellaria spinulosa* abundance in grab samples within the south coast REA region.

Current data showed that *Dendrodoa grossularia* was also distributed unevenly and appeared to exhibit the reciprocal zonation pattern to that of *S. spinulosa*, i.e. densities of this species decreased with increasing distance eastwards. Factors influencing the distribution of this species across the South Coast MAREA study area were unclear it was postulated this may be related to the substrate type available for colonisation, in many cases this sea squirt species was found to be attached to *Crepidula* shell so respective distributions may be correlated. The animal may also reproduce by cloning thus producing localised concentrations which will affect the numbers recorded. Limited larval dispersion and low potential for colonisation of new areas may be a contributing factor.

The REA has improved knowledge of the distribution of the brittlestar *Ophiothrix* spp. which was previously described as exhibiting a patchy distribution over the survey area with greatest abundances occurring to the west of License Area 122/1 A, 123 A and 124/1 A. Current data showed that high densities occurred within and around Area 407 to the south of the study area in numbers indicative of the presence of brittlestar bed habitat.

Further comparison of species abundance data is possible but in

			light of the spatial, temporal and methodological variations, is unlikely to provide further insight on changes in macrobenthos at a regional scale attributable to dredging. Instead, future monitoring against this baseline and following the same methods and design would allow assessment in this respect. Future monitoring could also provide opportunity to develop further additional measure to detect changes in communities. For instance the ratio of the relative proportions of filter /deposit feeders to predator / scavenging species at sampled sites over time might prove a useful index for the measurement of change attributable to dredging relating disturbances.					
33	**Section 9.4 and Figure 9.3**	**JNCC Comment**: Section 9.4 and Figure 9.3. It is understood that the biotope map was derived using REC and SC MAREA survey data only. The intention was to integrate the recent survey data with other extant datasets identified during the literature review to support habitat identification, improve data coverage and refine biotope maps. We would welcome clarification why this has not been done.	**EMU Response:** The BGS seabed sediments chart was used to inform the habitat map (by delimiting habitat extents) as complete coverage geosurvey data were not available, however EMU did not incorporate biological data from historic surveys. The underlying REC and REA principle is the collection and assessment of contemporaneous datasets to establish a physical and ecological baseline at a regional level. Due to the temporal variability of biotopes and biological communities use of extant datasets detracts from this core principle, dilutes final interpretation and assessment through introduction of methodological and temporal variations, and is likely to introduce error into a combined habitat map, confusing the issue rather than clarifying it.	**JNCC Response:** Content with response provided	**EMU Response:** No further action.	**Issue resolved**	**-**	**No change**
34	**Section 9.4**	**Natural England Comment:** Section 9.4. It would be nice if the biotope names and or description were included at least the first time they are mentioned in the text, not just the codes. It makes reading it very confusing other wise and cumbersome looking up all the different biotopes.	**EMU Response:** Acknowledged. This approach will be taken within EMU's East Coast MAREA.	**Natural England response:** Content that the response addresses the issue.	**EMU Response:** No further action	**Issue resolved**	**-**	**No change**
35	**Figure 9.5**	**Natural England Comment:** Figure 9.5 - not clear why this is historic. Clarity required to make sense of the figure – to be addressed in addendum	**EMU Response:** Acknowledged. Figure 9.5 is labelled as "Historic distribution of species and features of conservation interest in the MAREA" since it is based on historic data from all surveys undertaken prior to the 2009 REA/REC surveys.	**Natural England response:** Need clarification that the context of the historic nature of the figure 9.5 will be presented in the final version.	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Information provided in RAG response now incorporated into V 2 of the MAREA Fig 9.5**
36	**Section 9.6.1 Par 5**	**Natural England Comment:** Section 9.6.1 Par 5 says: They apparently still range in sandy muddy mixed sediments, near impacted zones, suggesting that they may not be unduly affected by such activity. This is total supposition supported by no evidence. What if they used to be in high numbers in these areas but are now present but much reduced? Clarity of evidence-base required.	**EMU Response:** EMU acknowledges and concurs with Natural England's comment. However, note that attempts were made to place current observations within a historic context but requests for distributional data were turned down by the Seahorse Trust. EMU's own observations from the current REA, together with other work within the eastern English Channel EEC, have shown that seahorses occur in and around aggregate areas on similar substrates. Based on our own experiences, therefore, it appears that seahorses may not be affected by such activity although we agree that this is difficult to prove in the absence of shared data.	**Natural England response:** The context of this issue needs to be presented within the final version report.	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Text amended** **Information provided in RAG response now incorporated into V 2 of the MAREA pg 9.10**

37	**Section 9.6.4**	**<u>Natural England Comment:</u>** Section 9.6.4. Why are the other species not afforded the same detail as the first two?	**<u>EMU Response:</u>** The extent of detail reported is based on published ecological notes and there is little published information to review. In addition, as the recording of *Barnea* was not confirmed a sub-heading for this species was not appropriate.	**Natural England response:** Content with this response.	**<u>EMU Response:</u>** No further action.	**Issue resolved**	**-**	**No change**
38	**Section 9.6.5**	**<u>Natural England Comment:</u>** Section 9.6.5. The sea squirt's range is quite small hence its conservation status, this need to be made clearer.	**<u>EMU Response:</u>** Acknowledged. The sea squirt or tunicate *Microcosmus claudicans* has a small range and because of this it is regarded as a nationally scarce species and considered a NIMF species. It is worth noting that the reported restricted range of *M. claudicans* by Jackson *et al.* (2007) which was the basis of the designation of a NIMF species was based on publically available datasets and does not include many unpublished datasets that would extend the range of this species beyond official records. Further information on these species at an international level can be found at http://www.sealifebase.org/summary/SpeciesSummary.php?id=55246# which appears to give these animals a much wider distribution pattern.	**Natural England response:** The context of this issue needs to be presented within the final version report.	**<u>EMU Response:</u>** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Text amended** **Information provided in RAG response now incorporated into V 2 of the MAREA pg 9.10**
39	**Chapter 9, Figure 9.6**	**<u>Cefas Comment:</u>** Chapter 9, Figure 9.6. *Mytilus edulis* doesn't appear on the map, but the text suggests it is present?	**<u>EMU Response:</u>** Acknowledged. The figure has been updated and is presented as Figure A9.12 below.  Figure A9.12: Current distribution of species of conservation interest in the MAREA.	**Cefas Response:** OK, we welcome amended figure.	**<u>EMU Response:</u>** Updated figure to be inserted within version 2 of the MAREA.	**Issue resolved**	**REA**	**Amended figure incorporated as 9.6** **Updated plot incorporated into V 2 of the MAREA Fig 9.12**
40	**Section 9.7.3**	**<u>JNCC Comment:</u>** Section 9.7.3. It is stated that underwater imagery revealed a large underwater mound of low lying reef type habitat belonging to CR.HCR.XFa.ByErSp.DysAct including the Ross coral *Pentapora*. Clarification is required on the location and extent of this area.	**<u>EMU Response:</u>** This was recorded as part of the REC survey at site 076A (Figure A9.13) with co-ordinates recorded as Eastings 674541.4 Northings 5607302.7. The REC survey did not provide further information on the extent of the area.  Figure A9.13: Photographic still of Ross coral *Pentapora (foliacea) fascialis* and white anemones *Actinothoe* spp. at REC survey Site 076A.	**JNCC Response:** Content with response provided	**<u>EMU Response:</u>** The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Reference to survey findings amended** **Information provided in RAG response now incorporated into V 2 of the MAREA pg 9.11**
41	**Chapter 9, Section 9.7.4, page 9-11**	**<u>Cefas Comment:</u>** Chapter 9, section 9.7.4., page 9-11, Last paragraph. Sentence beginning "Although…"	**<u>EMU Response</u>:** Acknowledged, and the sentence has been corrected to read: Although the Ross worm is naturally prevalent in the MAREA area and is not protected as a species, *Sabellaria* biogenic reef structures are a conservation issue. These may be associated with aggregate dredging areas where extraction and	**Cefas Response**: OK.	**<u>EMU Response:</u>** The revised sentence provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Amended Information provided in RAG response now incorporated into V 2 of the MAREA**

		doesn't make sense.	screening activities may actually enhance tube construction and reef growth.					
42	**Appendix B Tech Survey, Section 2.2**	**Cefas Comment**: Appendix B Tech survey, section 2.2. The report omits to mention that biological changes result primarily from the removal of sediment and associated fauna.	**EMU Response**: Although not stated outright, this is implicit within the list of dredging effects that have been described and particularly within the first item which states; "that biological changes, occurring as a consequence of physical changes to the sediment attributable to the extraction of marine aggregate will occur in the immediate vicinity of the dredging activity."	**Cefas Response:** OK, we welcome the clarification provided.	**EMU Response:** No further action	**Issue resolved**	**-**	**No change**
43	**Appendix B Tech Survey, Chart B**	**Cefas Comment**: Appendix B Tech survey, Chart B. Dredging in Areas 451 and 122/1G, 123G/124/1G do not appear to have been taken into account. Clarification is required, to take into account for relevant areas.	**EMU Response**: Because of the very low level of activity, these areas were not included in the outputs.	**Cefas Response:** All activity should be accounted for, irrespective of the level due to the potential for cumulative effects	**EMU Response:** Agree that all dredging activity should be accounted for regardless of intensity and frequency due to potential cumulative effects on benthos. Site specific EIAs should include assessment of EMS data to support conclusions in this regard.	**Issue resolved**	**EIA**	**No change**
44	**Appendix B Tech survey, section 2.2, page 7, para 4.**	**Cefas Comment**: Appendix B Tech survey, section 2.2, page 7, para 4. The report states a need to account for plumes arising from spoil disposal and fishing in future assessments. It would seem sensible to address this under 'in-combination' effects.	**EMU Response**: Spoil disposal and fishing are additional activities that will need to be considered during future consideration of potential cumulative effects on benthic ecology. With respect to the former activity, this is only likely to be relevant to a minority of licence areas and is therefore not relevant at a regional scale. The latter activity, however, is more or less ubiquitous across the region although stratified to a certain degree on the basis of seabed type, i.e. trawling over comparatively softer sand and gravel substrates whilst potting for crab and lobster occurs over harder substrates. Of course the actual distinctions are not so clear; crabs are also targeted on areas of sand and gravel associated with female migration pathways whilst whelk pots are distributed across much of the south coast region over a variety of sediment types. Potting, together with netting, however may be regarded as a relatively benign activity within the consideration of potential in combination effects with dredging. Pots and nets do not, by and large, impact significantly on benthic habitats and associated communities. As such these activities may not be required for inclusion within future in-combination assessments and could be screened out. Trawling, on the other hand, may be more damaging in this respect and tracks of beam trawl and otter doors are readily visible on the seafloor using side scan sonar. The extent of this activity, and hence the likely contribution to in-combination effects, is difficult to quantify both spatially and temporally and techniques such as VMS, over-flight and fisheries consultations will be important in attempts to define this. Full coverage acoustic survey may also be used to quantify the extent of benthic impacts as indicated by seabed scaring from demersal gears. Fishing (trawling) may disturb benthic habitats and communities. Although this disturbance is temporary, trawling itself in the region is relentless so the benthos may be in a constant state of perturbation. Fishing is also very wide ranging across the ranging so that seabed habitats and communities throughout the REA region may be affected n this way. This REA has shown that relationship between benthic fauna and substrate habitat type is poor and correlations during BIOENV and RELATE analyses are low. This suggests that other factors may be responsible for the distribution of macrofauna, i.e. sediment instability relating to trawling impacts. Incorporation of fishing (trawling) into in-combination assessments is therefore warranted although it should be noted that current lack of information regarding the spatial and temporal nature of this activity will confound precise appraisal.	**Cefas Response:** OK, all EIAs will require some level of in-combination assessment, this will need to consider fishing,a linkage between the outputs of the site specific fisheries consultation will be useful.	**EMU Response:** Agree that cross linkages with other EIA topics, such as fishing, will be useful to identify and assess potential in-combination effects. The information provided in RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**EIA**	**Information provided in RAG response now incorporated into V 2 of the MAREA**
45	**Appendix B Tech survey,**	**Cefas Comment**: Appendix B Tech	**EMU Response**: The majority of benthic communities found in the South Coast MAREA are **SS.SCS** and **SS.SMx** (Figure 9:3 of the	**Cefas Response:** OK, we welcome the clarification provided.	**EMU Response:** The information provided in RAG response 25th August 2011 will be incorporated within	**Issue resolved**	**REA**	**Information provided in RAG response now incorporated into V**

	section 3.1, page 15, para 1	survey, section 3.1, page 15, para 1. The report states that once the various physical and biological datasets are drawn together within the REA then relationships between palaeolandscapes, gravel seabed habitats and associated macrofauna can be explored. This assessment does not appear to be present within the report.	MAREA). **SS.SCS** represents the 'sublittoral unstable coarse sediments' which occur from the infralittoral zone to the circalittoral at around 30 m. They include coarse sands, gravel, pebbles, shingle and cobbles with low silt content. These areas are unstable as a result of the tidal currents and are characterised by robust fauna. Within the **SS.SCS** areas, biotope complexes were found including **SS.SCS.CCS** - 'circalittoral coarse sediments' and **SS.SCS.ICS** - 'Infralittoral coarse sediment' with derivatives such as **SS.SCS.ICS.Glap** - '*Glycera lapidum* in impoverished infralittoral mobile gravel and sand' and **SS.SCS.CCS.MedLumVen** - '*Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel' and **SS.SCS.CCS.PomB** - '*Pomatoceros triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles'. The gravel biotopes were found to be closely associated with the palaeochannels and adjacent areas. The **SS.SCS.CCS** biotope was closely aligned with the direction of the palaeochannels indicating that the channels have been in-filled by heavier sediments and may be more tide swept because of the topography. They appeared to contain habitats that are fairly homogeneous in character. The **SS.SMx** - 'sublittoral mixed (heterogeneous) sediments' are found from the infralittoral to deeper offshore circalittoral habitats in around 50 m. These habitats occupy the heterogeneous muddy gravelly sands and mosaics of cobbles and pebbles embedded in or lying upon sand, gravel or mud away from the main palaeochannel areas.		version 2 of the MAREA.			**2 of the MAREA pg 9.12**
46	**Appendix B Tech survey, page 63, para 1.**	**<u>Cefas Comment</u>**: Appendix B Tech survey, page 63, para 1. The report highlights a need to assess acoustic data to identify hard substrata (potential Annex 1 reef). These results, if they exist, do not appear to be contained within the report. While these data may not change the overall conclusions of the REA, this is a problem with finalising the REA before review - Not essential to be clarified at REA level but detracts from integrity of the document. Requires determining at EIA stage	**<u>EMU Response</u>**: The report does not highlight the need to assess acoustic data; rather it recognises it as a useful additional task that could be used to identify any areas of potential ecological interest for further survey. This could be done as part of EIA investigations where relevant acoustic data have been collected.	**Cefas Response:** OK, to review as part of EIA investigations – information within the REC may be appropriate.	**<u>EMU Response:</u>** Agree the need to review acoustic data to inform benthic assessment as part of EIA investigations.	**Issue resolved**	**EIA**	**No change**
47	**Appendix B Benthic Historical Survey, Table 2.1.**	**<u>Cefas Comment</u>**: Appendix B Benthic Historical Survey, Table 2.1. Cefas would be happy to make some additional benthic and PSA data available (e.g. Environmental Assessment Reference stations, located to the east of the Isle of Wight; Owers seabed recovery samples).	**<u>EMU Response</u>**: Acknowledged. EMU would be happy to share additional data which will further improve understanding of seabed conditions within the south coast region.	**Cefas Response:** Ok	**<u>EMU Response:</u>** No further action.	**Issue resolved**	**-**	**No change**
Chapter 10. Fish and Shellfish Ecology								
48 + 49	**Section 10**	**<u>Cefas Comment</u>**: This report provides a considered initial approach to describe, on a very broad-scale, the	**<u>EMU Response:</u>** These two comments refer to the same issue. The REA report provides a general overview of the fish ecology across the region incorporating large and small scale datasets. Historically the eastern English Channel (EEC) has been well	**Cefas Response**: There should be better representation of the data used i.e. map(s) of species distributions etc. We agree with the final comment. Beam trawl	**<u>EMU Response:</u>** Recognising the survey limitations, the following provides a characterisation of fish and shellfish assemblages based upon outputs of PRIMER analyses of combined REC and REA 2 m beam trawl data (total 50 samples). Subject to RAG comment, we propose that it,	**Cefas Response:** I'm pleased that the 2m beam trawl data has been incorporated the in to the REA. It must be noted that we recommended that this data were	**EIA and REA**	**Additional text incorporated in Appendix 10a**

		South Coast REA region. It is important to note that only a desk top study has been carried out to gather information, which has provided a general understanding of the region. However, it must be highlighted that this REA assessment is described using this information alone and does not appear to draw upon any of data from current activity EIA's in the region or from epibenthic trawls. No reference or evidence is provided within the fish ecology sections that demonstrate that the data from the REC and REA surveys have been used in characterising the fish community in this region. Also, it does not appear that other publically available survey data (such as the Cefas Eastern English Channel groundfish survey) have been incorporated. We must emphasise that survey data must therefore be used within site specific assessments to inform an EIA and to assess any impact of activities. Alternatively this information could be assessed as part of an addendum. **Cefas Comment:** Section 10. Only a desk study was undertaken. No data from epibenthic trawls from REA or REC. No data from site specific EIAs or monitoring. No data from sources such as the Eastern English Channel groundfish survey – therefore there are no data to verify the desk study	documented in terms of its fish ecology due to interest from commercial fisheries and the aggregate extraction industry. These have resulted in several large scale long term datasets pertaining areas of sensitivity and species of commercial value. Broad scale ecological sensitivity maps produced by Coull *et al.* (1998) and more recently updated by Ellis *et al.* (2010) indicate 17 species with spawning and/ or nursery grounds within the region. Although appearing comprehensive Ellis *et al.* (2010) state the data are in many cases limited or of questionable quality due to issues on gear selectivity, the timings and locations of surveys, and taxonomic identification in surveys. It is therefore recommended to consider these maps as interpretational tools for allowing a reasonable appreciation of the sensitivities within the region. The South Coast MAREA report draws upon these interpretations to highlight those species while addressing temporal and spatial sensitivities of the MAREA region. To further supplement the level of confidence additional long term studies can be utilised. In 1989 Cefas initiated a sampling programme independent of commercial fisheries. This set out to better describe the distribution and relative abundance of groundfish, including juveniles, and further biological sampling of commercial species covering the EEC (ICES division VIId). A total of 33 species representing flatfish, gadoids, elasmobranchs, other non-commercial species and shellfish were sampled over an 8 year period. Results provide an indication of seasonal changes in distribution while providing a more comprehensive assessment of the areas importance by distinguishing juvenile and adult populations. There remain a number of limitations to groundfish studies when considering the wider fisheries community. Key commercial and ecological species such as herring *Clupea harengus* and mackerel *Scomber scombrus* are effectively ruled out due to gear selectivity. In the report 'Biogeographical identification of English Channel fish and shellfish stock' Pawson (1995) makes light of the infrequent assessment of groundfish studies deriving indices from various other surveys run at different times of the year. Pawson (1995) goes on to describe 22 commercial fish and shellfish species found within the South Coast MAREA region. The report identifies bass, cod, edible crab, herring, mackerel, plaice, scallop, sole and spurdog as having enough biological data to understand their regional life history in enough detail to permit management on a stock-by-stock basis. Biological data on the remaining species is acknowledged to be poor. Pawson's findings support the South Coast MAREA results by inferring similar species assemblages and habitat utilisation. The MAREA then goes further by drawing upon recent datasets such as those outlined in the REC and offering consideration to additional species such as brill, turbot, dab, sandeel and mullets. Additionally the MAREA supports the more comprehensive shellfish list outlined in the REC report. These large scale datasets are in themselves broad and may miss site specific details a small-scale dataset can provide. The South Coast MAREA also utilises a number of small scale datasets focused on specified areas of the EEC and collected as part of the Eastern English Channel MAREA. These data were based on 2 m scientific beam trawling to provide a baseline from which a total of 25 commercial and non-commercial fish and shellfish species were identified. Environmental Impact Assessments (EIA) and monitoring studies have since mapped several spawning sites of black bream to the east of the South Coast MAREA region and these data are also drawn upon. Continued monitoring shows these are well-established spawning populations and are referenced in the South Coast MAREA report. It is recognised that the need to augment both large and small scale datasets into the MAREA to produce a robust analysis of the regional population is essential. However such site level work will continue after issue of the MAREA and will continue to help further improve understanding of the fish resources within the south coast region and their relationships with dredging.	data was collected as part of the REA (comment 64). Therefore this data should be analysed to add to the characterisation of the area	together with the other information provided within RAG response 25th August 2011, be inserted as an Appendix at the end of the relevant Chapter to enhance version 2 of the MAREA. Combining the REC and REA datasets revealed a total of forty five fish and shellfish taxa that were recorded in2 m beam trawl samples. Table 10.1 presents the ranked abundance of the top 15 most numerous taxa found together with their frequency of occurrence. Table 10.1. Top 15 most abundant taxa and respective frequency of occurrence recorded in combined REC / REA 2 m beam trawls. **Taxon** / **No. individuals** / **% frequency occurrence (n=50)** *Pandalina brevirostris* 3390 70 *Aequipecten opercularis* 1272 82 *Pandalus montagui* 988 32 Crangonidae (all brown shrimps) 1168 54 Gobiidae 581 76 *Callionymus lyra* 275 76 *Trisopterus luscus* 65 28 Majidae 64 52 *Sepiola atlantica* 55 42 *Trisopterus* 42 10 *Liparis liparis* 41 32 *Trisopterus minutus* 39 34 *Ctenolabrus rupestris* 30 2 *Echiichthys vipera* 29 10 *Ammodytes marina* 21 8 Conspicuous taxa in trawls included the shrimps *Pandalina brevirostris*, Gobies, the queen scallop *Aequipecten opercularis* and dragonet *Callionymus lyra* all of which occurred in 70% of the trawl samples or more. Brown shrimps Crangonidae, spider crabs, Majaidae and cuttlefish *Sepiola atlantica* were also relatively frequently recorded being present in around half the trawl samples collected. Despite being found in relatively high numbers, a number of species were only recorded in one or a few trawls suggesting an uneven distribution across the region. To investigate this a little more closely, the REA (see Technical Appendix B) plotted abundance of selected fish and shellfish against latitude to reveal any potential distributional trends across the study area (see Figure 10.1 below). A number of observations were made as follows; - overall, and with regard to the species selected, abundance appears to be reduced within the central area of the region compared to eastern and western parts; - the figure highlights a general trend of increasing numbers of brown shrimp (Crangonidae) with increasing distance eastwards; - there is single high peak in the abundance of pink shrimp *Pandalus montagui* in the western portion of the region. This related to a single catch of abundant pink shrimps in Trawl sample T18 comprising 80% of the total population of pink shrimp sampled within the study area and;	included to give further detail to what was a description based on a desk top exercise alone. However, as previously pointed out, it needs to be recognised that 2m beam data will only provide a partial description and will not adequately describe all fish and shellfish (particularly adults), therefore it is unlikely that the data will be suitable to fully inform site specific EIAs. However, it may be possible to assess whether/what further data are necessary for each application on a case-by-case basis. Further it is important that the data limitations are acknowledged in the REA.		

- despite among the top 15 most abundant fish species, the Goldsinny wrasse (*Ctenolabrus rupestris),* was only found at a single location corresponding to a shallow water site west of the Hooe Bank. Observations of the trawl contents showed that this area was associated with mussels and dense erect bryozoans such as *Flustra foliacea* and ross coral, *Pentapora fascialis*. Length measurements recorded in the field indicated that the wrasse included adults as well as juveniles suggesting that this area may be important to different life stages of this species.

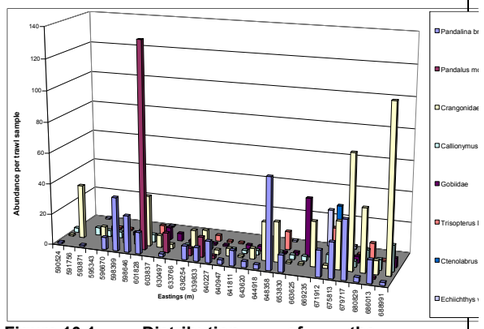


Figure 10.1 **Distribution of the abundance of selected fish and shellfish species collected from the 2 m beam trawl samples (REA data).**

Brown crab (*Cancer pagurus*) and lobster were not generally found within trawl samples as this technique is generally not amenable to the sampling of these species. Six individuals of crab were however, caught in REA trawls 9 and 10 located to the east of the Isle of Wight and south of Selsey Bill. This area corresponds to the local potting grounds and the "hen crab run" migration route identified by Terry Plumb (1996) and reported in Cooper (2005). A further three individuals were also caught within REA trawl sample 12 collected from the active dredging zone at Area 407. EIAs will need to include consultation with local fishing industry representatives to identify important commercial areas / crab and lobster distributional patterns.

Multivariate classification and sorting of the beam trawl samples identified 3 main groupings (groups c, d and e) together with two outlier samples (a and b) (see Figure 10.2). The distribution of the 2 m beam trawl groups is shown in Figure 10.3.

The largest group (group e) contained all of the REA samples and a small number of samples collected as part of the REC survey. It was the dominant group at the Owers and East of the Isle of Wight aggregate licences and co-dominant at the west of the Isle of Wight licences. Characterising taxa, identified using SIMPER (Table 10.2), included queen scallop, shrimps P*andalina brevirostris*, Crangon allmanni, Philocheras sp., dragonet, spider crabs (Majaidae) and cuttlefish (*Sepiola atlantica*).

Group d was largely distributed to the south and east of the study area. SIMPER analysis (Table 10.2) showed that it shared a similar suite of species as group e and that separation between these two sample groupings was attributable to differences in the abundance of conspicuous taxa, scallops and dragonet.

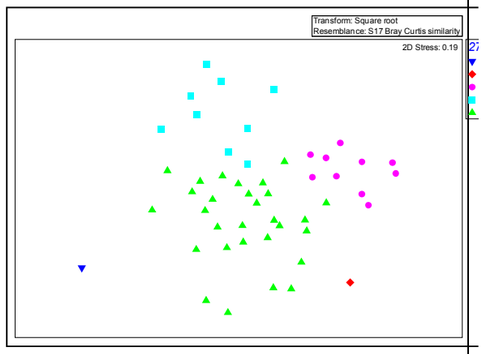


Figure 10.2. MDS ordination of combined REC and REA samples (sqrt transformed)

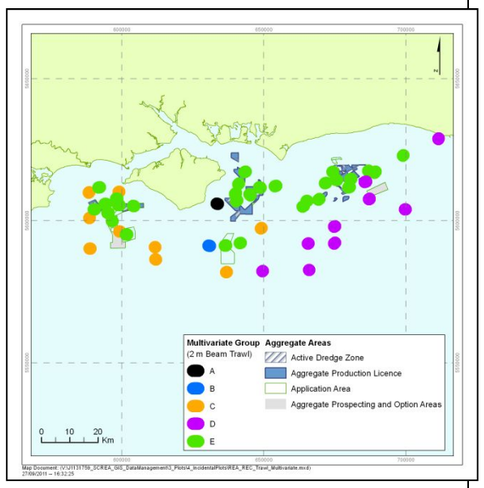


Figure 10.3. Distribution of multivariate groupings (fish and shellfish beam trawl data)

Group c was distributed to the south and west of the region and was characterised by the shrimps *P. brevirostris and Pandalus montagui* together with queen scallops.

Groups a and b comprised one trawl sample each. These trawls were particularly impoverished in terms of the fish and shellfish caught and they may therefore represent low diversity variants of the assemblages identified elsewhere within the south coast region. Group A for example only contained one individual of goby and one individual pink shrimp, *P. montagui*. Field observations taken at the time of collection indicated that the trawl sample contained a number of boulders. This may have reduced fishing efficiency at this location resulting in a comparatively reduced catch. Group B was a little richer but the sample still only contained just 18 individuals of shrimp and 5 gobies. It is unclear whether ground conditions would have reduced fishing efficiency. Conclusions regarding habitat / assemblage differences and potential dredging effects are limited on the basis of single sample data. EIAs will include consideration of licence monitoring data

					as part of the determination of the significance of any impacts of dredging on fish and shellfish. **Table 10.2. Summary SIMPER analysis of combined REA & REC 2 m beam trawl data (species contributing to the top 90% internal group similarity).** Group c — Average similarity: 59.80 Species / Av.Abund: *Pandalina brevirostris* 16.85; *Pandalus montagui* 6.45; *Aequipecten opercularis* 2.18 Group d — Average similarity: 44.25 Species / Av.Abund: *Aequipecten opercularis* 9.25; *Callionymus lyra* 1.14; *Liparis liparis* 0.74 Group — Average simila Species: *Aequipecten opercularis*; *Callionymus lyra*; *Pandalina brevirostris*; *Crangon allmanni*; Majidae; *Philocheras*; *Sepiola atlantica*			
50		**Cefas Comment:** Resolution may not be adequate for site specific issues, thus site specific assessments (drawing in all available survey data, either from the addendum or separately for each EIA) will be needed to inform an EIA - especially as spawning/nursery areas can change. Spatial overlaps can change, so borders of areas will need to be considered at a site specific level. Most of our commercial fishery concerns are answered by the consultation with industry during every site specific EIA.	**EMU Response:** EMU and the SCDA accept that current level of data resolution will not be adequate for assessment at the site specific, full EIA, level. This has been acknowledged within the MAREA Final Summary and Conclusions (Chapter 30) where it has been proposed that site-specific assessments, including up to date fisheries statistics data for the relevant ICES squares should be made at EIA level for all licence areas, however the mobile and wide ranging nature of fisheries will present a degree of uncertainty as to the temporal and spatial variability of fish assemblages at site level and necessitate consideration within a regional context. Indeed, it is because of the uncertainties at site level that we believe the REA (and addendum) has considerable value and utility, i.e. spawning and nursery areas cover the entire region in many cases as shown by the recent mapping and updates to the Coull *et al.* (1998) sensitivity maps (Defra, MB5301, 2010), and commercial fisheries activities are, in general, common throughout the south coast area. We feel, therefore, that it is appropriate to consider these receptors at a broader scale and at the level at which they are distributed. We consider that the REA and addendum achieve this and provide a broad understanding of the commercial fisheries and fish resources across the region and that they will continue to provide an important regional perspective to inform EIAs undertaken within the south coast group of licences. As well as the REA, the new sensitivity maps will remain essential reference material in determining potential interaction with spawning and nursery areas during site EIAs and bringing these data layers into a GIS will continue to be an important assessment technique for assessment of potential effects. We acknowledge that the importance of discrete areas within a fish's normal spawning/nursery range may change over time and this will need to be reviewed as part of site EIA work. We recognise that new data on fisheries and shellfisheries ecology are continually emerging and that important fish and shell fish areas are subject to revision (see also response to crab comment below). Again, this will continue to be addressed as part of normal EIA processes. Finally, we note that in addition to the more general broad ranging fish and shellfish issues, there are some site specific fisheries issues i.e. black bream spawning areas within inshore areas between Selsey and Worthing, but these are well documented and are identified through normal consultation processes during typical EIA investigations. Data sources, assessment methodologies and consultation processes will continue to be an important part of scoping exercises prior to each EIA and we welcome continued dialogue with regulators and stakeholders during this period to ensure that the most appropriate information and techniques are implemented and that all concerns are addressed.	**Cefas Response:** Agree that information will need to be reviewed.	**EMU Response:** No further action.	**Issue resolved**	**EIA**	**No change**
51		**Cefas Comment:** At the site specific EIA level a review of current information for the	**EMU Response:** EMU welcomes sharing of methodologies and recognises the value of a consistent approach across the aggregate regions. Site level consultation with industry and regulators will continue to be an important component of site level	**Cefas Response:** EMU probably need to take the initiative on this.	**EMU Response:** No further action with respect to current MAREA activities. However, EMU will look at adopting / further developing industry standard methodologies in conjunction with other consultancies, regulators and	**Cefas comments -** we commented that each EIA should provide a review of current information and this should include	**EIA**	**No change**

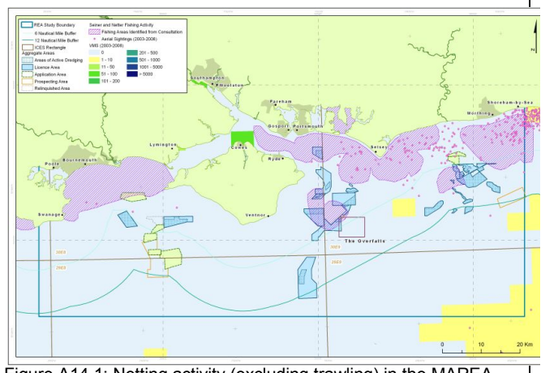
		site/area is expected, including a full consultation with local fishing industry to identify fisheries carried out within and surrounding the site. Recent commercial fisheries data should be presented and can be compared with the REA to highlight similarities or differences from the REA. It is noted that ERM has submitted a methodology for addressing fisheries issues within the site specific EIA in the Thames region (received 17/01/11) which Cefas has responded to separately and this may be of use for the EMU fisheries surveys.	investigations to ensure sufficient level and most recent local data are used in EIAs.		dredging operators as part of the process of continual improvement.	full consultation with the local fishing industry. We would encourage further development to improve and maintain communication with local fishing industries. In addition, we recommend that REA data are reviewed regularly to keep information as up-to-date as possible.		
52		**Cefas Comment:** Edible crabs need to be reassessed at the EIA level. Crabs will spawn and incubate their eggs on gravel banks and at this point are relatively immobile and vulnerable.	**EMU Response:** The assessment of brown crabs spawning at EIA level is an appropriate measure where feasible, however while knowledge of spawning areas and behaviour is available, it may not necessarily answer the detailed questions required for EIA level considerations. Laboratory studies have shown that brown crab are suggested to prefer gravel habitats as spawning areas (Edwards, 1979), and information presented by Cooper (2005) indicated an accumulation of suspected gravel spawning and migration areas east of the Isle of Wight. However, further work has also concluded that there is no reason to suggest that crabs would not spawn in sandy gravel substrates (e.g. at Bullock Bank and Hastings Shingle Banks) where early stage crab larvae have been recorded (Defra, 2004). Furthermore data considering migration routes and spawning activities are associated with a degree of uncertainty. Historical research suggests that brown crab migrate through the English Channel with results indicating that they move to the west, e.g. off Devon (see: Brown and Bennett, 1980; Bennett and Brown, 1983). Research also suggests that they take advantage of the prevailing return current to move larvae back to East Channel habitats. However, more recently Defra project MF0227 (2004) called into question the perception regarding English Channel brown crab stock structure, highlighting hydrographic conditions which are considered insufficient to allow larvae to drift back eastwards fast enough to presumed areas of maternal origin (see also Cefas, 2010). In addition, female return migration has recently been suggested; potentially further complicating migration perceptions (Defra, 2008). We note that Defra states that, "the availability of these preferred substrates is probably not the single, limiting factor determining the distribution of the main crab spawning grounds and there are probably other factors at work" (Defra MF0227, 2004). The spatial uncertainty associated with brown crab migration routes and spawning areas result in the associated difficultly of assessing impacts at EIA level. Sheehy and Prior (2005) noted that "improved spatial and physiological resolution of population data is a key requirement for achieving ecosystem wide management. Most of these areas can only be properly addressed with age-based data". As noted by Cefas (Cefas, 2010) the larval drift data indicate the possibility of separate populations in the English Channel (Cefas, 2010). Their research is ongoing and may further elucidate the status of migration and spawning areas in the English Channel which currently are not appropriate for detailed EIA analysis. Site specific surveys at the EIA level may provide information on specific local brown crab populations, however assessment of such populations is acknowledged as problematic. Furthermore contextualising this information to the regional scale when knowledge and actual crab population	**Cefas Response:** In general we welcome the additional evidence and discussion that has been provided and agree with the comments made, except in one or two instances. Ref to MF0227 – disagree with interpretation, , as females moving west have been seen to take a long time, and are spawning in a number of areas before reaching the larger spawning areas to the west and spawning during the westward migration allows larvae to drift back eastwards. Disagree with female return migration comment – we are hardly seeing any easterly movement. To move forward for site specific EIAs – as noted sampling is problematic, 2m beam trawls are not an ideal method, but any existing results/data should be used. However, a target site specific approach should be applied and this is best achieved through targeting fishing consultation. In some areas major crab fisheries target the pre-spawning crab stocks. At the pre-spawning stage females have been seen to aggregate, this may be substrate preference or good feeding grounds, but these aggregations are targeted by fishing effort. Therefore commercial activity is a good indication of important aggregations and spawning locations. At the site specific EIA stage, consultation with local fishing industry should be undertaken to identify the locations of crab fishing activity as a potential indicator of pre-spawning aggregations noting that this in not the only spawning indicator and	**EMU Response:** Acknowledge comments regarding interpretation of Defra research paper MF0227. Agree and appreciate advice concerning EIA investigations and recognise value in effective consultation with local fishers and organisations. We would welcome further discussion with Cefas to explore potential advantages of completing fisheries assessments at a regional/sub-regional level which may avoid fisher/stakeholder overload associated with the many licence areas in the south coast region and which may better assess this wide ranging and mobile receptor. We propose to incorporate the information provided in the RAG response 25th August 2011, subject to caveats re female return migration, into version 2 of the MAREA.	**Issue resolved**	**REA and EIA**	**Incorporated into Appendix 10a**

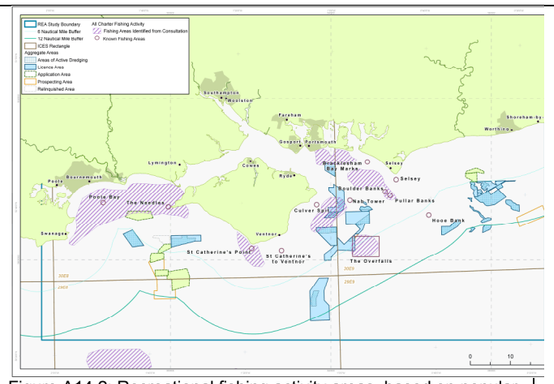
			distribution are at best patchy leaves conclusions open to potential misinterpretation. Thus regional level assessment is a reasonable approach based on the data currently available.	needs to be considered on a site specific scale,.				
53	**Section 10.2**	**Cefas Comment:** Section 10.2. The following statement is not necessarily true. 'Filter feeders like the scallop, for example, inhabit raised areas of seabed where faster bottom currents favour their particular feeding and reproductive habits. '	**EMU Response:** Acknowledged. The comment relates to filter feeders (with the scallop as an example) which generally do inhabit these conditions. EMU acknowledges and notes your specific comments regarding other scallop areas. This will be taken into account, if relevant, for individual licence area EIAs.	**Cefas Response:** OK.	**EMU Response:** No further action.	**Issue resolved**	**EIA**	**No change**
54	**Table 10-1**	**Cefas Comment:** Table 10-1. Evidence suggests that most edible crab spawn around the end of November and into December and incubate eggs until the following April-June. However, there may be some residual spawning and incubation throughout the year.	**EMU Response**: Edible crab in the English Channel are believed to undergo a westerly autumn migration towards offshore spawning grounds. Spawning generally occurs during winter months (Oct – Nov) prior to a relatively sedentary over-wintering period and release of larvae in spring. Larval release is thought to be temperature (sea water) dependant with release occurring earlier in the western channel compared to eastern Channel areas. Some residual spawning may occur all year round.	**Cefas Response:** OK.	**EMU Response:** The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Text added to box on page 10.9**
55	**Table 10-1**	**Cefas Comment**: Table 10-1. The reduced spawning activity given is broadly is appropriate for lobsters which tend to spawn in September and incubate the eggs for around 9 months until the following April-May.	**EMU Response**: EMU concurs that lobster generally spawn in September, incubating eggs until the following spring.	**Cefas Response:** OK.	**EMU Response:** The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Added to box for common lobster on page 10.9**
56	**Table 10-1**	**Cefas Comment**: Table 10-1 There are commercial fisheries for manilla clam (e.g. Poole harbour), spider crabs and velvet crabs may also be targeted commercially at times. Spurdog are also a species of commercial importance, although now heavily regulated. Cockles and mussels are also important commercial species. If the commercial importance relates only to local fisheries then this should be stated.	**EMU Response:** A manilla clam fishery is established in Poole Harbour following introduction of this species here. This fishery is unlikely to interact with dredging in the south coast region. Spider crab and velvet crab may also be exploited commercially within the region. Shore crab may also be taken for bait in whelk pots. Cockles and mussels are taken generally from inshore and harbour areas and are unlikely to be affected by dredging activities. Seed mussel is taken from Hooe Back to be relaid in Langstone Harbour. Again, no significant interaction with dredging is predicted.	**Cefas Response:** OK, but no response regarding Spurdog – this should be picked up in the site specific fisheries consultation.	**EMU Response:** The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Cefas Comments -** there seems to be no further comments regarding spurdog so, as per previous advice, this will need to be picked up at the site specific fisheries consultation.	**REA + EIA**	**Table amended to show species of commercial importance**
57	**Section 10.6**	**Natural England Comment:** Section 10.6. Expect to see a section within the fish ecology sections that makes inferences upon the sensitivity of a particular species to aggregate dredging e.g.- sandeel – habitat removal = highly sensitive or black seabream nests – habitat removal = highly sensitive.	**EMU Response:** This has not been undertaken for any other receptor within the baseline sections and to maintain consistency with the rest of the document we do not propose that this should be done for the fish ecology baseline. Sensitivity values will, however, be produced for the Fish Ecology receptors – see Chapter 21 addendum below.	**Natural England response:** Content with the response. Though need to refer to Natural England's and Cefas' responses considering the sensitivity assessments for fish ecology receptors – see Chapter 21 addendum below.	**EMU Response:** No further action.	**Issue resolved**	**-**	**No change**

58	**Section 10.6**	**Natural England Comment:** Section 10.6. Do not like the use of the word sensitivity in the fish sections which are then followed up by statements such as "common lobster is a species of commercial importance in the MAREA and is protected by a minimum landing size regulation". How are these sensitive or potentially sensitive to the effects of aggregate dredging?	**EMU Response:** Acknowledged. EMU concurs with the comment and the Fish Ecology and Distribution section of the East Coast REA will be amended to remove the use of the term sensitivity in this context.	**Natural England response:** Content with the response.	**EMU Response:** No further action.	**MMO Response:** Can the context in which the term sensitivity is used be addressed in this ES as MAREA Version 2 is being produced.	**REA**	**Amended to term value**
59	**Section 10.6**	**Cefas Comment:** Section 10.6. Mullet species: It would be sensible to separate the grey mullets from red mullet since they have widely differing biology.	**EMU Response:** Acknowledged. This will be done for future REAs where these species are present.	**Cefas Response:** OK.	**EMU Response:** No further action.	**MMO Response:** Since a 2nd Version of the MAREA is being produced can this separation be carried out.	**REA**	**No change**
60	**Section 10.6**	**Cefas Comment:** Section 10.6. Native oyster: It could also be mentioned that the major fishery in the Solent that has currently declined to very low levels.	**EMU Response:** Acknowledged, however whilst in decline, oysters in the Solent are not thought to interact with dredging activities in the south coast region.	**Cefas Response:** OK.	**EMU Response:** No further action.	**Issue resolved**	**-**	**Amended in oyster box on page 10.10**
61	**Section 10.6.**	**Natural England Comment:** Section 10.6. Squid is a commercial species of relatively minor importance in the MAREA? Minor to who? Perhaps something more quantitative here – represent <X% of commercial fish, shellfish and cephalopod landings.	**EMU Response:** Acknowledged. Squid is not listed by the Defra Fisheries Statistics Unit as being one of the top eight commercially important species (by mean value / tonne) within the MAREA region.	**Natural England response:** Content with the response	**EMU Response:** The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Amended in squid box on page 10.10**
62 + 63	**Section 10.7**	**Cefas Comment:** Section 10.7. States that 'A total of 28 commercial fish and shellfish species are present within the MAREA region' this is quite precise and gives the impression that no other species are present. It would be better to say that a total of 28 species have been identified from the data available.] **Natural England comment:** Section 10.7. A total of 28 commercial fish and shellfish are present but before it was stated over 60 species in the region – give conservation status that	**EMU Response:** These two comments relate to the same issue. EMU acknowledges that this is confusing and may give the impression that no other species are present. The section has been redrafted to read Table 10.1 indicates that more than 60 species of fish and shellfish have been identified in the South Coast MAREA region. Of these, 28 species of commercial importance have been identified from the available data.	**Cefas Response:** OK – will an updated (electronic) version of the REA be published? **Natural England response:** Content with the response.	**EMU Response:** The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Updated in Section 10.7**

		same weighting as commercial value						
64	**Section 10.7**	**Natural England Comment:** Section 10.7. This is not a baseline. It just says which fish (which is selective by this report) are in the area. By calling it a baseline suggests that someone would be able to use this document and detect change in fish/shellfish ecology in the MAREA as a result of dredging activity. Needs to be acknowledged within the report.	**EMU Response**: The overall MAREA document was intended as a baseline. Spawning and nursery areas are discussed as part of the consideration of the baseline situation for fish ecology. Effects on these receptors are typically, inherently subjective but informed by spatial analyses which identify potential overlaps and interactions. If a quantitative assessment is required then this can be achieved through comparison of 2 m beam trawl data collected as part of the benthic survey investigations.	**Cefas Response:** Why was the 2m beam trawl data not used in the REA? This is such valuable information – particularly for the benthic characterisation. A baseline needs to be represented by data, however, we refer to the REA as a characterisation, the baseline is for future monitoring to be compared to, the data collected for the REA is not suitable to inform statistically robust monitoring. The 2m beam data specified here should be presented. However, this survey method would not adequately describe all fish and shellfish and these limitations need to be acknowledged. The information presented gives a characterisation of the area. A baseline can be obtained for specific sites. **Natural England response:** Would be useful to present the fact that there is data available to allow a robust baseline determination. This, when linked with the revision below will address the point 64 raised by Natural England.	**EMU Response:** See response to comment 48 & 49 above.	**Cefas Response:** I'm pleased that the 2m beam trawl data has been incorporated the in to the REA. It must be noted that we recommended that this data were included to give further detail to what was a description based on a desk top exercise alone. However, as previously pointed out, it needs to be recognised that 2m beam data will only provide a partial description and will not adequately describe all fish and shellfish (particularly adults), therefore it is unlikely that the data will be suitable to fully inform site specific EIAs. However, it may be possible to assess whether/what further data are necessary for each application on a case-by-case basis. Further it is important that the data limitations are acknowledged in the REA.	**REA and EIA**	**Reference to term baseline removed.** **2m beam trawl data included in appendix 10 a**
65	**Section10.7**	**Cefas Comment:** Section 10.7 There is a brief conclusion at the end stating that, whilst accepting the limitations of the base line and assessment, 'it is not thought that current aggregate extraction in the region impacts significantly on fish and shellfish resources'. No evidence is presented to support this statement and then, a number of specific concerns are considered in the impact assessment.	**EMU Response:** Acknowledged. This is accepted and the paragraph has been redrafted - It is acknowledged that this baseline and the assessment in Chapter 21 are undertaken for those species where data are available and uncertainties exist on their distribution and behavioural response to the effects of aggregate extraction. Previous consultations with the fishing sector have identified a number of specific concerns regarding impacts on fish and shellfish ecology and these have been considered in the impact assessment (Chapter 21) where relevant.	**Cefas Response:** OK.	**EMU Response:** The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Revised text incorporated**
Chapter 13. Nature Conservation, Protected Areas and Species								
66	**Section 12.2.1**	**JNCC Comment:** Section 13.2.1 Please note that JNCC has now formally advised the Wight-Barfleur Reef as draft SAC for the qualifying features bedrock and stony reef. The site covers an area of approximately 1,370 km^2 and is located approximately 21 km south of St Catherine's point in the central English Channel, bordering the southern boundary of the study area (see http://www.jncc.gov.uk/page-4537 for more information). It is	**EMU Response:** Acknowledged. This will be considered at a site specific level for those licences that may impact the conservation features.	**JNCC Response:** Content with response provided	**EMU Response:** No further action.	**Issue resolved**	**EIA**	**Status of Wight Barfleur as possible SAC (as confirmed by JNCC) updated in section 13.2.1 on page 13.2 and within table 13.9**

		considered that further areas of reefs may be present nearby but outside the SAC boundary, but ground-truthing would need to be carried out to confirm this.						
67	**Section 13.2.1**	**JNCC Comment**: Section 13.2.1 The SC REA states that "The UK currently has 73 SPAs, but only one of these is entirely marine." At present the UK currently has 107 SPAs.	**EMU Response:** Acknowledged. This will be noted at a site specific level where relevant.	**JNCC Response:** Content with response provided	**EMU Response:** Acknowledged. Version 2 of the MAREA will be updated to - 107 SPAs present.	**Issue resolved**	**REA**	**Updated in section 13.2.1 SPA on page 13.2** **Updates to MCZs under 13.4.1 made on page 13.10**
Chapter 14. Commercial and Recreational Fisheries								
68	**Chapter 14, Section 14.1.1 paragraph 2**	**Cefas Comment:** Chapter 14, section 14.1.1, paragraph 2 states "It is recognised that the official data greatly under estimate the total amount of fish landed as vessels of less than 10m are not obligated to declare their landings.' However, since 2006 the registration of buyers and sellers should capture most of the landings of <10m vessels through the merchants and the shellfish licensing scheme requires reporting by <10m vessels.	**EMU Response:** Acknowledged, We believe that the introduction of the requirement of the <10m fleet to record landings will enhance data resolution for assessment purposes during future EIA's. We note that care should be taken in comparing historical trends and that data should be comparable pre/post 2006.	**Cefas Response:** OK	**EMU Response:** No further action	**Issue resolved**	**EIA**	**Text updated in 14.1.1 on page 14.1**
69	**Section 14.3.1**	**Cefas Comment**: Section 14.3.1: Net fisheries. The fixed and mobile net distinction is poor and incorrect. Normally people talk about fixed gears and towed gears. Trawls could be classed as mobile nets. Drift nets are mobile with respect to the seabed, but passive with respect to the water column. They are not fixed, but neither are they particularly mobile. Seine nets could be considered mobile, although the distances moved may be small, rather they are encircling nets. Fyke nets are fixed not mobile.	**EMU Response**: EMU concurs that there is an error in the distinction between fixed and mobile nets in the REA with respect to fyke nets. Fyke nets are fixed gears and should be discussed under section 14.3.1.1. However, we believe that drift nets are correctly discussed under mobile nets as these move over the seabed although we acknowledge Cefas' point that they remain passive within the water column. Similarly, we believe that seine nets are correctly discussed under mobile nets, albeit of limited mobility and within their own circumference.	**Cefas Response:** OK.	**EMU Response:** No further action	**MMO Response:** In your original response you have stated the Fyke nets are fixed nets and should be discussed under section 14.3.1.1. This needs to be addressed in version 2 of the MAREA and therefore requires further action.	**REA**	**Amended in section 14.3.1.1**
70	**Section 14.3.1.1**	**Cefas Comment**: Section 14.3.1.1 'Depending on the target species, typical mesh sizes range between 90 - 120 mm with larger nets of mesh size up to and above 220 mm used to catch turbot, red	**EMU Response**: We concur that the text regarding mesh sizes is misleading. Larger meshes are typically used to target rays and turbot whilst smaller and intermediate mesh sizes are typically used to target other species including sole.	**Cefas Response:** OK.	**EMU Response:** Version 2 of the MAREA will include the clarification regarding net sizes as presented in the RAG responses 25th August 2011.	**Issue resolved**	**REA**	**Amended in section 14.3.1.1**

		mullet and rays as well as salmon and trout.' This sentence is misleading implying that nets of larger mesh sizes are used to target turbot, red mullet, rays as well as salmon and trout. Gill nets mesh sizes are quite selectively specific, while trammel and tangle nets slightly less so. Large mesh nets tend to be used for turbot and rays, but red mullet are taken in small meshed nets, often less than 65mm. Salmon would be targeted by something intermediate.						
71	**Table 14.3**	**Cefas Comment**: Table 14.3 Bass fishing continues into the autumn.	**EMU Response**: From the data available, bass are principally target by recreational anglers during the summer, although EMU acknowledges that activity may continue into the autumn.	**Cefas Response:** OK.	**EMU Response:** No further action	**Issue resolved**	**-**	**Bass included in Autumn within Table 14.3**
72	**Figure 14.4**	**Cefas Comment**: Figure 14.4 Leading the title with 'seine' is misleading. Seine netting is a subset of netting and likely to comprise relatively little activity in this region. Simply putting Netting activity would better reflect this figure. It might also be worth explicitly stating that it excludes trawling.	**EMU Response**: Acknowledged. This is an error in the title and is corrected in Figure A14.1 below  Figure A14.1: Netting activity (excluding trawling) in the MAREA region. Data from consultation, aerial sightings and VMS (2003-2008).	**Cefas Response:** OK, welcome the amended figure.	**EMU Response:** Version 2 of the MAREA will include the updated Figure as presented in the RAG responses 25th August 2011.	**Issue resolved**	**REA**	**Title amended**
73		**Cefas Comment**: It seems slightly strange to include potting and line fishing on the same chart when these may be quite distinct fleets with very different target species.	**EMU Response**: The intention was to portray static fishing activity on a single plot. Whilst line fishing is not typically included within static gears, fishers do remain in one place during their fishing activity and tend to favour specific locations so behaviours are similar to potters despite respective target species being different.	**Cefas Response:** Ok	**EMU Response:** No further action.	**Issue resolved**	**-**	**No change**
74	**Figure 14.8**	**Cefas Comment**: Figure 14.8 The legend states 'all charted fishing activity'	**EMU Response**: Acknowledged. This is an error in the legend and is corrected in Figure A14.2 below	**Cefas Response:** OK, welcome the amended figure.	**EMU Response:** Version 2 of the MAREA will include the updated Figure as presented in the RAG responses 25th August 2011.	**Issue resolved**	**REA**	**Amended**

			 Figure A14.2: Recreational fishing activity areas, based on popular charter fishing areas and areas identified from consultation in the MAREA region.				
75	**Chapter 14 and Appendix D**	**Cefas Comment**: Chapter 14 and Appendix D Vessels registered at regional ports, gears used in the region, fishing areas, seasons and fishery values are generally described. The data are sourced from Sea Fisheries Committees, VMS data for assessing vessel activity and fish landings/catch data. Finer scale, local issues will need to be assessed in consultation with local fishermen.	**EMU Response**: EMU believes that the REA sets the regional context of fishing activities and fisheries issues within which site specific EIAs can be set. EMU recognises that the REA will not replace site specific consultations with both local fishermen and regulators. These will continue to be an important part of normal EIA investigatory work and will ensure local concerns are identified and properly addressed. However, generic themes including principal gear types, seasonality and broad distribution of effort as well as general spawning and nursery areas have been adequately portrayed within the REA and may not require regular updating within EIAs.	**Cefas Response:** OK	**EMU Response:** No further action.	**Issue resolved**	**EIA**	**No change**
76	**Section 2.12 of Appendix D**	**Cefas Comment**: Section 2.12 of appendix D The speed of vessels considered to be fishing, range from 1-8 knots and therefore may include some steaming activity. Fishing speeds will depend on the gear deployed, as shown in 2.2. For further information on this we refer the authors to the publication, Lee J., South A., Jennings S. 2010. Developing reliable, repeatable, and accessible methods to provide high-resolution estimates of fishing-effort distributions from vessel monitoring system (VMS) data. ICES J. Mar. Sci. March 4 2010	**EMU Response**: At the time of writing of the REA, the fishing speeds used to determine fishing activities were derived from conversations with local fishermen. EMU recognises the new ICES methodologies to estimate fishing effort on the basis of VMS data.	**Cefas Response:** OK	**EMU Response:** No further action.	**Issue resolved**	**-**	**No change**
77	**Appendix D**	**Cefas Comment**: Appendix D There has been no consultation with fishermen on a regional level. Although, various fisheries committees and local M&FA (MMO) fisheries	**EMU Response**: EMU believes that the REA sets the regional context of fishing activities and fisheries issues within which site specific EIAs can be set. EMU and the SCDA recognise that the REA will not replace site specific consultations with both local fishermen and regulators. These will continue to be an important part of normal EIA investigatory work and will ensure local concerns are identified and properly addressed. However, generic themes including principal gear types, seasonality and broad	**Cefas Response:** OK, site specific consultation will be very important as there needs to be careful consideration at the site specific stage as to whether there are any particular sensitive species that require more targeted surveying/assessment	**EMU Response:** No further action.	**Issue resolved**	**EIA**	**No change**

<table>
<tr><td></td><td></td><td>officers etc. have been consulted. We would recommend that good consultation and communication is established with UK and foreign fishermen using the area.</td><td>distribution of effort as well as general spawning and nursery areas have been adequately portrayed within the REA and may not require regular updating within EIAs.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="8"><h1>Chapter 19. Impact Assessment: Coastline</h1></td></tr>
<tr><td>78</td><td>Chapter 19</td><td><u>Cefas Comment:</u>
Chapter 19 – Cumulative impacts. The report has only looked at the coastline – however there are concerns with the overall (i.e. regional) sediment transport. Banks have been mapped – but they need discussion - especially in light of the different transport pathways shown on SCOPAC website. The impact matrices only look at the coastline with regards the sediment processes – not the overall sediment processes taking into account any offshore banks. Must be addressed at REA level – impacts to offshore banks may impact sediment transport on the coast. It does not need to spatially overlap.</td><td><u>EMU Response:</u> Acknowledged. The addendum below provides an assessment of cumulative impacts on the nearshore banks.

The effects of future dredging activities on the nearshore banks within the MAREA region were identified following a screening process.

Step 1 of the Impact methodology (see Chapter 3 of the MAREA) used the source-pathway-receptor model (see Chapter 5 of the MAREA) to identify pathways between the physical effects of dredging and the nearshore sandbanks.

The initial screening opportunity identified the effects for inclusion in Step 3 of the impact assessment, where the effects of aggregate extraction that potentially interact with the coastline were mapped in GIS. Using this approach the following effects and receptors were screened in and out of the assessment.

The effects which have a potential impact on inshore sandbanks, and which overlap with the receptor are:

- Seabed removal;
- Tides;
- Waves; and
- Sediment flux.
-
Table A19.1 below summarises the receptor sensitivities used within the assessment.

Table A19.1: Sensitivity values assigned to nearshore bank receptors within the assessment process

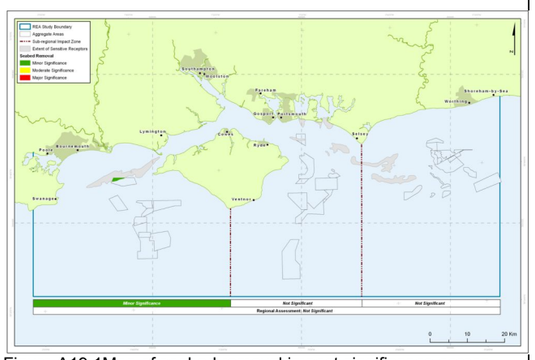
<table><tr><th>Effect</th><th>Receptor</th><th>Tolerance</th><th>Adaptability</th><th>Recoverability</th><th>Sensitivity</th></tr><tr><td>Seabed removal</td><td>Nearshore bank</td><td>Medium</td><td>Medium</td><td>Medium</td><td>Medium</td></tr><tr><td>Tides</td><td>Nearshore bank</td><td>High</td><td>High</td><td>High</td><td>Low</td></tr><tr><td>Sediment flux</td><td>Nearshore bank</td><td>Medium</td><td>Medium</td><td>Medium</td><td>Medium</td></tr><tr><td>Waves</td><td>Nearshore bank</td><td>High</td><td>High</td><td>High</td><td>Low</td></tr></table>
Understanding potential future changes in the environment as a result of cumulative aggregate extraction activities, and how such changes may impact nearshore sandbanks, are potential issues for many stakeholders. Accelerated sea level rise due to climate change means any future changes in wave heights as a result of aggregate extraction in the MAREA region require careful prediction. For this reason, the numerical model SWAN was used to predict changes in wave heights across the region (see MAREA Chapter 6). Modelling of changes in peak tidal current speeds and sediment flux using TELEMAC and SANDFLOW, was undertaken (also see MAREA Chapter 6). The impact assessment process is ‘effects’ led, which means the following section describes the findings of the cumulative impact assessment for effects of aggregate extraction on inshore sandbanks. It includes a description of the potential impacts and their impact significance, both sub-regionally and regionally.

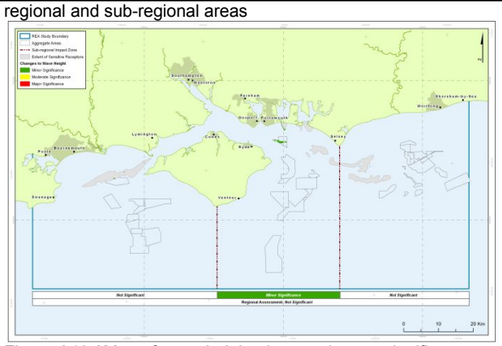
<u>Seabed removal</u>

There is no direct dredging of inshore sandbanks in the South Coast MAREA Region. There is aggregate extraction in Licence</td><td>Cefas Response: We very much welcome the additional work, assessment and evidence that has been presented in this addendum. We note that this does highlight some additional issues to consider in the West of the IOW region (figure A19.1). The results highlight two areas which will need to consider these issues further at the site specific EIA level (Area 122/2 and 409).</td><td><u>EMU Response:</u> The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA. The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.</td><td>Issue resolved</td><td>REA (Area 122/2 and 409 – EIA)</td><td>Included within Chapter text and CIA tables for nearshore bank receptor</td></tr>
</table>

			Area 122/2 in the East Isle of Wight sub-region, which overlaps with the Horse Tail sandbank, however within Area 122/2, there is no direct seabed removal because the gravel deposit which forms the resource is exposed 1 km to the southeast of the bank. The sandbank is very fine sand and would not be targeted as a resource sediment. Aggregate extraction is proposed in Area 409 which overlaps with Dolphin Bank. Significance statement: Seabed removal is assessed to be a medium magnitude effect, as a result of it being site-specific in extent, long term in duration, and routine. Sandbanks are considered to have a medium level of tolerance, adaptability and recoverability to the effects of seabed removal, as banks are naturally subjected to sediment mobilisation, particularly during storm events. Taking these values into consideration the sensitivity of nearshore sandbanks to seabed removal is assessed as medium. Within the MAREA region no seabed removal currently occurs on nearshore sandbanks in the West Isle of Wight sub-region, however the boundaries of Application Area 409 do overlap with Dolphin Bank. Given the medium magnitude of the effect, the medium sensitivity of sandbanks as physical structures and the small amount of spatial overlap, the impact of seabed removal on Dolphin Bank itself is assessed as being of Minor Significance. No other seabed removal occurs on nearshore sandbanks within the West Isle of Wight sub-region and the sub-regional significance is assessed as **Minor Significance** (Figure A19.1). No dredging occurs on nearshore sandbanks in the East Isle of Wight sub-region. While Licence Area 122/2 includes the Horse Tail sandbank the resource is exposed 1 km to the southeast of the bank and the bank itself is composed of very fine sand and would not be targeted. Given that no seabed removal occurs on nearshore sandbanks within the East Isle of Wight sub-region, the sub-regional significance is assessed as **Not Significant** (Figure A19.1). Within the MAREA region no seabed removal currently occurs on nearshore sandbanks in the Owers sub-region and therefore the impacts of seabed removal on nearshore banks in this sub-region is **Not Significant** (Figure A19.1). Based on these assessments of the magnitude of the effect, the sensitivity of sandbanks and the very small degree of interaction between the receptor and the effect at the regional scale, the cumulative impact of seabed removal on nearshore sandbanks at the regional scale is assessed to be of **Not Significant** (Figure A19.1). Uncertainty: The locations of the nearshore banks are well known and the spatial area of seabed removal is also well understood. For this reason, uncertainty in the assessment is considered Low. <u>Sediment flux and tides</u> Since inshore sandbanks play a role in sheltering the coast from wave effects this section considers the physical presence and structure of nearshore sandbanks with respect to alterations in sediment flux due to tidal current changes as a result of dredging. It has also been suggested that nearshore banks may supply sediment to the coast, and any alteration to this supply might therefore have an effect on coastal stability and erosion. Previous regional research summarized in this Addendum, as well as interpretation of geophysical data reported in the MAREA suggests, however, that the nearshore banks are more likely to be sinks of sediment rather than sources for the coastline although some small onshore sediment transport may occur. Any change in sediment flux that might affect the integrity of sandbanks is likely to be the most important effect of aggregate extraction. This is particularly the case where increased flux (associated with erosion) is predicted, since this has the potential to reduce the sheltering effects of the banks.					

			Significance statement: Changes in tidal currents and sediment flux rates are restricted to area within, or close to the boundaries of, individual extraction areas. The effects are localised or sub-regional in scale and long term in duration. The effects are considered to be a routine occurrence and the overall magnitude of changes in tidal currents and sediment flux on nearshore banks are therefore considered to be medium. Sandbanks are considered to have a medium level of tolerance, adaptability and recoverability to the effects of sediment flux as banks are naturally subjected to sediment mobilisation, particularly during storm events. Taking these values into consideration the sensitivity of nearshore sandbanks to sediment flux is assessed as medium. In the West Isle of Wight sub-region small areas of nearshore sandbank will be affected by changes in tidal currents. Modelling results show a maximum 5% increase and 10% decrease in peak tidal current speeds for Dolphin Sand and a very small area of 2 – 5% increase in peak tidal current speeds predicted for Shingles Bank. No changes in peak tidal currents are predicted to overlap with Dolphin Bank. Despite these changes in current speeds there are no predicted changes in sediment flux within 5 km of any nearshore sandbank within the West Isle of Wight sub-region. This is due to the fact that baseline tidal currents in the sub-region are relatively low and even with the modelled increases in peak tidal currents they are not sufficient to mobilise the 0.3 mm sediment. The impact of sediment flux and tidal currents on nearshore sandbanks for the West Isle of Wight sub-region are therefore considered to be **Not Significant**. In the East Isle of Wight sub-region, modelling results show large changes in peak tidal current speed for the Horse Tail sandbank. Model outputs show increases of up to 20% and decreases of up to 40% for tidal currents over the Horse Tail sandbank. These large changes are because the bank lies within the boundaries of the Area 122/2 licence and so the extremely localised changes in tidal currents overlap with the bank. Despite the large changes in tidal currents within Area 122/2 there are no predicted changes in sediment flux for Horse Tail. This is due to low baseline current speeds in the sub-region. No changes to peak tidal currents or sediment flux are predicted to overlap with Medmery Bank, also within the sub-region. The impact of sediment flux and tidal currents on nearshore sandbanks for the East Isle of Wight sub-region are therefore considered to be **Not Significant**. EMU would, however, acknowledge that further site specific investigation be conducted for any EIA conducted for the 122/2 licence renewal. In the Owers sub-region there are no overlaps of changes in tidal currents or sediment flux with nearshore banks in the sub-region. The impact of sediment flux and tidal currents on nearshore banks in the Owers sub-region is therefore considered to be **Not Significant**. The cumulative impact of tidal current changes and sediment flux changes on nearshore sandbanks at the regional scale is considered to be **Not Significant**. Uncertainty: The locations of the nearshore banks are well known and the potential impact of sediment flux and uncertainty in the modelled effects is considered low. Uncertainty in the overall assessment is also considered **Low**. <u>Waves</u> This section considers the effects on sandbanks of changes in wave height. This is based on modelling the propagation of waves that are only expected to occur on average once every 200 years, which is the same wave condition that would be used in modelling related to the design of coastal defences, and a more frequent wave condition that is expected to be exceeded 5% of the time in one year. Significance statement:				

			Changes of both 2-5%, and greater than 5%, to a 1 in 200 year wave height will have a localised extent, and will occur only rarely, however the effect is considered long-term. Taking these into account the magnitude of the effect is considered to be low. A greater than 5% change to a 5% exceedance in wave height scenario is considered to be a site-specific effect and occurs occasionally. The effect is, however considered to be long-term and the overall magnitude of the effect is considered low. A change of between 2-5% to the 5% exceedance in wave height scenario is a local and occasional effect. Its duration, however, is long-term and the overall magnitude is again considered to be low. Sandbanks are considered to have high tolerance, high adaptability and high recoverability to the effects of increased wave height and the sensitivity of nearshore sandbanks to changes in wave height is considered to be low. In the West Isle of Wight sub-region very small areas of nearshore sandbank will be affected by changes in wave heights. Maximum increases of 2-5% are predicted to occur at the southern margin of Dolphin Sand and Shingles Bank. Overall, based on the low magnitude of the impact, and the low sensitivity of the receptor, and the small spatial area affected the significance of changes in wave heights in the West Isle of Wight sub-region is assessed to be **Not Significant** (Figure A19.2). In the East Isle of Wight sub-region modelling results show maximum increases in wave heights of up to 14% are predicted for Horse Tail, which is located within Area 122/2 licence boundaries. No changes in wave heights are predicted for Medmery Bank. These large changes are because the bank lies within the boundaries of the Area 122/2 licence and so the extremely localised changes in wave heights due to dredging overlap with the bank. No changes in wave heights are predicted to overlap with Medmery Bank, also within the sub-region. The effect of changes in wave heights is assessed as being of **Minor Significance** for the sub-region due to the changes in Area 122/2 (Figure A19.2). EMU would also suggest that further site specific investigation be conducted for any site specific EIA conducted for the 122/2 licence renewal. In the Owers sub-region there are no overlaps of changes in wave heights with nearshore banks. The impact of changes in wave height on nearshore banks in the Owers sub-region is therefore considered to be **Not Significant** (Figure A19.2). The cumulative impact of wave height changes on nearshore sandbanks at the regional scale is considered to be **Not Significant** (Figure A19.2). Uncertainty: The locations of the nearshore banks are well known and the potential impact of wave height changes and uncertainty in the modelled effects is considered low. Uncertainty in the overall assessment is also considered **Low**.  Figure A19.1Map of seabed removal impact significance across		

			regional and sub-regional areas  Figure A19.2Map of wave height changes impact significance across regional and sub-regional areas					
79	**Section 19.4**	**Cefas Comment:** Section 19.4 "Any extraction beyond 14 m depth will have no impact on the coastline". Statement is too simplistic and based on incorrect assumptions for the coastline, namely beach drawdown assumptions for long linear beaches - which do not apply for the majority of the coastline in question. In addition, certain areas (for example 122/2 and 122/3) are in less than 14 metres of water. No discussion of these areas in the text other than to identify that they are in less than 15 m of water. Do not agree with the methods used – the University of Delaware beach closure – it is not applicable on a convoluted coastline with complex sediment transport pathways such as the South Coast. Reassess using appropriate methods.	**EMU Response:** The depth of closure was deemed an appropriate tool to examine estimated depths beyond which changes in beach profile are not expected to occur by using worst case scenarios of wave heights – as such, the result of 14 m is over-estimated. A depth of 14 m has also been identified by HR Wallingford (2010) as a water depth below which no changes in wave propagation are predicted to occur along the south coast. Depth of closure has been used as a descriptive measure for the regional beaches in the DTI Strategic Environmental Assessment Area 8, Superficial Seabed Processes and Hydrocarbon Prospectivity Report (BGS and CCO, 2007). The BGS and CCO (2007) conclude that depths of closure in Poole Bay occur approximately 450 m offshore, where water depths are shallower than 10 m. Repeat bathymetric surveys conducted by the Channel Coastal Observatory in Poole Bay have shown that the majority of profile changes occur within 200 m of the coast and within water depths of 4 m (Appendix A – Coastal Characterisation; Channel Coastal Observatory, 2011) and Zacharioudaki and Reeve (2010) report a depth of closure for Christchurch Bay of 10 m. Given these results a closure depth of 14 m is highly precautionary. Despite this the MAREA has screened in Licence Areas in water depths of less than 14 m, e.g. 122/2 and 122/3, for potential impacts to the coast due to changes in wave heights. It has been recommended that these licence areas will need to assess dredging scenarios at site specific EIA level and may require more detailed Coastal Impact Studies.	**Cefas Response:** We welcome this addition and are please to see additional evidence to justify the 14m rule, and agree that Area 122/2 and 122/3 will need additional assessment at the site specific EIA stage.	**EMU Response:** The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA (122/2 and 122/3- EIA)**	**No change**
Chapter 20: Impact Assessment: Benthic Ecology								
80, 81, 82, 83 + 84	**Sections 20.1.1, 20.2.1, 20.2.3 and 20.2.5**	**Natural England Comment:** Sections 20.2.1, 20.2.3 and 20.2.5. Significance statement: how are these conclusions reached of minor significance? **JNCC Comment:** Section 20.2. This section would benefit from a more detailed discussion of how the sensitivity of receptor scores were derived (e.g. description of tolerance, adaptability and recoverability of the	**EMU Response:** These comments will be dealt with as a whole. Chapter 3 of the MAREA describes the matrix based approach used in order to assist in assigning Significance, while Table A3.1 in this document shows the overall magnitude categories determined for each of the effects of dredging that was taken forward for combination with receptor sensitivities. A key component of the assessment has been the application of peer-reviewed biological sensitivity data (to various potential effects of aggregate extraction, such as substratum loss, increased suspended sediment, turbidity) available on the MarLIN website (http://www.marlin.ac.uk/biotic) to the characteristic species of benthic habitats (biotopes) based on the Marine Nature Conservation Review (MNCR) habitats classification scheme. The marine ALSF-funded genus traits handbook (MES, 2008) was used to provide supporting information on overall effects of dredging and indicators of potential recovery. The genus traits handbook was used as a secondary source of information in order to define potential sensitivity when gaps in the MarLIN data were	**Natural England response:** See previous comments regarding magnitude determination – e.g . comment 1 **Natural England response:** No, Table A20.1 does represent the sensitivity assessment. It is actually a vulnerability assessment as it makes determinations of receptor exposure and sensitivity to arrive at a determination (of vulnerability). Thus the values presented within the 'sensitivity' column are actually vulnerability values. For example: Circalittoral rock including five associated biotopes – some of the biotopes will have a sensitivity higher than	**EMU Response:** See EMU response to comment 1 above.	**English Heritage response:** We note that a table has been provided detailing the outputs of the Sensitivity matrix - based on all possible tolerance, adaptability and recoverability combinations. It is our opinion that this additional information in conjunction with Table A3.1: 'Magnitude Categories for the Physical Effects of Dredging' in the original SC addendum (letter dated 30th May), provide the level of detail required to give confidence in the methodology that has been used to assign sensitivity and magnitude scores, and in reaching the final determinations of impact significance.	**REA**	**Table 20.3**

		assessed biotopes). Only very few of the conclusions are supported by reference to relevant scientific publications and as a result sensitivity scores look like they have been assigned subjectively and therefore the reader must assume that there is a large uncertainty in the outcomes of the impact assessment. **JNCC Comment:** Allocating significance values is not justified. How did the author deduce that impacts on certain biotopes were minor? Needs justification. "…the potential overall cumulative impacts on the biotopes SS.SCS.CCS.POMB/complex, SS.SMx.CMx.OphMx (East of the Isles of Wight), and SS.SSa/complexes, SS.SSa.IFiSa.NcirBat, SS.SSa.CFiSa and SS.SSa.CMuSa (Owers) are considered to be of Minor Significance." See Figure 3.3. This process is not discussed in relation to each receptor. Will be addressed by producing an addendum presenting combinations of receptor specific classification scores and effect specific magnitude scores. **JNCC Comment**: Section 20.2.1, page 20.3. It is concluded that the biotopes associated with circalittoral rock have not been adversely affected by dredging despite being within the influence of the indirect effects of dredging. No justification to support this conclusion has been presented. **JNCC Comment**: Section 20.1.1 Screening. A more thorough presentation of information to justify the screening out of effects and sensitive receptors should be presented.	identified, or where there was a low proportion of biotope characteristic taxa with sensitivity data and hence where there would otherwise have been a relatively high level of uncertainty. This was because the MarLIN dataset provides sensitivities to specific effects (e.g. relating to sediment removal, sediment plume), whereas the genus traits handbook is limited to estimating sensitivity to overall dredging effects and recoverability. In this way the potential tolerances of recorded biotopes to specific effects of aggregate extraction could be used to identify key sensitivities and potential cumulative effects from models generated by HR Wallingford (Appendix D, HR Wallingford 2010). Table A20.1 below summarises the receptor sensitivities used within the assessment. Table A20.1: Sensitivity values assigned to benthic receptors within the assessment process **Effect** / **Receptor** / **Tolerance** / **Adaptability** / **Recoverability** / **S** Seabed removal: Circalittoral rock including five associated biotopes — Not targeted — Not targeted — Not targeted — Lo Seabed removal: Sublittoral coarse sediment including four associated biotopes and one biotope complex — High — High — High — Lo Seabed removal: Sublittoral sand including six associated biotopes — High — High — High — Lo Seabed removal: Sublittoral mixed sediment including six associated biotopes — High — High — High — Lo Suspended plume: Circalittoral rock including five associated biotopes — Medium — Medium — Medium — M Suspended plume: Sublittoral coarse sediment including four associated biotopes and one biotope complex — High — High — High — Lo Suspended plume: Sublittoral sand including six associated biotopes — High — High — High — Lo Suspended plume: Sublittoral mixed sediment including six associated biotopes — High — High — High — Lo Fine sand dispersion: Circalittoral rock including five associated biotopes — Medium — Medium — Medium — M Fine sand dispersion: Sublittoral coarse sediment including four associated biotopes and one biotope complex — Medium — High — High — Lo Fine sand dispersion: Sublittoral sand including six associated biotopes — High — High — High — Lo Fine sand dispersion: Sublittoral mixed sediment including six associated biotopes — High — High — High — Lo Bathymetry change: Circalittoral rock including five associated biotopes — Not targeted — Not targeted — Not targeted — Lo Bathymetry change: Sublittoral coarse sediment including four	'low'. Exposure addresses the fact that the receptor is 'not targeted' and this should be presented as a separate column labelled 'exposure'. Some of the biotopes will have a low tolerance, low adaptability and low recoverability resulting in a high sensitivity. BUT, there may be no pressure pathway for any particular effect and this would then result in a low vulnerability. The data presented are very mis-leading and this table can be helpful if re-drafted and presented in a different form. Each of the biotopes per habitat type should be presented separately. Currently they are presented combined e.g. Circalittoral rock including five associated biotopes. Different biotopes per habitat type can/will have different sensitivities and possibly exposures. To cluster them results in a loss of relevant information useful to interrogate any impact assessments made within the report and addendum letter. Table A20.1 will need to be re-drafted before Natural England is content that it correctly presents the relevant information. **JNCC:** As requested, information on tolerance, adaptability and recoverability of receptors have now been included in Table A20.1, but this has been done for habitats rather than at a biotope level. The assessment matrices within the original document contain some information on the sensitivities of biotopes to individual effects, but information on the tolerance and recoverability of individual biotopes should be included in Table A20.1, or alternatively an explanation should be presented of why all biotopes within each sensitivity are considered to have the same sensitivity to a given effect.		**JNCC response:** We requested that the determinations of sensitivity and impact significance should be presented at biotope level to account for potential differences between individual biotopes with regard to their tolerance and adaptability to and recoverability from dredging effects. On review of the additional information, it appears that this information has not been presented.		

				associated biotopes and one biotope complex					
				Sublittoral sand including six associated biotopes	High	High	High	Low	
				Sublittoral mixed sediment including six associated biotopes	High	High	High	Low	
			Sediment flux	Circalittoral rock including five associated biotopes	Medium	Medium	Medium	Medium	
				Sublittoral coarse sediment including four associated biotopes and one biotope complex	Medium	High	High	Low	
				Sublittoral sand including six associated biotopes	High	High	High	Low	
				Sublittoral mixed sediment including six associated biotopes	High	High	High	Low	
			Sensitivity values for receptors in the MAREA region were combined with magnitude of effects within the matrices described in the methodology to provide a significance output. It should also be noted that the outputs of the matrices are a tool to assist in assigning significance, and expert judgement must also be used to interpret the outputs, although this must be underpinned by a strong evidence-base.						
85	**Chapter 20**	**JNCC Comment:** Chapter 20 Impacts of individual sensitive receptors are not considered, for e.g. impacts to biogenic reef. These receptors have the potential to exist within the area but are only considered as part of a biotope.	**EMU Response:** A range of sensitive ecological receptors does exist within the South Coast region and consideration of these is implicit within the assessments made at biotope level and within the significance levels applied. For example, a number of biotopes that are characterised by epifauna assemblages have been identified within the region and are considered within the assessment matrices. These include the biotopes **CR HCR.XFa**, **CR HCR.XFaByErSp.DysAct** and **CR.HCR.XFa.FluCoAs**, and **SS.SMx.CMx.FluHyd.**, all of which comprise epifauna as characterising species which are comparatively sensitive to the effects of dredging. The consequences of the effects of dredging, including sediment smothering and scour, on sensitive epifaunal receptors are well documented and are now well understood. Where potential effects on characterising epifauna have been identified, then these have been assessed as an impact on the attributes of the respective biotope as indicated within the assessment matrices. We believe that regardless of geographical scale, assessment at biotope level is sufficiently responsive to record impacts on individual sensitive receptors including physical habitat and ecological receptors. We conclude therefore the REA has considered individual sensitive receptors within the consideration of effects on biotopes. Biogenic reefs have not been identified during the current REA of during previous studies and therefore it is not appropriate to include these within the assessment. An Ampelisca reef has been previously identified to the east of the Isle of Wight in Sandown Bay and a potential mussel bed exists at Hooe Bank but these areas are outside the footprint of aggregate extraction and so will not be affected by dredging activities.	**JNCC Response:** Content with response provided	**EMU Response:** The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Incorporated text into 20.2**
86	**Table 20.2**	**Natural England Comment**: Table 20.2. The heading does not specify what the relative proportion is in reference to – presumably it is the % of habitat that will be	**EMU Response**: The percentage values relate to the total coverage of each habitat within the region. Therefore SS.SCS covers 43% of the region whilst SS.SMx covers 44%. As a result SS.SCS and SS.SMx cover a total of 87% of the region. As explained in Table 20.2 these extents are indicative as the exact boundaries of the habitats are uncertain, however this approach was considered appropriate to indicate the relevant direction of pressure in terms of the areas of loss/damage or	**Natural England response:** This information will need to be presented within the revised version.	**EMU Response:** The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Clarification provided in Section 20.2 and table title amended**

		impacted by potential future operations? Now I'm not so sure, having read on. This highlights the importance of clear headings that would allow any figures and tables to be understood if read in isolation from the whole document. Please explain fully in the heading what this figure is, it is not clear.	modification due to dredging.					
87	Section 20.2.1	**JNCC Comment:** Section 20.2.1 It is concluded that the biotopes associated with circalittoral rock have not been adversely affected by dredging despite being within the influence of the indirect effects of dredging. No justification to support this conclusion has been presented.	**EMU Response:** EMU disagrees with this comment. Section 20.2.1 is a sub section which discusses the direct effects on receptors of seabed removal. Indirect effects on receptors are dealt with in other Sections of the chapter. As bedrock is not targeted by the aggregates industry, the conclusion that this habitat is not directly affected by seabed removal is valid.	**JNCC Response:** Content with response provided.	**EMU Response:** No further action.	**Issue resolved**	**-**	**No change**
88	Section 20.2.1	**JNCC Comment:** Section 20.2.1 Screening. A more thorough presentation of information to justify the screening out of effects and sensitive receptors should be presented	**EMU Response:** Vessel displacement is unlikely to affect benthic habitats, except in shallow-water areas. Direct impacts would only occur due to grounding or sinking of a vessel. Recent studies on noise generation by dredgers (e.g. Robinson et al., 2011) were not available at the time of the assessment however the results state that "Analysis of the measured data for differing operation modes leads to the conclusion that the major source of this higher frequency noise is the impact/abrasion of the aggregate material passing through the draghead, suction pipe and pump (possibly with some additional contribution due to cavitation noise)". For the purposes of the assessment completed for the REA, this effect could reasonably be incorporated into/addressed by the existing direct effect of aggregate extraction assessment (within licence areas) as the duration of effect is identical to that of aggregate extraction operations. There is also little information on the effects of these noise levels and intensities on benthic biological communities. The same report states from the limited data obtained, measurements of vibration from the dredger City of Chichester indicated vibration levels range from <1 mm/sec to occasional peaks of up to 5 mm/sec at a distance of 100 m from the active dredge head. The report also states that, "Care must be taken in the interpretation since there are no other data to corroborate the results". Tidal current changes and wave height changes were screened out following a review of HR Wallingford modelling data. This indicated that even when maximum modelled changes were included, the magnitude of tidal currents and wave heights remained within the levels to which the benthic fauna and habitat were typically naturally exposed.	**JNCC Response:** Content with response provided	**EMU Response:** The information provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Incorporated as 20.2.6**
89	**Section 20.2.1**	**Natural England Comment:** Section 20.2.1. Give the location of the information on seahorses more clearly. Also it says they remain present but are their numbers reduced, is their health reduced? No references given. Address in addendum.	**EMU Response:** Attempts were made by EMU to place observations within a historic context but requests for distributional data were turned down by the Seahorse Trust. EMU's experiences suggest that seahorses may not be affected by dredging activity although this is difficult to prove in the absence of shared data.	**Natural England response:** The constraints of the data should be clearly presented.	**EMU Response:** Noted., data constraints and other experience will be reported as context for statements provided.	**Issue Resolved**	**REA**	**Section 20.2.1 amended**
90	**Section 20.2.1**	**Natural England Comment:** Section 20.2.1. A big song and dance was made about this being evidence-	**EMU Response:** EMU acknowledges the comment and suggests the following amended text - The baseline data suggest that these species and associated biotope remain in a comparable condition despite being within the influence of the indirect effects of dredging, indicating they may not be adversely affected.	**Natural England response:** Content with the proposed revised text.	**EMU Response:** The revised text provided within the RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Text amended**

		based and auditable, yet statements like this: "The baseline data suggest that these species and associated biotope remaining in a healthy condition despite being within the influence of the indirect effects of dredging indicating they may not be adversely affected".						
91	**Section 20.2.1**	**Natural England Comment:** Section 20.2.1. "The biotope SS.SMx.CMx. OphMx in the east and Owers sub-regions is associated with brittlestar beds (species Ophiothrix fragilis and/or Ophiocomina nigra). It is listed as a UK BAP biotope and a Nationally Important Marine Feature (NIMF), and so should be considered during future site specific EIA. Their continued presence in the aggregate licence areas adjacent to actively dredged sites, particularly Area 407, suggests they do not appear to be adversely affected by the extraction process". This statement is a good example as to why we should not consider the information in this document to be collected and presented systematically. This is clearly 'cherry picking' one case study that supports the view they wish to see expressed and one supported without any empirical data or cited source for the information.	**EMU Response:** EMU refutes that it is "cherry picking" data as suggested by Natural England. The example presented is one example found within the South Coast MAREA region. The statement derives from experience in the MAREA region and the EEC where empirical field data (e.g. Area 461 in the EEC region). The statement is also not definitive; it merely states that observations suggest no adverse effect.	**Natural England response:** Please cite the comparable data then. By detailing the processes and any data that has assisted in statements then the report will remain robust. The main point here is that the tenants of the systematic approach have not been adhered to and thus the report should not make such statements. This is not to say that the report is not valid given the level of data available to make determinations. So clarity of statements is important. Clear reference to other data and knowledge from other MAREAs will help statements and these should be provided.	**EMU Response:** Agree. See also response to comment 89 above.	**Issue resolved**	**REA**	**Section 20.2.1 amended**
92	**Figure 20.1, page 20.7**	**JNCC Comment:** Figure 20.1, page 20.7. To provide more clarity on the overlap of actively dredged areas with sensitive habitats and high level biotope complexes it would be useful to display the assessed habitats and biotopes in different colours (link back to Figure 9.3). The same applies for Figures 20-2 to 20-5.	**EMU Response:** EMU welcomes the comment and has re-applied the biotope colours as per the original biotope map (Fig 9.3) (see Figure A20.1 below). However, we believe that greater clarity has not been achieved by this process as it is now hard to distinguish between biotope polygons and impact polygons. Note that the biotopes under assessment in each instance have been identified within the respective tables within the MAREA report.	**JNCC Response:** We acknowledge the comment and no further work is required.	**EMU Response:** No further action.	**Issue resolved**	**-**	**No change agreed**

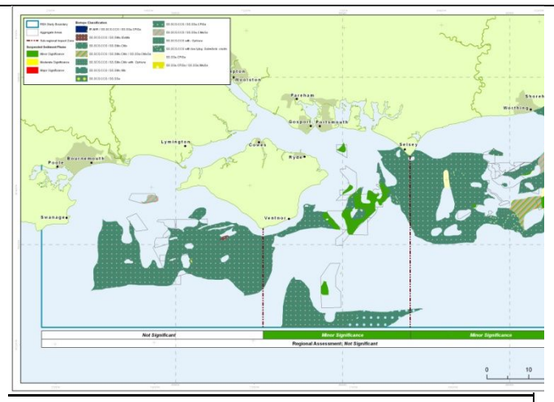


Figure A20.1: Map of suspended plume impact significance on sensitive biotopes across regional and sub-regional areas.

Chapter 21. Impact Assessment: Fish and Shellfish Ecology

93		**Natural England Comment:** Expect to see a section within the fish ecology sections that makes inferences upon the sensitivity of a particular species to aggregate dredging e.g.- sand eel – habitat removal = highly sensitive or black seabream nests – habitat removal = highly sensitive.	**EMU Response:** Table A21.1 below summarises the receptor sensitivities used within the assessment. Table A21.1: Sensitivity values assigned on a Regional scale, to fish and shellfish ecology receptors within the assessment process	**Natural England response:** Similar comments as for Table A20.1 above are pertinent here regarding re-drafting of the table to detail sensitivity per receptor species and then allow determination of exposure and thus the vulnerability determination. **Cefas Response:** It is not appropriate to place fish species in the above groupings, this appears too broad to accurately assess impacts, particularly for the most sensitive species. Currently for example, spawning herring – would come out as low sensitivity using the above tables when in reality they are very sensitive to extraction, have a low tolerance, low adaptability and probably a low recoverability. It would be useful to understand how this then leads to statements of significance, perhaps with some worked examples, particularly for sensitive species.	**EMU Response:** Acknowledged that the categories in Table A21.1 are broad. However finer scale categories, i.e. herring, black bream (and even crab) spawning are better assessed at EIA level (and informed through site level fisheries consultation). Black bream spawning for instance is very localised around Kingmere Rocks and so not relevant elsewhere in the SC REA study area. As such, at regional level, effects are likely to be low but local EIAs may conclude an elevated effect significance as appropriate. We therefore propose that subject to RAG advice, version 2 of the MAREA document will include Table A21.1 as presented in RAG response 25th August 2011.	**Issue resolved**	**REA and EIA**	**Tables updated**

Effect	Receptor	Tolerance	Adaptability	Recoverability	Sensitivity
Seabed removal	Adult stock – fish	High	High	High	Low
	Adult stock – shellfish	Low	High	High	Low
	Spawning – pelagic fish	High	High	High	Low
	Spawning – demersal fish	Medium	High	High	Low
	Nursery – all fish	High	High	High	Low
	Shellfish – overwintering and migratory	Low	Medium	High	Medium
Noise and Vibration	Adult stock – fish	High	High	High	Low
	Adult stock – shellfish	High	High	High	Low
	Spawning – pelagic fish	High	High	High	Low
	Spawning – demersal fish	High	High	High	Low
	Nursery – all fish	High	High	High	Low
	Shellfish – overwintering and migratory	Medium	Medium	Medium	Medium
Suspended plume	Adult stock – fish	High	High	High	Low
	Adult stock – shellfish	High	High	High	Low

				Spawning – pelagic fish	High	High	High	Low					
				Spawning – demersal fish	Medium	High	High	Low					
				Nursery – all fish	High	High	High	Low					
				Shellfish – overwintering and migratory	High	High	High	Low					
			Fine sand dispersion	Adult stock – fish	High	High	High	Low					
				Adult stock – shellfish	High	Medium	High	Low					
				Spawning – pelagic fish	High	High	High	Low					
				Spawning – demersal fish	Medium	Medium	High	Medium					
				Nursery – all fish	High	High	High	Low					
				Shellfish – overwintering and migratory	High	High	High	Low					
94 + 95	**Chapter 21 and Table 21.1**	**<u>Natural England Comment:</u>** Chapter 21 (mislabelled Chapter 12 in the comments) "No known spawning grounds for demersal spawning fish in this sub-region therefore this is screened out and not considered further for impact assessment." The whole area is a sole nursery and spawning ground, an Undulate Ray nursery ground. East of the Isle of Wight is also reported to be an important nursery areas for elasmobranchs. Clarify in addenda. **<u>Cefas Comment:</u>** Table 21.1 There may be demersal spawning fish and shellfish such as black bream and cuttlefish in the west and east Isle of Wight Isle sub-regions. Edible crab may spawn and incubate over a wide range of gravel banks. Although the eggs are brooded under the female's abdomen the egg mass is large and female edible crabs are essentially sessile at this life stage. To be investigated at site specific level in consultation with local fishermen for ALL subregions	**<u>EMU Response:</u>** Whilst it is true that demersal fish use the waters of the wider region for spawning, these fish tend to be mostly 'broadcast spawners' i.e. they shed their eggs into the water column. EMU is not aware of data confirming that the MAREA region generally supports demersal spawners i.e. fish that lay eggs (spawn) directly onto the seabed. The exception to this is black bream which spawn inshore, in the Owers sub-region between Littlehampton and Worthing, during spring/early summer. There is anecdotal evidence of the possibility of black beam nesting sites to the west of the Isle of Wight, although EMU is again not aware of any data confirming this. The regulatory authorities will need to raise this as a site specific issue in relation to development of Area 409. Side scan sonar surveys coupled with seabed video surveillance in May/June have proved successful in the Littlehampton area where black beam nests have been the subject of long term monitoring in relation to active dredging nearby. So far, no detrimental effects on spawning have been identified and no significant sediment effect (in the form of bedforms trending from the dredge area towards nest sites) has been detected. Similar studies may be implemented where black bream spawning sites are identified to the west of the Isle of Wight.	**Cefas Response:** Ok **Natural England response**: Content with the detail re Black Bream nests. Reference to Cefas response (to the EMU letter 30th May 2011) should be made regarding the issue about Sole breeding areas.	**<u>EMU Response:</u>** The information presented within RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Text included in section 21.4**

96	**Section 21.4.1**	**Cefas Comment:** Section 21.4.1 Mentions the vulnerability of female over-wintering ovigerous crabs several times. Paragraph on uncertainty captures some of the demersal spawning species, Cuttlefish could potentially be added to this list.	**EMU Response:** Cuttlefish eggs on the seabed have not been identified in the south coast region (to EMU's knowledge) but we concur that this species could potentially be added to this list.	**Cefas Response:** Ok	**EMU Response:** The information presented within RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Reference to cuttlefish included**
97	**Table 21.5 and Table 30.3**	**Cefas Comment:** Table 21.5 and Table 30.3 Owers region – black bream and brown crab seen as minor significance – but these ignored in table 30.3 for inclusion in site specific EIAs	**EMU Response**: Although not itemised specifically, brown crab and black bream are included in Table 30.3 under commercial and recreational fisheries for inclusion in site specific EIAs	**Cefas Response:** Ok, however table 30.3 would be an excellent summary reference table if these details were included.	**EMU Response:** The information presented within RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Table amended**
98	**Section 21.4**	**Natural England Comment:** Section 21.4. Final paragraph reads "This assessment addresses these concerns. However, unlike other receptors in this MAREA, impact significance is not mapped. This is because mapping the spatial extent using best available data does not provide enough certainty." Why? Because there isn't enough information on spawning and nursery ground? Apparent 'screening out' because of a lack of information isn't responsible.	**EMU Response:** This is a misunderstanding of the text. The receptors are not screened out of the assessment, and the MAREA assesses the following fish and shellfish receptors: - Adult stocks of key fish species; - Adult stocks of key shellfish species; - Spawning - pelagic (e.g. those species present that spawn into the water column); - Spawning – demersal (e.g. those species present that spawn directly onto the seabed); - Nursery – all fish species; and - Shellfish – migratory routes, overwintering grounds. - Chapter 21 does not, however, provide maps of effect-receptor overlap in the way that other Impact Chapters do. This is because of the mobile nature of the receptors and uncertainty in their spatial distributions. This is also reflected in the moderate to high uncertainties applied to the assessments.	**Natural England response:** Content with the explanation.	**EMU Response:** No further action.	**Issue resolved**	**-**	**No change**
99	**Section 21.4.1**	**Natural England Comment:** Section 21.4.1. Seabed removal paragraph reads "The direct uptake of fish and shellfish is unlikely given their mobile nature." For fish I would agree but shellfish mobility is overestimated and their flee response may not be quick enough to remove them from the active dredging zone in time. Plus shellfish beds aren't always confined to hard substrates.	**EMU Response:** Acknowledged. Section 21.4.1 does not imply that shellfish beds are confined to hard substrates, however it does identify the fact that those shellfish which form subtidal beds, or are attached to hard substrates, are more vulnerable to the direct impacts of seabed removal.	**Natural England response:** Content with the explanation	**EMU Response:** No further action.	**Issue resolved**	**-**	**No change**
100	**Section 21.4.1**	**Natural England Comment:** Section 21.4.1. Seabed removal significance statements – Uncertainty – do not think there is enough to go on here to justify a classification of 'Not significant'. Perhaps 'Not assessed due to a lack	**EMU Response:** EMU does not agree that there is insufficient data on which to base an assessment of the effects of seabed removal. The areas where seabed removal will take place are well understood. The scale of these areas, compared with the scale of the sub-regions and region are relatively small. For adult stock fish all the species within the region are considered common throughout the south coast and UK. They are mobile species able to avoid areas of impact, and target alternative prey. For adult stock shellfish it is considered that suitable habitat is widespread throughout the region.	**Natural England response:** Content with the explanation and context provided.	**EMU Response:** The information presented within RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Section 21.4.1 updated accordingly**

		of information' would be more appropriate. The Sussex SFC has done a lot of work on habitat preference to species across their region. This could be useful.	Pelagic spawning fish spawn across the MAREA region and into the English Channel. Their eggs remain in suspension and will disperse across a wide spatial area. Demersal spawning fish are not known to spawn in the West Isle of Wight and East Isle of Wight sub-regions, however black bream and herring are known to spawn in the Owers sub-region. Herring spawning is concentrated further offshore than the licence areas while black bream nests are located inshore of the licence areas and intensively monitored. Nursery areas for mackerel, bass and lemon sole are known within the region, but these are either spatially extensive, or located inshore of the licence areas. Finally for overwintering and migratory shellfish it is known that important areas exist, that migratory pathways occur and that seabed removal has the potential to remove suitable overwintering substrate. Given this evidence EMU feels that there are sufficient data to undertake the cumulative assessment and that the effects of seabed removal on the majority of receptors can be assessed as **Not Significant**. The exception is for the 'Shellfish – overwintering and migratory' where seabed removal is assessed as being of **Minor Significance** for the East of the Isle of Wight and Owers sub-regions.					
101 + 102	**Section 21.4.4 and Table 21.2**	**Cefas Comment:** Section 21.4.4 Fine sand dispersion could also include a mention of edible crab spawning and incubation behaviour. It does bring it up in the conclusions. **Cefas Comment:** Table 21.2 Shellfish over-wintering and migratory. There is a general westwards movement by adult edible crabs. Whilst the exact route is not known it may pass through the licence areas given that these are gravel substrates, suited to crabs.	**EMU Response:** The assessment of brown crabs spawning at EIA level is an appropriate measure where feasible, however while knowledge of spawning areas and behaviour is available, it may not necessarily answer the detailed questions required for EIA level considerations. A regional level assessment is a reasonable approach based on the data currently available. EMU refers the reader to a discussion on crab spawning provided Section 10 of this Addendum.	**Cefas Response:** Ok – see comment 52.	**EMU Response:** No further comment	**Issue resolved**	**REA and EIA**	**No change**
103	**Section 21.5.4**	**Natural England Comment:** Section 21.5.4. Regional impacts – Minor significance is assigned to brown crab but there's no mention of black bream, herring or sandeel which in previous paragraphs were "..considered to be moderately sensitive to the effects of fine sand dispersion..." If this is the case, and given the low levels of confidence, then in the areas in which these species occur perhaps a 'Minor Significance' classification should be assigned?	**EMU Response**: A ***Minor Significance*** has already been assigned within the MAREA to demersal spawning fish (specifically black bream) in the Owers sub-region. While herring and sandeel are sensitive to the effects of fine sand dispersion these species are considered to be common within the region and the wider south coast and UK. Herring are also concentrated further offshore from the licence areas. EMU does not, therefore, agree that fine sand dispersion should be assessed to be of Minor Significance for these species.	**Natural England response:** Content with the explanation – suggest may be just explicitly highlighting that Black Bream are considered as part of the demersal spawning fish category. As these are a notable nature conservation species.	**EMU Response:** The information presented within RAG response 25th August 2011 will be incorporated within version 2 of the MAREA.	**Issue resolved**	**REA**	**Tables amended**

Chapter 28. Impact Assessment: Archaeology

104		**English Heritage Comment:** In comparison to the Thames MAREA these sections are less well presented and robust, despite a greater level of discussion in the text. In the Thames MAREA the way that determinations of significance are reached is clearer from the discussion, whereby magnitude of effects, receptor value and sensitivity and areas of interaction are clearly referenced. In this way any subjective decisions or professional judgements based on experience that are made by the authors are transparent and clear. Addendum to be produced to demonstrate how the various combinations and permutations from Matrix A and Matrix B in Figure 3:3 and Chapter 3 have been combined to reach the final determinations of impact significance.	**EMU Response**: Table A28.1 below summarises the receptor sensitivities used within the assessment. These sensitivity values were combined with the magnitude values defined in Table A3.1 to provide Significance scores. Determining the overall significance of an effect does incorporates a degree of subjectivity, with matrix outputs guiding professional judgment and experience, underpinned by a strong evidence-base.	**Natural England response:** Same comments as per Table A201.1 and A21.1 – these are not all sensitivity assessments, some are vulnerability determinations. See previous comments **English Heritage response:** Our original concern with the SC MAREA document was the way that determinations of impact significance have been reached is not transparent. In section 28 there is no discussion of the way that magnitude of effects has been used to reach the final determinations. Without this detail there is no way of assessing the validity of the final determinations and any subjective decisions or professional judgements based on experience that are made by the authors are less transparent and clear. We accept that in making such determinations a level of subjectivity is required, however a transparent and robust methodology, must be followed and clearly presented in order to give all future readers and users of the outputs of the SC MAREA confidence in the validity of the determinations it makes. This matter was the subject of some discussion during the meeting with EMU and SCDA on 2nd February 2011. Natural England also raised concerns over the way that the determinations of impact significance had been derived, with particular reference to figure 3:3 on page 3.5 of the SC MAREA report. It was agreed during the meeting on 2nd February that further examples relating to figure 3:3 would be provided to demonstrate how the various combinations and permutations from Matrix A and Matrix B (sensitivity and magnitude) had been combined to reach the final determinations of impact significance. It was our view that these suggested additional examples, to be produced in an addendum to the SC MAREA, would provide the further level of confidence required in the determinations in the Archaeological Impacts chapter. On review of the addendum, it appears that at present this information has not been presented. There are no such examples under either Section 104, or in Section 1 of the addendum which relates to Chapter 3 – 'Methodology'. As such questions over the methodology adopted in	**EMU Response:** The new Tables presented under section A above provide greater clarity on the determinations of impact significance within the South Coast MAREA. The assessment of the effects on known shipwrecks and aircraft wrecks incorporate a "likelihood" category – it is unlikely that known wrecks will be impacted by dredging as industry will avoid these sites. We would welcome further discussion concerning improvement in the clarity of these assessments.	**English Heritage response:** we retain our original concern that some of the sensitivity scores provided in the SC REA addendum under Table A28.1 do not tally with those presented in the original REA document. The details that were presented in table A28.1 in the addendum must tally exactly with the sensitivity scores presented in the text of sections 28.2-28.4 inclusive in the original REA document.		**Table updated to reflect content of chapter, please note that the table A28.1 contains errors and reference should be made to the revised CIA tables.** **Text amended to reflect current use of terminology.**

Effect	Receptor	Tolerance	Adaptability	Recoverability	Sensitivity
Seabed removal Bathymetry change Sediment flux	Pleistocene fluvial gravels	Low	Low	Low	High
	Estuarine alluvium	Low	Low	Low	High
	Peat	Low	Low	Low	High
	Isolated prehistoric finds	Low	Low	Low	High
	Known, charted shipwrecks	Positions known, and avoided by industry			Low
	Recorded, uncharted maritime casualties	Low	Low	Low	High
	Unknown, uncharted shipwrecks	Low	Low	Low	High
	Isolated maritime finds	Low	Low	Low	High
	Known, charted aircraft wrecks	Positions known, and avoided by industry			Low
	Recorded aircraft losses	Low	Low	Low	High
	Isolated aircraft finds	Low	Low	Low	High

				the SC MAREA remain. Instead of this information that addendum includes a table of magnitude values (Table A3.1), and a table indicating sensitivity values assigned to archaeological receptors (Table A28.1). In addition to this, the information presented in Table 28.1 has raised further issues with the sensitivity scores that have been assigned to archaeological receptors. Several of the sensitivity scores in Table A28.1 do not correspond to the relevant sensitivity scores originally used in Chapter 28 of the MAREA. For example, in the addendum only one table of sensitivity scores is presented for 3 different effects of dredging – Seabed Removal, Bathymetric Change and Sediment Flux. However, an archaeological receptor, such as 'Pleistocene Fluvial Gravels' will be far more sensitive to Seabed removal than it will be to Bathymetric change. Further to this, we also note from Table A28.1 that the sensitivity scores for 'charted shipwrecks' and 'known, charted aircraft' sites have a low sensitivity score, based on the fact that their positions will be known and avoided by industry. Whilst we do not dispute this, any avoidance measures adopted by industry should be considered as a question of their exposure (degree of interaction) rather than directly in their sensitivity score. If a dredger were to coincide with a known charted shipwreck site, then that wreck's tolerance, adaptability and recoverability to that impact would be low. As such the sensitivity score will still be high, but when avoidance measures (their exposure to a dredging effect) are considered we can assume that site is likely to be far less vulnerable. With the above matters in mind, we require the information originally requested in relation to the SC MAREA methodology, based on the worked examples from Matrices A and B in Figure 3.3 to be presented to us, before we are prepared to fully sign off the SC MAREA. This is necessary to provide us all with confidence in the validity of the final determinations of impact significance and the robustness of the methodology adopted. Given the further issues with sensitivity scoring consistency that have been highlighted by Table A28.1 of the addendum, this requirement becomes of even greater			

				importance. With this in mind we also request that EMU revisit the detail of Chapter 28 and revise the details of table A28.1 in line with their original sensitivity scores that are evident in the text of sections 28.2-28.4 inclusive.				
Chapter 29. Cumulative and In-Combination								
105	**Chapter 9**	**Cefas Comment**: Chap 29 In Combination. It is noted that a more detailed assessment at EIA level will be necessary. Further, in chapter 30 it is stated that the MAREA has not focussed on monitoring or R&D and that this is best addressed once the REA findings have been considered. Typically, a scoping study (presumably site specific) with focussed consultation is followed by a full-scale assessment. The danger with considering the environment on such a broad scale is that smaller local species/habitat issues may either not be identified or get screened out of the impact assessment.	**EMU Response:** In-combination assessments will need to be undertaken within the context of the REA drawing upon the broad-scale features and activities within the wider area. Discrete features, where present will be identified through the appropriate consultation processes at scoping stages and where necessary as a result of site specific survey as defined in Tables 30.1 – 30.3. Detailed assessment at site level is required in compliance with Dredging Regulations in relation to maintenance of the integrity of European Marine sites. As such, the detailed site level assessments are likely to be applicable to a few licences only where interaction with SACs or SPAs appears likely in combination with other activities. It may be suitable to undertake a screening exercise post REA to identify those aggregate licence areas that have potential to require site level in-combination assessment.	**Cefas Response:** Ok	**EMU Response:** No further action.	**Issue resolved**	**EIA**	**No change**

GENERAL UPDATES TO VERSION 2 DOCUMENTS:

Chapter 1 – General updates on terminology and legislation

Chapter 2 - General updates on terminology and legislation

Chapter 3 – Chapter updated and revised and signed off by RAG

Chapter 5 – Updated to reflect all receptors, addition of key noise reference: Robinson *et al*

Chapter 6 – Inclusion of summary of the large trailer suction dredger model (HR Wallingford, 2011).

Chapter 10 – Review of diadromous fish species

Chapter 11 – Inclusion of additional data on seal foraging

Chapter 12 – General updates based on the Cook and Burton reference

Chapter 13 – Update on MCZ

Chapter 16 – general update on status of renewables development

Chapter 23 – General review of receptors and additional species scoped in on basis of SPA and Cook and Burton reference resulting in additional receptors considered minor significance.

Chapter 24 – SPA features screened in and assessed. Update on MCZs.