Marine Management Organisation

South Inshore and South Offshore Marine Plan Areas:

South Plans Analytical Report

June 2014

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If referencing this document, please cite it as: South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report (SPAR) June 2014

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1.0 Introduction

1.1 Purpose

The South Plans Analytical Report is a summary of the evidence and issues for the South Inshore and South Offshore marine plan areas. The information in this report will be used to inform the next steps in the planning process, such as generating the plans' vision, objectives and policies. The work to produce the report and supporting evidence has been informed by discussions with a range of stakeholders both within the plan areas and beyond.

This report was released for formal consultation, from 23 September to 1 November 2013 (see section 1.4), and used as supporting material for a series of workshops held along the South coast during October 2013. Following this it was refined to incorporate comments from the formal consultation and workshops. The SPAR also presents a refined list of core issues for marine planning in the South marine plan areas. In keeping with stakeholders' views,[1] a single report has been produced covering both the South Inshore and South Offshore plan areas.

1.2 Overview and general approach

We are committed to marine plans that are based on the best currently available evidence. To ensure this, we are gathering evidence as widely as possible, we have drawn together the range of relevant sources but also highlighted core issues emerging from the evidence (see Chapter 3). This should inform discussion of core issues and provide the basis for the next steps in the planning process, helping us to establish a clear vision and objectives for the plan areas. In writing this report, it was considered important to collate and summarise relevant information on behalf of stakeholders and to begin to identify core issues for the South marine plan areas.

In so doing, we have drawn upon our experience from a similar step in the process of developing the East Inshore and East Offshore marine plans, and the production of the 'East Inshore and East Offshore Marine Plan Areas Evidence and Issues Report. Based upon stakeholder feedback and our increased understanding of where and how marine planning can add most value, we have revised the format, style and depth of analysis that has gone into the report, to make it easier to use for stakeholders. The report is supported by detailed evidence (referred to throughout). We have also paid more attention to trying to identify the core issues early, so that these can be discussed, agreed and taken through the planning process. Core issues can be thought of as those issues that are likely to drive or be subject to significant change in the plan areas during the life of the plan and where marine planning can add value (including to complement other measures).[2]

The format of the report follows that of the Marine Policy Statement, in that it breaks down the evidence and issues presented into environmental, economic and social

[1] MMO (2012) Statement of Public Participation workshop summary report www.marinemanagement.org.uk/marineplanning/areas/documents/south_workshops_summary.pdf

[2] As opposed to 'non core issues for planning' that marine planning does not need to resolve, largely because they are addressed by other existing measures.

topics and further divides these by relevant sectors or considerations. This has been done intentionally; we feel it provides the clearest way for us to present and order our evidence and issues at this early stage of the planning process. As the planning process progresses however, we aim to integrate more across social, economic and environmental topics. This process has already started, through the theming of our issues and their grouping into core issues, and will continue throughout the rest of the planning process.

Chapter 2 in this report presents the evidence as it relates to individual sectors and topics and identifies the potential core issues for them. These sections follow a similar format, which is as follows:

- Introductory text, to provide context. This describes the sector or topic, in broad terms
- Current Situation. A description of the existing activity or distribution relating to a sector or topic
- Current Policy. The national and sub-national policy influencing the development of that sector or topic
- Future Trends. The likely future development of the sector or topic and influencing factors
- Potential Core issues. The most important issues suggested by the evidence for that sector or topic
- Interactions with Sectors. Identification of how the sector or topic interacts with others
- Issues for Sustainability. Where there may be issues that have a wider economic, social or environmental aspect, these are identified.

As each sector and topic is different, both in the level of evidence available (for example some may not have relevant national or sub-national policy) and in how this translates to issues, the format above is a guide; some sectors or topics may not use all of these headings.

The Marine Management Organisation has analysed a range of evidence and sources of issues including:

- data and evidence associated with the South Inshore and South Offshore marine plan areas such as recently commissioned reports including from industry
- information and issues collated from stakeholders and the Strategic Scoping Report
- national plans and policies that influence the management of the marine areas
- local plans and policies that influence the management of the marine areas.

In line with the Government's Marine Policy Statement and high level marine objectives,[3] this report covers all the key activities that take place in the marine area, as well as all the environmental, social and economic considerations that need to be taken into account in marine planning. It should be noted that the issues are based:

- directly on specific points of evidence and

[3] Defra (2011) Marine Policy Statement, p11

- indirectly on a reading of the evidence as a whole for that sector
- on interactions between sectors and between sectors and wider issues
- on information from the South Plans Analytical Report consultation and workshops.

Many of the issues are a combination of views rather than being directly attributable. The issues have been 'filtered' as it is important for stakeholders as well as the Marine Management Organisation to form a view on which are key to marine planning. To help that assessment, the issues have been analysed to derive a list of core issues, grouped into themes. There is a list of all issues considered in the annex at the end of the document, along with a list of issues not for marine planning. The potential impacts of the issue, relevant sectors or topic driving the issue, and those sectors or interests impacted have also been identified, with some suggested responses of how planning could deal with these issues included by way of example. Further to the assessment, Chapter 3 provides an overview and discussion of all the issues taken together.

The Marine Management Organisation is working with local authorities and other coastal managers and regulators to ensure effective integration between marine plans and others, including terrestrial plans and, in doing so, contributes to achievement of integrated coastal management.[4] This co-operative approach has considered the many existing plans and policies relevant to the South marine plan areas and analysed those of most relevance, such as local development frameworks. The Marine Management Organisation will continue to work with interested parties to understand and address the implications for planning and management at the coast.

1.3 Evidence base for marine planning

Evidence is essential to the development of effective marine plans, to better understand activities, resources and the ecosystem in the South marine plan areas. Data and information from a wide range of stakeholders, partners and organisations has been collated prior to initiating marine planning in the South. The evidence base on which this report is based and spatial information/data can be accessed through the marine planning portal.

Evidence will be used throughout the planning process, from understanding issues in the South marine plan areas, to analysing potential solutions and drafting supporting policies. Additional evidence may be used that is not represented here, especially emergent material that sheds new light onto a core issue.

New evidence commissions for the South marine plan areas

Where possible we have utilised existing research to inform marine planning. For example, through the utilisation of key resource areas work completed by The Crown Estate. This work defines where resources for certain activities are located in order to predict the potential future spatial locations of interest for marine developments. this report.

[4] Defra (2011) Marine Policy Statement, p13

When planning began in the South marine plan areas in April 2013, a number of evidence projects were commissioned to support analysis and decision making, particularly where experience from the development of marine plans in the East highlighted gaps in the evidence base, or to make recommendations on how to integrate wider considerations into the planning process, such as co-location and cumulative effects. The commissions align with the Marine Management Organisation's Strategic Evidence Plan (which sets the priorities for all projects that the Marine Management Organisation commissions until 2015.

Subsequent to the publication of this report, a further round of evidence projects has been commissioned and completed. This round of evidence commissions developed partially in response to information and issues highlighted during the consultation and associated workshops. Most of the projects during this phase of evidence collection were produced in such a way as to have application across all marine plan areas. The intention being to ensure that projects have value and utility for areas yet to be planned. This should ensure maximum value for money given that methodologies can be applied again for other plans areas. All finalised evidence commissions can be found on our website.

1.4 Consultation

This report was published for consultation for a period of six weeks, from 23 September to 1 November 2013. The formal consultation was in accordance with the requirements of Schedule 6 of the Marine and Coastal Access Act 2010 (consultation on matters to be included in the draft plan) and the Statement of Public Participation for the South Inshore and Offshore Marine Plan Areas.
The report was published on the Marine Management Organisation website, promoted through the marine planning newsletter and via email correspondence with stakeholders. We received 76 individual responses to the consultation from interested parties.

During the consultation a series of workshops were held along the South coast, in partnership with the Solent Forum, Dorset Coastal Forum and Devon Maritime Forum. The workshops were attended by over 175 stakeholders with comments and feedback obtained accounted for within the revised report.

A number of questions were posed as part of the consultation to help focus stakeholder's responses as follows:

1. Does the evidence available provide an accurate picture of the current and future situation for marine activities in the South plan areas?

2. Are there any pieces of additional evidence that you consider should be included at this stage that provide new information?

3. Does the content of the report represent the issues for the South plan areas you would like marine planning to address? If not, what is missing and can you provide evidence to support the additional issues?

4. Do the themes adequately represent the issues? And do you have anything to add with regards how the Marine Management Organisation may address the issues?

5. How do you see these issues changing over the next 20 years?

The answers provided to these questions have been crucial to the changes made to the report, as has the information given to us at the workshops. A report summarising the discussions and information coming from the workshops was published in February 2014. After the workshops and consultation, further engagement with stakeholders took place, in order to ensure that we have the best understanding possible of the issues for the South marine plan areas. Chapters 2 and 3 reflect this work, which enhanced the report, enabling the next steps in the planning process to be undertaken from a strong foundation.

2.0 Sector and Topic Evidence and Issues

2.1 Climate

2.1.1 Climate Change Adaptation and Mitigation

Ocean climate is largely defined by temperature, salinity, circulation and the exchange of heat, water and gases with the atmosphere. The functioning of the marine ecosystem is highly dependent on changes to the physical and chemical environment, both of which are influenced by climate.[5]

There is a growing evidence base demonstrating that climate change is already having an impact on the marine environment to such an extent that is affecting the government's vision for clean, safe, healthy, productive and biologically diverse oceans and seas. The best available predictions of what could happen to the marine environment in the future are becoming of increasing importance for adaptation and risk planning.[6] This is because they offer an insight in to the possible implications for issues as diverse as flooding, habitat conservation and food safety.

The evidence for observable, expected and possible impacts of climate change is ever evolving as technology and understanding develops. Despite the rapid growth of information examining climate impacts, issues of resolution, scale and processing time limit the applicability of certain sources (eg Intergovernmental Panel on Climate Change fifth assessment report) to the South marine plan areas. The marine planning evidence base draws on the best available evidence to inform decision making. This will be updated to include the most up to date sources in line with plan review periods.

Current Policy

Significant local, regional, national, European and international policy has been established to tackle climate change.[7] These policies are periodically updated and amended to reflect current evidence. To consider all applicable policy in detail within this document would be impractical, as such, this section's focus is on national policy. Sector or topic specific polices relating to climate change are outlined in respective sections within this report.

The Climate Change Act (2008) provided a framework for climate change adaptation through requiring the production of a UK wide 'Climate Change Risk Assessment' document every five years. Notably, the assessment includes a marine and fisheries sector specific report.[8] The first assessment was published in January 2012 with the National Adaptation Programme report published on the 1st July 2013. The programme responds to the risks identified within the Climate Change Risk

[5] Birchenough S.N.R. et al (2013) Marine Climate Change: Adaption Report. Applied science to support the MMO under the Defra Strategic Evidence and Partnership Fund (SEPF).
[6] CCRA UK (2012) Climate Change Risk Assessment Summary Report: Marine and Fisheries. http://randd.defra.gov.uk/Default.aspx?Module=More&Location=None&ProjectID=15747
[7] The UK government provide links to various scales of policy online: https://www.gov.uk/government/policies/adapting-to-climate-change#bills-and-legislation
[8] Pinnegar J. et al *(2012)* Climate Change Risk Assessment for the Marine and Fisheries Sector. *Technical report*

Assessment and seeks to improve UK resilience to climate change through adaptation. The Climate Change Act gives the government powers to request that certain organisations and public bodies report on the steps that they are taking to respond to climate change. These reports are available online.

The Climate Change Act commits the UK to reducing greenhouse gas emissions by 80% by 2050 compared to 1990 levels. Despite such ambitious targets, many of the impacts of climate change are unlikely to be avoided.[9] Policy therefore is looking to adapt to, rather than abate climate induced changes. This policy direction is expected to cost less than the alternative. If good management practices are adopted early on the economic losses as a result of climate change may be reduced by a ratio of 4:1.[10] This cost reduction would be realised through damage avoided rather than money saved.

Such policies are already influencing activities within the South inshore and offshore marine plan areas. For example, the commitment to cut emissions by 80% dictates a direction towards lower carbon emission from energy generation. This means a gradual reduction of fossil fuelled power stations and a move towards nuclear and renewable technologies. The Government's energy policy statement (EN-1) outlines that there will be no new nuclear power stations within the South Inshore plan area (Section 2.6.5). In the medium term, continued use of oil and gas will require carbon capture and storage to reduce greenhouse gas emissions, however, this is more likely to be in the North and Irish Seas, rather than in the South marine plan areas.[11]

Analysis of local authority core strategies, local development frameworks and Areas of Outstanding Natural Beauty in the South marine plan areas highlight the challenges of climate change through policies which cover broad mitigation and adaptation strategies, and specific requirements relating to potential impacts such as sea level rise, coastal flooding and increased erosion. Policies include:

- the need for developments to be sustainable through design and construction, be energy efficient, reduce contribution to carbon emissions, and be designed and located to be resilient to the impacts of climate change[12]
- the importance of green infrastructure and natural areas in reducing impacts of climate change

[9] Murphy, J.M. et al., (2009), *UK Climate Projections Science Report: Climate change projections*. Met Office Hadley Centre, Exeter

[10] Calculation based on the ratio between the cost of adaptation and the difference between gross and residual damage in Europe table 3 pag 24 (3852-2773:254) in de Bruin, K.C., Dellink, R.B. and Agrawala, S. (2009) "Economic Aspects of Adaptation to Climate Change: Integrated Assessment Modelling of Adaptation Costs and Benefits" OECD Environment Working Papers No.6, OECD Publishing

[11] MMO (2013). South marine plan areas futures analysis. A report produced for the Marine Management Organisation by ABP Marine Environmental Research Ltd, 241pp. MMO Project No: 1039. ISBN: 978-1-909452-14-5

[12] Arun District Council draft local plan, Worthing LDF, South Hampshire LDF, New Forest National Park LDF, Exeter Core Strategy.

- the need to enable wildlife and habitats to adapt to climate change and to seek opportunities to mitigate for the impact of sea level rise on the landscape, access and nature conservation interests and for habitat creation[13]
- the need for developments to demonstrate resistance and adaptation to the projected long term effects of climate change, including extreme weather events, flood damage, greater variability in temperature, and sea level rise over the life of the development[14]
- recommendations that development will not be permitted in the vicinity of areas liable to flood[15]
- where a risk of flood is identified then planning applications must be accompanied by a site-specific flood risk assessment identifying how risk will be mitigated and minimised. This must be consistent with the latest guidance in the Strategic Flood Risk Assessment, national planning policy framework and technical guidance, and any supplementary information from the Environment Agency.[16]

Current situation

The fact that the climate is changing and will continue to do so is now unequivocal. Despite the efforts of the most advanced climate models and significant scientific research, exactly how these changes will manifest is difficult to determine, especially at a regional level. The broad and varied nature of climatic changes is such that all marine sectors and topics; from heritage conservation to shipping, are likely to be impacted in some way. This is especially true at transitional zones, such as the coast. Due to the variety of marine activities, it would be impossible to review all potential impacts in detail within this document. As such, an overview of core issues is provided here. For further information the reader should refer to the references provided as footnotes and hyperlinks.

Air Temperature

The air temperature in central England has risen by about 1°C since the 1970s.[17] This increase is, at least in part, driven by greenhouse gas emissions from human activities.

Table 1 shows projected air temperature and precipitation by the 2050s for the South West approaches and Eastern channel marine regions. Changes in air temperature over marine regions are projected to be larger for the South of England than in the North due to the proximity to the European continental land mass, which will warm faster than the oceans. Increases could be in the region of 1.2 to 3.2°C by the 2050s.[18] The gradient of change in precipitation is also larger in the South than the north. By the 2050s, the South marine plan areas are projected to experience wetter

[13] Wealdon LDF; New forest national park LDF; management plans for the Isle Of Wight AONB, Chichester harbour AONB, South Devon AONB
[14] Southampton LDF, Chichester harbour AONB Management Plan, The plan for Torbay to 2032 and beyond.
[15] Bournemouth district wide local plan,
[16] Brighton and Hove City Council LDF draft core strategy; Havant LDF
[17] Jenkins et al, 2009. UK Climate Projections: Briefing report.
[18] Jenkins et al, 2009. UK Climate Projections: Briefing report.

winters and drier summers, with precipitation increases of up to about 30% in winter, and decreases of approximately 45% in the summer.[19]

Table 1: Changes in winter and summer mean temperature and precipitation, averaged over marine regions, by the 2050s under the Medium emissions scenario, taken from UKCP09.[20]

	Mean air temp winter °C	Mean air temp summer °C	Precipitation winter %	Precipitation summer %
South West Approaches	+1.2 to + 2.9	+1.3 to +3.2	0 to + 28	-43 to -2
Eastern English Channel	1.2 to 3.3	1.4 to 3.4	1 to 31	-49 to 0

Sea Temperature

Seawater temperatures are increasing, with shallow shelf seas,[21] such as those surrounding the UK, likely to see some of the largest relative increases of all seas and oceans. Over the past four decades, observations have tracked sea surface temperatures rising by more than 1.0^{o}C.[22]

UK Climate Projections 2009 (UKCP09)[23] are the most recent projections to cover the UK and it's shelf seas. Under the medium emissions scenario,[24] the UK's shelf seas are likely to experience warming of between 1.5 and 4°C by the end of the 21st century. Of the South marine plan areas, the waters off the South Kent coast are projected to experience the most notable temperature rise, estimated at approximately 2.5 to 4°C, with the largest increases expected in autumn months.[11] The projected increase in mean sea surface temperature for the South inshore and offshore marine plan areas is shown in Figure 1.[25] Further projections will be made available on the Marine Planning Portal shortly after the publication of this report.

[19] Jenkins et al, 2009. UK Climate Projections: Briefing report.
[20] UKCP09 projections assign a probability to possible climate change outcomes to demonstrate the probability of climate change being less than or greater than a certain value, using the cumulative distribution function. The climate change at the 50% probability level is that which is as likely to be exceeded as not exceeded, ie the central estimate. The projections presented in table 1 are between two probability levels (10% certain that very unlikely to be less than, and 90% certain that very likely to be less than).
[21] Shelf seas are those situated on continential as opposed to oceanic tectonic plates. They are characterised by a realtively shallow (<200m) water column and close proximity to continential land mass
[22] MCCIP (2013). Marine Climate Change Impacts Report Card 2013 (Eds. Frost M, Baxter JM, Bayliss-Brown GA, Buckley PJ, Cox M, Withers Harvey N) Summary Report, MCCIP, Lowestoft, 12pp.
[23] Murphy, J.M., et al. 2010 UK Climate Projections Science Report: Climate change projections Version 3. MetOffice Hadley Centre, Exeter, UK.
[24] UKCP09 considered the effects caused by low, medium and high carbon dioxide emissions scenarios, however only a medium emission scenario is available for sea surface temperature.
[25] MMO (Unpublished) Potential Effects of climate change in the South and East Marine Plan Areas. A report produced for the Marine Management Organisation,Report prepared by: Cefas and Cranfield University

As the sea surface temperature rises, the strength and duration of stratification of the water column[26] is expected to increase throughout the UK's shelf seas. This is likely to impact biological and physical processes beyond the effects of temperature change.[27]

The physical and-chemical properties of the marine environment influence the species and communities living there. Species not native to the English South coast, those typically associated with warmer waters (found at lower latitudes) are increasingly being found in established populations further North, often to the detriment of native species. In additon to changes in species distribution, organisms are also exihbiting signifcant changes in life cycles, such as breeding earlier in the year.[28] As well as the negative impact on marine communities, non-native species have a negative economic impact estimated in the region of £40 million per year.[29]

Sea level rise

Sea level around the UK has risen by about 1 mm per year in the 20th century, with the rate of change rising since the 1990s.[30] The majority of this change has been attributed to the thermal expansion of ocean water and melting of land-based glaciers and ice caps caused by rising temperatures. Absolute sea level rise around the UK is projected to be between 12 to 76 cm by the year 2095.[31] Taking account of the relative vertical movements of land, a slightly larger sea level rise is projected in the South of England because of subsidence. The projected sea level rise for the South inshore and offshore marine plan areas is shown in Figure 2.[32]

As a result of sea level rise, an increasing number of people and businesses throughout England and Wales will be at risk of coastal and fluvial flooding. The 900,000 people currently at risk of flooding is projected to increase by 44% - 300% by 2050. Sea level rise places an additional pressure on the natural environment through coastal squeeze, placing species and habitats at greater risk of cumulative effects. In total, 32,000ha of designated habitat is considered to be vulnerable to coastal flooding.[33]

[26] Water stratification occurs when water masses with different properties (such as salinity, temperature and density) form layers which act as a barrier to water and nutrient mixing. Less dense, warmer water lay above denser, colder waters; the boundary between is known as the thermocline.
[27] Jenkins et al, 2009. UK Climate Projections: Briefing report.
[28] MCCIP (2013). Marine Climate Change Impacts Report Card 2013 (Eds. Frost M, Baxter JM, Bayliss-Brown GA, Buckley PJ, Cox M, Withers Harvey N) Summary Report, MCCIP, Lowestoft, 12pp.
[29] Williams, F. et al., 2010 The economic cost of invasive non-native species on Great Britain Cab/001/09
[30] Jenkins et al, 2009. UK Climate Projections: Briefing report.
[31] Lowe, J.A., et al., 2009 UK Climate Projections science report: Marine & Coastal projections. Met Office Hadley Centre, Exeter, UK.
[32] MMO (Unpublished) Potential Effects of climate change in the South and East Marine Plan Areas. A report produced for the Marine Management Organisation,Report prepared by: Cefas and Cranfield University
[33] CCRA (2012) Climate Change risk Assessment for the Floods and Coastal Erosion Sector, January 2012. Ramsbottom, D., Sayers, P. & Panzeri, M. (Defra code GA0204) 272pp

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Figure 1: Draft output from MMO1077 Potential spatial effects of climate change - UKCP09 projected mean sea surface temperature change

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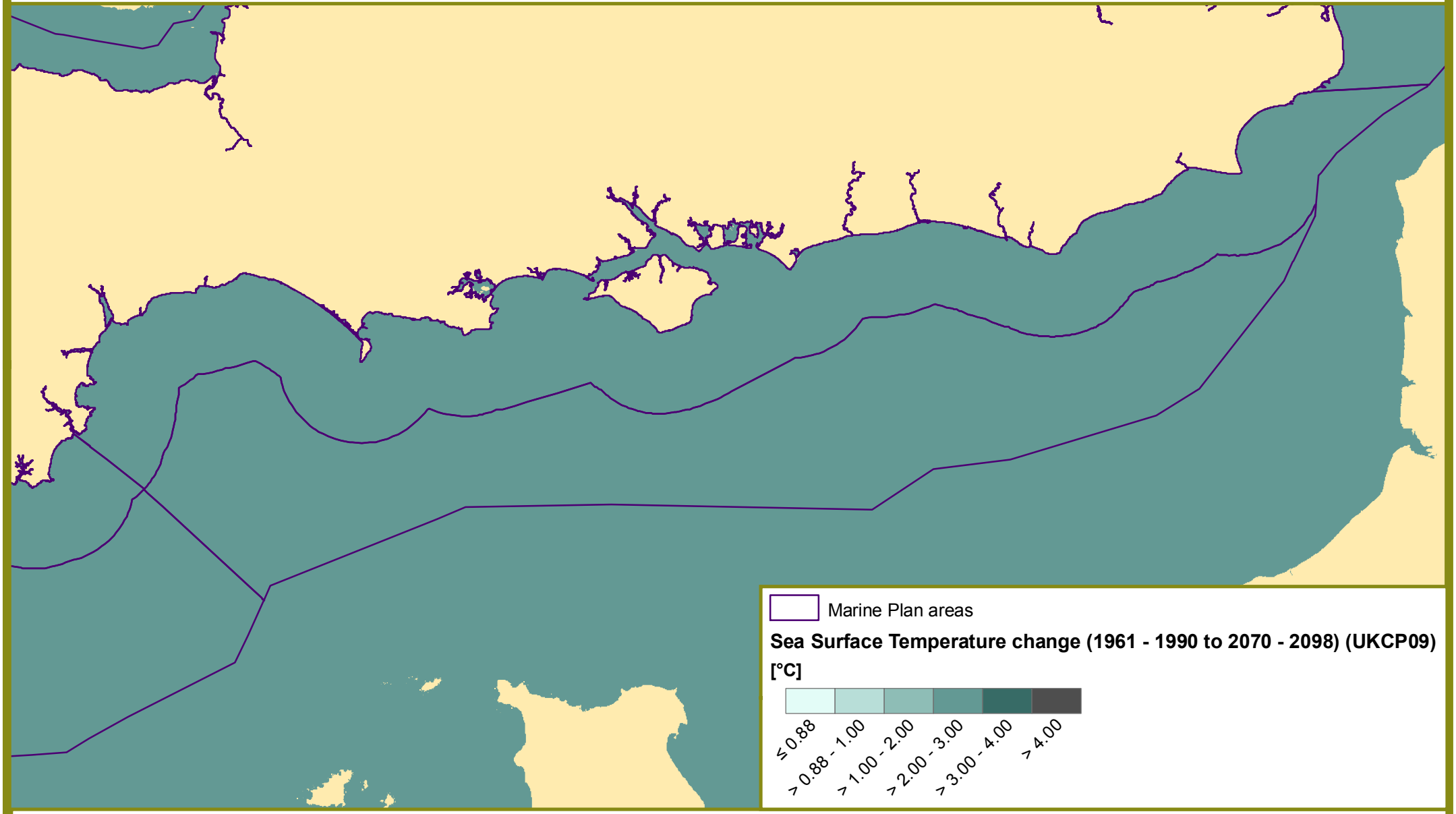

Storm Events

Changes in the winter mean wave height are projected to be between –35 cm and +5 cm and changes in the annual maxima are projected to be between –1.5 metre (m) and +1 m. UK Climate Projections indicate that the area adjacent to Southampton Water is likely to experience the most significant increase in storm skew.[34] Figure 2 demonstrates projected change in storm skew. Extreme wave height is projected to be greatest in the South West region of the South marine plan areas.[35]

Currently, there is no substantial evidence for future changes in storm-related extreme sea levels for the UK, due to low confidence in the simulation of extreme winds in climate models. Therefore for the most part, future changes in extreme sea level will be governed by mean sea level rise, rather than any change in the storm surge component.[36]

Ocean Acidification

Carbon dioxide released from industrial and agricultural activities has resulted in observable increases in global atmospheric concentrations from pre-industrial levels of ~280ppm to more than 396ppm in 2013.[37] The oceans act as a sink for carbon dioxide, helping to mitigate the rise of atmospheric carbon through absorbing atmospheric gases. However, this natural mitigation does not come without a cost. It is significantly altering seawater chemistry by increasing the acidity of seawater (lowering pH),[38] in a process known as ocean acidification.

Observations indicate seawater has decreased by 0.1pH units since pre-industrial times. Significantly, the observed rate of change has exceeded anything experienced in the past 300 million years.[39] It is predicted that the oceans will continue to acidify throughout the 21st century, regardless of emission scenarios, as they continue to absorb atmospheric carbon dioxide.[40,41]

[34] Storm Skew is the weather induced increased in sea level above maximum predicted tide
[35] MCCIP (2010) Marine Climate Change Impacts Partnership Climate of the marine environment [Online] Available from: www.mccip.org.uk/annual-report-card/2010-2011/climate-of-the-marine-environment.aspx
[36] MCCIP (2010) Marine Climate Change Impacts Partnership Climate of the marine environment [Online] Available from: www.mccip.org.uk/annual-report-card/2010-2011/climate-of-the-marine-environment.aspx
[37] Dr. Pieter Tans, NOAA/ESRL (www.esrl.noaa.gov/gmd/ccgg/trends/) and Dr. Ralph Keeling, Scripps Institution of Oceanography (scrippsco2.ucsd.edu/).
[38] pH is the measure of acidity or basicity of a solution. Pure water is pH 7 on a scale of 0 (Acidic) to 14 (Basic)
[39] MCCIP (2013). Marine Climate Change Impacts Report Card 2013 (Eds. Frost M, Baxter JM, Bayliss-Brown GA, Buckley PJ, Cox M, Withers Harvey N) Summary Report, MCCIP, Lowestoft, 12pp.
[40] Defra, 2010 Charting progress 2: Chapter 6 Climate change Published by Defra on behalf of the UK Marine Monitoring and Assessment Strategy community, London.
[41]: MCCIP (2013). Marine Climate Change Impacts Report Card 2013 (Eds. Frost M, Baxter JM, Bayliss-Brown GA, Buckley PJ, Cox M, Withers Harvey N) Summary Report, MCCIP, Lowestoft, 12pp.

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Figure 2: Draft outputs from MMO1077 Potential spatial effects of climate change - UKCP09 projected climate changes

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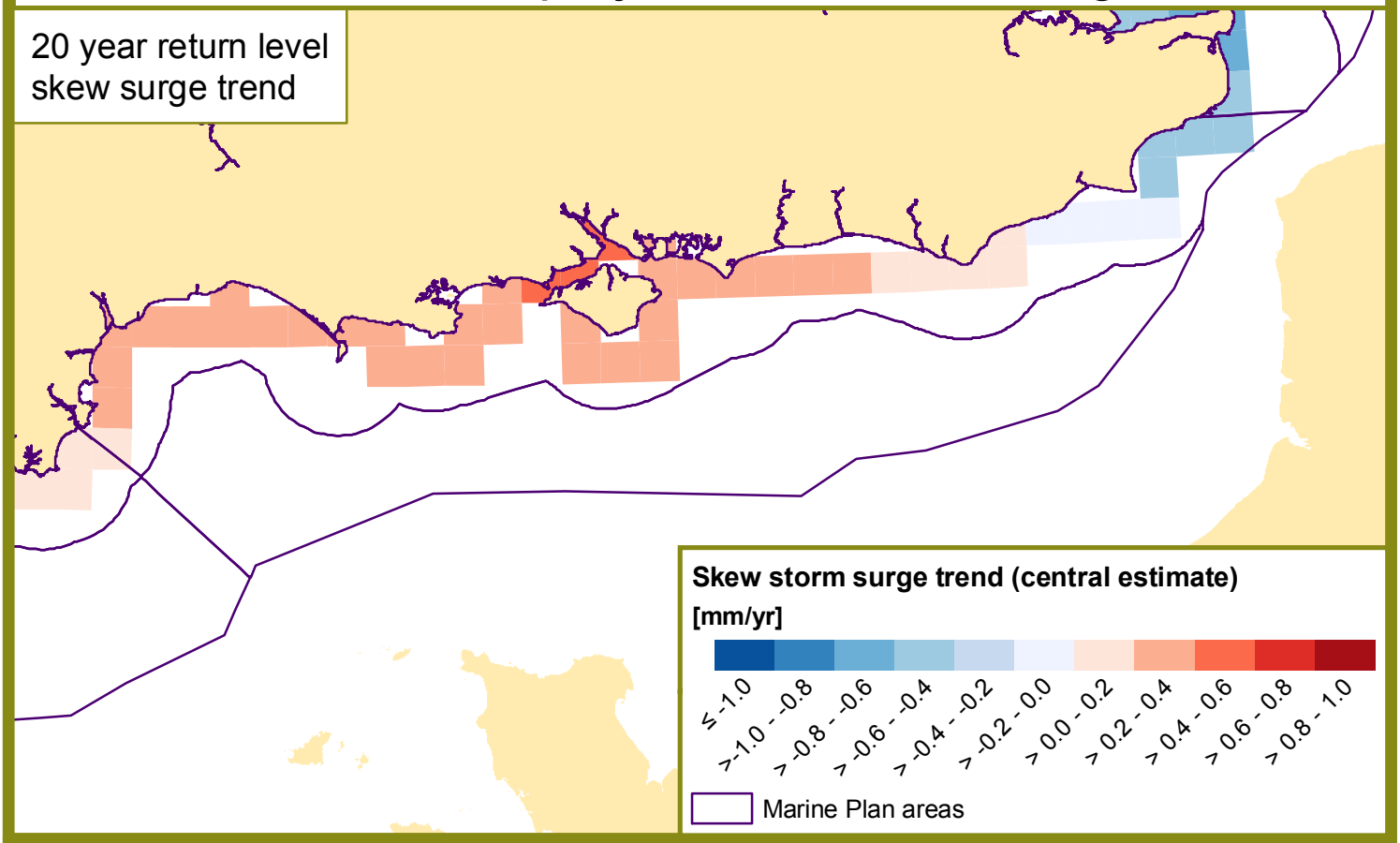
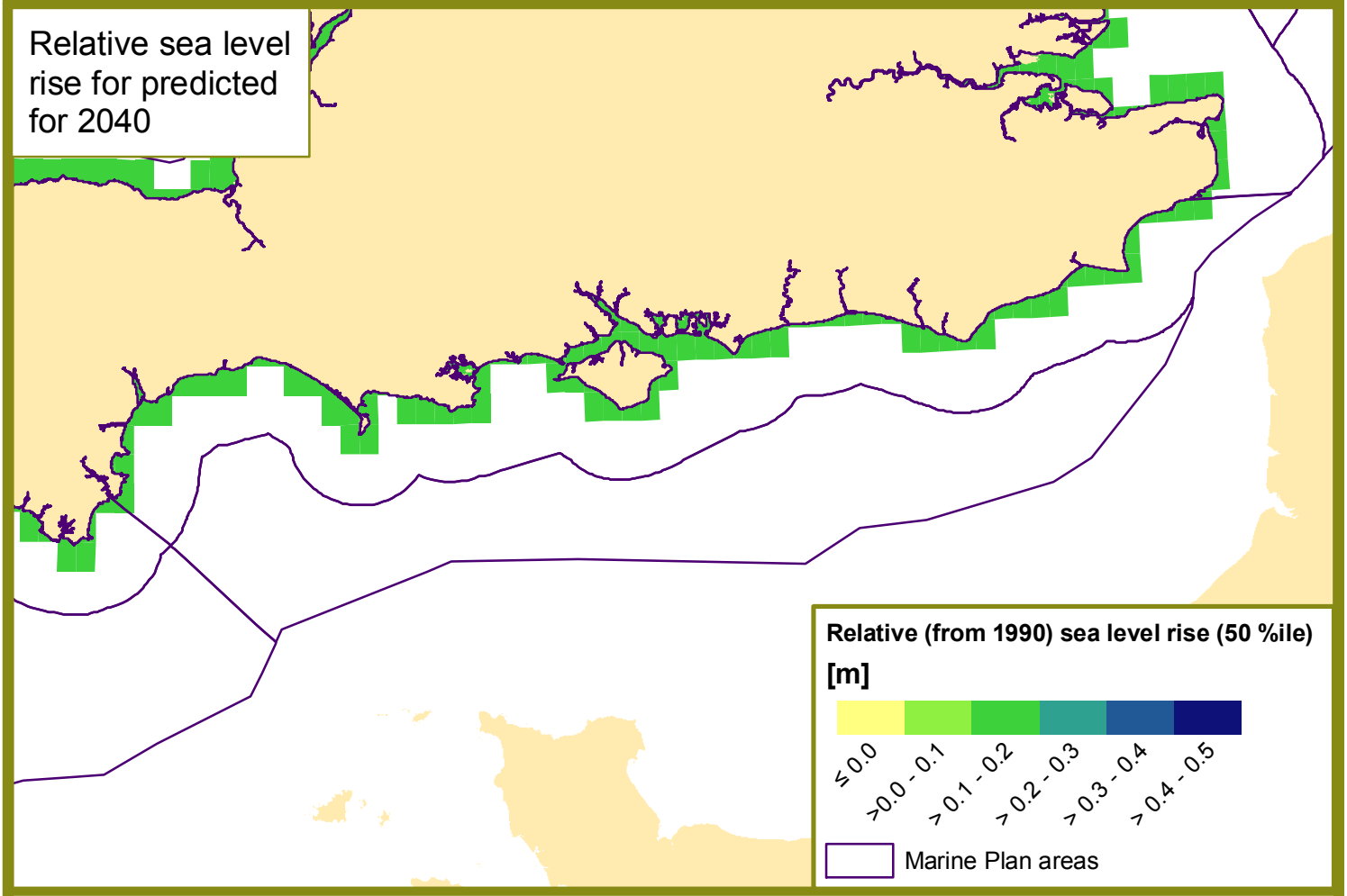




Map produced in ETRS89 UTM 30N. Not for Navigation. Contains Ordnance Survey and UK Hydrographic Office data

Projections indicate a further decrease in pH of around 0.1 units by the 2020s, and between 0.25 and 0.47 units by 2100.[43] The resulting ocean acidification could have negative consequences for ecosystem processes and species; particularly those organisms with calcareous shells including commercially important shellfish species.[44]

Ocean acidification in turn reduces the ability of the oceans to absorb carbon dioxide, and therefore buffer the effect of global warming. Climate warming may increase rates of open ocean carbon cycling, making less carbon available to the benthic (sea floor) systems resulting in reduced benthic biomass with potential knock on effects for marine food webs. In addition, climate change may cause an increase in areas or periods of low oxygen in the oceans.

Issues

The marine area is intrinsically linked to UK society and the wider economy; as such, potential impacts of climate change on the marine sector will have wider consequences. Particularly clear links are identified between climate and biodiversity, ecosystem services, health, transport, industry and service sectors.[45] Some of the potential issues for the South marine plan areas are highlighted in Table 2. Further detail is provided in relevant sector chapters within this document.

[43] Pinnegar, J., et al., 2012 Climate Change Risk Assessment for the Marine and Fisheries Sector In: UK 2012 Climate Change Risk Assessment. Defra, London.
[44] Defra, 2012, UK Climate Change Risk Assessment
[45] Pinnegar, et al (2012) UK Climate Change Risk Assessment for the Marine and Fisheries Sector.

Table 2: Considers some of the most critical climate change impacts and benefits for sectors within the South Plan areas. This table is not an extensive list, though highlights some of the more pressing issues relevant to the South Plan area. Adapted from MMO 1077[46]

Sector	Potential Risks	Potential Benefits
Offshore Wind	More extreme storms and waves affecting: • Efficiency of turbines • Structural integrity of infrastructure • Safety of working on and travelling to offshore sites • Scour around seabed structures • Construction of offshore sites • Turbines taken off grid in extreme events • More maintenance required Sea level rise, more extreme storms and waves and changes to fluvial inputs causing; • Inundation of interconnection nodes at the coast	Higher wind speeds may increase the energy generated from wind turbines
Tidal Stream/Wave energy	Sea level rise, more extreme storms and waves and changes in ocean current affecting; • Efficiency • Site integrity • Safety of working on, and travelling offshore sites • Turbines taken off grid in extreme events • Inundation of interconnection nodes at the coast	Increased water movement in storm events may increase the energy generated
Ports / Shipping	Sea level rise, more extreme storms and waves, fluvial flooding and changes in ocean currents affecting; • Sedimentation post flooding events, increasing need for dredging to keep channels clear • Flooding of port facilities and access roads • Disruption to shipping (including passenger ferries) • Safety of ships at sea • Loss of cargo	Sea level rise and coastal flooding could reduce the need for dredging to keep channels clear in some areas

[46] MMO (in press) Potential Effects of climate change in the South and East Marine Plan Areas. A report produced for the Marine Management Organisation,Report prepared by: Cefas and Cranfield University

Sector	Potential Risks	Potential Benefits
Dredging / Disposal	More extreme storms and waves and an increase in fluvial inputs affecting; • Efficiency of operation (such as the positioning of suction dredgers) • Increase need for and cost of dredging • Safety at disposal and dredge sites • Need for re-mapping of sites	More extreme storms and waves and an increase in fluvial inputs resulting in increased need for dredging. This could be of benefit to the dredging industry.
Aggregates	More extreme storms and waves affecting; • Safety during operations • Efficiency during operations (such as the positioning of suction dredgers)	Sea level rise and coastal flooding causing an increase in demand for aggregates for building and maintaining sea defences which would benefit the aggregate industry
Cables / Pipelines	More extreme storms and waves, and changes in ocean currents affecting; • Scour around buried pipelines / cables • Damage to pipelines /cables • Safety concerns when laying new pipelines /cables	
Fisheries	Sea temperature rise, ocean acidification, changes in fluvial flows (particularly in estuarine nursery ground) and ocean currents causing negative changes including; • A decrease in abundance, survival and growth of some exploitable fish species • An increase in abundance, survival and growth of non-native and invasive species • Northward movement of species following warming conditions More extreme waves and storms affecting; • Safety of fishing vessels • reduction of fishing days may affect prices through market uncertainties Negative impacts may be exacerbated by low oxygen conditions and presence of pollutants and marine contaminants	Sea Level Temperature rise causing beneficial changes affecting; • Abundance, survival and growth of some exploitable fish and shellfish species • Abundance, survival and growth of exploitable non-native species

Sector	Potential Risks	Potential Benefits
Aquaculture (Principally Shellfish)	Sea temperature rise and changes in fluvial inputs increasing; • Frequency of occurrence and concentration of marine pathogens or harmful algal blooms in shellfish leading to economic losses or human health implications • Occurrence of nuisance invasive species fouling gear or affecting shellfish growth Sea level rise and more extreme storms and waves affecting; • Site and facility infrastructure • Loss of suitable intertidal habitat for aquaculture or movement of commercial species outside of current (and future) aquaculture sites Ocean acidification and sea temperature rise negatively affecting shellfish growth and reproduction	Sea temperature rise creating conditions for culture of previously unexploited species. Sea Temperature rise and changes in fluvial inputs potentially reducing the marine pathogens affecting shellfish (depending on their environmental tolerances)
Tourism & Recreation	Sea level rise, more extreme storms and waves, sea temperature rise and changes to fluvial inputs affecting; • Ecotourism (access to sites in bad weather, decrease in some bird species populations through nest inundation / disturbance) • Safety of recreational fisheries during bad weather • Coastal tourism during bad weather • Integrity of coastal tourism infrastructure • Loss or degradation of beaches • Decrease in suitable conditions for diving amongst other recreational activities • Decrease in bathing water quality during storms and operation of combined sewer overflows	Air and sea temperature rise creating benefits through; • Increased Ecotourism • Increased recreational fishing • Increased coastal tourism • Improved conditions for watersports More extreme storms and waves, air and sea temperature rise and coastal flooding creating benefits through • Increased opportunities for some water sports such as sailing and surfing
Inshore and Offshore Protected Areas Natural Marine Environment	Sea level rise and coastal flooding, more extreme storms and waves, air and sea temperature rise and fluvial inputs affecting; • Loss of coastal habitats and the need for compensatory habitats • The links within ecological networks may be compromised and weakened, especially within designated areas • Habitat integrity such as re-suspension of soft substrates and reduced growth of reef species • Breeding success of marine organisms at onshore and offshore sites • Breeding success of bird and marine mammals at onshore nesting sites (eg little terns in Langstone harbour)	Sea temperature rise and changes to ocean currents potentially improving the links within ecological networks

Sector	Potential Risks	Potential Benefits
Power Stations	Sea temperature rise increasing the ecological effects of cooling water discharge (* and reducing efficiency of power stations cooling systems – this in itself could lead to increased greenhouse gas emissions) Sea level rise, more extreme storms and waves and fluvial flooding affecting; • Site integrity • Safety • Economic losses due to temporary shut downs or failure	
Waste Water	Fluvial inputs and flooding affecting • Operation of combined sewer overflows, in turn affecting water quality	
Defence	Sea level rise, more extreme storms and waves and fluvial flooding affecting; • Coastal site integrity • Safety of military operations at sea and air	

2.1.2 Coastal Change

Introduction

The Marine Policy Statement states "Coastal change and coastal flooding are likely to be exacerbated by climate change, with implications for activities and development on the coast." The Climate and Ocean Acidification section (2.1.1) covers the climatic causes (ie sea level rise, storm events etc) of flooding and coastal erosion in more detail.

Conversely, if not managed properly, activities such as dredging, dredged material deposition and marine landing facility construction (to name a few) could result in direct effects on the coastline. Indirect changes to the coastline and seabed could also occur due to the direct changes mentioned above such as localised or more widespread coastal erosion and changes to offshore features such as submerged banks and ridges. Changes to the movement of sediment resulting from infrastructure development could also affect the physical nature of the coastline.[47]

Current policy

The government considers coastal flooding as one of the highest priority risks[48] and inappropriate development or activities in the South marine plan areas could increase the risk of flooding to homes and businesses. The Environment Agency, alongside Local Lead Flood Authorities, play a central role in managing flood risk and erosion from rivers and the sea. They have produced a number of statutory and non-statutory management plans that support England's Flood and Coastal Erosion Risk Management Strategy and these documents present a clear picture of the processes at work and associated risks to England's coastline. These include Catchment Flood Management Plans, Flood Risk Management Plans and Shoreline Management Plans. In addition, planning policy (eg National Planning Policy Framework) and related guidance outlines how developers and authorities should manage flood risk and development at the coast.

Climate change projections (eg UKCP09), in combination with other plans allow an understanding of the possible outcomes for coastal areas, particularly from sea-level rise.

Interactions between land and sea are important, complex and intrinsic within climate change discussions. Of the 4,500km of English coastline, approximately 1,800 km are at risk of coastal erosion. Shoreline Management Plans, although non-statutory, provide large scale risk assessments for the coastline for short, medium and long term time frames (20, 50 and 100 years respectively) and identify sustainable management approaches for the next 100 years. Shoreline Management Plans detail the coastal defence strategy for each section of a coastline; where a particular stretch of coastline is at significant risk, with respect to climate change a Coastal Change Management Area will be defined. It is the responsibility of the Environment

[47] Marine Policy Statement (2011). Defra. 2.6.8 Coastal change and flooding
[48] National Risk Register of Civil Emergencies (2013). https://www.gov.uk/government/publications/national-risk-register-for-civil-emergencies-2013-edition

Agency and respective local authorities to plan and produce shoreline management plans and define coastal change management areas. Each shoreline management plan provides one of the following four policy recommendations for stretches of coastline:

- holding the line (HTL) through the maintenance of present defences or provision of new defences
- advance the line (ATL)
- no active intervention (NAI)
- managed realignment (MR) where defences are removed and/or moved inland to allow for natural coastal flooding.

Marine planning will not seek to duplicate or impinge on the work of Shoreline Management Plans, Flood and Coastal Erosion Risk Management and Coastal Change Management Areas, but rather signpost and highlight the importance of such policy and documents for consideration in relation to new development.

Increasing pressures from an eroding coastline coupled with development pressures on land put the natural, historic and built environment at risk. An estimated 4,000ha of coastal designated sites has been lost through coastal change, with an estimated 140-280 ha of priority habitat considered at risk of erosion by 2050.[49]

Current situation

As part of the Floods Directive, the production of a Preliminary Flood Risk Assessment was required, showing the impact of historic flooding by 2011, and the generation of flood risk maps showing a range of hazard variables (water depth, extent and probability) by 2013. The Environment Agency has completed a number of Catchment Flood Management Plans relevant to the South marine plan areas covering 14 catchments within them. The plans aim to identify the causes of flooding and recommend ways of managing it over the next 50 to 100 years for each catchment. The Environment Agency published a National Flood Risk Assessment, indicating the ways in which flood risk should be reduced and mitigated, through physical or policy measures. A number of flood schemes are ongoing which relate to the coast of the South Inshore plan area.

There are six shoreline management plans covering the coastline of the South inshore marine plan area.

[49] CCRA (2012) Climate Change risk Assessment for the Floods and Coastal Erosion Sector, January 2012. Ramsbottom, D., Sayers, P. & Panzeri, M. (Defra code GA0204) 272pp

Table 3: Shoreline Management Plans within boundaries of the South inshore and offshore marine plans. Details of each plan can be found on respective authority and government webpages.

Council	Shoreline Management Plan
Shepway District Council	South Foreland to Beachy Head
Arun District Council	Beachy Head to Selsey Bill
New Forest District Council	Selsey Bill to Hurst Spit
Isle of Wight District Council	Isle of Wight
Bournemouth Borough Council	Hurst Spit to Durlston Head
Teignbridge District Council	Durlston Head to Rame Head

The shoreline management plan boundaries can be viewed on the marine planning portal. The most up to date shoreline management plans support 'hold the line' policies for much of the existing defended areas, such as Bournemouth, Chichester, Portsmouth, Bognor Regis, Brighton and Eastbourne. This corresponds with areas where major infrastructure and populations require protection. There are other areas where managed realignment is proposed, such as Dungeness and Selsey Bill and where flood defence works have been carried out to increase the standard of protection while also creating important intertidal habitat. The Medmerry Coastal Flood defence Scheme is a good example of this. Much of the Isle of Wight and Beachy Head is no active intervention.[50]

A number of local authority plans have more spatially specific policies. The Poole core strategy prioritises the protection of the town centre from the risk of coastal flooding associated with global warming and predicted sea level rises by 2126, through the development of new flood defences. It also flags the importance of considering impacts upon the natural environment, for instance through facilitating species migration and habitat creep.

The New Forest District Council core strategy states that development will not be permitted within the defined coastal erosion zone which runs along the cliff tops from the district boundary West of Barton-on-Sea to Milford-on-Sea, so as to reduce future threats to public safety. Policies in the West Dorset and East Devon local plans reflect the significance of coastal change.

The beneficial use of dredged materials for habitat replenishment/creation, beach recharge (such as in Bournemouth) and natural flood defences occurs in some areas on the South coast. There are many benefits to this approach which include ensuring the material remains in the natural sedimentary system, reducing the need for disposal at sea (which requires a license so thus reducing the cost) and highlighting potential areas for use of this material from major dredging projects. Lymington harbour is an example whereby dredged material from the harbour has remained in the natural system, while also replenishing important habitat. It is an aspiration of many stakeholders on the south coast to utilise the opportunities of dredge material more and the Marine Management Organisation has commissioned a study (due for

[50] MMO Draft South Marine Plans Sustainability Appraisal Scoping Report (2014) (in press)

completion in July 2014) looking into the opportunities and challenges of this. Please see section 2.10, Dredging and Disposal, for more information about this study.

Future trends

With predicted increases in storminess, sea level rise and more erratic weather conditions due to the impacts of climate change, coupled with the pressures from population growth (particularly in already built up areas) and future development of marine activities and industries, it is highly likely the South Inshore plan area will be affected by further coastal change.

Future development will need to consider sea level rise predictions during construction, operation and decommissioning and adapt to future changes. The natural marine environment will also be affected by coastal change. Coastal squeeze is likely to increase due to the impacts of climate change, reducing the physical space for habitats such as saltmarsh as well as the quality of the habitat. Coastal habitats can and do adapt to coastal change but with a static landward boundary, squeeze is inevitable. Sea level rise is already impacting on little terns in Langstone harbour. Beach recharge is already being used to maintain their habitat but this is an example of where the impacts are already affecting species.

Furthermore, if European Marine Sites are damaged or experience loss due to flood risk management or coastal squeeze, compensatory habitat is required by way of replacement. The Regional Habitat Creation programme, co-ordinated by the Environment Agency in consultation with Natural England and local authorities provides a strategic and proactive approach for the provision and delivery of compensatory habitat.

Potential core issues

- The opportunities and challenges for the beneficial use of dredged materials need to be explored further to help address the impacts of coastal change. Any support marine plans can offer would help ensure material remains in the sedimentary system, habitats and natural flood defences are created and the better utilisation of natural resource for the benefit of businesses and people.

Issues for other sectors

- Developments need to be resilient to coastal change and flooding and consideration should be given to how to adapt to future changes. In turn, developments need to ensure they do not have an unacceptable impact on coastal change.

Issues for sustainability

- Coastal squeeze, due to the impacts of climate change and population and industrial growth, will impact on coastal habitats such as saltmarsh and sand dunes, reducing the quality and amount of space for habitats and associated species.
- Habitats such as saltmarsh and sand dunes can act as natural flood defences. Therefore coastal squeeze may reduce their ability to do this, adding to the requirement and cost for manmade defences.

2.2 Natural environment

2.2.1 Air quality

Air pollution can impact upon biodiversity, the wider environment and human health. The cost of man-made particulate based air pollution on human health has been estimated to be between £8.6 and £18.6 billion a year[51] although legislation and policy governing air quality, introduced over the last 30 years, has successfully minimised the worst health effects.

The Marine Policy Statement recognises that activities and developments in the marine and coastal area can have adverse effects on air quality.[52] The principal sources of air contamination at sea are from point source oil and gas installations[53] and ship movements.[54] Sulphur oxides (SOx) and nitrogen oxides (NOx) are two of the main sources of pollutants from ships both of which are regulated by MARPOL (International Convention for the Prevention of Pollution from Ships) through the restriction of these emissions from ship exhausts as well as the deliberate emission of ozone depleting substances. The generation of energy from renewable sources has an overall beneficial effect on air quality, in comparison to fossil fuels.[55]

Current Situation

The Air Quality Strategy sets national objectives for local authorities, many of the standards derived from EU obligations, such as from the Ambient Air Quality Directive (and daughter directives) and the National Emission Ceilings Directive.

Local authorities have been carrying out assessments since 1997 to measure air quality in their area and try to predict how it will change in the future. All local authorities have to report the outcomes of their assessments against national objectives and if any area does not meet the requirements, an Air Quality Management Area is declared and an action plan developed to address the issues.[56] Although these Air Quality Management Areas are terrestrially-focused, many of the local authorities with Air Quality Management Areas are coastal and therefore port or shipping activity is likely to contribute to air quality alongside related and surrounding activities such as freight transport. This is because industry is often situated close to ports because of the proximity to import (for raw materials) and export (finished goods) routes. For example, some of the highest concentrations of sulphur dioxide are located at some of the UK's major ports such as Southampton. However, other ports such as Dover do not show 'hotspots' of such concentrations indicating it is not necessarily shipping itself that accounts for the peaks but the nearby industry linked to the ports.[57]

[51] Defra (2010) Valuing the Overall Impacts of Air Pollution
[52] Marine Policy Statement (2011). Defra. 2.6.2.1
[53] Offshore combustion plants are regulated by the Offshore Combustion Installations (Pollution Prevention and Control) Regulations 2012 and the Greenhouse Gases Emission Trading Scheme Regulations 2013.
[54] http://apis.ac.uk/overview/regulations/overview_shipping_emissions.htm
[55] Marine Policy Statement (2011). Defra. 2.6.2.1
[56] http://aqma.defra.gov.uk/aqma/home.html
[57] Air Pollution in the UK annual report (2011). Defra.

There are 18 local authorities adjacent to the South Inshore plan area with at least one Air Quality Action Plan in each.[58] Many of the local authorities refer to air quality and associated action plans in their core strategies, mostly in relation to only supporting development that will not cause (air) pollution unless it does not breach the national objectives.

The International Maritime Organization (IMO) has set up Sulphur Emission Control Areas where sulphur emission standards are more restrictive than other areas and this includes the South Inshore and South Offshore marine plan areas. This has implications for shipping because it requires a more expensive, but less polluting, type of fuel (no more than 0.1% sulphur content) to be used and this must be in place by 2020.[59]

Future trends

Air quality is not routinely monitored at offshore sites so it is difficult to predict the future trend of air quality in the South marine plan areas. Since the 1960s when monitoring of air quality began, air pollution from Nitrous Oxides, Sulphur Oxides and particulate matter has reduced overtime.[60]

The Marine Strategy Framework Directive UK Initial Assessment and targets for achieving Good Environmental Status recognise the link between a healthy marine environment, specifically sub-tidal benthic habitats, inter-tidal rocky habitats and inter-tidal sediment habitats, and the regulation of air quality. Furthermore, sources of diffuse pollution from transport emissions can contribute to anthropogenic eutrophication.[61] Any degradation in these habitats could reduce their ability to regulate air quality.[62]

Shipping is becoming increasingly subject to international standards as discussed in the sections above and these measures are expected to have a significant benefit on air quality and human health.[63] However, the use of specialised fuel comes at an increasing cost to shipping companies and could result in reduced ship traffic with companies opting to move freight via other means.

Potential core issues

Marine plans provide the opportunity for greater integration at the coast to reduce air pollution. Terrestrial air pollution is already managed through Air Quality Management Areas and emissions from shipping are governed by international

[58] http://aqma.defra.gov.uk/aqma/maps.php
[59] Strategic Scoping Report (2013). MMO.
[60] Air Quality in the UK (2003). Defra.
[61] Definition: having waters rich in mineral and organic nutrients that promote a proliferation of plant life, especially algae, which reduces the dissolved oxygen content and often causes the extinction of other organisms. The process of eutrophication makes the water more eutrophic.
[62] Marine Strategy Part one: Initial Assessment and Good Environmental Status (2012). HM Government.
[63] International Maritime Organisation Maritime Knowledge Centre, 2012. International Shipping Facts and Figures – Information Resources on Trade, Safety, Security, Environment. 7.5. Ship-generated air pollution

legislation through the International Maritime Organization. Otherwise air quality at sea is not measured nor managed in a holistic manner.

- It is important to understand the future direction of those industries which emit Sulphur Oxides, Nitrous Oxides and particulate matter to understand the potential future direction or trends of air quality. The impact of air pollution on the environment and human health is partly dependent on marine industry, therefore consideration of air quality in the development of plan policies for these industries is required.

Interactions with other sectors

- Ports and shipping: increased shipping activity, port expansion and associated industry growth could lead to increased Sulphur Oxides and Nitrous Oxides emissions at coastal locations, which in turn could contribute to the breach of national objectives for air quality. Legislation outlined in earlier text goes a significant way to addressing these emissions but if trade increases leading to more shipping movements, this could counteract the influence of international and national legislation.
- The use of specialised fuels comes at an increasing cost to shipping companies and this could result in reduced ship traffic with companies opting to move freight via other means. This too could have a benefit on air quality but also impact on local economies reliant on ports, shipping and associated industries.

Issues for sustainability

- The requirements of national and international legislation to address air pollution could lead to increased sea transport costs and thus a possible reduction in the competitiveness of short-sea shipping versus other transport modes (rail, road, air). This would benefit air quality but have a knock on effect on the national economy as well as coastal communities reliant on the port industry for local income and employment.
- In the South marine plan areas, there is a significant amount of commercial shipping, recreational boating and passenger ferries which collectively contribute to air pollution. Consideration of the cumulative effect of these activities on air quality is needed, particularly in the coastal area.
- Ongoing challenges with air quality (from transport emissions amongst others) in Air Quality Management Areas at the coast and on land could lead to eutrophication of the marine environment.

2.2.2 Sediment and water quality

The Marine Policy Statement says: “Developments and other activities at the coast and at sea can have adverse effects on transitional, coastal and marine waters. During the construction, operation and decommissioning phases of development, there can be increased demand for water, discharges to water and adverse ecological effects resulting from physical modification to the water environment.” And it is not just forms of development that can impact on water quality. Shipping can also adversely affect water quality and beaches through discharges from vessels, particularly litter.

Furthermore, the Marine Policy Statement recognises that as part of sustainable development, the health and wellbeing of communities and the protection of the environment is paramount and this can be achieved through providing modern, high quality management and treatment of surface and waste water. This also contributes to our compliance with EU legislative requirements.

Waste water discharges do not generate a measurable economic value but are an often unavoidable product of many industries. Furthermore, sectors such as tourism, recreation and shellfisheries rely on a healthy marine environment, which includes good water quality (ecological and chemical), for the future of the industry. Therefore the provision, and treatment of, waste water is crucial to the development and growth of many marine activities and industries, as contamination of shellfish and bathing waters can have a social and economic impact as well as undermining a healthy marine environment.

Sedimentary processes of the seabed play a critical role in the distribution of benthic habitats, which in turn, form a major part of ocean life.[64] Sediment movement on the seabed occurs in two ways: suspended sediment transport of mud and fine sand and bedload transport of sand and gravel. Both of these are predominantly controlled by offshore tidal currents, as opposed to wave climate.[65] In the South marine plan areas, sandy gravel and gravel is the predominant form of sediment with some large deposits of gravelly sand.

Sedimentary processes are not only influenced by natural processes. Capital and maintenance dredging of sediments is focused around the Isle of Wight and in Southampton Water in support of shipping activity. Dredging, particularly in inshore areas, can be a benefit to sedimentary systems, when the material is retained in the system. “Appropriately targeted disposal of dredged sediment can have an ancillary benefit in maintaining sedimentary systems…” as well as delivering social and economic benefits. These benefits can include maintaining navigation channels and the use of dredged materials in construction, recreational activities (beach nourishment),habitat creation (salt march restoration)[66] and flood and coastal defences. Please see the information under the dredging and disposal section regarding the beneficial use of dredged materials and associated project. There can also be negative impacts from dredging activity, such as potential risks to fish and other marine life, damage to habitat and to spawning and nursery grounds. Assessment of these environmental impacts is required during the licensing process. It must be noted that where sediment is contaminated, possibly through historical industrial activity, dredging has the potential to cause significant environmental and health effects through the exposure of contaminants.

[64] Charting Progress 2, Ocean Processes (2010). Defra.
[65] Brampton A H, Evans C D R and Velegrakis A F (1998) Seabed Sediment Mobility Study - West of the Isle of Wight. Project Report No 65. London: CIRIA 218 pp
[66] Marine Policy Statement (2011). Defra, 3.6.4.

Current policy

Increasingly strict legislation and considerable investment[67] from water companies has significantly improved water quality in the UK. This has resulted in a steady increase in bathing water quality since 1988 in the South marine plan areas. Furthermore, the Government introduced the Catchment Based Approach, which established catchment projects for each of England's 83 river catchments to work collaboratively with stakeholders to deliver improved water quality to meet targets set under the Water Framework Directive (delivered by the Environment Agency through River Basin Management Plans) and continue improvements in water quality. Similarly there has been a general decrease in the number of monitored shellfish waters in England and Wales and much of this is due to sewerage improvement schemes. It is important to note that for both directives, there have been variations in the year on year increases which are often due to weather patterns, especially heavy rainfall which leads to increased incidences of storm overflows and diffuses agricultural pollution.

The Environment Agency is also responsible for implementing the Shellfish Waters Directive (2006) in England which aims to protect and, where necessary, improve the quality of waters where shellfish grow and to contribute to the high quality of directly edible shellfish products. The Environment Agency monitors the level of faecal coliforms in the water column in all designated shellfish waters in England quarterly.

There are requirements for sewage treatment under the Urban Waste Water Directive, which includes specific provisions for sensitive areas. Sensitive areas are waters which are eutrophic,[68] or at risk of becoming eutrophic, contain nitrate concentrations >50mg/l, or may fail to meet standards required in other directives.

Current situation

There are a large number of waste water discharge points across the South Inshore marine plan area which are mostly managed by Southern Water, South West Water and Wessex Water. Figure 3 indicates the large number of outfalls particularly situated around built up areas. These include outfalls into Southampton water and the Solent, Poole harbour, Brighton, Newhaven, Worthing and to the West of the plan area (Exeter, Dartmouth). There are also trade and industry discharge points in various locations, eg, Southampton Water, Portsmouth, Poole and Chichester Harbours and Dover. There are three power stations (Dungeness, Shoreham and Fawley) which abstract water for cooling purposes and then return the water to the marine environment as waste water.[69]

There are high concentrations of water treatment works and sewerage disposal points around the main conurbations including Exeter, Weymouth, Poole,

[67] Water Industry capital improvements are funded by industry and are delivered on a five year investment cycle. The spend profile for the five years is agreed with the Environment Agency and OFWAT. Effluent quality improvements to protect the marine environment and Bathing Water quality are embedded within the five year cycle.

[68] Definition: having waters rich in mineral and organic nutrients that promote a proliferation of plant life, especially algae, which reduces the dissolved oxygen content and often causes the extinction of other organisms. The process of eutrophication makes the water more eutrophic.

[69] MMO (2013). South Marine Plan Areas Futures Analysis. MMO Project No: 1039

Southampton, East Isle of Wight, Portsmouth, Chichester, Brighton and Hove, Hastings and Folkestone. These and all the other surface water and waste water collection systems along the south coast are linked up to waste water treatment plants to ensure the water is treated before being discharged back to the marine area.[70] Discharges to controlled waters are covered by environmental permits issued by the Environment Agency.

Sewage discharges entering sensitive waters are required to have a greater degree of treatment. In the South marine plan areas, there are:

- 17 coastal waters which are considered sensitive, they are located in the east Solent including Chichester, Langstone and Portsmouth harbours as well as Poole harbour
- 36 are considered sensitive under the Bathing Waters Directive and they are located around Dungeness, the East Solent, Poole bay and Lyme Bay
- 16 are considered sensitive under the Shellfish Waters Directive and these are located within the East Solent, Poole Bay, Exe estuary and the River Dart.[71]

There are two River Basin Management Plans covering the South marine plan areas; the South East and the South West River Basin Management Plans, with a total of 45 estuarine, transitional or coastal water bodies. Within these two River Basin Management Plans, there are 18 coastal water bodies which fall within the South Inshore marine plan area, three have good ecological potential (located between Portland Bill and Selsey Bill and South of the Isle of Wight) and 15 have moderate ecological status or potential. In terms of chemical status, nine sites currently have good status, one site failed the standard and eight do not require assessment.

River Basin Management Plans also address estuarine and transitional waters of which there are 27 in the South Inshore marine plan area. Of these, 26 have been assessed as moderate and one has poor ecological quality (located within Poole Harbour). This indicates that, the majority of coastal water bodies will not meet Good Ecological Status, as required by the Water Framework Directive, by 2015.[72]
The Bathing Waters Directive (2006)[73] sets out standards for testing certain types of bacteria in the marine area during bathing season (May-September). There are 127 bathing water sites which are surveyed in the South marine plan areas and these can be viewed on the marine planning portal.[74] Of the 127, 13 are considered to be at risk of failing to meet the higher standards of the revised Bathing Water Directive. There are a number of sources of pollution contributing to this risk of failure including sewage overflows during periods of heavy rain, slurry and manure runoff and

[70] MMO (2013). South Marine Plan Areas Futures Analysis. MMO Project No: 1039
[71] MMO (2013). South Marine Plan Areas Futures Analysis. MMO Project No: 1039
[72] Please note that if a water body fails on one indicator, it means it fails overall. The data in Figure 3, regarding the current and predicted ecological quality was derived from the 2009 WFD baseline classification and shows how the water quality is expected to be in 2027, based on monitoring information available in 2009. The baseline classification is updated on a formal basis every six years and will be reissued in 2015 and it is highly likely the projected classifications for 2027 will change.
[73] A revised Bathing Water Directive is currently being produced which will be implemented by 2015 with a set of new parameters to measure water quality.
[74] http://planningportal.marinemanagement.org.uk/#

wrongly connected drains in houses and businesses. This indicates the inherent link between upstream catchments and the activities that go on in them and the impact it can have further downstream in coastal and transitional waters in relation to water quality.

There are 33 designated shellfish waters in the South marine plan areas and these are mostly found around the Solent, Poole Harbour and Portland Harbour (see figure 42 in the aquaculture section). In 2012, 21 of the shellfish waters failed to meet the guideline standard under the Shellfish Waters Directive 10 of these having a history of poor compliance failing to meet the guideline standard for the past four consecutive years (2009-2012 inclusive). The majority of these failing areas can be found in and around the Solent, with a number to the West of plan areas, near the river Dart and Exe estuary,

Analysis of local authority core strategies indicated the importance of good water quality through policies covering:

- maintenance of high standards of water quality for the purposes of tourism and recreation and for the benefit of environmental designations[75]
- management of litter in estuaries and coastal areas[76]
- proposals not having an adverse effect on the quality of coastal waters ie reducing pollution
- support for meeting Water Framework Directive standards and working at a catchment scale to integrate marine conservation, land use and water quality[77]
- specific mention of the Poole Harbour designated sites in relation to reducing the adverse effect of nutrient loading in this area.

Future trends

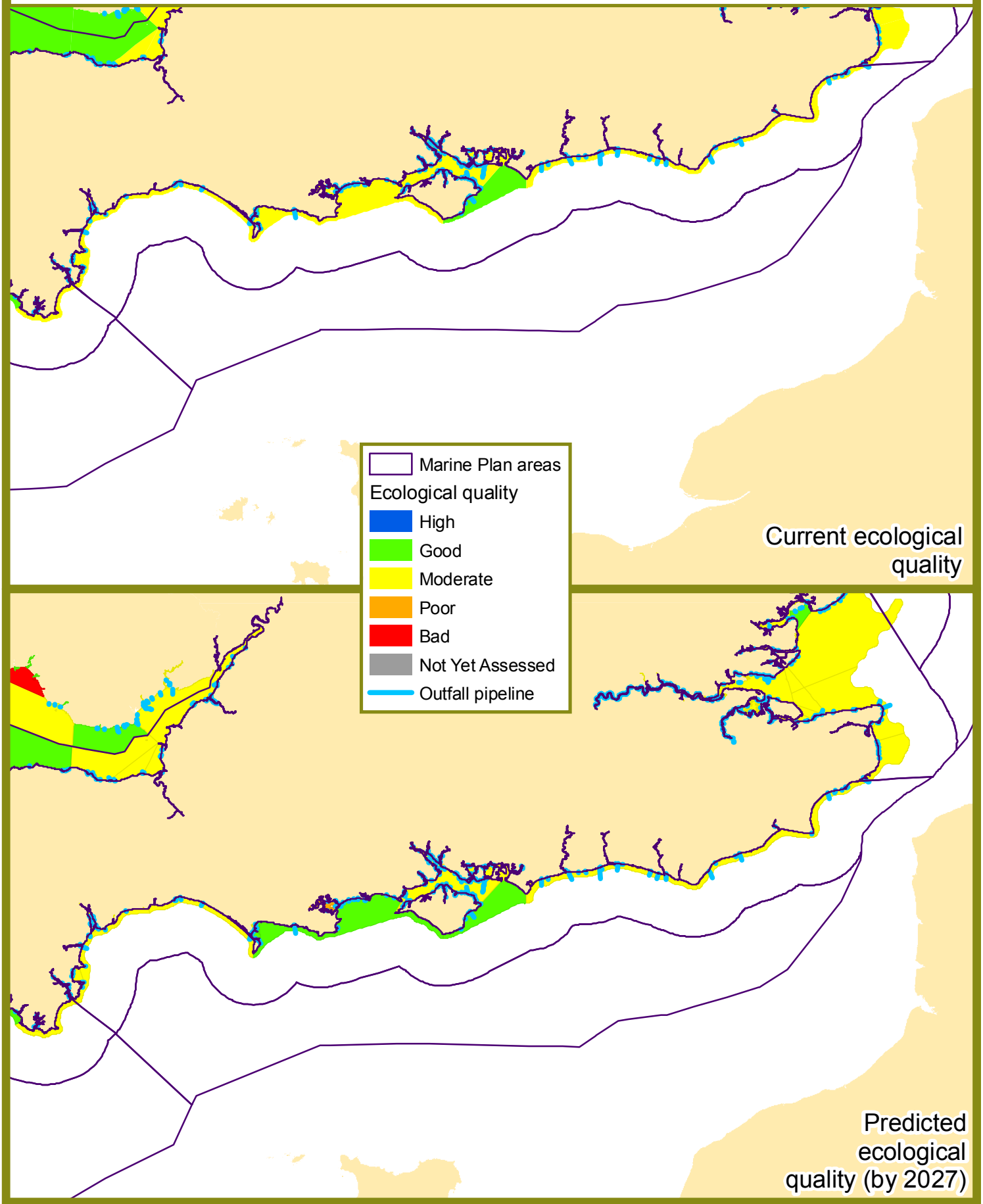
The Marine Strategy Framework Directive recognises eutrophication as one of the major threats to the quality of estuarine and coastal waters. Inputs of nitrogen and phosphorous from diffuse sources (such as agriculture) and from point sources such as sewage treatment works and industrial processes are the main causes of manmade eutrophication. For example, the Poole Harbour Catchment Initiative indicates the estimated percentage of nitrogen sources to Poole Harbour is about 80% from agricultural diffuse sources and 15% from sewage treatment works.[78] Therefore the Marine Strategy Framework Directive, and emerging catchment management approaches to control diffuse pollution in river catchments, are key policy drivers to reduce eutrophication in UK seas and thus improve the overall quality of marine waters and health of the marine area in the future.

[75] These include: Planning Purbecks Future Local Plan, Chichester Harbour AONB Management Plan, Eastleigh Borough Local Plan, A landscape for success for Torbay to 2032 and beyond, Chichester Draft Local Plan, East Devon AONB Management Plan,
[76] These include: Chichester Harbour AONB Management Plan, East Devon AONB Management Plan, South Devon AONb management Plan.
[77] These include: Worthing Local Development Framework
[78] http://www.wessexwater.co.uk/environment/threecol.aspx?id=7525&linkidentifier=id&itemid=7525

Marine Management Organisation

Figure 3: Current and predicted ecological water quality

June 2014



Potential core issues:

- population growth and associated infrastructure, likely to be focused in already built-up areas, will put more demand on the sewage network and water companies with regards the disposal of waste water. The environmental impact of more sewerage systems and associated discharges will need to be monitored and managed. Despite best efforts, it may be difficult to avoid negative impacts on the environment if the number of systems and outfalls increases.
- more frequent and intense storms, possibly as a result of climate change, could impact on water quality due to the potential for storm overflows.

Interactions with other sectors

- tourism, recreation, fisheries and shellfisheries all rely on, and are influenced by, a healthy marine environment, which includes good water quality. Without this, these activities and industries could be impacted economically and socially, so maintaining good water quality is important to not only the environment but the goods and services it provides to these sectors
- the development of industry such as nuclear power or port expansion will impact on coastal waters during their construction, operation or decommissioning phases. While this is an often unavoidable by-product of industrial development and impacts are assessed through the various licensing and permitting regimes, the cumulative impact on the water environment must be considered and monitored
- climate change could lead to increased flooding and coastal erosion, which in turn could lead to increased sediment loading in estuaries and coastal areas. This could impact upon port and shipping activity as further dredging of sediment may be required (which has an economic impact) to enable them to continue their activities
- as noted in section 2.13, water quality is of high importance to the aquaculture industry. Poor water quality can lead to reduced species growth and an increased risk of disease for both shellfish and humans via consumption.

Issues for sustainability

- Sea level rise, associated with climatic changes, will need to be considered in the location and nature of outfalls in the South Inshore plan area. This coupled with more frequent storm events could cause damage and increased pollution risks through flooding and blockages so this along with the physical impact of major sea outfalls should be considered in the development of marine plans.

2.2.3 Marine Litter

Coastal and marine litter and debris is an aesthetic, ecological and economic problem. Marine litter through ingestion or entanglement by fish, mammals, reptiles and birds can result in mortality. Floating debris can also provide a method of transportation for invasive non-native species, and larger items can cause damage to marine structures, vessels and their propulsion systems.

The main sources of beach litter across all regions are from the public, fishing, sewage-related debris and shipping. Plastic items made up the bulk of the material found in beach litter surveys across the UK between 2003-2007, accounting for around 70% of the total litter.[79]

Offshore seabed litter has been surveyed at only a limited number of sites and data are sparse.

Current situation

The South marine plan areas showed a clear downward trend in litter density, from 3500 items/km in 2003 to less than 1500 items/km in 2007. Although public litter provided the main contribution to total figures with an average density of 927 items/km, the downward trend was thought to have been driven largely by a decline in the amount of public litter; however, the precise reason for this was unclear.[80]

Future trends

The greatest source of beach litter is from coastal communities and activities; expected increased development of coastal areas and of recreational use will likely result in corresponding increases in litter levels.

As persistent litter is typically non-biodegradable it will continue to accumulate in the marine and coastal environment leading to environmental and economic implications. Beyond environmental degradation, sectors that could be affected include tourism and recreation.

Potential core issues

Marine litter can raise mortality levels of native marine species and provide a vector for invasive species, both of which could have a significant environmental impact.

Interactions with other sectors

Tourism, recreation, fisheries and shellfisheries all rely on, and are influenced by, a healthy marine environment, which includes one with low, or ideally, no levels of marine litter. Without this, these activities and industries could be impacted economically and socially so reducing litter is important to not only the environment but the goods and services it provides to these sectors.

2.2.4 Underwater noise

Ambient and impulsive sound can be generated by marine activities, including:

- inshore and offshore construction, especially piling
- sand and gravel extraction,
- drilling
- vessel movements

[79] UK Marine Monitoring and Assessment Strategy (UKMMAS) (2007) Charting Progress 2, Clean and Safe Seas Feeder Report Section 3.6: Litter. p.253

[80] UK Marine Monitoring and Assessment Strategy (UKMMAS) (2007) Charting Progress 2, Clean and Safe Seas Feeder Report Section 3.6: Litter. p.253

- use of sonar, underwater explosions
- seismic surveys
- acoustic deterrent devices (ADDs)
- dredging (navigational and aggregate).

The energy in these sounds generally exceeds the levels that occur naturally in the marine environment such as sounds created by rain, wind and waves.[81]

Increased levels of underwater noise can affect many marine organisms in a number of ways. Ambient or continuous sound can disrupt their ability to navigate over long distances as well as affecting local orientation (which is required to avoid predators and hazards) and search for prey and mates. Impulse sounds cause effects such as avoidance of feeding or breeding grounds, temporary or permanent damage to hearing and, in extreme cases, death.[82]

Marine mammals are the best known group considered to be at risk from increased underwater noise but many fish species and some invertebrates can potentially be affected too.[83,84]

Current situation

Implementation of the Marine Strategy Framework Directive Descriptor 11 is the main mechanism through which underwater noise is considered at a strategic level. The initial assessment concludes that there is insufficient data to support a quantitative assessment of underwater noise in UK waters, due to a lack of monitoring studies. To understand the effects of noise on individuals and groups of different species as well as the risks, significance and appropriate mitigation of impacts, further investigation and research is required. At this point in time there is insufficient data to provide a clear assessment as to whether current levels of noise in UK waters are having an impact on the behaviour, distribution or population levels of cetaceans or other noise sensitive marine animals.[85] An ongoing project – Population Consequences of Disturbance (PCOD) is seeking to develop a model to establish at what point there are population impacts on cetaceans, this project considers English waters and is due to publish in late 2014.

[81] OSPAR (2009), Assessment of the environmental impact of underwater noise, Available online: http://qsr2010.ospar.org/media/assessments/p00436_JAMP_Assessment_Noise.pdf#page=13
[82] HM Government (2012), Marine Strategy Part One: UK Initial Assessment and Good Environmental Status, Available online: www.gov.uk/government/uploads/system/uploads/attachment_data/file/69632/pb13860-marine-strategy-part1-20121220.pdf
[83] DECC (2009), UK Offshore Energy Strategic Environmental Assessment (OESEA): Environmental Report, Available online: www.offshore-sea.org.uk/consultations/Offshore_Energy_SEA/OES_A3d_Water.pdf
[84] DEFRA (2005), Charting Progress 2, Available online: http://chartingprogress.defra.gov.uk/clean-seas-noise
[85] HM Government (2012), Marine Strategy Part One: UK Initial Assessment and Good Environmental Status, Available online: www.gov.uk/government/uploads/system/uploads/attachment_data/file/69632/pb13860-marine-strategy-part1-20121220.pdf

The Marine Strategy Framework Directive Descriptor 11 assessment also highlights that compliance with existing legislative requirements such as the Environmental Impact Assessment Directive, the Strategic Environmental Assessment Directive and the Habitats Directive is sufficient to ensure that the direct impacts of noise on the marine environment are appropriately managed.

The Department for Environment Food and Rural Affairs has been working closely with Centre for Environment Fisheries and Aquaculture Science, Joint Nature Conservation Committee, Department for Energy and Climate Change and The Crown Estate to look at the potential for cumulative impacts occurring from construction noise across the marine space. This work has indicated that current and projected levels of impulsive sounds are unlikely to result in significant cumulative impacts that could result in significant behavioural effects of marine life.[86]

In addition to this group there is a wider Underwater Sound Forum which is made up of key stakeholders in the marine and maritime communities that have an interest in how noise is measured. Areas of work include:

- production of guidelines for the measurement of ambient noise
- characterisation of piling noise and guidelines for its measurement
- characterisation of marine aggregate extraction noise and guidelines for its measurement
- shipping noise
- work on Marine Strategy Framework Directive Descriptor 11.

Future trends

The recommendation by the Marine Strategy Framework Directive Technical Subgroup on Underwater Noise is that a noise registry should be created. This registry will record, assess and manage the distribution and timing of anthropogenic sound sources over a certain frequency, in the marine environment. In addition to this, surveillance and monitoring of ambient noise levels will also be completed.[87]

The development of offshore renewables and other marine construction in the near future will potentially cause impulse noise to be generated across the marine environment. The impact and severity of each activity will be considered in project specific applications such as Environmental Impact Assessments. The Energy National Policy statement EN-3 gives guidance on how developers and decision makers should consider these impacts and appropriate mitigation measures that can be employed.

[86] Defra (2013) Sound waves, Effects of underwater noise on coastal fish and crustaceans behavioural responses in the field - ME5205: http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=17302&FromSearch=Y&Publisher=1&SearchText=underwaternoise&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description

[87] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status, Available online: www.gov.uk/government/uploads/system/uploads/attachment_data/file/69632/pb13860-marine-strategy-part1-20121220.pdf

The operation of offshore energy production installations, initially wind farms then tidal and wave systems in the South marine plan areas, is likely to raise local ambient and impulse noise levels both in the short and long term. The management of subsurface noise emitted from shipping is currently the subject of international debate within the International Maritime Organisation and further guidance is expected on this issue in the future.[88]

Potential core issues

- Renewables development and operation and other marine construction have the potential to increase overall underwater noise levels and distribution over a larger geographical area.
- The impact of shipping noise on receptors is not fully understood. Its effects, including the potential for injury, may not be observed at current levels due to lack of appropriate monitoring.[89] Any effects may increase in the future as the amount of shipping traffic increases.

Interactions between sectors

- There is a lack of evidence on the effects of the wide spectrum of current and future underwater noise levels and distribution.
- Cumulative effects of development activities such as dredging, vessel movements or piling for offshore installations are not yet understood but as activities increase, so will the level of noise

Issues for sustainability

- Noise is caused by all sectors to varying degrees, so as they grow the potential for impact grows too. The most obvious impacts are on marine mammals and other species, although further research is needed to understand the extent of such impacts.

2.2.5 Marine ecology

The natural environment within the South marine plan areas encompasses marine and coastal biodiversity, water, air, geology and coastal processes. The quality of the marine natural environment has a direct effect on the way we benefit from it; as a source of food, energy and building materials and as a place where we live, work and play. Features, species and habitats in the South marine plan areas are particularly diverse in nature, with some aspects being nationally and internationally important and rare.

The underlying geology ranges from massive sub-tidal sandbanks to areas of mixed sediment sand and rocky reef, ranging from hard granite to soft chalk and clays, the diversity of habitat helps support the diversity of species. In addition to the Jurassic

[88] DEFRA (2005), Charting Progress 2, Available online: http://chartingprogress.defra.gov.uk/clean-seas-noise

[89] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status, Available online: www.gov.uk/government/uploads/system/uploads/attachment_data/file/69632/pb13860-marine-strategy-part1-20121220.pdf

Coast World Heritage Site, it is home to significant stretches of global rare coastal chalk outcrops near Dover, Eastbourne, the Isle of Wight and Dorset.

The many estuaries, large and small, in the South inshore plan area significantly increase the length of the coastline and the opportunities for land-sea interactions, as well as introducing their own unique features to the overall nature of the plan areas.

The Marine Policy Statement requires that the marine plan authority should ensure that 'appropriate weight'[90] is attached to, among other things, protected species, habitats and other species of "principal importance for the conservation of biodiversity", such as those identified through the Convention on Biological Diversity and, the Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention').

The UK Administrations recognise the economic, social and intrinsic value of a healthy marine environment and are committed to halting the loss of biodiversity and restoring it so far as is feasible, in addition to no net loss to biodiversity. This means halting and, if possible, reversal of biodiversity loss with species and habitats operating as part of a healthy, functioning ecosystem; and general acceptance of biodiversity's role in enhancing the quality of life, with its conservation becoming a natural consideration in all relevant public, private and non-governmental decisions and policies.[91]

The Marine Policy Statement sets out a high level approach to marine planning; this requires the plan development process to be based on an ecosystem approach. An ecosystem-based approach to the management of human activities means an approach which ensures that the collective pressure of human activities is kept within the levels compatible with the achievement of good environmental status; that does not compromise the capacity of marine ecosystems to respond to human-induced changes; and that enables the sustainable use of marine goods and services.

Central to the ecosystem approach is the consideration of the environment alongside social and economic issues in marine planning. Further information on how marine plans will take an ecosystem approach can be found in the Marine Management Organisation project 1048 Ecosystem Approach in Marine Planning report (in-press).

The role and value of the ecosystem is reflected in the Marine Strategy Framework Directive, the Natural Environment and Rural Communities Act, National Ecosystem Assessment (NEA), and through a wider commitment to the EU Biodiversity Strategy which highlights the need to 'protect, value and appropriately restore, biodiversity for its intrinsic value and essential contribution to human wellbeing and economic prosperity. The Natural Environment White Paper (NEWP) calls for key reforms for protecting and improving the natural environment including supporting Local Nature Partnerships, creating new Nature Improvement Areas, the need for ecologically coherent planning, and piloting biodiversity offsets.

[90] 'Appropriate' should be judged by reference to the Marine Policy Statement, existing requirements and information provided through the on-going development of the South marine plans
[91] HM Government (2011) Marine Policy Statement, paragraph 2.6.1.1.

The Marine Strategy Framework Directive initial assessment of the state of the marine environment and the pressures and impacts it faces builds on the state of the marine environment assessment Charting Progress 2 (CP2) and associated feeder reports published in July 2010.[92] Under the Marine Strategy Framework Directive, a framework is being established within which EU Member States will take measures to achieve Good Environmental Status for the marine environment by 2020. The characteristics of Good Environmental Status[93] provide a description of what the marine environment will look like when this status is achieved, with targets and indicators developed for each descriptor to provide a framework assessing progress.[94] There are 11 Descriptors[95] for Good Environmental Status; Descriptor 1 (biodiversity), Descriptor 4 (food webs) and Descriptor 6 (sea-floor integrity) are particularly relevant to the health of the marine environment, protection of biodiversity, sustainability and productivity of marine ecosystems and the goods and services they provide.

Existing measures such as the Water Framework Directive, Habitats Directive, Wild Birds Directives, Marine Protected Area network, and the Common Fisheries Policy are already contributing to improving the state of the marine environment. The Government will review before 2015 whether any additional measures might be required to achieve Good Environmental Status.

Local plans across the South Inshore plan area reflect national policy, calling for biodiversity to be safeguarded, with policies which protect, manage and enhance the environmental and ecological characteristics of the local area in both designated and non-designated sites. These include policies by Arun District Council, Bournemouth Borough Council, Eastbourne Borough Council and the Isle of Wight Council, to name a few. The importance of links between habitats is recognised in order to connect isolated sites and to facilitate species movement. Although the UK Biodiversity Action Plan (UK BAP) has been succeeded by the UK Post-2010 Biodiversity Framework, the list of priority habitats and species remains a useful reference for local authority decision-makers. Details of each habitat and species with current issues and threats can be accessed via the Joint Nature Conservation Committee website.

A number of local development frameworks have highlighted the link between a healthy level of biodiversity and the additional benefits to the tourism and recreation sector, including Exeter City Council, the New East Devon local action plan and Eastbourne Borough Council core strategy. Wealden District Council local

[92] It should be noted that while CP2 is also used to inform this report, its assessments are based on regional sea units, which do not exactly align with English marine plan areas, the South marine plan areas correspond to the CP2 Eastern regional sea (Region 3) which extends slightly further east towards the Thames Estuary.
[93] MSFD, 2008/56/EC Article 3(5) – Good Environmental Status means the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations. A fuller description is set out at MSFD, 2008/56/EC Article 3(5).
[94] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status
[95] MSFD 2008/56/EC Annex 1.

development framework notes the additional benefit to healthy living as recreational opportunities are enhanced. Plans that relate specifically to the marine environment include the South Downs national park which supports the value of marine and coastal habitats and Worthing Council local development framework which promotes new development on the seafront which will limit adverse effects on the marine environment.

There are several cross-channel initiatives relevant to the South marine plan areas, such as the PANACHE project (Protected Area Network Across the Channel Ecosystem), CAMIS (Channel Arc Manche Integrated Strategy), VALMER (Valuing Marine Ecosystem Services in the Western Channel Region)[96] and CHARM (Channel Integrated Approach for Marine Resource Management). These projects aim to develop common assessment and management methods across the marine protected area network, improve marine ecosystem service valuation to support management and planning, and seek to develop and implement integrated maritime policy, and sustainable management. In addition, there are a number of regional coastal partnerships such as the Devon Maritime Forum, Dorset Coastal Forum and Solent Forum, established to deliver integrated coastal zone management.

This section goes on to look at features within the overarching biodiversity that have special protection measures or are seen as a key indicator in ecosystem[97] health and climate change, such as plankton. Sections are included on habitats, fish, cetaceans, seals and birds, which are all listed in Annex III of the Marine Strategy Framework Directive which sets out an indicative list of natural environment characteristics that can be used to assess Good Environmental Status. It is acknowledged that the biodiversity highlighted in this report is only a small facet of the wider biodiversity found in the South plan areas and that aspects such as distribution and sensitivity are often seasonal and in some cases poorly understood.

The Marine Management Organisation has developed a comprehensive catalogue of spatially referenced environmental data to inform its functions. This catalogue is known as the Marine Management Organisation Master Data Register. Approximately 90 per cent of the data held in the catalogue is sourced from third parties. Where possible the Master Data Register provides links allowing users to access the latest version of these data by pointing them to the data source. We will work with south plan data holding organisations and stakeholders to collate, analyse and consider additional biodiversity information as required through the planning process.

Microbes and plankton

Marine microbial and planktonic organisms play a key role in cycling nutrients that are essential for other marine organisms. As plankton is at the bottom of the food web it supports and therefore affects many other species, such as seabirds, and determines the carrying capacity (in this case the level of biomass and diversity) of ecosystems and the services they provide. Through its presence and absence

[96] VALMER is an 11 partner Innovation & Environment Regions Of Europe Sharing Solutions IV A Channel programme, to which the Marine Management Organisation provides funding.
[97] An ecosystem formed by the interactions between a community of living organisms in a particular area and its nonliving environment.

plankton regulate larval fish development and survival, and thus the success or failure of recruitment[98] to the adult fish stocks.[99]

Marine microbes play a key role in cycling nutrients that are essential for other marine organisms and the ecosystem services they provide.[100] However, there is still a lack of fundamental understanding of the complex roles they play. This means there is insufficient evidence to assign a current or future health status to microbes.[101]

Current situation

Long-term observations indicate that plankton as a whole is healthy and subject to few direct anthropogenic pressures. Research has shown the major influence in the distribution of plankton to be climatic. However, the consequences of the feedback relationships with the wider ecosystem, fisheries and climate change are not clear.[102]

Future trends

Trends in increasing sea surface temperature, eutrophication (high water nutrient levels), ocean acidification and pollution all affect the balance of biomass and diversity within natural community structures,[103,104] for instance an increase in sea surface temperature could lead to more diversity in plankton, but less overall biomass. This in turn could lower the carrying capacity of ecosystems. Changes in plankton as a result of rising sea temperatures may impact on other species groups in the pelagic food web.

Ocean acidification is expected to impact planktonic ecosystems and especially vulnerable calcareous organisms[105] in the future.[106]

New targets for achieving Good Environmental Status in pelagic habitats all focus on plankton, recognising its key role in the marine ecosystem. The targets require that plankton distribution, structure, condition and abundance are not significantly adversely affected by anthropogenic drivers.[107]

Plankton and microbes are both affected by eutrophication that can artificially boost certain populations. This is less significant in offshore areas where there is greater mixing and dilution with oceanic waters; the many estuary and river systems in the South inshore plan area are however more susceptible.

[98] Recruitment occurs when juvenile organisms survive to be added to a population
[99] CP2 Chapter 3: Healthy and Biologically Diverse Seas p.34
[100] UK National Ecosystem Assessment, 2011, Chapter 12: Marine
[101] CP2 Chapter 3: Healthy and Biologically Diverse Seas p.33
[102] CP2 Chapter 3: Healthy and Biologically Diverse Seas p.34
[103] http://chartingprogress.defra.gov.uk/feeder/HBDSEG-FeederReport-sec3_2.pdf
[104] Edwards et al. 2012. Global Marine Ecological Status Report: results from the global CPR survey. Available at: www.sahfos.ac.uk/research/publications/ecological-status-report.aspx
[105] Organisms with exposed shells, skeletons or tubes structures formed of calcium (Ca) and carbonate (CO3) based deposits that dissolve in increasingly acidic conditions.
[106] http://chartingprogress.defra.gov.uk/base-food-web
[107] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status

Eutrophication is expected to decline as nutrient inputs from the main sources (sewage treatment works and agriculture) fall due to the measures put in place under the EU Urban Waste Water treatment Directive, Habitats Directive and Nitrates Directives. However recovery from eutrophication in semi-enclosed water bodies can take many years, due to the large reservoirs of nutrients in sediments.[108]

Potential core issues

- Though plankton levels are currently deemed to be healthy, the predicted changes in climatic conditions could affect the species composition and overall numbers of plankton present in the South marine plan areas

Interactions between sectors

- Sectors which have the potential to affect water quality, such as aquaculture or activities related to the improvement of water quality, will have the potential to affect plankton levels and diversity.

Issues for sustainability

- The potential for ocean acidification to have an impact, particularly upon calcareous species is an issue that could affect the sustainability of current plankton populations

Invasive non-native species

A non-native species is one that has been introduced (ie by human action) outside its natural past or present distribution, An invasive non-native species is any non-native animal or plant that has the ability to spread causing damage to the environment, the economy, our health and the way we live.

The main methods by which invasive non-native species are introduced are:

- hull fouling (attachment to the bottom of boats/ships)
- transhipment through ship ballast water discharge
- unintentional aquaculture activity
- changing climatic conditions that allow species to extend their range.

There is potential for the introduction of hard substrates from offshore activities to act as “stepping stones” in the migration of non-native species.

Current situation

Invasive non-native species appear in a number of habitats around the UK, including intertidal and shallow subtidal environments. A number of national and international initiatives aim to recommend and introduce safeguards to limit the transport of invasive species, including the GloBallast Partnership Programme and the Invasive Non-native Species Strategy for Great Britain.

There are various invasive non-native species found in England. The following species are known to occur in the South marine plan areas.

- Wireweed

[108] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status

- Wakame
- Devil's tongue weed
- Orange striped anemone
- Darwin's barnacle
- Japanese skeleton shrimp
- Ruby bryozoan
- Pacific oyster
- Slipper limpet
- Veined rapa whelk
- Orange-tipped sea squirt
- Leathery sea squirt
- Carpet sea squirt
- A number of different species of colonial sea squirts

Future trends

Although greater efforts are being made to limit the introduction of new species and manage existing invasive species, the increase in shipping and recreational boating, combined with climate change leading to improving conditions for species, mean it is likely that this will become a more significant problem in the future.

Greater knowledge is required concerning the potential impact of future climate change (including ocean acidification), the risks posed by introduced and potentially invasive species, and the consequences of potential new vectors such as offshore structures providing 'stepping stones' for species migration, which look set to expand dramatically in the next few years.

The Marine Strategy Framework Directive Descriptor 2 requires that 'non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem', achieving this aim is likely to include the development of specific management plans for high risk species already present or likely to be introduced into the UK in place by 2020.

Potential core issues

- A combination of increases in activities that can introduce non-native species and a changing climate that make conditions more favourable, mean that the number of invasive and non-native species is likely to increase in the future, despite efforts to limit this.

Interactions between sectors

- The interaction between sectors that can spread species and those that provide potential 'stepping stones' will need to better understood, particularly as all are predicted to grow in the South marine plan areas.

Habitats

The South marine plan areas have a particularly high biological diversity as a result of the variety of habitats, geophysical features and processes present. The wide range of habitats include reefs, mixed sediments, bays, estuaries, open water, different rock types and a variety of coastal habitats types such as shingle beaches, dunes and cliffs (up to mean high water). There is also a diverse array of tidal

influence and ranges, with areas of particular complexity around the Isle of Wight, Selsey Bill, Portland Bill and the Straits of Dover; and the boundary of the English Channel and North Sea. These water bodies allow the migration of different organisms between these regional seas. For the purposes of this report a habitat is defined as the physical surroundings in which organisms live and interact, while a habitat with its associated biological organisms can be defined as a biotope.

Figure 4 illustrates the distribution of broadscale sea bed habitats across the South marine plan areas at levels two and three of the European Nature Information System, a relatively coarse or broad scale degree of detail that matches the broad nature of the Charting Progress 2 assessments. This is a hierarchical system where level 1 contains very broad descriptions of physical habitats moving to level 5, which describes detailed biotopes (physical habitat with associated biological community).[109] This map displays data from JNCC's UK SeaMap 2010[110] along with data from local habitat surveys[111] from the 'Mapping European Seabed Habitats' (MESH) project. Areas shown in white illustrate data gaps.

Figure 5 displays features of conservation importance; species and habitats that are particularly threatened, rare, or declining. These were principally identified from features listed under existing legislation and international conventions, such as the Wildlife and Countryside Act, UK Biodiversity Action Plan (UKBAP), Convention on Biological Diversity (CBD), and the OSPAR Convention. Data displayed on these maps highlight known FOCI derived from the Defra MB0102 project commissioned to produce the necessary data layers for the recommendation of MCZs.

There are a number of other useful data sources on the distribution of different marine habitats including data collected through project specific surveys. The Marine Management Organisation also has an ongoing programme of work to improve our understanding of the habitats in the South plan areas which will be driven by any key requirements and where marine planning can add most value. Such data may be analysed further by the Marine Management Organisation at a later stage in the planning process if required.

Current situation

There are a variety of important habitats in the South, reflected by the number of local authorities that have used their local plans to aid habitat protection, including Chichester Harbour Conservancy. Chichester Harbour Area of Outstanding Natural Beauty has a linked programme of monitoring on habitats and species. Many authorities, such as Exeter City Council and Dorset County Council for the Dorset Area of Outstanding Natural Beauty are developing plans for the conversion and

[109] It should be noted that there are many different schemes under which habitats and biotopes can be categorised and mapped (eg Habitats Directive, OSPAR, FOCI, Wildlife and Countryside Act), also that there are important habitats at different scales (eg sea grass beds and biogenic reef), many which are not shown in figure 4.

[110] UK SeaMap 2010 predicted the presence and extent of physical habitats in UK marine waters by overlaying physical data layers and translating the physical descriptions to EUNIS habitats. The physical layers used were: substrate, biological zones, (made up of bathymetry, light penetration and depth to wave base), kinetic energy (made up of tidal current and wave-generated kinetic energy), bio geographic zone (derived from bathymetry layer) and salinity.

[111] An overview of this process can be found here: www.searchmesh.net/Default.aspx?page=1921.

management of coastal land to salt marsh and mudflats in line with the Regional Habitat Creation Programme. The Medmerry managed realignment scheme includes the conversion of vulnerable land to intertidal habitat, offsetting wetlands lost elsewhere in the Solent. Medmerry is the largest open coast managed re-alignment scheme in the UK and is being delivered by the Environment Agency (see section 2.1.2 on geology and coastal process for more information on the habitat creation strategy and associated projects).

Intertidal rock is an abundant and widespread habitat. It is generally in good condition, though under pressure from localised harvesting of edible shellfish, the occurrence of non-native species and climate change.[112] The South marine plan areas are also home to a variety of biogenic reefs made up of a combination of living and dead worms and shells, which are important for stabilising marine sediments and providing habitat for other organisms. Seagrass beds perform a similar function as well as providing habitat for rare species like the spiny and short-snouted seahorses.

Intertidal sediments are similarly widespread, including sand and shingle beaches, vegetated shingle, mudflats and salt marshes. Mudflat and salt marsh habitats are considered to be in poor condition and declining, due to historic and ongoing land claim, coastal defence (structures), pollution, die back and lack of sediment supply or removal of sediment from the system for example via dredging. Salt marsh and intertidal sediment habitats adjacent to urban areas are sensitive to a number of variables including wave action, wave direction and coastal squeeze, where habitats have decreasing space between rigid coastal structures and rising sea level or coastal erosion. Bait digging can also be an issue affecting intertidal areas,[113] particularly throughout the muddy estuaries of the South Inshore Plan area.

Shallow and shelf sub-tidal sediments are under pressure in all areas and condition is generally on a level trend. Widespread fishing is the activity contributing the most pressure[114] on these habitats with pollution, invasive non-native species and aggregate extraction also considered a concern.[115]

Natural England has published a description of a number of other important habitats including the unique ironstone subtidal ledges off Hengistbury Head.

Future trends

Good Environmental Status targets for reef and rock habitats require that habitat distribution, extent and condition (as well as condition of the benthic community) are either stable or increasing. A lack of evidence on sediment habitats means that current targets focus on trends with the intention of setting more specific, quantified targets in the future.

[112] http://chartingprogress.defra.gov.uk/assessment-summary-2
[113] Stakeholder comment October 2013
[114] http://chartingprogress.defra.gov.uk/assessment-summary-2
[115] Charting Progress 2 Healthy and Biological Diverse Seas Feeder Report: Section 3.1: Marine Habitats. p71. In: UKMMAS (2010) Charting Progress 2 Healthy and Biological Diverse Seas Feeder Report (Eds. Frost, M & Hawkridge, J).

Habitat loss through sea level rise and coastal squeeze is an issue in places like Portsmouth, Langstone and Chichester Harbours,[116] [117] [118] it reduces the size of important breeding and feeding habitats and ecosystem services such as coastal defence and flood water storage. Compensation of habitat loss is possible through measures like managed realignment[119] only where it is both technically feasible and where it is socially acceptable. This is happening across the South Inshore plan area through the Regional Habitat Creation Programme to create new saltmarsh habitat (detailed in section 2.1.2 coastal processes). It is likely that a greater area will be required in future to compensate for further loss, although the extent and quality of habitat created may not be a like for like replacement.

Additional future habitat loss and habitat change is closely linked to ongoing and future human activities across all sectors. Many activities impact habitats; the most widespread being fishing (particularly trawling and fixed gear). Locally, the extraction of aggregates has altered the seabed in the Eastern Channel. While there is increasing demand formarine aggregate, the area impacted is relatively small, and is likely to remain so.[120] [121] See also section 2.9 on Marine Aggregates.

[116] Charting Progress 2 Healthy and Biological Diverse Seas Feeder Report: Section 3.1: Marine Habitats. pp.166, 167. In: UKMMAS (2010) Charting Progress 2 Healthy and Biological Diverse Seas Feeder Report (Eds. Frost, M & Hawkridge, J).
[117] Urban Edge Environmental Consulting 2013, HRA for the Portsmouth Site Allocations Development Plan Document: Screening Statement. Available at: www.portsmouth.gov.uk/media/UE-0060_Portsmouth_CC_Site_Allocations_HRA_Screening_6_20130219.pdf
[118] Royal Haskoning (2006) Coastal squeeze, saltmarsh loss and Special Protection Areas. English Nature Research Reports, Number 710. Available at: http://publications.naturalengland.org.uk/publication/62014
[119] Managed realignment is the landward retreat of coastal defences and other hard structures to make space for coastal habitats, these habitats often provide an element of flood and erosion defence in their own right.
[120] http://chartingprogress.defra.gov.uk/benthic-habitats
[121] UK Ecosystem Assessment Technical Report Chapter 12

Marine Management Organisation

Figure 4: Marine habitats

Mapped to EUNIS levels 2 and 3

June 2014

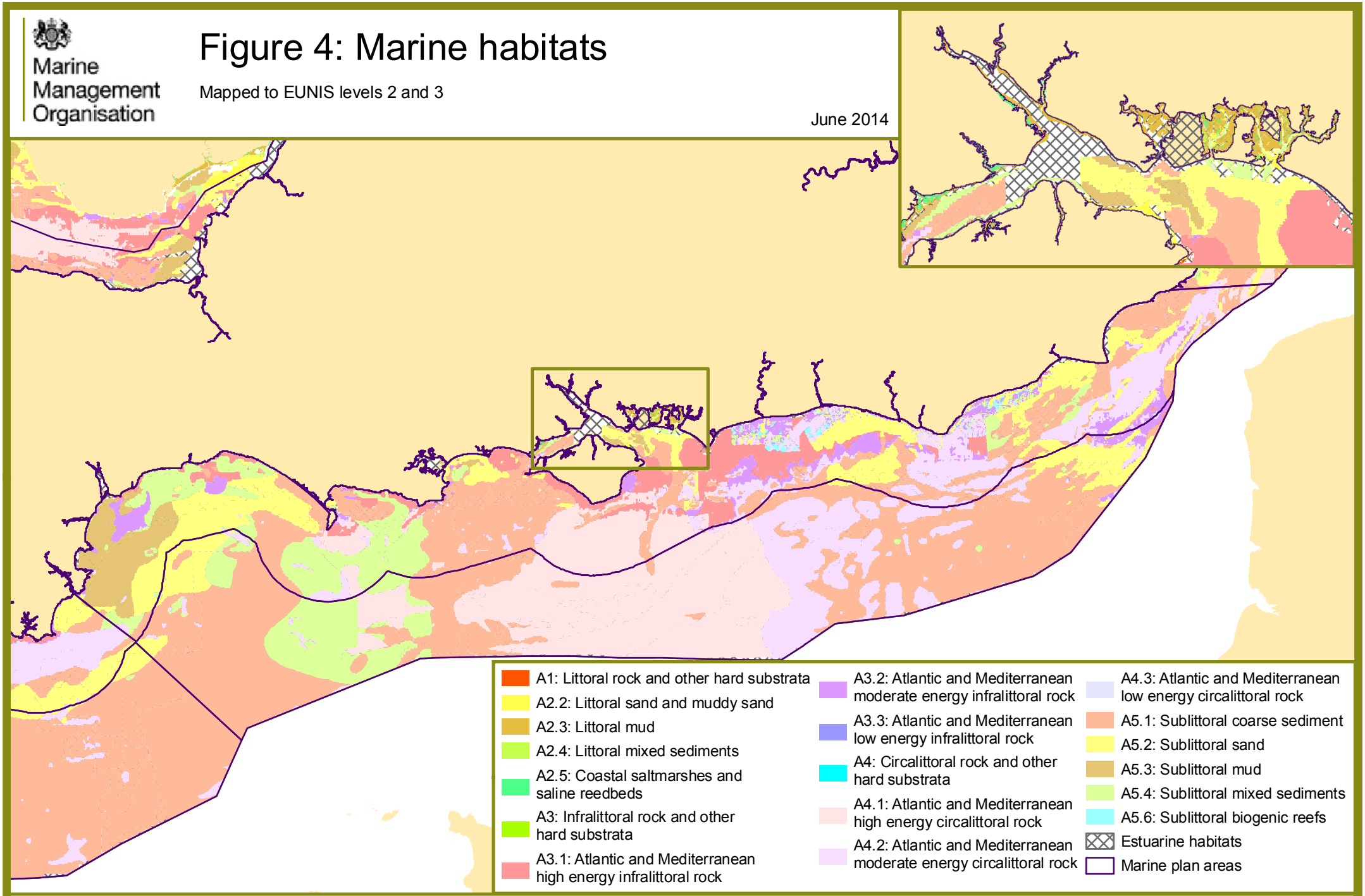


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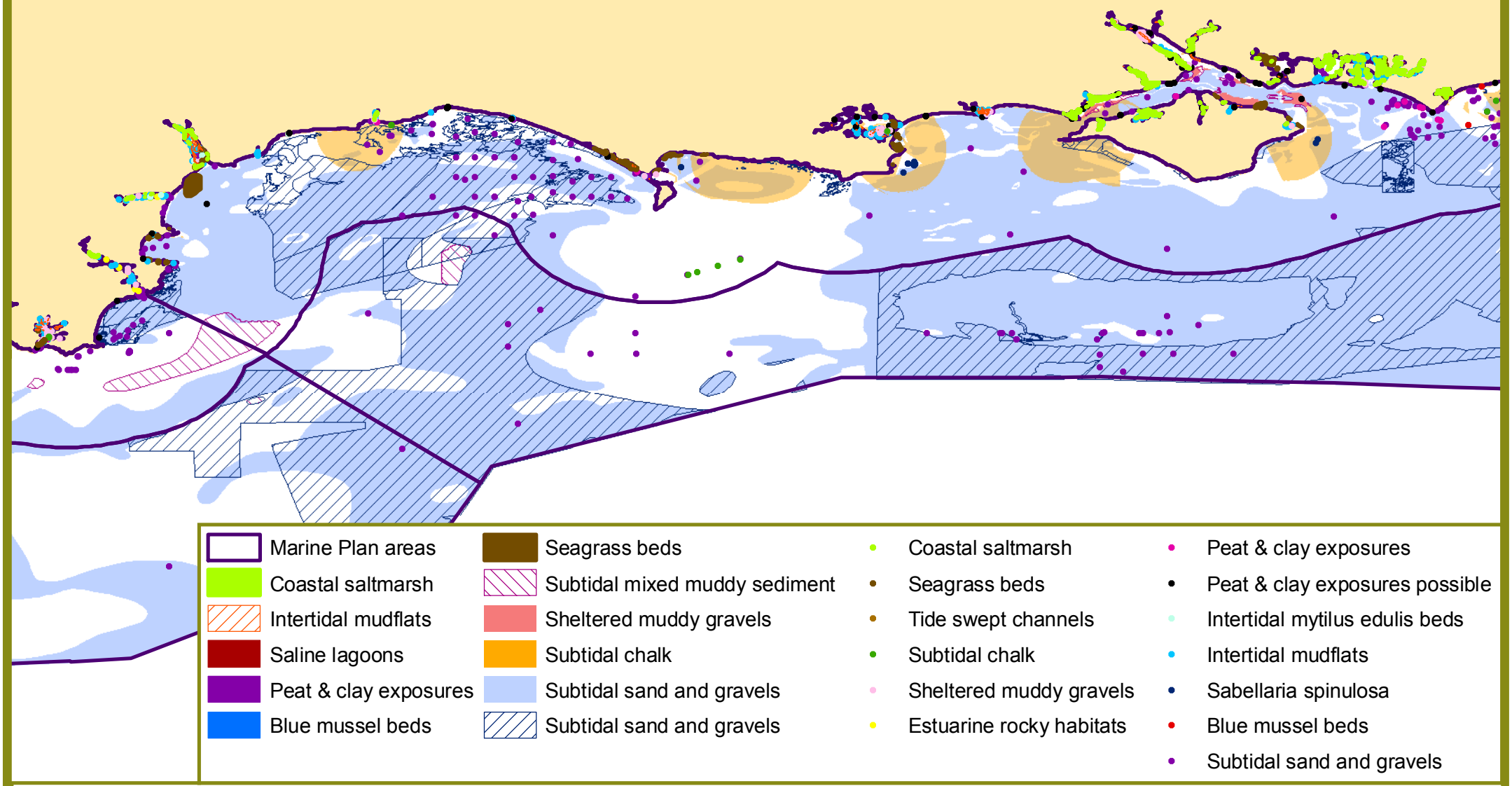
Figure 5a: Habitats of conservation importance

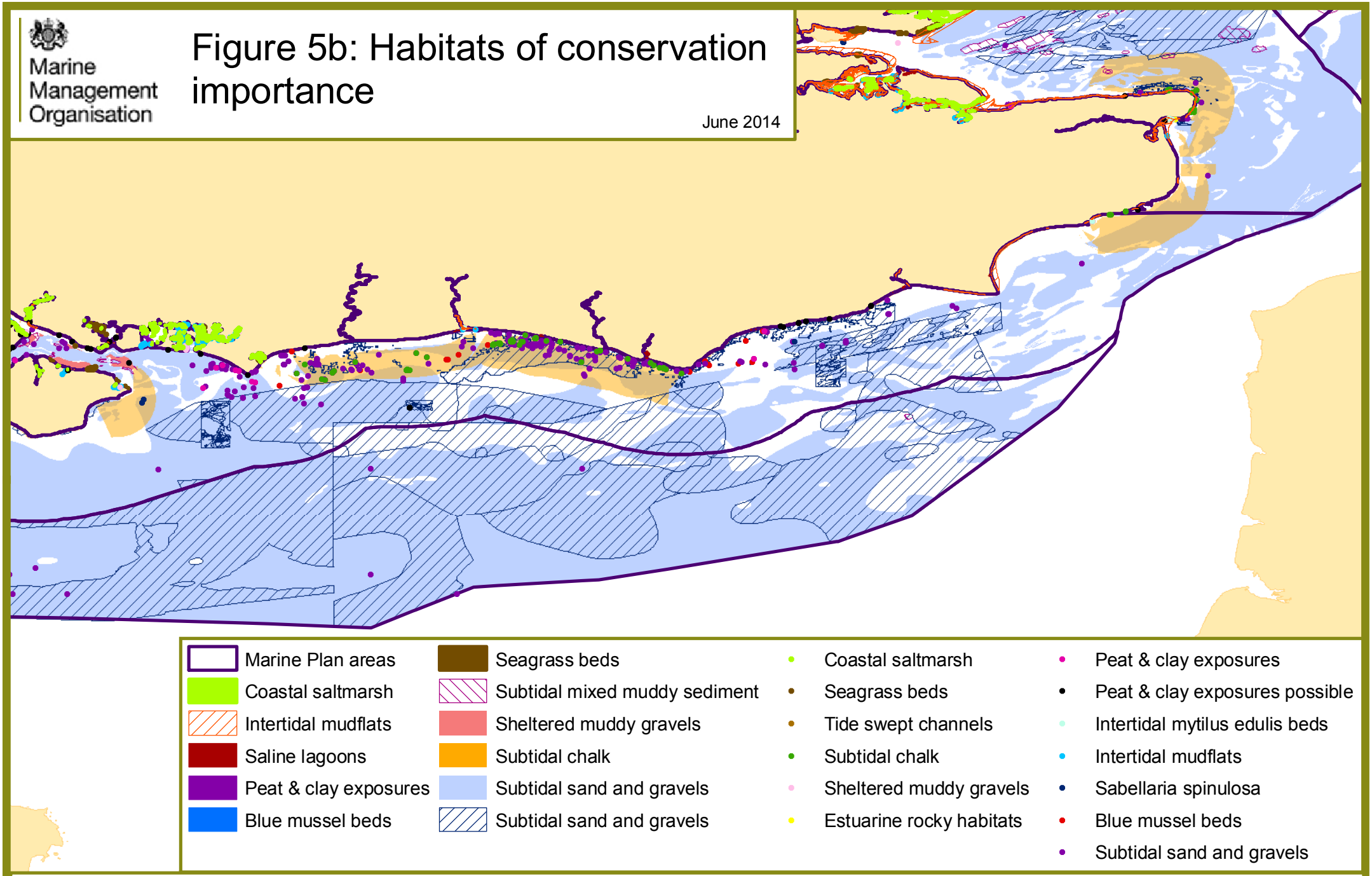
June 2014



Marine Management Organisation

Figure 5b: Habitats of conservation importance

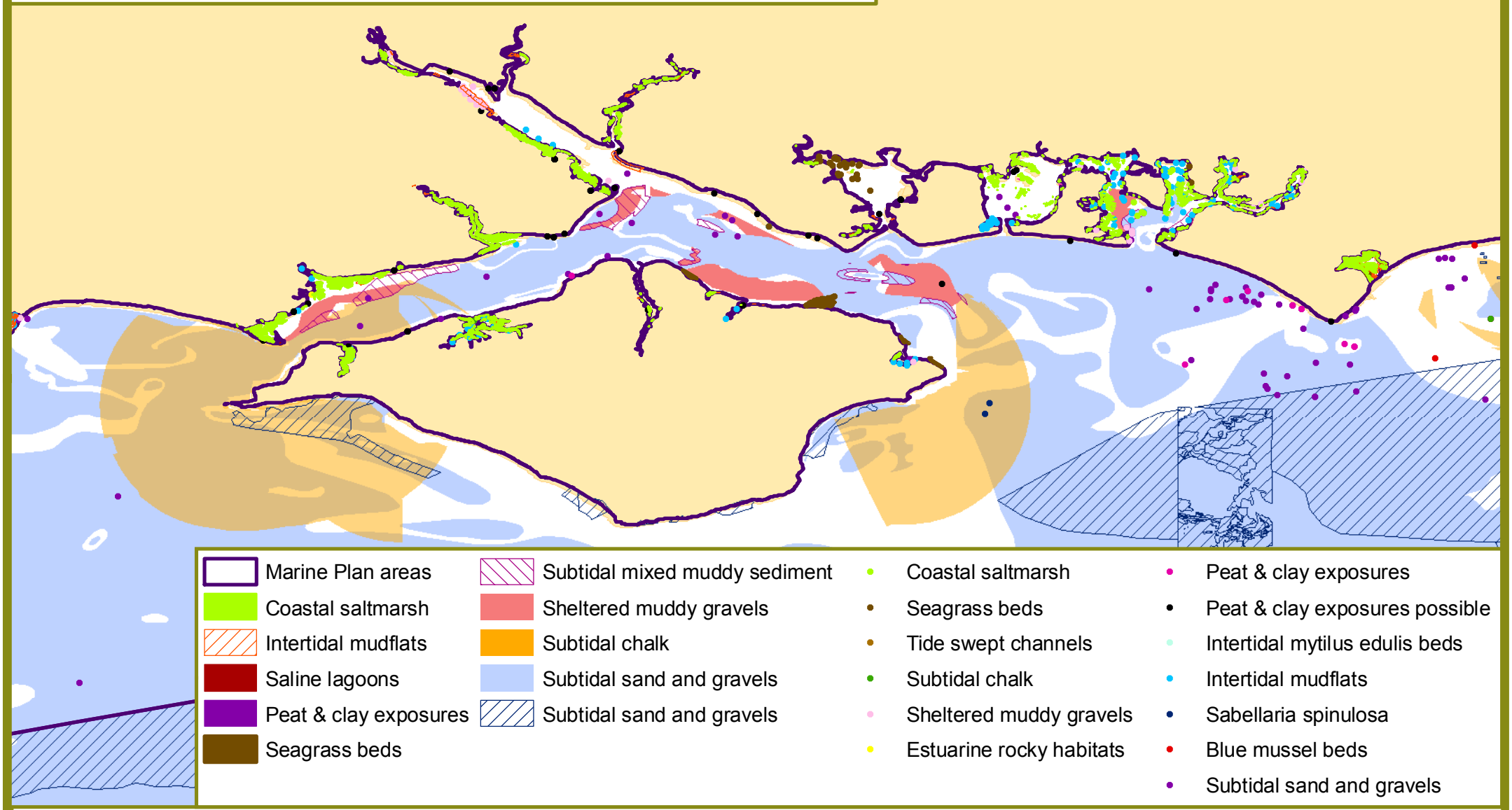
June 2014



Marine Management Organisation

Figure 5c: Habitats of conservation importance

June 2014



Fish

The Marine Strategy Framework Directive initial assessment discusses the current state of the 330 fish species thought to inhabit the shelf seas surrounding the British Isles. It includes an assessment of Coastal Waters (as defined by the Water Framework Directive), but does not include Transitional Waters (eg estuaries, sea lochs and coastal lagoons). The assessment highlights that all parts of the marine fish community have been impacted by human activities, most notably through direct extraction by commercial fishing. Additional pressures on fish include the removal of non-target fish (predators, prey or competitors) and the physical impacts of fishing gear on essential habitats. Estuarine fish species are subject to additional pressures from inputs of pollutants and coastal developments, though a number of initiatives (including those associated with the Water Framework Directive) are helping to improve the physical and chemical quality of rivers and estuaries.

There has been a substantial increase in the number of fish stocks that are harvested sustainably over the period 2000-2011 but there is some way to go before the majority of commercial fish stocks are at safe levels.[122] There are particular concerns over the populations of several fish species that remain severely depleted with respect to the population sizes that are known to have existed 50 or 100 years ago (such as sharks, rays, skates, European eel and salmon). These issues are being addressed through management measures such as the Environment Agency's National Eel Management Strategy, and eel fishing byelaws. In recent years, some seriously depleted stocks have become the subject of emergency measures and recovery plan proposals, with total allowable catch, linked to effort control measures that have restricted the number of fishing days at sea per annum since 2003.[123] The entire South plan areas are a recovery zone for cod and the western portion is a recovery zone for sole.[124]

Current situation

Charting Progress 2 describes the South marine plan areas as relatively shallow, with some notable characteristics as follows:

- the deeper waters in the mid-Channel are dominated by thickback sole and red gurnard and the inshore waters are dominated by flatfish (plaice, dab, sole, and solenette) and other inshore species, including lesser weverfish and common dragonet
- species of conservation interest that occur in the South marine plan areas include sea horses which are occasionally caught off Sussex and Dorset.
- Estuarine fish communities are generally considered to be of poor status in the South marine plan areas
- bass have dominated catches since 1983 in the river catchments opening into the Solent (Test, Itchen, Hamble, Bealieu and Lymington)
- salmon numbers have shown declines in many rivers since 1988, with the Centre for Fisheries and Aquaculture Science and the Environment Agency classifying populations in the Test, Itchen, Hampshire-Avon, Stour, Piddle and

[122] http://chartingprogress.defra.gov.uk/feeder/HBDSEG-feeder.pdf
[123] http://www.marinemanagement.org.uk/fisheries/statistics/documents/ukseafish/2012/final-2.pdf
[124] http://www.marinemanagement.org.uk/fisheries/management/days.htm

Axe as failing statutory conservation limits. However, while uncertain, the populations are thought to be improving in the Frome, Exe, Teign and Dart and there has been evidence of recent increases in both the Test and the Itchen.

The draft Sustainability Appraisal Scoping Report[125] for the South also highlights the abundance of a wide variety of shellfish species (such as scallops, cockles, mussels, periwinkles, whelks, lobsters, brown crabs and native oysters) and cephalopods, particularly the long-tailed squid, short-tailed squid and cuttlefish. It also highlights the occasional presence of basking shark in waters around the Isle of Wight.[126]

Research was recently commissioned by the Marine Management Organisation to develop spatial models of essential fish habitat in the South plan areas (including sites for spawning, feeding and growth to maturity). This information is displayed in figure 7 and shows the spatial distribution of species (surveyed in the study) that rely on the South plan areas as an essential habitat. This information supports earlier work on mapping spawning and nursery grounds to assist in the designation of Marine Conservation Zones (displayed in figure 6 which shows the spatial distribution of fish species using the South Plan Areas for spawning and nursery activity, to a low and high intensity), and other more localised surveys such as the small fish surveys carried out by the Inshore Fisheries and Conservation Authorities on the South coast. The maps shown in figures 6 and 7 represent only some of the known spawning and nursery grounds in the area due to a variety of reasons specific to each study, including data limitations, sampling methods and the spatial extent of the projects (please see the full reports here and here for further detail on the methods used and limitations). These maps indicate many areas of the South plan areas that are essential fish habitat for a variety of species at different stages in the life cycle, particularly at the eastern and western limits of the plan areas (see figure 7), but also around the Solent area (see figure 6). In addition to the places highlighted in these maps, there are other known areas such as a designated bass nursery area in Chichester Harbour.

Future trends

Many species of fish in the South marine plan areas have been impacted by human activity, yet the extent to which fish are affected by different pressures depends on the sensitivities of different species of fish, their location and the strength and duration of a pressure. The main pressure on fish is the extraction by commercial fishing activity,[127] however changes to fishing activity as a result of new management measures eg as a result of new marine protected areas or through policy changes including the reform of the Common Fisheries Policy, may see this pressure decrease. Other human pressures include loss of habitat from physical damage (such as the effect of aggregate extraction on herring spawning grounds in

[125] MMO (2014) South Marine Plans Sustainability Appraisal Scoping Report (in press)
[126] Swaby SE & Potts GW (1998). Chapter 5.9. Fish: other species. In: JH Barne, CF Robson, SS Kaznowska, JP Doody, NC Davidson & AL Buck Eds. Coasts and seas of the United Kingdom. Region 8 Sussex: Rye Bay to Chichester Harbour (Coastal Directory Series). Joint Nature Conservation Committee, Peterborough pp. 101-102.
[127] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status

the East of the South offshore plan area[128]) and the introduction of hazardous substances.[129] Environmental improvements resulting from the achievement of 'Good Environmental Status' (under the Marine Strategy Framework Directive) may see an increase in the diversity, health and abundance of fish species through descriptors 1, 4 and 6.

Climate change is beginning to have a detectable impact on fish populations, with marked changes in distribution, timing of migration, reproduction, recruitment and growth rates all being documented. Charting Progress 2 indicated that the mix of species present in the South marine plan areas has changed over the last 50-100 years due to a changing climate, with warm water species such as red-mullet, bass, anchovy, Atlantic trigger fish and John Dory spreading rapidly and cold water species retreating northward.[130] Recent research by the Marine Management Organisation[131] has suggested that these effects are likely to continue into the near future (next 20 years).

[128]The East Channel Association (2013) East English Channel Herring Spawning Assessment
[129] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status
[130] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status
[131] MMO (2014) Potential Effects of climate change in the South and East Marine Plan Areas. A report produced for the Marine Management Organisation, pp 27. MMO Project No: 1077 (in press).

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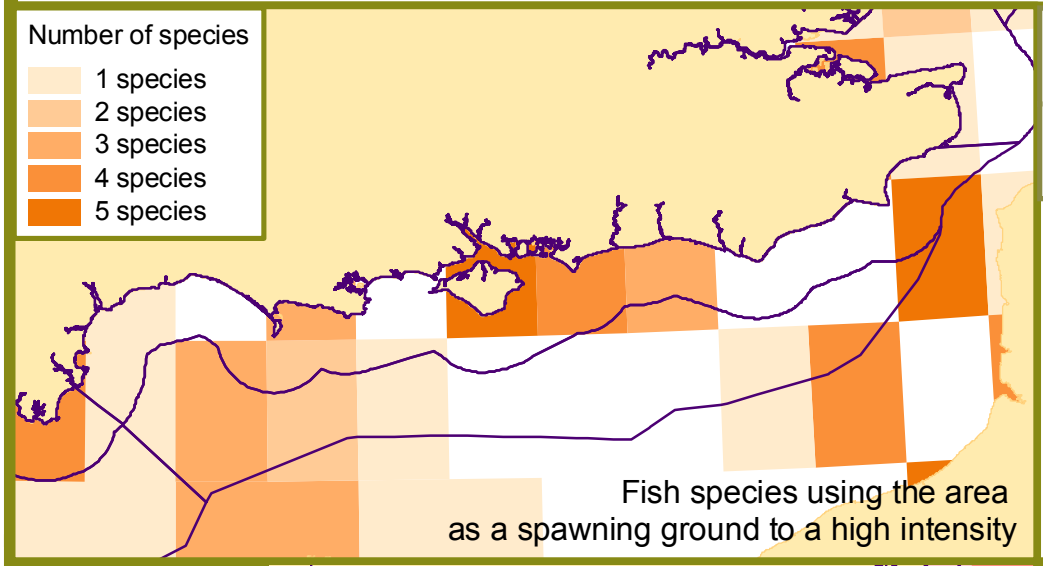
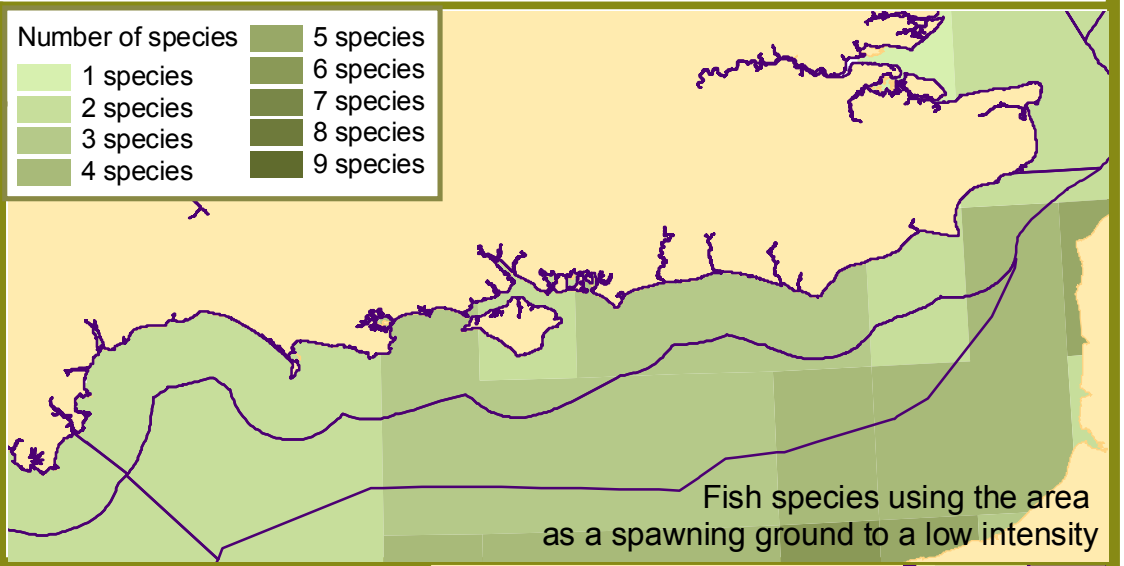
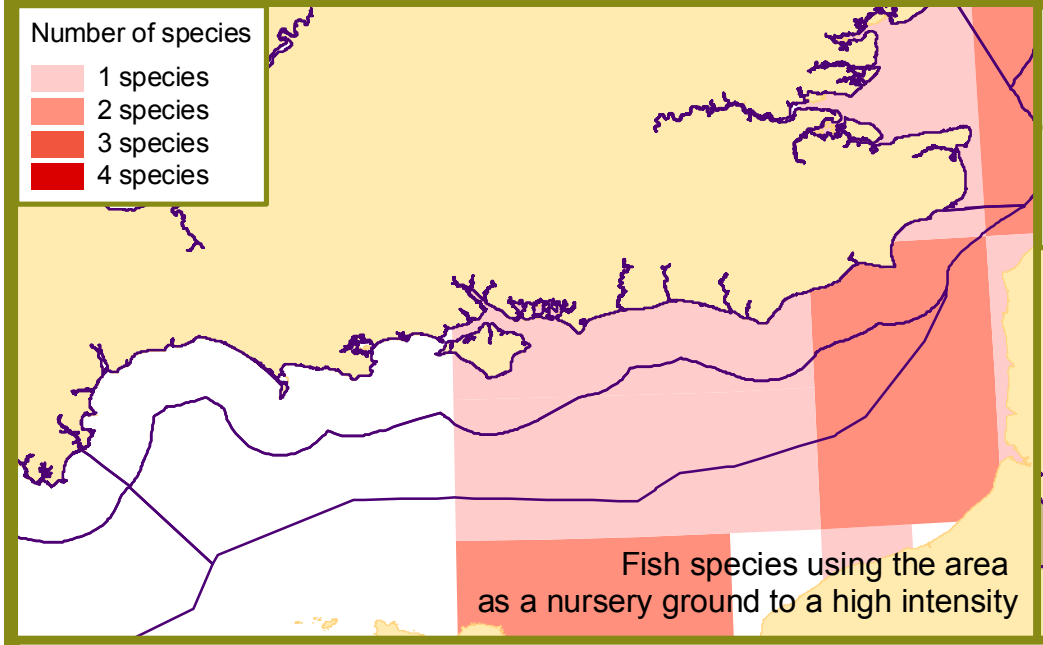
Figure 6: Fish spawning and nursery grounds

June 2014







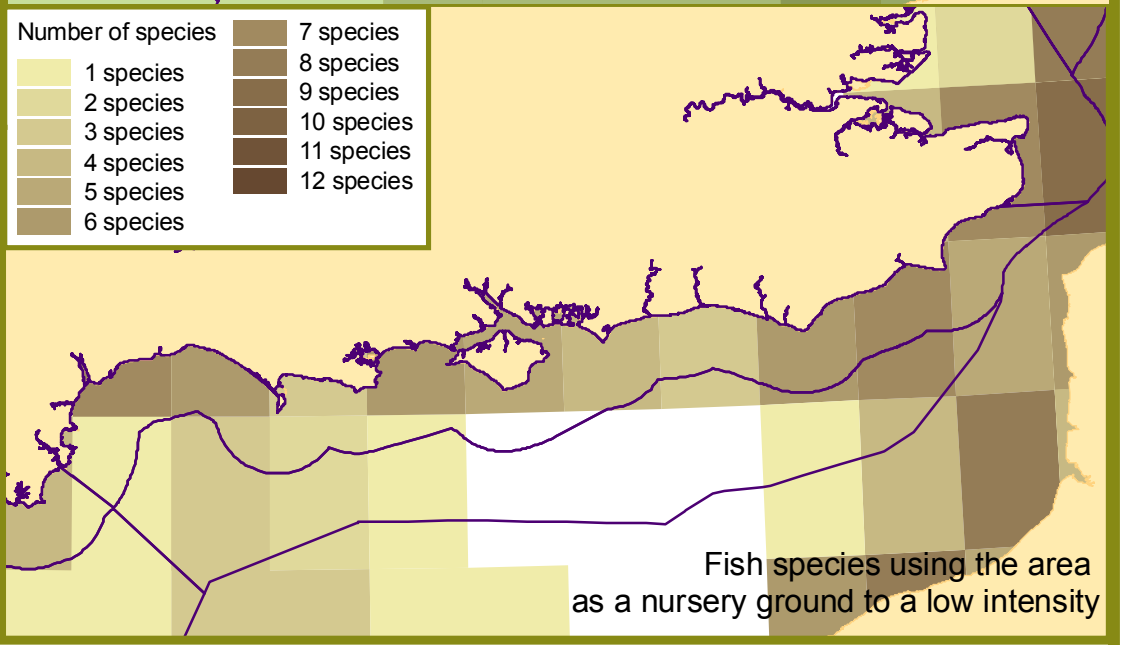


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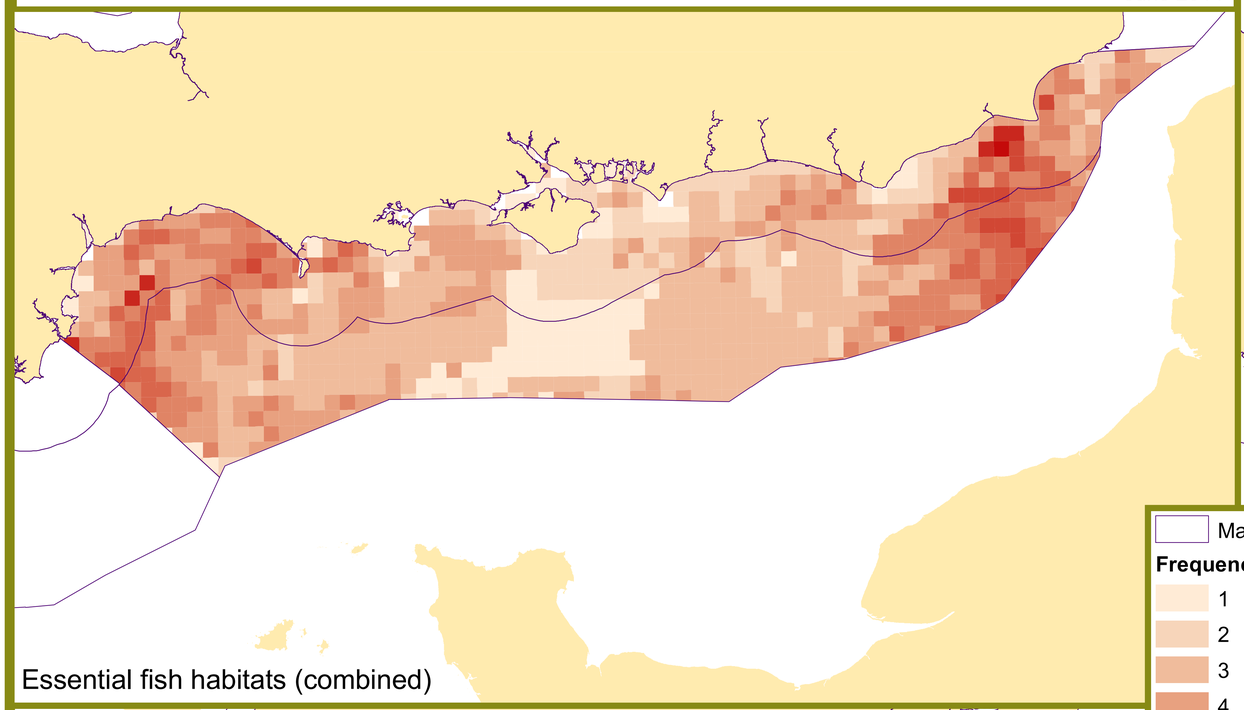
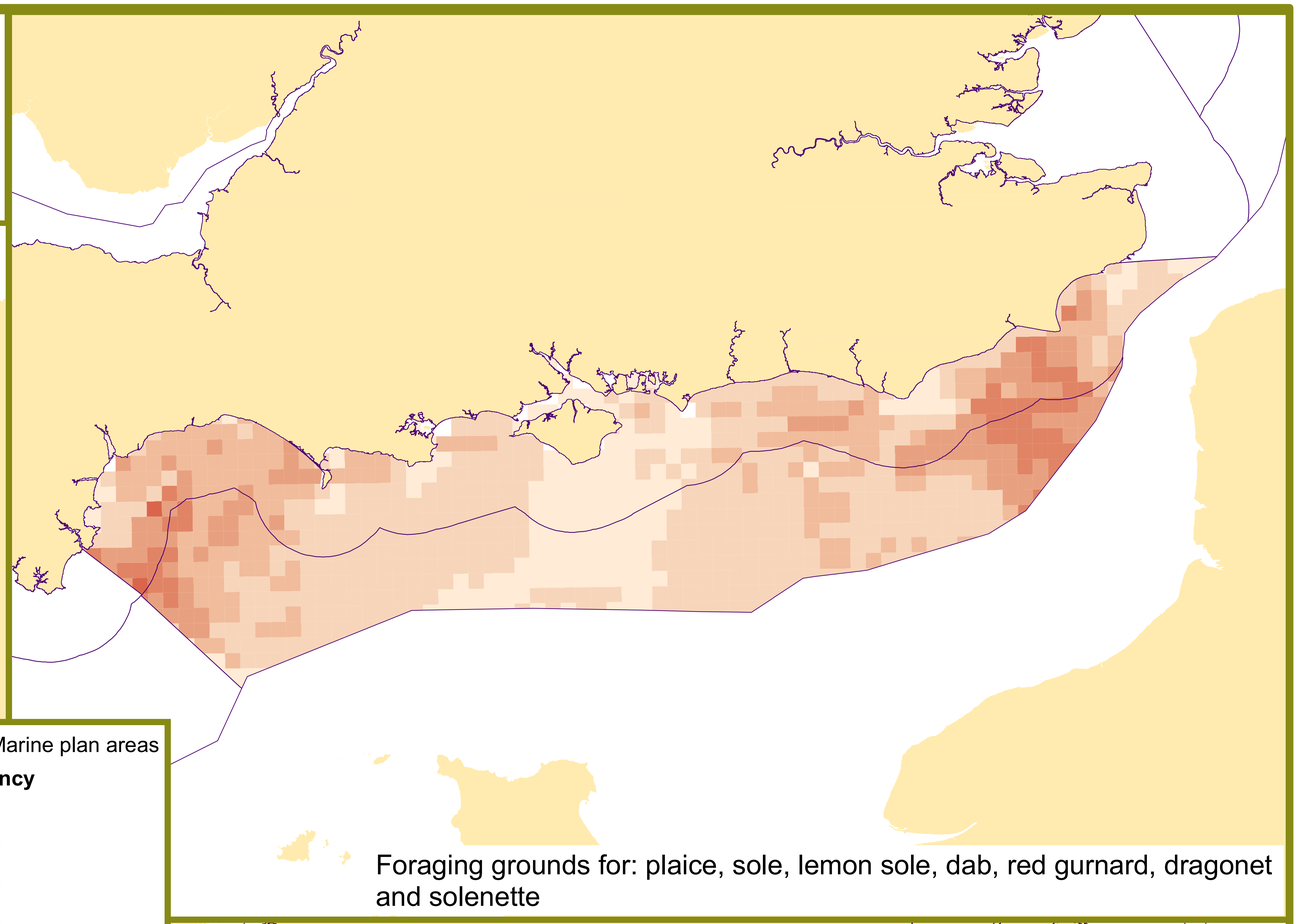
Figure 7: Essential fish habitats

June 2014



Essential fish habitats (combined)



Foraging grounds for: plaice, sole, lemon sole, dab, red gurnard, dragonet and solenette

Marine plan areas

Frequency

1
2
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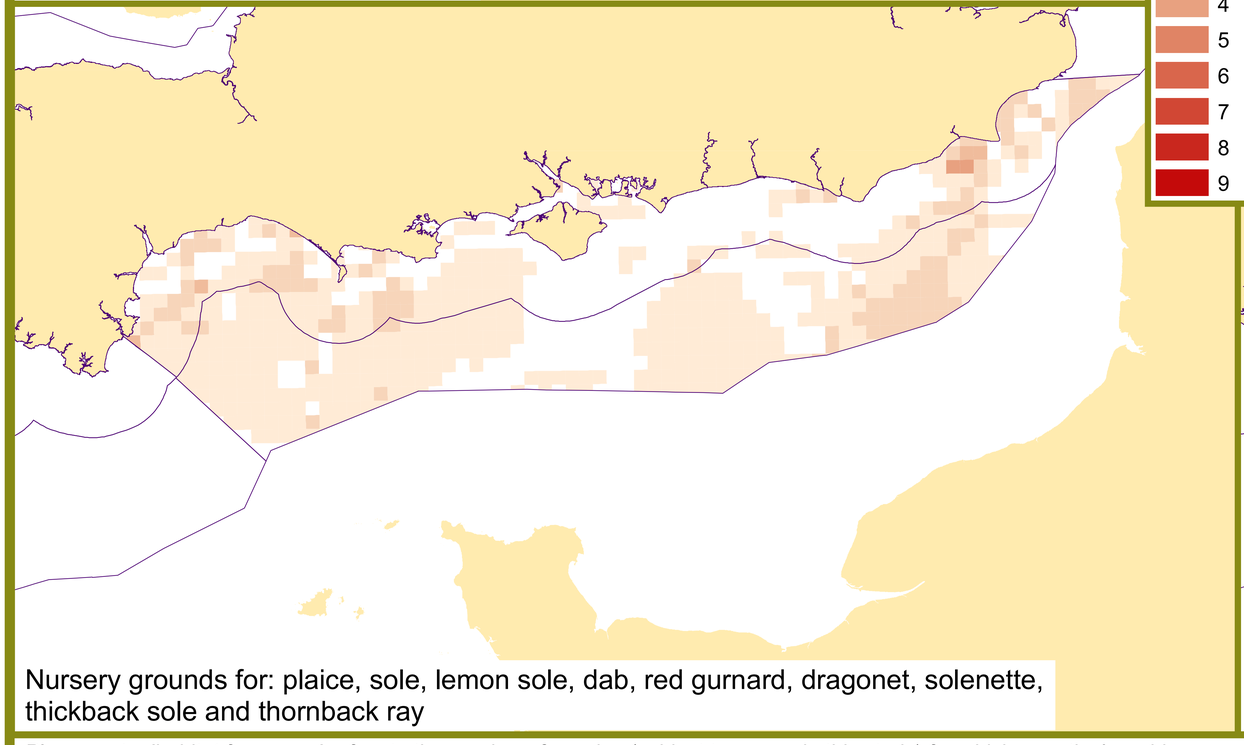
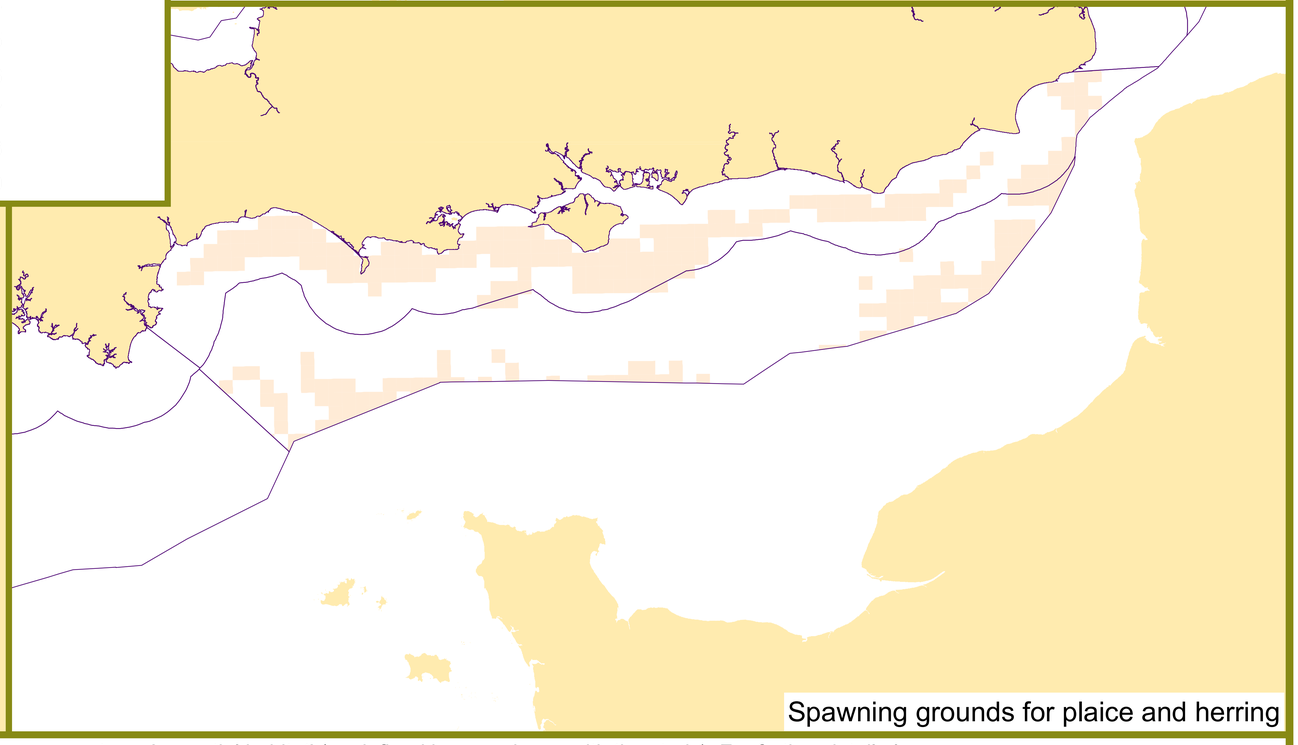


Nursery grounds for: plaice, sole, lemon sole, dab, red gurnard, dragonet, solenette, thickback sole and thornback ray



Spawning grounds for plaice and herring

Please note- 'habitat frequency' refers to the number of species (subject to survey in this study) for which a particular grid square represents an 'essential habitat' (as defined in accordance with the study). For further detail please see:
http://www.marinemanagement.org.uk/evidence/documents/1044.pdf

Marine Mammals

The principal marine mammals in English waters are seals and cetaceans (whales, dolphins and porpoises). The grey seal and the harbour seal (also called common seal) are the two species of seal resident in England. Though there are no major seal colonies in the South marine plan areas there are rare sightings of individual grey seals, and several small populations of harbour seals, that are permanent to the area. These are likely to originate from the larger populations on the East coast.[132] [133]

13 species of cetacean have been recorded on the south coast, seven of these are found year round, with harbour porpoise and bottlenose dolphin being the principal species.

Current situation – Cetaceans

Many of the cetaceans found in the South marine plan areas are part of much larger and more widespread international biological populations, which are highly mobile, including some which migrate long distances, and may be present in the South marine plan areas for only part of the time. There are some resident or seasonal cetacean pods and individuals; these tend to be located at the western edge of the South marine plan areas.[134] The South Inshore and Offshore areas are a small component of the cetacean survey areasso attributing counts specifically to the plan area is difficult, however in general the most commonly sighted cetacean in the Channel coastal waters is the bottlenose dolphin, followed by harbour porpoise.

A recent report to the Agreement on the Conservation of Small Cetaceans in the Baltic and North Seas advisory committee[135] identified Lyme Bay as a local 'hotspot' for white-beaked dolphins, with an estimation of over 200 individuals using the bay between 2007 and 2011. This new evidence conflicts with most published assessments that the species is rare in the Channel.

The presence and distribution of harbour porpoise in the plan area is not well known, however there appeared to be a link to water depth, with the majority of encounters occurring in depths of 50-100m, and a preference for the western area of the Channel, away from the major shipping lanes and within the Eastern Channel for shallow areas of uniform topography.[136]

Charting Progress 2 concluded that the status of harbour porpoise and common bottlenose dolphin species in the eastern Channel (which roughly equates to the

[132] http://seawatchfoundation.org.uk/wp-content/uploads/2012/07/SouthwestEngland_small.pdf
[133] www.marine-conservation.org.uk/ukseals www.marine-conservation.org.uk/ukseals
[134] SCANS-II (2008). Small cetaceans in the European Atlantic and North Sea. Final Report to the European Commission under project LIFE04NAT/GB/000245. Sea Mammal Research Unit, University of St. Andrews,
[135] Brereton T, Lewis K & Macleod C (2013). Lyme Bay: A recently discovered hotspot for white-beaked dolphins in the English Channel. *20th ASCOBANS Advisory Committee Meeting*, Warsaw, Poland, 27-29 March 2013. AC20/Doc.4.1.c, 39-58pp
[136] Cucknell A-C, Boisseau O, McLanaghan R & Moscrop A (2012). A final report on the presence and distribution of harbour porpoises (*Phocoena phocoena*) from visual and acoustic survey in French and British waters of the English Channel in May and June 2011. *19th ASCOBANS Advisory Committee Meeting*, Galway, Ireland, 20-22 March 2012. AC19/Doc.5-02, 16pp.

South marine plan areas), is considered poor, largely as a result of historical bycatch of harbour porpoise in fixed net fisheries, and the high shipping density in the area.

Current situation – Seals

The harbour seal population in the Solent area established around 1994 is thought to be made up of 20-25 individuals; the population size appears to be stable or possibly slightly increasing, there is also a known harbour seal haul-out site within Poole Harbour. One or two grey seals may also now be semi-resident in the area.[137]

Small grey and harbour seal colonies are present on the East Kent coast and seals from these colonies can be expected to be present in the South Inshore and Offshore areas. Although harbour seals frequently transited between regions,[138] trip distance and duration between haul-out sites and foraging areas are shorter for seals on the South coast compared to the larger East coast populations.[139]

Future trends – Cetaceans and Seals

It is difficult to predict future trends for seals and cetaceans due to uncertainties in the relationship and influence of pressures on population dynamics, which in themselves are poorly understood.[140] Cetaceans and seals may be displaced by noise associated with developments including offshore wind farm construction and operation and shipping, these sources may also impacted indirectly through contributing to changes in prey distribution and increased susceptibility to disease and contaminants may occur as a result of warming waters associated with climate change.[141] There is further uncertainly relating to cumulative effects to these pressures, which may affect the long-term viability of some species.[142]

Targets for achieving Good Environmental Status for marine mammals are all based on existing commitments under the Habitats Directive and relate to distribution, abundance, productivity and impacts of key pressures. Separate targets have been developed for seals and cetaceans due to their differing life histories.[143]

[137] Chesworth, J. C., Leggett, V. L. and Rowsell, E. S. (2010). Solent Seal Tagging Project Summary Report. Wildlife Trusts' South East Marine Programme, Hampshire and Isle of Wight Wildlife Trust, Hampshire.

[138] Sharples RJ, Moss SE, Patterson TA & Hammond PS (2012). Spatial variation in foraging behaviour of a marine top predator (*Phoca vitulina*) determined by a large-scale satellite tagging program. *PLoS ONE* **7**: 1-14. doi:10.1371/journal.pone.0037216.

[139] Goodman SJ (1998). Patterns of extensive genetic differentiation and variation among European harbour seals (*Phoca vitulina vitulina*) revealed using microsatellite DNA polymorphisms. *Molecular Biology and Evolution* 15: 104-118.

[140] Pinn, E. (2010). Charting Progress 2 Healthy and Biological Diverse Seas Feeder report: Section 3.7: Cetaceans. Published by Department for Environment Food and Rural Affairs on behalf of UKMMAS. p550-591. In: UKMMAS (2010) Charting Progress 2 Healthy and Biological Diverse Seas Feeder Report (Eds. Frost, M & Hawkridge, J).

[141] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status

[142] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status

[143] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status

Birds

The South Inshore area has limited suitable habitat for nesting seabirds but there are estuarine and soft coastal areas notable for breeding, wintering and passage water birds. Of the 25 known UK breeding seabird species, 12 breed throughout the area in varying numbers,[144] and the region is of relatively less importance than elsewhere in the UK.

Despite this, large numbers of sea and water birds are present in the South marine plan areas all year round, with others being seasonal visitors for breeding or over-wintering, such as the Mediterranean gull and Brent goose. Most sea birds spend the majority of their lives at sea, but some stay in inshore waters (eg terns, gulls, great cormorant and European shag) and others venture much further offshore and beyond the shelf-break, even during the breeding season. Water birds occur in large aggregations where food is abundant (such as in and around estuaries), with most internationally important aggregations occurring during spring and autumn migrations or during winter.[145]

Current situation

Areas in the South that are important for bird populations include; Dungeness to Pett Level, Pagham Harbour, Chichester, Langstone and Portsmouth Harbours, the Solent, Southampton Water, Chesil Beach, the Fleet, and Lyme Bay.[146] Different areas of the south coast provide different functions for birds including opportunities for foraging, or protection during the breeding season (such as that provided by the cliffs of Durlston and Portland Bill which offer protection to species such as guillemots). The importance of certain areas can be demonstrated through the number of local authorities who highlight the importance of protecting bird populations in their draft local plans, including Chichester District Council (in Chichester and Langstone Harbours) and Havant Borough Council (who highlight the need to protect Brent geese through conservation of their habitat in their Local Development Framework). Trends in numbers of water birds in the region were identified as being positive overall with numbers of wintering water birds being stable (at least over the last five years) at most of the principle sites in the area, while only Pagham Harbour and Portsmouth Harbour numbers have steadily declined.

Healthy bird populations can bring value for tourism and recreation through wildlife watching and employment at reserves. Poole Harbour Special Protection Area is a good example of this, where the shallow waters and intertidal habitats are home to significant numbers of wintering, migrating and breeding birds and also attract a range of recreational users from birdwatchers to those undertaking watersports, walking and cycling. Poole Harbour is one of six case study sites for the Valuing Marine Ecosystem Services in the Western Channel Region (VALMER)[147] project,

[145] Mitchell, P.I., Austin, G., and Parsons, M. (2010). Charting Progress 2 Healthy and Biological Diverse Seas Feeder report: Section 3.8: Marine birds.Pp.630-633. In: UKMMAS (2010) Charting Progress 2 Healthy and Biological Diverse Seas Feeder report (Eds. Frost,M & Hawkridge, J).
[146] Mitchell, P.I., Austin, G., and Parsons, M. (2010). Charting Progress 2 Healthy and Biological Diverse Seas Feeder report: Section 3.8: Marine birds.Pp.630-633. In: UKMMAS (2010) Charting Progress 2 Healthy and Biological Diverse Seas Feeder report (Eds. Frost,M & Hawkridge, J).
[147] VALMER is an 11 partner Interreg IV A Channel programme, to which the Marine Management Organisation provides funding.

where the monetary and non-monetary benefits derived from recreation are being investigated.

Figure 8 shows a selection of the available data for those birds that interact with the south plan areas (other available evidence includes data from the BTO Wetland Bird survey, and data on biodiversity estimates and breeding locations which may be assessed in further detail by the Marine Management Organisation at a later date if needed for plan development). The summer and winter seasonal differences in seabird density for gannets, kittiwakes, common scoters, red-throated divers and red-breasted mergansers illustrate the need to consider both time and location when assessing potential interactions with bird populations.[148] BirdLife International's 'Important Bird Areas' and colony locations for common guillemot, common tern, European shag, great cormorant, little tern, northern fulmar, razorbill, roseate tern and sandwich tern indicate the distribution and diversity of bird life along the south coast (also see figure 9 under the 'Protection of habitats and species' for the location of specific sites designated for the protection of birds).

Birds in the South experience a number of pressures including; climate change leading to increased storm surge during the nesting season (for shoreline nesting species such as the terns), summer storms, recreation activities (disturbance), fishing activity (on prey species) and predation (for example foxes). These have caused substantial declines in bird numbers in both offshore feeding sea bird species, such as black-legged kittiwakes, and inshore feeding species, such as the herring gull. Species with strong migration and territorial habits are less able to adapt to loss of intertidal feeding habitats and disturbance pressures by shifting to new areas.[149] [150]

Breeding sea birds

The Mediterranean gull has maintained a small breeding presence along the south coast (with Langstone Harbour featuring the UK's largest Mediterranean gull breeding colony), with many of its breeding sites designated as Special Protected Areas. Other gulls breeding along this coastline are the herring gull, lesser black-backed gull, black-headed gull and great black-backed gull. Cormorants and shags breed in low numbers, with kittiwakes and guillemots breeding in some numbers and regularly feeding offshore (kittiwakes are widely distributed in the Channel throughout the year despite the national declining trend). Tern breeding numbers in Langstone and Rye Harbour colonies have declined, likely due to increased predation and storms.

Breeding water birds

There are several notable breeding assemblages of waterbirds in the region, such as the internationally important populations of Brent geese and waders around the Special Protection Areas and Ramsar wetlands on the Solent coast. Low lying

[148] WWT Consulting (2013) Seabird sensitivity mapping for English territorial waters project for Natural England
[149] Hallam, D. (2013). Bob Chapman (Hampshire & Isle of Wight Wildlife Trust), Langstone Harbour site visit [meeting] (Personal communication, 10 July 2013).
[150] King, D. (2010) Solent Waders and Brent Goose Strategy 2010. Hampshire and Isle of Wight Wildlife Trust.

wetlands such as Pagham Harbour and Rye and Chichester Harbour support high densities of grassland breeding waterbirds such as garganey, shoveler, gadwall and plovers. Further west, numerous coastal sites are important for breeding birds, notably the redshank, lapwing, snipe and oystercatcher. The highest densities of breeding waders are on the Newtown and Beaulieu estuary, while the Solent and Isle of Wight area is a major site for ringed plover.

Wintering birds

In winter, guillemots are widely distributed in low numbers, with concentrations increasing towards the eastern Channel. Razorbills are also present in low numbers in the Dover Strait and eastern Channel during winter months. Common tern, little tern, sandwich tern and roseate tern all breed along the coast with many colonies designated as Special Protection Areas (under the Habitats Directive). Seabird numbers in coastal waters in the South Offshore area are generally low. Most breeding seabird species from the inshore area feed in estuaries, on exposed intertidal areas or in other shallow, inshore waters.[151] Fulmars are widely distributed in the Eastern Channel from November through to July. Gannets move from the North Sea to the Channel in winter and are present during summer months, probably commuting from breeding colonies on the Channel Islands.

On the Western side of the South Inshore plan area, between Hayling and Lyme Regis, much of the coastline is estuarine or soft coast. This habitat is important for wintering and passage birds and there are many sites given Special Protection Area designation. The estuarine shores attract species including dark-bellied Brent goose, dunlin, purple sandpiper, gadwall, grey plover, golden plover, knot, sanderling, pintail and black-tailed godwit. Lyme Bay is seasonally important for the critically endangered Balearic shearwaters[152] and the Dungeness to Pett Levels area include saltmarsh, sand-flats and mud-flats that provide valuable feeding areas for wintering water birds.

Future trends

The future status of sea birds and water birds is difficult to predict given the wide range of pressures on them and our lack of knowledge on how they interact. The Solent Disturbance and Mitigation Project was established by the Solent Forum in 2007 to assess the current and future levels of recreational activity on the Solent coastline and the predicted impacts of future development on bird usage in this area. The report outputs help to provide a greater understanding of bird disturbance in the Solent and may help to provide guiding principles to consider when developing in the area (there is ongoing work to improve the confidence of the model used in the study).

The implementation of the Marine Strategy Framework Directivealongside the Birds Directive and subsequent management measures, will aim to help ensure Good Environmental Status targets for birds include ensuring species distribution,

[151] Tasker ML (1998). Seabirds. In: JH Barne, CF Robson, SS Kaznowska, JP Doody & NC Davidson Eds. Coasts and seas of the United Kingdom. Region 6 Eastern England: Flamborough Head to Great Yarmouth. Joint Nature Conservation Committee, Peterborough.
[152] Hallam, D. (2013). Wildlife and Countryside Link SPAR bilateral [meeting] (Personal communication, 18 July 2013).

population size, condition and productivity are not impacted by human activity. It may also help to increase the resilience of sea bird populations to the effects of climate change.[153] However, despite the introduction of any new management measures, declines in sea bird numbers are anticipated to continue in the short-term as sea birds do not breed until three to nine years old.[154] The Joint Nature Conservation Committee are currently considering the western portion of the South plans areas for potential designation as a Special Protection Area for Balearic Shearwater, which if designated will aim to protect populations in this area.

Although overall abundance for sea and water birds is likely to increase, specific species are likely to experience significant declines. The Charting Progress 2 feeder report showed the trends for 22 of the species that contributed to the status analysis of the South marine plan areas were relatively stable or increasing with an overall net increase in bird numbers. However of the species that are in decline, four have been in long-term decline having begun declining in the early 1990s. A further seven have been in decline since the late 1990s. Six of these 11 declining species trends stand at their lowest levels since the 1975/76 baseline.

Coastal habitat creation schemes are becoming more prevalent in the south Inshore plan area as part of managed realignment schemes and as compensatory measures for development (such as the Medmerry management realignment scheme which will create new intertidal habitat). The effects on new and displaced bird habitat have not yet been fully assessed and may have both positive and negative impacts on water and sea bird populations.[155] See 'Coastal processes' in section 2.1.2 for more detail.

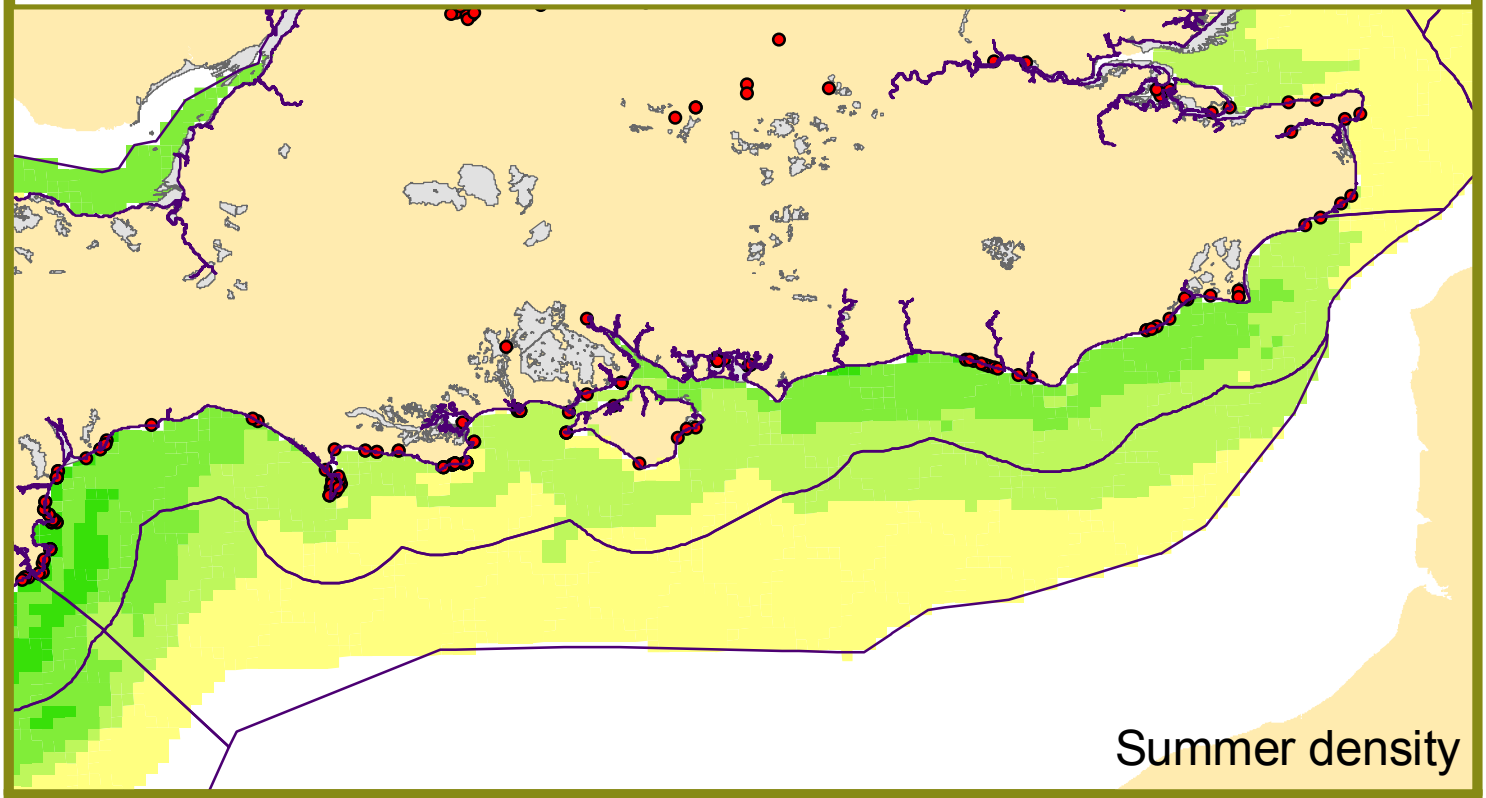
[153] HM Government, 2012, Marine Strategy Part One: UK Initial Assessment and Good Environmental Status
[154] RSPB (2013). Marine strategy framework directive consultation (MSFD) – RSPB response.
[155] https://www.gov.uk/government/publications/medmerry-coastal-flood-defence-scheme/medmerry-coastal-flood-defence-scheme

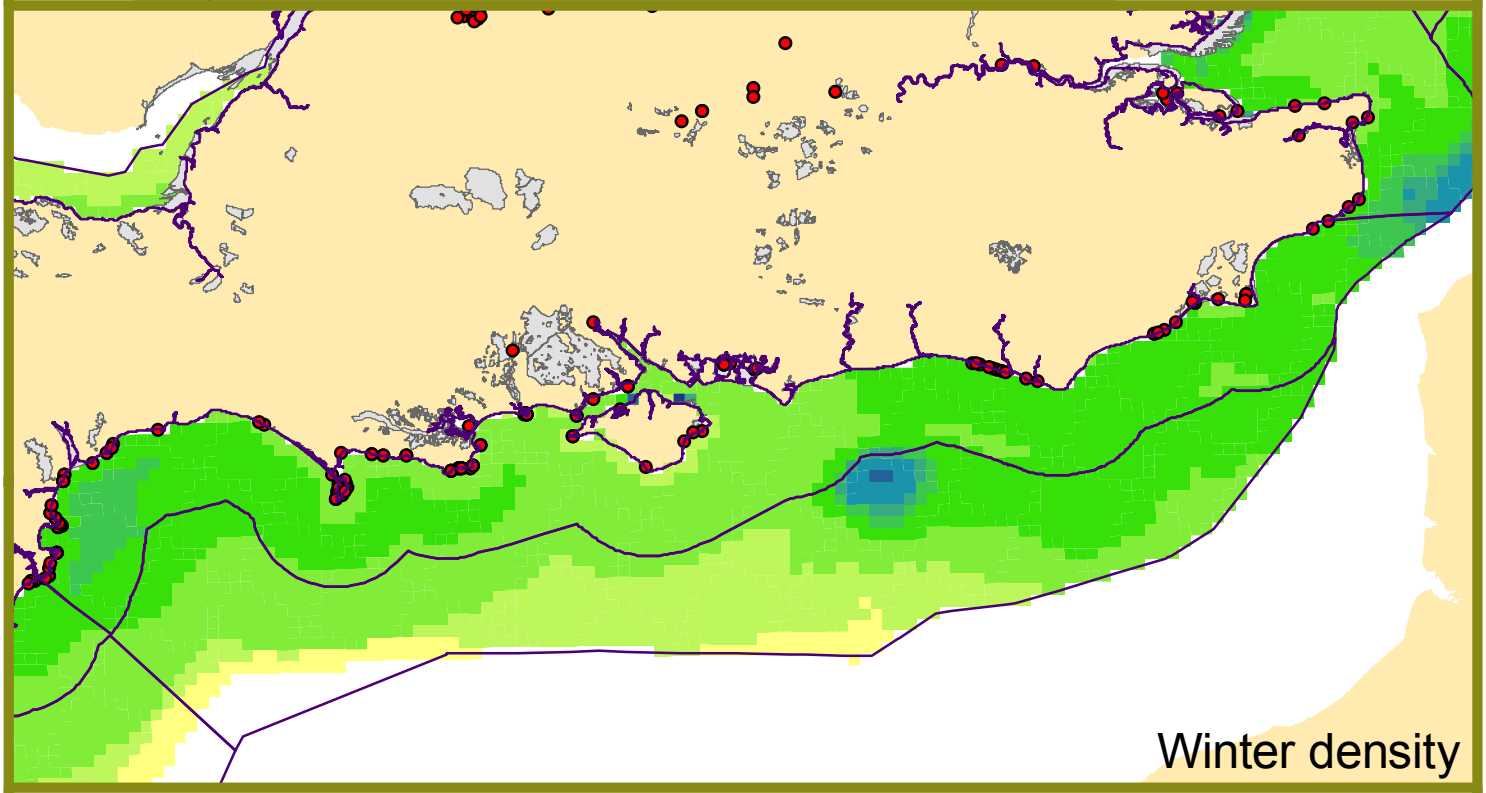
Marine Management Organisation

Figure 8: Seasonal seabird density

Wildfowl and Wetlands Trust & European Seabirds at Sea 1979-2011 data modelled on a 3km² grid. Density data for gannets, kittiwakes, common scoters, red-throated divers and red-breasted mergansers only.

June 2014





Marine plan areas

Important Bird Areas (RSPB)

Colonies

Seabird density (birds per 3km²)

0 - 5

6 - 10

11 - 20

21 - 30

31 - 40

41 - 50

51 - 100

101 - 250

251 - 400

401 - 1682

Protection of habitats and species

As part of an ecosystem-based approach[156] to nature conservation the UK administrations are committed to having a well-managed network of Marine Protected Areas by 2016; under international agreements including the Convention on Biological Diversity and the OSPAR Convention. A Marine Protected Area network is a key measure towards achieving Good Environmental Status as required by the Marine Strategy Framework Directive. The sites in the network will work together to provide more benefits than an individual conservation area could on its own. All those areas established under international, European and national legislation with a marine component will contribute to this network and include:

- Special Areas of Conservation (SAC) designated under the Habitats Directive
- Special Protection Areas (SPA) classified under the Birds Directive
- Sites of Special Scientific Interest (SSSI) with marine components designated under the Wildlife and Countryside Act 1981(as amended)
- Marine Conservation Zones (MCZ) designated under Marine and Coastal Access Act 2009
- Ramsar sites (wetlands of international importance) designated under the Ramsar Convention on Wetlands, 1971.

The Marine Policy Statement requires that appropriate weight[157] is attached to designated sites and protected species and also to habitats and species of principal importance for the conservation of biodiversity[158] beyond the boundaries of Marine Protected Areas. Marine planning has a role in delivering the requirements of the Marine Policy Statement and in supporting the coherence of the Marine Protected Areas network in general. Details of features of conservation importance and existing designations can be found on the Marine Management Organisation planning portal.

[156] MPS (1.1): A practical interpretation of the ecosystem approach is set out in regulation 5 of the Marine Strategy Regulations 2010 which transpose the Marine Strategy Framework Directive. An ecosystem-based approach to the management of human activities means an approach which ensures that the collective pressure of human activities is kept within the levels compatible with the achievement of good environmental status; that does not compromise the capacity of marine ecosystems to respond to human-induced changes; and that enables the sustainable use of marine goods and services.

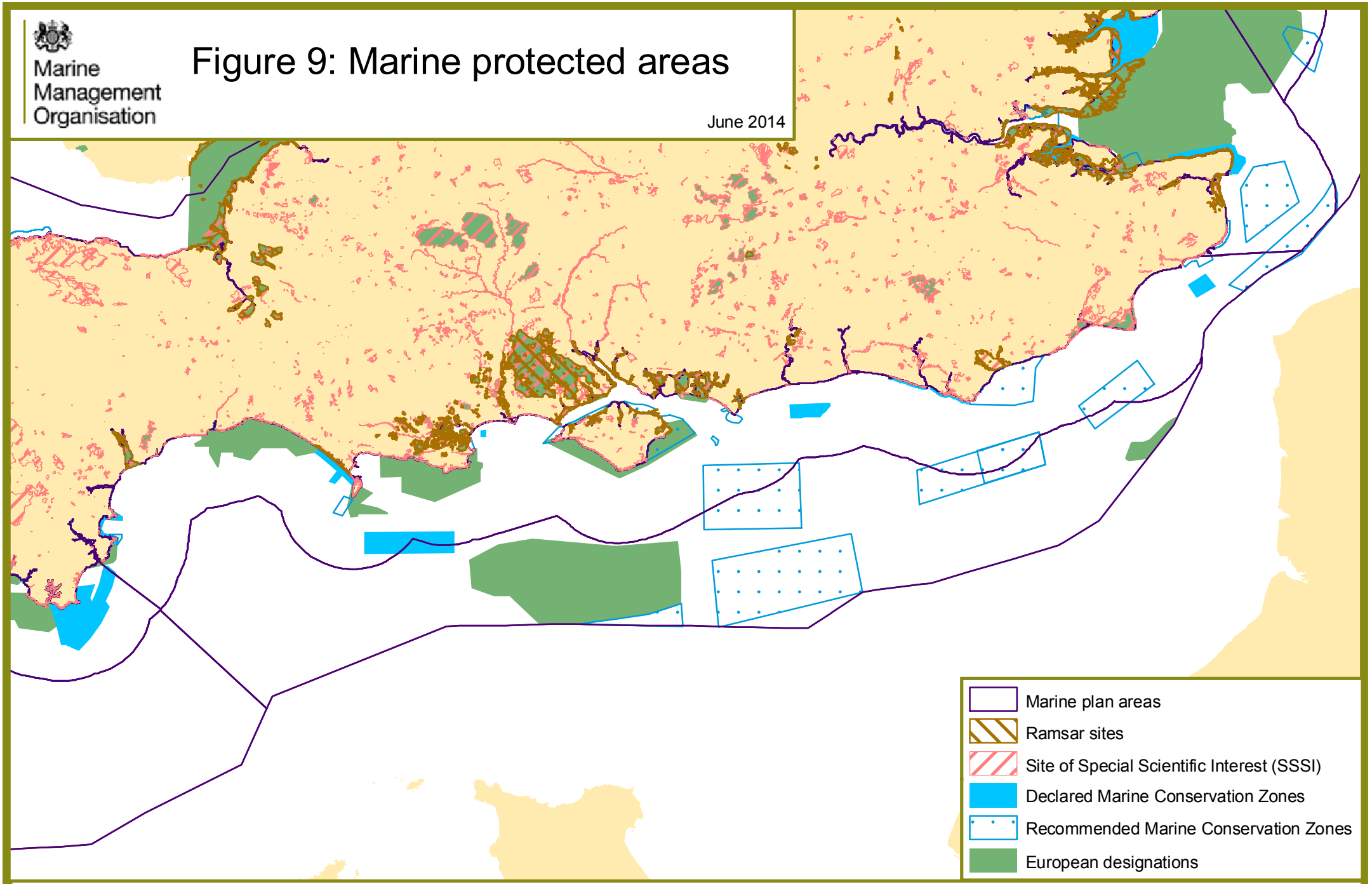
[157] 'Appropriate' should be judged by reference to the MPS, existing requirements and information provided through the on-going development of the South marine plans

[158] HM Government, 2011, Marine Policy Statement, paragraph 2.6.1.5.

Marine Management Organisation

Figure 9: Marine protected areas

June 2014



Current situation

Figure 9 shows the distribution of Marine Protected Areas across the South Inshore and Offshore marine plan areas. Table 4 provides further details for each type of designation, the number of sites and area covered.

Table 4: Number, area coverage, and distribution of all designated sites in the South Inshore and Offshore marine plan areas (as at June 2014)

	South Inshore	South Offshore
Number of SPA sites	11	0
Area covered by SPA km²	142	0
% of marine plan area covered by SPA	1	0
Number of SAC sites	38	2
Area covered by SAC km²	967	1442
% of marine plan area covered by SAC	9	13
Number of Ramsar sites	10	0
Area covered by Ramsar sites	139	0
% of marine plan area covered by Ramsar sites	1	0
Number of SSSI sites	267	0
Area covered by SSSI km²	168	0
% of marine plan area covered by SSSI	2	0
Number of designated MCZs	9	1 (note there are 9 designated MCZs in total in the South but one (South Dorset) straddles the inshore and offshore)
Area covered by tranche 1 MCZs km²	315	50
% of marine plan area covered by tranche 1 MCZs	3	0.5
Number of MCZs recommended for designation in tranche 2	8	2 (note there are 9 tranche 2 MCZs in the South in total, but one site (Offshore Overfalls) straddles the inshore and offshore
Area covered by MCZs recommended for designation in tranche 2 km²	395	1217
% of marine plan area covered by MCZs recommended for designation in tranche 2	4	11

Note: The table provides a count for each marine plan area which a designated site overlaps, and therefore if a site overlaps with more than one marine plan area it will be counted within each. The Special Areas of Conservation data includes candidate Special Areas of Conservation (cSACs) and Sites of Community Importance (SCIs). The Special Protection Area data includes Special Protection Areas with boundaries that overlap the English marine plan areas and are designated for either a marine or terrestrial species.

The Marine and Coastal Access Act created a new type of Marine Protected Area called a Marine Conservation Zone to protect nationally important marine wildlife, habitats, geology and geomorphology. Marine Conservation Zone sites will be selected to protect not just the rare and threatened, but the representative range of marine wildlife.

The South Inshore plan area has nine designated Marine Conservation Zones from the first tranche. The South Offshore plan area has only one designated Marine Conservation Zone in the first tranche which straddles both inshore and offshore so is counted as 1 of the 9 designations. Hythe Bay, which was not considered in tranche 1 designation, will be considered as part of the third tranche of Marine Conservation Zones, expected in 2016.The designated and recommended sites partially overlap existing Natura designations, affording protection to habitats and species which are currently not protected under European legislation. Marine Conservation Zones will have variable levels of protection depending on their features of interest. This will ensure that a network of sites can be achieved in a way that minimises adverse impacts on sea users and maximises benefits for nature conservation.

There are currently 11 Special Protection Areas with marine components, covering 1% of the South Inshore marine plan area. These contribute 2% to the total coverage in England. These sites are designated to protect sea birds, waders and waterfowl and cover areas important for migration, breeding and aggregation. The Special Protection Areas in the South marine plan areas are largely coincident with Ramsar sites. There are no Special Protection Areas in the South Offshore marine plan area.

There are 38 Special Areas of Conservation in the South Inshore plan area and two in the South Offshore plan area covering 9% and 13% of the plan areas respectively. Despite the relatively high frequency of Special Areas of Conservation compared to other plan areas, the sites tend to be small, and therefore contribute only 9% to the total English Special Areas of Conservation coverage. The sites cover a range of habitats including biogenic and stony reefs, coastal lagoons, coastal sand dunes, shingle, sea cliffs and sea caves, tidal rivers and estuaries, mudflats, seagrass and salt marsh.

The Solent Maritime Special Area of Conservation contains large aggregations of Atlantic salt meadow and represents the only example of a site at which the smooth cord-grass, *Spartina alterniflora*, is found in the UK, and one of only two UK sites at which significant expanses of the small cord-grass *Spartina maritime*, are found.[159]

There are 267 coastal Sites of Special Scientific Interest in the South Inshore plan area, designated under the Wildlife and Countryside Act 1981 (as amended), covering around 1% of the plan area. These are cited for their biological and geological interest features. The sites contain intertidal habitats and always have a terrestrial component as they do not extend below the low water mark.

[159] James et al, 2010. The South Coast Regional Environmental Characterisation. British Geological Survey Open Report OR/09/51.

The National Park Designations of the New Forest and The South Downs National Parks are also of key importance in connecting the estuaries to the coast and in conserving and enhancing the wildlife as well as the cultural heritage of the coastal zone (National Parks and Areas of Outstanding Natural Beauty are considered further in the nationally designated landscapes chapter.

As an illustration of the conservation importance of parts of the South marine plan areas, note that almost the entire coast of the Isle of Wight is subject to conservation designations of one type or another.

Future trends

Work is underway by the Statutory Nature Conservation Bodies to identify further fully marine Special Protection Areas in order to provide additional protection in line with the legislation. The areas of search for new sites are available on the JNCC website as a series of maps, which show locations in the South Inshore marine plan area are being considered for the protection of Balearic shearwater.

There are four marine habitats and four marine species present in UK waters away from the coast for which the European Commission has stated that additional Special Areas of Conservation must be designated. These are submerged sandbanks, submerged or partially submerged sea caves, reefs, submarine structures made by leaking gases, grey and harbour seals, bottlenose dolphin and harbour porpoise. The Statutory Nature Conservation Bodies are currently working to identify additional sites. Although the South marine plan areas have potential Annex 1 habitat present, there are currently no areas of search[160] undergoing investigation and survey within the plan areas.

The Department for Environment, Food and Rural Affairs announced tranche two of the recommended Marine Conservation Zones for consultation for designation in February 2014 in conjunction with decisions on other environmental priorities. Two sites in the South marine plan areas included in the regional Marine Conservation Zones project recommendations will not be considered further as socio-economic costs were considered to outweigh the conservation benefit.

The conservation benefits achieved by designation depend on the features present, conservation objectives and effective management. Any restrictions on activities will be determined by their potential impact on protected features and the management measures in place to achieve the conservation objectives. Protection of areas outside of sites is also provided by existing measures such as strategic environmental assessments and environmental impact assessments which require applicants to consider features outside of designated sites. The Marine Management Organisation has developed a strategic approach to Marine Protected Area management, and have developed a table providing information about designated sites, including some of the Statutory Nature Conservation Body advice about the impact of human activities upon site features.[161] The management measures for a

[160] http://jncc.defra.gov.uk/page-4543

[161] Note: this table includes only the advice in relation to activities for which the MMO has management responsibility.

number of proposed sites are still to be defined, with potential implications for activities.

In March 2012, the government published a review of the implementation of the Habitats Directive and Wild Birds Directive, with particular reference to the burdens placed on business through the regulatory process. The Department for Environment, Food and Rural Affairs identified four key areas where change will improve the implementation of the Directives. These are:

i. Facilitating nationally significant infrastructure projects
ii. Improving implementation processes and streamlining guidance
iii. Improving the quality, quantity and sharing of data
iv. Improving the customer experience

A number of measures were identified to implement the changes required, to demonstrate how economic and environmental objectives are both compatible and central to long-term sustainable development.

In addition, in August 2012, the Department for Food and Rural Affairs announced a revised approach to managing fishing activity in European Marine Sites (EMSs). The revised approach applies to all European Marine Sites and potential Special Protection Areas and possible Special Areas of Conservation in England and will promote sustainable fisheries while conserving the marine environment and resources, securing a sustainable future for both. It aims to ensure that, in order to comply with Article 6 of the Habitats Directive, management measures are identified for high risk features by December 2013,[162] and any additional fishery management measures for the conservation of the abovementioned sites are in place by 2016. IFCAs are also implementing management measures to protect features of European Marine Sites within 6 nautical miles.[163]

Marine Ecology Potential core issues

This section summarises some of the potential core issues in relation to marine ecology in the South marine plan areas.

- Climate change may have implications for the protection of habitats and species from the following variables.[164]
  - Sea level rise/coastal flooding
  - Extreme storms and waves
  - Air and sea temperature rises
  - Ocean acidification
  - Changes in terrestrial input (riverine flow and flooding)
  - Changes to ocean currents
  - Changes in plankton distribution and knock on effects for fisheries
  - Ocean acidification (see section 2.1.1)

[162] http://www.marinemanagement.org.uk/protecting/conservation/ems-byelaws.htm
[163] http://www.marinemanagement.org.uk/protecting/conservation/ems-ifcabyelaws.htm
[164] Marine Management Organisation (2014) Potential Effects of climate change in the South and East Marine Plan Areas. A report produced for the Marine Management Organisation, pp 27. Marine Management Organisation Project No: 1077.

Therefore adaptive management of protections for sites and species will be needed. For example, if an area is created to protect a certain fish spawning ground and the fish migrate from that area due to rising temperatures, the protected area boundaries would need to be flexible to ensure that the fish are still protected. Where licence conditions are in place to protect a mobile species, they may need reviewing if the species moves as a result of climate change.[165]

- sea-level rise as a result of climate change, potential impacts of extreme weather events and 'coastal squeeze' associated with urban, industrial and sea defence development are all significant threats to the long-term maintenance of habitat diversity and structural integrity
- incremental loss of fringing habitats[166] and transitional communities[167] is a threat, particularly for those sensitive habitats that are not formally protected such as some areas of sea grass and habitat complexes like the Dart Estuary.[168] [169] [170] The loss of fringing habitats could also have an effect on species directly such as bird populations, outlined in more detail above
- the benefits brought by ecosystem services are not yet well quantified; therefore it is difficult to fully understand the impacts of human activities. As discussed in the above sections, changes in sea temperature are already affecting species populations and habitat distribution, which in turn drives alterations to community structure and function. Climate change could also affect human health through the increase of optimum conditions for marine pathogens such as Norovirus and Vibrios.[171] However it may bring benefits to cultural ecosystem services through warmer summers.

The South marine plan areas are very busy, with co-existence of activities being the norm. If environmental protection measures result in displacement of an activity, there is little opportunity to relocate.[172] The further development of the network of Marine Protected Areas, changes to management measures in current designated areas and implementation of the Marine Strategy Framework Directive could all have an impact on industry, which needs to be considered fully.

Marine Ecology Interactions with other sectors

- The UK National Ecosystem Assessment found that the diversity of marine organisms and habitats provide a range of ecosystem services and benefits,

[165] Townhill, B.L., et al, 2013, Marine Management Organisation Climate Change Adaptation Reporting - Feeder Report A report to the Marine Management Organisation.
[166] Fringing habitat is that habitat at the edge of an area of habitat
[167] Transitional communities are communities that are going through change from one type of habitat to another
[168] Hallam, D. (2013). Natural England SPAR bilateral [meeting] (Personal communication, 11 July 2013).
[169] Hallam, D. (2013). Natural England SPAR bilateral [meeting] (Personal communication, 11 July 2013).
[170] Hallam, D. (2013). Wildlife and Countryside Link SPAR bilateral [meeting] (Personal communication, 18 July 2013).
[171] Marine Management Organisation (2014) Potential Effects of climate change in the South and East Marine Plan Areas. A report produced for the Marine Management Organisation, pp 27. Marine Management Organisation Project No: 1077.
[172] J. Stockill, personal communication with Natural England 2013.

which are strongly interlinked. These benefits are of significant value to the UK society, and include:

- food (fish, shellfish)
- reduction of climate stress (carbon and other biogas regulation);
- genetic resources (for aquaculture)
- blue biotechnology (eg biocatalysts, natural medicines)
- fertiliser (seaweed)
- coastal protection
- waste detoxification and removal and disease and pest control
- tourism, leisure and recreation opportunities
- a focus for engagement with the natural environment
- physical and mental health benefits and
- cultural heritage and learning experiences.

Although the goods and services provided by the natural marine environment are typically experienced by those that live by or visit the coast, many, like renewable energy and food, both directly and indirectly benefit much of the UK's society.[173]

- the work of local authorities highlight issues where the environment and sectors come into potential conflict, but where the sectors involved are dependent on the environment. For example at Dawlish Warren Spit; a Special Area of Conservation, Special Protection Area, National Nature Reserve and a popular tourist destination in Teignbridge District. The Council, now and in the future, aims to balance biodiversity, conservation, tourism, coastal squeeze and impacts of climate change and coastal community flooding
- human activities which have a physical impact on seafloor integrity damage regulating and supporting services. While impacts are quite localised, trawling activity has the most widespread impact, with food provision also being affected by overexploitation.[174] Marine aggregate extraction also has a damaging impact on the benthos with consequential reduction in its capacity as a food source for fish and shellfish; it also creates squeeze on both trawling and fixed gear fisheries[175]
- increasing activity in other marine sectors is putting additional pressure on the marine environment and the services it provides. Interactions with renewables offshore wind farms, shipping and fisheries activities can cause displacement from feeding grounds and the most efficient flight paths, increasing the energy requirements for birds. There is also a collision risk depending on the design and location of large-scale infrastructure and the possibility diving birds and marine mammals may become entangled in fishing nets,[176] alongside and increased risk of non-native species occurring due to more shipping activity and dumping of ballast waters

[173] UK National Ecosystem Assessment Technical Report, Chapter 12
[174] UK National Ecosystem Assessment Technical Report, Chapter 12
[175] UK National Ecosystem Assessment Technical Report, Chapter 12
[176] Hallam, D. (2013). Natural England SPAR bilateral [meeting] (Personal communication, 11 July 2013); Hallam, D. (2013). Wildlife and Countryside Link SPAR bilateral [meeting] (Personal communication, 18 July 2013).

- healthy bird and mammal populations bring value for tourism and recreation through wildlife watching and employment at reserves. However, interactions with coastal tourism and recreation can cause disturbance to birds and other organisms. This may restrict or alter their natural behaviours particularly foraging and eating. In more localised areas there are also issues of collision with recreational users[177]
- it should be noted that at this point in time there is insufficient data to provide a clear assessment as to whether current levels of noise in UK waters are having an impact on the population levels of cetaceans or other noise sensitive marine animals. See section 2.2.4 Underwater noise.

Marine Ecology Issues for sustainability

- cetaceans are vulnerable to collision, pollution and underwater noise, particularly from construction of renewable energy infrastructure, ports and sonar. There are however difficulties in making direct links between individual pressures and their impact. There are potential issues of cumulative effects of multiple noise sources as marine construction and vessel movements increase
- unregulated and unsustainable hand gathering of shellfish and bait digging is also an issue, leading to physical damage, unsustainable reduction in biomass and disturbance issues.

2.3 Social considerations

The South has significant conurbations that are increasingly interspersed with sparsely populated rural areas towards the West. Communities generally have a high level of affluence and low levels of deprivation. However, there are significant pockets of high deprivation. There are areas with very high numbers of people above retirement age and conversely areas with unusually low numbers. Health and wellbeing tends to be good apart from the deprived areas. Proximity of many people to the coast and its protected landscapes can mean a greater understanding and interest generally in the marine area.

Current situation

In order to better understand the types of communities bordering marine plan areas, and how they could benefit from the introduction of marine plans, the Marine Management Organisation commissioned a socio-economic study.[178] This report still provides the most directly relevant analysis of the socio-economic processes at work in English coastal communities and the benefits to, and opportunities for, marine planning. However, as the reports relied to a degree on a synthesis of 2001 census data, there are limitations in the confidence that can be placed on their findings.

The study developed a set of coastal typologies which provide a swift overview of the types of coastal communities and their characteristics including current position and

[177] http://www.solentforum.org/forum/sub_groups/Natural_Environment_Group/Disturbance_and_Mitigation_Project/Final_ReportR2051_21_Dec12.pdf

[178] MMO (2011), Maximising the socio-economic benefits of marine planning for English coastal communities

recent trends (see figure 11). The following sub-sections detail the most common typologies within the south marine plan areas and relative to the rest of England. These are best viewed next to figure 10 (population distribution) and figure 12 (distribution of local authorities).

Coastal professionals

The South marine plan areas' communities have the highest percentage of "coastal professionals" (C2: Cosmopolitan Coast)[179] of any plan area (not including London). This typology is comprised of city and market town service centres with highly skilled populations and dynamic economies. It includes areas in and around the seaside cities of Brighton, Portsmouth (Southsea), Southampton and Worthing. It also includes historic county towns such as Lewes, Chichester and Exeter. Many people are highly qualified and working in high-skilled sectors including knowledge economy activities, real estate, renting and business activities and education. Brighton has also retained one of the highest levels of holiday spend in England.

There has been a high level of jobs growth in recent years and employment is less likely to be part-time. Areas with higher numbers of "coastal professionals" tend to be relatively close to employment centres, however, a high proportion of people commute long-distances to work. Many people live in private rented accommodation and there is also a high proportion of student households. Population densities and overcrowding are high. Conversely, it is common for people to live alone and the quality of the housing overall is the second highest of any coastal typology.

Deprivation levels are generally lower than the coastal average, but higher than the average across the coastal fringe and coastal retreat groups elsewhere in the South.

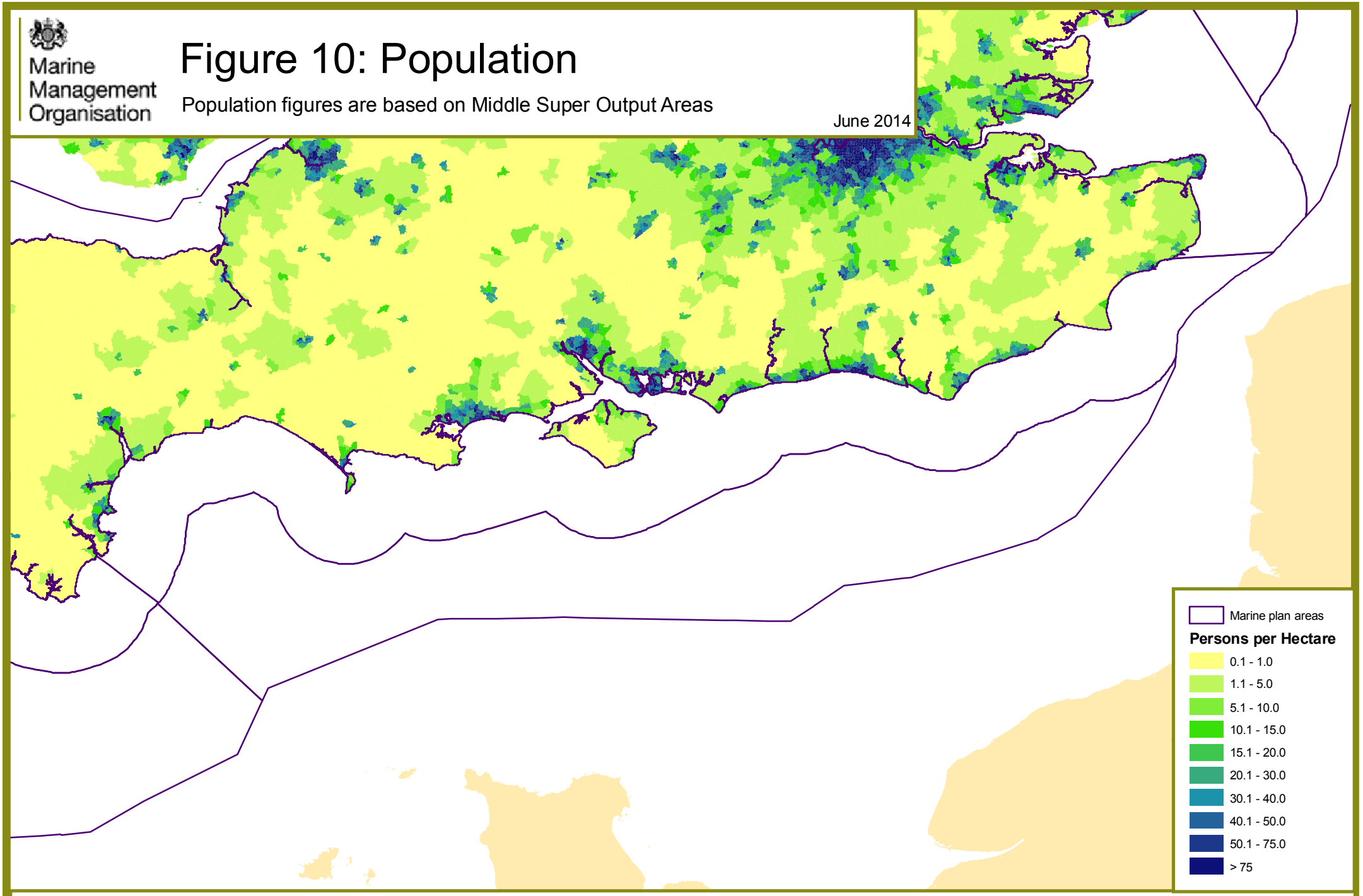
[179] Coastal typologies: detailed methods and outputs (MMO, 2011)

Marine Management Organisation

Figure 10: Population

Population figures are based on Middle Super Output Areas

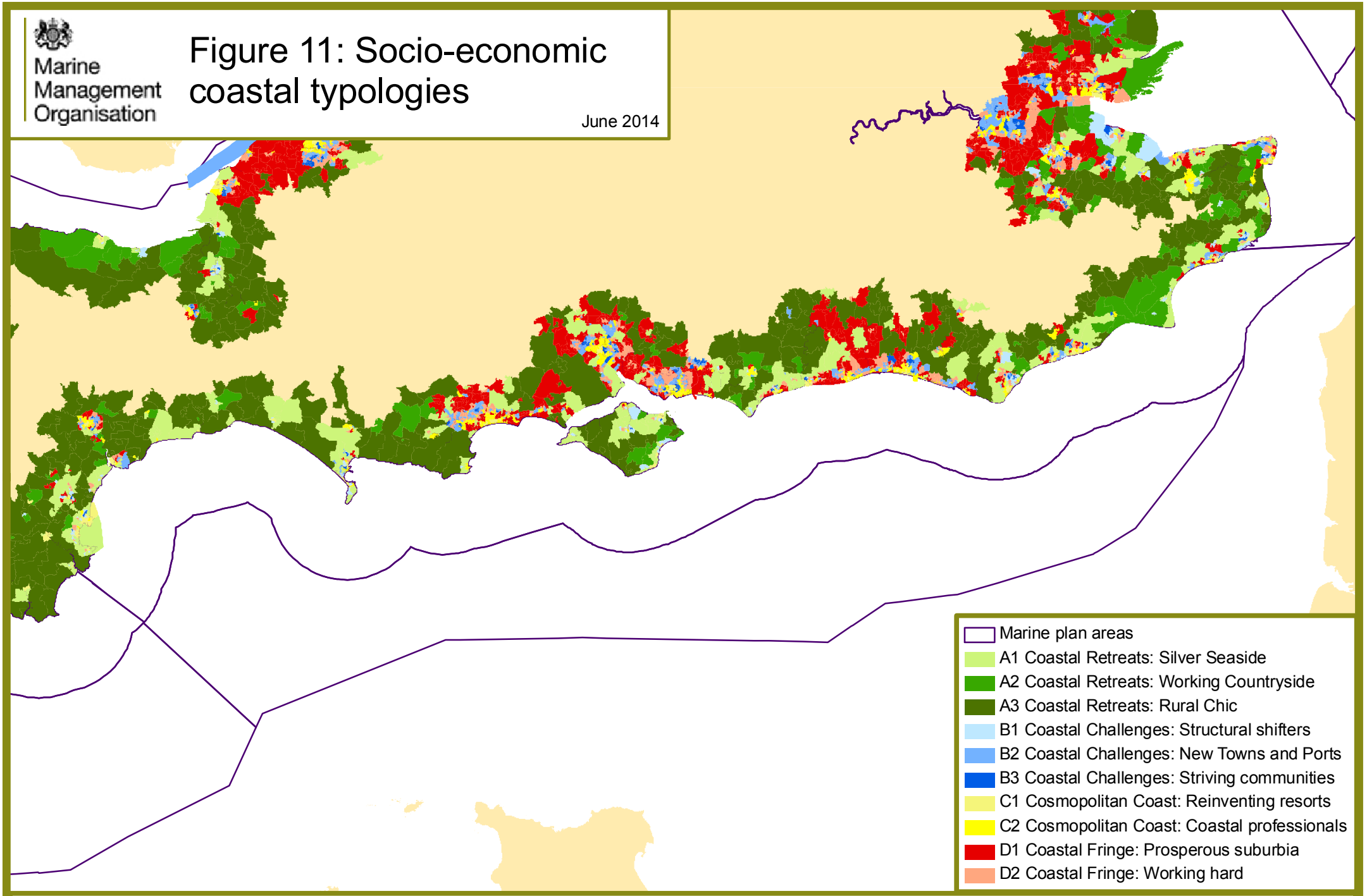
June 2014



Marine Management Organisation

Figure 11: Socio-economic coastal typologies

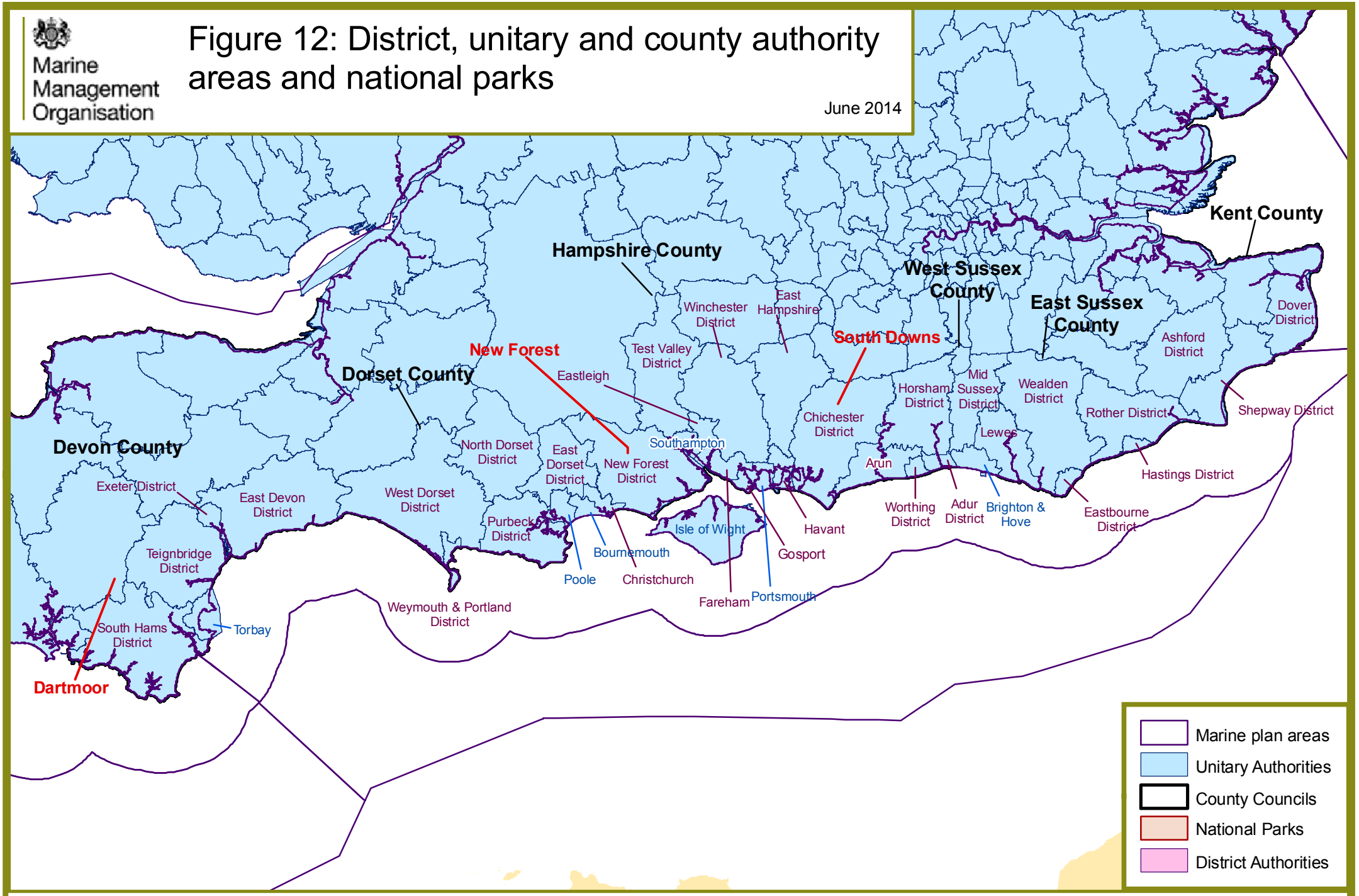
June 2014



Marine Management Organisation

Figure 12: District, unitary and county authority areas and national parks

June 2014



Silver seaside

The South also has the highest level of “silver seaside” (A1: Coastal retreats) communities. “Silver seaside” are retirement areas primarily located in smaller, less developed resorts including areas of Torbay, Selsey, Sidmouth, Seaton, New Romney, Emsworth, Southborne and on the Isle of Wight. Areas of this typology are sparsely populated, with low population density and with a high proportion of people of pensionable age. The vast majority of housing is owner occupied, although there is an above average percentage of second homes/holiday accommodation.

The proportion of people receiving benefits is relatively low. “Silver seaside” areas tend be peripheral, with higher travel times to employment centres. Related to this, home working and self employment is common. The Isle of Wight has the third highest level of holiday spend in England, Torbay also has a high level of holiday spend. There is a low level of crime.

Prosperous suburbia

The South has the largest number of affluent areas of “prosperous suburbia” (D1: Coastal Fringe) which are found predominantly on the edge of towns and in satellite suburban towns around larger coastal cities, for example, Wimborne Minster/Oakley and Ferndown/Three Legged Cross (Greater Bournemouth), Locks Heath/Bursledon/Whiteley and Botley/Hedge End (Southampton), Poole, Portsmouth and Worthing.

Communities of this typology have the highest average quality of housing of any coastal typology. People are more likely to own their own homes with a high number of them detached and large. There is a corresponding low percentage of second homes/holiday accommodation, well below coastal average.

“Prosperous suburbia” areas are characterised by low levels of deprivation on most measures. People enjoy much better health than rest of England and the coastal averages. Employment in these areas is largely concentrated in service sectors, with a high proportion of people employed in finance, real estate and business activities. Self-employment and long-distance commuting are both common. “Prosperous suburbia” has the second lowest level of crime (on average) of all the typology groups.

Working hard

The South has the second largest number of communities classed as “working hard” (D2: Coastal Fringe) including towns such as Peacehaven and Fareham/Porchester. These communities are characterised by a strong economy with a higher overall employment rate than all of the other typologies. In general, employment is more concentrated in industrial sectors such as manufacturing and port activities than the average across coastal areas. Populations are more stable than any of the other typology groups with fewer people moving in or out of the area in a given year.

There is a low level of crime compared to many other typology groups. Owner-occupation levels are high. The quality of housing is the second highest of any coastal typology with the second lowest percentage of second homes/holiday accommodation, well below English and coastal averages.

Rural chic

While still not particularly common, The South Inshore plan area has the highest number of “rural chic” communities (A3: Coastal retreats) throughout England. The typology is predominantly found in sparsely populated or rural areas, or in smaller settlements with populations less than 1,500 mainly in the hinterland in the East, and directly on the coast in the West. “Rural chic” areas are generally more prosperous with higher levels of skills and occupations and below average levels of deprivation. The people enjoy good health and the levels of crime are the lowest of all the typology groups.

“Rural chic” areas are very sparsely populated, with an average population density of less than three people per square km. Travel times to key services are significantly further than across other typologies; car ownership is relatively high and the preferred means of travelling to work. As a consequence ”rural chic” areas have higher levels of home working and self-employment than other typologies.

The housing stock is characterised by a high proportion of relatively large, detached housing. “Rural chic” areas have the highest percentage of second homes/holiday accommodation, well above English and coastal averages. There are also a higher proportion of households living in caravans than across other typology groups although caravans make up a small proportion of the total housing. The overall quality of the housing is below average for England and the coast.

New towns and ports

The South marine plan areas have the highest number of “new towns and ports” (B2: Social challenges) including Havant, Gosport, Exmouth and parts of Hastings. Challenges relate to poor skills and high levels of worklessness,[180] but counterbalanced by relatively strong economy and often located close to areas of economic growth. Employment rates are high compared to areas with similar levels of worklessness. A high proportion of people are involved in manufacturing, construction and activities associated with ports including marine transport, storage and communication. The proportion of people with degree level qualifications is below the coastal and English averages, however there is a strong presence of knowledge industry jobs in these “new towns and ports”. This apparent contradiction suggests that skilled people commute into these areas to work from outside, with the areas attractive for businesses (for example with relatively cheap accessible land for development), but less attractive for residents. The typology has the lowest percentage of second homes/holiday accommodation, well below English and coastal averages.

Reinventing resorts

As with “rural chic”, while not particularly common in the South, the South Inshore plan area has the highest number of “reinventing resorts” (C1: Cosmopolitan Coast) communities. These are primarily tourist economies with high levels of deprivation,

[180] Worklessness is defined as being “involuntarily excluded from the labour market, measured by receipt of either Jobseeker’s Allowance, Incapacity Benefit or Severe Disablement Allowance, Income Support for lone parents, Carer’s Allowance or other out-of-work benefits (other Income Support, including Disability Premium or Pension Credit under State Pension ages” Understanding the worklessness dynamics and characteristics of deprived areas, (DWP, 2011).

but diversifying to attract a more highly skilled population. The typology includes some areas of Torbay, and also Totnes and Ryde. Hastings is the second most deprived seaside town in England and its residents contend with the effects of multiple deprivation – low incomes, few employment opportunities, poor health and low levels of educational attainment. A high proportion of people in "reinventing resorts" areas are involved in tourist activities including hotels and catering. By contrast there are fewer people employed in industrial occupations. The population is, therefore, very transitory, with particularly high levels of seasonal unemployment.

These communities have the poorest quality housing on average of any coastal typology.

Despite relatively high levels of deprivation, skill levels are above average for coastal areas. There is also evidence of entrepreneurship with relatively high levels of home working and self-employment, suggesting that despite the relatively weak economy, professionals may be 'downshifting' to these areas for lifestyle and environmental considerations rather than economic reasons.

People in these areas have poorer health than the rest of English and coastal averages. The typology has twice the average for people receiving benefits for mental health issues and the highest level of crime, well above English and coastal averages.

A recent initiative to address the issues in Hastings has been the development of a Fisheries Local Action Group using the Coastal Communities Fund. It promotes a sustainable future for the fishing fleet and improvements to local markets for fish products. Socio-economic benefits are also anticipated through promotion of tourism and recreation.

Future trends

Coastal communities are diverse and face a wide range of challenges. They have mixed degrees of economic success compared to inland areas.[181] Bournemouth, Brighton, Hastings, Southampton and Worthing saw large relative improvements in their economies since 2009. Unfortunately, many have seen major downturns including Hastings which has shown the most dramatic fall of any city on long term economic performance (from 1901-2011) although reversing that trend since 2009.

In order to address such changing socio-economic circumstances communities need to take action to adjust and find new directions for their place and its resources. Two new academies, an expanding university centre, and a recent £100 million new college for vocational training, are ways Hastings is addressing the major issues of the relatively low level of skills in the working-age population. Brighton has successfully made the linkage between strong local environments, the attraction of a young, innovative population, and economic growth.[182]

[181] Cities Outlook 2013 (Centre for Cities, 2013)
[182] Brighton: Regeneration of a major resort, in Coastal Regeneration in English Resorts 2010 (Walton and Browne, Coastal Communities Alliance, 2010)

There are four local enterprise partnerships operating to promote economic growth in the South: Heart of the South West, Coast to Capital, South East and Solent,Solent local enterprise partnership being the only one outside the East and North East marine plan areas having a marine industry focus. Many of these marine industries are targeting offshore renewable energy technology, whether it is for manufacturing, maintenance or to improve skills and knowledge.

The European Fisheries Fund operated previously in the South. It offered communities the opportunity to address the challenges posed in their local area and funded a number of projects in the South in 2012-13 including; development of social enterprise, home industry start-ups and green infrastructure in Torbay; Europe's first National Coastal Tourism Academy in Bournemouth; a restaurant and training centre in Hastings Pier Gateway; and reinstatement of the Swanage to Wareham railway. Building on the European Fisheries Fund, the European and Maritime Fisheries Fund supports fishermen in the transition to sustainable fishing, supports coastal communities in diversifying their economies, finances projects that create new jobs and improve quality of life along European coasts and makes it easier to access financing. There is potential for the South marine plan areas to benefit from this fund in the future.

Declining fish stocks, rising costs of entry into the industry, environmental activism, climate change and the potential of offshore windfarm development have the potential to put pressure on the fishing community in their ability to operate profitably. While many communities have significant fishing industries (Brixham, Shoreham, Southampton, Poole, Weymouth, Portsmouth and Selsey) there is general decline in the sector. Decline in employment in the fish catching sector and improvement in education promotes employment in other sectors or emigration of the younger generation from local fishing communities. Crew members are now more likely to come from settlements distributed over a wider geographical area making social networks weaker and more dispersed.[183] It is not clear how reduced fishing activity now may lead to long-term benefit by contributing towards sustainable fisheries.

Climate change may lead to an increase in the numbers of visitors to coastal destinations, longer tourism seasons, increased infrastructure and range of facilities and demand on natural environment.[184] As noted below this may lead to negative social effects. Sea temperature rise, due to climate change, is likely to increase the abundance of warm water species.[185] This may prove a stimulant to the angling community, however, this is likely to be accompanied by the movement out of the area of traditional cold water species that may ultimately result in no overall increase in species diversity. Improved coastal access, and in the economy, may attract more people to the coast for recreational activities. Changing lifestyles may cause a shift to experience (rather than material) recreation/tourism markets.[186] Coastal

[183] Whatever Became of Social Objectives in Fisheries Policy?, *Fisheries Research* 95, no.1: 1-5 (Symes, D, and J Phillipson (2009)).
[184] Impacts of Climate Change on Tourism, Marine Climate Change Impacts Annual Report Card 2006, Marine Climate Change Impacts Partnership (Viner, D., 2006)
[185] Marine Climate Change Impacts – Fish, Fisheries and Aquaculture (2012), (Marine Climate Change Impacts Partnership, 2012)
[186] Charting Progress 2 (Defra, 2010)

Communities Adapting to Change (CCATCH - the Solent) and Living with a Changing Coast Poole (Harbour and Exe Estuary) are two initiatives that piloted ways for local communities to adapt to future coastal change, thereby improving resilience and reducing the negative, and enhancing the beneficial, consequences.[187] [188]

There is some evidence of improvement in health and wellbeing through living on the coast.[189] This may be through increased opportunity for physical activity and a general engagement with the coast, however, there is no proven cause-effect relationship and it may also be due to the "healthy migrant effect" through healthy (and wealthy) individuals moving to the coast and, therefore, contributing to a higher good health to proximity ratio. There may also be a possible negative effect due to overcrowding through increased tourism and recreation. Marine Management Organisation research (in press)[190] indicated that people in the South Inshore plan area generally have feelings that are above the English average of being happier and satisfied, less anxious and with a more worthwhile life. Dorset and Hampshire are the counties experiencing the highest feelings of wellbeing.

While generally affluent, prime examples of the most deprived coastal typologies exist in the South Inshore plan area. The socio-economic study[191] identified that deprived coastal communities were most likely to benefit from marine planning where connections were made with the growth of offshore industries, as it could create jobs and prosperity in those areas. Fishing has the greatest economic multiplier, however, this is aligned to a growth in smaller "artisanal" operations rather than industrial-scale vessels.

A recent study[192] outlined the social impacts of a number of activities. Management of people is a core issue in order to address conflict between different recreational use of areas and between locals and visitors.

The socio-economic study identified which types of industry and activity would particularly suit certain typologies:

Table 5: Typology codes

Code	Typology (those in bold are main typologies identified for South)
A1	**Coastal Retreats: Silver Seaside**
A2	Coastal retreats: Working countryside
A3	**Coastal retreats: Rural chic**
B1	Coastal challenges: Structural shifters

[187] Coastal Communities 2150 and beyond, (Environment Agency, 2014).
[188] Living with a Changing Coast, http://www.licco.eu/
[189] Does living by the coast improve health and wellbeing?, Health & Place 18(5): 1198-1201 (Wheeler, B. W., M. White, et al. (2012).
[190] Exploring the Potential of Using Office for National Statistics (ONS) Data for Marine Planning Final Report, MMO Project No: 1075 (MMO, 2014) (in press)
[191] Maximising the socio-economic benefits of marine planning for English coastal communities (MMO, 2011)
[192] Social impacts of fisheries, aquaculture, recreation, tourism and marine protected areas (MPAs) in marine plan areas in England, MMO Project: 1035 (MMO, 2013).

Code	Typology (those in bold are main typologies identified for South)
B2	**Coastal challenges: New towns and ports**
B3	Coastal challenges: Striving communities
C1	**Cosmopolitan coast: Reinventing resorts**
C2	**Cosmopolitan coast: Coastal professionals**
D1	**Coastal fringe: Prosperous suburbia**
D2	**Coastal fringe: Working hard**

All typologies are a probable good fit for marine dredging and disposal (other than estuary areas which are locally valued) and telecommunication cabling.

- C1, C2, A1, A3: fishing is a good fit where in keeping with historic character such as in Selsey (and when facilities are small-scale and carefully sited in C1 and C2). For C1 and C2, tourism and recreation are already doing well due to modernising and re-branding their tourism offer as is the situation in Brighton. Further tourism development, particularly of types which encourage a niche approach to particular market segments is likely to be popular. Tourism will be valuable in these areas due to the associated leisure and lifestyle benefits that it creates. Other activities are a partial fit (a mussel farm is proposed off Sidmouth), except for marine aggregates which is a poor fit

- D1, D2: fishing is again a good fit where in keeping with historic character such as in Poole and Portsmouth. Even processing facilities, as long as they are small-scale and carefully sited, will be sought for the jobs they bring. Together with B2 these are the only typologies with a probable good fit for aquaculture due to a positive view of employment opportunities. Exmouth, for example, has developed mussel farming

- B2: Probable good fit with all activities except surface and waste water treatment. This is the only typology where marine aggregates are a potential good fit with population profiles, geographical character, and existing suitable sites and infrastructure such as Havant. Similarly, this is the only typology with a probable good fit for energy development. These areas have the labour markets and infrastructure to make energy development attractive to investors. The degree of local economic impact will depend on the extent to which the location is able to capture wider elements of the supply chain processes within the local economy

- the extent to which tourism and recreation will be a good fit for D1, D2 and B2 will depend to a great degree on local conditions. City break markets have performed relatively well over the past decade, and a number of industrial cities have seen strong hotel growth and a (at least partially) successful development of their tourism offer (such as Southampton). The jobs brought by almost any development would prove particularly popular in these areas.

Potential core issues

In weaker economies, such as Hastings, quality of local jobs, skills deficit and poor transport and connectivity to other places are the main barriers to economic growth.

These are compounded by social issues such as housing shortages and high house prices.[193]

Overdevelopment of coastal areas for housing, recreation and tourism infrastructure, together with accompanying increased numbers of recreational users and tourists, may generate negative social impacts on locals as well as visitors. This is especially the case if the economic benefits to individual households are not clear.[194]

Interactions with other sectors

The South marine plan areas have a particular "maritime" feel due to their history of fishing, naval activity and coastal tourism. Tourism and recreation are important with the inshore area having the greatest number of blue flag beaches of all English marine plan areas. The Bathing Water Directive recognises the importance of clean water for human health and the overall state of coastal waters.[195] Some areas have a very high holiday spend. The South marine plan areas have the highest percentage (16%) of boating activity in England due in part to the high number of Royal Yachting Association (RYA) member marinas (67). The Solent is considered to have the largest number of yacht moorings in the world. Dorset was particularly important for tourism in 2012 as it was home to the Olympic sailing competitions in Weymouth; the legacy of this activity continues to attract visitors. Angling charter vessels operate out of Poole and Weymouth providing an attractive offer to anglers as well as providing local employment.

There is significant fishing activity in the South marine plan areas, particularly for over-15m vessels. Brixham was the English port with the highest value of landings in 2011, worth £26 million[196] due largely to the greater proportion of demersal species and shellfish landed there, which typically sell at higher prices per tonne than pelagic species. Fishing activity within smaller ports like Selsey and Shoreham is attractive for tourism and provide a distinct social identity. However, this can also lead to an increase in property prices creating difficulties for locals.[197]

There is high density shipping activity, particularly in the South Offshore marine plan area. Portsmouth and Southampton are significant ports, but Portland is under-used. Portsmouth is one of the three main UK naval bases and is home to almost two-thirds of the Royal Navy's surface ships. It will be home to two new aircraft carriers, HMS Queen Elizabeth and HMS Prince Of Wales when brought into service. It is a major element in the local character and economy, but is vulnerable to government spending cuts.

The area is also important for renewable energy. Two Round 3 offshore wind farms (Navitus Bay and Rampion) currently divide local opinion due to conflict between

[193] The Hastings Planning Strategy (Hastings Borough Council, 2014)
[194] Does living by the coast improve health and wellbeing?, Health & Place 18(5): 1198-1201 (Wheeler, B. W., M. White, et al. (2012).)
[195] European bathing water quality in 2013, EEA Report 1/2014 (European Environment Agency, 2014)
[196] MMO UK Sea Fisheries Statistics 2011
[197] Constructing 'The Stade': Fishers' and non-fishers' identity and place attachment in Hastings, south-east England. Marine Policy 37(0). (Urquhart, J. and T. Acott, 2013).

employment creation and adverse effects on visual impact and access to marine space. Local people may be more supportive of development of the powerful tidal streams around the Isle of Wight and off Portland, particularly if access to space is not unduly compromised. The Solent Ocean Energy Centre, on the Isle of Wight, has submitted a Marine Licensing application that if approved and developed could provide offshore testing facilities for tidal stream devices as well as related potential employment opportunities.

Aquaculture is a growing marine activity in the Exe, Torbay and off Sidmouth. It has potential to increase employment and social development within peripheral towns or port areas where there are high levels of unemployment. Aquaculture is also being promoted as an activity which can contribute to the conservation of particular habitats and therefore maintain to some extent biodiversity and is seen as a "legitimate and responsible partner with other natural resource users.[198] Increased regulation and inspection could add to the costs of operation. However, this could positively contribute to continued professional development of staff in relevant environmental management and legislative knowledge (Lantra 2006). Restrictions due to site availability, environmental carrying capacity and availability of investment and labour (due to emigration) could hamper growth.

Much of the area is protected for its natural and cultural heritage value. There are nine UNESCO world heritage sites in the South marine plan areas including the only natural coastal site, the East Devon and Dorset Jurassic Coast. Roughly half of the coast has designated landscapes such as national parks and Areas of Oustanding Natural Beauty (see Figure 12). They have the only candidate special areas of conservation (cSACs) in England and significant numbers of existing designations, including the highest number of special areas of conservation (SACs) (although not the largest area protected) of all marine plan areas. There are a number of recently designated and recommended Marine Conservation Zones.

The Isle of Wight has almost its entire coastline under designation. As so much of these protected areas are inshore and coastal, the nearby large populations have closer engagement and stake in them, in comparison with many of those elsewhere in England. The site, their resources and recreational activities deliver significant social benefits (see section 2.15). There is a convergence with management of biodiversity as the habitats and species of the foreshore, and amenity beaches are all caught between rising sea level and increased storms at sea and coastal defences on land (so called "coastal squeeze"). On the South coast 695km is "Hold the line", 66km "Managed retreat" and 435km "No active intervention". This indicates that 42% of the South coast has potentially no, or limited, protection from climate change.[199]

Despite that offshore aggregate removal is exacerbating coastal erosion despite evidence to the contrary. Furthermore, marine aggregate extraction is highly

[198] Social and economic policy issues relevant to marine aquaculture, J. Appl. Ichthyol. 17, 194-206 (Burbridge, P, Hendrick, V, Roth, E. and H. Rosenthal (2001)
[199] MMO calculation based on Shoreline Management Plan zonation of the South marine plan inshore area coast.

regulated, and a wide range of environmental issues have to be thoroughly assessed before the activity is licensed (see section 2.9).

The areas are important for education and research. The National Oceanographic Centre at Southampton University and the Centre for Environment, Fisheries and Aquaculture Science laboratory at Weymouth generate economic and social benefits and provide a general focus for the wider south coast in conjunction with other providers such as Plymouth Marine Laboratory.

Newly published research (in press) identified a broad number of potential social impacts of marine sectors and their interactions.[200] Notable issues include:

- **employment** is recognised as the most important means by which to fulfil material wellbeing, as well as being central to individual identity and social status and an important contributor to physical and mental health. Some marine sectors such as ports, help to generate nationally significant quantities of jobs and can therefore be thought of as significant generators of social benefit. For other sectors, most notably commercial fishing, which are less significant employers nationally, but important for the South plan areas, social benefits linked to way of life and personal and community identity can be particularly significant

- where a certain activity has taken place in an area for a long time such as fishing in Hastings, it can become a strong feature of that community's identity and **sense of place**. The social networks that are generated between long-term workers and residents can help to build community cohesion. Whilst economic restructuring often offers economic, and in turn employment and income, benefits, it can also erode the traditional identity or sense of place

- **degradation and enhancement of the natural environment** can affect a number of sectors, most notably the commercial fishing, recreation and tourism sectors. The development of offshore infrastructure, especially offshore wind farms is often perceived to have a negative impact on the experience of recreation participants and tourists, although this does not necessarily hold true once the infrastructure is in place. Marine Protected Areas are currently seen as a key tool for enhancing the quality of the UK marine environment. There is some evidence of potential benefits to commercial fishing, recreation and tourism, although the UK evidence base is very limited.

The analysis of interactions between Marine Policy Statement sectors identified four inter-sector interactions that hold the greatest potential for significant social impacts:

- offshore renewables and commercial fishing
- offshore renewables and shipping
- marine protected areas and commercial fishing
- marine protected areas and ports.

[200] Social Impacts and Interactions Between Marine Sectors, MMO Project 1060 (MMO2014). In press

Of these four, the interactions between Marine Protected Areas and inshore commercial fishing are considered to have the greatest potential for social impact, although it remains unclear whether such impacts might be significant at the scale of a marine plan.

Issues for sustainability

- people gain many social benefits from ecosystem services (such as clean air and water and use of the environment for tourism and recreation), but can also produce significant positive and negative impacts
- achievement and maintenance of good environmental status, through integrated management, is a major challenge for marine planning
- consideration of the cumulative impact on social character of communities in transition from historic dependence on fishing and/or tourism
- while important to manage the fisheries for their overall sustainability, their socio-economic importance for local fishing communities must be recognised
- the Solent has major issues for water quality and its sediment budget
- climate change is producing significant issues for social benefits.,.low-lying areas are at increasing risk of flooding with adverse social and economic effects (especially the Solent due to the concentration of industry and infrastructure, and its economic development)
- conversely, the accretion, or sediment build up, which may increase vegetated coastal habitat and protect built infrastructure, can also have negative effects such as on the beach-launched fishing fleet in Hastings.

2.3.1 Historic environment

The historic environment includes aspects resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged. Those elements of the historic environment – buildings, monuments, sites or landscapes – that have been positively identified as holding a degree of significance meriting consideration are called 'heritage assets.[201]

Current situation

Some heritage assets have a level of interest that justifies statutory designation, the purpose of which is to ensure that they are protected and conserved for the benefit of current and future generations.

Designated heritage assets may include.[202]

- scheduled monuments designated under the Ancient Monuments and Archaeological Areas Act 1979
- protected wreck sites designated under the Protection of Wrecks Act 1973
- sites designated under the Protection of Military Remains Act 1986.

[201] HM Government (2011) MPS para 2.6.6.1. www.gov.uk/government/publications/uk-marine-policy-statement
[202] HM Government (2011) MPS para 2.6.6.4. www.gov.uk/government/publications/uk-marine-policy-statement

Many heritage assets with archaeological interest in these areas are not currently designated as scheduled monuments or protected wreck sites but are arguably of equal significance. Sites of historic interest are distributed throughout the marine area and around the coast and hinterland. Equal value can be attributed to these features in every marine plan area and no one area ranks as more significant than another.[203]

English Heritage published the National Heritage Protection Plan in May 2011. This sets out the priorities which English Heritage will dedicate resources to in the years 2011 to 2015 for all aspects of national heritage, spanning both the pre-historic and historic periods.

In October 2011 English Heritage produced guidance on The Setting of Heritage Assets. This set out advice on managing change within the settings of heritage assets including archaeological remains and historic buildings, sites, areas, and landscapes.

English Heritage has responsibility under the Protection of Wrecks Act 1973 (section 1: Historic Shipwrecks), within the English area of the UK Territorial Sea, to consider applications and recommendations for designation, re-designation and de-designation of shipwreck sites. On the basis of their advice the Secretary of State (Department for Culture Media and Sport) is responsible for designating restricted areas around sites which are, or may be, shipwrecks (and associated contents) of historic, archaeological or artistic importance. The Secretary of State is also responsible for the issuing of licences to authorise certain activities in restricted areas that otherwise constitute a criminal offence. Figure 13 details information of designated and protected wreck sites.

Historic environment records (HERs) provide comprehensive information and evidence about the historic environment in a particular area. They are an essential source of information for managing, caring for and understanding the historic environment. Maintained by local planning authorities, they are used for planning and development management as well as for public benefit and educational use. The National Planning Policy Framework sets out the requirement for local planning authorities to maintain or have access to an historic environment record to ensure they are used as a matter of course in planning and development matters.

The South marine plan areas contain a unique and diverse historic environment both along the coastline and beneath our seas. This environment has been impacted extensively by past human activities ranging from early human occupation stretching back some 80,000 years to more modern military, commercial and cargo wreck sites of the twentieth century. Strong historic associations to iconic landscapes such as the white cliffs of Dover form part of our national identity when leaving and returning to England by sea. To the west of the plan areas the Jurassic Coast covers 95 miles of coastline from East Devon to Dorset, with rocks recording 185 million years of the

[203] MMO (2013). Strategic Scoping Report for marine planning in England, p60. Available online at: www.marinemanagement.org.uk/marineplanning/key/documents/ssr-august2013.pdf

Earth's history. A more local perspective of historic features within the South inshore and offshore marine plan areas can be found in local authority historic environmental records.

Potential Core issues

There are a number of potential issues facing the protection of the historic environment and the heritage assets that lie within. The potential for increased footfall due to tourism and recreation poses a direct risk to the preservation of coastal buildings and monuments. Another effect of increased footfall is the risk to heritage assets through coastal erosion along paths and bridal ways.

Interactions with other sectors

Due to the unknown nature of many heritage assets and the restrictions posed by the sea; interactions with other sectors are limited to those that happen along the coast or on the sea bed and are spread across the South plan areas. These include:

- infrastructure development including renewable energy project development, coastal defences, port development, cable and pipeline installations poses a threat to any unknown assets buried beneath the sea bed and development at sea raises concerns to the setting of historic buildings, gardens and landscapes.
- of other activities that disturb the sea bed such as mobile gear and beam trawling fisheries or dredging activities raises concerns to heritage assets on the surface and beneath the sea bed.
- ports and shipping – associated anchorage areas, ship-to-ship transfer locations and dredging and disposal activities.

Issues for sustainability

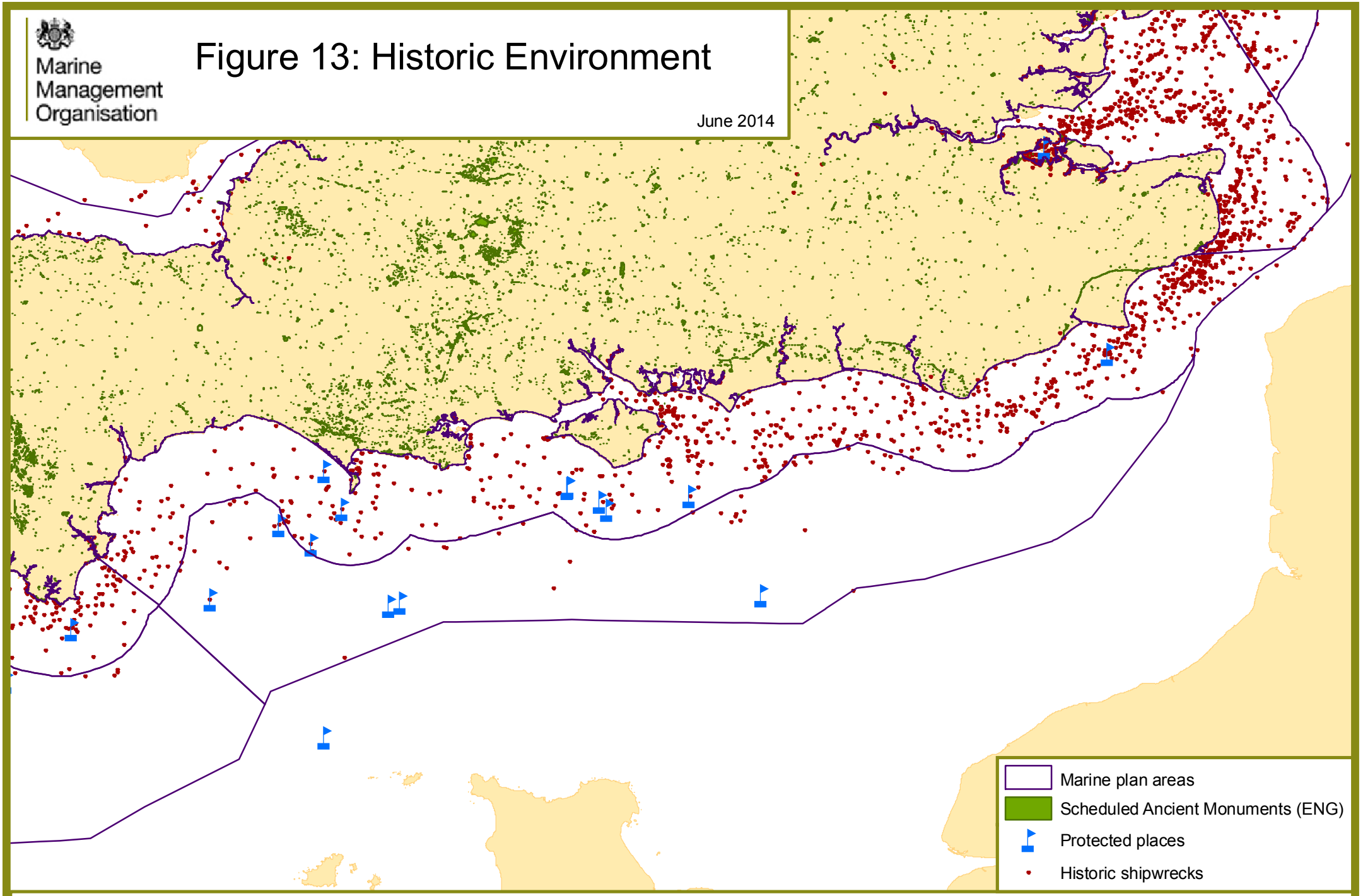
Due to the unknown nature of many heritage assets and the restrictions posed by the sea; issues for sustainability are difficult to define as they occur along the coast or on the sea bed and are spread across the South plan areas.

- climate change and coastal erosion processes
- submarine cable and pipeline installation (see section 2.11).

Marine Management Organisation

Figure 13: Historic Environment

June 2014



2.3.2 Nationally designated landscapes

There are a number of statutory designations and non-statutory categories protecting England's terrestrial, natural, and historic environment under both national and international law.[204]

Current Situation

Nationally important landscapes are protected through legislation under the National Parks and Access to the Countryside Act 1949. This act aims to conserve and enhance certain areas for their natural beauty, with areas designated either as National Parks or Areas of Outstanding Natural Beauty (AONBs).[205]

The legislative system in England and Wales is supported by international guidelines and sharing of experience of designation management through fora like International Union for Conservation of Nature (IUCN) and Europarc Federation. The England and Wales designation system for National Parks and Areas of Outstanding Natural Beauty is recognised as falling within the parameters of International Union for Conservation of Nature's (IUCN) Category V Protected Landscape definitions.

The statutory duties/powers for designating new National Parks and Areas of Outstanding Natural Beauty in England and reviewing existing boundaries reside with Natural England. National Park and Areas of Outstanding Natural Beauty designation often coincides with other designations to conserve and enhance natural and cultural environment attributes.[206]

The National Planning Policy Framework (NPPF) states that "great weight should be given to conserving landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to landscape and scenic beauty. The conservation of wildlife and cultural heritage are important considerations in all these areas, and should be given great weight in National Parks and the Broads".[207]

Areas of Outstanding Natural Beauty (AONB)[208]

Areas of Outstanding Natural Beauty are designated solely for their landscape qualities, for the purpose of conserving and enhancing their natural beauty (which includes landform and geology, plants and animals, landscape features and the rich history of human settlement over the centuries).

There are seven Areas of Outstanding Natural Beauty that overlap the South inshore marine plan area. A further two do not overlap the South Inshore marine plan area but there is potential for these areas to be affected by planning decisions. Details of these can be found in table 6 below.

[204] More information can be found at: https://www.gov.uk/protected-or-designated-areas
[205] More information regarding National Parks and AONBs can be found at Natural England's website: www.naturalengland.org.uk/ourwork/landscape/protection/default.aspx
[206] More information can be found at Natural England's website: www.naturalengland.org.uk/ourwork/landscape/protection/default.aspx
[207] DCLG(2012) National Planning Policy Framework, Para 115
[208] More information can be found at Natural England's website: www.naturalengland.org.uk/ourwork/landscape/protection/default.aspx

The Countryside and Rights of Way (CROW) Act 2000 added new measures to help protect the future of Areas of Outstanding Natural Beauty through the creation of conservation boards, clarification of the role of local authorities and the preparation of management plans to set out how local authorities will care for Areas of Outstanding Natural Beauty.

National Parks[209]

National Parks are extensive tracts of countryside that are protected by law for future generations because of their natural beauty and for the opportunities they offer for open air recreation.

The parks are living and working landscapes, with an increasing focus on supporting the communities and economic activity that underpin the qualities for which each have been designated.

There are two national parks that overlap the South inshore marine plan area. Dartmoor National Park does not overlap the South Inshore marine plan area but there is potential for these areas to be affected by planning decisions. Details of these can be found in table 6 below.

Heritage Coasts (non designated)[210]

Heritage Coasts are identified for the national purposes of conservation and enhancement of the natural beauty of the coastline, its terrestrial and marine flora and fauna, and heritage features.

Heritage Coasts are 'defined' rather than designated, as there is no statutory designation process like that associated with national parks and areas of outstanding natural beauty.

The purposes of Heritage Coasts are to:

- conserve, protect and enhance the natural beauty of the coasts, their marine flora and fauna, and their heritage features
- facilitate and enhance their enjoyment, understanding and appreciation by the public
- maintain and improve the health of inshore waters affecting Heritage Coasts and their beaches through appropriate environmental management measures
- take account of the needs of agriculture, forestry and fishing, and of the economic and social needs of the small communities on these coasts.

The South inshore marine plan areas comprise many of these protected landscapes. Those with boundaries that extend to mean low water spring tide physically overlap with the South Inshore plan area and could be impacted by marine development.

[209] More information can be found at Natural England's website: www.naturalengland.org.uk/ourwork/landscape/protection/default.aspx
[210] More information can be found at Natural England's website: www.naturalengland.org.uk/ourwork/landscape/protection/default.aspx

Others located inland that do not overlap with the South Inshore plan area should also be considered as they may equally be impacted by marine development due to their setting or the setting of a heritage asset located within them.

Table 6 below identifies the designated and non designated landscapes located in the South Inshore marine plan area.

Table 6: Designated and non designated landscapes

Areas of Outstanding Natural Beauty (AONB)	National Parks	Heritage Coasts
South Devon	New Forest	South Devon
East Devon	South Downs	East Devon
Dorset	* Dartmoor	West Dorset
Isle of Wight		Purbeck
Chichester Harbour		Tennyson
High Weald		Hamstead
Kent Downs		Sussex
* Blackdown Hills		Dover-Folkestone
* Cranborne Chase and West Wiltshire Downs		

* does not overlap with the South Inshore marine plan area but there is potential for these areas to be effected by planning decisions.

Jurassic coast - world heritage site[211]

Located within the South Inshore marine plan area the Dorset and East Devon coast is designated a world heritage site due to its combination of geological, paleontological and geomorphological features. Comprising eight sections along 155km of largely undeveloped coast the site displays approximately 185 million years of the Earth's history, including a number of internationally important fossil localities. This coast is considered by geologists and geomorphologists to be one of the most significant teaching and research sites in the world.

The world heritage site has strong legal protection, a clear management framework and the strong involvement of all stakeholders with responsibilities for the property and its setting. A single management plan has been prepared and is coordinated by the Dorset and Devon County Councils. There is no defined buffer zone as the wider setting of the site is well protected through the existing designations and national and local planning policies.

Potential Core issues

The effects of infrastructure development both along the coastline and at sea pose a risk to the natural tranquillity and visual setting of nationally designated landscapes. It should therefore be acknowledged that the emergence of round 3 windfarm development in the South marine plan areas heightens the risk to those landscapes. Other activities that disturb the tranquillity or result in the damage of a protected

[211] More information can be found at UNESCO's website: http://whc.unesco.org/en/list/1029/

landscape should be considered. This can be said of increased footfall from tourism and recreation activities resulting in the increased risk to damage and coastal erosion.

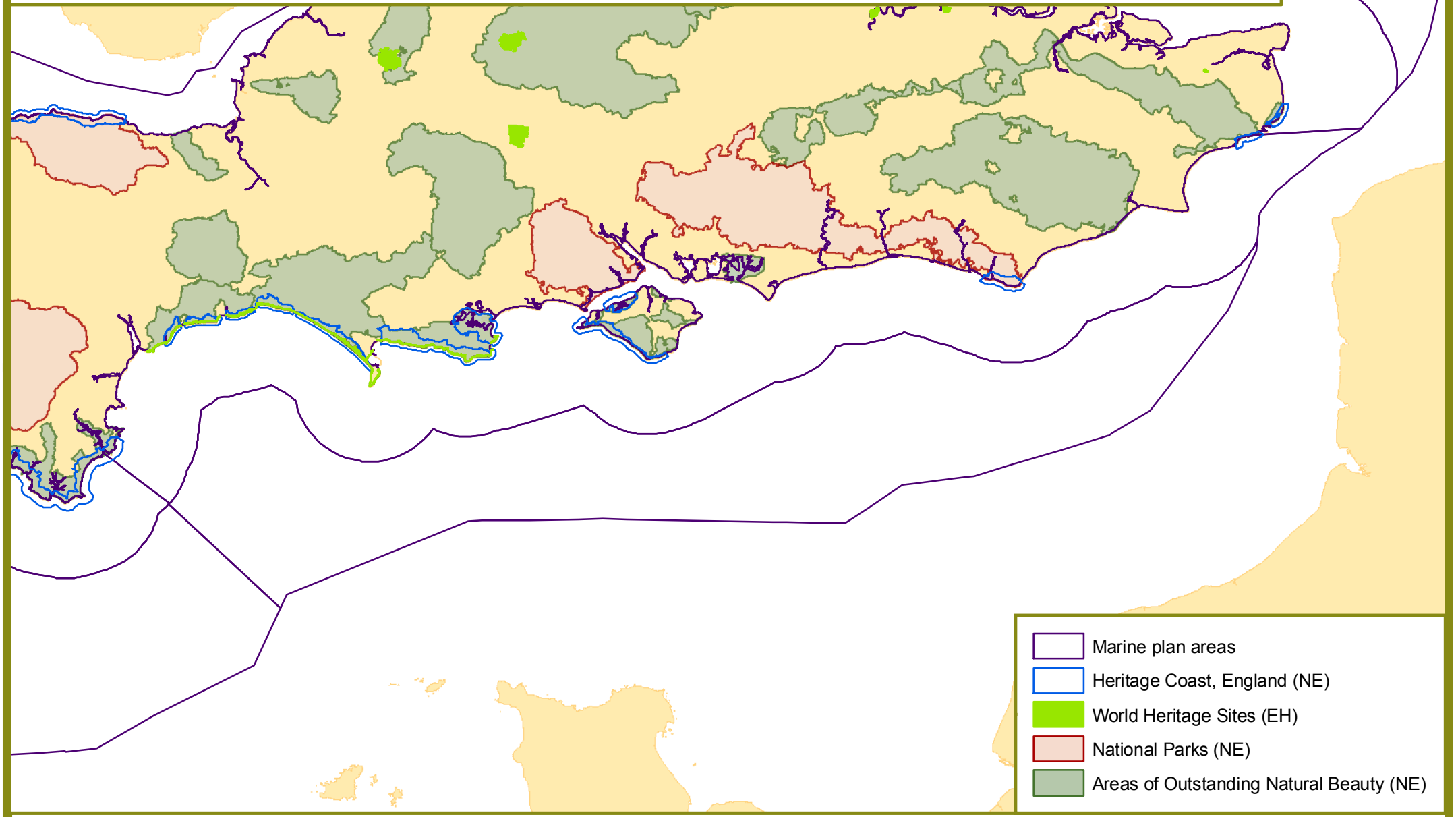
Interactions with other sectors

Nationally protected landscapes have strong links with both seascape and the historic environment. Many protected landscapes are themselves considered heritage assets which in turn afford protection in relation to the setting of a heritage asset. The effects of infrastructure development through wind and tidal energy projects, port development and, cable landings and pipelines pose a threat and should be considered. Coastal erosion and tourism and recreation activities also threaten to damage protected landscapes. Consideration should be made for coastal access and its supporting infrastructure

Marine Management Organisation

Figure 14: Nationally designated landscapes

June 2014



2.3.3 Seascape

The Marine Policy Statement describes seascape (for the purposes of planning) as meaning landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other.[212]

Current Situation

The National Planning Policy Framework states that "local planning authorities should maintain the character of the undeveloped coast, protecting and enhancing its distinctive landscapes, particularly in areas defined as Heritage Coast, and improve public access to and enjoyment of the coast".[213]

Following the publication of "An Approach to Seascape Characterisation" produced by Natural England and the first strategic scale character assessment for the East Inshore and East Offshore marine plan areas, the Marine Management Organisation recently undertook work to produce a seascape assessment for the South Inshore and South Offshore marine plan areas.[214]

The study comprises a strategic scale character assessment, using Natural England's approach and a visual resource study which is the first of its type designed specifically for the marine planning process. This approach to visual resource mapping will be used alongside Natural England's "An Approach to Seascape Characterisation" in the development of subsequent studies undertaken by the MMO for other marine plan areas.

The National Planning Policy Framework states where appropriate, landscape character assessments should be prepared and integrated with assessment of historic landscape character, and for areas where there are major expansion options assessments of landscape sensitivity.

Full national coverage of English Heritage's programme of Historic Seascape Characterisation (HSC) was finalised early in 2014. The characterisation extends to coastal land, presenting its maritime perspective, overlapping and complementing the 'terrestrial perspective' provided by English Heritage's 'Historic Landscape Characterisation' (HLC) programme.[215]

Natural England is currently working to produce a suite of refreshed National Character Area (NCA) profiles. These profiles divide the English mainland into 159 distinct character areas, each defined by a unique combination of landscape, biodiversity, geodiversity and cultural and economic activity.

[212] HM Government (2011) MPS para 2.6.6.1. Available online at: www.gov.uk/government/publications/uk-marine-policy-statement
[213] DCLG(2012) National Planning Policy Framework, Para 114
[214] MMO (2013). Seascape Assessment for the South Marine Plan Areas (Marine Plan Areas 6 and 7). http://www.marinemanagement.org.uk/evidence/1037.htm
[215] More information available at: www.english-heritage.org.uk/professional/research/landscapes-and-areas/characterisation/historic-seascape-character/

The Marine Management Organisation worked closely with Natural England and English Heritage to align coastal characterisations with the South seascape assessment. Subsequent seascape studies around the English coast will benefit from this approach.

Work to undertake more local scale seascape studies is being carried out by some local authorities (Kent). Once complete these studies will help to underpin the seascape assessment being undertaken across the South marine plan areas.

Character of the South marine plan areas

The South Inshore and Offshore marine plan areas contain rich and diverse coastlines and marine environments. The coast includes a range of communities, both urban and rural, which vary in wealth and current opportunities for employment. The South marine plan areas benefit from unique coastlines including iconic landscapes such as the white cliffs of Dover, grey cliffs of Portland stone and the fossil rich cliffs of the Dorset and East Devon World Heritage Site (Jurassic Coast). Other prominent landmarks such as The Needles (Isle of Wight) and lighthouses at Anvil Point and Portland Bill have been used for generations as navigational marks for commercial and recreational shipping and contribute to a sense of place.

A number of traditional fishing activities take place in the South inshore marine plan area including commercial fishing for species such as mackerel, herring, bass, lobsters and crabs. Basking sharks, and marine mammals may also be present. Coastal tourism and recreation is also a feature of the inshore areas including recreational fishing and water sports. The Solent's sheltered waters also attract some of the largest numbers of marine recreational users in North Eastern Europe, supported by a large number of yacht clubs and marinas and world-class sailing events.

The South offshore marine plan area is dominated by commercial shipping activity and is one of the busiest shipping channels in the world. It supplies goods though the English Channel to wider Europe and across the Atlantic. The offshore area also contains a large part of the English Channel Outburst Flood Feature which provides evidence of the flood which created the channel separating England from mainland Europe.

The South marine plan areas are strongly associated with the defence of Britain including its role in the Anglo-Dutch Wars and both World Wars. Wrecks are littered across the seabed providing evidence of the Channel's turbulent past as well as its long and continuing role as an international trade route. Today the coastal area and marine environment has strong military defence infrastructure including naval ports and training and exercise areas on land and at sea.

More information can be found in the Seascape Assessment for the South Marine Plan Areas.

Potential Core issues

The effects of infrastructure development both along the coastline and at sea pose a risk to the visual resource of a seascape or landscape. It should therefore be acknowledged that the emergence of potential Round 3 windfarm development in the

South marine plan areas heightens the risk to those areas. Increased tourism and recreation and the development of facilities to support it, may also change the character of an area. In turn, as tourism and recreation are partly dependent on seascape as a resource, changes to character (either by tourism and recreation or other marine activities) may have an adverse effect on tourism and recreation.

Interactions with other sectors

The visual resource element of seascape has strong links with nationally protected landscapes and the protection they afford. The effects of infrastructure development through wind and tidal energy projects, port development, cable landings and pipelines pose a potential threat and should be considered. In terms of character, the South seascape assessment includes reference to all sectors within and can be used to develop a ‘sense of place’ for the South marine plans.

Figure 15: Draft marine character areas

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Descriptions of character types can be found here:
http://www.marinemanagement.org.uk/marineplanning/areas/documents/south-seascape-characteristics.pdf

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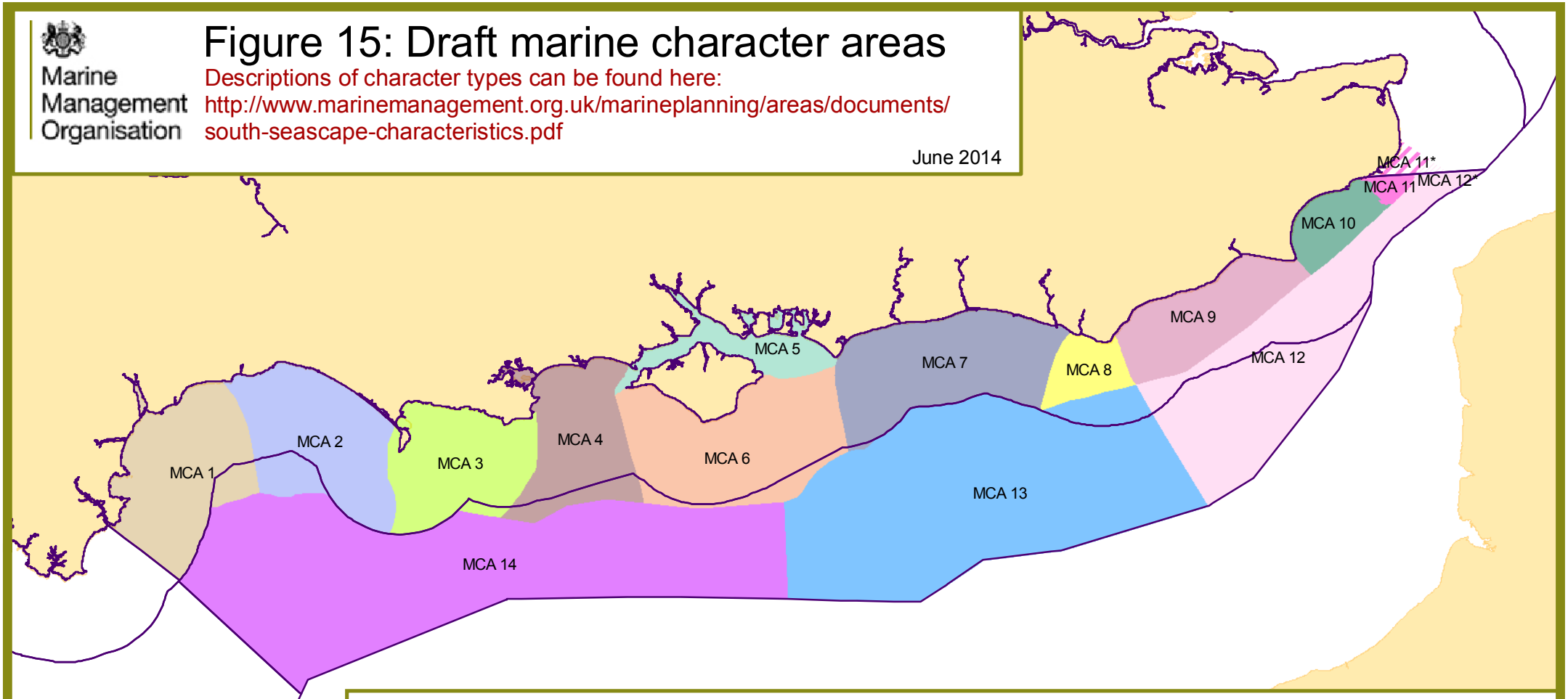

Marine plan areas

Marine character areas

- MCA 1 : Lyme Bay (West)
- MCA 2 : Lyme Bay (East)
- MCA 3 :Portland, Weymouth Bay and Lulworth Banks
- MCA 4 :Poole and Christchurch Bays
- MCA 5 :The Solent
- MCA 6 :South Wight
- MCA 7 :Selsey Bill to Seaford Head
- MCA 8 :South Downs Maritime
- MCA 9 :Eastbourne, Pevensey & Rye Bays
- MCA 10 :Dungeness, Hythe and East Wear Bays
- MCA 11 :Dover Strait Inshore Waters
- MCA 11* :Dover Strait Inshore Waters (*outside study area)
- MCA 12 :English Channel/Dover Strait
- MCA 12* :English Channel (East) / Dover Strait (*outside study area)
- MCA 13 :English Channel (Central)
- MCA 14 :English Channel (West) & the Wight-Barfleur Reef

Figure 16: Draft visual resource mapping

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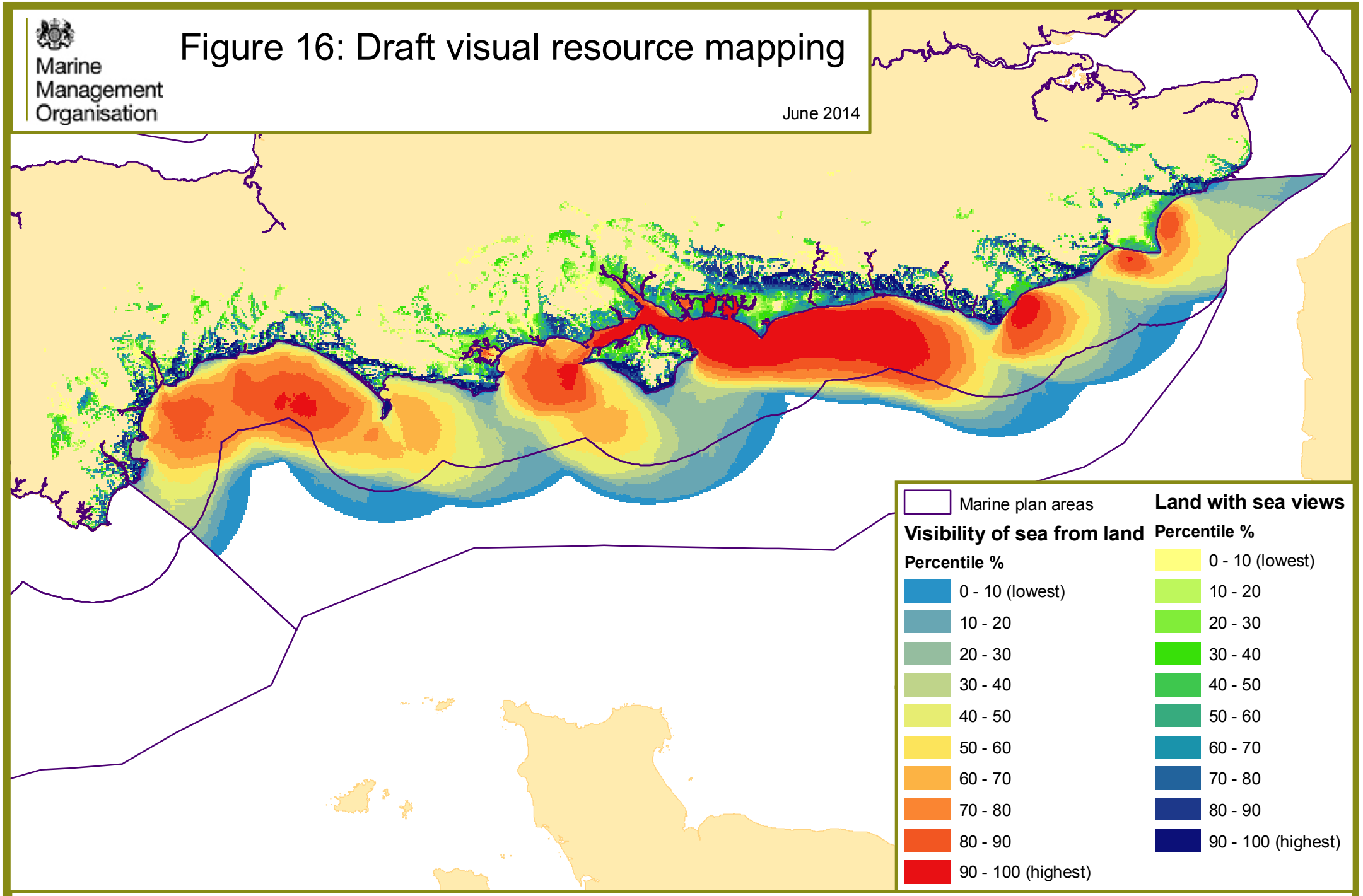


2.4 Economic considerations

The economic activity undertaken in, and reliant upon, the South marine plan areas is varied, covering a number of sectors and supporting activities. These activities provide productivity and employment benefits to those communities on the coast and further inland, as well as providing resources such as aggregates, for use in further economic activities on land. Each sector in this report has its own section looking at the detailed economic considerations, so this section will look at the overall economic picture, including the relative contributions of each sector, the economic development priorities of local authorities and local enterprise partnerships and future developments that may influence the economic activity of the South marine plan areas. This section will use gross value added [216] and employment benefits of activities as indicators of economic activity. The Marine Management Organisation commissioned a report to provide an economic baseline for the economy of the South marine plan areas, looking at the current situation and potential future growth of the range of sectors and this section will use this report to describe the current and future situation.

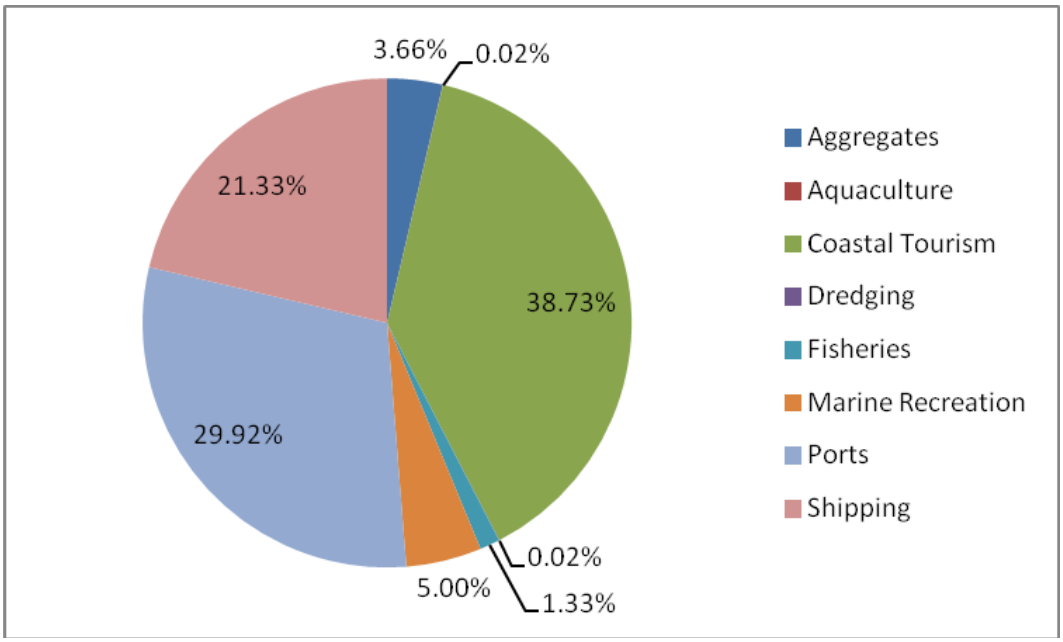
Current situation

The total gross value added for the marine economy in the South plan areas across all sectors in 2013/14 is forecast to be £3,895 million. It is important to highlight that this was based upon what data was available; information is not accessible for every sector. The key sectors contributing to this total includes coastal tourism, with 39% of the total (£1,508 million), ports, with 30% of the total (£1,157 million), and shipping, with 21% (£825 million). This demonstrated in figure 17.

A report[217] produced for the Partnership for Urban South Hampshire (PUSH) identified that the naval base in Portsmouth injects £334 million into the local economy. While this figure is not directly comparable to gross value added for other sectors, it does give some indication of the size of the defence sector and its importance. While sectors such as dredging and telecommunications are activities that generate economic benefit in their own right, their main benefit is to enable other sectors that generate more significant economic benefit, such as shipping, in the case of maintenance dredging. Another report,[218] commissioned by Partnership for Urban South Hampshire and the South East England Development Agency suggested that marine activities in the Solent area in 2007 generated £1.9billion of gross value added. This figure excludes defence, tourism and oil and gas and whilst not comparable directly to the figures presented above, gives an indication of the size of the economic contribution of marine activity to just one part of the land area bordering the South marine plan areas.

[216] GVA is a measure of the economic contribution of an individual producer or sector of the economy.
[217] University of Portsmouth (2012). Socio-Economic Impact Assessment of Portsmouth Naval Base.
[218] Adams Hendry Consulting (2007). Solent Waterfront Strategy.

Figure 17: Proportion of Gross Value Added for each sector within the plan areas in 2013/14[219]



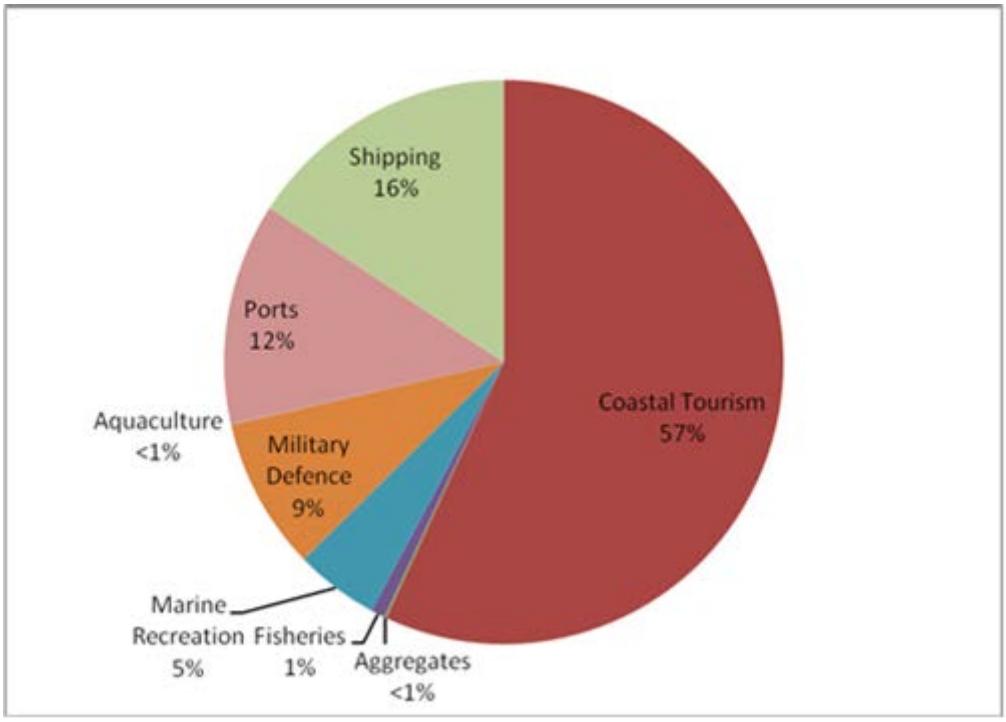
Employment

The South marine plan areas are forecast to employ, directly and indirectly (through related activities) over 330,000 people in total in 2013/14. Coastal tourism is the predominant employer for both direct and indirect employment, though the data (see figure 18 below) does not reveal the quality or level of remuneration of the employment; tourism employment can be seasonal, and have lower wage levels than other sectors.

The socio-economic report produced for the Marine Management Organisation highlights the roles that different activities can have in providing local employment benefits for different skills levels. For example, it highlights the positive role that ports can have in providing large amounts of relatively low-skilled labour, in turn having a positive impact on deprivation, as deprived areas are those with concentrations of low-skilled people. The other main employer, coastal tourism, is also a large employer of lower skilled people, though this work can be more seasonal. Taken together, these suggest that marine activities of the sort that dominate the economic picture can have a positive effect on deprivation.

[219] Note: this does not include GVA data for Coastal Protection, Military Defence, and Telecoms and Communications due to lack of quantitative information despite there being significant economic activity within the sectors. For Renewables, CCS and Oil and Gas comparatively little economic activity is believed to be currently taking place and therefore these sectors are also not quantified.

Figure 18: Employment distribution by sector in South marine plan areas



Geographical distribution

There is a geographical split in activity, with much of the intensive marine industrial activity centred on the Solent, as well as the largest concentration of shipping and ports activity. Further West, the unique natural environment is very important for the tourism industry, though fishing, ports and shipping activity are also important. These activities are centred on towns and villages along the coast, such as Brixham, Portland and Poole, with shipping comprising primarily passenger transit and short-freight routes across to the continent. East of the Solent are a number of urban centres, such as Brighton, which have significant tourist industries centred on a 'seaside' offer, that have diversified to include other types of tourism such as business tourism.

Much of the remaining economic activity is located according to resource availability, for example aggregate dredging and fishing, which take place where the resource can be found. Fishing and aggregates are also examples of economic activity which might not have a large direct economic contribution, but which do provide materials that are crucial to larger industries on land, for fishing this is food processing and for aggregates this is construction. The economic contribution of the supply chains fed by these industries is not included here, though it is significant.

Policy

National policy has a strong focus on economic growth, as the means, along with deficit reduction, to move the economy further out of recession and tackle public debt. The range of policy to enable this includes:

- the Plan for Growth, which looks to rebalance employment from the public to the private sector, as well increasing productivity

- the Spending Review 2013 and associated infrastructure plan, 'Investing in Britain's Future', which set out spending priorities, including a single growth fund for investment in projects to grow the economy
- delegation of European funding for economic development to local enterprise partnerships, subject to suitable strategic economic plans
- sector strategies for renewables, oil and gas and nuclear, which look to further maximise the use of resources provided by marine and coastal areas.

At sub-national and local levels, policy is very supportive of economic development, with the 'presumption in favour of sustainable development' in the National Planning Policy Framework being clearly reflected in most of the local plans along the South coast. Many local plans highlight the importance of the marine environment and accord importance upon its conservation or preservation, particularly linked to coastal tourism, which often relies on the environment. Port development is often prioritised too, reflecting the economic importance of these two sectors to the economy of the South marine plan areas.

Future trends

Five local enterprise partnerships cover the area next to the South marine plan areas, these are business-led partnerships that will drive future economic development at the sub-national and local level, their activities driven by local economic circumstances and priorities.

Local enterprise partnerships are being given increasing control over funding and investment and are currently developing strategic economic plans, to inform investment for the future, primarily over a 3-6 year timeframe. Coastal tourism is a priority for three of the local enterprise partnerships, with tourism in general being a priority for the remaining two. Ports, marine engineering (for the marine energy and shipping sectors) and defence (primarily naval across these areas) are also mentioned. As priorities for economic development, it can be assumed that these sectors will be subject to future efforts to stimulate and increase growth over and above that anticipated or planned for currently. The focus on these sectors suggests that there may be increased positive impacts on deprivation, due to the large numbers of lower-skilled people employed in these sectors. It also suggests that there will be increased levels of shipping and larger areas of coast given over to ports and marine fabrication activities.

Alongside this, a number of related initiatives are helping to drive business growth in strategic locations, for example Enterprise Zones such as that in the Solent are providing a range of tax, infrastructure and regulatory incentives to businesses looking to invest in these areas. Particular types of businesses are often prioritised in Enterprise Zones; in the Solent Enterprise Zone one of the priority sectors is the maritime sector, comprising primarily of high-value engineering and design businesses undertaking work for marine sectors as set out in this report.

There are threats to economically important sectors though; the Solent Local Enterprise Partnership has highlighted that, due to the Strategic Defence Review, there is scope for a change in the nature of the work undertaken at the Portsmouth naval base, which would have an impact on the economic contribution to the local economy. The recent announcement by BAE systems that it would be closing the

Portsmouth site has meant that there will be a significant loss of jobs at the shipyard, though maintenance jobs will continue within Portsmouth.

Coastal tourism is reliant upon the natural and built environments along the coast. Changes to these environments, for example from other, intrusive economic activities or developments that are not in keeping with the existing character of an area, can have an unintended negative effect on this important sector.

Potential core issues

The core issues for economic activities primarily relate to:

- the amount of growth possible, given environmental considerations and space constraints
- impacts upon individual sectors by other sectors, for example upon coastal tourism through inappropriate developments in unrelated sectors
- maintaining the competitiveness of key sectors, such as ports and shipping
- the ability to maximise benefits for local areas (particularly those experiencing high levels of deprivation) from expansion in marine sectors.

As this section is largely an overview of the economic sectors in the South marine plan areas, all of which have their own sections following this one, the issues for those sectors as well as their interactions with other sectors are covered in their respective sections.

2.5 Defence and national security

The Ministry of Defence has the primary role of providing military defence and security to the people of the UK and overseas territories. Within UK waters in peacetime military activities comprise basing, practice and training activities, routine patrolling, transporting equipment and personnel in and out of the country, search and rescue operations (in conjunction with HM Coastguard) and communications including using radar.[220]

Current situation

Basing

The South Inshore plan area includes one of the UK's main naval bases at Portsmouth (Her Majesty's Naval Base). Portsmouth is home to almost two-thirds of the Royal Navy's surface ships, including Type 45 destroyers, Type 23 frigates, mine countermeasures and fishery protection squadrons. Portsmouth is planned to be the home to the new Queen Elizabeth class aircraft carriers from 2017 and is a major employer with 16,000 people employed at peak times. For every 100 jobs the predicted downstream spending at the naval base stimulates another 66 jobs elsewhere in the Solent Local Enterprise Partnership area. Overall the base generates output of £1.68bn, and for every £1m generated another £750,000 of spending is stimulated in other sectors of the economy (MMO 1050).

Her Majesty's Naval Base Devonport is situated just outside the South marine plan areas in the South West Inshore marine plan area. It is the largest naval base in

[220] MMO (2013). Strategic Scoping Report for marine planning in England, p64

western Europe and the home to Britain's amphibious warships, half her frigates and submarine fleet. Flag Officer Sea Training the training hub of the front-line fleet of the Royal Navy is also based at Devonport, the fleet active throughout the South marine plan areas.

There is considerable interaction between the two naval bases not only in direct operations and training but also in the areas of personnel, engineering and supplies. Consideration of the interactions between South and South West marine plan areas will be undertaken as part of the marine planning process.

Training

The Royal Navy has a reputation for being a world leader in operational sea training operational seagoing training delivering across all disciplines for the Royal Navy and other Navies. The Navy's training prepares all types of aircraft, surface warships, submarines and auxiliaries for all operations that are likely to be faced.

Sea training is carried out within defined military practice and exercise training areas, the South marine plan areas containing a number of these, the majority of which cover the South and West of the Isle of Wight to Start Point. Military practice and exercise areas are used predominantly for naval training, involving shipping and aircraft engaged in firing activities. Areas of concentrated aerial activity are primarily located over Portland and Weymouth (MMO 1050). The direct access to supporting assets, services and a highly flexible infrastructure contributes to the benefits these areas bring to the South marine plan areas.

The majority of these training and exercising sites are covered by Ministry of Defence byelaws. Access is prohibited when such activities are taking place, typically for several weeks per year (MMO 1050). Large submarine exercise areas are also located within the South marine plan areas, although large scale submarine activities in the South marine plan area are rare. Byelawed areas can be examined in more detail on the Ministry of Defence website.

Operating

Defence activities include a wide range of operations in the South marine plan areas; utilising both defined areas of defence interest eg practice and exercise areas as well as operating within the wider marine environment.

Further to the main naval base at Portsmouth and its associated activities, defence activities operate from Portsmouth, Southampton and Weymouth with submarine berthing; Lydd and Portland Bill with range and test and evaluation establishments and Poole and Lympstone with the Royal Marines.

Enduring Royal Navy operations in the area include protecting the coastline and coastal waters, including fisheries protection, to search and rescue operations.

Five ports within the South marine plan areas have licences to handle explosive material. These ports are Portland, Poole, Marchwood (under review), Portsmouth and Folkestone.[221]

Sea mounting

The main defence Sea Mounting Centre is Marchwood Military Port located on the western side of Southampton water.

This facility is operated by seventeen Port and Maritime Regiment Royal Logistics Corps whose role is primarily to load and discharge service or civilian shipping in support of military administration, exercises and operations worldwide. The Sea Mounting Centre also provides a training base for army port and maritime personnel. The port is also utilised by the Royal Fleet Auxiliary.

Should the Armed Forces be required to mount a significant deployment then they will use much of the military infrastructure along the South coast. This activity is likely to focus on Marchwood Military Port and Portsmouth Naval Base but may include other ports. Decision makers should be aware of such occasional activities that may occur away from the more often used defence establishments and ensure they are not constrained.

Existing policy

The following relevant goals/objectives and policies drawn from the Marine Policy Statement are highlighted by way of context:

> "marine activities should not prejudice the interest of defence and national security and the Ministry of Defence should be consulted accordingly. The participation of the Ministry of Defence in the development of marine plans and their contribution to overall safety, security and resilience will ensure the effective use of marine resources while identifying mitigation measures, where possible, for incompatible activity or usage"
>
> And "marine plan authorities and decision makers should take full account of the individual and cumulative effects of marine infrastructure on both marine and land based Ministry of Defence interests. Marine plan authorities, decision makers and developers should consult the Ministry of Defence in circumstances where defence interests may be compromised".

Defence activity is prevalent across the South marine plan areas although this is not recognised widely across local plan policies. More detail regarding defence activity can be found in the descriptive text within such plans and further consideration of this will be made when developing South Marine plan policies.

[221] MMO (2013). Economic Baseline Assessment of the South coast, p30/31

Marine Management Organisation

Figure 19: Defence activity

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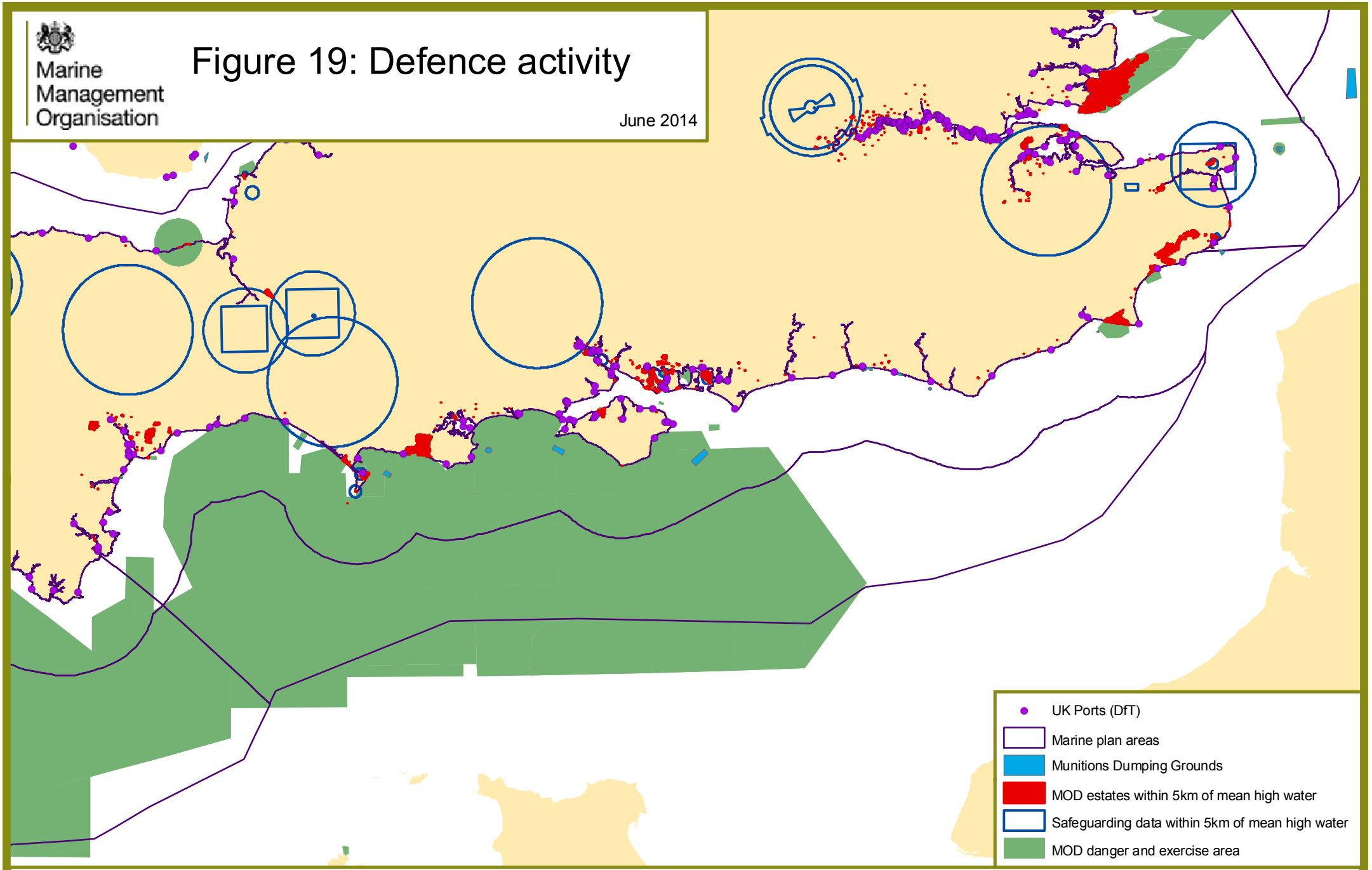


Future trends

Any future changes in the nature and level of this marine activity are likely to be driven by strategic decisions at national level taken by the Ministry of Defence. The marine planning process itself is unlikely to have great influence over the prevalence or location of defence-related activities.[222]

The Ministry of Defence search and rescue helicopters will be withdrawn in a phased programme during the period 2015 to 2016 and replaced by a new UK-wide search and rescue helicopter contracted service under the Department for Transport.

A Cabinet Office led, cross-government agreement has seen the formation of a National Maritime Information Centre (NMIC). This has been set up to bring together representatives of the Marine Management Organisation, Department for Transport, Ministry of Defence, Home Office, Foreign and Commonwealth Office and Department of Energy and Climate Change into one location to ensure the full range of maritime security challenges can be tackled in partnership across government. The Royal Navy's command and control infrastructure and maritime surveillance capability is of upmost importance for the National Maritime Information Centre.

Potential core issues

- it is important for decision makers to take account of appropriate locations for new developments alongside other uses of marine space
- marine activities should not prejudice the interest of defence and national security and the Ministry of Defence should be consulted accordingly[223]
- marine plan authorities, decision makers and developers should consult the Ministry of Defence in circumstances where defence interests may be compromised.

Interactions with other sectors

- potential exists for wind turbines to cause radar interference when turbine heights exceed certain levels, but how this will affect future deployment of offshore wind farms remains to be seen
- recent developments in radar technology may eliminate the need for Ministry of Defence to object to wind farm projects on this basis[224]
- disturbance/ adverse effects on habitat and wildlife in practice and exercise areas, no impact is expected upon these areas.

Issues for sustainability

- within the plan area there are a number of historic munitions dumps, the location of these are publicly available, although information on the intensity of use and type and quantity of munitions disposed of is limited.

[222] MMO (2013). MMO (2013). Economic Baseline Assessment of the South coast, p30/31
[223] HM Government (2011) MPS para 3.2.2 www.gov.uk/government/publications/uk-marine-policy-statement
[224] Ministry of Defence (2012) MOD paves way for new wind-farm-friendly radars, 12 January 2012, www.gov.uk/government/news/mod-paves-way-for-new-wind-farm-friendly-radars

2.6 Energy production and infrastructure development

2.6.1 Oil and Gas

Current Situation

Oil (petroleum) and gas (natural gas) extracted in the UK largely takes place in the offshore marine area from oil and gas wells, the oil and gas are pumped initially to a rig and transported onshore via pipelines. Oil and gas provides the UK with a significant proportion of its primary energy demand, contributing 73% in 2011.

There is currently no active oil and gas extraction activity in the South offshore plan area. However within close proximity to the marine area there are land based oil extraction sites located in Wareham, Kimmeridge and Wytch Farm, Dorset. Wytch Farm, recently taken over by Perenco from British Petroleum (BP), is the largest onshore field in Western Europe with the production of over 500 million tonnes (Mt) of crude oil per annum. A small part of Wytch farm extends into the offshore area in Poole Bay, although drilling operations are entirely land-based. [225] Wytch Farm currently has the world's longest well trajectory of 10.1km under Poole Bay (Dorset Coast Forum, no date).

Existing policy

The key government drivers for the oil and gas industry are the push for the UK to have a competitive and secure energy market and to move towards a low carbon economy. Legislation and policy includes:

- Climate Change Act (2008)
- Energy Act (2011)
- Petroleum Act (1998)
- UK Marine Policy Statement (2011)
- Climate Change Committee advice (2011)
- Carbon Budgets
- Energy White Paper (2003) - Our energy future - creating a low carbon economy.

As reserves throughout the UK are mature, the UK is becoming increasingly dependent on imported energy, which is anticipated to supply about half of the UK's total annual gas demand by 2020.

Value of the activity

As there are currently no offshore based oil and gas extraction sites within the South marine plan areas no economic assessment has been completed. However associated secondary support activities exist, such the ESSO (Exxon Mobil) refinery at Fawley, near Southampton, which is the largest in the UK. Situated on Southampton water it has a mile-long marine terminal that handles around 2,000 ship movements and 22 Mt of crude oil per annum. Fawley Oil Refinery plays a key community role for the area providing 2,300 onsite jobs. The extraction site at Wytch

[225] MMO,2013. Economic Baseline Assessment of the South Coast

farm currently employs 100 staff and 250 contractors with an estimated gross value added of £266 million.

The majority of oil and gas-related activity is located within the centre of the South marine plan areas. It is concentrated in the areas from Bridport in the West to Selsey Bill in the East, particularly in the vicinity of the Isle of Wight and Poole, with the exception of one subsurface installation pipe offshore from Eastbourne that is now classed as 'debris', although still with an 'active' status. See Figure 20 showing activity areas.

Future trends

There is unlikely to be any significant production activity in the South marine plan areas in the short-term as there is currently no offshore production taking place.[226] The 26th oil and gas licensing round (2010) saw NP Solent (a subsidiary of Northern Petroleum Plc), NWE Mirrabooka (Northwestern Energy) and Infrastrata gain licences to commence drilling activities in nine different blocks off the coast of the Isle of Wight and in the Wessex Basin. The aforementioned companies are yet to begin exploratory activities, although Infrastrata has announced plans to drill its first exploration well in 2013. [227] The 27th oil and gas licensing round (2012) saw a further two blocks offered (97/13 and 98/12b) to Nautical (now Cairn) and partners Infrastrata for licenses to search and bore for petroleum which are shown in Figure 20 above. In addition Consent has been granted by the Department of Energy and Climate Change for the acquisition of seismic data in blocks 98/7b, 98/12 and 98/8.

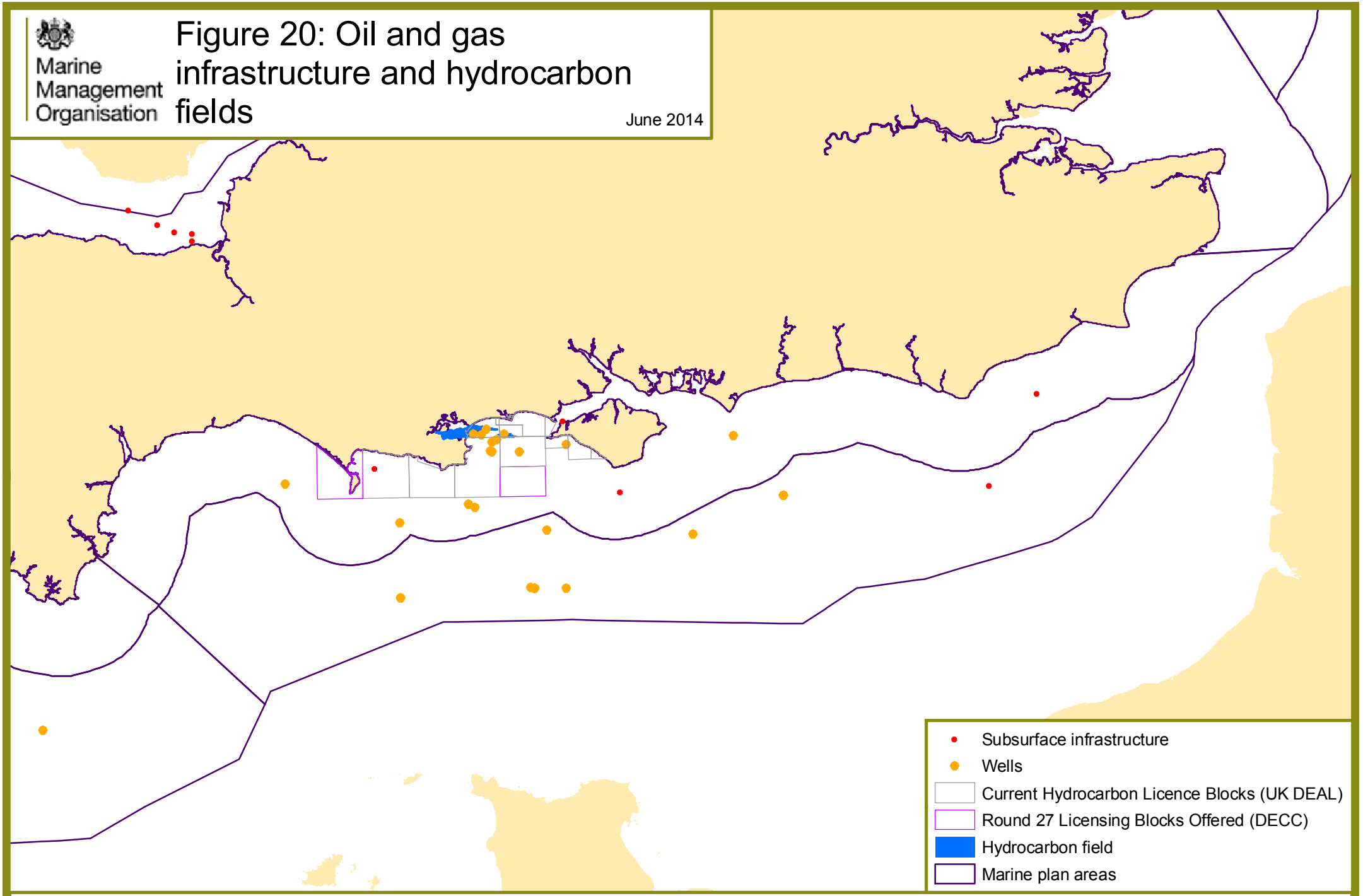
The prospect of any drilling activity leading to production commencing within the next six years is dependent on the results of the exploration activity. Depending on the findings of the initial exploration work, it is possible that offshore development for production could occur within the next 20 years.[228] A small proportion of the oil and gas production licences awarded in the licensing round may develop into extraction sites. Therefore it is not guaranteed that the licences identified above will develop into production sites.

[226] MMO, 2013. South Marine Plan Futures Analysis
[227] www.infrastrata.co.uk/index.php?option=com_content&task=view&id=270&Itemid=105
[228] MMO, 2013. South Marine Plan Futures Analysis

Marine Management Organisation

Figure 20: Oil and gas infrastructure and hydrocarbon fields

June 2014



Historic trends

Oil refining has taken place at Fawley since 1921 and the oil terminal at Hamble has been operational, at a small scale, since 1924. Both pre-date the discovery of oil in the area, though Hamble is now responsible for the export of oil produced at Wytch Farm.

In 1965 BP drilled the first offshore UK well in the South coast region in Lulworth Banks, although this was exploratory and was never developed. Production has grown incrementally since then and after the extent of the offshore oilfields at Wytch Farm was confirmed in 1988, BP commenced Extended Reach Drilling (ERD) techniques in the region in 1993.

Potential core issues

There are currently no issues for the oil and gas sector within the South marine plan areas, but should large oil or gas deposits be found these would be expected to be extracted, in line with current government policy subject to the relevant licenses and permissions being obtained

2.6.2 Offshore Wind Energy

Offshore wind energy production is set to play a crucial role in achieving renewable energy production and carbon dioxide emission reduction targets by 2020 as well as the 2030 EU greenhouse gas targets.[229] There are a number of wind farms in the planning phase and gaining consents as well as a growing number that are operational around English waters. Offshore wind technology is the most established renewable energy technology in English waters with 3.8GW of capacity in operation or under construction and a further 32GW in the development pipeline.[230] This represents the largest deployment of offshore wind farms in the world.

Current situation

There are currently no wind farms in construction or operation in the South marine plan areas but The Crown Estate's Round 3 zone[231] identification process identified two zones within which developers can look to bring projects forward subject to the relevant regulatory consents. These are Navitus Bay (off the Dorset and Hampshire coast) and Rampion (off the coast of Brighton).

Rampion[232]

- project is being developed by E.ON Climate and Renewables

[229] DECC (2014) https://www.gov.uk/government/publications/uk-summary-of-analysis-on-2030-ghg-targets

[230] Figures from UK Wind Energy Database www.renewableuk.com/en/renewable-energy/wind-energy/uk-wind-energy-database/index.cfm and
The Crown Estate website www.thecrownestate.co.uk/energy-infrastructure/offshore-wind-energy/our-portfolio/

[231] The Crown Estate website; Our portfolio: Round 3 windfarms, available online: www.thecrownestate.co.uk/energy-infrastructure/offshore-wind-energy/our-portfolio/round-3-wind-farms/

[232] E.ON UK (2013), Rampion Exhibition Boards: Welcome to the Rampion Offshore Wind Farm project update. www.eon-uk.com/downloads/1304_Rampion_Exhibition_Boards_(Final)_pdf.pdf

- application is for an installed capacity of 700MW with a range of options from 100, 7MW turbines to a maximum of 175 turbines of at least 3MW generating capacity each
- proposed site between 13km and 23km off the Sussex coast
- onshore export cable proposed be buried for 26.4km to a National Grid substation approximately 2km south-west of the village of Bolney
- project will create an estimated 65-85 permanent jobs
- Newhaven port identified as the base for operations and maintenance activities post installation if approved
- proposal submitted to the Planning Inspectorate's National Infrastructure Division in March 2013 with a decision on the project expected in summer 2014.

Navitus Bay[233]

- joint venture between Eneco Wind UK Ltd and EDF Energy
- proposed to be one of the largest offshore projects in the UK marine environment
- proposed installed capacity of 1100MW from a range of options from 136, 8MW turbines to 218, 5MW turbines
- proposed site is 13.9km offshore at its closest point to the coast (the Needles)
- estimates of up to 1,000 jobs will be created during the construction phase of the project with 100 permanent jobs created for the operational life of the wind farm
- onshore export cable proposed to land at Taddiford Gap, between Barton-on-Sea and Milford-on-Sea and run 35km underground to a substation close to West Moors and Three Legged Cross
- project application has been submitted to the Planning Inspectorate's National Infrastructure Division in April 2014.[234]

Current policy

Offshore wind energy projects can bring a range of benefits to the UK, including climate change mitigation, achievement of renewable energy targets, increasing energy security and diversity, providing employment together with the potential to create new habitat and possibly contribute to the objectives of marine conservation zones.

Climate Change Act

The Climate Change Act 2008 and subsequent order revising the 2020 carbon budget committed the UK Government to reduction of greenhouse gas emissions by 80% on 1990 levels by 2050, with an interim target of 34% by 2020.

Renewable Energy Directive

The UK has a legally binding target to generate 15% of its energy from renewable sources by 2020, stemming from the EU Renewable Energy Directive

[233]Navitus Bay, Website http://navitusbay.production.lablateral.com/project.aspx
[234] National Infrastructure Planning http://infrastructure.planningportal.gov.uk/projects/south-east/navitus-bay-wind-park/

Renewable Energy Roadmap

This document forms a 'delivery roadmap' to achieve the Renewable Energy Directive's targets to 2020.
Analysis conducted as part of this report estimated the potential for growth in offshore wind generation to 2020 has a central range estimate of up to 18 GW.

Electricity Market Reform

The Electricity Market Reform aims to replace the current renewable obligation scheme in order to deliver the Government's three energy policy objectives – to ensure energy security, to keep energy bills affordable, and to de-carbonise energy generation.
The main mechanism for achieving these targets are Contracts for Difference (CfD), which will provide long-term support for all forms of low-carbon generation by removing these sources of generation from wholesale electricity prices providing a long-term and stable income for renewable energy generators.

National Policy Statements

The Department of Energy and Climate Change has produced a number of national policy documents for energy infrastructure which set out national policy as to how applications should be considered. The documents relevant to offshore wind are the overarching document (EN-1) and the renewable energy document (EN-3).

Sub-national policy

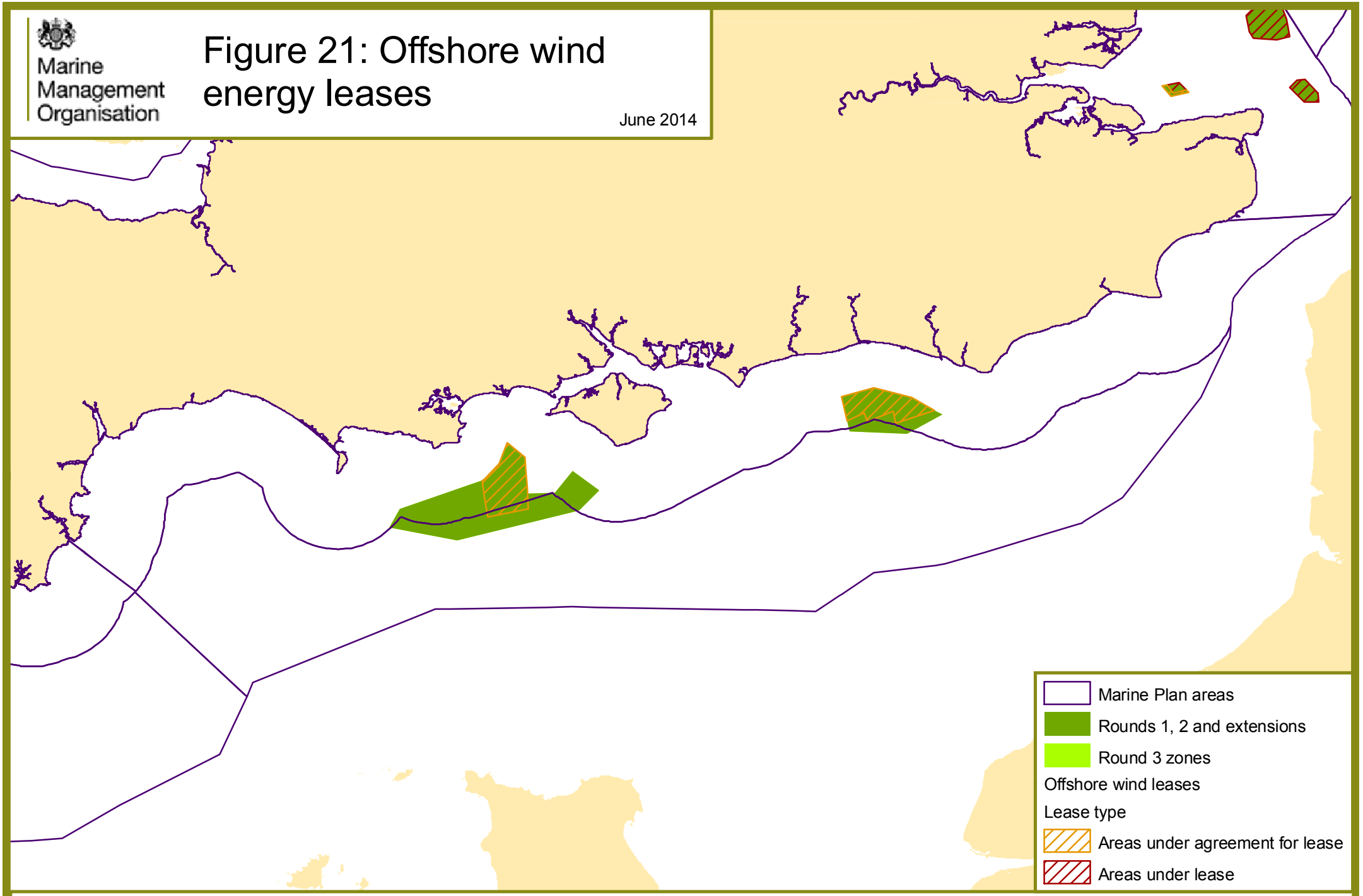
Numerous sub-national policy documents offer differing levels of support for renewable energy:

- Lewes District Council Core Strategy has a policy supporting the delivery of onshore infrastructure and support services for the Rampion offshore wind farm at Newhaven port
- New Forest District Council Core Strategy provides a level of support by retaining suitable sites to accommodate marine industries and site with direct access to the coast for marine related businesses
- Eastleigh Borough Council Local Plan states it will permit development of zero or low carbon energy generation infrastructure
- Numerous sub-national plans present a general support for renewable energy as long as social, economic and environmental considerations are taken into account., these include Test Borough Council's Local Plan, Purbeck District Council's Local Plan, Arun District Council's Draft Local Plan, Dorset Area of Outstanding Natural Beauty and the East Devon Area of Oustanding Natural Beauty delivery plans
- visual resource and wider environmental considerations alongside the development of renewable energy have been highlighted in policies in plans from Chichester Harbour Area of Oustanding Natural Beauty, Purbeck District Council's Local Plan, Isle of Wight Area of Oustanding Natural Beauty and West Dorset District Council's Local Plan.

Marine Management Organisation

Figure 21: Offshore wind energy leases

June 2014



Future trends

The development of the two Round 3 zones in the South marine plan areas if consented, has potential to impact upon the area and other activities throughout construction and operation. Most of these impacts will be assessed as part of project level assessments, however some of the indirect or more strategic impacts may be managed through the South marine plans and application of their specific policies in decision making. There is also potential for further development in the long term (see figure 22), however at this time there are no plans for future leasing rounds apart from demonstration sites.

If consented, Rampion would commence construction by 2015 with completion by 2018/19.[235] It is estimated that the total capital value of the project, including inshore, offshore and onshore elements, would be in the order of £2 billion, however, it is challenging to show how much may be secured in the region or locally.[236]

If consented, Navitus Bay aims to commence construction in 2017 with the project fully operational by 2021. No assessment of the supply chain has been completed at this point but precedents set by other wind farms indicate a significant number of local jobs in the supply chain may occur as a result of the wind farms construction.

Potential core issues

- gaining investment in projects and the potential effects of Contracts for Difference and uncertainty on how this will affect the development lifecycle[237]
- consenting risk highlighted as a big issue for developers due to the front loading of work in this process
- potential cumulative effects of construction in the South marine plan area with navigation, visual impact, birds and marine noise of particular concern at the strategic level (note that these aspects are assessed and mitigated in project level environmental impact assessments (EIA) and subsequent environmental statements) and considered more widely at a strategic level by regulators
- managing the strategic issues in relation to the current programme of offshore wind farms are considered by the UK Offshore Energy Strategic Environmental Assessment 2 (OESEA2).[238]

Interactions with other sectors

- potential for conflict between offshore wind farms and other sectors, the MSP Directive alongside national planning policy statements will help to define which activities have priority for certain sectors
- navigation – wind farms can present an obstacle to both recreational and commercial shipping with vessels being diverted around the development in some cases, however agreements[239] are in place to mitigate this

[235] E.ON UK (2013), Rampion Exhibition Boards: Welcome to the Rampion Offshore Wind Farm project update. www.eon-uk.com/downloads/1304_Rampion_Exhibition_Boards_(Final)_pdf(1).pdf
[236] http://iet.jrc.ec.europa.eu/remea/directive-200928ec-european-parliament-and-council-23-april-2009-promotion-use-energy-renewable
[237] Marine Management Organisation (2013), MMO Project No 1039: South marine plan areas futures analysis, Available online: www.marinemanagement.org.uk/evidence/documents/1039.pdf
[238] https://www.gov.uk/government/publications/uk-offshore-energy-strategic-environmental-assessment-2-environmental-report

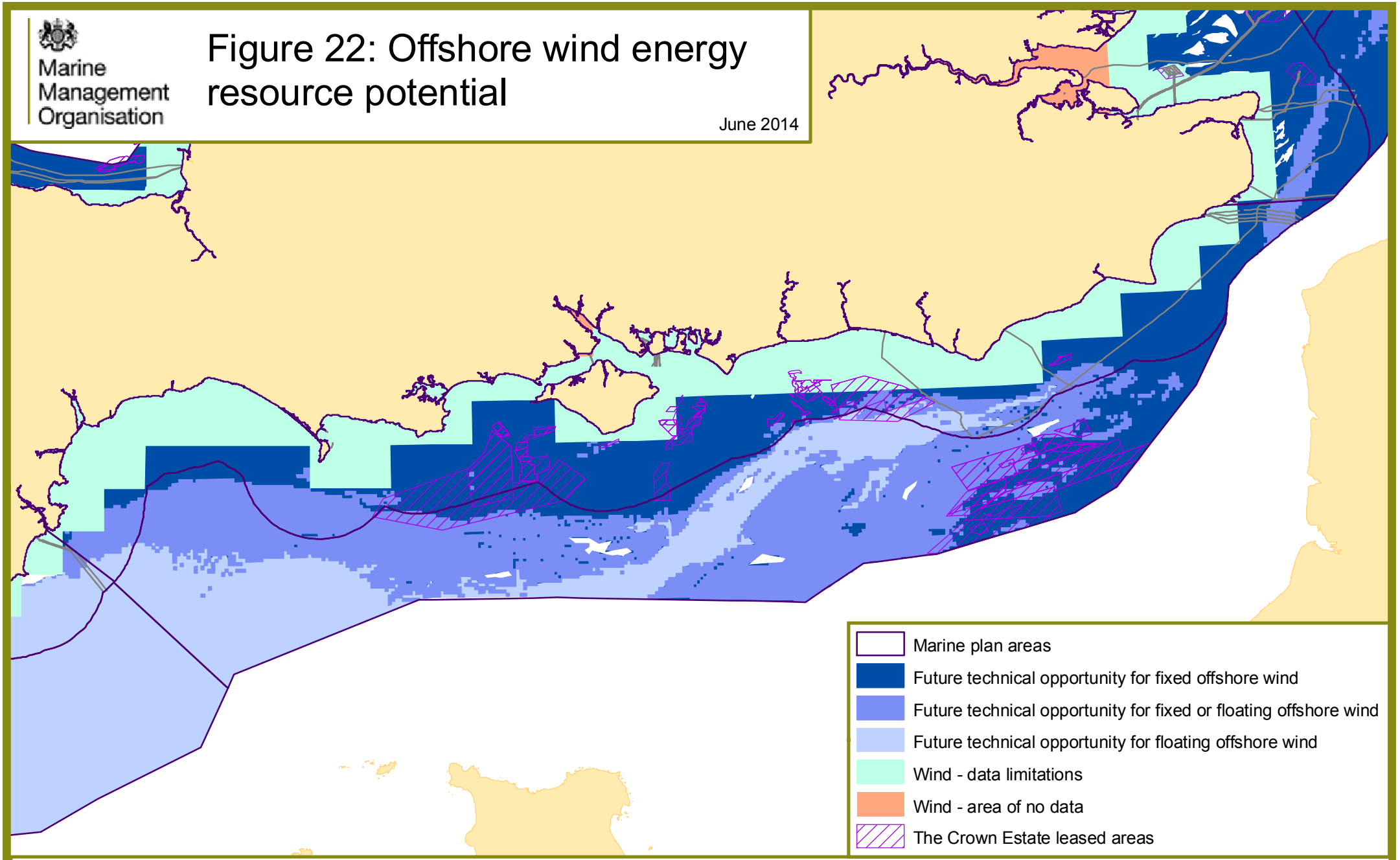
- visual resource – needs careful management to consider sensitive receptors through the relevant assessments
- fishing – displacement of certain types of fishing activity from both within the wind farms and cable corridors
- recreation – effects upon a range of activities such as sea angling, sailing and diving to either displace or restrict these activities
- planning and consenting and the consideration of other sectors through these processes for offshore windfarm development.

[239] http://www.marinemanagement.org.uk/evidence/1010.htm

Marine Management Organisation

Figure 22: Offshore wind energy resource potential

June 2014



Note: The areas of future technical opportunity do not include the presence of hard constraints posed by existing uses of the marine estate or other factors including natural & cultural resources, marine users, economics and market appetite and policy drivers required for the opportunity to be supported. Cables and pipelines outside of the Territorial Waters Limit (other than export cables) are not shown as they are not subject to The Crown Estate's permission

2.6.3 Tidal stream devices

Significant development of wave and tidal energy devices has occurred in recent times with a number of devices being deployed at test sites around the UK. It is estimated that the wave and tidal energy industry could be worth up to £6.1 billion providing up to 20,000 jobs by 2035.[240]

Resource mapping completed by The Crown Estate[241] shows that harvestable wave energy is not feasible using current technology in the South marine plan areas. While tidal range may not be significant, harvestable tidal stream resources exist in the South marine plan areas focused around the Isle of Wight and Portland Bill. We will continue to investigate with The Crown Estate further possibilities around medium velocity resource around smaller headlands.

Current situation

Perpetuus Tidal Energy Centre (also known as the Solent Ocean Energy Centre)[242]

The energy centre is currently being developed by the Isle of Wight Council. The centre aims to develop a managed test and demonstration facility for tidal energy developers. This facility is targeting deployment of full scale single units and small arrays, from prototype to pre-commercial stages of development, itwas awarded an agreement for lease from The Crown Estate in November 2012 and is situated to the South of the Isle of Wight. Developers have already commissioned a scoping report with a full Environmental Impact Assessment process expected to be completed by 2014. If consented, construction is planned to commence in 2015 over a period of approximately 12 months.

Activities at the facility will include the installation, testing and decommissioning of tidal devices, as well as operation and assessment of maintenance methods and operational issues. The devices will be grid connected with individual test devices connecting into an offshore hub for export of electricity ashore.

The Crown Estate's wave and tidal leasing program[243]

The Crown Estate performed an industry engagement exercise with wave and tidal stakeholders to establish how best to encourage and accelerate wave and tidal stream technology development. The outcome of this exercise was to lease more demonstration zones with the option of third party management of zones. This is a similar arrangement to that of FabTest in the South West Inshore plan area. The relevant application bid and assessment process is yet to be undertaken for these areas. Alongside the third party management option, project or technology

[240] Renewable UK (2013), Wave and Tidal Energy in the UK: Conquering Challenges, Generating Growth, Available online: www.renewableuk.com/en/publications/index.cfm/wave-and-tidal-energy-in-the-uk-2013
[241] The Crown Estate (2012), UK Wave and Tidal Key Resource Areas Project, Available online: www.thecrownestate.co.uk/media/355255/uk-wave-and-tidal-key-resource-areas-project.pdf
[242] MMO, Website, Marine Case Management System - Public Register, Available online: https://marinelicensing.marinemanagement.org.uk/mmo/fox/live/MMO_PUBLIC_REGISTER/
[243] The Crown Estate Wave and Tidal- Further Leasing, Available online: www.thecrownestate.co.uk/energy-infrastructure/wave-and-tidal/working-with-us/further-leasing/

developers are also invited to enter into the leasing process to express interest in developing within the zones or, for individual project developers, other areas of specific interest in UK waters. The Crown Estate intend to award seabed rights as early as June 2014.

Local view

At various ports and harbours eg Portland, there is support for the installation of small scale wave or tidal devices with the additional backing of the relevant local authorities.

Current policy

Climate change act

The Climate Change Act 2008 and subsequent order revising the 2020 carbon budget committed the UK Government to reduction of greenhouse gas emissions by 80% on 1990 levels by 2050, with an interim target of 34% by 2020.

Tidal energy is unlikely to contribute significantly to the 2020 targets however supporting development of testing facilities will be essential to ensure this technology can contribute to longer term targets.

Renewable Energy Directive

In terms of renewable energy, the UK has a legally binding target to generate 15% of its energy from renewable sources by 2020, stemming from the EU Renewable Energy Directive.

Renewable Energy Roadmap (Update 2012)

The document forms a 'delivery roadmap' to achieve the Renewable Energy Directive's targets to 2020 and discusses the potential for wave and tidal energy to do this.

The document states that in order to capitalise on current progress in the development of tidal devices, the industry needs to progress to deploying commercial scale arrays. Sites such as Perpetuus Energy Centre will enable appropriate facilities to test devices at array scales and will aid the continued development of devices up to commercial scale.

Sub-national policy

Numerous sub-national policy documents offer differing levels of support for renewable energy:

- New Forest District Council Core Strategy provides a level of support by retaining suitable employments sites with direct access to the coast for marine-related businesses.
- Eastleigh Borough Council Local Plan states development of zero or low carbon energy generation infrastructure will be permitted potentially allowing cable landing locations for offshore tidal developments within certain caveats
- Numerous sub-national plans present a general support for renewable energy as long as social, economic and environmental considerations are taken into account. These include Test Borough Council Local Plan, Purbeck District Council's Local Plan, Arun District Council's Draft Local Plan, Dorset Area of

Oustanding Natural Beauty and the East Devon Area of Oustanding Natural Beauty delivery plans.
- Balancing visual resource and wider environmental considerations alongside the development of renewable energy has been highlighted in policies in plans from Chichester Harbour Area of Oustanding Natural Beauty, Purbeck District Council's Local Plan, Isle of Wight Area of Oustanding Natural Beauty and West Dorset District Council.

Adjacent to the South marine plan areas is the RegenSW Marine Energy Park. This initiative aims to allow collaboration between local and national government, local enterprise partnerships, technology developers, academia and industry. This may benefit the development of a tidal energy industry in the South marine plan areas in the long term as companies and researchers locate to the area and sites are developed.

Future trends

The Crown Estate's wave and tidal demonstration leasing round and key resource areas study indicates that there is significant potential for developing tidal stream devices around the Isle of Wight and off Portland Bill. It is unclear if and when commercial arrays and larger scale tidal developments might be brought forward.

The South West Marine Energy Park prospectus includes proposals for various ports in the South and South West marine plan areas to support tidal development over the next few years.

Potential core issues

- development of commercial scale arrays to ensure the progress made in this sector continues.
- Space should be left to ensure this activity can happen in the most cost effective areas to ensure the continued development of the industry
- demonstration and test sites offer a valuable stepping stone to achieving this goal where devices can be tested in a live environment. The Crown Estate is in the process of identifying more of these sites in the South marine plan areas and development within them should be encouraged in line with national policy
- within the boundaries of the current technology, tidal resource is relatively constrained needing protection from other marine construction and activities to ensure the potential resource is not sterilised for this use.

Interactions with other sectors

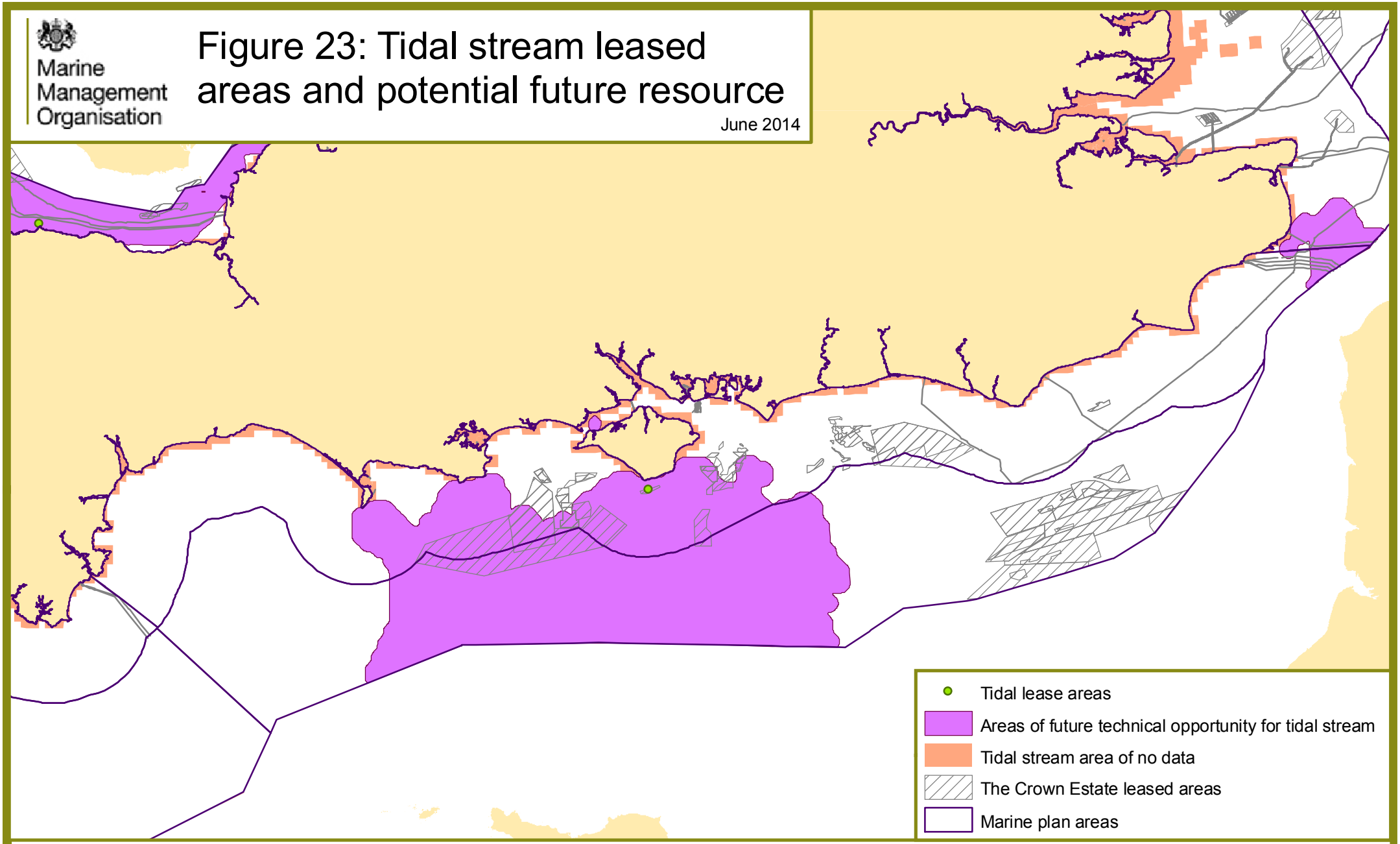
- installation of tidal arrays and devices have the potential to make demands on the same space as:
    - fishing activity
    - recreational boating
    - shipping activity
    - aggregates extraction
- other sectors potentially affected by the installation of tidal or wave energy devices include:
    - offshore wind energy installations
    - the built environment

    - coastal infrastructure.
- wind and tidal energy projects have the potential to conflict in the South marine plan areas due to Navitus Bay wind farm site being situated in an area of tidal stream resource that could theoretically be developed in the future.
- potential for co-location of wind and tidal devices could be considered. Similarly smaller devices such as ‘micro-tidal’ should also be considered as they could have the benefits of energy generation with a smaller area of operation such as sheltered estuaries or rivers.development of supply chains and tidal stream devices in the South marine plan areas offers a large potential for economic growth in coastal communities along the South coast.
- cumulative effects of construction in the South marine plan area with wake effects and associated disruption of coastal processes, effects on birds (especially diving birds), collision risk, scour and marine noise from pilling activities are a potential concern.

Marine Management Organisation

Figure 23: Tidal stream leased areas and potential future resource

June 2014



Note: The areas of future technical opportunity do not include the presence of hard constraints posed by existing uses of the marine estate or other factors including natural & cultural resources, marine users, economics & market appetite and policy drivers required for the opportunity to be supported. Cables and pipelines outside of the Territorial Waters Limit (other than export cables) are not shown as they are not subject to The Crown Estate's permission

2.6.4 Carbon capture and storage

Carbon capture and storage is a developing technology that could contribute to the reduction of carbon dioxide being released into the atmosphere, such as when fossil fuels are burned within large-scale power stations. The carbon dioxide would be separated at its source and transported by associated infrastructure and pipelines, injected and stored in applicable geological formations. In the case of the offshore area, saline aquifers and depleted oil and gas fields would be used.

Current situation

There are currently no large-scale commercial Carbon Capture and Storage projects proposed or in development within the South marine plan areas. In 2008, the Portland Gas Storage Project (PGSP) was granted planning permission for a 1,000 million cubic metre natural gas storage facility and associated infrastructure. Within the facility but as a separate project Infrastrata undertook a feasibility study to store carbon dioxide in saline aquifers beneath Portland. In 2012 Portland Gas Storage Project applied to the Department of Energy and Climate Change for funding as part of the Carbon Capture and Storage commercialisation programme where £1 billion of funding has been made available for the developments of Carbon Capture and Storage technologies. The Portland Gas Storage Project was unsuccessful in its application for funding for the Carbon Capture and Storage facility.

Infrastrata, the developer behind Portland Gas Storage Project, has stated that due to the current poor market conditions and the lack of investment in the project, Carbon Capture and Storage development is unlikely to proceed in the short term.[244] This does identify that the South marine plan areas have potential for carbon dioxide storage and is additionally highlighted with the identification of saline aquifers located off St. Alban's Head in Dorset which have the potential to store over 500 million tonnes of carbon dioxide.[245] In 2011 the UK produced net carbon dioxide emissions of approximately 458.6 million tonnes (Mt).

Current policy

For the Carbon Capture and Storage sector the principal drivers come through the implementation of the following international, European and UK legislation and policies:

- Kyoto Protocol
- Energy Act 2008
- Climate Change Act 2008
- Carbon Storage Directive (Directive 2009/31/EC)
- UK Marine Policy Statement
- Carbon Capture and Storage Roadmap (2012)
- Energy White Paper (2003) – Our energy future – creating a low carbon economy
- Carbon Plan (2011)

[244] www.infrastrata.co.uk/index.php?option=com_content&task=view&id=261&Itemid=137
[245] www.gov.uk/government/uploads/system/uploads/attachment_data/file/48317/4899-the-ccs-roadmap.pdf

Value of the activity

Carbon Capture and Storage has the potential to play a role in the move to a low-carbon economy, alongside renewables and nuclear power, such technology could help the development of the power and industrial sectors, maintaining associated jobs and contributions to the local community. Carbon Capture and Storage is predicted to create 100,000 jobs across the UK by 2030, contributing £6.5 billion to the UK's economy.[246]

The lack of any current Carbon Capture and Storage projects in the South marine plan areas means that it is not currently possible to quantify the economic impacts associated with this technology., this does not mean that there is no economic activity in the South marine plan area, just that research and exploration activity cannot be quantified.[247]

As Carbon Capture and Storage is an emerging industry not just within the UK but globally, current and future trends are difficult to forecast, with its commercial viability yet to be established the technology remaining as yet unproven in the UK. Despite suffering setbacks in terms of financing still aspires to the target of one operational Carbon Capture and Storage facility in the UK by 2020.

The UK's CCS Roadmap currently predicts that for the UK there will be groups of power and industrial plants, supported and linked by associated infrastructure where carbon dioxide is stored offshore. Within the South marine plan areas there are no such viable sites at this time. The ExxonMobil oil refinery at Fawley is currently the only large-scale emitter of carbon dioxide within the plan area. While the roadmap suggests that carbon capture and storage at this site would be economically viable, with a 'source to sink' cost of under £10 a tonne, the storage of carbon dioxide in saline aquifers is currently less well understood than for oil and gas fields and therefore further assessment of saline aquifers is required to unlock the UK's storage potential

Current uncertainty over carbon dioxide storage within saline aquifers (further assessment on suitability to be undertaken) and the considerable initial investment required to link the Fawley refinery site with the saline aquifers situated off St Alban's Head and/or Portland, suggest that it is unlikely that there will be Carbon Capture and Storage technologies operating within the South marine plan areas within the next 20 years.[248]

Potential core issues

- With stricter emerging targets on industry to cut carbon dioxide emissions the following factors are important in the role of driving down the costs for carbon capture and storage:
    - investment from government
    - regard to the recommendations from the Carbon Capture and Storage Cost Reduction Taskforce,
    - carbon capture and storage research and development

[246] MMO, 2013. South Marine Plan Futures Analysis.
[247] MMO, 2013. Economic Baseline Assessment of the South Coast.
[248] MMO, 2013.South Marine Plan Futures Analysis.

Consideration of the above points may mean that carbon capture and storage becomes economically competitive and viable within the plan areas over the next 20 years.

2.6.5 Nuclear

Nuclear power is a proven low carbon technology that has been used in England to produce electricity since the 1950s. Nuclear energy is anticipated to play an increasingly important role as the UK moves to decarbonise and diversify electricity generation.[249]

The characteristics of electricity generation through nuclear power offer independence from fossil fuel supply chains, longer term availability, carbon generation on par with renewable energies and the opportunity reduce impacts of fluctuating energy costs.

It is estimated that 19 percent of electricity produced in the UK is delivered through nuclear energy. A predictable base load of electricity has been generated by each nuclear site over the years.[250]

Thermal power stations convert heat energy into mechanical energy which is then used to generate electricity. A range of fuels including nuclear, fossil fuel and biomass are used to generate electricity in thermal power stations. It is expected that thermal power generation will continue to play an important role in the transition to a low carbon economy to ensure security of energy supply.[251]

Both nuclear and thermal power stations rely on water for cooling efficiency. Access to through flow water cooling, such as that offered at coastal locations improves efficiency by 2%, potentially saving up to £200 million per year, offering the added benefit of efficiency through reduced greenhouse gas emissions. The nature of the fuel directs nuclear facilities to be located based on cooling requirements; invariably they are constructed on the coasts.

Current situation

Nuclear power in the UK is produced from two types of reactor, pressurised water reactors and advanced gas cooling reactors.

Within the South marine plan areas, Dungeness B is the only operating nuclear facility, following the decommissioning of Dungeness A in 2006. This site is owned by EDF Energy and located on Romney Marsh, Kent, with the two reactors providing

[249] National Policy Statement for Energy (EN-1) 3.5.1 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/37046/1938-overarching-nps-for-energy-en1.pdf

[250] Dukes 2013, chapter 5, page 117 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/279546/DUKES_2013_Chapter_5.pdf

[251] National Policy Statement for Energy (EN-1) 4.7.4 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/37046/1938-overarching-nps-for-energy-en1.pdf

a combined capacity of 1, 110 MW[252] with capacity to generate enough electricity to supply 1.5 million homes. Through its location on Romney Marsh a constant supply of cooling water can also be sourced from seawater in the area.[253] The outputs derived from Dungeness B will help contribute to the UK legally binding EU target for 15% of energy consumption to come from renewable sources by 2020.[254]

In the South inshore plan area, there are two operational thermal power stations; Marchwood and Shoreham[255], both of which utilise combined cycle gas turbines. While Marchwood also has facilities in place to use steam generated from waste gasses to generate further energy from an additional turbine on site[256]. The government identifies carbon capture and storage technology as a means of providing low carbon energy derived from fossil fuels. There is no expectation of developments of this sort in the South marine plan areas, although this is covered in greater depth in section 2.6.4 of this report.

The nuclear sector continues to make a major contribution to both the national and local economy, something which will continue as decommissioning projects begin to take place. Dungeness B supported 554 jobs in 2012 and contributed £29 million to the local economy.[257]

Current policy

National Policy

The Department of Energy and Climate Change has produced a number of national policy documents for energy infrastructure which set out how national policy is to applied and considered. Those relevant to nuclear power are the overarching National Policy Statement for energy (EN-1) and the national policy statement for Nuclear Power Generation (EN-6).

The UK government has highlighted an urgent need for new electricity generation, including nuclear power if it is to meet national and international targets of an 80% reduction in greenhouse gas emissions by 2050, compared to 1990 levels.[258]

The role of nuclear power generation is expected to become increasingly important to the UK energy supply, government policy directing that nuclear power should be able to generate as much energy as possible to contribute towards to the UK's need for new capacity (EN-1).

[252] Department of Energy and Climate Change, Maintaining UK Energy Security, Table of past and present UK nuclear reactors
www.gov.uk/government/publications/table-of-past-and-present-uk-nuclear-reactors
[253] Draft South Marine Plan Futures Analysis 2013 para 8.2.1
[254] The Marine Policy Statement (2011), Energy production and infrastructure development, p 3.3.2
www.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf
[255] Scottish Power http://www.spenergywholesale.com/pages/shoreham_power_station.asp
[256] Marchwood Power http://www.marchwoodpower.com/ccgt/
[257] South Marine Plan Futures Analysis 2013 para 8.2.2
http://www.marinemanagement.org.uk/evidence/1039.htm
[258] The Marine Policy Statement (2011), Energy production and infrastructure development, p 3.3.2
www.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf

The National Policy Statement for Nuclear Power Generation (EN-6) identifies eight potentially suitable sites for new nuclear development by 2025, none of which lie within the South Inshore plan areas. The national policy statement has been produced (EN-6) in relation to applications for development for these sites, no alternatives considered suitable. There is therefore no expectation of any new nuclear infrastructure to be built within the South marine plan areas in the short to medium term.

New nuclear power is one of the three key elements of the government's strategy for decarbonising and diversifying electricity production by 2050.[259] The government believes that new nuclear plant is likely to become the least expensive form of low carbon electricity generation,[260] with 16GW of new nuclear power proposals intended to be put forward by 2025.[261]

Sub-national policy

While no reference has been made regarding nuclear activity in sub national policy, Kent County Council has produced a local minerals and waste development framework that addresses the management of nuclear waste. Any waste generated from Dungeness B is disposed of at licensed engineered disposal sites or transported to sites at Sellafield and Drigg in Cumbria for disposal.

[259] National Policy Statement for Energy (EN-1) 3.5.6 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/37046/1938-overarching-nps-for-energy-en1.pdf

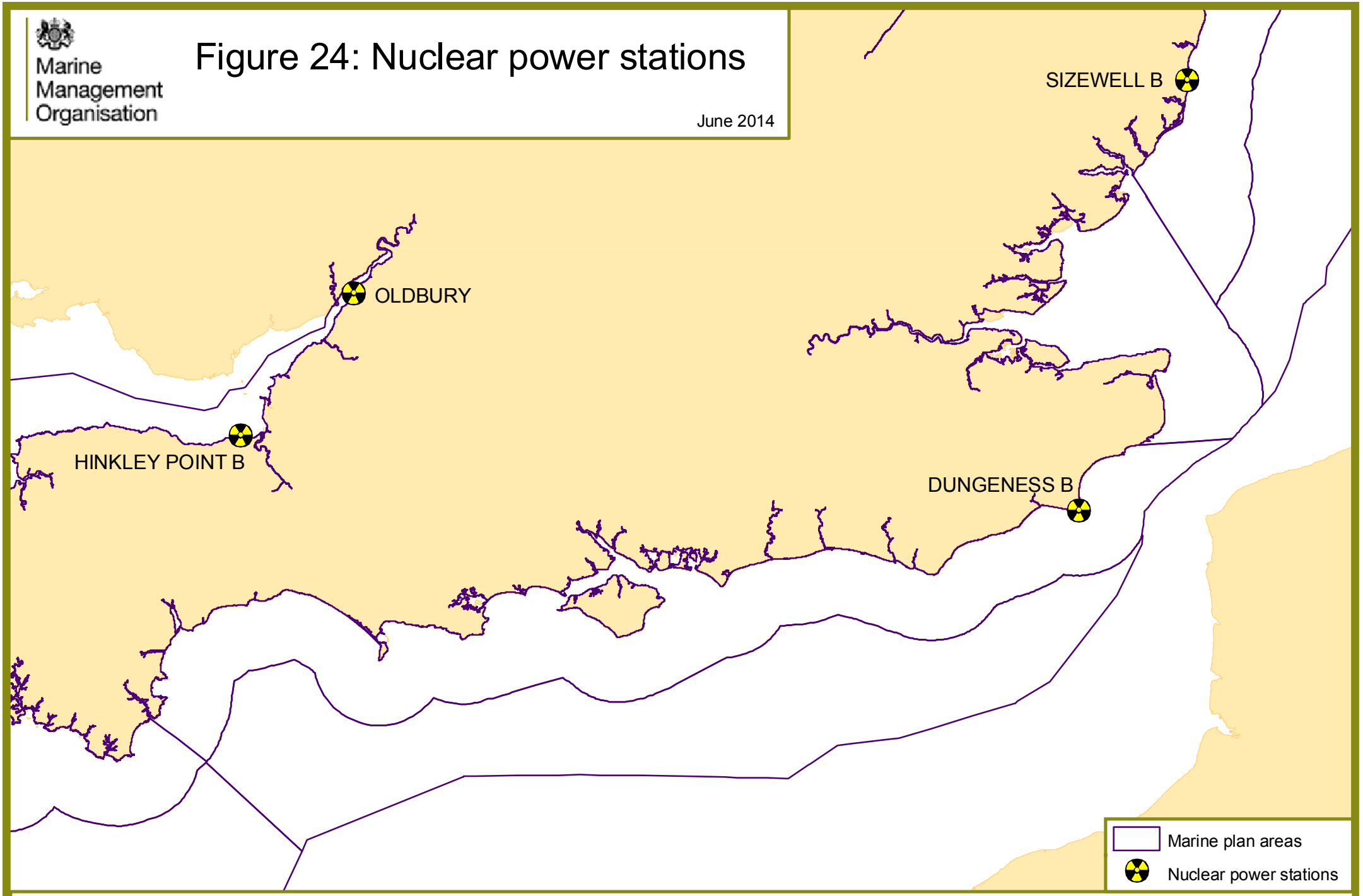
[260] National Policy Statement for Energy (EN-1) 3.5.8 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/37046/1938-overarching-nps-for-energy-en1.pdf

[261] World Nuclear Association Website Update, Nuclear Power in the United Kingdom www.world-nuclear.org/info/Country-Profiles/Countries-T-Z/United-Kingdom/

Marine Management Organisation

Figure 24: Nuclear power stations

June 2014



Future trends

Dungeness B is currently set to start its decommissioning process in 2018 although there is the possibility of extending its reactor life until 2028[262] any extension subject to commercial and safety reviews. The government's Suitable Site Assessment (EN-6) did not identify any possible sites for development in the South marine plan areas and any new proposals that come forward during the lifetime of the marine plans must still be in accordance with the National Policy Statement for Nuclear Power Generation (EN6). Any such proposal in the South marine plan areas would be highly unlikely given the outcomes of the suitable site assessment (EN-6).

In 2006 decommissioning began at the Dungeness A site, expected to run until 2033 where the final stages of the care and maintenance plan preparations will then be completed. During this time economic benefit will reduce, with a major reduction of on site employment. It is estimated that around 260 jobs will be lost between 2017 and 2019 from 310 during 2011/2012 down to 50 in 2018/2019.[263] However, there could be some socio-economic benefits for the area once the site is fully decommissioned. Opportunities for employment roles and potential skills development could look to boost income opportunities, such as redevelopment of the site which could lead to further income generation.

Where any decommissioning or future developments take place this should be carried out in line with EN6. The National Policy Statement clearly outlines policies which have been designed to minimise adverse effects on marine ecology.

Potential core issues

Impacts on the coastline and exiting coastal infrastructure must be taken into account when any nuclear infrastructure development takes place. For Dungeness B this will relate to the current operations and also the decommissioning of the site, as opposed to further developments within the South marine plan area.

Assessments of any effects on the marine environment or existing coastal practices would be taken into account through the required environmental assessments.

Interactions with other sectors

Where dredging and disposal forms part of any of the decommissioning process it is possible that it would require a marine license. If this were the case through the licensing process and the assessment of any application, consideration would be given to any appropriate mitigation measures[264] identified and the relevant bodies notified. Impacts to any protected areas around the coast would also be assessed as part of this process.

[262] EDF Energy - Our Nuclear Power Stations http://www.edfenergy.com/about-us/energy-generation/nuclear-generation/nuclear-power-stations/

[263] Romney Marsh Economic Impact Assessment and Socio-Economic Action Plan – Oct 2011 www.sitestakeholdergroups.org.uk/dungeness/upload/Romney-Marsh-Economic-Impact-Assessment-and-Socio-Economic-Action-Plan-October-2011.pdf

[264] Overarching National Policy Statement for Energy (EN-1), Coastal Change, p 5.5.17 www.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

Issues for sustainability

The National Policy Statement EN6 highlights a number of impacts from nuclear power including:

- flood risk
- water quality and resources, including temperature changes to water and radionuclide emissions
- coastal change and impacts upon this, including water temperature changes
- biodiversity and geological conservation
- landscape and visual impacts
- socio-economic
- human health and wellbeing.

2.7 Ports

Ports carry out a wide variety of activities including cargo handling, waterborne freight transport and shipbuilding and repair. These operations are supported by secondary activities including storage and warehousing, civil engineering works, rail and road freight transport.[265]

Current situation

The South Inshore plan area hosts a number of English Channel ports serving freight, passenger and fishing industries as well as leisure interests, with 47 ports and harbours, the majority being smaller ports, catering primarily for fishing and leisure markets.[266] Some ports will be involved in national markets but there is a significant majority of ports which are very much concerned with regional and local markets, focussed on Europe, and these ports are common along the coast of the South plan areas.[267]Around 500 commercial vessels per day use the Dover Strait Traffic Separation Scheme.[268] This traffic has a significant bearing upon the business of these ports.

The majority of port activity is driven by trade with other EU member states. This is reflected in the high proportion of Roll on-Roll off traffic in the UK, amounting to 14% of all traffic. Containers, largely generated by international traffic but nevertheless with a high proportion of feeder traffic from the Continent, represent 10 % of the total UK market.[269]

In contrast to ports in many other countries, the UK port industry is mainly owned and managed by the private sector or as Trust Ports and while there are a number of plans and strategies in place at a local level, the development of marine plans has the potential to be helpful to the industry in the absence of other large scale spatial plans.

[265] UKMMAS (2010) Charting Progress 2 Feeder Report: Productive Seas. Report to Defra, http://chartingprogress.defra.gov.uk/
[266] ABPmer (2013) South Marine Plan Futures Analysis. A report produced for the Marine Management Organisation by ABP Marine Environmental Research Ltd. MMO Project No: 1026-10.
[267] Adapted from personal communication with BPA, 9th July 2013
[268] BMT Isis (2009), Reducing Risk in the English Channel/La Manche Traffic Separation Schemes, Report for Maritime and& Coastguard Agency, May 2009
[269] Personal communication with BPA, 9th July 2013

Ports include Southampton, the fourth largest port in the UK in terms of freight tonnage, a leading passenger port, and plays an important role in deep sea shipping (which includes the transport of consumer goods from the Far East and energy supplies). Other notable commercial ports and harbours include Teignmouth, Portland (that includes a refuelling facility for deep draught vessels), Weymouth, Poole, Portsmouth, Shoreham, Newhaven and Folkestone. Smaller ports include Dartmouth, Exmouth, Lyme Regis, Christchurch, Lymington, Hamble, Eastbourne and Chichester.[270] The ports in the South Inshore plan area received around 9.4% of shipping traffic in the UK, based on port ship arrivals in 2011.[271] [272] In the Solent area, ports facilitate important passenger services serving the Isle of Wight.

A significant proportion of all non-EU seaborne trade passes through the Port of Southampton, more than any other port in the UK. The port accommodates a range of trades of national importance in the container, cruising, oil and petrochemicals, and motor vehicles sectors.[273] Within harbours and estuaries, the overall frequency of shipping movements (for all commercial vessels including ferries) can be very high. There were more than 64,000 shipping movements within Southampton Water during 2012[274] and more than 5,000 commercial vessel movements within Poole Harbour.[275]

Ports generally employ fewer people today than they did 30 years ago, whilst the industry continues to make a significant contribution to the UK economy.[276] Ports in the plan area handled 46 to 53 million tonnes of cargo a year over the last decade, although data indicates that the ports are currently at the lower end of this range, handling 46.5 million tonnes in 2011, showing on overall a declining trend since 2007.[277]

Ferry passenger numbers have reduced in recent years. International sea passenger movements in the major passenger ports (Newhaven, Portsmouth, Southampton, Poole and Weymouth) have declined around 48% from 4.4 million in 2002 to 2.3 million in 2012.[278] However, this decline should be treated with caution, the reduction in numbers may not indicate a continuing trend with the possibility of a stable level of passenger traffic having been reached.[279]

[270] ABPmer (2013) South Marine Plan Futures Analysis. A report produced for the Marine Management Organisation by ABP Marine Environmental Research Ltd. MMO Project No: 1026-10.
[271] Department for Transport (2012) UK Ports, ship arrivals by type and deadweight: 2011, 10 November 2012. www.gov.uk/government/statistical-data-sets/port01-uk-ports-and-traffic
[272] This excludes the ferry traffic to and from the Isle of Wight.
[273] BMT Isis (2009), Reducing Risk in the English Channel/La Manche Traffic Separation Schemes, Report for Maritime and& Coastguard Agency, May 2009
[274] ABP, 2013, personal communication.
[275] Poole Harbour Commissions (PHC), 2012. Poole Harbour Commissioners Draft Master Plan – Version 2. Poole: Poole Harbour Commissioners. 76 pages.
[276] Marine Management Organisation, 2011. Maximising the socio-economic benefits of marine planning for English coastal communities. Final Report. July 2011.
[277] Department for Transport (2012) UK Ports, ship arrivals by type and deadweight: 2011, 10 November 2012. www.gov.uk/government/statistical-data-sets/port01-uk-ports-and-traffic
[278] Department for Transport (2012) Sea Passengers Statistics: SPAS01 - UK International Sea Passengers. www.gov.uk/government/statistical-data-sets/spas01-uk-international-sea-passengers
[279] Based on personal communication with the UK Chamber of Shipping, April 2013

Traffic volume handled by UK ports has remained relatively constant over the past decade. Although the number of vessels visiting Southampton in particular has decreased in recent years, reflecting a change in the shipping line alliances (consortia) with the number of containers handled per vessel per port call increasing, demonstrating the achievement of economies of scale.[280] In the last decade South coast ferry ports saw major reductions in ferry passenger numbers. In 2011, Poole handled approximately 253,000 passengers, compared to 586,000 in 2001.[281] In contrast, there has been a sharp increase in the number of cruise ships visiting ports over the same period, Southampton being the busiest cruise port in the UK, with four passenger cruise terminals in operation. In 2012, over 1.6 million cruise passenger movements were recorded at the port from over 400 cruise ship calls, up from 702,000 passenger movements in 2007.[282] [283] [284]

Given the volume of vessel traffic in the South plan areas, anchorages play a particularly important part in their management. For example, the St Helen's anchorage located off Bembridge to the east of the Isle of Wight is considered to be a critical feature for local harbour authorities. This area has been used as an anchorage for hundreds of years and it is one of a few in the South plan areas that provides a safe haven for vessels, particularly from Westerly gales, and is the closest safe anchorage to the west of the Dover Straits providing protection in strong South Westerly gales.

The Port of Dover in the South East marine plan area has not been considered as part of this report. A significant amount of marine traffic from Dover adjacent to the Eastern boundary of the South marine plan area transits the South marine plan areas.

Current policy

The National Policy Statement for Ports recognises the essential role ports and harbours play in the UK and sets out the need for new port infrastructure, defining the approach that should be taken to proposals including the main issues which will need to be addressed. It illustrates the need to cater for forecast long-term growth in volumes of sea trade. Further to the National Policy Statement the Department for Transport has established a Ports Strategic Partnership that, among other things, provides an overview of activities being taken forward to deliver an overarching ambition of a thriving ports industry.[285] This partnership articulates a framework for discussion regarding future strategic development.

[280] Personal communication with ABP, 12th April 2013.
[281] DfT, 2012a. UK Port Statistics 2011. Department for Transport. www.gov.uk/government/organisations/department-for-transport/series/ports-statistics.
[282] ABP (2009) Port of Southampton Master Plan 2009 - 2030. www.southamptonvts.co.uk/admin/content/files/PDF_Downloads/Master%20Plan/SMP.pdf
[283] ABP (2012) Port of Southampton Vessel Traffic Services. www.southamptonvts.co.uk/
[284] Personal communication with ABP, 12th April 2013.
[285] Ports strategic partnership plan: a framework for discussion between government, industry and trade unions. September 2013. https://www.gov.uk/government/publications/ports-strategic-partnership-plan-a-framework-for-discussion-between-government-industry-and-trade-unions

Ports and harbours have wider statutory responsibilities as harbour authorities including an overall duty to ensure safety of navigation.[286] To manage this responsibility harbour authorities may propose Special Directions, in compliance with the Harbour Act 1964 and following engagement with others, that empower them in relation to a number of management measures. Such measures may include wide ranging powers to direct vessels within the harbour, prevent navigational obstructions, the regulation of navigational safety and conduct of vessels within the harbour.

Ports and harbours operate under an 'open port duty' (as required)[287] for 24 hours a day, 365 days a year. They handle a wide variety of trades that need to be accommodated and therefore benefit from certain permitted development rights meaning that land within the port may at any time be used for any port operational purpose. Port operations conform with stringent safety and security requirements within a 'market led' industry, where competition between different ports is encouraged because of the economic benefits that result[288] and to make maximum use of its existing land (minimising use of greenfield sites).[289]

Ports provide infrastructure for multiple activities and manage quayside space they provide. Ports are supported in sub-national plans by different authorities, this is summarised in the table below (note that this table is not exhaustive and is presented for illustrative purposes only). Beyond commercial operations, ports and harbours often provide recreation-related infrastructure including marinas. Sub-national considerations related to tourism and recreation activities are covered elsewhere in the relevant section of this report.

[286] C-SCOPE, 2010. Ports and Shipping Topic Paper. http://www.cscope.eu/_files/results/activity_1/dorset/topic_papers/Ports%20and%20Shipping%20Topic%20Paper.pdf
[287] Section 33 of the Harbours, Docks and Piers Clauses Act 1847
[288] Department for Transport, 2012. National Policy Statement for Ports. Paragraph 3.3.1 and 3.4.13
[289] Department for Transport, 2012. National Policy Statement for Ports. Paragraph 3.3.3

Table 7: Local planning policy in the South and references to port activity

	Draft Adur Local Plan (2012) – Shoreham Harbour	Arun District Council Draft Local Plan – Littlehampton and Pagham harbours	Brighton and Hove City Council Draft LDF – Shoreham Harbour	Dorset AONB Coast 2009-14	Teignbridge Local Plan 2013-2033	Chichester Harbour AONB Management Plan 2014-19	Gosport Borough Local Plan 2011-2029	Isle of Wight Island Plan – East Cowes and Medina Valley	Southampton LDF	Poole Core Strategy	Weymouth and Portland Local Plan	Havant LDF	Portsmouth Plan	Rother District Plan – Port of Rye
Regeneration and diversification beyond port or harbour use	Y		Y											
Supporting improvement of port operations / infrastructure and / or promote and facilitate growth	Y		Y					Y	Y	Y			Y	
Safeguarding measures to manage impacts upon ports or harbours		Y			Y	Y	Y		Y	Y	Y	Y	Y	Y
Support port or harbour master plan	Y		Y											
Encourage sustainable transport			Y	Y					Y	Y	Y			Y
Maintaining the character of a port or harbour space						Y								
Commitment to port or harbour focussed plan or strategy development	Y		Y					Y		Y	Y			

Local Development frameworks and Core Strategies are complemented at County level by local authorities' Minerals and Waste plans. These address matters such as those appearing in the Hampshire Minerals and Waste Plan that includes the need to safeguard appropriate land which may become available / be released within the plan period from existing uses for minerals and/or waste wharfage.

Port and harbour master plans set out the way ports intend to develop over a given time period. These are not statutory, but are important tools supporting an understanding of their aspirations and how they can be supported where appropriate. Shoreham Port Master Plan has been endorsed by the three Local Authorities in the area and identified as a material consideration for determining planning decisions within the Harbour in the Local Authorities' Plans.[290] [291] A summary of policy priorities for the port and harbour master plans available for ports in the South Inshore plan area is provided in the 'futures' section.

Value of the activity

Direct employment in the United Kingdom ports sector is estimated to be around 117,200 full time equivalents. For more detail on methodologies, please see the reports referenced. [292] [293] [294] [295] An estimated 24,601 jobs are indirectly related to the industry, based on UK indirect employment in the sector,[296] and 153 businesses in the plan area are involved with ports, based on UK information from the Annual Business Survey. The total Gross Value Added of the sector is currently estimated to be £1,165 million.[297]

Activities taking place at ports have a significant impact on employment in the local area. At the Port of Southampton around 8,300 direct jobs are dependent on the wider port area, indirect employment supported by the port's activities accounting for some 9,370 jobs in the Solent region.[298] Taking into account jobs directly and indirectly supported by the oil terminals and defence installations, the port supports around 14,640 in the wider Solent region.[299] The port's role as a major employment generator becomes more important when considering the local levels of

[290] Brighton and Hove City Council's LDF draft (Core Strategy February 2013 - draft) http://www.brighton-hove.gov.uk/content/planning/local-development-framework
[291] Draft Adur Local Plan 2012 http://www.adur-worthing.gov.uk/adur-ldf/adur-local-plan/#draft-adur-local-plan-2012
[292] Department for Transport, 2012. National Policy Statement for Ports
[293] Department for Transport (2011) Sea Passenger Statistics 2011. Available from: www.gov.uk/government/publications/sea-passenger-statistics-2011
[294] Oxford Economics (2013) The Economic Impact of the UK Maritime Services Sector: Ports, A report for Maritime UK (including regional breakdown), February 2013, www.britishports.org.uk/sites/default/files/ports_2012_final_report.pdf
[295] Department for Transport (2011) UK Port Freight Statistics 2011 Final Figures. Available from: www.gov.uk/government/publications/port-freight-statistics-2011-final-figures
[296] Oxford Economics (2013) The Economic Impact of the UK Maritime Services Sector: Ports, A report for Maritime UK (including regional breakdown), February 2013, www.britishports.org.uk/sites/default/files/ports_2012_final_report.pdf
[297] Inflated to 2013/14 values
[298] Atkins (2011) Economic Impact of the Port of Southampton, Final Report to Marine South East, August 2011. www.marinesoutheast.co.uk/docs/research/
[299] Oxford Economics (2013) The Economic Impact of the UK Maritime Services Sector: Ports, A report for Maritime UK (including regional breakdown), February 2013, www.britishports.org.uk/sites/default/files/ports_2012_final_report.pdf

unemployment, low economic activity rates and relatively high levels of deprivation.[300] These estimates of employment associated with the Port of Southampton exclude employment attributed to cruise operations, generating around 1,200 jobs in the local area.[301]

Businesses directly linked to the operation of the Port of Southampton generate a turnover of £772 million a year (excluding oil activities),[302] with port businesses spending approximately 50% of their expenditure in the Solent, 20% in the rest of the South East and 20% in the rest of the UK, the remainder associated with international suppliers. The port's supply chain is therefore a significant driver for local and regional economies. Taking into account indirect turnover, the port generates some £1.27 billion of Gross Domestic Product a year at the Solent level, compared to £1.81 billion at the national level.[303]

The Port of Portsmouth directly employs of 805 full time equivalent jobs and injects £38.7 million into the greater Portsmouth area. Indirectly, these figures rise to 1,595 full time equivalent jobs supported by port activity and a total estimated £71.3 million output throughout the greater Portsmouth area economy.[304]

Similarly important economic relationships can be observed in relation to other ports and harbours in the South Inshore plan area, where they are major employers and support a strong and growing maritime supply chain.

Port activity is inextricably linked to shipping and both must be adaptable so as to respond to changes in local, regional and global trade patterns. Dredging and disposal are both important activities to enable vessels to access ports and harbours.

Future trends

Drawing upon port master plans (or similar), Table 8 offers an overview of aspirations that, alongside responding to market demand, will direct and manage activity at ports in the South Inshore plan area. These aspirations are described over varying timescales set out within each plan and this should be borne in mind when considering them in relation to marine plans that look to a 20 year time horizon. It should be noted this table is not exhaustive eg it does not include non-specific statements such as a general commitment to development, and is for illustrative purposes only.

[300] Oxford Economics (2013) The Economic Impact of the UK Maritime Services Sector: Ports, A report for Maritime UK (including regional breakdown), February 2013, www.britishports.org.uk/sites/default/files/ports_2012_final_report.pdf

[301] Based on information provided by stakeholders at a MMO workshop held in London, 25th March 2013

[302] Atkins (2011) Economic Impact of the Port of Southampton, Final Report to Marine South East, August 2011. www.marinesoutheast.co.uk/docs/research/

[303] UKMMAS (2010) Charting Progress 2 Feeder Report: Productive Seas. Report to Defra, http://chartingprogress.defra.gov.uk/

[304] PIP, 2011. Portsmouth International Port Master Plan. www.portsmouth-port.co.uk/about_us/port_master_plan.

While existing plans provide an overview of likely activity to come, likely growth patterns can also be gleaned from annual business plans such as that available for Langstone Harbour. This sets out that the importation of sea dredged aggregates provides around 30% of income (2008/09 figures), noting that Langstone Harbour has very limited wharfage and infrastructure with limited opportunity for expansion. The UK government believes that there is a compelling need for substantial additional port capacity over the next 20 to 30 years, to be met by a combination of development already consented and those for which planning applications have yet to be received.[305]

The continued success of ports and harbours in the South plan areas (particularly larger ones) will in part be dependent upon ongoing deep-water access and provision of sheltered approach channels, enabling ports to maximise opportunity from their proximity to near continent and international shipping lanes.[306] It is likely that the largest absolute increases in trade volume are likely to occur through the Port of Southampton. Analysis to 2030 suggests increases of total tonnage from 38.83 million tonnes in 2005 to approximately 62.66 million tonnes by 2030.[307] Significant port expansion would be required to realise these trade volumes. The Port of Southampton Master Plan (2009-2030) identifies plans for future development at Dibden Bay, as also recognised by New Forest District Council.

[305] DfT (2012) National Policy Statement for Ports, January 2012, http://assets.dft.gov.uk/publications/national-policy-statement-for-ports/national-policy-statement-ports.pdf www.gov.uk/government/publications/national-policy-statement-for-ports
[306] Personal communication with ABP, 12th April 2013.
[307] ABP, 2009. Port of Southampton Master Plan 2009-2030. http://www.southamptonvts.co.uk/Port_Information/Commercial/Southampton_Master_Plan/

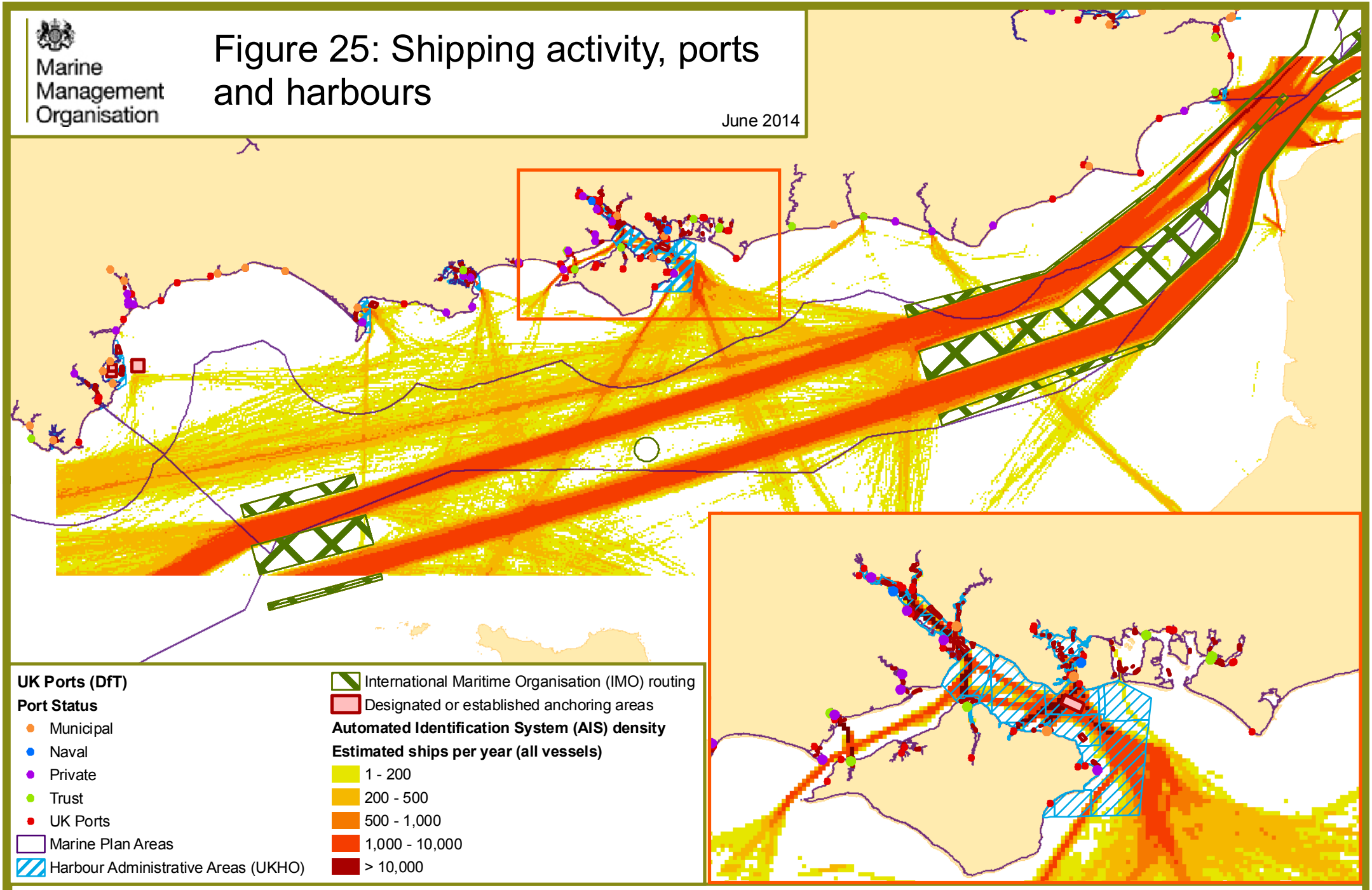
Table 8: Summary of the port master plans' aspirations in the South Inshore plan area

	Port of Southampton Master Plan 2009-2030	Newhaven Port Master Plan 2012	Poole Harbour Commissioners Master Plan 2012	Portland Harbour Authority Marine Spatial Plan 2008	Portsmouth International Port Planning to 2026	Shoreham Port Master Plan 2010	Port of Dover Master Plan
Intensification of land use for key trade activity	Y						
Accommodate growth in deep sea vessel activity	Y			Y			
Accommodate growth in container activity	Y		Y	Y		Y	
Accommodate growth in Ro-Ro activity	Y	Y	Y	Y	Y	Y	Y
Accommodate growth in cruise activity	Y		Y	Y	Y	Y	
Accommodate growth in dry bulks and/or general cargo	Y		Y	Y		Y	Y
Accommodate military shipping and operations				Y			
Accommodate low carbon technology facilities	Y	Y	Y				
Accommodate fishing and/or leisure use		Y	Y	Y			
Provision of additional infrastructure or access	Y	Y	Y	Y	Y	Y	Y
Working with others on connectivity	Y	Y	Y		Y		Y
Working sustainably and with sensitivity towards the environment	Y	Y	Y	Y			
Providing space for the public and/or the environment		Y	Y	Y		Y	
Redevelopment of existing port areas / jurisdiction for other uses				Y		Y	

Marine Management Organisation

Figure 25: Shipping activity, ports and harbours

June 2014



Within the South marine plan areas, there are two proposed Round 3 offshore wind farm developments, Navitus Bay and Rampion. Neither wind farm has received development consent from government. The earliest date for construction is 2014 (for Rampion) and 2017 (for Navitus Bay). For more information regarding these developments please see the offshore wind energy section of this report.

Should the development be granted approval, E.ON has selected Newhaven Port as their operations and maintenance base for the Rampion wind farm and would invest in the modernisation and redevelopment of Newhaven Port. Navitus Bay has yet to identify the most suitable port for their base with Poole, Portland, and Yarmouth currently being considered.

As a consequence of the trend towards larger vessels, access to ports dependent on suitable tidal conditions is likely to become increasingly constrained. Increases in the numbers of deep-draughted, wider vessels has already affected navigation within tidally-constricted ports. This will remain a key driver for the need for commercial ports to deepen and/or widen navigation channels.[308] An alternative response to the challenge of increasing numbers of larger vessels may be to employ short-sea shipping whereby intermediary relay-vessels are involved with transfer of goods at sea, enabling transport of goods between larger vessels and ports.[309] Such an approach would potentially enable use of a wide range of ports, making use of current capacity and capability. However, this radical reorganisation would be dependent upon progress in a number of areas, including development of a range of new technologies, to be considered feasible. It could also be affected by existing and future shipping patterns, as well as being to some extent dependent on weather conditions.

Commercial ports compete with one another and future port developments outside the South marine plan areas have the potential to draw trade away from this region, to other UK or European ports (though interrelationships are complex due to the wide variety of types of trade passing through ports). An example of this at the UK level is competition between Thames Ports and ports on the South Coast, particularly in light of the London Gateway development. Beyond the UK, it is possible that more non-European cargo may be first landed in the Port of Rotterdam before being transported to the UK via short-sea trade routes from the Netherlands.

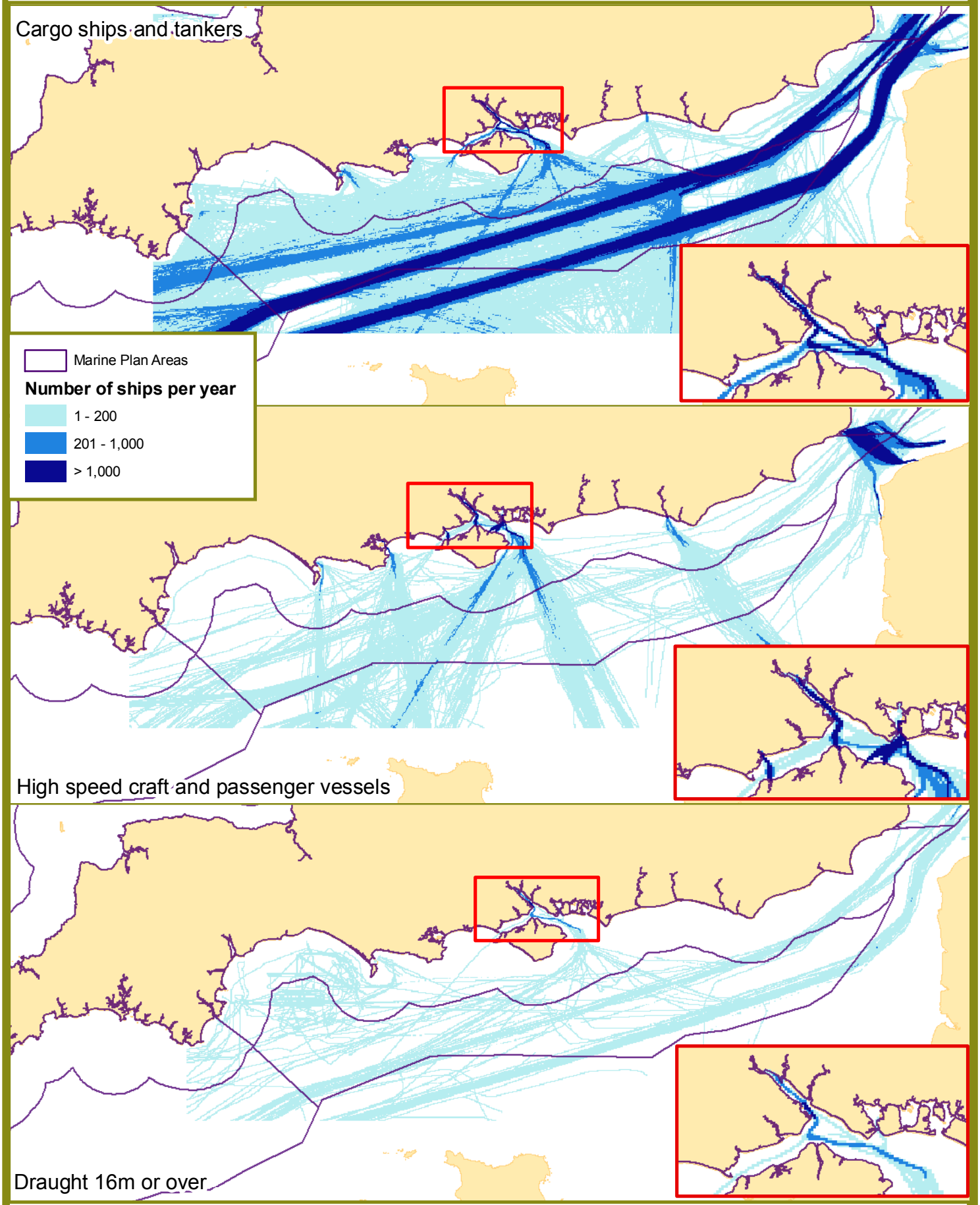
While a range of possible port and harbour developments have been identified here, it should be noted that they may not necessarily require change to the footprint of sites, rather reconfiguration to enable facilitation of prioritised activities.

[308] UKMMAS, 2010. Charting Progress 2: An assessment of the state of UK seas. Prepared by the UK Marine Monitoring and Assessment Strategy (UKMMAS) community July 2010.
[309] Channel Arc Manche Integrated Strategy (CAMIS), the Channel in 2030. https://camis.arcmanche.eu/stock/files/user4/11_The_Channel_in_2030.pdf

Marine Management Organisation

Figure 26: Shipping activity by type

June 2014

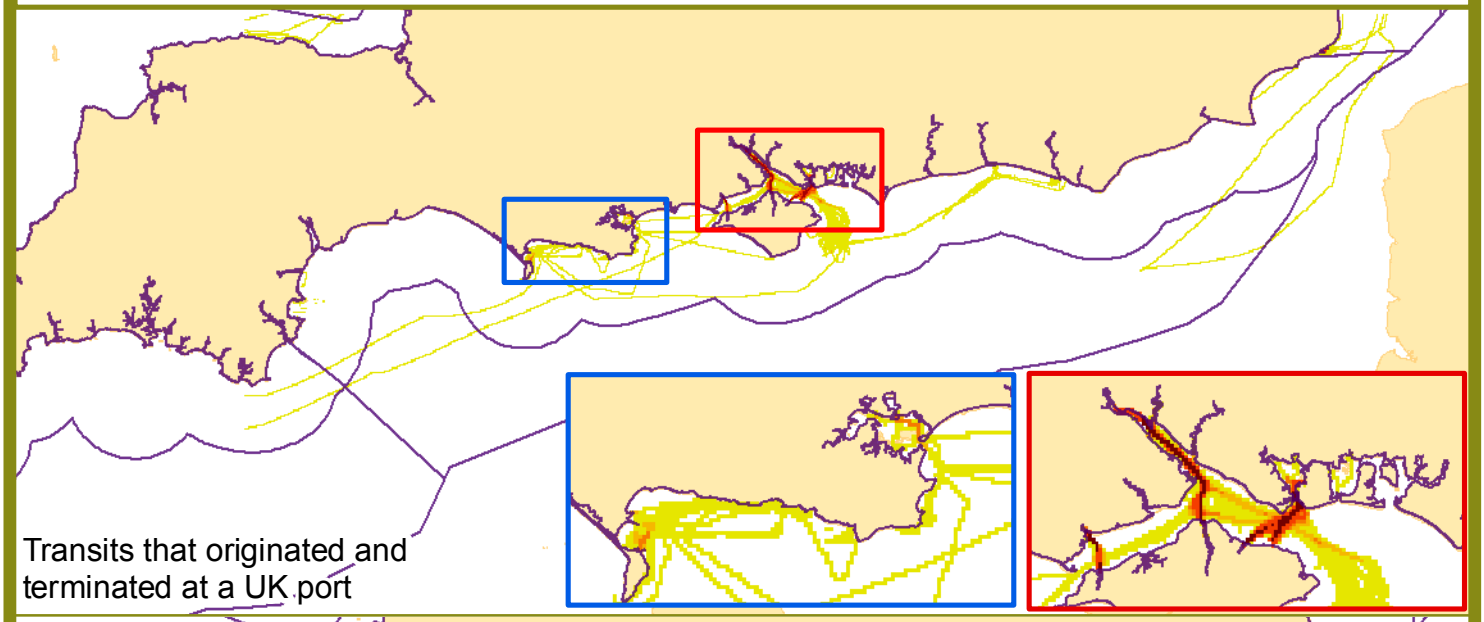


Map produced in ETRS89 UTM 30N. Contains Ordnance Survey and UK Hydrographic Office data © Crown copyright and database right 2014. Marine Management Organisation

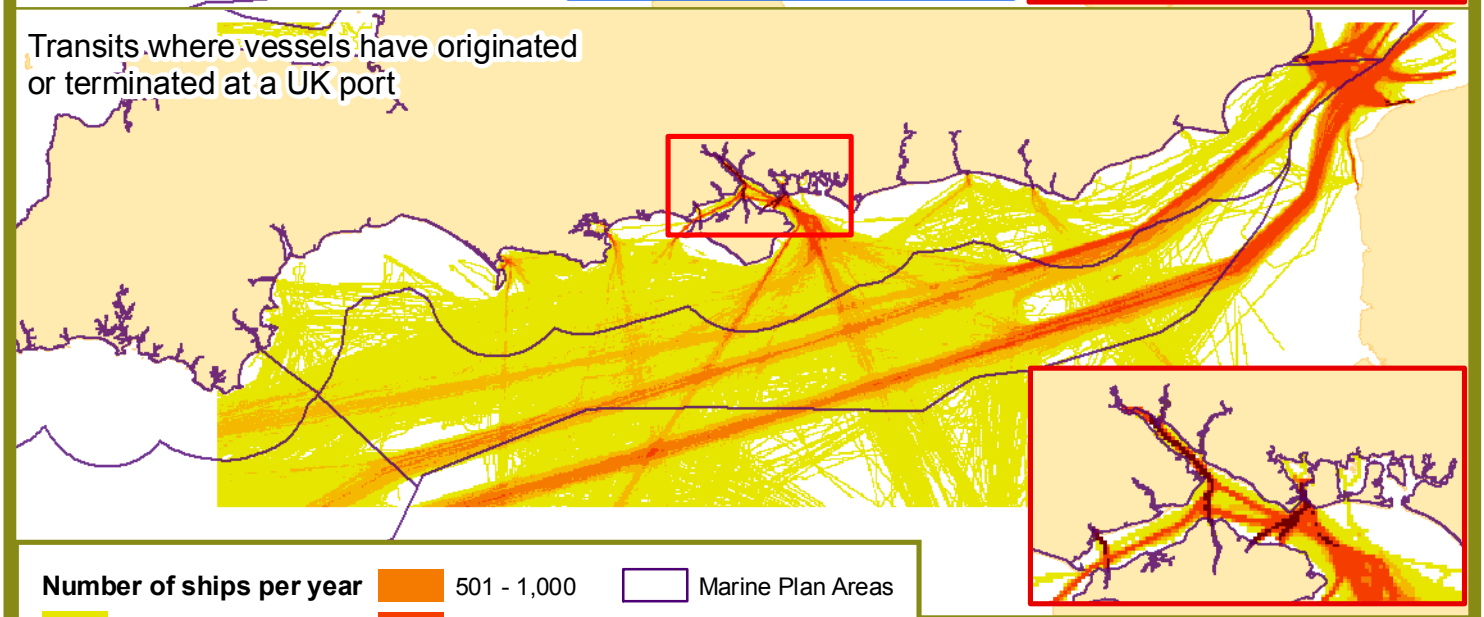
Marine Management Organisation

Figure 27: Shipping transit patterns

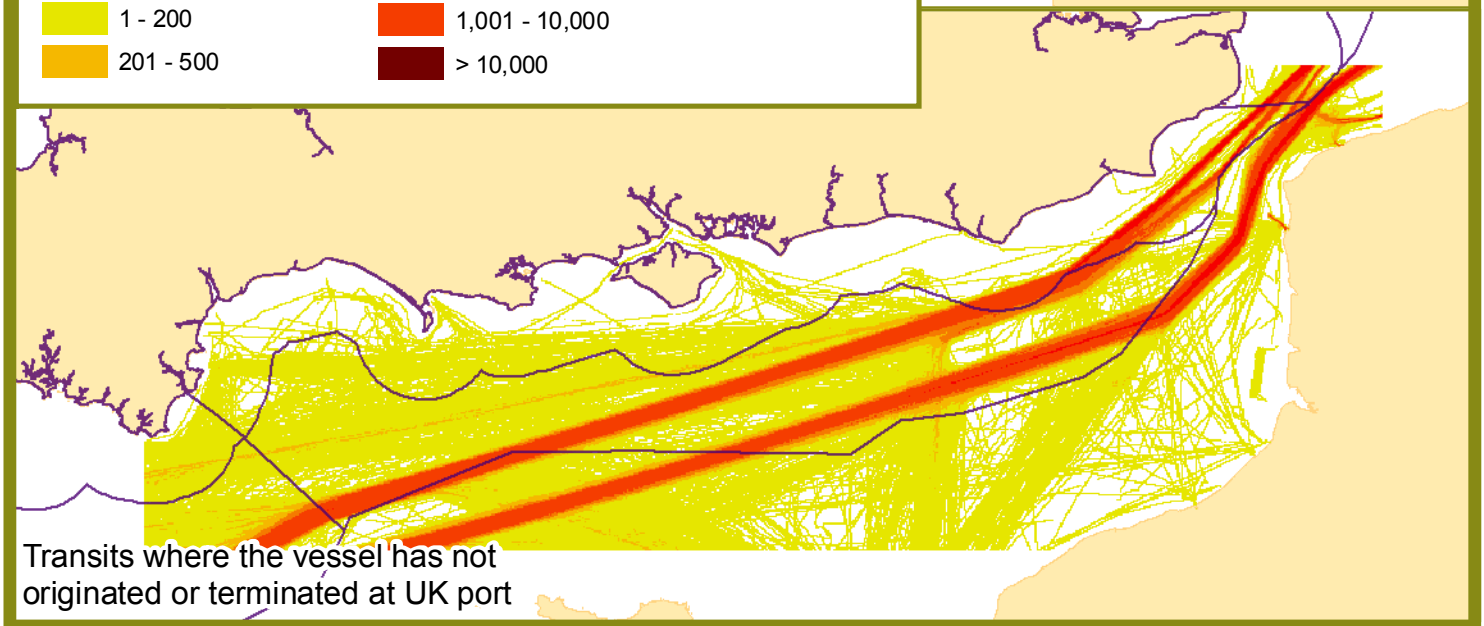
June 2014



Transits that originated and terminated at a UK port



Transits where vessels have originated or terminated at a UK port



Transits where the vessel has not originated or terminated at UK port

Number of ships per year

- 1 - 200
- 201 - 500
- 501 - 1,000
- 1,001 - 10,000
- > 10,000
- Marine Plan Areas

Potential core issues

- access restrictions may arise should dredging regimes not be maintained, or if future port development opportunities are restricted. This may result in the following issues:
    - ports which cannot meet the requirements of users operating within the global market place may cease to be commercially attractive, with consequent loss of trade.
    - loss of revenue would potentially have an effect on direct and indirect employment levels in the local and regional economy and reduce the potential for future private investment, a key requisite and commercial imperative for any major port operation.
- the variations in scale and markets served by ports in the South Marine Plans Areas means that their resultant impacts and benefits will be different. Marine plans will need to understand this in order to add value to existing policy.

Interactions with other sectors

The construction of additional port facilities may be required on the Dibden reclaim between 2021 and 2027,[310] as this is the only place for significant expansion of the Port of Southampton. The Port of Southampton is seeking to safeguard the site in the New Forest District Council Local Plan. Further to this, the Hampshire Minerals and Waste Plan safeguards land which may become available/be released from existing uses within the plan period, so that its use for minerals and/or waste wharf or rail depot infrastructure can be considered.[311] However, this Minerals and Waste Plan does not safeguard the site for port uses. It is likely that Associated British Ports will commence a master planning exercise of the proposed development within the next six years or so.[312] Master planning will no doubt include consideration of the prevailing designations at or adjacent to the Dibden Bay site as any impact upon these will need to be carefully managed.

Traditional activities associated with ports in the South Inshore plan area include commercial shipping (management of related goods), provision for recreation and landing of aggregates. Increasingly, facilitating the installation and maintenance of offshore renewable energy projects will become a part of the port activities.

Given future changes in shipping activity and the need for ports to manage this, anchorages will continue to play a part in the management of vessels. Where ports accommodate more and/or larger vessels, anchorage use patterns interact with the activities of others. This is particularly likely where shipping activity in and around ports is already relatively intense. The role of marine planning in mitigating potential impacts across all sectors with respect to anchorages will need to be determined with stakeholders in accordance with the national and international approaches to the management of shipping activities as plans are developed.

[310] Marine Management Organisation (2013) South Marine Plan Futures Analysis. A Report produced for the Marine Management Organisation by ABP Marine Environmental Research. MMO Project No: 1026-10

[311] Policy 34 on safeguarding 'land to the north west of Hythe'. Adopted Hampshire Minerals and Waste Plan, October 2013. http://www3.hants.gov.uk/mineralsandwaste/planning-policy-home.htm

[312] Personal communication with ABP, 12th April 2013.

Ports and harbour authorities have ambition to take advantage of development opportunities so as to respond to the emerging demands placed upon them.Where non-port-related activities are developed, it would be useful to consider the future needs of ports to identify linked development opportunities and/or conflicts.

Issues for sustainability

The continued operation of ports depends upon the ability to respond to the needs of markets and an ability to accommodate trends in international cargo movement, such as the need for deeper or new channels for vessels with deeper draughts. Many ports and harbours are located in designated areas in estuaries where there is a drive to maintain, and where possible improve, conditions for biodiversity. There may be an ongoing balance to be struck between maintaining the flexibility that enables thriving ports and the long term management of natural resources. Ports play an active role in the management of resources in adjacent estuaries, through implementation of their own plans and acting upon their responsibilities, as well as being actively involved with other initiatives such as Estuary Management Plans, Port and harbour developments tend to involve conservation interests from an early stage, help to overcome issues before they arise.

The impact of climate change upon sea levels may also constitute a long-term issue for ports and harbours to consider in terms of access management. Larger ports and harbours, recognised as key infrastructure providers, have submitted detailed adaptation plan reports as part of directions to report under the Climate Change Act 2008. Overall it is recognised that there is a need for ports to respond to sea-level rise, storm surges, temperature change, high winds, increased rain and snow. This situation being kept under review as uncertainty in predictions makes it difficult to adopt more stringent design thresholds for port and harbour adaptation. Risks include the potential for sea level rise and flooding leading to inundation of port facilities.[313]

2.8 Shipping

Shipping activities include are sea and coastal freight and passenger transport, and cargo handling, marine aggregate vessel transit between ports and production licence areas, and maintenance dredging vessels working between ports and disposal sites. Ancillary activities supporting the sector include dredging for access, disposal of dredged materials, building and repairing of ships, pilotage, berthing, storage and warehousing.[314]

The shipping sector is directly linked to the ports sector. Within the South marine plan areas, the English Channel, one of the busiest shipping arteries in the world,[315] links the North Sea to the Atlantic.

[313] Marine Climate Change Impact Partnership, Marine Climate Change Impacts Report Card 2013. http://www.mccip.org.uk/media/18758/mccip-arc2013.pdf
[314] UKMMAS (2010) Charting Progress 2 Feeder Report: Productive Seas. Report to Defra. Available from: http://chartingprogress.defra.gov.uk/
[315] ABPmer (2013) South Marine Plan Futures Analysis. A report produced for the Marine Management Organisation by ABP Marine Environmental Research Ltd. MMO Project No: 1026-10.

A significant amount of traffic is engaged in transporting goods and people across the Channel, between ferry ports including Weymouth, Poole and Portsmouth. A large proportion of the shipping in the Channel follows well defined routes, but vessels engaged in other activities, such as fishing or recreation, tend to navigate more freely within the area.[316] [317]

Ships transiting through the South marine plan areas minimise the risk of collision by following Traffic Separation Schemes (TSS). Opposing traffic is divided into 'lanes' starting in the West with the Casquets Traffic Separation Scheme and continuing through the Dover Strait Traffic Separation Scheme with around 500 commercial vessels per day transiting.[318] A significant amount of traffic destined for major commercial ports in the Thames, Felixstowe and Rotterdam in the Netherlands passes through the International Maritime Organization shipping lanes in the plan areas.

National and international priorities are the need for ships to be able to navigate in UK waters, and particularly in the approaches to UK ports, without hazard or excessive deviation.

Current situation

While the volume of traffic handled by UK ports and harbours has remained relatively constant over the past decade, there has been a sharp increase in the number of cruise ships visiting and travelling through UK waters.[319] This is in line with evidence suggesting that the UK is the fastest growing cruise market in Europe, with growth of over 250% between 1996 and 2007.[320]

Around 54% of commercial vessels navigating within the South marine plan areas call at UK ports or associated anchorages, or are UK to UK port vessels. Many of these transits are accounted for by passenger ferry services to French and Channel Island ports, in addition to marine aggregate dredgers transiting between ports and production licence areas and maintenance dredging vessels working between ports and disposal sites.[321]

Approximately 45% of all vessel traffic within the South marine plan areas is associated with transitory traffic which does not call at a UK port. Much of this traffic

[316] James, J W C, Pearce, B, Coggan, R A, Arnott, S H L, Clark, R, Plim, J F, Pinnion, J, Barrio Frójan, C, Gardiner, J P, Morando, A, Baggaley, P A, Scott, G, Bigourdan, N., (2010) The South Coast Regional Environmental Characterisation. British Geological Survey Open Report OR/09/51. 249 pp.
[317] ABPmer (2013) South Marine Plan Futures Analysis. A report produced for the Marine Management Organisation by ABP Marine Environmental Research Ltd. MMO Project No: 1026-10.
[318] BMT Isis (2009), Reducing Risk in the English Channel/La Manche Traffic Separation Schemes, Report for Maritime & Coastguard Agency, May 2009
[319] Office for National Statistics (2012) Annual Business Survey, 2011 Provisional Results, November 2012, www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-276587
[320] ABP (2009) Port of Southampton Master Plan 2009 - 2030. www.southamptonvts.co.uk/admin/content/files/PDF_Downloads/Master%20Plan/SMP.pdf
[321] ABPmer (2013) South Marine Plan Futures Analysis. A report produced for the Marine Management Organisation by ABP Marine Environmental Research Ltd. MMO Project No: 1026-10

is to or from major North European ports within the North Sea such as Rotterdam, Antwerp, Hamburg, Amsterdam and Bremen.

The annual count of commercial vessel transits (of 300 gross tonnage and above) passing Beachy Head is around 60,000.[322] In comparison, the annual count of vessel transits passing Portland Bill to the outer boundary of the South Offshore marine plan area is around 28,000. The principal reason for this difference is the location of the East and West bound International Maritime Organization Traffic Separation Scheme (indicated in the map at figure 24).[323]

Traffic intensity within the separation scheme, especially off Folkestone and Dover reaches an average weekly density of 250 vessels in 500 metres. A peak average weekly density of 315 vessels in 500 metres is observed at the intersection between cross channel traffic and the traffic separation scheme.

Cross-Solent ferry traffic from Southampton to Cowes, and Portsmouth to Ryde/Wootton Creek shows average 500 metres density's exceeding 500 transits a week (though it should be noted that another link to the Isle of Wight is provided by the Lymington to Yarmouth service). The peak transit count in the South marine plan areas is recorded in the entrance to Portsmouth Harbour at 165 transits within a 500 metres grid during one day.[324]

Deep draught (that is greater than about 16 metres) vessels (mainly tankers) transiting through the English Channel do not call at UK ports but are instead transit to or from the ports of Rotterdam and Hamburg. Large container vessels do call at ports within the South Inshore plan area, the principal port being Southampton and to a lesser extent, Portsmouth. Locations of deep water anchorages can also be clearly identified, such as those located off to the East of the Isle of Wight, within Weymouth Bay and Tor Bay.

Passenger vessel routes are most closely associated with regular crossings from Poole, Portsmouth and Newhaven to continental European channel ports, with further routes including from Portsmouth to Bilbao. The majority of commercial high speed craft transits are also associated with the cross channel ferry routes from Weymouth, Poole and Portsmouth. The areas are also plied by vessels servicing historically important trade links (both passenger and freight) with the Channel Islands.

Within the South marine plan areas, there are few areas free of commercial traffic greater than 300 gross tonnes. Exceptions are found in isolated mid-channel areas, such as that found to the south of Beachy Head, in between the East and West-bound shipping lanes and within some inshore areas, including Lyme Bay,

[322] MMO (2013) Spatial Trends in Shipping Activity. A report produced for the Marine Management Organisation, MMO Project No: 1042
[323] Department for Transport (2011) Sea Passenger Statistics 2011. Available from: www.gov.uk/government/publications/sea-passenger-statistics-2011
[324] Oxford Economics (2013) The Economic Impact of the UK Maritime Services Sector: Ports, A report for Maritime UK (including regional breakdown), February 2013, www.britishports.org.uk/sites/default/files/ports_2012_final_report.pdf

Christchurch Bay/Poole Bay, the Compton coastal section of the Isle of Wight and within the Selsey Bill to Newhaven coastal embayment. These inshore areas are not a direct transit between ports and therefore see very limited or no commercial shipping.

Trends in cargo vessel arrivals and associated freight tonnages handled in the South Inshore plan area's ports during the period 2001 to 2011 broadly follow the national-scale trends in shipping. From 2001 to 2011 total cargo vessel arrivals in the South marine plan areas declined from 14,422 in 2001 to 12,500 in 2011. However, this is offset against the trend towards increasing size of individual cargo vessels.

Increasing freight tonnage during the period 2001 to 2007 in the South marine plan areas was followed by a sharp decline during the period 2008 to 2011 as a result of the economic downturn. These effects are most evident at Southampton, which experienced a drop in cargo vessel arrivals of around 20% between 2008 and 2009. However, by 2011 the number of cargo vessel arrivals at Southampton had returned to around 5,000 per annum. Between 1980 to 2007 total traffic through Southampton increased by 83%, in spite of two periods of economic recession in the UK in early 1980s and early 1990s (ABP, 2009).

The total Gross Value Added of the shipping sector in the South plan areas is estimated to be £831 million in 2013/14.[325] This figure, derived from the UK Gross Value Added of the sector,[326] and apportioned to the South marine plan areas using two factors. The first based on the percentage of UK shipping revenue from carrying passengers (27%) and passenger movements in the marine plan areas as a percentage of the UK total (28.5%).[327] The second based on the percentage of UK shipping revenue from freight (73%, includes freight transported by passenger vessels)[328] and the number of vessels arriving in the marine plan areas as a percentage of the UK total (9.4%).

Total employment in the shipping sector in the South plan areas, in Full Time Equivalents, is estimated at 21,460 (direct) and 11,700 (indirect). These figures are based on the UK totals apportioned to the marine plan areas considering the percentage of shipping Gross Value Added in the area compared to the UK total (15%).[329] However, the number of businesses operating within the shipping sector is uncertain. Based on the proportion of vessels arriving in the South marine plan areas

[325] This figure is inflated to 2013/14 values
[326] Oxford Economics (2013) The Economic Impact of the UK Shipping Industry, A report for Maritime UK (including regional breakdown), February 2013. www.maritimeuk.org/wp-content/uploads/2012/01/The-economic-impact-of-the-UK-maritime-services-sector.-Shipping1.pdf
[327] Department for Transport (2011) Sea Passenger Statistics 2011. Available from: www.gov.uk/government/publications/sea-passenger-statistics-2011
[328] Oxford Economics (2013) The Economic Impact of the UK Maritime Services Sector: Ports, A report for Maritime UK (including regional breakdown), February 2013, www.britishports.org.uk/sites/default/files/ports_2012_final_report.pdf
[329] Oxford Economics (2012) The Economic Impact of the UK Maritime Services Sector: Ports, A report for Maritime UK (including regional breakdown), February 2013, www.britishports.org.uk/sites/default/files/ports_2012_final_report.pdf

(9.4% in 2011/12) [330] and applying that proportion to the number of businesses identified in the Annual Business Survey,[331] it is estimated that 253 businesses operated in the shipping sector in 2013/14.

The maps provided in this chapter focus on describing the patterns of shipping traffic observed in the South plan areas. For clarity this information is presented on a white background. However, it should be noted that depth of water is a critical consideration for the transit of vessels and while mapping that reflects this factor is not included here, the relevant bathymetry information can be found on the marine planning portal for further context.

Current Policy

Shipping is regulated by global agreements through a specialised UN agency with responsibility for vessel safety and the prevention of pollution from ships, the remit of the International Maritime Organization. Their primary purpose is to develop and maintain a comprehensive international regulatory framework for shipping with a remit including safety and environmental concerns, maritime security; and the efficiency of shipping. International Maritime Organization conventions are wide ranging with concerns including:

- safety of life at sea
- prevention of pollution from ships
- regulations for preventing collisions at sea
- facilitation of international maritime traffic
- management of ships' ballast water and sediments.[332]

As part of an integrated approach to transport planning, Europe and the UK both wish to see growth in shipping and have put in place measures to stimulate this growth, particularly in short sea and coastal shipping.[333] In the UK the Department for Transport has established a Shipping Strategic Partnership that, among other things, provides an overview of activities being taken forward to deliver an overarching ambition of vibrant, quality and sustainable shipping.[334] This partnership articulates a framework for discussion regarding future strategic development.

While shipping is regulated through international measures overseen by the International Maritime Organization, various authorities such as in Dorset are seeking to encourage domestic waterborne transport, building upon pilot services, for a number of reasons.[335] [336] Shipping is a relatively low carbon transport mode so its use for UK to UK port transport can be a way to encourage carbon reduction.

[330] Department for Transport (2011) UK Port Freight Statistics 2011 Final Figures, www.gov.uk/government/publications/port-freight-statistics-2011-final-figures
[331] Office for National Statistics (2012) Annual Business Survey, 2011 Provisional Results, November 2012, www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-276587
[332] International Maritime Organization, www.imo.org/About/Conventions/ListOfConventions/Pages/Default.aspx,
[333] European Commission (2011) Roadmap to a Single European Transport Area
[334] Shipping strategic partnership plan: a framework for discussion between government, industry and trade unions. September 2013. https://www.gov.uk/government/publications/shipping-strategic-partnership-plan-a-framework-for-discussion-between-government-industry-and-trade-unions
[335] Dorset and East Devon Coast World Heritage Site Management Plan 2009-2014.
[336] The Jurassic Coast Marine Links project. http://jurassiccoast.org/waterborne.

Looking across transport modes, waterborne transport in the context of local transport planning can play a part in releasing capacity in other modes. In the South marine plan areas, short sea (UK port to nearby European port) and coastal (UK port to UK port) shipping represents an important characteristic with very frequent journeys across the Solent between the Isle of Wight and mainland ports, with locations involved in these links indicated on figure 27, as well as between South coast ports and Europe. In numerous plans along the south coast including Torbay's Local Transport Plan, the maintenance and improvement of infrastructure supporting these routes is supported (further details in section 2.6).

Several specific measures are being put in place by authorities bordering the South marine plan areas seeking to enable the maintenance, development, diversification and growth of ports and harbours. It is expected that port developments will allow for larger vessels to be accommodated more frequently at the larger ports, while diversification of harbourside activities and facilities including those related to renewable energy will be reflected in an increase in the diversity of types of vessel operation.

Future trends

There are limited alternatives to the use of sea transport for the movement of freight and bulk commodities, freight by air and train constrained by capacity. Consequently, shipping continues to provide the predominant way to move the vast majority of freight in and out of the UK, the provision of sufficient sea port capacity will remain an essential element in ensuring sustainable growth in the UK economy.

Forecasts indicate that UK sea trade will grow by 37% in six years, contributing £700 billion to UK Gross Domestic Product by 2017.[337]

Over the next six years it is expected that the proportion of large vessels transporting goods will continue to increase, international shipping companies including the Roll-on Roll-off and container lines, are continually seeking to achieve economies of scale in the transportation of goods. Similar trends are also observed with cruise ships and passenger ferries, new generation ferries being developed by the main cross channel companies continuing to increase in size.[338]

Despite the trend towards increasing vessel size, overall shipping traffic is still likely to increase in future, given the general expansion in world trade and the desire to ease land transport problems. Indeed, the European Commission has a priority to reduce congestion on the roads of Europe and the trans-European transport network policy (TEN-T) includes several shipping corridors defined under Priority Project 21 including "motorway of the seas". Furthermore, shipping has been identified as an important means by which to mitigate the effects of climate change by facilitating the increased movement of freight by sea rather than road.[339]

[337] RSA (2012) Britannia rules the waves: UK shipping booms as sea trade exceeds £500 billion, April 2012, http://news.rsagroup.com/pressrelease/view/1097
[338] UKMMAS, 2010. Charting Progress 2: An assessment of the state of UK seas. Prepared by the UK Marine Monitoring and Assessment Strategy (UKMMAS) community July 2010.
[339] HM Government 2011. Marine Policy Statement. https://www.gov.uk/government/publications/uk-marine-policy-statement

The introduction of new regulations in 2016 requiring the use of marine fuels with substantially reduced sulphur content will substantially increase fuel costs for conventional ferries. The impact of these changes is the source of much uncertainty within the ferry industry and the longer sea crossing routes in particular. Developments in 2015 with respect to low sulphur fuel may affect some ports such as Portsmouth and Poole in which ferries are the main income generator.

Potential core issues

Overall, offshore wind farm development presents an opportunity for sector diversification to include installation and servicing vessels. However, it should be acknowledged that there is also a risk associated with the growth in renewable energy; especially Round 3 offshore wind farms, in relation to the growth of the shipping sector within the South marine plan areas. If shipping routes are obstructed, the economic viability of some vessels coming to ports within the marine plan areas might be compromised resulting in a detrimental impact on the growth of the sector. Resolving such matters is informed by discussion between representative parties, including the relevant UK regulator for shipping safety, the Maritime and Coastguard Agency and related guidance such as Marine Guidance Note 371, and are examined on a case by case basis as projects are designed, assessed and delivered.

While ports are developing to accommodate diversified and increased shipping activity there will still be a significant amount of through traffic within the marine plan areas. It is important to take this into account when discussing the shipping sector in the South marine plan areas.

Interactions with other sectors

The shipping industry in UK waters is linked to the state of the UK economy, and to the effectiveness of the ports industry to accommodate demand for import and export of goods. It is also vulnerable to global scale macro-economic trends. The current economic situation has led to a severe downturn in demand; however in the long term this is unlikely to reduce the eventual levels of demand for port capacity, in particular for unitised goods.[340]

Similarly to the ports sector, the shipping sector will continue to grow due to demand from sectors that are able to operate more independently of the macro-economic issues, eg renewable energy, that is more strongly related to UK-based factors. As such, while a portion of the shipping sector depends on the health of the economy, strong growth in renewable energy will play a part in sector growth over the coming years.

While renewable energy may support parts of the shipping sector; possible implications may arise from the displacement of vessels due to renewable energy developments eg navigational measures taken to avoid a renewable energy development may increase the frequency of transits through marine aggregate production licence areas. In this example, displacement of shipping therefore has the

[340] MDS Transmodal (2011) Port Infrastructure Development UK. www.mdst.co.uk/attachments/downloads/PID_presentation_v1.pdf

potential to create risks to aggregate extraction activities due to increased density of navigation activity.

Increased competition for marine resources affecting the sea space available for the safe navigation of ships remains a core issue for the sector.[341] Shipping can co-exist with marine conservation, fishing and aggregate extraction but there are other uses of the sea in respect of which this cannot be said. One example of an approach to mitigating pollution risk from shipping and providing an aid to passage planning has been the establishment of Marine Environmental High Risk Areas which are defined as areas having high environmental sensitivities and being at risk from shipping activity. Marine Environmental High Risk Areas have been developed specifically for shipping activity and are not necessarily applicable to other sectors' activities. Potential exists for marine planning to help address this issue in the future by ensuring that other, conflicting uses of the sea – such as offshore wind farms – do not make it more difficult for ships to navigate safely or are developed in such a way as to avoid excessive deviation from planned routes.

Issues for sustainability

Competitiveness of shipping

Two sulphur emission control areas have been established by the International Maritime Organization. The Baltic sulphur emission control area took effect in May 2006, while the North Sea sulphur emission control area (including the full length of the English Channel) came into force from November 2007.

In 2010 the amount of sulphur content in ships fuel used within a sulphur emission control area was reduced from 1.5% to 1.0%. The ship owner has a choice of whether to use either a higher quality fuel (low sulphur marine gas oil) or the cheaper heavy fuel oil, providing the exhaust gases of the latter are cleaned before emissions.[342]

The European Parliament has also incorporated an International Maritime Organization accord that will lower sulphur in fuel used by all ships in the Baltic Sea, the North Sea and the English Channel to 0.1% in 2015 from 1% now.

There are concerns that this new regulation may lead to an increase in sea transport costs. Resultant cost increases for transportation by sea have the potential to reduce the competitiveness of short-sea shipping transport against other transport modes. This may affect some ports in which ferries are the main income generator, such as Portsmouth and Poole.[343]

Collision risk related to cumulative effects and displacement

In addition, recreational vessel movements are set to increase and traffic related to installing and maintaining offshore wind farms will emerge. While smaller vessels,

[341] Defra (2011) Marine Policy Statement https://www.gov.uk/government/publications/uk-marine-policy-statement

[342] UKMMAS, 2010. Charting Progress 2: An assessment of the state of UK seas. Prepared by the UK Marine Monitoring and Assessment Strategy (UKMMAS) community July 2010.

[343] ABPmer (2013) South Marine Plan Futures Analysis. A report produced for the Marine Management Organisation by ABP Marine Environmental Research Ltd. MMO Project No: 1026-10.

including those servicing wind farms, may be operating within wind farms it is likely that a proportion of the recreational and wind farm-related traffic will seek to share space with displaced commercial shipping. As well as the increased risk of collision arising from vessel density in these areas, another risk emerges when considering that commercial shipping operators can face challenges detecting other vessels within wind farms.

This means that when these smaller vessels emerge from wind farms they may be in unexpectedly close proximity to commercial operators. As conversations around wind farm development processes continue, it is likely that the potential risks to commercial shipping posed by cumulative effects can be mitigated, particularly in association with improving technology, but developing offshore wind farms in light of limited knowledge of consequent trends in use continues to carry a level of risk. The need to ensure the potential risks to commercial shipping from cumulative effects are identified and mitigated is compounded bathe fact that commercial shipping is set to grow in terms of both frequency and size of vessel, the second of these factors impacting upon manoeuvrability (such as increased size of turning circle and stopping distances).

2.9 Marine aggregate extraction

The South marine plan areas are currently the second busiest area in England for marine aggregate extraction in terms of:

- tonnage dredged,
- licensed area
- area dredged
- as a significant proportion of future search areas.

The total area that is licensed for aggregate extraction within the South marine plan area is 155.47 square km.

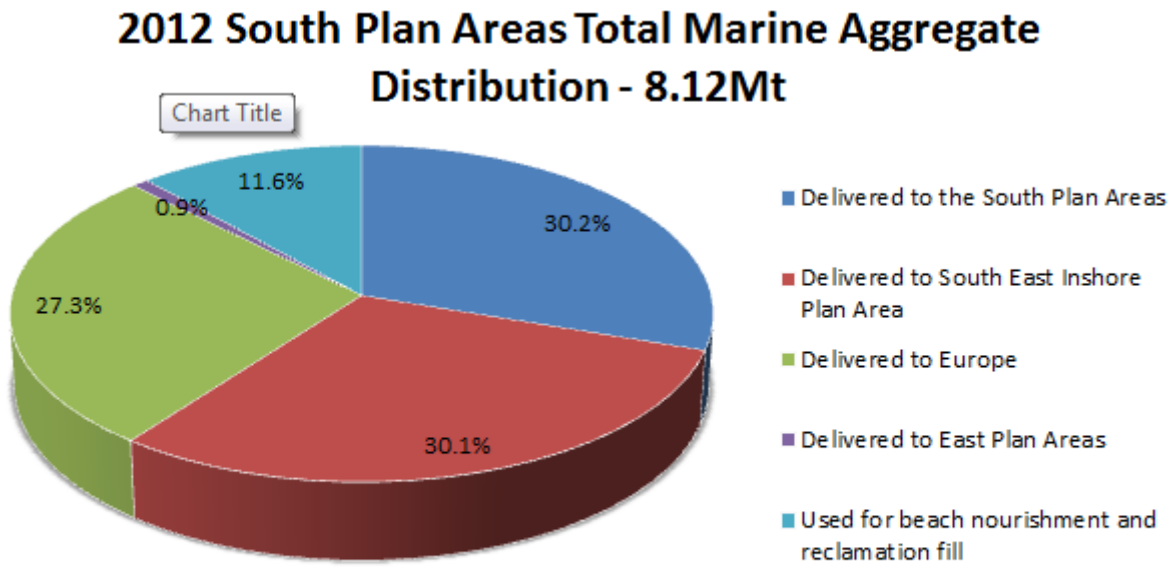
Current situation

The annual production figures for 2012 show a total of 8.12 million tonnes (Mt) of aggregates were extracted from the South marine plan areas.[344] Of the total aggregate extracted 88% (7.2 Mt) was used for construction aggregates and 12% (0.9 Mt) for the purposes of beach nourishment. From the total 16.7 Mt of marine aggregate extracted nationally in England, approximately 48% was taken from the South marine plan areas.

The distribution of aggregate extracted from the South marine plan areas can be illustrated by the 8.12Mt extracted in 2012.

[344] Marine aggregates The Crown Estate licences summary of statistics 2012

Figure 28: Total marine aggregate distribution



Current policy

The National Planning Policy Framework states that 'minerals are essential to support a sustainable economy and that plans (including marine plans) should safeguard areas of marine aggregate extraction that are of local or national importance'.

The National Planning Policy Framework and the supporting Managed Aggregate Supply System facilitates the long term-planning for aggregate supply in England. This system ensures that mineral planning authorities have adequate aggregate resource to meet local and national supply. The Managed Aggregate Supply System requires mineral planning authorities to prepare local aggregate assessments that consider the opportunities and constraints for mineral supply to a specific region. This means that land-locked counties within the South marine plan areas may have to consider the need for marine aggregate particularly where land-based resources are constrained or non existent.

The national and regional guidelines for aggregate supply in England for 2005 to 2020[345] indicate that 16 Mt per annum (Mtpa) of marine sand and gravel should fulfil national demand.

Terrestrial mineral and waste management plans within the South marine plan areas contain policies that highlight the need to safeguard suitable wharf and transport facilities for landed marine aggregates. This is particularly important for the South

[345] Annex A of theNational and regional guidelines for aggregates provision in England 2005-2020 (DCLG, 2009)

marine plan area as 38% of aggregate dredged for construction in 2011 in the area was delivered to wharves in the Thames estuary. Specifically, the Isle of Wight retains roughly 80% of the aggregates landed there (MMO 1050). In 2012 Shoreham Harbour Wharves recorded the highest figure for material landed in the plan areas at 1.05 Mtpa. Southampton has the second highest landing activity, with 0.73 Mtpa.[346]

Marine aggregates extracted from within the South marine plan areas are also landed across other plan areas. This highlights the duty to co-operate for public authorities when preparing terrestrial and marine plan documents (section 33 A of the Localism Act 2011).

Value of the activity

Within the South marine plan areas there are currently eight businesses active in marine aggregate extraction. The forecast economic value of this activity for 2013-14 is £143 million Gross Value Added . The direct employment of the sector within the South marine plan areas is estimated to be around 178 full time equivalents and it is estimated that 924 full time equivalents are indirectly employed within the sector. The lack of direct employment does not reflect the importance of the sector, the sector creating significant indirect employment further down the supply chain also acting as an 'enabler' for employment generation in other industries, such as construction

Marine aggregate extraction in the South marine plan areas takes place in two locations, which are the East English Channel and the South coast region (licenced areas located off West Sussex and around the Isle of Wight). Figure 29 illustrates marine aggregate consented licences (as of 5 October 2012[347]) located in the South marine plan areas.

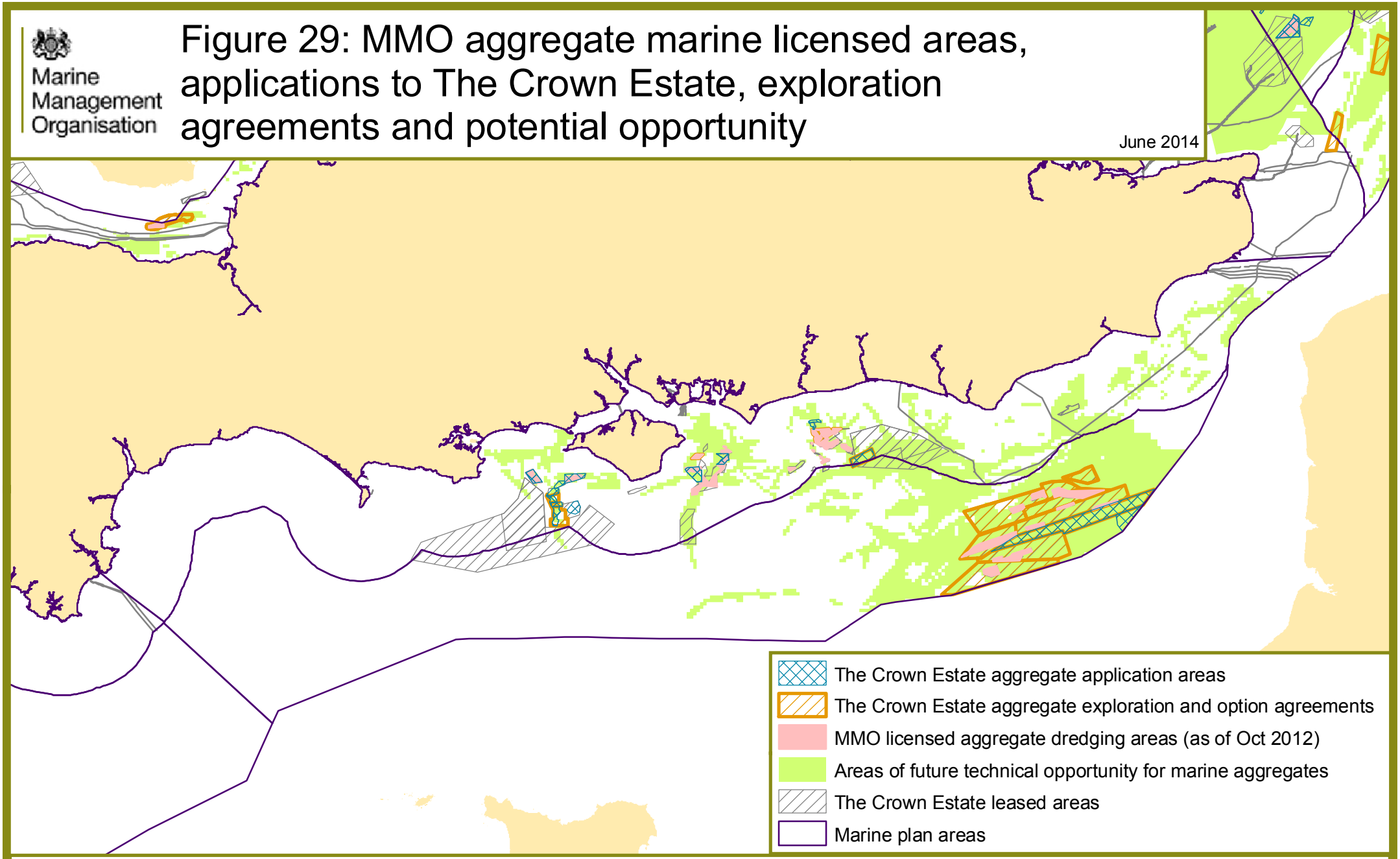
Individual operators are issued with marine licences to extract marine aggregates from defined areas of seabed commercially leased from The Crown Estate following an assessment of their proposals that may include an Environmental Impact Assessment. To facilitate consistent environmental management, these operators cooperate collectively through two regional associations, the East Channel Association and the South Coast Dredging Association, which have been established to enable regional scale assessment, monitoring and management of issues related to the sector. In the South coast region aggregate extraction has occurred (via consented aggregate dredging licences) since the 1970s. Marine aggregate extraction started in the South offshore plan areas in 2006 and the inshore plan area in 1980 at Hastings Shingle Bank.

[346] Marine Aggregates The Crown Estate Licences Summary of Statistics 2012
[347] This is the latest available data, this information will be updated at the earliest opportunity and will be available via the marine planning portal http://planningportal.marinemanagement.org.uk/

Figure 29: MMO aggregate marine licensed areas, applications to The Crown Estate, exploration agreements and potential opportunity

Marine Management Organisation

June 2014



Note: The areas of future technical opportunity do not include the presence of hard constraints posed by existing uses of the marine estate or other factors including natural & cultural resources, marine users, economics & market appetite and policy drivers required for the opportunity to be supported. Cables and pipelines outside of the territorial waters limit (other than export cables) are not shown as they are not subject to The Crown Estate's permission

Future trends

Over the past 20 years, the area permitted for dredging within the South marine plan areas has changed. Many of the historic licence areas have reduced in size, with a number being surrendered entirely by the companies operating them. Over the same period, several new production licence areas have been awarded marine licences.[348]

Beach replenishment continues to be important for the South Inshore plan area, this due to maintenance of amenity beaches at tourist destinations (throughout Dorset), and of coastal protection (Shoreham, Sussex). Dredging for beach replenishment in the South marine plan areas peaked in 2006 with over 10% of marine aggregates dredged destined for beach replenishment.

As a consequence of climate change impacts at the coast, there is likely to be an increased need for extraction of marine aggregates for use in coastal defence works throughout the lifetime of the south plans. If increased quantities are required to be supplied to meet demand then this will be considered within existing regulatory processes.

Marine sand and gravel resources are expected to play a role in supporting the delivery of any major infrastructure such as new nuclear power stations, port and transport infrastructure developments and offshore wind farms (both through port facility development and the possible use of concrete gravity base foundations and their associated installation ballast). The aggregates sector is well placed to supply the large volumes of construction aggregate and fill material that may be required due to the proximity of the marine aggregate resource within the South plan areas.

Potential core issues

- determination of the 15 year marine licence applications for dredging within the South marine plan (due to be submitted over the next two years) will mean that the marine plans, with their 20-year focus, will have an influence on the marine aggregate industry over a 30-year period
- current dredging fleet is aged the South plans could influence the marine aggregate industry's next cycle of capital investment, estimated to be £1 billion
- effects of climate change posed by sea level rise, the role of the aggregates industry in supplying marine sand and gravel for coast protection and amenity purposes will become increasingly important over the lifetime of the marine plans
- requirements for large volumes of construction aggregate to support local major infrastructure projects taking place in the marine plan area (port developments, offshore wind farms) can be expected to increase over the marine plan period.

Interactions with other sectors

Due to the diverse number of activities taking place within the South marine plan areas, co-existence and possible displacement of activities from other areas (Round 3 wind farm zones, cabling and capital dredge and disposal sites, fishing, increased

[348] http://www.bmapa.org/downloads/reference.php

shipping, possible infrastructure and anchorage sites) onto marine aggregate resource and marine licence areas must be considered.

Issues for sustainability

The South coast and East English Channel marine aggregate regional environmental assessments have produced cumulative impact assessments for the marine aggregates extraction industry and the potential effects on other marine industries. This detailed assessment indicates that current extraction activity is within current acceptable environmental limits and is supported by site-specific assessments by the Marine Management Organisation and its advisers on an application-by-application basis, and by research into cumulative effects between dredging in the East English Channel aggregates region and commercial fisheries.

As well as the need to manage wider environmental impacts and spatial interactions with other marine users, there is also the potential to interact with heritage sites Marine Protected Areas and other industry. In the case of a number of these, the industry already has adopted a range of best practice measures – including heritage guidance notes /reporting protocols, fisheries liaison codes of practice and a Biodiversity Action Plan strategy – together with adoption of regional approaches to assessment, monitoring and management through the regional dredging associations and the associated Marine Aggregate Regional Environmental Assessments. All of these issues influence and help to shape the sustainability of the sectors activities.

In addition analysis of the vessel monitoring system data suggests the permitted aggregate extraction has had no effect on the density and intensity of fishing activity within the South marine plan areas.[349] Currently research is being undertaken to understand cumulative effects on regional fisheries within the South marine plan areas with particular attention on spawning and nursery grounds.

2.10 Dredging and disposal

Dredging and disposal plays a vital part in ensuring the maintenance of navigational channels, berths and docks in and around ports and marinas.

Dredging focuses on the extraction of sediment from the sea bed in order to maintain deepen or widen navigational channels and access routes. Constant vessel traffic contributes to sediment movement, which together with ongoing hydromorphological processes, requires ongoing work to prevent these channels becoming too shallow for vessels to access and egress the various ports and harbours across the South marine plan areas.

Dredging can be separated into two types as follows:

- maintenance dredging – removal of sand, mud and gravel in order to maintain safe navigational access at all times. This would usually involve repeat dredges or a series of cycles[350]

[349] Marine Aggregates The Crown Estate Licences Summary of Statistics 2012
[350] Marine licensing guidance 3 Dredging, disposal and aggregate dredging April 2011 p7

- capital dredging – deepening and/or widening existing channels and creation of new channels.[351]

Current Situation

The Marine Policy Statement (3.6.8) states that 'applications to dispose of wastes must demonstrate that appropriate consideration has been given to the internationally agreed hierarchy of waste management options for sea disposal'. Where possible, dredged material should be reused or recycled before choosing to dispose at sea. Schemes for such re-use include replenishment of mudflats, providing habitat and feeding grounds for wildlife, and recharging of barrier beaches for coastal defence.

Approved marine licences may stipulate this as a condition, and this is signposted in accordance with the Marine Policy Statement (3.6.2).

The amount of dredged material disposed of at sea each year from the United Kingdom has been relatively consistent since 1985,[352] with all maintenance and navigational dredging requiring consent through a marine licence unless it is specifically exempted as of 2014.[353] [354]

In addition capital dredging and the disposal of spoil within one nautical mile of the coast may require a full Environmental Impact Assessment, including the likely effects on protected European sites or species, and will be tested under the Water Framework Directive**.** Where appropriate dredging activities are assessed using the Maintenance Dredging Protocol.

The existing marine licensing process considers environmental impacts resultant from dredging activity together with any social or economic benefits that may arise in connection with any proposed dredging or disposal project through the assessment and determination of any license application.

Within the South marine plan areas there are 23 active sites for marine dredging disposal. These are largely used by companies who carry out navigational dredging throughout ports and harbours. There are a further 31 unused disposal sites historically used for a variety of activities such as liquid industrial waste, munitions, and dredged materials. Nab Tower, to the South East of the Isle of Wight, was the site within the South marine plan areas to receive the largest amount of dredged material. Between 1986 and 2010 Nab Tower received an annual average of 1.3 million tonnes of dredged material. This amount increased to over 7 million tonnes during 1997 as a result of work being carried out in Southampton water. Other major disposal sites in the area include Swanage Bay, Shoreham, Newhaven and

[351] East Inshore and Offshore Evidence and Issues Report p125
[352] http://www.defra.gov.uk/environment/waste/legislation/waste-hierarchy
[353] http://www.legislation.gov.uk/uksi/2012/698/contents/made
[354] Including the Marine and Coastal Access Act s. 75
http://www.legislation.gov.uk/ukpga/2009/23/contents

Dover.[355] Within the South Inshore plan area the major rivers and navigational channels that are dredged include:

- The Solent
- Poole Harbour
- Southampton Water
- Portsmouth Harbour

Activity within these sites equates to an estimate of £0.61 million of Gross Value Added in 2013-14.

Economic activity in the South marine plan areas remains hard to establish due to a lack of clear data disaggregated from that for the UK. The Gross Value Added for this sector is an estimation based on direct employment resultant from licensed dredging discharges.[356] It is estimated that around 9%[357] of the activity that takes place within ports is located in the South marine plan area. Arrivals from tankers, roll on roll off vessels, container vessels, passenger ships and other vessels have been included [358] and equates to around £0.61 million of Gross Value Added in 2013-14. It is worth noting that this may not be a true reflection of capital and maintenance dredging in the South marine plan areas compared to the rest of the UK, but is thought to indicate a reasonable proxy.[359]

The following points are drawn from various information sources and may be considered as part of establishing plan policies and objectives during the plan-making process.

- the development of a maintenance dredge protocol provides assistance to operators and regulators seeking or giving approval for maintenance dredging activities that could potentially affect European sites (also known as Natura 2000 or N2K sites) around the coast of England[360]
- the Environment Agency, in their role as the competent authority for the Water Framework Directive, will consider the effects of dredging and disposal activities on water status. The Water Framework Directive applies to waters out to one nautical mile from the baseline from which territorial waters are drawn[361]
- the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (The London Convention) is an agreement to control

[355] ABPmer (2013) South Marine Plan Futures Analysis. A report produced for the Marine Management Organisation by ABP Marine Environmental Research Ltd. MMO Project No: 1026-10.
[356] UKMMAS (2010) Charting Progress 2 Feeder Report: Productive Seas, Defra on behalf of UKMMAS, 2010, http://chartingprogress.defra.gov.uk/feeder/PSEG-feeder.pdf
[357] Based on the number of vessels arriving in key ports within the marine plan areas (Cowes, Newhaven, Poole, Portsmouth, Rye, Shoreham, Southampton, Teignmouth and Weymouth & Portland), as a percentage of the UK total.
[358] Dept. for Transport (2012) UK port freight statistics: 2011 final figures, September 2012 www.gov.uk/government/statistical-data-sets/port01-uk-ports-and-traffic
[359] MMO (2013) Economic Baseline Assessment of the South Coast
[360] Defra (1994) Maintenance Dredging and the Habitats Regulations 1994, p4
[361] Environment Agency (2000) www.environment-agency.gov.uk/research/planning/33362.aspx

pollution of the sea by deliberate disposal of wastes or other matter from vessels, aircraft and platforms [362]

- the Convention for the Protection of the Marine Environment of the North-East Atlantic (The OSPAR Convention) regulates international cooperation on environmental protection in the North-East Atlantic. It updates the 1972 Oslo Convention on dumping waste at sea and the 1974 Paris Convention on land-based sources of marine pollution
- requirements set out in 1992, direct contracting parties to take all possible steps to prevent and eliminate pollution and to take the necessary measures to protect the marine area against adverse effects of human activities to safeguard human health and conserve marine ecosystems.[363]

Future Trends

The areas permitted for disposal have altered over the last 20 years. A large number of sites have been closed, partly in response to legislative changes restricting the disposal at sea of certain types of material such as munitions and liquid industrial waste. Based on information available on the five main sites, in the same period there has been no consistent trend in the volume of material that has been disposed of at these sites within the South marine plan areas. Short-term, inter-annual fluctuations are evident in the amount of material disposed of at each site, which typically reflects contributions from capital dredge projects in nearby ports and harbours. (MMO 1039)

The outputs from project MMO1077 (in press) on climate change indicate that increased storminess in the south plan areas may result in an increased need for maintenance dredging. Table 2 within the climate change chapter outlines the effects this may have on the sector and what additional factors, such as navigational safety at dredging and disposal sites, will need to be taken into consideration, along with outlining potential benefits.

This overall picture is consistent with the UK as a whole, with the amount of dredged material disposed of at sea each year relatively consistent since 1985 (HM Government, 2011).

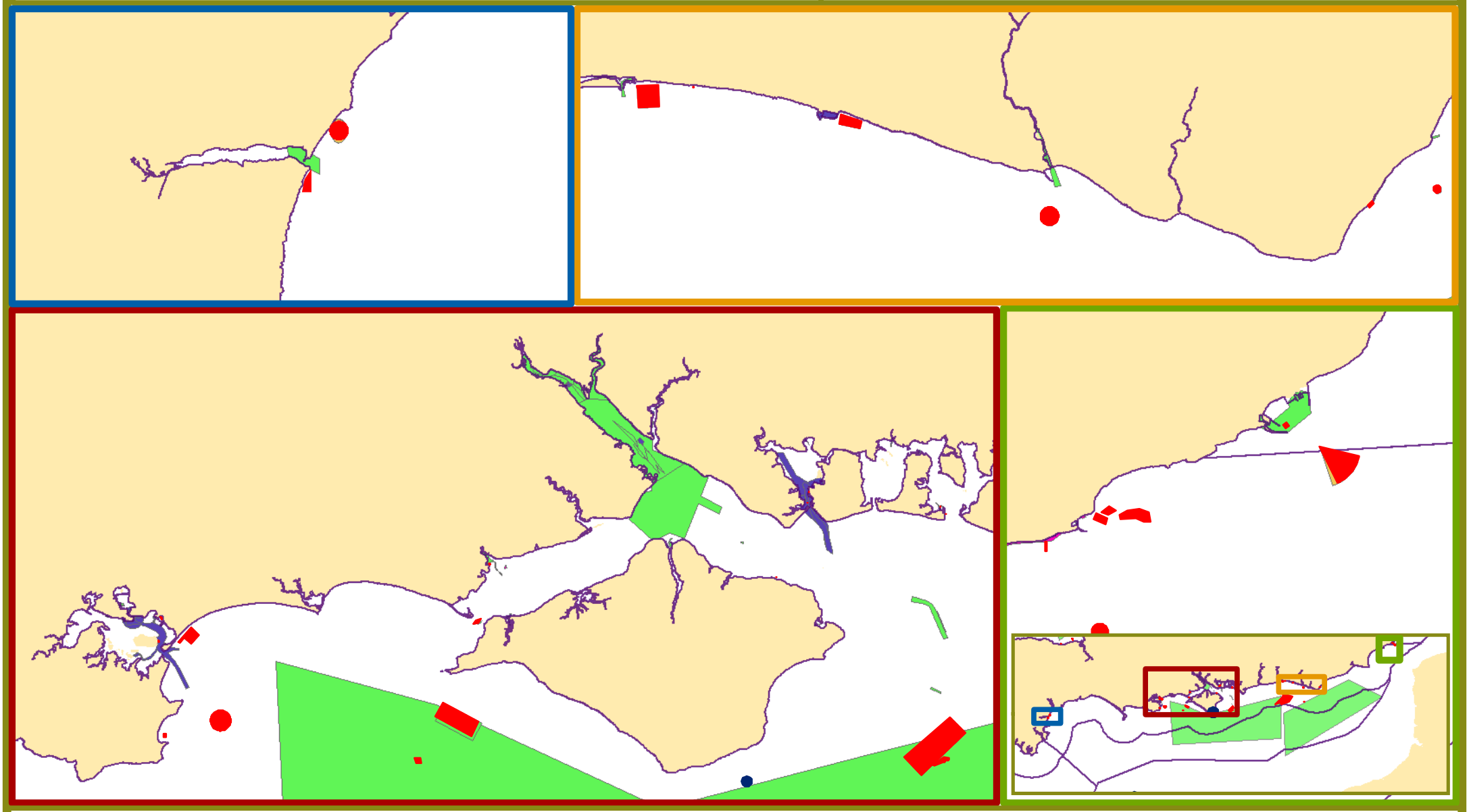
Looking ahead the level of maintenance dredging will, at the minimum, be sustained, whereas capital dredging is likely to increase due to potential port expansion projects. This will be driven by increased shipping activity coupled with larger vessels which may require applications to dredge deeper, wider and more frequently at ports, harbours, and approaches. Various capital dredging projects are planned for the Port of Southampton, in order to improve access for the deep-draughted vessels that currently use the channel, including the large 15.5 m draughted container vessels that are now being brought into service by the world's major shipping lines.

[362] MMO – Marine Licensing Guidance 3, p18
[363] MMO – Marine Licensing Guidance 3, p18

Marine Management Organisation

Figure 30: Licensed dredging and disposal areas

June 2014



Approximately 11.6 million m^3 (circa 20 million wet tonnes) of capital material may be dredged over the next six years and will primarily be disposed of at the Nab Tower disposal site.[364]

This amount of dredge disposal will be equivalent to nine times the current annual average received by Nab Tower. In addition to commercial ports and shipping drivers, it is likely that a number of existing marinas will expand in response to increasing demand for recreational boat moorings. Any increase in capital dredging is likely to result in increases in maintenance dredging.

A major expansion has also been planned to improve the Portsmouth Naval Base facilities over the next ten years in order to accommodate the new Queen Elizabeth Class aircraft carriers, which will be arriving from 2017 (MMO 1039). The project includes various capital dredge works set to start in 2014-15 and it is likely that material will primarily be disposed of at the Nab Tower disposal site.[365] Smaller capital dredge works are also proposed for Poole Harbour and include the deepening of existing conventional quays to 7.5 metres within the next six years, with dredge spoil largely being disposed of at the Swanage Bay disposal site.[366]

These capital dredge projects and ongoing maintenance dredge requirements will have a direct effect on the amount of material to be disposed at sea. This may necessitate an increase in the number of disposal licence applications within the South marine plan areas. However, the spatial extent of existing disposal areas is not likely to increase in size; therefore existing disposal sites may receive a higher volume of dredged material.[367]

Potential for beneficial use of dredged spoil

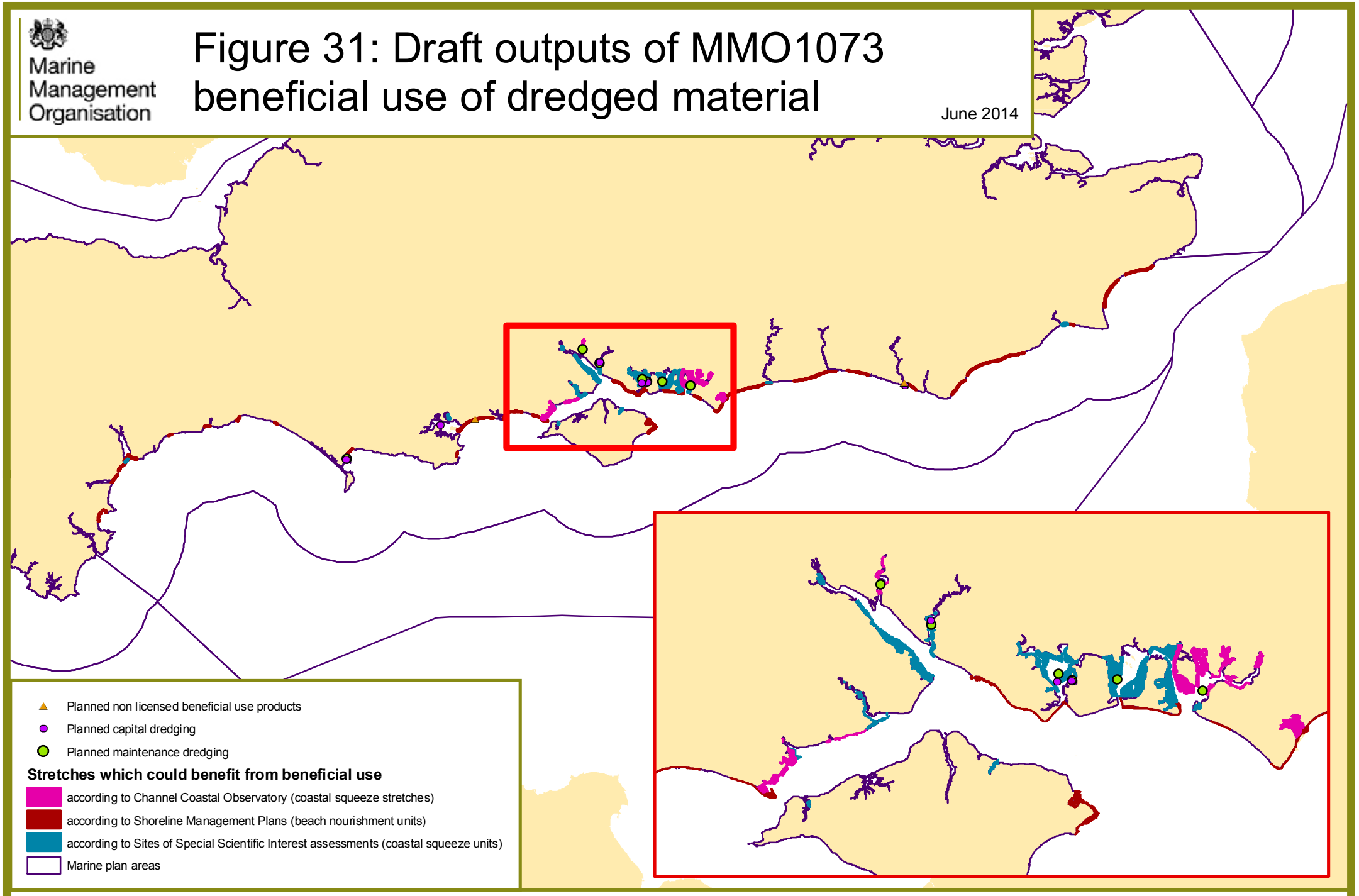
Stakeholders and regulators highlighted to us through consultation that although it was desirable for dredge materials to be used beneficially, there were a number of challenges that industry and beneficiaries faced. In recognition of this fact the Marine Management Organisation commissioned a report (currently in press) into the beneficial use of marine dredgings[368] and this has confirmed potential for the reuse of marine dredgings within the South marine plan areas. The re-use of such dredgings whilst in many cases desirable, is not straightforward, requiring a degree of future planning from all those involved be they regulators and contractors or as recipients of the dredged spoil. This report acts as a catalyst for further discussion in this area with potential to feed into further development of the South marine plans.

[364] ABP (2013) Southampton VTS Development Proposals at the Port of Southampton. www.southamptonvts.co.uk/Port_Information/Development_Projects/Approach_Channel_Dredge/ and MMO 1039 http://www.marinemanagement.org.uk/evidence/1039.htm
[365] MMO (2013) South Marine Plan Areas Futures Analysis. MMO Project No: 1039
[366] Poole port master plan http://www.phc.co.uk/masterplan/_downloads/phc-masterplan.pdf
[367] MMO (2013) South Marine Plan Areas Futures Analysis. MMO Project No: 1039
[368] MMO (2014). Use of Beneficial Dredged Materials in the South Inshore and South Offshore Marine Plan Areas. A report produced for the Marine Management Organisation, pp 58. MMO Project No: 1073. ISBN: 978-1-909452-31-2. (in press)

Marine Management Organisation

Figure 31: Draft outputs of MMO1073 beneficial use of dredged material

June 2014



Recent examples of beneficial use of marine dredgings include saltmarsh replenishment works at Lymington and a capital dredging project in Southampton Water. Further information on these specific projects and dredging activity across the South marine plan areas can be found within the above report.

Potential core issues

- increased demand for capital dredging and disposal sites due to a trend towards larger ships, particularly in bulk and container shipping
- cumulative effects on possible contamination of aggregate resource through disposal grounds and licensed areas being within close proximity and the impacts this could have on any mobile species.

Interactions with other sectors

As recreational boating demands increase, and as vessel size continues to rise, port expansion will have an impact on the amount of maintenance and capital dredging that will be required overall, supporting the local economies of scale within the sector.

There is potential for wider impacts upon biodiversity and ecosystems of both maintenance and capital dredging to emerge, both directly and as a contributor to cumulative effects. These are outlined in the following section on sustainability and but are commonly managed and mitigated through measures established at the point of licensing the activity.

Issues for sustainability

- potential risk to marine life and ecology through changes in water quality (relating to changes in chemistry and turbidity), noise and physical disturbance
- the release of contaminants (legacy of industrial pollution)
- impacts on designated nature conservation areas (potential destruction or destabilisation)
- degradation of heritage assets through direct or indirect physical activity
- effects on a coastal landscape and/or seascape (for example, maintenance through beach nourishment or disturbance of subsea features at disposal grounds)
- changes to natural sedimentary systems via physical changes to contributing structures eg alteration of channel depths.

2.11 Subsea Cabling

Submarine cables are part of the backbone of the world's power, information and international telecommunications infrastructure, and are socially and economically crucial to the UK. Submarine telecommunication cables carry over 95 per cent of the world's international communications traffic including telephone, internet and data. Generally cables support many other services, both power and telecommunications for the UK's local communities, major utilities and industries. The transatlantic telecommunication cables landing in the UK carry more than 70 per cent of Europe's

transatlantic internet traffic.[369] Alongside this, electricity power cables will support 18 Gigawatts of offshore windfarm capacity by 2020.[370] Subsea cables deliver the benefits of any offshore wind farm activity, future renewables activity, offshore power grid, interconnectors, communication and broadband provision. They also include interconnectors between the United Kingdom and Europe.

Current Situation

Within the marine plan areas around England, as at May 2013 there are currently 14,575 kilometres of submarine cable. Within the South marine plan areas there are 1,357 kilometres of submarine cable which make up around 10% of the total length of cables, or 31% of the number of cables in the English marine plan areas.[371] The total footprint of these cables in English marine plan areas covers around 0.21km^2 of the seabed, however it is important to bear in mind additional protective buffer zones either side of the cables exist in order to protect them from damage and allow for repair and maintenance. Also no other 'intrusive seabed activity'[372] can be undertaken here without the cable owner's permission. Typically, these are a minimum of 250m buffer each side but this can be greater particularly where they intersect with other activities.

The following relevant goals/objectives and policies drawn from the Marine Policy Statement and the recent Budget Statements are highlighted by way of context for the South marine plan areas although please note that identifying objectives and deriving planning policies are later steps in the planning process:

- importance of telecommunication and power cabling as vital infrastructure for the domestic and global economy and, as such, should be reflected in marine plans[373]
- timely development of the telecommunications network in all parts of the UK is vital to help ensure the government's commitment to the minimum broadband speed promise[374]
- submarine telecommunications cable connectivity is a vital part of delivering a high-quality superfast broadband experience to users.
- the 2013 Budget Statement stated as part of the economic recovery; "We can provide the economy with the infrastructure it needs...We are giving Britain the fastest broadband and mobile telephony in Europe." The successful implementation of this statement may well require new infrastructure or upgrades to existing infrastructure. The 2014 statement continues this support by including a commitment to businesses to allow 330 000 more premises access to superfast broadband[375]

[369] Defra (2010) Marine Policy Statement, p41 https://www.gov.uk/government/publications/uk-marine-policy-statement
[370] Renewable Energy Roadmap
[371] Marine Management Organisation (2013) Strategic Scoping Report for marine planning in England, p116 www.marinemanagement.org.uk/marineplanning/key/ssr.htm
[372] The Crown Estate use this definition when developing consents
[373] Defra (2010) Marine Policy Statement, p41
[374] Department for Culture, Media and Sport www.gov.uk/government/publications/britains-superfast-broadband-future
[375] HM Government (2014) 2014 Budget Report Figure 1.1 https://www.gov.uk/government/publications/budget-2014-documents

- the 2011 Office of Gas and Electricity Markets report (2.8.3) on offshore transmission coordination also supports the financial benefits of having a joined up approach
- studies conclude that there are no overriding environmental reasons to prevent achievement of sub-sea grid power development up to 2020[376]
- national policy continues to support the development of offshore wind energy and the associated subsea cables to connect those installations to land, with continued funding (through a Green Investment Bank) and support set out in the Renewable Energy Road Map
- when decision makers are examining and determining applications for communications or energy infrastructure and marine plan authorities are developing marine plans they should take into account the positive wider societal and economic benefits of improved telecommunications. These are that telecommunications cables should be developed where appropriate, necessary and economically feasible, and the potential impact of inward investment in telecommunications cabling related manufacturing and deployment activity as well as the associated social and cultural benefits
- marine plan authorities will need to liaise, as appropriate, with terrestrial planning authorities to ensure the development of any necessary on-shore infrastructure is considered appropriately. This may be assisted through the coastal concordat
- alongside this the development in the application of telecommunication cables and the increased technological advances in the capability and capacity of subsea cables generally.
- the United Nations Convention on Law of the Sea (UNCLOS) articles, especially 56, 58, 77, 78 and 79, allow for telecommunications cables to be laid at sea with limited reasonable constraints suggested under license conditions by the sovereign state inside the 12 nautical mile limit. There is no constraint on telecommunications cable installation in the Exclusive Economic Zone. Licensing and laying of telecommunication cables that begin in the UK and extend beyond the 12 nautical mile[377] limit cannot be refused as the cable is international in nature, that is those that connect the sovereign state to another country
- in the waters of the Exclusive Economic Zone there are also likely to be subsea cables that are passing through UK waters but not landing in the sovereign state. Marine planning will need to consider implications of any such examples for the marine plan areas, and potential benefits of integration with other sectors.[378]

[376] Defra (2010) Marine Policy Statement, pp32-33 para 3.3.17 https://www.gov.uk/government/publications/uk-marine-policy-statement

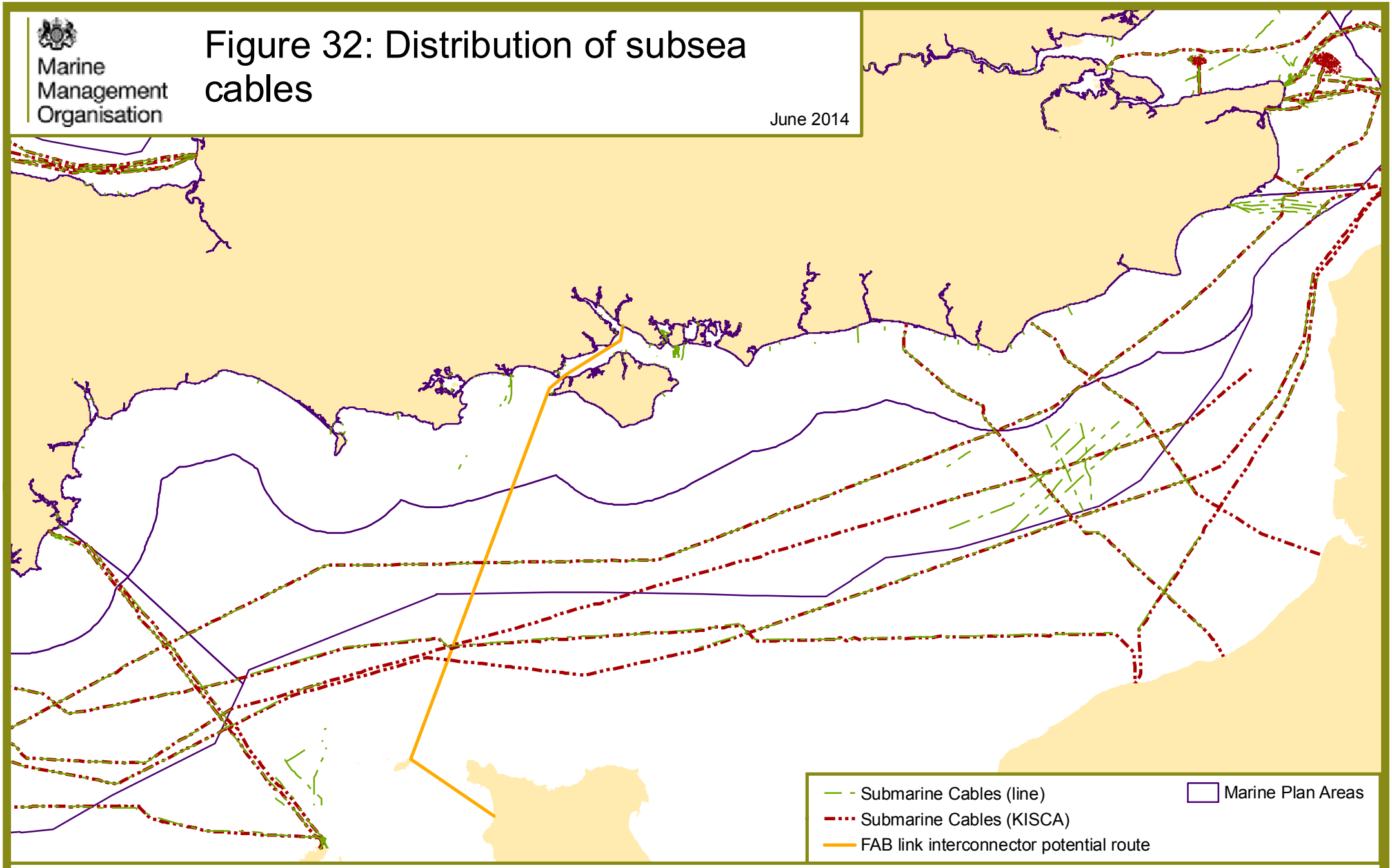
[377] Also Marine and Coastal Access Act 81(2) also states we must grant consent within 12nm. http://www.legislation.gov.uk/ukpga/2009/23/contents

[378] Marine planning are liaising with National Grid for a useful dataset relating to landfall sites.

Marine Management Organisation

Figure 32: Distribution of subsea cables

June 2014



Please note the MMO do not have access to a comprehensive cables data layer, as a result this map displays data extracted from the UKHOs S-57 dataset and KISCA cable routes.

Current policy

Arun District Council, Eastleigh Borough Council and West Dorset District Council[379] all have specific planning policies that mention or are explicit about telecommunications however these policies relate to mobile telephony not specifically to infrastructure for subsea telephony cabling. It is vital that terrestrial and marine planning coordinates with the relevant policies so suitable provision for both telephony and power cable infrastructure can be supported. Also a wide range of local authorities along the South coast reference renewable energy infrastructure where they are supportive of it within certain contexts. Consideration should be given to these policies when developing South marine plans policies that relate to subsea cabling.

The Gross Value Added measure of the Telecoms and Communications sector for the whole of the UK is estimated to be £29.5 billion (based on 2011 figures). Since then further studies have suggested that the value is greater – in the region of £40bn, this data is yet to be clarified and published. Due to the unavailability of regional figures, or suitable apportioning data, it is not possible to provide a robust estimate for the Gross Value Added measure of the sector in the plan areas. However it is clear that activity within the sector makes or facilitates a significant economic contribution to the plan areas and elsewhere within the UK.[380]

Connection of Round 3 wind farms to the power distribution network has been considered by the Office of Gas and Electricity Markets and the Department of Energy and Climate Change within the Offshore Transmission Coordination Project. This concluded that the most cost effective transmission network would be one which is coordinated rather than adopting a radial format[381] With the North Seas Countries' Offshore Grid Initiative (NSCOGI)[382] working to support this approach. Office of Gas and Electricity Markets are also developing a framework for non-developer-led wider network benefit investment (WNBI) in coordinated offshore assets. Their recently held consultation (March 2014) set out three alternative tender models for this type of investment.[383]

Generally cabling activity in the South Marine Plan areas is limited. Two telecoms cables make landfall in the South inshore marine plan area at Brighton and Bexhill. In addition Atlantic Crossing 1 runs along the seabed through the marine plan areas. There is a significant number of telecoms and power cables between the Isle of Wight and the mainland; however many of these are historical and have not been accurately mapped but should be considered in any policy development.[384]

Interconnection between European countries provides a number of services to electricity markets bringing them closer together. The UK has four operational

[379] West Dorset council local plan Policy IN7
[380] MMO (2013). Economic Baseline for the South Inshore and Offshore Marine Plan areas
[381] MMO (2013). Economic Baseline for the South Inshore and Offshore Marine Plan areas
[382] www.entsoe.eu/about-entso-e/working-committees/system-development/the-north-seas-countries-offshore-grid-initiative-nscogi/
[383] Ofgem (2014) Offshore Transmission: Non Developer-Led Wider Network Benefit Investment https://www.ofgem.gov.uk/publications-and-updates/offshore-transmission-non-developer-led-wider-network-benefit-investment
[384] The latest data for fishing and other sea users is available here: http://www.kis-orca.eu/

interconnectors[385] none of which are in the South marine plan areas; IFA (Interconnexion France Angleterre, between Great Britain and France), owned by National Grid and RTE; BritNed (between Great Britain and the Netherlands) owned by National Grid and Tennet; Moyle Link (between Great Britain and Northern Ireland) and the East-West connector (between Great Britain and Eire).

In order to maintain and repair cables in the South and South West marine plan areas there is significant cabling related activity based at Portland. The majority of UK cable depot and storage for telecoms is located here with other locations such as Avonmouth in the Bristol Channel and Burntisland, Fife among others. It is also the UK home port for the Atlantic Cable Maintenance and repair Agreement (ACMA) maintenance vessel for six months of the year – stand by port location is shared with Bermuda. Appreciable subsea cable support activity takes place here and is significant to the local economy as the home base port for one of the world's foremost subsea cable installers located just inside the western limit of the South Inshore marine plan area.[386]

Future Trends

Any increase in cabling will be reliant on the following factors:

a) number of offshore wind farm proposals and associated connections
b) demand for telephony and internet connection as well as any increase in speed/data transmission requirements
c) location and density of population in the areas that require this infrastructure.

In the last 30 years use of subsea cables for telephony and broadband has increased significantly[387] however there are no upcoming significant proposals for new infrastructure in the South marine plan areas at present. We must bear in mind that as the lifetime of cables tends to be 15-25 years some cables that are installed in the marine plan areas may require some redevelopment during the lifetime of the plans.[388]

Demand for additional capacity for new telecommunications cables is likely within the South marine plan areas due to the close proximity to France and the potential for further interconnection into Europe and beyond. Location of future cables is uncertain but will be based on the viability of appropriate landfall sites and space available for installation aligned to customer demands. It is likely that there will not be a significant increase in footprint of telecommunications cables due to the advances in the technology allowing more capacity from a similarly sized cable to that currently installed.[389]

[385] National Grid: Getting More Connected http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=32371
[386] MMO (2013). Economic Baseline for the South Inshore and Offshore Marine Plan areas and anecdotal discussions with industry
[387] MMO (2013) South Marin Plan Futures Analysis
[388] MMO (2013). Economic Baseline for the South Inshore and Offshore Marine Plan areas and anecdotal discussions with industry
[389] MMO (2013) South Marin Plan Futures Analysis

Mitigation of climate change through more efficient transmission of electricity is something that National Grid have been considering in power cables that form part of the grid distribution, including mapping of impacts of cables in winter and summer and their mitigation.[390] There is potential that the power cable connecting the Isle of Wight may need to be replaced in the long term within the lifetime of the plan. Currently with the limited number of wind farms proposed in the South marine plan areas, some power cables will be necessary but at this stage, it is not known how many.

Interconnectors are transmission cables which allow electricity to flow between countries, and can be used to import or export power as required. Great Britain already has four of them, linking us to France, Ireland, The Netherlands and Northern Ireland. These links, totalling 4GW, represent around 5% of existing electricity generation capacity. However, this level remains low compared to the 10% benchmark proposed by the European Commission and there is consensus from the UK Government, the regulator, consumer organisations, green groups, and the main European institutions that this gap should be filled.

At present, National Grid is developing three interconnector projects: IFA2 – Second Interconnector to France; NSN – Interconnector to Norway; NEMO – Interconnector to Belgium. Other potential interconnector projects include Iceland and Denmark.[391] IFA2 has a landing point within the South marine plan areas near Folkestone.[392]

Potential core issues:

- it is important for marine planning to take account of appropriate locations and landfall sites for subsea cables, for both telecommunications and to support offshore developments like tidal or wind energy installations or further interconnectors, alongside other uses of marine space
  while there is anticipated growth in the number of subsea cables in the South marine plan areas, it is difficult to quantify the amount and location of increase in cables. However where any emerging marine energy installation is proposed a cable will be required to connect it to the National Grid
- challenges arise in taking account of potential future sites in planning. Subsea Cables UK have developed guidance in collaboration with The Crown Estate, Renewables UK and the Renewable Energy Association, which supports application of a best practice approach to managing the co-existence and acceptable proximity of offshore renewable energy installations and seabed cable installations
- guidance is currently limited to shallow waters and is under development for offshore wind farms and further guidance expected to address the different challenges of wave and tidal co-existence with subsea cables. Subsea Cables UK as the leading trade association for cables also has guidelines on best practice for cable installation to promote successful co-existence with other seabed users.

[390] www.gov.uk/government/publications/adaptation-reporting-power-received-reports Climate Change Adaptation Report by National Grid Electricity Transmission plc September 2010
[391] National Grid (2014) Getting More Connected http://www2.nationalgrid.com/About-us/European-business-development/Interconnectors/
[392] http://www2.nationalgrid.com/About-us/European-business-development/Interconnectors/france/

Interactions with other sectors

Interactions occur with numerous activities but particularly with the ports and shipping, aggregates and fishing sectors. Potential impacts are:

- risk of damage to a cable (which is an offence when intentional),[393] from activities such as fishing, through snagging, aggregate extraction, shipping or recreation
- exclusion of or mitigation measures for damaging activities may need consideration to ensure achievement of an appropriate level of risk
- compatibility needs to be considered when cables are installed within the immediate vicinity of other installations or activities
- for renewable energy developments, exclusion zones are a potential solution which can be requested for the cables and the development site by developers at the application stage
- technology improvements for fibre optic cables allow capacity per cable increases which could allow the industry to keep pace with demand without an exponential increase in the number of cables required
- the effect of power cables on the environment through scour and electromagnetic field output, however following an Marine Management Organisation evidence report (MMO 1031) there is no evidence to suggest that EMFs pose a significant threat to elasmobranchs at the site or population level
- there is generally little disturbance to habitat during laying and maintenance of subsea telecommunications cables, these activities assessed by Natural England and JNCC to be compatible with execution within MCZ areas and why further environmental assessment for simple burial is not necessarily required
- for power cables, the scale of project can adjust the balance of this activity clearly. This is why energy cable projects include an early project assessment of the impacts of installation. For all cable projects, there should be a simple assessment of impact of cable recovery prior to any decision to carry out such activity or not
- proximity of the development sites and cable infrastructure with existing marine aggregate interests result in potential for direct interaction with marine aggregate interests which could have a negative impact on an existing cable installations.

Issues for sustainability

Sustainability issues are difficult to define, as cumulative effects from other sectors on cabling may include the risk of limitations in prescribing or selecting landing points. The combination of shipping, fishing, recreational activity and other coastal uses and designations could constrain appropriate areas for cable landings as well as appropriate locations for communications or grid infrastructure such as terminal stations for communications, converter stations for direct current cables from offshore wind farms or grid connections.

[393] Under UNCLOS

2.12 Fishing

The marine planning Strategic Scoping Report highlights the importance of the South marine plan areas for England's fishing industry, as they land more fish (both in terms of tonnage and value) than any of the other marine plan areas in England. The Marine Management Organisation are responsible for the management of all quota stocks (and non-quota stocks between 6-12nm), with non-quota stocks between 0-6nm managed by the four Inshore Fisheries and Conservation Authorities that operate in the South plan areas:

- Kent and Essex (between the East end of Rye Bay and the northern boundary of Essex)
- Sussex (for the whole of the Sussex coast)
- Southern (for the entire Dorset, Hampshire and Isle of Wight coast)
- Devon and Severn (which has two sea boundaries, the southern of which falls within the South marine plan areas from Lyme Regis to the border between Devon and Cornwall).

These four organisations are responsible for fisheries management at a local level (including the establishment and enforcement of byelaws), together with conservation focussed activities supporting EU regulations/ directives such as Natura 2000. Their byelaws support the Common Fisheries Policy,(the revision of which came into force on 1 January 2014), and may enforce activity in ways such as restricting certain gear types, or protecting juvenile fish. For the purposes of marine planning, fishing is considered to cover commercial and subsistence fishing and the wider processing industry, with recreational angling addressed separately under 'recreation' (see section 2.15).

Understanding the nature and distribution of fishing activity in the South marine plan areas is a key priority for marine planning and it is necessary to consider multiple data sources to begin to understand activity levels, including vessel monitoring system (VMS) data for over-15m vessels (soon to be available for over-12m (see figure 36)), landings data and shellfish returns from the Marine Management Organisation (see figures 37 and 40)and sightings data on inshore vessels from the Inshore Fisheries and Conservation Authorities. Whilst each of these data sources has different limitations, the most notable gaps in our understanding are with the activity of inshore vessels under-10m in length which make up a large portion of the fleet in the area. In order to fill these knowledge gaps, the Marine Management Organisation is currently exploring the use of plotter data to supplement the data sources above and any outputs may feed into the South marine plans at a later stage. In addition, the Department for Environment Food and Rural Affairs are soon to publish a project to strengthen the available data for inshore vessels[394] and some

[394] Defra MB0117 'Understanding the distribution and trends in inshore fishing activities and the link to coastal communities' http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18126&FromSearch=Y&Publisher=1&SearchText=MB0117&SortString=ProjectCode&SortOrder=Asc&Paging=10

early outputs have been shared in this report (see figures 38, 39 and 41) to assist our understanding.

The growing use of inshore Vessel Monitoring Systems for electronic reporting of inshore activity will also offer additional opportunities to gain a greater understanding of where fishing takes place in the future. The current situation set out below is our best understanding of the nature and distribution of fishing using the evidence currently available.

Current Situation

Fishing activities in the South plan areas are highly diverse, using a wide variety of methods and with a high level of seasonal variation. In 2011, over 27,000 tonnes of fish were landed into ports in the South inshore plan area, with the five highest producing ports being Brixham, Shoreham, Portsmouth, Weymouth and Poole (by both tonnage and value) (see figure 34 and 35). In addition to port landings, some smaller scale fishing vessels land fish on beaches in areas such as Worthing and Hastings.[395] 86% of the vessels whose home port is in the South inshore plan area are under-10m vessels, highlighting the important contribution smaller vessels make to the fishing industry in the South. Species targeted in the South marine plan areas include sole, cod, whiting, scallops, dogfish, conger eel, bass, ling and herring during the winter months (see figures 37 and 38). Shellfish also forms an important part of the inshore fishery catches throughout the South marine plan areas (see figure 40), including species such as whelks, cuttlefish, crabs and lobsters. Specialist inshore fisheries in this region include dredge fisheries for oysters and various clams in the Solent and Poole Harbour.[396] The South plan areas span two International Council for the Exploration of the Seas fishing zones; VIId and V11e, with each having different quotas which in turn affect the fish caught in them.

The total value of fish landed into ports in the South marine plan areas in 2011 was just over £51million (although it is important to remember firstly that fish landed within the ports in the plan areas may not necessarily be caught in the plan areas, and secondly that fish caught in the plan areas may be landed in ports outside them). There are 698 fishermen whose home port is in the South Inshore plan area and earnings remain significant in the South due to the increasing value of fish.[397] However, species values can often fluctuate according to a number of variables including market supply, stock levels and weather.

There are also a further 1037 employees estimated to be working in the seafood processing sector.[398] It is estimated that there are 285 businesses associated with

[395] Stakeholder communication October 2013
[396] UKMMAS (2010) Charting Progress 2 Feeder Report: Productive Seas, Defra on behalf of UKMMAS, 2010, http://chartingprogress.defra.gov.uk/feeder/PSEG-feeder.pdf
[397] MMO: 1050 (2013) Economic baseline assessment of the South coast http://www.marinemanagement.org.uk/evidence/1050.htm
[398] MMO South marine plan areas economic baseline report- Based on the UK total employment in seafood processing (11,864) and apportioned to the marine plan areas based apportion factor quoted above for direct employment (8.7%).

the fishing sector[399] in the South Inshore plan area, with several coastal wards experiencing a relatively significant dependence on fishing, such as Brixham and Radipole (covering Weymouth), in which 23% and 13% of the workforce are dependent on fishing respectively.[400] The need for a sustainable fishing industry has been considered in a number of local plans, including the Chichester Harbour and South Devon Area of Outstanding Natural Beauty management plans, Teignbridge District Council and Weymouth and Portland Borough Council's plans.

Brixham harbour has recently experienced large scale regeneration,[401] including a purpose built fish market which opened in March 2011 (representing an investment of £20m).[402] In addition, the town has also seen a small increase in fleet size in contrast to many other English ports.

Figure 36 highlights the significant presence of large international vessels that also fish in the South marine plan areas. Non-UK vessels in the South have historic rights to fish between 6nm and 12nm, with many non-UK over-15m vessels active outside of 12nm, such as the Dutch cutter fleet.[403] While much of the fish landed in the South Inshore and South Offshore marine plan areas is sold in London where there is high demand, niche markets have developed more recently including whelks and West Country Crabs, which have found an export market in China.[404] Some of the larger boats operating in the South marine plan areas may land their catch in the Channel Islands or France.

[399] Department for Business Innovation & Skills (2012) Business Population Estimates for the UK and Regions, Published 17 October 2012. Available from: www.gov.uk/government/uploads/system/uploads/attachment_data/file/16402/bpe_2012_data.xls
[400] Ekos Consulting (UK) Ltd. & Nautilus Consultants (2003) Socio-Economic Baseline Study of the South West Fishing Industry. Commissioned by PESCA and the South West Regional Development Agency.
[401] Defra (2011) 'A review of English fish markets', Part of the 'Fishing for the Markets' programme
[402] Torbay Development Agency (2013) Brixham Fish Market. www.torbaydevelopmentagency.co.uk/projects/brixham-projects/brixham-fish-market
[403] Finding Sanctuary, Irish Seas Conservation Zones, Net Gain and Balanced Seas (2012) Impact Assessment materials in support of the Regional Marine Conservation Zone Projects' Recommendations, pp33
[404] Based on information provided by stakeholders at a MMO workshop held in London, 25th March 2013

Figure 33: Proportion of fish landed in the South

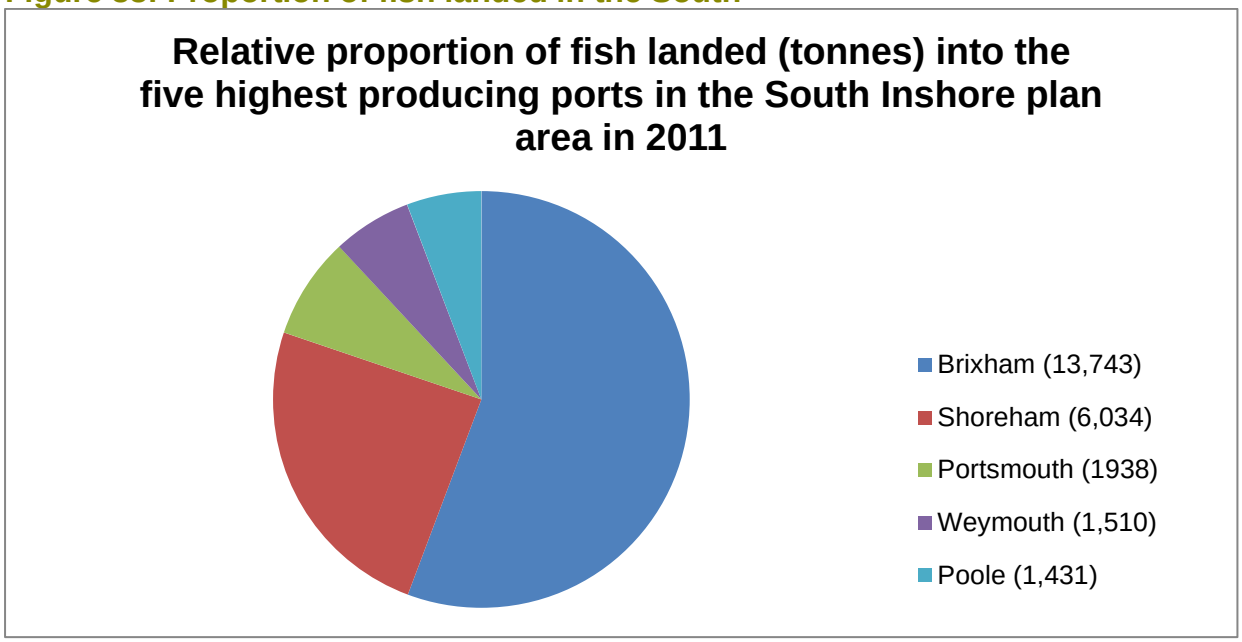
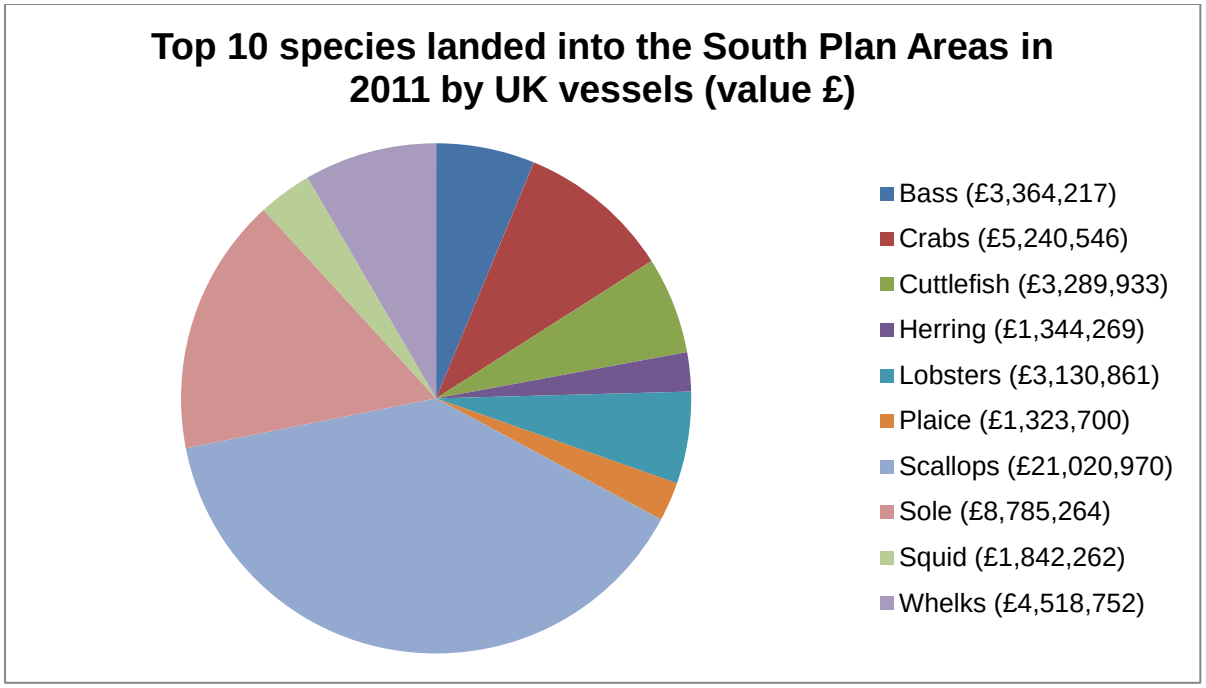


Figure 34: Top ten species landed (£ value)

NB: Both tonnage and value are shown to demonstrate the difference between the two metrics in the South.



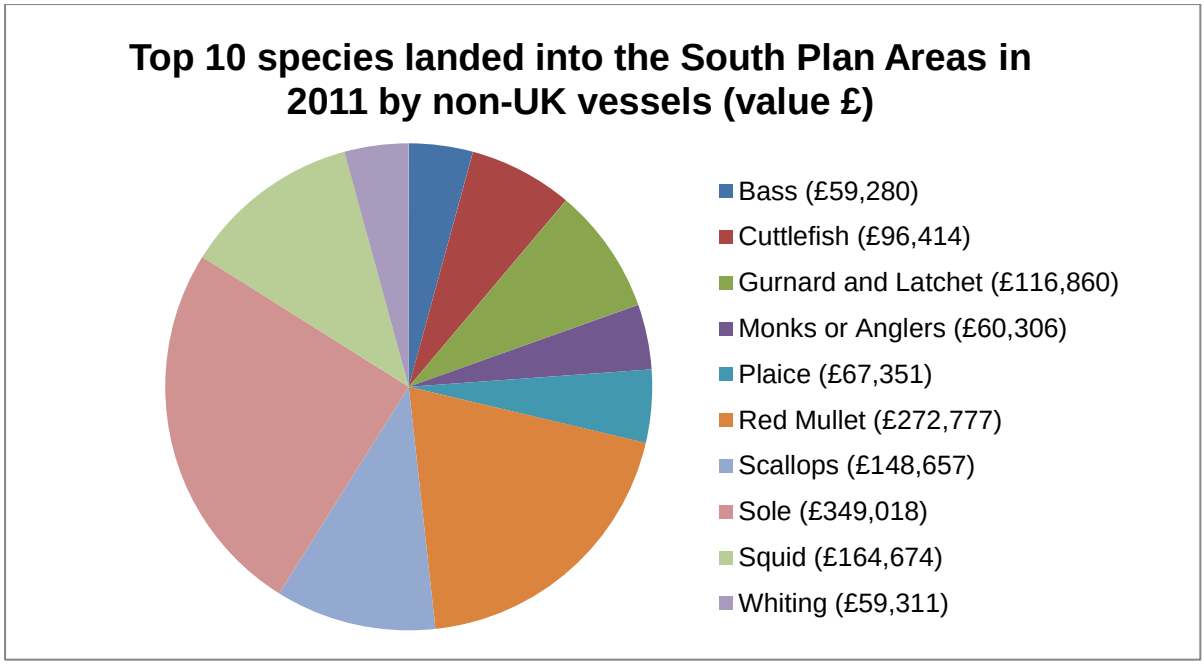
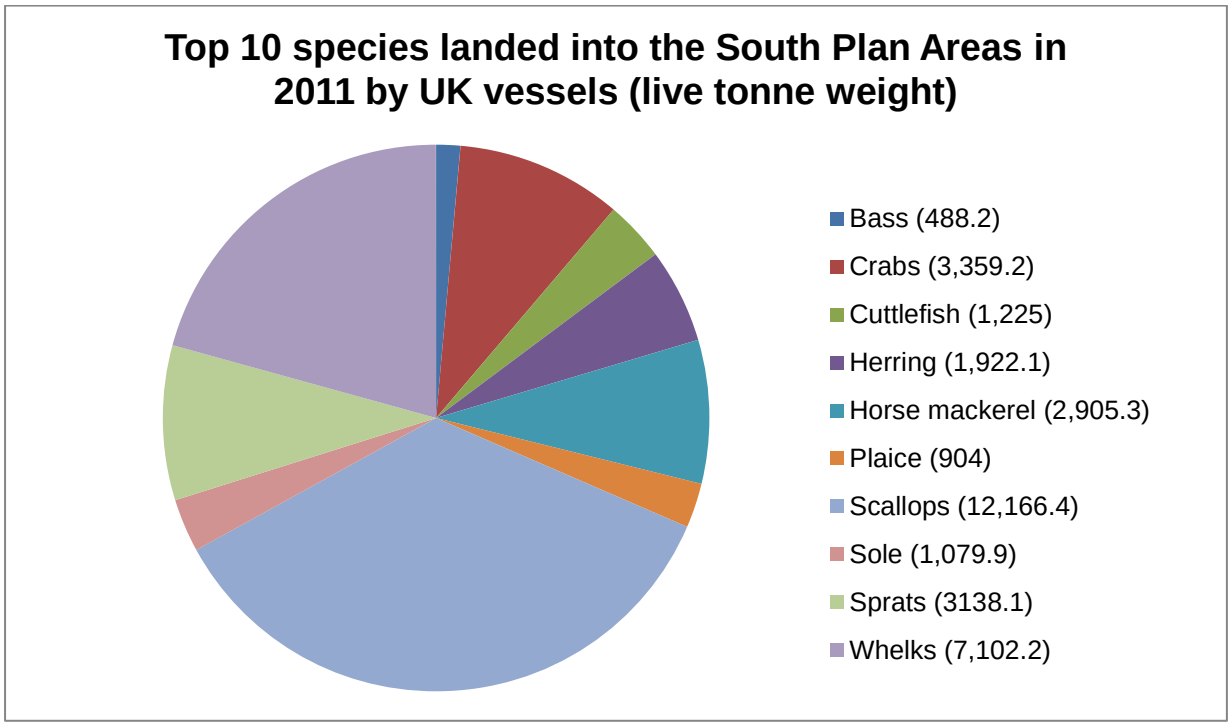
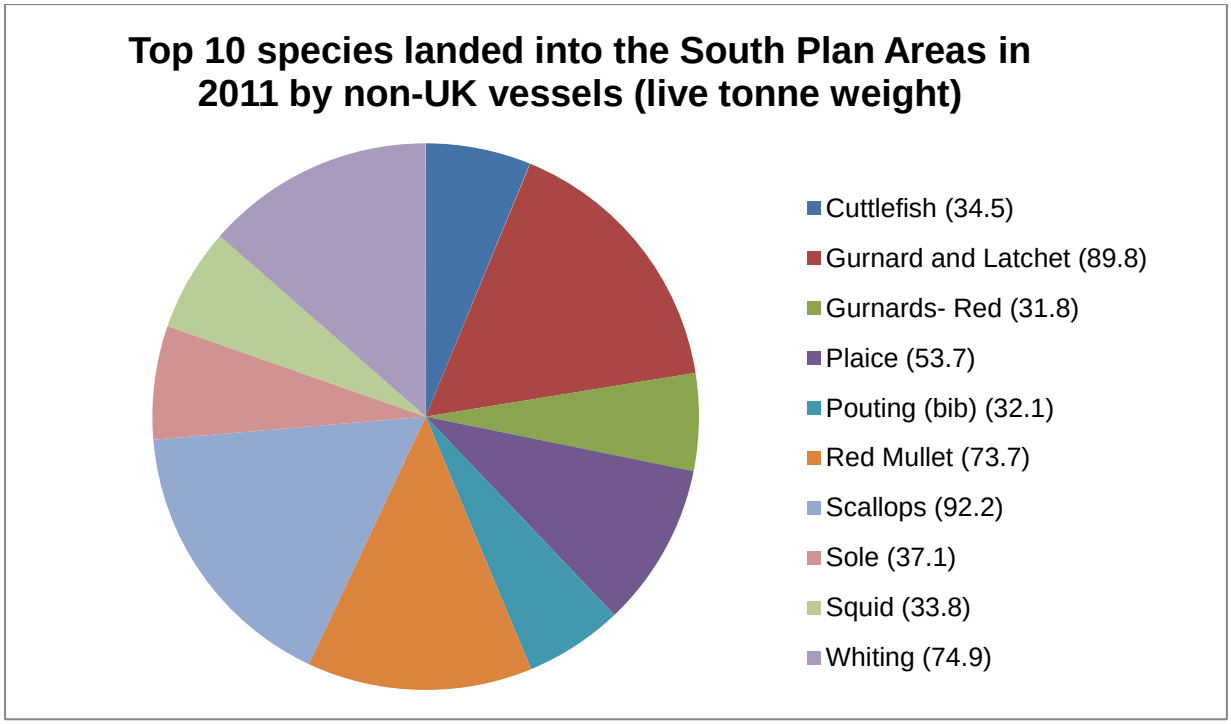


Figure 35: Top ten species landed (live weight)

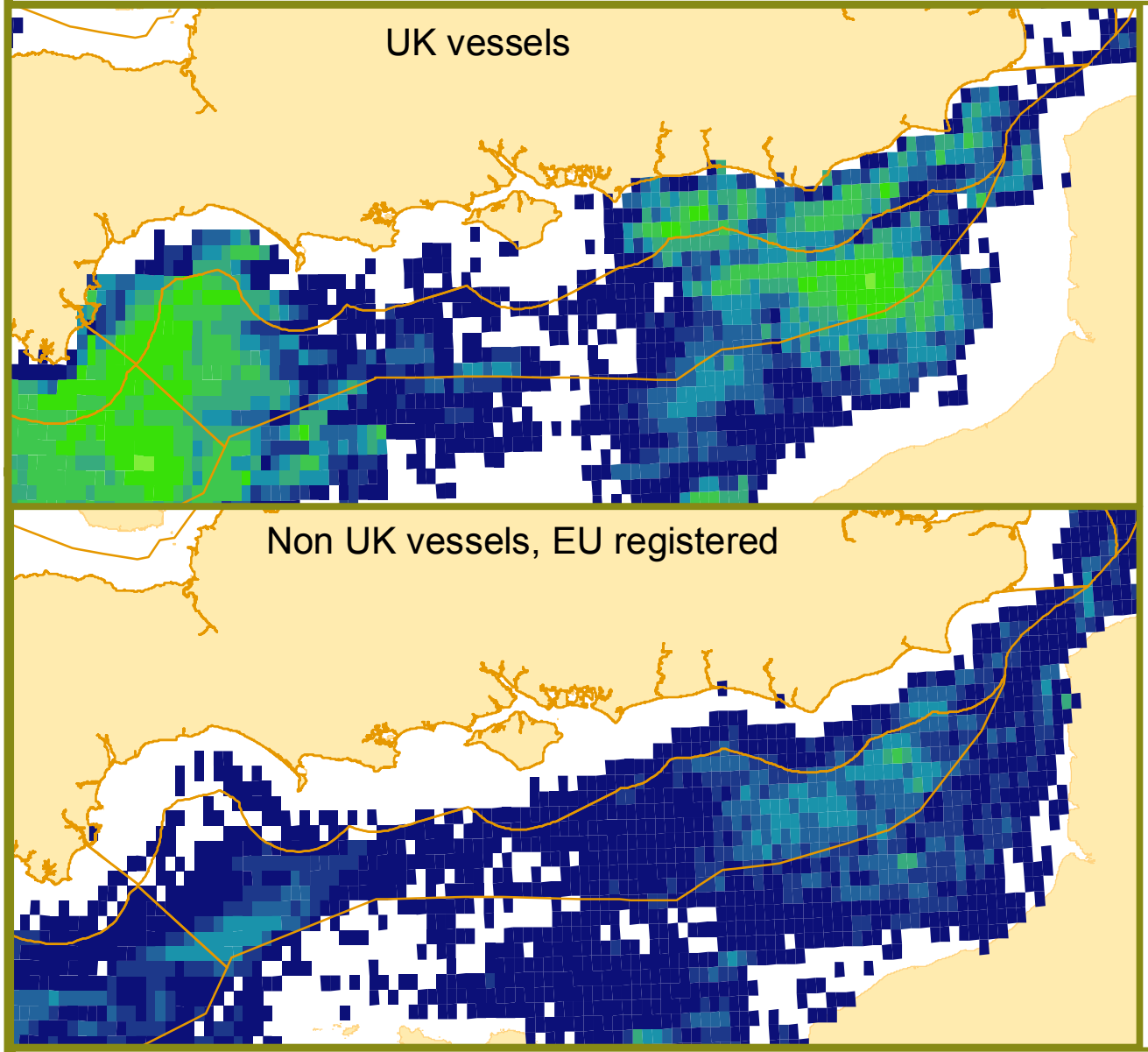



Top 10 species landed into the South Plan Areas in 2011 by non-UK vessels (live tonne weight)
Cuttlefish (34.5)
Gurnard and Latchet (89.8)
Gurnards- Red (31.8)
Plaice (53.7)
Pouting (bib) (32.1)
Red Mullet (73.7)
Scallops (92.2)
Sole (37.1)
Squid (33.8)
Whiting (74.9)

Marine Management Organisation

Figure 36: Fishing effort for ≥15m UK and EU registered vessels 2007-2010 (time spent fishing in hours)

June 2014



Marine plan areas

≥ 15m vessel fishing effort 2007-2010 (all gears)

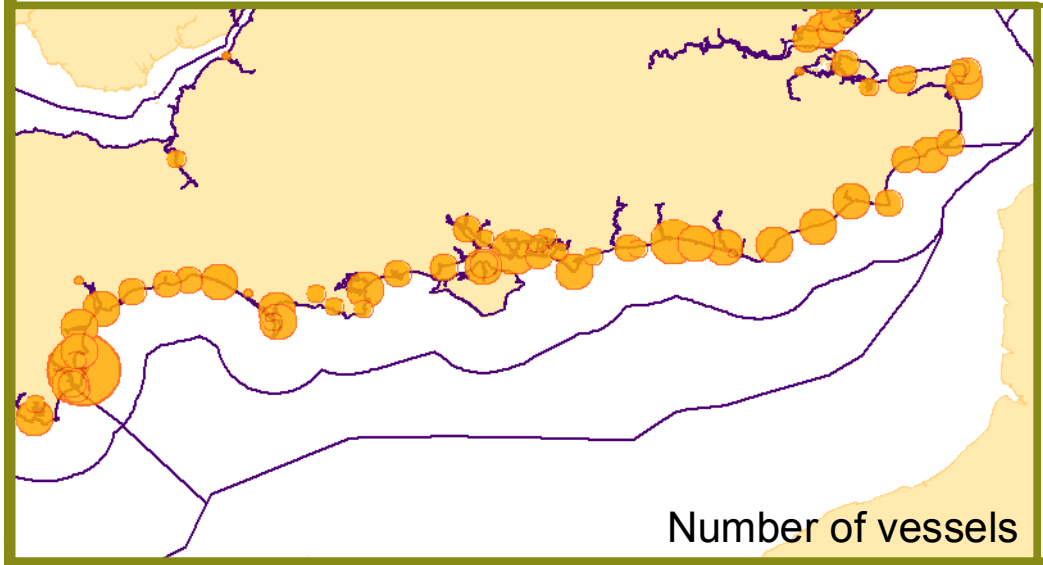
Time spent (hours)

- > 0 - 20 hrs
- > 20 - 40
- > 40 - 80
- > 80 - 160
- > 160 - 320
- > 320 - 640
- > 640 - 1,280
- > 1,280 - 2,560
- > 2,560 - 5,120
- > 5,120 hrs

Marine Management Organisation

Figure 37: Port fish landings in 2011 (all UK vessels)

June 2014



Landings by No. of vessels
(No. of vessels)

- 1 - 3
- 4 - 12
- 13 - 48
- 49 - 192
- 193 - 729
- 730 - 3,072

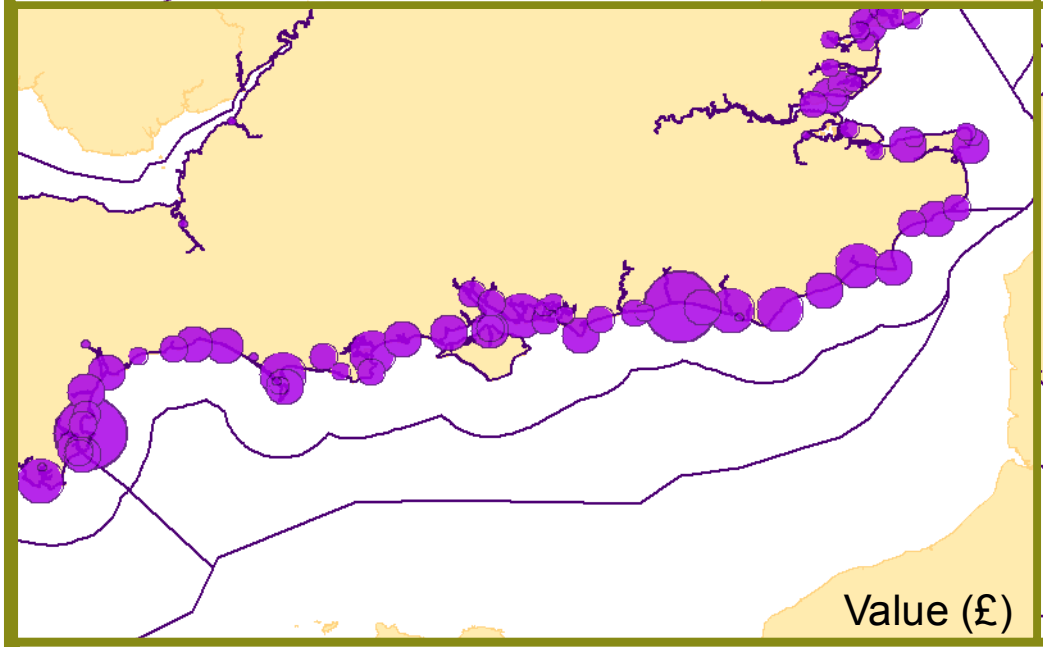
Landings by value
(£ Sterling)

- > £0 - £7,000
- > £7,000 - £42,000
- > £42,000 - £252,000
- > £252,000 - £1,512,000
- > £1,512,000 - £9,072,000
- > £9,072,000 - £54,432,000

Landings by weight
(Tonnes)

- > 0 - 2
- > 2 - 12
- > 12 - 72
- > 72 - 432
- > 432 - 2,592
- > 2,592 - 15,552

Marine Plan areas



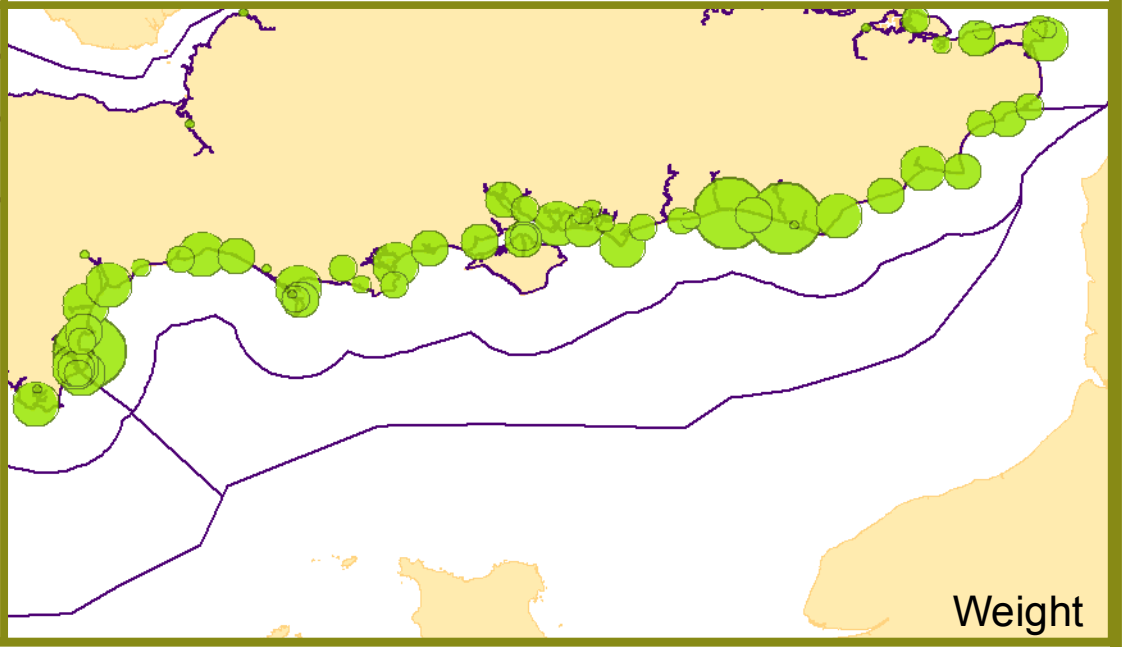
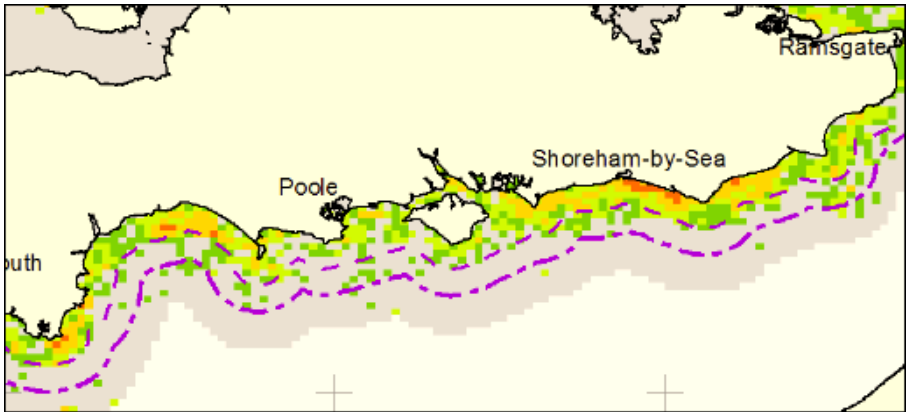
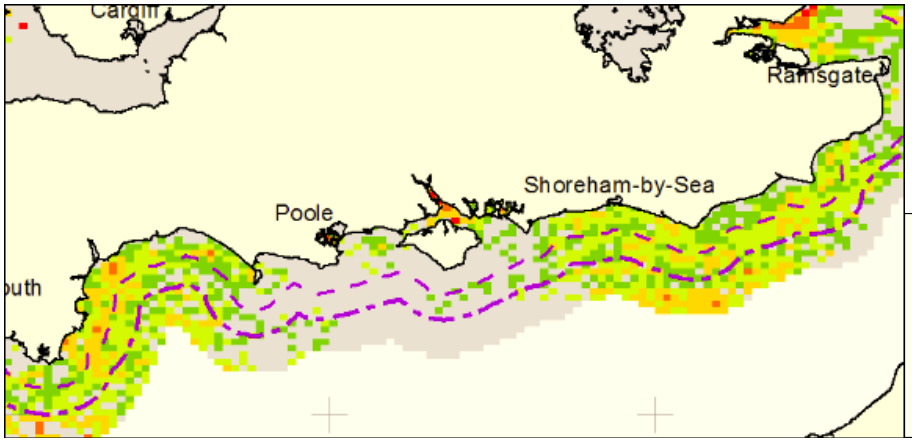


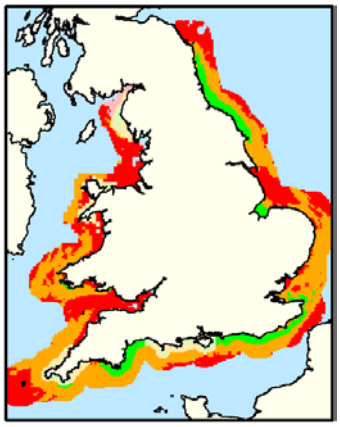
Figure 38: Draft- Inshore fishing activity[405]



Static gears



Mobile gears

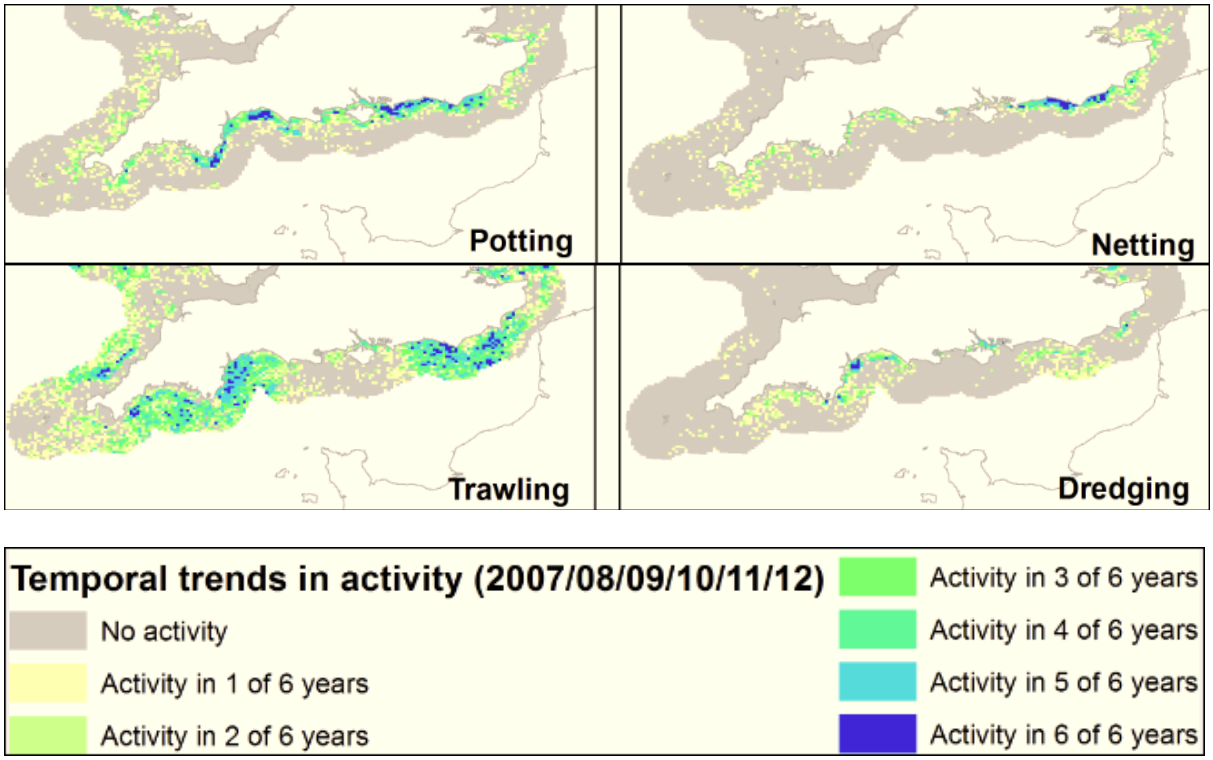


Spatial variation in confidence

Average Surveillance Effort over 1 year	Confidence class
More than once in every 6 days	High
Less than once in every 6 days, but more than once in 2 weeks	Moderate
Less than once in 2 weeks	Low
No surveillance effort	No Data

[405] DRAFT outputs from Defra project MB0117 'Understanding the distribution and trends in inshore fishing activities and the link to coastal communities'.

Figure 39: Draft-Temporal trends in inshore fishing activity[406]

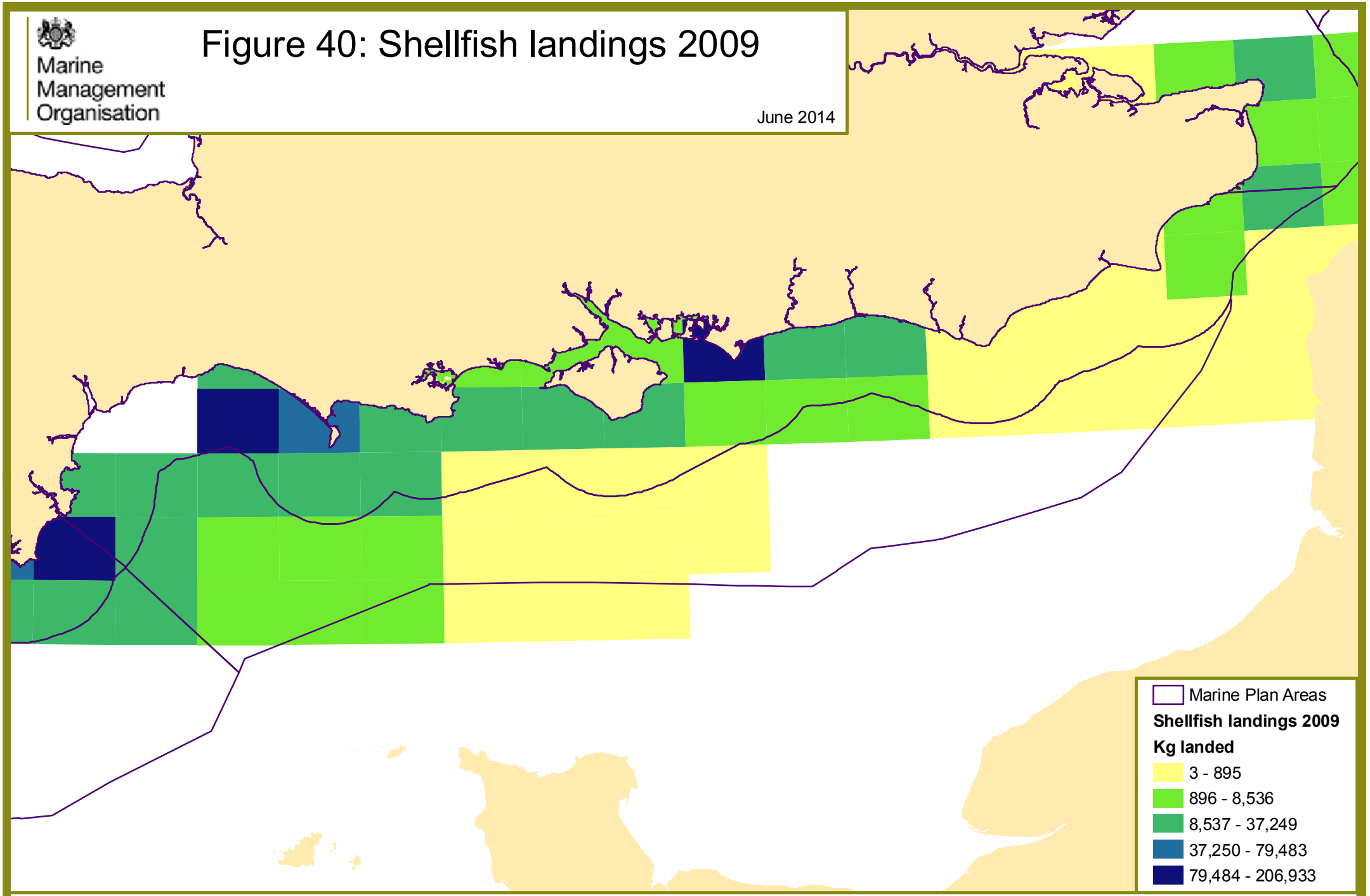


[406] DRAFT outputs from Defra project MB0117 'Understanding the distribution and trends in inshore fishing activities and the link to coastal communities'.

Marine Management Organisation

Figure 40: Shellfish landings 2009

June 2014



Future Trends

It is difficult to predict how fishing activity may change in the future, but changes are likely to be driven by the following key factors.[407]

- changes to the Common Fisheries Policy such as a ban on discards, maximum sustainable yield of quota stocks and regionalisation of fisheries management
- introduction of new marine protected area management measures and measures to achieve good environmental status under the Marine Strategy Framework Directive
- the increasing use of the South marine plan areas by other activities including energy production
- increasing fuel costs
- climate change
- changes in stock levels.

Other factors include the decreasing costs of fishing due to increased vessel efficiency, consumer taste (including an increase in the total consumption of fish, the consumption of under-utilised species, and increased consumption of fish under certification schemes such as Marine Stewardship Council), diversification of markets and possible habitat improvement under policy initiatives such as the Common Fisheries Policy and the Marine Strategy Framework Directive.[408] The recent legal ruling to re-allocate unused fish quotas to smaller vessels may also see a short term increase in the quantity of fish landed in the South due to the large number of smaller vessels there. Project Inshore (which aims to achieve Marine Stewardship Council accreditation for up to 200 stocks) has the potential to open up new marketing opportunities for the industry through customer support for sustainably caught seafood.

Potential core issues

The fishing industry faces a number of potential issues, most notably the uncertainty related to any changes that may result from the recently revised Common Fisheries Policy and therefore a difficulty to forward-plan. There is also uncertainty surrounding the potential introduction of new marine protected area management measures that are likely to affect the fishing industry, yet it remains unknown how and to what extent. These concerns supplement a range of additional issues facing the industry which are set out in more detail below.

Interactions with other sectors

Potential displacement and loss of grounds are a key concern for fishermen, largely due to the growth in other sectors (such as offshore renewable energy) and new marine protected areas, but also within the fishing sector itself through gear conflict (eg Lyme Bay). Fishermen are particularly concerned about increased pressure on existing fishing grounds, especially around the Isle of Wight where the cumulative

[407] MMO: 1051 (2013) Future Trends in Fishing and Aquaculture in the South Inshore and Offshore plan areas http://www.marinemanagement.org.uk/evidence/1051.htm
[408] MMO: 1051 (2013) Future Trends in Fishing and Aquaculture in the South Inshore and Offshore plan areas http://www.marinemanagement.org.uk/evidence/1051.htm

impact of activities such as renewable energy production, aggregate extraction, ferry routes and new management measures may be felt.

A recent study was commissioned by the Marine Management Organisation[409] to better understand how marine planning might help address the issue of displacement, by scoping the potential of a 'core fishing grounds approach'[410] when developing plan policy. This project highlighted a number of issues with the approach, including the challenge of gaining consensus on the most 'valuable' areas for the industry, and how to overcome the issue of activity change year on year (temporal trends are shown in figure 39). The Marine Management Organisation is currently exploring how best to take this work forward.

In addition to displacement causing direct effects on the industry, indirect effects such as possible impacts on tourism or effects on secondary industries such as restaurants in active fishing ports, eg Brixham and Hastings, are also a concern.

Issues for sustainability

The environmental impact of some fishing practices is still an issue and the UK as a whole is challenged with ensuring that fishing continues in a sustainable way. In particular, trawling and dredging have been associated with environmental pressures such as abrasion[411] (see section 2.2.5 for more information).

Recent research commissioned by the Marine Management Organisation[412] highlighted the potential impacts of climate change on commercial fisheries as a result of sea temperature rise affecting the abundance and distribution of stocks (yet it remains uncertain as to the nature of these effects). Any changes on fish distribution may impact on quota management and may require the industry to diversify (however this may also create opportunities to target different species). These changes may affect income for those targeting traditional species.

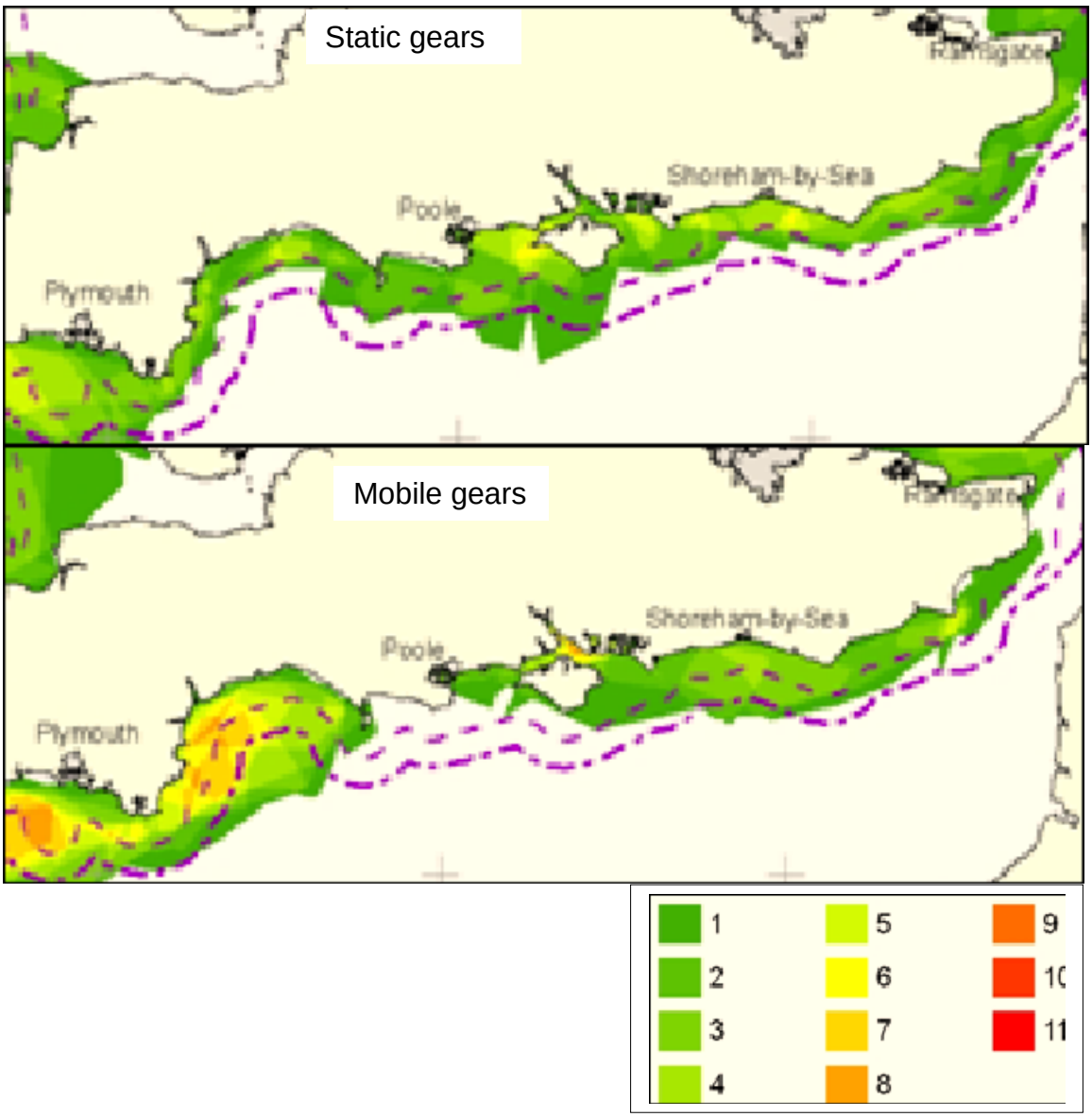
In addition to economic and environmental impacts, changes to the fishing industry have the potential to yield social impacts, both locally and on a wider scale. Recent research[413] suggests that the interactions between marine protected areas and offshore renewables on commercial fishing have the greatest potential for significant social impacts. Research has highlighted the importance of fishing to the identity and sense of place in Hastings[414] and the important contribution fishing makes to the

[409] MMO project 1074 Scoping the Opportunities and Challenges to using a 'Core Fishing Grounds' Approach to Develop a Spatial Marine Plan Policy for Fishing (in press)
[410] An approach that identifies those areas that are of most value to fishers, highlights them through a marine plan and which may use plan policy to give the fishing industry priority in these areas over other activities
[411] HM Government,2012,Marine Strategy Part 1,UK Initial Assessment and Good Environmental Status
[412] MMO project 1077 Potential Effects of climate change in the South and East Marine Plan Areas (in press)
[413] MMO project 1060 Social Impacts and Interactions Between Marine Sectors (in press)
[414] Urquhart, J. and T. Acott (2013). "Constructing 'The Stade': Fishers' and non-fishers' identity and place attachment in Hastings, south-east England." Marine Policy 37(0): 45-54.

character of towns such as Rye.[415] The Department for Environment Food and Rural Affairs are soon to publish a study that seeks to highlight areas of sea that are 'zones of influence' for more than one port and therefore at greater risk of social impact (see draft outputs in figure 41). These issues are being explored further through projects such as the Interreg 'Geography of Inshore Fishing' and any relevant outputs from this project (which is due for completion in September 2014) will be considered at later stages of plan development.

NB: Issues relating to fish rather than fishing as an activity are addressed in section 2.2.5.

Figure 41: Overlapping 'Zones of Influence' for fishing ports on the South coast[416]



[415]Reed, M., P. Courtney, et al. (2013). "Beyond fish as commodities: Understanding the socio-cultural role of inshore fisheries in England." Marine Policy 37(0): 62-68.
[416] DRAFT outputs from Defra project MB0117 'Understanding the distribution and trends in inshore fishing activities and the link to coastal communities'.

2.13 Aquaculture

Current situation

Currently, within the South inshore marine plan area, all commercial aquaculture activity takes place within 1 nm of mean low water. In the South inshore plan area there are 34 designated shellfish waters (majority class B classification[417]) covering 520.8 km^2 or 5% of the inshore plan area, and 16 authorised shellfish farms in operation within these waters.[418] In 2013 the South inshore plan area held 32% of all English aquaculture production, and by species was responsible for 33% of all mussel production and around 43% of all oyster production. In 2011 1566 tonnes of shellfish were produced via aquaculture (MMO 1051), the majority from mussel farming. There is no finfish aquaculture within the South plan areas.[419] There are various spatial concentrations of aquaculture production eg in the Solent, Poole, the Exe, Torbay and Sidmouth, with mussels, oyster, clams, cockles and scallops all being cultivated. Inside Portland Harbour mussels are farmed on long lines, Pacific oysters grown in lantern nets and a semi-submerged mussel system is in place off Torbay (MMO 1051).

Statutory bodies involved with the regulation of aquaculture in England include the Inshore Fisheries and Conservation Authorities, the Environment Agency, Centre for Environment, Fisheries and Aquaculture Science, The Crown Estate and Natural England. The Marine Management Organisation may also be involved via the application of European Marine and Fisheries Funding, for providing a vessel license for unregistered vessels (eg those without a fishing license) that are part of an aquaculture production business to collect wild mussel seed for aquaculture operations,[420] and for licensing fixed structures relating to aquaculture such as cages.

Current Policy

There are numerous pieces of legislation related to the industry and these can seem complex.[421] Recent national strategy and European legislation may help boost the industry, this highlighted in the aquaculture consultation document produced by English aquaculture industry bodies, looking at industry constraints (MMO 1039) and that required to assist growth of the sector. This included research into development capacity; research/trials and innovation regarding offshore aquaculture; increased access to investment; clarity on government bodies' roles in the industry, streamlining of regulatory requirements, and inclusion in marine spatial planning. Legislation and guidance documents include the European Commission's Strategy for the Sustainable Development of European Aquaculture. Common Fisheries

[417] CEFAS (2009-2013) Assorted Sanitary Reports covering estuaries in the Inshore South marine plan area. Produced under regulation (EC) 854/2004. www.cefas.defra.gov.uk/our-science/animal-health-and-food-safety/food-safety/sanitary-surveys/england-and-wales.aspx

[418] Personal communication with Kevin Denham, Head of the Fish Health Inspectorate, Cefas, May 2013

[419] Personal communication with Ian Laing, CEFAS, January 2013 – based on data CEFAS collate annually for Eurostat

[420] The UK fishing Vessel Licensing Scheme, Instructions for Marine Officers (The Red Book)

[421] Defra (2012) Planning for sustainable growth in the English Aquaculture Industry, January 2012, available at www.gov.uk/government/consultations/planning-for-sustainable-growth-in-the-english-aquaculture-industry

Policy reform has led to a more detailed inclusion of aquaculture in this legislation, including foreseeing greater aquaculture infrastructure development within the EU. Additionally, it makes provisions for development of aquaculture producer organisations via the common market organisations regulation. The commission established non-binding union strategy guidelines which look to reduce administrative burden, encourage sustainable aquaculture, and facilitate access to growth.[422]

Within the South inshore marine plan area there are a number of regulated aquaculture sites including a hybrid order in Poole Harbour.[423] Managed by Southern Inshore Fishery and Conservation Authority it leases 1.86km^2 to aquaculture businesses and contains one of the area's largest Pacific oyster farms and includes a byelaw that ensures 'any mussels relayed within the harbour must originate from within their district'. In addition there are several orders within the Solent (two companies managing and harvesting native oysters), in Lyme Bay (mainly for mussel beds),[424] a hybrid order in the Dart for oyster and mussel, and a regulatory order in the Teign for mussels. Locally, it is recognised that there is potential for expansion of trestle/bag aquaculture in this estuary.[425]

Within local plans there is no direct mention of aquaculture; however it is indirectly referred to in the following plans under water quality and fisheries:

- Chichester District Council Draft Local Plan Policy 13: 'Planning permission will be granted for development where the provision of water infrastructure is not considered detrimental to the water environment, including existing abstractions, river flows, water quality, fisheries, amenity or nature conservation'.
- Worthing Borough Council Local Development Framework Policy 15: 'The council will support the aims of the Water Framework Directive to protect and enhance the quality of the borough's surface freshwater areas, coastal waters and groundwaters'.

In addition there is the Poole Harbour Aquatic Management Plan which contains sections on aquaculture; and various local studies into shellfish including the possibility that mussel farming in the Exe may be aggravating shifting sands in the estuary.

[422] Basic Regulation on the CFP – Final Compromise Text, June 2013. http://cfp-reformwatch.eu/wp-content/uploads/2013/06/2013-06-14_Basic_regulation_on_the_CFP_final_compromise_text.pdf
[423] The Sea Fisheries (Shellfish) Act, 1967 introduced the concept of **Regulated** and **Several** fisheries whereby the common law right of shell fishing is removed to ensure the protection of property rights in such fisheries. Hybrid orders which are regulating orders with powers to grant leases of Several rights. www.cefas.co.uk/publications/techrep/techrep136.pdf for more information on Orders.
[424] Information obtained during bilateral meeting with Southern IFCA officers in June 2013.
[425] Pers Comms Graeme Smith, Teignbridge District Council, 2013.

Marine Management Organisation

Figure 42: Current aquaculture areas

June 2014

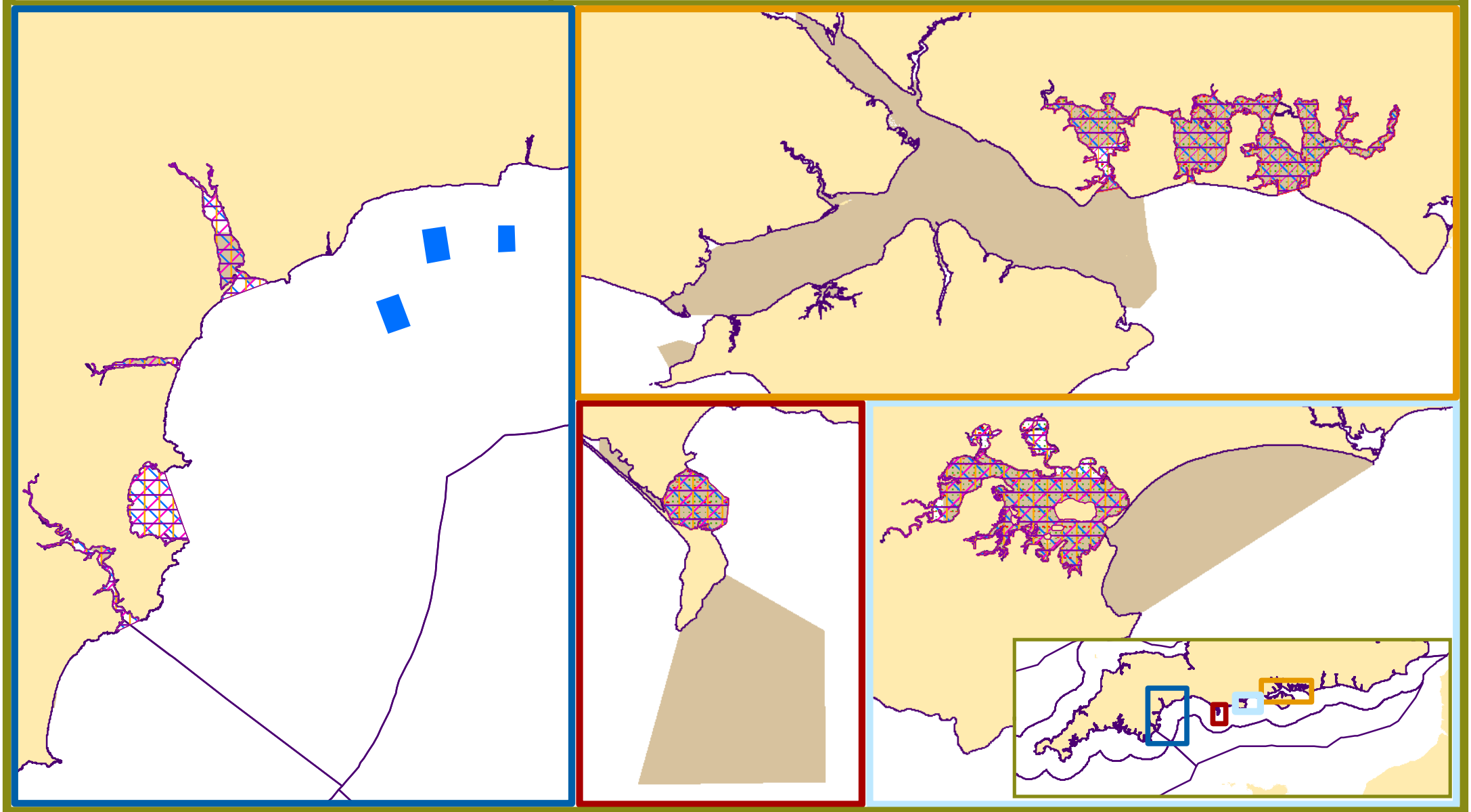


Figure 42 displays aquaculture currently occurring within the South marine plan areas. The data for the Solent and Chichester estuary is the best available data the Marine Management Organisation holds. We are aware that there is oyster cultivation occurring in some areas of the estuaries and associated inlets, but do not currently have access to a Geographical Information System based dataset for this area.

Value

In 2009 estimated economic value of shellfish production in England was £7.16 million.[426] The Gross Value Added of the aquaculture sector was estimated to be £2.98 million, which equated to £741,000 for the South marine plan areas (MMO 1050). Within the South marine plan areas there are 42 known direct employees, with another 104 people indirectly employed in supporting industries.[427] Future development levels are difficult to predict due to the close linkages with changes in wild fisheries, market forces, and the recent instability in economic growth rates (MMO 1050). The following types of aquaculture have been identified by the project work (MMO 1040) as having the greatest annual net profit per individual business within their current technology limitations: lobster hatcheries/restocking, and mixed trestle/bag culture of oyster. However, if profit is based on the footprint of the plan areas actually utilised by aquaculture type, mussels would be the most profitable as they are cultivated across a wider area. Lobster ranching and restocking is seen as a possibility for expansion of English aquaculture as a whole (MMO 1051), however, some question its viability and practicality compared to better management of wild lobster stocks[428] for example by 'V' notching and release of egg bearing/berried lobsters. Based on current technology 855km^2 of the South marine plan areas are seen as potentially suitable for aquaculture activities[429] (see figure 43).

The most profitable activities were highlighted in a study (MMO 1040) undertaken on behalf of the Marine Management Organisation. The study was a literature review to identify current constraints on various different types of aquaculture. Natural resource, infrastructure and planning constraints and proximity to supporting services were all assessed. In addition an economic assessment was undertaken to identify potential net profits based on average market prices of species in question and costs occurred during business operation.

[426] Defra (2012) Planning for sustainable growth in the English Aquaculture Industry {and inflated to 2013/14 values), January 2012, available at www.gov.uk/government/consultations/planning-for-sustainable-growth-in-the-english-aquaculture-industry

[427] Personal Communication with Kevin Denham, Head of the Fish Health Inspectorate, Cefas, May 2013 and Using a multiplier derived from
Food and Agriculture Organization of the United Nations, National Aquaculture Sector Overview - Canada, www.fao.org/fishery/countrysector/naso_canada/en

[428] Pers Comms (April 2014) Phil Belden of South Downs National Park Authority

[429] Calculated by Ruth Barber of MMO, August 2013, baseline information taken from MMO (2013) 'Spatial Trends in Aquaculture Potential in the South and East Coast Inshore and Offshore Marine Plan Areas' a report produced for the Marine Management Organisation by Marine Planning Consultants. Project no: 1040 http://www.marinemanagement.org.uk/evidence/1040.htm

Marine Management Organisation

Figure 43: Aquaculture potential based on current technology, environmental and legislative constraints

June 2014

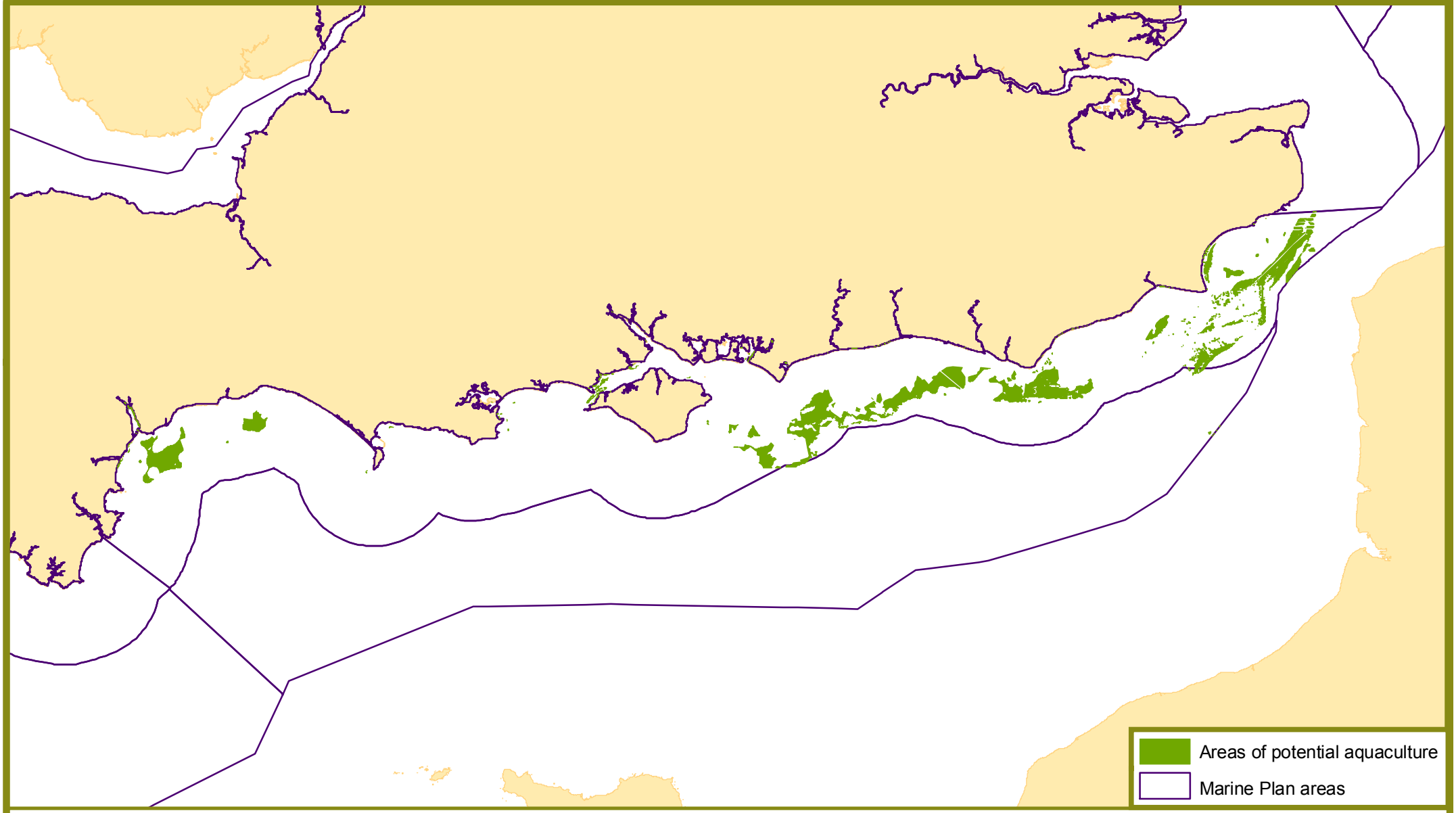


Table 9: Breakdown of area by aquaculture type

855km² within the South marine plan areas have been deemed as suitable for one or more species of aquaculture, based on current technology. This can be broken down by species as follows:

Aquaculture type	Area (km^2)	% of total area
Bottom Culture (Clams)	4	<1
Rope Grown (mussels)	172	20
Lobster Restocking	601	70
Macro Algae	188	22
Trestle Bag Bivalve	23	3
Fin Fish	102	12
Bottom Culture (Oysters)	0.2	<1

Alongside the economic value aquaculture has potentially significant social benefits associated with increased employment opportunities. These benefits are likely to be clustered to where there are active aquaculture sites and processing facilities.[430]

Future trends

Recent slowing of economic growth among other factors means that it is difficult to predict future expansion.[431] Such development could include a movement of aquaculture offshore, co-location with other activities, and the cultivation of new species. Outside of factors covered elsewhere (eg market forces), factors that could drive changes in the industry include: co-location opportunities with offshore wind energy projects/offshore potential for shellfish farming; climate change; multi-trophic aquaculture and marine biomass production. Technological development may also influence industry growth offshore, but is out of the scope of this report.

Within offshore windfarm sites the specific infrastructure, environmental conditions and developer willingness will determine the type of aquaculture that could be undertaken. Additionally negotiations with the windfarm developer will be required. The culture of shellfish such as mussels within wind farm infrastructure has been shown to be biologically and economically feasible (MMO 1010). A project undertaken in Wales at North Hoyle Wind Farm by the Shellfish Association of Great Britain, Seafish and Deepdock Ltd[432] cultivated mussels on the seabed within the wind farm with promising results. This project is linked to studies funded by European Fisheries Fund Wales,[433] which intend to help raise developer confidence by increasing knowledge of environmental and economic potential for cultivation offshore. The North Hoyle project itself is currently closed.

[430] MMO (2014) Social impacts and interactions between marine sectors (in press). MMO 1060
[431] UKMMAS (2010) Charting Progress 2. Feeder Report: Productive Seas, Defra on behalf of UKMMAS, 2010, http://chartingprogress.defra.gov.uk/feeder/PSEG-feeder.pdf
[432] www.shellfish.org.uk/files/7599EFF%20Co-Location%20Project%20December%202012%20Meeting%20Report%20FINAL.pdf
[433] www.shellfish.org.uk/files/7599EFF%20Co-Location%20Project%20December%202012%20Meeting%20Report%20FINAL.pdf

Current developments in the South marine plan area which are looking to expand the industry include the 15 year lease obtained by Offshore Shellfish Ltd to create the UK's first large scale offshore rope cultured mussel farm in Lyme Bay situated between 3nm-6nm offshore at 20-24m depth and expected to employ up to 30 people producing up to 10,000 tonnes of mussels per year. It has been designed to allow for potting to continue between the mussel lines, thus allowing co-existence with this type of capture fishery and has potential to substantially increase production of mussels in the plan areas.[434]

Multi-trophic aquaculture combines the cultivation of a fed aquaculture species, eg fish, with a species that extracts matter eg shellfish or seaweed. This enables a balanced ecosystem approach and is seen as more socially acceptable. The system has been tested in Canada, Scotland and Norway and has shown potential[435] yet has not been tested in England. It could have potential for combining aquaculture and biomass directly (see below) particularly at Langstone Harbour where naturally established macro-algae (*Undaria pinnatifida)* under managed conditions could help reduce eutrophication in the estuary and be harvested as a food product.[436]

Climate change could have major impacts for the sector, particularly shellfish aquaculture, due to the effects of rising water temperatures and changes in plankton composition (MMO 1050). Rising water temperature could induce faster growth rates and increased spatfall in warm water species, but could adversely affect cold water species or those grown in intertidal areas. Higher water temperatures could also allow for novel species such as tilapia and bluefin tuna to be farmed. Increased water temperature may also allow for certain shellfish species to be grown outside of hatcheries (natural spawning).[437] Increased storm frequency may impact the equipment required to keep stock secure, and ocean acidification could affect the calcifying processes of commonly cultured shellfish species including mussels[438] especially at the early life stages. Effects have already been seen in oyster hatcheries in the USA.[439]

The effects of climate change are likely to be felt more strongly on the South coast of the UK due to sea level rise not being offset by glacial uplift. This is likely to result in the loss of intertidal habitats required for seabed cultivation of oyster and mussel.[440]

Marine biomass (the cultivation of macro-algae) is emerging as one of the newest prospective business sectors but has yet to develop into a full demonstration phase.

[434] 'UK Offshore Aquaculture Prospects A Crown Estate Perspective', presentation given at UK Aquaculture forum Oct 2012
[435] http://www.scotland.gov.uk/Publicaitons/2013/08/6786/13 Scottish government publication - seaweed policy statement consultation.
[436] Pers Comms (April 2014) with Paul Farrell of University of Portsmouth
[437] Impacts of climate change on aquaculture. Gibbins M, Bracknell I, Service M, 2013, MCCIP Science Review 2013:1
[438] Pinneger J, Watt T, Kennedy K (2012) Climate Change Risk Assessment for the Marine and Fisheries sector. (Defra)
[439] Ocean Challenge, Volume 20, 2013, Natalie Hicks, Ocean Acidification – much more than a hot research topic
[440] Impacts of climate change on aquaculture. Gibbins M, Bracknell I, Service M, 2013, MCCIP Science Review 2013:1

Research and development is however well established in identifying resource potential. Marine biomass is included with aquaculture for the purpose of marine planning as we are focussing on the cultivation of the algae (a form of aquaculture) and not the economics and supply chain which will be energy related.

Marine biomass has potential space and ecosystem implications for the South Inshore marine plan area in the future. The Crown Estate and Centre for Environment, Fisheries and Aquaculture Science are currently carrying out ecosystem effects modelling in Scotland.[441] Additionally there are projects occurring in Norwegian and Irish waters, and Statoil has plans for a 2000ha project by 2015 and a 10,000ha project by 2020 near Bergen.[442] Studies[443] indicate that macro-algae grows well in the vicinity of finfish aquaculture cages, offering potential for the combination of two industries.

It is important to note that macro-algae does have other uses outside of the biomass industry, including for food (human and animal feed), fertiliser,[444] and pharmaceuticals. Although the current focus is on biogas production, the pure aquaculture side of cultivating algae could contribute to other industries in the future. Finally, the cultivation of macro-algae may provide food resources and habitat for marine species even if on a temporary basis, this could support habitat creation for juvenile fish for instance.[445]

[441] Aldridge, J., van de Molen, J. and Forster, R. 2012. 'Wider ecological implications of Macroalgae cultivation', The Crown Estate, 95 pages. ISBN: 978-1-906410-38-4

[442] The Crown Estate futures supporting text, 2013, provided to the MMO via personal communication
[443] http://www.scotland.gov.uk/Publicaitons/2013/08/6786/13 Scottish government publication - seaweed policy statement consultation.
[444] Biomara: www.biomara.org/understanding-seaweed/the-importance-of-seaweed-across-the-ages
[445] http://www.scotland.gov.uk/Publicaitons/2013/08/6786/13 Scottish government publication - seaweed policy statement consultation.

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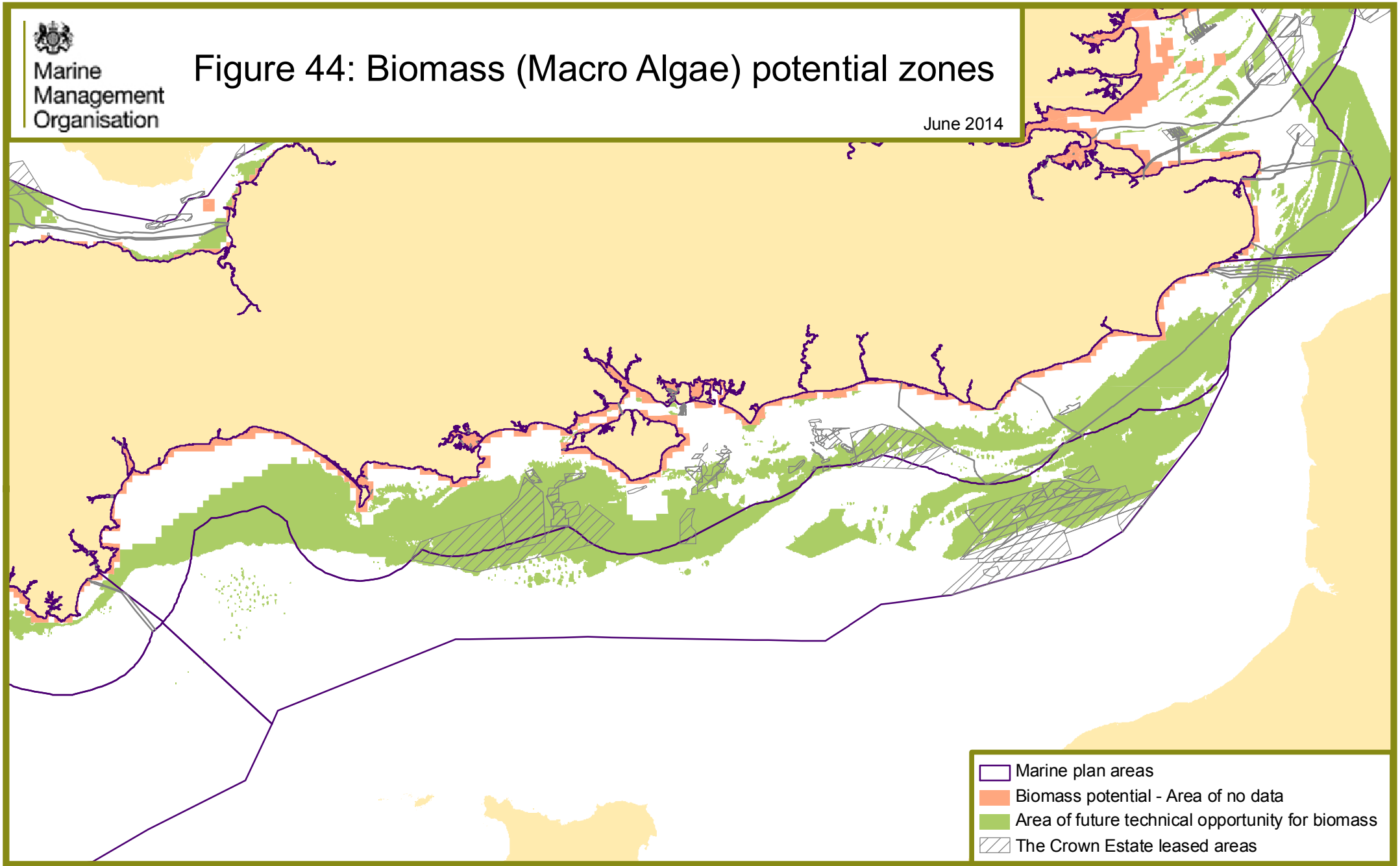
Figure 44: Biomass (Macro Algae) potential zones

June 2014



Note: The areas of future technical opportunity do not include the presence of hard constraints posed by existing uses of the marine estate or other factors including natural & cultural resources, marine users, economics & market appetite and policy drivers required for the opportunity to be supported. Cables and pipelines outside of the territorial waters limit (other than export cables) are not shown as they are not subject to The Crown Estate's permission

Potential core issues

Water quality

Water quality is of high importance to the aquaculture industry. Poor water quality can lead to reduced species growth and increased risk of disease, both to the shellfish and to humans via consumption.[446]

Certain shellfish species (oyster in particular[447]) are known to help purify water and thus maintaining healthy shellfish stocks could be beneficial. However, sustainable shellfish cultivation on the South coast depends on co-operation with others including water companies, who deliver major capital schemes to improve coastal water quality under the requirements of the Water Framework Directive.

As water quality is poor in many estuaries, shellfish companies are struggling to maintain a water quality status that allows for reduced processing of the harvested shellfish. In addition the reduced quality status means that they are unable to command as high a price as they potentially could.[448]

Climate change

Climate Change impacts on the aquaculture sector will vary by species, but are likely to be felt particularly strongly in the South plan areas. Impacts include:

- disease and fouling increases (including via storm water overflow)
- alterations to habitat and water quality (including sediment re-suspension)
- changes in growth rates
- increases in invasive species
- potential effects of ocean acidification on calcification of shells (oysters are particularly sensitive to changes in pH and may need to move offshore to survive).

Growth rate changes could be positive for the industry and cultivation of new species could be possible due to warmer water temperatures and new habitat creation.[449]

Interactions with other sectors

Relationship building and understanding between aquaculture businesses and recreational boating would benefit both sectors, as within the South Inshore marine plan area aquaculture occurs in estuaries alongside recreational boating and yacht racing. Examples of such integration occur within the Solent where (particularly in the summer months) pleasure boating occurs alongside important oyster beds. This can lead to both competition for space and risk of water pollution from vessels.

Maintenance/capital dredging, port and shipping activities, oil refining, and capture fisheries also occur close to aquaculture activities. These may be a source of conflict

[446] East Inshore and Offshore Marine plan Areas Evidence and Issues Report 2012 (MMO) http://www.marinemanagement.org.uk/marineplanning/areas/east_issues.htm
[447] MMO (2014) Social impacts and interactions between marine sectors (in press) MMO1060
[448] MMO (2014) Social impacts and interactions between mairne sectors (in press) MMO1060
[449] MMO (2014) Potential spatial effects of climate change in the South and East Marine Plan Areas (in press) 1077)

for space, but again the more immediate concern is water contamination by bacteria, viruses, and chemical pollution, and impacts from non-native species[450] eg from ballast water. Faecal contamination from large concentrations of breeding/overwintering birds may also be an issue,[451] as well as storm water overflows during flood events.

The Crown Estate believes that regulatory bodies should look to co-location of aquaculture with other marine interests, most notably capture fisheries.[452] The idea is that land based infrastructure for the two industries is similar, with many transferable skills, meaning there is scope for positive interactions between the sectors. Relationship building with capture fisheries are key; the fisheries sector needs to see aquaculture as complementary not as a direct competitor.

With a changing climate there could be an increase in competition with recreational activities either due to reduced suitable space (bathing water sites and aquaculture both require a high level of water quality) or an increase in activity levels eg recreational boating and ports and shipping activity and associated dredging.[453] With the need to consider new sites for aquaculture due to changing sea temperatures and pH, as well as water quality concerns, marine planning and the ability to predict potential suitable sites will become increasingly important.

Issues for sustainability:

- aquaculture is often seen as a way to contribute to meeting the rising demand for seafood and it is therefore imperative that it helps to maintain a healthy and diverse environment
- expansion of the aquaculture industry is likely to lead to increased jobs in coastal communities at various skill levels, especially if joined with capture fisheries
- for established forms of aquaculture the science behind these (eg best practice, species environmental requirements) requires collating in order that operation and development of aquaculture takes place using the best available environmental management practices
- for novel/emerging forms, including offshore potential, investment is needed to look at environmental impact and production technology, and to collate existing information on procedures from other countries where this form is more established
- for all aquaculture types research is occurring into economic/social benefits. The Marine Management Organisation has begun this via MMO project 1035

[450] MMO (2014) Social impacts and interactions between mairne sectors (in press) MMO1060
[451] CEFAS (2009-2013) Assorted Sanitary Reports covering estuaries in the Inshore South marine plan area. Produced under regulation (EC) 854/2004. www.cefas.defra.gov.uk/our-science/animal-health-and-food-safety/food-safety/sanitary-surveys/england-and-wales.aspxwww.cefas.defra.gov.uk/our-science/animal-health-and-food-safety/food-safety/sanitary-surveys/england-and-wales.aspx
[452] Pers. comms. Alex Adrian The Crown Estate 2013 and 'UK Offshore Aquaculture Prospects A Crown Estate Perspective', presentation given at UK Aquaculture forum Oct 2012
[453] MMO (2014) Potential spatial effects of climate change in the South and East Marine Plan Areas (in press) 1077)

'Social impacts of fisheries, aquaculture, recreation and tourism, and marine protected areas in marine plan areas in England'

- site selection and carrying capacity are key considerations for any aquaculture development
- carrying capacity will influence stocking density and yield, but if considered correctly it should not be prohibitive. Carrying capacity assessments will help developments to be in line with requirements under Marine Strategy Framework directive and Food and Agriculture Organisation (FAO) code of conduct for Responsible Fisheries.[454]

2.14 Tourism

Tourism can be defined as the activities of persons travelling to and staying in places outside their usual environment, as described by the World Tourism Organisation.[455] There are certain features and attractions which draw more people to the coast, including heritage coasts, coastal paths, marine recreational opportunities, seaside towns and visitor attractions.

Recreation can be defined as activities carried out by local residents who regularly participate in a particular type of activity, or by those visiting the area, or marine recreational activities are one type of attraction that will draw people to an area. For consideration of issues relating to recreation, see section 2.15.

Current Situation

The South Inshore plan area is a popular tourist destination with a large number of seaside towns and attractions. The Eastern half of the coastline is highly accessible to London and the Southeast. The Western part sits within the South West region which has the largest share of the UK domestic tourism market.[456]

Torquay, Weymouth, Bournemouth, Isle of Wight and Brighton and Hove have a higher combined holiday spend than any other marine plan area in England demonstrating its importance for tourism.[457]

Wildlife and natural landscapes attract many visitors to the plan areas. Popular destinations include the New Forest National Park (which stretches for 42km from Hurst Spit to Calshot), the South Downs National Park (which stretches for 140 kilometres from Winchester to Eastbourne) and the South Devon, East Devon, Dorset, High Weald, Isle of Wight and Kent Downs areas of outstanding natural

[454] Site selection and carrying capcity for inland and coastal aquaculture. FAO Institute of Aquaculture and University of Stirling, FAO Fisheries and Aquaculture Proceedings 21.
[455] This definition has been adopted by the UK Government.
[456] MMO (2013) Compilation of information on tourism relevant to marine planning in the south inshore and offshore marine areas, final report, April 2013 http://www.marinemanagement.org.uk/evidence/1038.htm
[457] MMO (2013) Social impacts of fisheries, aquaculture, recreation, tourism and marine protected areas (MPAs) in marine plan areas in England http://www.marinemanagement.org.uk/evidence/1035.htm

beauty.[458] Other designations include sites of special scientific interest and national nature reserves. Many of these marine environments are protected as special areas of conservation and special protection areas.[459]

The Jurassic Coast, England's only natural World Heritage site (located along the Dorset and East Devon coast), receives over 5 million visitors each year.[460] Other major natural heritage attractions include the South West Coast Path (from Minehead in Somerset to Poole Harbour in Dorset with the latter section from Dartmouth to Poole Harbour in the plan area), the Solent Way (stretching for 97km from Milford on Sea to Emsworth in Hampshire) Berry Head (Devon), Lulworth Cove and Durdle Door (Dorset), The Needles (Isle of Wight), Seven Sisters, Beachy Head (Sussex) and Dungeness (Kent). There are 22 blue flag beaches and 44 beaches presented with seaside awards across the South, attracting people to the area.[461]

The South coast is host to a variety of wildlife watching activities with tourists hoping to see (among other species): whales, dolphins, basking sharks, seals and waterbirds. This undertaken from boats or ashore. Most of the boat-based wildlife watching is focused between the coastline of the river Dart and Berry Head, Devon. Wildlife watching is also popular along the Jurassic Coast, Portland Bill and the Isle of Purbeck as well as within natural harbours such as Poole.[462]

Other notable activities related to tourism in the plan areas include the cruise industry, conference trade, heritage tourism (land based and underwater sites), diving and sea angling.

Cheap foreign holidays and budget airlines have contributed towards a reduction in traditional seaside holidays in the UK over the last 15 years.[463] However, since the economic downturn and through improved publicity, domestic holidays have increased by approximately 40% in 2011.[464] In particular 'staycation' (where people stay at home, but undertake recreational activities within driving or easy local travel distance) style holidays have grown in popularity in recent years. Holiday goers are starting to demand more natural and authentic vacations, in coastal settings often described as untouched, rather than in the traditional larger seaside resorts.

The majority of local authorities in the plan area have local development framework and local plan policies related to tourism with an emphasis on sustainable development. This includes promoting tourism development in existing urban areas and centres so as to protect natural environmental assets, landscape character, and

[458] MMO (2013). Economic Baseline for the South Inshore and Offshore Marine Plan areas http://www.marinemanagement.org.uk/evidence/1050.htm
[459] MMO (2013). Economic Baseline for the South Inshore and Offshore Marine Plan areas http://www.marinemanagement.org.uk/evidence/1050.htm
[460] Fisher Associates (2011) Jurassic Coast World Heritage site waterborne Transport Study, a report prepared by Fisher Associates for Dorset AONB, June 2011
[461] Not all local authorities apply for blue flag beach awards and there are other awards such as the Marine Conservation Society good beach guide available.
[462] MMO (2013). South Marine Plan Areas Futures Analysis. MMO Project No: 1039 http://www.marinemanagement.org.uk/evidence/1039.htm
[463] Adams Henry consulting ltd 2007; Beatty et al, 2010)
[464] Penrose, 2011

social heritage, for example Portland Bill and Poole harbour. Growth sectors such as green tourism are actively encouraged. Coastal regeneration has also been identified by many authorities (for example Eastbourne District Council) and is considered a priority in the south which includes the desire to reduce seasonality of employment related to tourism. There is anecdotal evidence to suggest that rural tourism is disproportionately valuable to the smaller coastal communities and often provides employment ratios that are above those for conventional resorts.

Future Trends

A recent study looking into future trends of different marine sectors[465] indicated a number influences on the future direction of tourism:

Uncertainties surround the potential magnitude and rate of expected climate change impacts on tourism. Milder weather and a longer summer season predicted under some scenarios could increase visitor numbers, however wetter weather and increased storms could also deter visitors.

The growth of the tourism market is heavily dependent on the general health of the UK and global economy. Investment in new, as well as updating existing, facilities is likely to encourage tourism and may cause redistribution in tourism numbers among existing locations.

Potential core issues

- coastal erosion, for example, around the Isle of Wight may impact on the tourism offer
- climate change is predicted to increase coastal flooding and erosion through sea level rise and an increase in extreme events
- some seaside towns are in decline and need regeneration and investment
- maintenance of transport networks and access to the coast for tourism and recreational users
- potential conflicts in promotion of tourism in seaside locations, including growing the jobs market and visitor numbers, and maintaining natural environmental assets at the same time
- there may be potential conflicts between tourism and recreation such as multiple beach users and demand for space.

Interactions with other sectors

- consenting of wind farms, tidal energy schemes and associated port development could impact on tourism in certain areas ie Navitus Bay, Rampion and St Catherine's Point
- health of the marine environment, especially the water quality, is very important to tourism and recreation (see section on recreation and on water quality)
- climate change - all tourism that is associated with the ocean, is heavily influenced by climate change, global economic and socio-political conditions,

[465] MMO (2013). South marine plan areas futures analysis. http://www.marinemanagement.org.uk/evidence/1039.htm

and their interactions.[466] Climate change, through impacts on ecosystems, can reduce the appeal of destinations, increase operating costs, and/or increase uncertainty in a highly sensitive business environment.[467] Increased storminess for example will have economic implications on the provision and maintenance of beaches and coastal defence infrastructure

- passenger vessel routes between the UK and near continental destinations are located at several ports within the plan area notably, Weymouth, Poole, Portsmouth and Newhaven (see the shipping section 2.8). Transit of tourists through these ports will have economic implications (benefits include, purchases of lodgings, fuel, food, car parking etc. but also a bring a cost to the area in the form of maintaining supporting infrastructure)
- recreation – tourism and recreation are in many ways intrinsically linked in the plan areas eg water sport activities (Poole Harbour) and recreational sailing events (Cowes Week on the Isle of Wight) etc. for which people specifically travel to the area. (Issues relating to recreation are covered in more detail in section 2.15).

Issues for sustainability

- development of tourism opportunities, both in terms of new infrastructure and increased in footfall in rural areas, may adversely affect the environment by changing the landscape and character of an area potentially harming or disturbing species and habitats. support is given to tourism infrastructure concentrated in existing towns and urban areas, where visitors can stay and travel to and from rural areas
- development of tourism opportunities outside of the summer visitor season by stimulating/supporting out of season activities and events to encourage economic regeneration, whilst retaining the existing identity of the natural environment
- growth in visitor numbers may impact positively on the economy, but negatively on the environment and could benefit from the promotion of responsible/ecotourism
- climate change could be positive and negative for tourism, for example warmer weather may encourage more people to holiday in the area but may impact on water quality making areas less desirable for tourism, additionally, extreme weather events may cause tourists to holiday elsewhere
- transport networks are a core issue for areas supporting tourism and are a potential limiting factor for visitor numbers to certain areas having a direct impact on the social, economic and environmental sustainability of an area through infrastructure improvement and maintenance.

[466]Scott, D., M. C. Simpson, and R. Sim (2012a), The vulnerability of Caribbean coastal tourism to scenarios of climate change related sea level rise, Journal of Sustainable Tourism, 20(6), 883-898.
[467] Scott, D., C. M. Hall, and S. Gössling (2012b), Tourism and climate change: Impacts, adaptation and mitigation, 463 pp., Routledge, Abingdon, UK.

2.15 Recreation

The sea provides a range of recreational opportunities creating employment for local people, generating income for the economy, supporting overall quality of life and providing health and wellbeing benefits.[468] Furthermore, these recreational activities, and the businesses that rely on them for their livelihoods, can be enhanced by a well-managed, attractive and healthy marine environment.

Current Situation

The South marine plan areas have a high recreational value[469] and are very popular for activities including pleasure boating, sailing, diving (including diving on wrecks), sea angling, kayaking, surfing, windsurfing and exploration of underwater and coastal heritage assets.[470] There are also many blue flag beaches (Figure 45) and popular rural beaches such as Studland beach in Dorset which receives one million visitors each year.[471]

The marine recreation sector is inherently linked with tourism (see section 2.14); many people visit the area to try a new recreational activity or to simply walk on the beach and enjoy the surrounding views. Furthermore, there are many marine and coastal designations in the South Inshore plan area (including national parks, areas of outstanding natural beauty and the Jurassic Coast World Heritage Site – see section 2.14) which attract visitors to the area. In 2012 the number of people employed by coastal tourism on the South coast was estimated to be over 47,000 people, significantly more than any other marine sector (the next highest being ports and shipping at just below 7000), indicating the importance of coastal tourism to employment.[472]Furthermore coastal tourism had the greatest number of business on the South coast and contribution to Gross Value Added.

The majority of local authorities adjacent to the South Inshore plan area recognise the importance of recreation to the economy and this is reflected in their local development frameworks. Many local authorities are aware of the challenge, now and in the future of balancing biodiversity and conservation requirements, coastal squeeze and the impacts of climate change with tourism and recreation and they have specific issues relating to this of which are too detailed to be listed here. 34 local authorities have policies in their core strategies relating to tourism and recreation (most referencing the marine and coastal environment) which generally focus on (but are not limited to):

- development (ie harbour or marina) and regeneration of the seafront to attract visitors and create new jobs and income for local communities
- encouragement of opportunities to diversify (in terms of the activities or the season) the visitor economy, but not at the detriment of existing opportunities

[468] Defra (2010) Marine Policy Statement, page 46 https://www.gov.uk/government/publications/uk-marine-policy-statement
[469] Decision on selection of third and fourth marine areas for plan production (2012). MMO. http://www.marinemanagement.org.uk/marineplanning/areas/south_selection.htm
[470] Water sports participation study (2011). British Marine Federation.
[471] Fisher Associates, 2011. Jurassic Coast World Heritage Site Waterborne Transport Study.
472 MMO (2014) Exploring the Potential of Using Office for National Statistics (ONS) Data for Marine Planning Final Report.(in press) MMO.

- access to the coastline and the sea, this includes both access to coastal areas and physical access to the sea through the provision of slipways, footpaths and moorings
- balance between increasing the visitor economy (recognising the significant contribution it makes to the economy and local communities) while managing the impacts of tourism and recreation, especially on designated areas which are often the reason people choose to visit an area
- management of recreational activity and reduction of disturbance caused to the natural environment, this expressed in the policies of Area of Outstanding Natural Beauty management plans
- eight local authorities specifically mention sailing/boating in their policies with regards to making suitable provision and ensuring this activity can continue sustainably.

There are also many non statutory plans and documents, such as the Green infrastructure strategy for South East Dorset, which recognise and aim to promote the value of the coast and activities in the water environment, These documents inform local plans.

Leisure boating is the most popular and economically valuable part of the marine water sports industry. The greatest density of Royal Yachting Association clubs and privately owned marinas in the UK lie adjacent to the South Inshore marine plan area[473] with the Solent, Isle of Wight, river Dart and Brighton some of the most popular recreational boating areas in the UK (see Figure 46).[474] Sailing also takes place at Shoreham and Poole Harbour, the development of the Weymouth and Portland National Sailing Academy (an Olympics 2012 legacy) increasing sailing activity in the area. The presence of recreational boating activities are also common to people on or visiting the South coast, thus adding to the sense of place and character of the area.

The South coast has the greatest number of marinas and berths in the UK, indicating the interest in sailing activities and demand for associated facilities. Coastal marinas in the South East and South West contribute an estimated £36 million each year to the economy.[475] Furthermore, many craft moor within estuaries without having a recognised marina, such as the Teign estuary, where there are around 10 free to use, publicly accessible slipways.

There are many international sailing and boating events in the South marine plan areas such as Cowes week, Round the Island race and Southampton Boat Show. These generate revenue for the local economy and attract tourists to the area, approximately £6.4million income is generated for local businesses through tourism expenditure during Cowes week.[476]

[473] BMF (2007). Economic benefits of Coastal marinas UK and Channel Islands Full Report.
[474] Please note, figure 46 indicates some of the well-known and well-used boating areas and cruising routes in the South marine plan areas. This figure is indicative and the absence of a specific route or boating area should not be interpreted as an absence of activity.
[475] Economic benefits of coastal marinas UK and Channel islands (2007). British Marine Federation.
[476] MMO (2013). Economic Baseline for the South Inshore and Offshore Marine Plan areas http://www.marinemanagement.org.uk/evidence/1050.htm

Weymouth and Portland are also popular diving sites due to the large number of wrecks and reefs, along with Torbay, Selsey and the Isle of Purbeck.

The South marine plan areas are some of the most popular stretches of coastline for wind and kite surfing despite the optimum conditions being infrequent compared to other marine plan areas.[477] Popular sites include Poole Bay, Brighton, Bournemouth, Camber, Eastbourne, Hayling Island, Langstone Harbour, Shoreham and Lancing.

Surfing is popular on the South coast, with hotspots around Hastings, Birling Gap and West Wittering. The Dorset coastline is also popular with surfers due to its sheltered nature. Bournemouth, Christchurch and Kimmeridge bay are highlighted on the Dorset icoast tool as popular locations, along with five surf schools in the area. Dorset is also home to Europe's first artificial surf reef at Boscombe.

Paddle sports (canoeing, sea kayaking, stand-up paddle boarding) occur predominantly inshore at locations such as Poole Harbour, Studland Bay, the Dart Estuary, Hamble and Itchen Estuaries, Torbay and the Isle of Purbeck (see Figure 45).

Sea Angling 2012 estimated there are 884,000 sea anglers (boat and shore-based) in England, contributing £360 million Gross Value Added to the national economy.[478] Sea angling is a very popular activity within the six nautical mile limit, with an estimated 40,000 active sea anglers around the Solent,[479] and many participating along the Sussex coastline and out of Selsey and Itchenor. There are a number of large charter boats taking tourists out from ports such as Weymouth and Poole and they regularly frequent Poole Bay, the Isle of Wight, offshore from Brighton and the Isle of Purbeck (the latter also popular for coasteering). Many local authorities recognise the importance recreational sea angling makes to the local economy and are keen to develop the activity, promote events to visitors and improve the facilities to support the predicted growth of this activity.

Outdoor swimming is popular between May and September and the Environment Agency monitor and report on the cleanliness of our bathing waters during this period. On the South coast, there are many beaches which meet the minimum or higher standards for bathing water quality and are suitable for outdoor swimming.[480] These include the Solent, Isle of Wight and Bournemouth, where events are organised through clubs often raising money for charity.

The Solent Way, South Downs Way and South West Coast Path are popular with walkers enjoying the views of the coastline and out to sea. Many of the recreational activities covered in this section contribute to the character of the marine area, 'sense of place' and nautical heritage which people enjoy seeing while walking these trails.

[477] The Waves As Resource (WAR) Report (2010). Surfers Against Sewerage.
[478] Sea angling 2012 – a survey of recreational sea angling activity and economic value in England. Defra (November 2013).
[479] Strategic guidance for the water-based recreation in the Solent. March 2011. Earth to Ocean.
[480] http://environment.data.gov.uk/bwq/explorer/index.html

Due to the nature of recreational activities, it is difficult to say with any degree of accuracy how many people participate in water-based activities because people do not have to belong to a club to participate[481] with activity often sporadic depending on type and location and is not plan-area wide. Existing data can be viewed on the marine planning portal. The Marine Management Organisation commissioned a national recreational modelling project to predict the potential for marine recreation and the results of the modelling were verified with recreational stakeholders. The activity maps (which stakeholders broadly agreed with) are included below (Figure 47). The key, which refers to recreation potential, indicates areas where recreational activities are most likely to occur based on the conditions for each type of recreational activity.[482] considered in the study. A number of activities have not been included because further work is being done to improve the input data to the model.

It is recognised that the model outputs only provide part of the picture. More work could be done to look at the frequency and density of activities and consider their socio-economic value, but to inform an initial understanding across all marine plan areas where activities could occur, this information provides a good foundation.

[481] Strategic guidance for the water-based recreation in the Solent. March 2011. Earth to Ocean.
[482] Please note the low to high ranges shown in the key on these figures differ as they are individually specified according to the activity mapped.

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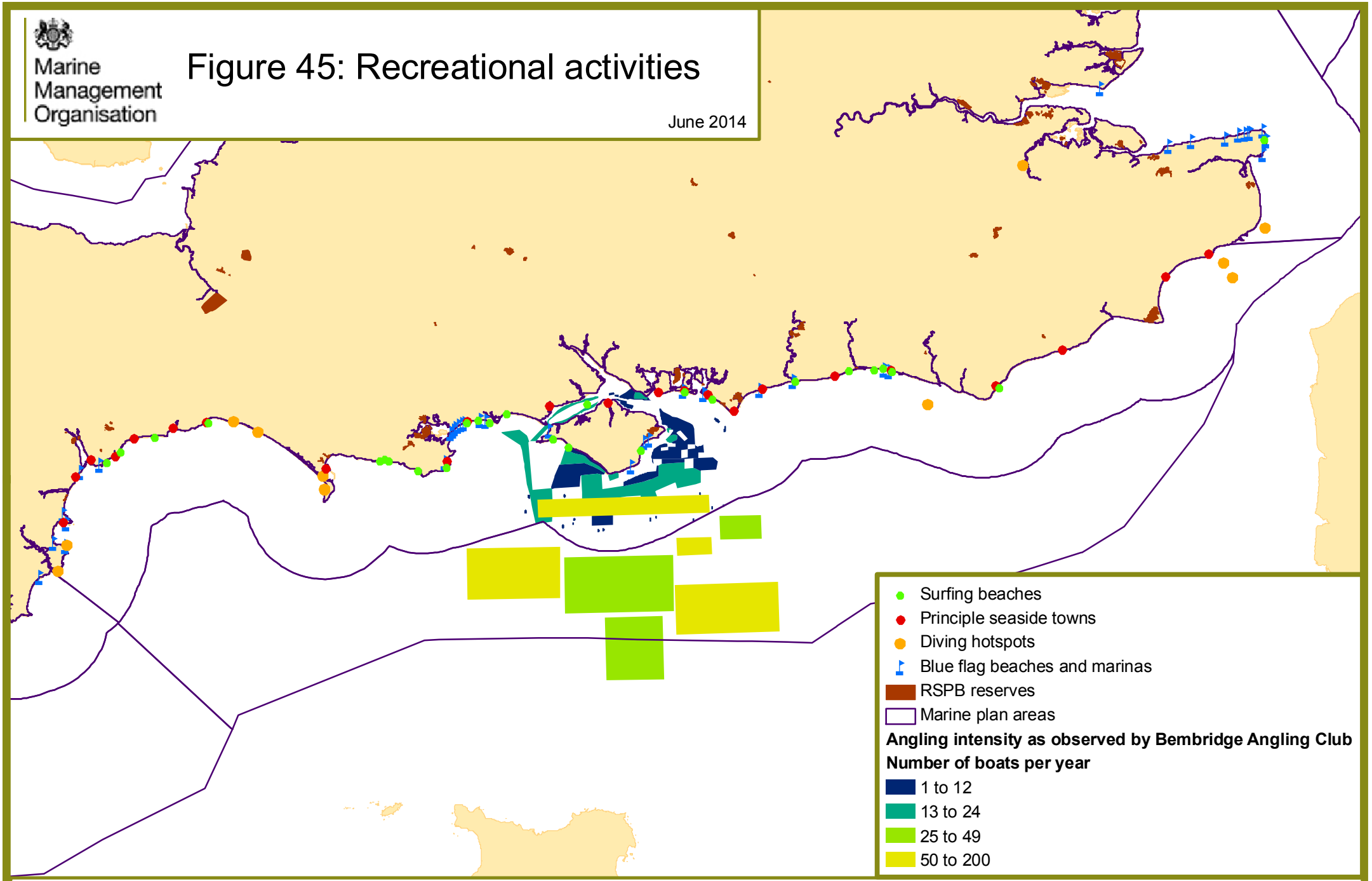
Figure 45: Recreational activities

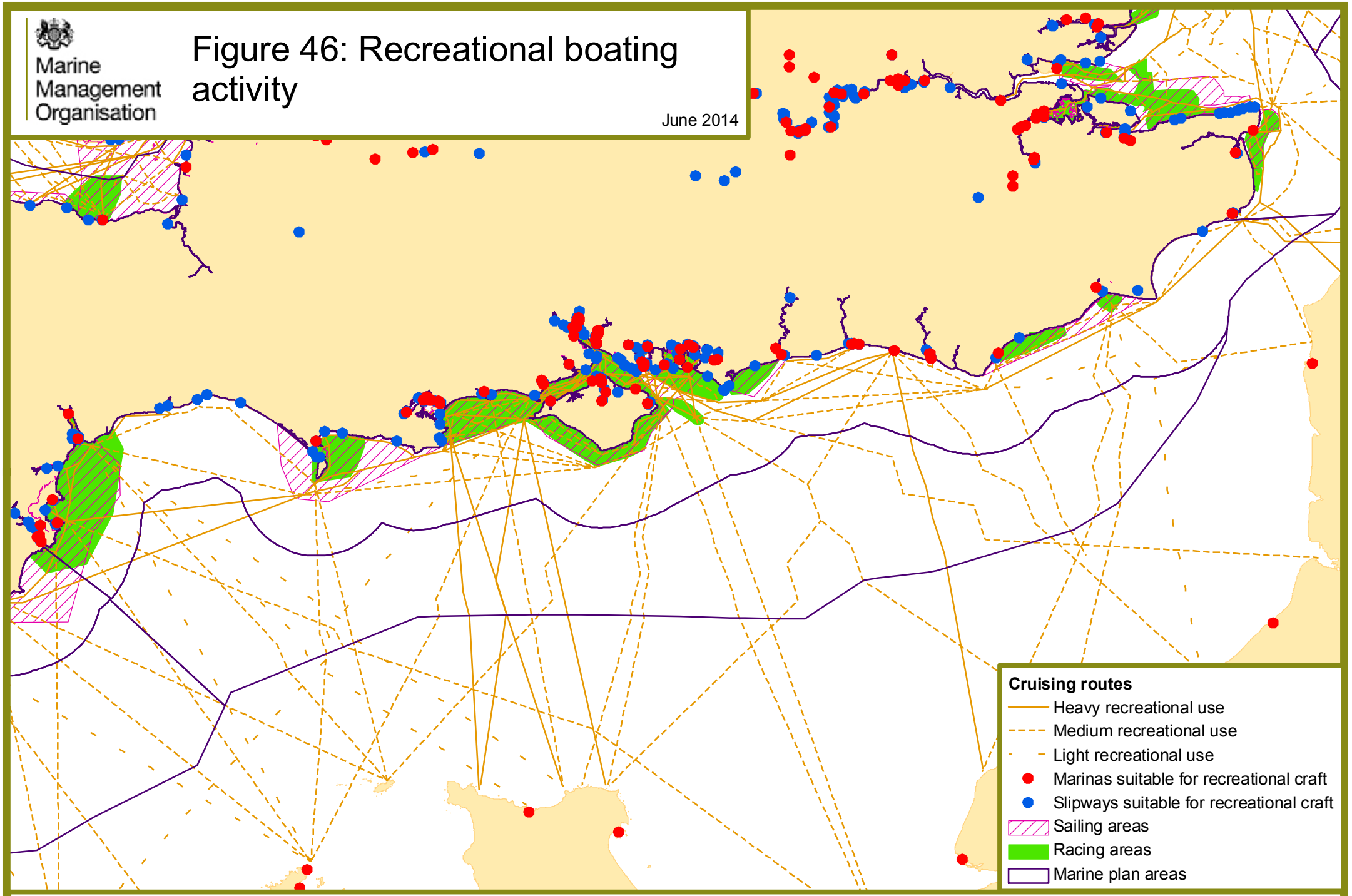
June 2014



Marine Management Organisation

Figure 46: Recreational boating activity

June 2014

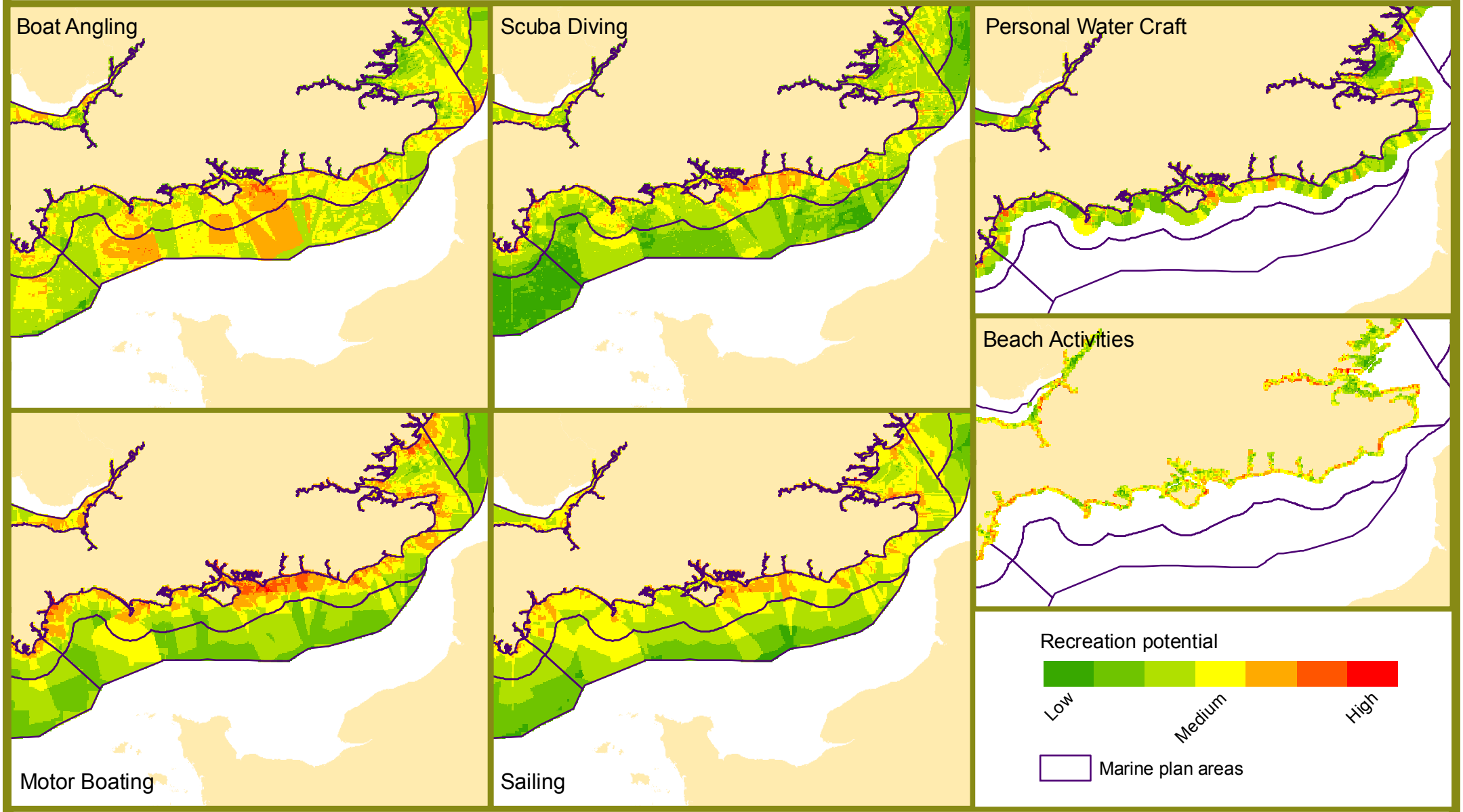


Marine Management Organisation

Figure 47: Recreational Modelling Outputs : boat angling, scuba diving, personal watercraft, motor boating, sailing and beach activities

(please see associated text for more information regarding the outputs scale)

June 2014



Future trends

The popularity of water sports and related industries has grown dramatically becoming an increasingly important aspect of the marine recreation and tourism market in recent years.[483] For example, the surfing industry grew by an estimated 10% globally from 2004-08, but the recent economic recession has subsequently reduced growth.[484]

Between 2000 and 2010, the recreation sector experienced high growth in numbers in many activities including surfing, kite surfing and kayaking,[485] with participation remaining relatively stable except for 16-34 year olds where participation has declined since 2002.[486]

The water sports participation study highlighted that, during the 12 months to September 2012, 5.8% (2.8 million) of the UK population participated in at least one of the core boating activities,[487] this a 3% decline compared to 2005 following the broad trend of decline since 2002.[488] Despite this the British Marine Federation reported the total revenue of the UK leisure, super yacht and small commercial marine industry in 2012 to be up 0.3% from 2010-11, totalling £2.855 billion.[489]

It is important to note that development of the tourism and recreation industry must consider the impact on the marine environment and that growth and development (either directly or indirectly benefitting these industries) should be sustainable. A number of studies have been commissioned by the Solent Forum to look into specific impacts of recreational activities and development on marine wildlife. These include:

- potential impacts of paddle-related activities on birds in Langstone Harbour, (protected through international and European designation). concluding that further mitigation techniques need to be introduced to reduce the impact on birds
- a study looking at new development close to the Solent coastline. It concluded that development within 5.6km may have an adverse effect on internationally protected birds.

The Valmer project also commissioned a study looking at the importance of the natural environment for tourism and recreation. Participants of various recreational activities rated the environment as a more significant characteristic (ie good water quality, abundant wildlife) of the harbour and thus where they choose to carry out their activity, rather than the costs to visit or facilities in Poole Harbour. This indicates

[483] Lazarow, N. 2007. Journal of Coastal Research. The value of coastal recreational resources: a case study approach to examine the value of recreational surfing to specific locales.
[484] SIMA, 2011. 2010 SIMA Retail Distribution Study. A report by The Surf Industry Manufacturers Association.
[485] United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS) (2010). Charting Progress 2 Feeder Report Productive Seas. Defra on behalf of UKMMAS. 472pp.
[486] Watersports and Leisure Participation Report (2011). BMF, MCA, RNLI, RYA and BCU.
[487] Small sail boat racing, Other small sail boat activities, Yacht racing, Yacht cruising, Power boating, General motor boating, Canal boating, Canoeing, Rowing, Windsurfing, Water skiing, Using personal watercraft.
[488] Watersports Participation Study (2012)
[489] UK Leisure, Superyacht and Small Commercial Marine Industry, Key Performance Indicators (2011/12)

the strong relationship between the natural marine environment and where people choose to participate in recreational activities.

The development of a coastal path around England by Natural England supporting obligations introduced through the Marine and Coastal Access Act supports access to the coast and marine area.

A recent study looking into future trends of different marine sectors, commissioned by the Marine Management Organisation, indicated a number of factors influencing the future direction of recreation:

- marine conservation zones (27 designated as part of tranche 1 with 37 put forward for consideration in tranche 2) may influence where recreational activities can take place. The biggest potential impact is from any activity which requires anchorage/s due to the impact anchoring can have on habitats. Appropriate management measures will be put in place where necessary to address this
- climate change will influence future temperatures, precipitation and storminess levels
- future offshore renewable energy developments may influence where recreational activities can take place, particularly sailing and sea angling, although due to their characteristics (mostly using only the sea surface for a short period and not requiring permanent infrastructure) most recreational activities are able to co-locate with other activities (such as offshore wind farms, commercial shipping) so this may reduce potential for displacement
- the recreation sector is predicted to grow in line with the recovery of the UK economy.

Potential core issues

- marine recreation is an important economic contributor to the South coast of England, particularly sailing and can play an important role in regeneration and investment opportunities. Maintaining this and ensuring opportunities for sustainable growth will be challenging in amongst the growth of other marine sectors and activities
- associated facilities (marinas, clubs) and infrastructure (slipways, moorings), both on land and in the sea need to be maintained and developed to facilitate sustainable growth within the marine recreational industry
- physical access to the water is limited because of the low number of public access slipways. Many privately owned marinas on the South coast enable access to the water, but more publicly accessible slipways would enable more visitors to participate in boating as well as other recreational activities such as the use of different forms of personal watercraft
- conflict between different recreational activities occasionally occurs as evidenced by a policy in the Chichester Harbour Area of Outstanding Natural Beauty management plan to minimise any potential conflict. The likely long term growth of recreational activities may increase this risk of conflict ie between personal water craft users and sailors
- potential growth in recreational activities and development of other activities and industries could challenge existing recreational activities. affecting health and wellbeing benefits realised through recreation for local communities and tourists.

Interactions with other sectors

- participation in marine recreational activities is inherently linked to tourism with a shift towards visitors focusing on experiences rather than material goods. Therefore in order to maintain the recreational industry, the tourism industry must also be supported
- there are a high number of terrestrial and marine designations in the South marine plan areas. The designations, due to their features, views and/or cultural heritage, attract many people to the area and encourage participation in outdoor recreation. Proposals that impact on these designations could in turn impact on the tourism and recreation economy
- recreational activities, particularly sailing and boating, are being squeezed into commercial shipping lanes which pose a safety risk for all parties involved. Navigational safety is mostly addressed through existing measures (such as codes of conduct) and co-location is already encouraged. Sailors must occasionally cross commercial shipping lanes (this is down to necessity rather than choice) and this is likely to become more challenging with the predicted growth of both shipping and marine recreation.
- the predicted growth of ports, renewable energy and aquaculture will further compound this issue. The Royal Yachting Association are keen to agree operational exclusion zones with industry and they have a number of position statements on co-location with aquaculture and offshore wind farms
- port development could impede access to the marine area although the Department for Transport's guidance on the production of Port Master Plans clearly states, under paragraph 81, that measures should be taken to ensure that leisure activities in the vicinity of the port are protected from the impacts of proposed developments
- the growth of renewable energy projects specifically potential for wind farms at the Rampion and Navitus Bay sites and tidal resource at St Catherine's Point off the coast of the Isle of Wight, could create a conflict with recreation in terms of reduced space to carry out activities and the visual impact it will have on people's experience
- cables location, particularly in the inshore area, may conflict with recreational activities that require anchorages. Consideration will be required on the location of either any new anchorage areas or cabling.

Issues for sustainability

- consideration of the impact of multiple marine recreational activities on both marine designations and the wider marine environment should be considered, especially with the predicted overall, long-term growth of the sector. As previously mentioned, there are a number of studies that have looked at the impact of recreation on the natural environment
- marine recreation relies heavily on a healthy marine environment, especially so for water quality, as healthy beaches and clean waters attract people to the coast and enable participation in water-based recreation in a safe manner. In turn, long term growth of recreational activities may cause a negative impact on the marine environment, therefore a balance between them must be considered
- the lack of space due to the growth of other sectors could impact or encroach on recreational activities. This is likely to have adverse socio-economic effects

on local communities dependent on the recreation sector. These could include impacts to current and future employment opportunities, especially in deprived areas, reduced access could impact on the health and wellbeing of coastal communities and the character of areas could be fundamentally changed if tourism and recreation opportunities are reduced

- there are a number of different predictions for the impact of climate change on marine recreation. Warmer weather and rising sea temperatures could support the growth of the sector, attracting more people to participate in marine recreation. Increased storminess and unpredictable weather could conversely lead to lead to a decrease in participation levels. Furthermore warmer sea temperatures could lead to increased cases of vibrio disease.

3.0 Core issues and themes

This document chapter presents a summarised view of the evidence and marine related issues that affect the environment, economy and society within and adjacent to the South marine plan areas. It looks at the level of individual sectors, and topics and their considerations.

Following the consultation and workshops in October 2013, stakeholder views have been incorporated into this revised document and further consideration and analysis of the issues has been undertaken.

In so doing, many issues (over 150) were identified, some of which require wider measures than marine planning, somewhere marine planning is only a part of the solution. A summary of the type of issues this refers to can be found in Annex 2. E, examples include where an issue is addressed by existing legislation / or measures or the issue falls outside of the remit of marine planning.

It is important to bear in mind that this report does not provide an exhaustive list of issues relating to every aspect of every sector or topic. There is a wealth of information that sits behind them such as analysis of local planning policies, evidence and data. Furthermore, we expect more issues to be highlighted during the future stages of plan-making and following stakeholder engagement, with some issues likely to need may be further investigated through more detailed analysis.

This chapter presents the results of analysis undertaken by the Marine Management Organisation to categorise the issues into four themes, in order to better understand them and enable their progression through the marine planning process. In doing so We have looked for the common characteristics between issues to create, in order to derive a list of core issues. that can then be used to help drive the planning process. The themes are:

- enabling sustainable economic growth
- protection of the natural marine environment
- opportunities for employment, investment and regeneration
- maintaining and enhancing social benefits.

In the consultation version of this document, there was a fifth theme focused on climate change. This is now embedded within the four themes listed above to ensure integration with the relevant issues where appropriate.

A number of the issues relate to evidence. It is recognised that while the marine plans and associated documents are built on the best available evidence, for some issues there may be a lack of evidence or certainty.

The Marine Policy Statement (2.3.1) states "Where evidence is inconclusive, decision makers should make reasonable efforts to fill evidence gaps but will also need to apply precaution within an overall risk-based approach."

Where possible and appropriate, we aim to address and fill data gaps. It is imperative we work with partners and stakeholders to do so as it is not only the

responsibility of the Marine Management Organisation to address these. evidence gaps.

In categorising the sector or topic-level issues into core issues and themes, we have attempted to be objective, but there are many different ways of categorising the issues given their complexity and diversity. We have used our experience and judgement, along with comments from the workshop and consultation to derive the core issues and themes. In order to see how each sector-or topic level issue relates to a core issue and theme, please see the table in Annex 1. Each core issue has associated descriptive text, providing a summarised explanation linking it to the contributing sector or topic-level issues.

Based on our experience of the East marine plans, we felt it necessary to derive core issues to better identify a set of core issues to help give the planning process focus and allow for the improved development of vision and objectives. This will also aid later stages of the process. From this, we developed themes, and undertook analysis to select those where we feel marine planning is at least part of the solution, based upon experience gained from developing the East marine plans. Further analysis led to a number of overall (core) issues that sit under a theme. Examples of the sector or topic issues are included under each core issue by means of illustration.

Through this work, impacts, industries and considerations that drive the core issues were identified, as well as those affected.

Detail from the sector or topic-level issues will inform future stages of planning and help develop more focused and spatially specific plan policies.

In developing this table (table 10) we have not been spatially specific, except in one or two examples. However, it is possible to identify where an issue may occur by looking at where the sectors or topics driving the core issue exist. This information could potentially identify hotspots, where multiple issues are relevant exist. The table is presented below.

Table 10: Themes and Core Issues

Theme	Core issue and description
Protection of the natural marine environment	**Core issue 1: To deliver a coherent network, both designated areas and non-designated areas and species need to be afforded protection. Furthermore, the ability for these areas to adapt to future changes and grow is needed to achieve the delivery of a coherent network.** The South coast has a large number of designated sites contributing to a coherent network of protected areas to support rare and endangered species and habitats of international importance. There are also many species and habitats not protected under European or UK law but that are important to the marine environment. The continued, flexible approach to protection and enhancement of these areas, species and habitats is required to maintain the unique and valuable nature of the marine environment in the South plan areas. Pressures such as increased storminess, sea level and sea temperature rise, as a result of the impacts of climate change, may affect species and habitats. Increased storminess and flooding may affect nesting birds; changes in sea temperature may affect the distribution of species, migratory routes for mobile species and the potential range for invasive species; and increased coastal squeeze from sea level rise could reduce existing habitat and the potential for future habitat creation. These will all prove a challenge in the ongoing protection of the marine environment and will require innovative adaptation methods to enable the enhancement of the natural marine environment.
	Core issue 2: Existing activities are putting a degree of pressure on habitats (and the associated species that live within them). These activities need to be managed to reduce this pressure. Irrespective of future development opportunities, there is currently a degree of physical impact on the natural marine environment from existing activities and industries, particularly habitats and species not protected by designations, eg sea grass areas damaged by trawling, dredging and anchoring activities. Activities that cause abrasion, such as fishing with mobile gears, aggregate dredging, anchoring and dredging and disposal can impact on natural sedimentary systems, causing physical changes to benthic habitats and altering channel depths. This in turn can affect the species associated within or near these habitats. Coastal development can also cause squeeze on habitats and heritage assets, affect water quality and disturb species. These assets and natural resources need to be maintained and enhanced where possible for the benefit of the marine environment and for the continued provision of goods and services, for example to activities such as tourism and recreation.

	Core issue 3: The physical growth of industry into new areas may cause encroachment on the natural marine environment. Potential residential and industrial growth on the South coast could conflict with areas or species protected for their environmental importance, as well as areas that are not protected but play an important role in providing environmental goods and services and for their intrinsic value. There are locations within and adjacent to the South marine plan areas which have potential for growth in marine industries. For example, areas of the Solent naturally lend themselves to development of existing ports to support increased ship movements, there are renewable energy opportunities off the coast of Brighton and the Isle of Wight and aquaculture is a growing industry with much potential. These, coupled with development on land (both residential and infrastructure to support marine sectors) and the increasing need for managed realignment schemes to address flooding, may put increased pressure on the environment, some of which is nearing its environmental carrying capacity. Potential for growth in these areas poses challenges to the natural environment such as the introduction of new and invasive species, limited areas for habitat creation (often used as mitigation for development) and encroachment into designated areas. A balance needs to be struck between enabling development and growth to provide jobs and create revenue nationally and locally and the health of and space for the marine environment; a resource in itself crucial to many marine activities and industries.
	Core issue 4: Impact of industry, and activities and climate change on mobile and highly mobile species are hard to predict, understand and account for. Migratory and breeding birds, fish species, cetaceans and seals are resident or regular visitors to waters off the South coast of England. Their presence indicates the health of the marine environment and attracts people to the area. Conversely, these species are vulnerable to pressures such as collision, disturbance, pollution and underwater noise caused by many marine activities, eg construction of renewable energy infrastructure, port and shipping activity, sonar and tourism and recreation activity. They are also impacted by the effects of climate change such as changes in sea temperature effecting the migratory routes of mobile species. The consideration of mobile species during construction, operation and decommissioning of marine industry will be important to maintain healthy populations of mobile species and the contribution they make to the wider marine ecosystem. There are still challenges around predicting the spatial distribution and future trends of seals and cetaceans before further work can be done to understand fully the impacts of pressures such as noise on cetaceans. This is

	especially relevant to the cumulative/in combination effect of either a number of different pressures on a species or the impact of a number of activities causing the same pressure. This is something marine planning can contribute towards.
	Core issue 5: Current marine industry and activities, the potential growth of these and the impacts of climate change will cause Cumulative and in-combination effects on the natural marine environment. The growth of different industries in and adjacent to the South marine plan areas, will cause cumulative pressures on the marine environment. Multiple activities causing the same pressure (cumulative) or those that create different pressures in the same area (in combination) will risk damage to habitats and species. Pressures during construction and operation, the potential associated displacement and disturbance from activities such as tourism and recreation could cumulatively effect visual impacts, marine noise, mobile species, habitats and potentially as-yet unquantified effects could also arise. Current and future impacts of climate change create a further level of complexity to understanding and beginning to address cumulative effects. Sea level and sea temperature rises and increased storminess will add to the pressure on the marine environment, thus exacerbating the pressures covered in this theme, on the marine environment. Cumulative/in combination effects of activities is an important and varied topic with many different examples and scenarios, existing legislation through the marine licensing process requires consideration of their effects on the marine environment (through environmental impact assessments). Marine planning can play a strategic role in assessing and mitigating cumulative effects through signposting existing evidence, highlighting evidence gaps and contributing to addressing this by working with others to improve decision making around cumulative effects.
Maintaining and enhancing social benefits	**Core issue 6: Marine activities and related topics provide social benefits for coastal communities. The growth of marine industry and activities may lead to competition between them, causing conflict and displacement. Consideration and sustainable provision of these social benefits is required to ensure they are not lost.** Many marine activities that go on in the South marine plan areas provide social benefits for people living on the South coast of England and beyond. These benefits include: • the enjoyment of being able to engage and interact with the natural marine environment and its views through activities such as tourism, recreation and fishing and the health and wellbeing benefits known to accompany these activities • the importance and attraction of an areas cultural heritage , character, and identity and sense of place due

	to the activities carried out there for many years • the contribution of local revenue to the coastal communities, from both tourists and local people engaging with the marine area. Many marine activities contribute to these benefits; particularly tourism, recreation, fishing and seascape/cultural heritage which are the main drivers of these recognised social benefits on the South coast of England. The predicted growth of these and other activities, and the interaction between them, poses risks to the current social benefits realised in the South marine plan areas. Competition for space between different types of recreational activities, coupled with the predicted growth of industries such as renewables and aquaculture may squeeze some of these activities into smaller areas. This may reduce the participation levels and enjoyment and wellbeing received from such activities and raise concerns over navigational safety. Climatic changes will also initiate different responses from different activities and thus could have further knock-on effects, such as displacement, on other activities. For example, changes in sea temperature, as a result of climate change, may result in increased opportunities for aquaculture. This could displace recreational activities. Displacement of fishing, which many people see as inherent to local areas, could impact on the character of the area and sense of place and thus on the enjoyment of many visiting the area. Furthermore the many marine and terrestrial designations which drive the tourism industry, provide recreational opportunities for people and protect many seascapes and features could be impacted from the growth of marine activities. Activities which predominately drive social benefits need to be managed to ensure their future growth is sustainable. Industry-focussed activities also need to be managed to find a balance between growth and the potential impact they may have on those activities driving the important social benefits on the South coast.
	Core issue 7: The natural marine environment provides goods and services which some activities rely on. These activities provide important social benefits, such as access, health, wellbeing, enjoyment and support to coastal communities to visitors and local communities. The attraction of the South coast of England for many marine activities is largely due to the quality of the natural marine environment and the designated areas providing views of the marine area. People want to ‘access’ the area for these reasons and utilise the natural resources for jobs and income but this in turn can pose a risk to the very attraction drawing people to the coastline. Finding the balance between enhancing and improving access for social benefits while protecting the natural environment is a challenge, partly for marine planning and will be key to the sustainable development of the South marine plan areas. Being able to reap the social benefits from the South marine plan areas hinges on the ability for people to use, access and enjoy it. Access to the natural marine environment is known to improve health and wellbeing and

	supports coastal communities through jobs and revenue. Access could include physical access to the water to participate in recreational activities or associated facilities and infrastructure on land to facilitate and support activities in the marine area. Climate change has potential to impact on the marine environment, thus affecting the goods and services it supports. Some impacts may be seen as opportunities, ie increased sea and air temperatures may attract more tourism and encourage people to participate in marine recreational activities, with others posing further risks to the marine environment and activities reliant on it. For example, increases in sea temperature may encourage invasive species, increase levels of water-borne diseases, change the growth rate of aquaculture species and affect migratory fish routes impacting on fishing opportunities. Therefore, ensuring marine activities are resilient and can respond to climatic changes is important to be able to realise the social benefits they provide.
	Core issue 8: Existing marine activities coupled with their predicted growth may impact on the historic environment, heritage assets and protected landscapes and the goods and services they supports. Maintaining access and safeguarding the historic environment for both its own protection and to service other activities will be important. The historic environment, and heritage assets and protected landscapes attract people to an area and drive tourism and some forms of recreation in the South plan areas. There are many wreck sites which attract divers and are important habitats for many species, buried prehistoric remains and areas of outstanding natural beauty, national parks and a world heritage site attract visitors and drive local economies. Tourism and recreation can in themselves cause damage to these assets if they are not managed sustainably. Furthermore, the impacts of climate change, such as increased flooding and coastal erosion, sea level rise and changes to sea temperature and salinity could damage heritage assets and the historic environment. This, coupled with the current activity and predicted growth in marine industry, poses an increasing threat to the historic environment, and heritage assets and protected landscapes.
Enabling sustainable economic development	**Core Issue 9: Growth in marine activities often requires exclusive use of space, or access to space, which will often lead to competition between sectors and a need for decisions to be made about where space is used by different sectors.** Therefore there is a need to understand the growth of new and existing sectors, in terms of the amount of growth and where this growth might occur. Sectors that are expected to grow need space to do so and have particular requirements and individual issues. New sectors such as tidal or offshore wind energy projects, have need for

	exclusive use of the seabed, though there may be potential for other sectors such as shipping, fishing or aquaculture to share some space, depending on the type of fishing or shipping in question (gear type or draught will decide this). Competition for space may lead to more sectors in close proximity, which may impact the ability of some sectors to function, for example increased use of estuaries may impact water quality, damaging the ability of shellfisheries to maintain or grow their businesses. It could also limit the ability of some sectors to expand, for example where no more dredging is allowed for water quality reasons, yet is needed for continued growth of ports. Competition for space also has another aspect, which is where it is likely to come into conflict with existing or planned areas of environmental protection or social benefit, for example where port activity may want to use space currently protected for nature conservation. Climate Change is predicted to lead to increased storminess, with increased potential for damage to businesses. Sea level rise will create greater coastal squeeze; this will mean less space for growth and mitigation for development (habitat creation/compensatory habitat). Increased sedimentation from flooding and erosion may increase costs for shipping and ports through additional maintenance dredging. Changes in sea temperature may change the geographical opportunities for aquaculture. There may be economic opportunities from climate change, such as increased potential for some types of tourism.
	Core Issue 10: Many sectors are dependent on the high quality environment that exists in the South marine plan areas. Their future growth relies upon access to and use (in terms of amenity value and use values) of the marine environment. Many industries rely upon the environment for their goods or services. These same industries have impacts on the environment, and growth in those sectors could therefore increase those impacts. Sectors such as tourism and recreation rely upon the ability of those involved to be able to enjoy the environment and to use it in a number of ways, be this passive use through enjoyment of views and the wider setting, to the need for clarity in the water column for diving, or for high quality water for all water sports. Fishing and aquaculture both rely upon the ability of the environment to support fish stocks, which relates to both the habitats that support fish stocks and the quality of the water and levels of nutrients and pollutants in it. Aggregate extraction also impacts on the environment but can also support it through the use of dredged material in habitat creation and natural flood defences. Some activities, such as fishing and aggregate extraction, may impair the ability of certain areas to support viable

	fisheries through impacts to stocks and important nursery and spawning grounds. If growth in all activities is to be achieved or supported in order to maximise economic benefits, then the impact upon the environment needs to be understood, avoided or minimised and mitigated where appropriate. Climate change has potential to impact on the marine environment, thus affecting the goods and services it supports.. Some impacts may be seen as opportunities, ie increased sea and air temperatures may attract more tourism and encourage people to participate in marine recreational activities, with others posing further risks to the marine environment and activities reliant on it. For example, increases in sea temperature may encourage invasive species, increase levels of water-borne diseases, change the growth rate of aquaculture species and affect migratory fish routes impacting on fishing opportunities. This emphasises the fragile nature of the marine environment in relation to climate change and its ability to have significant knock-on effects on marine activities which provide a wealth of socio-economic benefits to visitors and coastal communities alike.
	Core Issue 11: Economic growth is reliant upon existing and new infrastructure. The position, scale and magnitude of impact of new infrastructure cannot always be predicted currently. All economic activities in the South marine plan areas depend on some form of infrastructure. As the majority of sectors expect to grow, requirements for additional infrastructure are likely; this will have a physical impact which will vary by sector. Some types of infrastructure require exclusive use of an area and may impair the growth of other sectors, both where they are physically located and beyond. For example, if a substation for electricity transmission is sited in an area where tourism is dependent upon the natural environment, it may impair the enjoyment of tourists and result in a decline in their numbers.. Furthermore, new and existing infrastructure needs to be resilient and flexible to the changing climate. Increased risk of flooding and coastal erosion and sea level rise, as a result of climate change, has the potential to impact on infrastructure and therefore the location and level of risk needs to be considered.

Opportunities for employment, investment and regeneration	**Core Issue 12: Some seaside towns are in decline and need regeneration and investment. Growth in key marine sectors can help to drive this investment.** Parts of the south coast where traditional industries such as 'seaside' tourism and fishing dominate the local economy are experiencing decline as a result of overdependence on one or two sectors of the economy, especially where those industries are undergoing change. New and emerging industries such as tidal and offshore wind, energy along with continued growth of ports and shipping and new forms of tourism and fishing, offer opportunities for these areas to diversify, building on their existing skills. For example Newhaven has been selected as the preferred operations and maintenance base for the Rampion offshore wind development, with expected resultant benefits for local businesses. Some opportunities will need investment, for example in dockside infrastructure, for their benefits to be maximised and through this regeneration of under-used space could occur. Regeneration and reuse of existing marine infrastructure and space is highlighted in several local plans and economic strategies as a key objective for economic development.
	Core Issue 13: Marine developments can provide opportunities for access to employment for coastal communities, who may have a skills base that match those needed by marine sectors These opportunities can offer local employment as well as growth and diversification chances for local businesses, bringing significant economic benefits to communities. Portsmouth and Gosport are deprived areas with opportunities to use existing skill sets to contribute towards marine manufacturing, through the reuse of ports and associated infrastructure to attract businesses to the area and support new job opportunities. Expansion of the aquaculture industry is likely to lead to increased jobs in coastal communities at various skill levels, especially if combined with the capture fisheries sector. Opportunities at a variety of skill levels is important, especially in areas with a diverse labour market; 'matching' economic opportunities to areas most suited to them from a skills viewpoint, increases the chances for local economic benefit to be realised.
	Core Issue 14: Investment in maintaining or enhancing infrastructure associated with marine sectors is necessary to ensure future employment opportunities. Infrastructure needed for marine activities in coastal areas can often be complementary (such as facilitating access to the sea), but the use of such infrastructure is often exclusive to one activity (for example marinas and ports serve very different markets, despite both facilitating access to the sea.). It is important that associated facilities (marinas, clubs) and infrastructure (slipways, moorings), both on land and in the sea, are maintained and developed to accommodate potential impacts of climate change and facilitate growth within the marine recreation and tourism industries, which are important economic contributors to the South plans' economy. Tourism and recreation are also reliant upon landward infrastructure such as transport networks.

	Other forms of infrastructure, such as cable landfalls or substations that are linked to other industries, are not complementary and can impact negatively upon opportunities for tourism and recreation, whilst themselves having the potential for generating employment opportunities in their own right. Coastal defences and protection can attract investment by providing certainty for developments, though they may limit the opportunities available through their visual impact. Development of infrastructure that is linked to existing and potential business opportunities is key to achieving economic growth. The impacts of climate change offer opportunities to some marine activities and sectors and any associated infrastructure required to harness these opportunities must also be resilient to climate change.

A list of the raw issues is located in Annex 1, the process by which we analysed all the information provided to us during the consultation and points to notes is located in Annex 2.

4.0 Conclusions and Next steps

4.1 Conclusions

The purpose of this report is to clearly lay out the core issues relevant to the South marine plan areas and present the evidence which informed them.

Consultation on the Draft South Plan Area Analytical Report, including the issues workshops in October 2013, gave stakeholders the opportunity to understand the evidence base and highlight gaps for further work, inform the Marine Management Organisation as to whether they recognise the issues and agree with the themes, and offer early thoughts on possible solutions that marine planning may deliver.

4.2 Progress and Next Steps – South Plan Areas Analytical Report

Following the consultation on this report, comments received by stakeholders were considered, and used in a number of ways as follows:

- publication of the final report incorporating appropriate changes to the sector or topic-level issues, core issues and themes

- the Marine Management Organisation recently published, and is currently commissioning, a number of projects which will provide additional evidence to inform marine planning in the South marine plan areas. Where it is highlighted that further evidence is required in support of the issues, the Marine Management Organisation will aim to source that evidence, or may consider additional commissions

- feedback on the issues and possible planning responses was used to develop an early working vision for the South marine plan areas which will be subject to stakeholder engagement

- the revised report, themes and core issues will be key inputs to inform later stages of planning, such as the development of different policy options.

4.3 Next steps – Vision and Objectives development

Core issues refined through the South Plans Analytical Report will be used to inform the next stage of marine planning which is the development of the draft vision and objectives for the South marine plan areas. These will be subject to upcoming stakeholder engagement and consultation during summer 2014.

The themes will be used as a basis for the draft vision for the South marine plan areas. In order to achieve the vision, the core issues will be used to draft objectives. In the later stages of marine planning for the South, the issues for each sector or topic will be used to draft policies, building on the evidence gathered from the South Plan Areas Analytical Report.

Annex 1 – Core Issues Derivation

During the consultation for the South Plan Area Analytical Report and associated workshops, stakeholders highlighted the requirement for a clear link between the sector or topic level issues highlighted in chapter 2 and the themes and core issues tables in chapter 3. As described earlier, the core issues table provides a summary of the sector or topic-level issues and groups them into four themes for management and application during the marine planning process.

The table below (table 11) indicates how the core issues were derived from sector or topic-level issues, and how these link to themes. Therefore it is possible to identify a specific issue in chapter 2 and then find it within the appropriate theme and core issue in the table below.

The sector or topic level issues were then all considered to inform the core issue description.

Table 11: Raw list of issues

Protection of the natural marine environment	**Core issue 1: To deliver a coherent network, both designated areas and non-designated areas and species need to be afforded protection. Furthermore, the ability for these areas to adapt to future changes and grow is needed to achieve the delivery of a coherent network.** The South coast has a large number of designated sites contributing to a coherent network of protected areas to support rare and endangered species and habitats of international importance. There are also many species and habitats not protected under European or UK law but that are important to the marine environment. The continued, **flexible approach to protection and enhancement of these areas**, species and habitats is required to maintain the unique and valuable nature of the marine environment in the South plan areas. Pressures such as **increased storminess, sea level and sea temperature rise**, as a result of the impacts of climate change, may affect species and habitats. Increased storminess and flooding may affect nesting birds; changes in sea temperature may affect the distribution of species, migratory routes for mobile species and the potential range for invasive species; and increased coastal squeeze from sea level rise could reduce existing habitat and the potential for future habitat creation. These will all prove a challenge in the ongoing protection of the marine environment and will require innovative adaptation methods to enable the enhancement of the natural marine environment. **Sector-level issues** • A combination of increases in activities that can introduce non-native species and a changing climate that make conditions more favourable, mean that the number of invasive and non-native species is likely to increase in the future, despite efforts to limit this • climate change may have implications for the protection of habitats and species from the following variables. o Sea level rise/coastal flooding o Extreme storms and waves o Air and sea temperature rises o Ocean acidification o Changes in terrestrial input (riverine flow and flooding)

- Changes to ocean currents
- Changes in plankton distribution and knock on effects for fisheries

- adaptive management of protections for sites and species will be needed. For example, if an area is created to protect a certain fish spawning ground and the fish migrate from that area due to rising temperatures, the protected area boundaries would need to be flexible to ensure that the fish are still protected. Where licence conditions are in place to protect a mobile species, they may need reviewing if the species moves as a result of climate change
- the incremental loss of fringing habitats and transitional communities is a threat, particularly for those sensitive habitats that are not formally protected such as some areas of sea grass and habitat complexes like the Dart Estuary. The loss of fringing habitats could also have an effect on species directly such as bird populations, outlined in more detail above
- the South marine plan areas are very busy, with co-existence of activities being the norm. If environmental protection measures result in displacement of an activity, there is little opportunity to relocate. The further development of the network of Marine Protected Areas, changes to management measures in current designated areas and implementation of the Marine Strategy Framework Directive could all increase the potential for conflict with industry
- the benefits brought by ecosystem services are poorly quantified; therefore it is difficult to fully understand the impacts of human activities. As discussed in the above sections, changes in sea temperature are already affecting species populations and habitat distribution, which in turn drives alterations to community structure and function
- marine litter can raise mortality levels of native marine species and provide a vector for invasive species, both of which could have a significant environmental impact.

- Sea-level rise as a result of climate change, potential impacts of extreme weather events and 'coastal squeeze' associated with urban, industrial and sea defence development are all significant threats to the long-term maintenance of habitat diversity and structural integrity.

Core issue 2: Existing activities are putting a degree of pressure on habitats (and the associated species that live within them). These activities need to be managed to reduce this pressure.

Irrespective of future development opportunities, there is currently **a degree of physical impact on the natural marine environment from existing activities and industries**, particularly habitats and species not protected by designations, eg sea grass areas damaged by trawling, dredging and anchoring activities.

Activities that cause abrasion, such as fishing with mobile gears, aggregate dredging, anchoring and dredging and disposal can impact on natural sedimentary systems, causing physical changes to benthic habitats and altering channel depths. This in turn can affect the species associated within or near these habitats. Coastal development can also cause **squeeze** on habitats and heritage assets, affect water quality and disturb species. These assets and natural resources need to be maintained and enhanced where possible for the benefit of the marine environment and for the continued provision of goods and services, for example to activities such as tourism and recreation.

Sector-level issues

- The incremental loss of fringing habitats and transitional communities is a threat, particularly for those sensitive habitats that are not formally protected such as some areas of sea grass and habitat complexes like the Dart Estuary. The loss of fringing habitats could also have an effect on species directly such as bird populations, outlined in more detail above
- the South marine plan areas are very busy, with co-existence of activities being the norm. If environmental protection measures result in displacement of an activity, there is little opportunity to relocate. The further development of the network of Marine Protected Areas, changes to management measures in current designated areas and implementation of the Marine Strategy Framework Directive could all increase the potential for conflict with industry
- human activities which have a physical impact on seafloor integrity damage regulating and supporting services. While impacts are quite localised, trawling activity has the most widespread impact, with food provision also being affected by overexploitation. Marine aggregate extraction also has a damaging impact on the benthos with consequential reduction in its capacity as a food source for fish and shellfish; it also creates squeeze on both trawling and fixed gear fisheries
- unregulated and unsustainable hand gathering of shellfish and bait digging is also an issue, leading to physical damage, unsustainable reduction in biomass and disturbance issues
- there is generally little disturbance to habitat during laying and maintenance of subsea telecommunications cables, these activities have been assessed by Natural England and JNCC to be compatible with execution within MCZ areas and further environmental assessment for simple burial is not necessarily required.
- potential risk to marine life and ecology through changes in water quality (relating to changes in chemistry and turbidity), noise and physical disturbance as a result of dredging and disposal
- the release of contaminants (legacy of industrial pollution) impacts on designated nature conservation

areas (potential destruction or destabilisation) as a result of dredging and disposal

- dredging and disposal can cause changes to natural sedimentary systems via physical changes to contributing structures eg alteration of channel depths
- cabling interactions occur with numerous activities but particularly with the ports and shipping, aggregates and fishing sectors. Potential impacts are:
    - the effect of power cables on the environment through scour and electromagnetic field output, however following an Marine Management Organisation evidence report (MMO 1031) there is no evidence to suggest that electromagnetic fields pose a significant threat to elasmobranchs at the site or population level
- aquaculture is often seen as a way to contribute to meeting the rising demand for seafood and it is therefore imperative that it helps to maintain a healthy and diverse environment.

- The National Policy Statement EN6 highlights a number of impacts from nuclear power including:
    - flood risk
    - water quality and resources, including temperature changes to water and radionuclide emissions
    - coastal change and impacts upon this, including water temperature changes
    - biodiversity and geological conservation
    - landscape and visual impacts
- ongoing challenges with air quality (from transport emissions amongst others) in Air Quality Management Areas at the coast and on land could lead to eutrophication of the marine environment.

- The benefits brought by ecosystem services are poorly quantified; therefore it is difficult to fully understand the impacts of human activities. As discussed in the above sections, changes in sea temperature are already affecting species populations and habitat distribution, which in turn drives alterations to community structure and function. Climate change could also affect human health through the increase of optimum conditions for marine pathogens such as Norovirus and Vibrios. However it may bring benefits to cultural ecosystem services through warmer summers.

Core issue 3: The physical growth of industry into new areas may cause encroachment on the natural marine environment.

Potential residential and industrial **growth on the South coast could conflict with areas or species** protected for their environmental importance, as well as areas that are not protected but play an important role in providing

environmental goods and services and for their intrinsic value.

There are locations within and adjacent to the South marine plan areas which have potential for growth in marine industries. For example, areas of the Solent naturally lend themselves to development of existing ports to support increased ship movements, there are renewable energy opportunities off the coast of Brighton and the Isle of Wight and aquaculture is a growing industry with much potential. These, coupled with development on land (both residential and infrastructure to support marine sectors) and the increasing need for managed realignment schemes to address flooding, may put **increased pressure on the environment,** some of which is nearing its environmental carrying capacity.

Potential for growth in these areas poses challenges to the natural environment such as the **introduction of new and invasive species**, limited areas for habitat creation (often used as mitigation for development) and encroachment into designated areas.

A balance needs to be struck between enabling development and growth to provide jobs and create revenue nationally and locally and the health of and space for the marine environment; a resource in itself crucial to many marine activities and industries.

Sector-level issues

- The opportunities and challenges for the beneficial use of dredged materials need to be explored further to help address the impacts of coastal change. Any support marine plans can offer would help ensure material remains in the sedimentary system, habitats and natural flood defences are created and the better utilisation of natural resource for the benefit of businesses and people
- more frequent and intense storms, possibly as a result of climate change, could impact on water quality due to the potential for storm overflows
- disturbance/ adverse effects on habitat and wildlife in practice and exercise areas, no impact is expected upon these areas.

- Developments need to be resilient to coastal change and flooding and consideration should be given to how to adapt to future changes. In turn, developments need to ensure they do not have an unacceptable impact on coastal change
- coastal squeeze, due to the impacts of climate change and population and industrial growth, will impact on

coastal habitats such as saltmarsh and sand dunes, reducing the quality and amount of space for habitats and associated species

- habitats such as saltmarsh and sand dunes can act as natural flood defences. Therefore coastal squeeze may reduce their ability to do this, adding to the requirement and cost for manmade defences.
- population growth and associated infrastructure, likely to be focused in already built-up areas, will put more demand on the sewage network and water companies with regards the disposal of waste water. The environmental impact of more sewerage systems and associated discharges will need to be monitored and managed. Despite best efforts, it may be difficult to avoid negative impacts on the environment if the number of systems and outfalls increases
- increasing activity in other marine sectors is putting additional pressure on the marine environment and the services it provides. Interactions with renewables offshore wind farms, shipping and fisheries activities can cause displacement from feeding grounds and the most efficient flight paths, increasing the energy requirements for birds
- there is potential for wider impacts upon biodiversity and ecosystems of both maintenance and capital dredging to emerge, both directly and as a contributor to cumulative effects. These are outlined in the following section on sustainability and but are commonly managed and mitigated through measures established at the point of licensing the activity.

- The interaction between sectors that can spread species and those that provide potential 'stepping stones' will need to better understood, particularly as all are predicted to grow in the South marine plan areas
- there is also a collision risk depending on the design and location of large-scale infrastructure and the possibility diving birds and marine mammals may become entangled in fishing nets, alongside an increased risk of non-native species occurring due to more shipping activity and dumping of ballast waters.

Core issue 4: Impact of industry and activities on mobile and highly mobile species are hard to predict, understand and account for.

Migratory and breeding birds, fish species, cetaceans and seals are resident or regular visitors to waters off the South coast of England. Their presence indicates the health of the marine environment and attracts people to the area. Conversely, these **species are vulnerable to pressures** such as collision, disturbance, pollution and underwater noise caused by many marine activities, eg construction of renewable energy infrastructure, port and shipping activity, sonar and tourism and recreation activity. The consideration of mobile species during construction, operation and decommissioning of marine industry will be important to maintain healthy populations

of mobile species and the contribution they make to the wider marine ecosystem.

There are still challenges around **predicting the spatial distribution and future trends** of seals and cetaceans before further work can be done to understand fully the impacts of pressures such as noise on cetaceans. This is especially relevant to the cumulative/in combination effect of either a number of different pressures on a species or the impact of a number of activities causing the same pressure. This is something marine planning can contribute towards.

Sector-level issues

- Renewables development and operation and other marine construction have the potential to increase overall underwater noise levels and distribution over a larger geographical area
- climate change may have implications for the protection of habitats and species from the following variables.
    - Sea level rise/coastal flooding
    - Extreme storms and waves
    - Air and sea temperature rises
    - Ocean acidification
    - Changes in terrestrial input (riverine flow and flooding)
    - Changes to ocean currents
    - Changes in plankton distribution and knock on effects for fisheries
    - Ocean acidification
- adaptive management of protections for sites and species will be needed. For example, if an area is created to protect a certain fish spawning ground and the fish migrate from that area due to rising temperatures, the protected area boundaries would need to be flexible to ensure that the fish are still protected. Where licence conditions are in place to protect a mobile species, they may need reviewing if the species moves as a result of climate change
- the incremental loss of fringing habitats and transitional communities is a threat, particularly for those sensitive habitats that are not formally protected such as some areas of sea grass and habitat complexes like the Dart Estuary. The loss of fringing habitats could also have an effect on species directly such as bird populations, outlined in more detail above
- there is also a collision risk depending on the design and location of large-scale infrastructure and the

	possibility diving birds and marine mammals may become entangled in fishing nets, alongside an increased risk of non-native species occurring due to more shipping activity and dumping of ballast waters. • The impact of shipping noise on receptors is not fully understood. Its effects, including the potential for injury, may not be observed at current levels due to lack of appropriate monitoring. Any effects may increase in the future as the amount of shipping traffic increases • there is a lack of evidence on the effects of the wide spectrum of current and future underwater noise levels and distribution • noise is caused by all sectors to varying degrees, so as they grow the potential for impact grows too. The most obvious impacts are on marine mammals and other species, although further research is needed to understand the extent of such impacts • it should be noted that at this point in time there is insufficient data to provide a clear assessment as to whether current levels of noise in UK waters are having an impact on the population levels of cetaceans or other noise sensitive marine animals • noise is caused by all sectors to varying degrees, so as they grow the potential for impact grows too. The most obvious impacts are on marine mammals and other species, although further research is needed to understand the extent of such impacts • cetaceans are vulnerable to collision, pollution and underwater noise, particularly from construction of renewable energy infrastructure, ports and sonar. There are however difficulties in making direct links between individual pressures and their impact. There are potential issues of cumulative effects of multiple noise sources as marine construction and vessel movements increase • for established forms of aquaculture the science behind these (eg best practice, species environmental requirements) requires collating in order that operation and development of aquaculture takes place using the best available environmental management practices • for novel/emerging forms of aquaculture, including offshore potential, investment is needed to look at environmental impact and production technology, and to collate existing information on procedures from other countries where this form is more established • for all aquaculture types research is occurring into economic/social benefits. The Marine Management Organisation have begun this via MMO project 1035 ‘Social impacts of fisheries, aquaculture, recreation and tourism, and marine protected areas in marine plan areas in England.

Core issue 5: Current marine industry and activities, the potential growth of these and the impacts of climate change will cause cumulative and in-combination effects on the natural marine environment.

The growth of different industries in and adjacent to the South marine plan areas, will cause **cumulative pressures on the marine environment**. Multiple activities causing the same pressure (cumulative) or those that create different pressures in the same area (in combination) will risk damage to habitats and species. Pressures during construction and operation, the potential associated displacement and disturbance from activities such as tourism and recreation could cumulatively effect visual impacts, marine noise, mobile species, habitats and potentially as-yet unquantified effects could also arise.

Current and future impacts of climate change create a further level of complexity to understanding and beginning to address cumulative effects. Sea level and sea temperature rises and increased storminess will add to the pressure on the marine environment, thus exacerbating the pressures covered in this theme, on the marine environment.

Cumulative/in combination effects of activities is an important and varied topic with many different examples and scenarios and existing legislation through the marine licensing process requires consideration of their effects on the marine environment (through environmental impact assessments). Marine planning can play a strategic role in **assessing and mitigating cumulative/in combination effects** through signposting existing evidence, highlighting evidence gaps and contributing to addressing this by working with others to improve decision making around cumulative effects.

Sector-level issues

- the development of industry such as nuclear power or port expansion will impact on coastal waters during their construction, operation or decommissioning phases. While this is an often unavoidable by-product of industrial development and impacts are assessed through the various licensing and permitting regimes, the cumulative impact on the water environment must be considered and monitored
- potential cumulative effects of construction in the South marine plan area with navigation, visual impact, birds and marine noise of particular concern at the strategic level (note that these aspects are assessed and mitigated in project level environmental impact assessments (EIA) and subsequent environmental statements) and considered more widely at a strategic level by regulators
- cumulative effects of construction in the South marine plan area with wake effects and associated

	disruption of coastal processes, effects on birds (especially diving birds), collision risk, scour and marine noise from pilling activities are a potential concern • cumulative effects on possible contamination of aggregate resource through disposal grounds and licensed areas being within close proximity and the impacts this could have on any mobile species. • In the South marine plan areas, there is a significant amount of commercial shipping, recreational boating and passenger ferries which collectively contribute to air pollution. Consideration of the cumulative effect of these activities on air quality is needed, particularly in the coastal area • there is potential for wider impacts upon biodiversity and ecosystems of both maintenance and capital dredging to emerge, both directly and as a contributor to cumulative effects. These are outlined in the following section on sustainability and but are commonly managed and mitigated through measures established at the point of licensing the activity • cumulative effects of development activities such as dredging, vessel movements or piling for offshore installations are not yet understood but as activities increase, so will the level of noise • the South coast and East English Channel marine aggregate regional environmental assessments have produced cumulative impact assessments for the marine aggregates extraction industry and the potential effects on other marine industries. This detailed assessment indicates that current extraction activity is within current acceptable environmental limits and is supported by site-specific assessments by the Marine Management Organisation and its advisers on an application-by-application basis, and by research into cumulative effects between dredging in the East English Channel aggregates region and commercial fisheries • in addition analysis of the vessel monitoring system data suggests the permitted aggregate extraction has had no effect on the density and intensity of fishing activity within the South marine plan areas. Currently research is being undertaken to understand cumulative effects on regional fisheries within the South marine plan areas with particular attention on spawning and nursery grounds.

Maintaining and enhancing social benefits	**Core issue 6: Marine activities provide social benefits for coastal communities. The growth of marine industry and activities may lead to competition between them, causing conflict and displacement. Consideration and sustainable provision of these social benefits is required to ensure they are not lost.** All the marine activities that go on in the South marine plan areas provide **social benefits** for people living on the South coast of England and beyond. These benefits include: • the enjoyment of being able to engage and interact with the natural marine environment and its views through activities such as tourism, recreation and fishing and the health and wellbeing benefits known to accompany these activities • the importance and attraction of an areas cultural heritage, character and identity and sense of place due to the activities carried out there for many years • the contribution of local revenue to the coastal communities, from both tourists and local people engaging with the marine area. Many marine activities contribute to these benefits; particularly tourism, recreation, fishing and seascape/cultural heritage which are the main drivers of these recognised social benefits on the South coast of England. The **predicted growth** of these and other activities, and the interaction between them, poses risks to the current social benefits realised in the South marine plan areas. Competition for space between different types of recreational activities, coupled with the predicted growth of industries such as renewables and aquaculture may squeeze some of these activities into smaller areas. This may reduce the participation levels and enjoyment and wellbeing received from such activities and raise concerns over navigational safety. **Displacement** of fishing, which many people see as inherent to local areas, could impact on the character of the area and sense of place and thus on the enjoyment of many visiting the area. Furthermore the many marine and terrestrial designations which drive the tourism industry, provide recreational opportunities for people and protect many seascapes and features could be impacted from the growth of marine activities. Activities which predominately drive social benefits need to be managed to ensure their future **growth is sustainable**. Industry-focussed activities also need to be managed to find a balance between growth and the potential impact they may have on those activities driving the important social benefits on the South coast. **Sector-level issues**

- Where a certain activity has taken place in an area for a long time such as fishing in Hastings, it can become a strong feature of that community's identity and sense of place. The social networks that are generated between long-term workers and residents can help to build community cohesion. Whilst economic restructuring often offers economic, and in turn employment and income, benefits, it can also erode the traditional identity or sense of place
- the development of offshore infrastructure, especially offshore wind farms is often perceived to have a negative impact on the experience of recreation participants and tourists, although this does not necessarily hold true once the infrastructure is in place
- potential growth in recreational activities and development of other activities and industries could challenge existing recreational activities, affecting health and wellbeing benefits realised through recreation for local communities and tourists.

Core issue 7: The natural marine environment provides goods and services which some activities rely on. These activities provide important social benefits, such as access, health, wellbeing, enjoyment and support to coastal communities to visitors and local communities.

The attraction of the South coast of England for many marine activities is largely due to the quality of the natural marine environment and the designated areas providing views of the marine area. People want to 'access' the area for these reasons and utilise the natural resources for jobs and income but this in turn can pose a risk to the very attraction drawing people to the coastline. Finding the balance between enhancing and improving access for social benefits while protecting the natural environment is a challenge, partly for marine planning and will be key to the sustainable development of the South marine plan areas.

Being able to reap the social benefits from the South marine plan areas hinges on the ability for people to use, access and enjoy it. Access to the natural marine environment is known to improve health and wellbeing and supports coastal communities through jobs and revenue. Access could include physical access to the water to participate in recreational activities or associated facilities and infrastructure on land to facilitate and support activities in the marine area.

Sector-level issues

- Although the goods and services provided by the natural marine environment are typically experienced by

those that live by or visit the coast, many, like renewable energy and food, both directly and indirectly benefit much of the UK's society.

- people gain many social benefits from ecosystem services (such as clean air and water and use of the environment for tourism and recreation), but can also produce significant positive and negative impacts.
- climate change is producing significant issues for social benefits, low-lying areas are at increasing risk of flooding with adverse social and economic effects (especially the Solent due to the concentration of industry and infrastructure, and its economic development). Conversely, the accretion, or sediment build up, which may increase vegetated coastal habitat and protect built infrastructure, can also have negative effects such as on the beach-launched fishing fleet in Hastings
- climate change could also affect human health through the increase of optimum conditions for marine pathogens such as Norovirus and Vibrios. However it may bring benefits to cultural ecosystem services through warmer summers
- as well as the need to manage wider environmental impacts and spatial interactions with other marine users, there is also the potential to interact with heritage sites, Marine Protected Areas and other industry. In the case of a number of these, the industry already has adopted a range of best practice measures – including heritage guidance notes /reporting protocols, fisheries liaison codes of practice and a Biodiversity Action Plan strategy – together with adoption of regional approaches to assessment, monitoring and management through the regional dredging associations and the associated Marine Aggregate Regional Environmental Assessments. All of these issues influence and help to shape the sustainability of the sectors activities
- in addition to economic and environmental impacts, changes to the fishing industry have the potential to yield social impacts, both locally and on a wider scale. Recent research suggests that the interactions between marine protected areas and offshore renewables on commercial fishing have the greatest potential for significant social impacts. Research has highlighted the importance of fishing to the identity and sense of place in Hastings and the important contribution fishing makes to the character of towns such as Rye. The Department for Environment Food and Rural Affairs are soon to publish a study that seeks to highlight areas of sea that are 'zones of influence' for more than one port and therefore at greater risk of social impact (see draft outputs in figure 41). These issues are being explored further through projects such as the Interreg 'Geography of Inshore Fishing' and any relevant outputs from this project (which is due for completion in September 2014) will be considered at later stages of plan development.

- Two Round 3 offshore wind farms (Navitus Bay and Rampion) currently divide local opinion due to conflict

	between employment creation and adverse effects on visual impact and access to marine space. Local people may be more supportive of development of the powerful tidal streams around the Isle of Wight and off Portland, particularly if access to space is not unduly compromised • the site, their resources and recreational activities deliver significant social benefits. There is a convergence with management of biodiversity as the habitats and species of the foreshore, and amenity beaches are all caught between rising sea level and increased storms at sea and coastal defences on land (so called "coastal squeeze") • degradation and enhancement of the natural environment can affect a number of sectors, most notably the commercial fishing, recreation and tourism sectors. Marine Protected Areas are currently seen as a key tool for enhancing the quality of the UK marine environment. There is some evidence of potential benefits to commercial fishing, recreation and tourism, although the UK evidence base is very limited.
	Core issue 8: Existing marine activities coupled with their predicted growth may impact on the historic environment, nationally designated landscapes and seascapes, and the goods and services it supports. Maintaining access and safeguarding the historic environment for both its own protection and to service other activities will be important. The historic environment and heritage assets attract people to an area and drive tourism and some forms of recreation in the South plan areas. There are many wreck sites which attract divers and are important habitats for many species, buried prehistoric remains and areas of outstanding natural beauty, national parks and a world heritage site attract visitors and drive local economies. Tourism and recreation can in themselves cause damage to these assets if they are not managed sustainably. This, coupled with the current activity and predicted growth in marine industry, poses an increasing threat to the historic environment and heritage assets. **Sector-level issues** • consideration of the cumulative impact on social character of communities in transition from historic dependence on fishing and/or tourism • while important to manage the fisheries for their overall sustainability, their socio-economic importance for local fishing communities must be recognised • there are a number of potential issues facing the protection of the historic environment and the heritage assets that lie within. The potential for increased footfall due to tourism and recreation poses a direct risk to the preservation of coastal buildings and monuments. Another effect of increased footfall is the risk to heritage assets through coastal erosion along paths and bridal ways

	• due to the unknown nature of many heritage assets and the restrictions posed by the sea; interactions with other sectors are limited to those that happen along the coast or on the sea bed and are spread across the South plan areas. These include: o infrastructure development including renewable energy project development, coastal defences, port development, cable and pipeline installations poses a threat to any unknown assets buried beneath the sea bed and development at sea raises concerns to the setting of historic buildings, gardens and landscapes. o of other activities that disturb the sea bed such as mobile gear and beam trawling fisheries or dredging activities raises concerns to heritage assets on the surface and beneath the sea bed. o ports and shipping – associated anchorage areas, ship-to-ship transfer locations and dredging and disposal activities • due to the unknown nature of many heritage assets and the restrictions posed by the sea; issues for sustainability are difficult to define as they occur along the coast or on the sea bed and are spread across the South plan areas o climate change and coastal erosion processes o submarine cable and pipeline installation (see section 2.11) • the effects of infrastructure development both along the coastline and at sea pose a risk to the natural tranquillity and visual setting of nationally designated landscapes. It should therefore be acknowledged that the emergence of round 3 wind farm development in the South marine plan areas heightens the risk to those landscapes. Other activities that disturb the tranquillity or result in the damage of a protected landscape should be considered. This can be said of increased footfall from tourism and recreation activities resulting in the increased risk to damage and coastal erosion • nationally protected landscapes have strong links with both seascape and the historic environment. Many protected landscapes are themselves considered heritage assets which in turn afford protection in relation to the setting of a heritage asset. The effects of infrastructure development through wind and tidal energy projects, port development and, cable landings and pipelines pose a threat and should be considered. Coastal erosion and tourism and recreation activities also threaten to damage protected landscapes. Consideration should be made for coastal access and its supporting infrastructure • the effects of infrastructure development both along the coastline and at sea pose a risk to the visual resource of a seascape or landscape. It should therefore be acknowledged that the emergence of potential Round 3 windfarm development in the South marine plan areas heightens the risk to those areas. Increased tourism and recreation and the development of facilities to support it, may also change the character of an

	area. In turn, as tourism and recreation are partly dependent on seascape as a resource, changes to character (either by tourism and recreation or other marine activities) may have an adverse effect on tourism and recreation • the visual resource element of seascape has strong links with nationally protected landscapes and the protection they afford. The effects of infrastructure development through wind and tidal energy projects, port development, cable landings and pipelines pose a potential threat and should be considered. In terms of character, the South seascape assessment includes reference to all sectors within and can be used to develop a 'sense of place' for the South marine plans • visual resource – needs careful management to consider sensitive receptors through the relevant assessments • as well as the need to manage wider environmental impacts and spatial interactions with other marine users, there is also the potential to interact with heritage sites, Marine Protected Areas and other industry. In the case of a number of these, the industry already has adopted a range of best practice measures – including heritage guidance notes /reporting protocols, fisheries liaison codes of practice and a Biodiversity Action Plan strategy – together with adoption of regional approaches to assessment, monitoring and management through the regional dredging associations and the associated Marine Aggregate Regional Environmental Assessments. All of these issues influence and help to shape the sustainability of the sectors activities • degradation of heritage assets through direct or indirect physical activity • effects on a coastal landscape and/or seascape (for example, maintenance through beach nourishment or disturbance of subsea features at disposal grounds) • there are a high number of terrestrial and marine designations in the South marine plan areas. The designations, due to their features, views and/or cultural heritage, attract many people to the area and encourage participation in outdoor recreation. Proposals that impact on these designations could in turn impact on the tourism and recreation economy.

Enabling sustainable economic development	**Core Issue 9: Growth in marine activities often requires exclusive use of space, or access to space, which will often lead to competition between sectors and a need for decisions to be made about where space is used by different sectors.** There is a need to **understand the growth of new and existing sectors**, in terms of the amount of growth and where this growth might occur. Sectors that are expected to grow need space to do so and have particular requirements and individual issues. New sectors such as tidal or offshore wind energy projects, have need for exclusive use of the seabed, though there may be potential for other sectors such as shipping, fishing or aquaculture to share some space, depending on the type of fishing or shipping in question (gear type or draught will decide this). **Competition for space** may lead to more sectors in close proximity, which may impact the ability of some sectors to function, for example increased use of estuaries may impact water quality, damaging the ability of shellfisheries to maintain or grow their businesses. It could also limit the ability of some sectors to expand, for example where no more dredging is allowed for water quality reasons, yet is needed for continued growth of ports. Competition for space also has another aspect, which is where it is likely to come into conflict with existing or planned areas of environmental protection or social benefit, for example where port activity may want to use space currently protected for nature conservation. Climate Change is predicted to lead to **increased storminess**, with increased potential for damage to businesses. Sea level rise will create greater coastal squeeze; this will mean less space for growth and mitigation for development (habitat creation/compensatory habitat). Increased sedimentation from flooding and erosion may increase costs for shipping and ports through additional maintenance dredging. Changes in sea temperature may change the geographical opportunities for aquaculture. There may be economic opportunities from climate change, such as increased potential for some types of tourism and recreation. **Sector-level issues** • Two Round 3 offshore wind farms (Navitus Bay and Rampion) currently divide local opinion due to conflict between employment creation and adverse effects on visual impact and access to marine space • the core issues for economic activities primarily relate to:

	o the amount of growth possible, given environmental considerations and space constraints o impacts upon individual sectors by other sectors, for example upon coastal tourism through inappropriate developments in unrelated sectors o maintaining the competitiveness of key sectors, such as ports and shipping o climate change is predicted to increase coastal flooding and erosion through sea level rise and an increase in extreme events • gaining investment in renewable projects and the potential effects of Contracts for Difference and uncertainty on how this will affect the development lifecycle • managing the strategic issues in relation to the current programme of offshore wind farms are considered by the UK Offshore Energy Strategic Environmental Assessment 2 (OESEA2) • planning and consenting and the consideration of other sectors through these processes for offshore windfarm development • development of commercial scale tidal arrays to ensure the progress made in this sector continues. demonstration and test sites offer a valuable stepping stone to achieving this goal where devices can be tested in a live environment. The Crown Estate is in the process of identifying more of these sites in the South marine plan areas and development within them should be encouraged in line with national policy o with stricter emerging targets on industry to cut carbon dioxide emissions the following factors are important in the role of driving down the costs for carbon capture and storage investment from government o regard to the recommendations from the Carbon Capture and Storage Cost Reduction Taskforce o carbon capture and storage research and development • impacts on the coastline and existing coastal infrastructure must be taken into account when any nuclear infrastructure development takes place. For Dungeness B this will relate to the current operations and also the decommissioning of the site, as opposed to further developments within the South marine plan area • the construction of additional port facilities may be required on the Dibden reclaim between 2021 and 2027, as this is the only place for significant expansion of the Port of Southampton. The Port of Southampton is seeking to safeguard the site in the New Forest District Council Local Plan. Further to this, the Hampshire Minerals and Waste Plan safeguards land which may become available / be released from existing uses within the plan period, so that its use for minerals and / or waste wharf or rail depot infrastructure can be considered. However, this Minerals and Waste Plan does not safeguard the site for port uses. It is likely that Associated British Ports will commence a master planning exercise of the proposed development within the next six years or so. Master planning will no doubt include consideration of the prevailing

	designations at or adjacent to the Dibden Bay site as any impact upon these will need to be carefully managed • the shipping industry in UK waters is linked to the state of the UK economy, and to the effectiveness of the ports industry to accommodate demand for import and export of goods. It is also vulnerable to global scale macro-economic trends. The current economic situation has led to a severe downturn in demand; however in the long term this is unlikely to reduce the eventual levels of demand for port capacity, in particular for unitised goods • similarly to the ports sector, the shipping sector will continue to grow due to demand from sectors that are able to operate more independently of the macro-economic issues, eg renewable energy, that is more strongly related to UK-based factors. As such, while a portion of the shipping sector depends on the health of the economy, strong growth in renewable energy will play a part in sector growth over the coming years • determination of the 15 year marine licence applications for dredging within the South marine plan area are due to be submitted over the next two years will mean that the marine plans, with their 20-year focus, will have an influence on the marine aggregate industry over a 30-year period • tourism and recreation are in many ways intrinsically linked in the plan areas eg water sport activities (Poole Harbour) and recreational sailing events (Cowes Week on the Isle of Wight) etc. for which people specifically travel to the area. (Issues relating to recreation are covered in more detail in section 2.15) • participation in marine recreational activities is inherently linked to tourism with a shift towards visitors focusing on experiences rather than material goods. Therefore in order to maintain the recreational industry, the tourism industry must also be supported • growth in visitor numbers may impact positively on the economy, but negatively on the environment and could benefit from the promotion of responsible ecotourism • potential growth in recreational activities and development of other activities and industries could challenge existing recreational activities, affecting health and wellbeing benefits realised through recreation for local communities and tourists • Consenting of wind farms, tidal energy schemes and associated port development could impact on tourism in certain areas ie Navitus Bay, Rampion and St Catherine's Point • it is important for decision makers to take account of appropriate locations for new developments alongside other uses of marine space • marine activities should not prejudice the interest of defence and national security and the Ministry of

	Defence should be consulted accordingly. Marine plan authorities, decision makers and developers should consult the Ministry of Defence in circumstances where defence interests may be compromised • potential exists for wind turbines to cause radar interference when turbine heights exceed certain levels, but how this will affect future deployment of offshore wind farms remains to be seen. Recent developments in radar technology may eliminate the need for Ministry of Defence to object to wind farm projects on this basis • wind farms can present an obstacle to both recreational and commercial shipping with vessels being diverted around the development in some cases, however agreements are in place to mitigate this • displacement of certain types of fishing activity from both within the wind farms and cable corridors • commercial shipping can have effects upon a range of activities such as sea angling, sailing and diving to either displace or restrict these activities • within the boundaries of the current technology, tidal resource is relatively constrained needing protection from other marine construction and activities to ensure the potential resource is not sterilised for this use • installation of tidal arrays and devices could potentially displace: o fishing activity o recreational boating o shipping activity o aggregates extraction • wind and tidal energy projects have the potential to conflict in the South marine plan areas due to Navitus Bay wind farm site being situated in an area of tidal stream resource that could theoretically be developed in the future • potential for co-location of wind and tidal devices could be considered. Similarly smaller devices such as 'micro-tidal' should also be considered as they could have the benefits of energy generation with a smaller area of operation such as sheltered estuaries or rivers. Development of supply chains and tidal stream devices in the South marine plan areas offers a large potential for economic growth in coastal communities along the South coast • given future changes in shipping activity and the need for ports to manage this, anchorages will continue to play a part in the management of vessels. Where ports accommodate more and / or larger vessels, anchorage use patterns interact with the activities of others. This is particularly likely where shipping activity in and around ports is already relatively intense. The role of marine planning in mitigating potential impacts across all sectors with respect to anchorages will need to be determined with stakeholders in accordance with the national and international approaches to the management of shipping activities as plans are

	developed • overall, offshore wind farm development presents an opportunity for sector diversification to include installation and servicing vessels. However, it should be acknowledged that there is also a risk associated with the growth in renewable energy; especially Round 3 offshore wind farms, in relation to the growth of the shipping sector within the South marine plan areas. If shipping routes are obstructed, the economic viability of some vessels coming to ports within the marine plan areas might be compromised resulting in a detrimental impact on the growth of the sector. Resolving such matters is informed by discussion between representative parties, including the relevant UK regulator for shipping safety, the Maritime and Coastguard Agency and related guidance such as Marine Guidance Note 371, and are examined on a case by case basis as projects are designed, assessed and delivered • while renewable energy may support parts of the shipping sector; possible implications may arise from the displacement of vessels due to renewable energy developments eg navigational measures taken to avoid a renewable energy development may increase the frequency of transits through marine aggregate production licence areas. In this example, displacement of shipping therefore has the potential to create risks to aggregate extraction activities due to increased density of navigation activity • increased competition for marine resources affecting the sea space available for the safe navigation of ships remains a core issue for the sector. Shipping can co-exist with marine conservation, fishing and aggregate extraction but there are other uses of the sea in respect of which this cannot be said. One example of an approach to mitigating pollution risk from shipping and providing an aid to passage planning has been the establishment of Marine Environmental High Risk Areas which are defined as areas having high environmental sensitivities and being at risk from shipping activity. Marine Environmental High Risk Areas have been developed specifically for shipping activity and are not necessarily applicable to other sectors' activities. Potential exists for marine planning to help address this issue in the future by ensuring that other, conflicting uses of the sea – such as offshore wind farms – do not make it more difficult for ships to navigate safely or are developed in such a way as to avoid excessive deviation from planned routes • in addition, recreational vessel movements are set to increase and traffic related to installing and maintaining offshore wind farms will emerge. While smaller vessels, including those servicing wind farms, may be operating within wind farms it is likely that a proportion of the recreational and wind farm-related traffic will seek to share space with displaced commercial shipping. As well as the increased risk of collision arising from vessel density in these areas, another risk emerges when considering that commercial shipping operators can face challenges detecting other vessels within wind farms • this means that when these smaller vessels emerge from wind farms they may be in unexpectedly close

proximity to commercial operators. As conversations around wind farm development processes continue, it is likely that the potential risks to commercial shipping posed by cumulative effects can be mitigated, particularly in association with improving technology, but developing offshore wind farms in light of limited knowledge of consequent trends in use continues to carry a level of risk. The need to ensure the potential risks to commercial shipping from cumulative effects are identified and mitigated is compounded by the fact that commercial shipping is set to grow in terms of both frequency and size of vessel, the second of these factors impacting upon manoeuvrability (such as increased size of turning circle and stopping distances)

- due to the diverse number of activities taking place within the South marine plan areas, co-existence and possible displacement of activities from other areas (Round 3 wind farm zones, cabling and capital dredge and disposal sites, fishing, increased shipping, possible infrastructure and anchorage sites) onto marine aggregate resource and marine licence areas must be considered
- challenges arise in taking account of potential future sites for cables in planning. Subsea Cables UK have developed guidance in collaboration with The Crown Estate, Renewables UK and the Renewable Energy Association, which supports application of a best practice approach to managing the co-existence and acceptable proximity of offshore renewable energy installations and seabed cable installations
- guidance is currently limited to shallow waters and is under development for offshore wind farms and further guidance expected to address the different challenges of wave and tidal co-existence with subsea cables. Subsea Cables UK as the leading trade association for cables also has guidelines on best practice for cable installation to promote successful co-existence with other seabed users

Cabling interactions occur with numerous activities but particularly with the ports and shipping, aggregates and fishing sectors. Potential impacts are:

- risk of damage to a cable (which is an offence when intentional), from activities such as fishing, through snagging, aggregate extraction, shipping or recreation
- exclusion of or mitigation measures for damaging activities may need consideration to ensure achievement of an appropriate level of risk
- compatibility needs to be considered when cables are installed within the immediate vicinity of other installations or activities
- for renewable energy developments, exclusion zones are a potential solution which can be requested for the cables and the development site by developers at the application stage
- technology improvements for fibre optic cables allow capacity per cable increases which could allow the industry to keep pace with demand without an exponential increase in the number of cables

required
    - the combination of shipping, fishing, recreational activity and other coastal uses and designations could constrain appropriate areas for cable landings as well as appropriate locations for communications or grid infrastructure such as terminal stations for communications, converter stations for direct current cables from offshore wind farms or grid connections
- planning might help address the issue of displacement, by scoping the potential of a ‘core fishing grounds approach’ when developing plan policy. This project highlighted a number of issues with the approach, including the challenge of gaining consensus on the most ‘valuable’ areas for the industry, and how to overcome the issue of activity change year on year (temporal trends are shown in figure 39). The Marine Management Organisation is currently exploring how best to take this work forward
- potential displacement and loss of grounds are a key concern for fishermen, largely due to the growth in other sectors (such as offshore renewable energy) and new marine protected areas, but also within the fishing sector itself through gear conflict (eg Lyme Bay). Fishermen are particularly concerned about increased pressure on existing fishing grounds, especially around the Isle of Wight where the cumulative impact of activities such as renewable energy production, aggregate extraction, ferry routes and new management measures may be felt. A recent study was commissioned by the Marine Management Organisation to better understand how marine
- maintenance/capital dredging, port and shipping activities, oil refining, and capture fisheries also occur close to aquaculture activities. These may be a source of conflict for space, but again the more immediate concern is water contamination by bacteria, viruses, and chemical pollution, and impacts from non-native species eg from ballast water. Faecal contamination from large concentrations of breeding/overwintering birds may also be an issue, as well as storm water overflows during flood events
- there may be potential conflicts between tourism and recreation such as multiple beach users and demand for space
- recreational activities, particularly sailing and boating, are being squeezed into commercial shipping lanes which pose a safety risk for all parties involved. Navigational safety is mostly addressed through existing measures (such as codes of conduct) and co-location is already encouraged. Sailors must occasionally cross commercial shipping lanes (this is down to necessity rather than choice) and this is likely to become more challenging with the predicted growth of both shipping and marine recreation
- the predicted growth of ports, renewable energy and aquaculture will further compound this issue. The Royal Yachting Association are keen to agree operational exclusion zones with industry and they have a number of position statements on co-location with aquaculture and offshore wind farms

	• the growth of renewable energy projects specifically potential for wind farms at the Rampion and Navitus Bay sites and tidal resource at St Catherine's Point off the coast of the Isle of Wight, could create a conflict with recreation in terms of reduced space to carry out activities and the visual impact it will have on people's experience • conflict between different recreational activities occasionally occurs as evidenced by a policy in the Chichester Harbour Area of Outstanding Natural Beauty management plan to minimise any potential conflict. The likely long term growth of recreational activities may increase this risk of conflict ie between personal water craft users and sailors • the lack of space due to the growth of other sectors could impact or encroach on recreational activities. This is likely to have adverse socio-economic effects on local communities dependent on the recreation sector. These could include impacts to current and future employment opportunities, especially in deprived areas, reduced access could impact on the health and wellbeing of coastal communities and the character of areas could be fundamentally changed if tourism and recreation opportunities are reduced. • Recent research commissioned by the Marine Management Organisation highlighted the potential impacts of climate change on commercial fisheries as a result of sea temperature rise affecting the abundance and distribution of stocks (yet it remains uncertain as to the nature of these effects). Any changes on fish distribution may impact on quota management and may require the industry to diversify (however this may also create opportunities to target different species). These changes may affect income for those targeting traditional species • with a changing climate there could be an increase in competition with recreational activities either due to reduced suitable space (bathing water sites and aquaculture both require a high level of water quality) or an increase in activity levels eg recreational boating and ports and shipping activity and associated dredging. With the need to consider new sites for aquaculture due to changing sea temperatures and pH, as well as water quality concerns, marine planning and the ability to predict potential suitable sites will become increasingly important • climate change could be positive and negative for tourism, for example warmer weather may encourage more people to holiday in the area but may impact on water quality making areas less desirable for tourism, additionally, extreme weather events may cause tourists to holiday elsewhere • there are a number of different predictions for the impact of climate change on marine recreation. Warmer weather and rising sea temperatures could support the growth of the sector, attracting more people to participate in marine recreation. Increased storminess and unpredictable weather could conversely lead to

	lead to a decrease in participation levels. Furthermore warmer sea temperatures could lead to increased cases of vibrio disease. • sea level rise, associated with climatic changes, will need to be considered in the location and nature of outfalls in the South Inshore plan area. This coupled with more frequent storm events could cause damage and increased pollution risks through flooding and blockages so this along with the physical impact of major sea outfalls should be considered in the development of marine plans • the requirements of national and international legislation to address air pollution could lead to increased sea transport costs and thus a possible reduction in the competitiveness of short-sea shipping versus other transport modes (rail, road, air). This would benefit air quality but have a knock on effect on the national economy as well as coastal communities reliant on the port industry for local income and employment.
	Core Issue 10: Many sectors are dependent on the high quality environment that exists in the South marine plan areas. Their future growth relies upon access to and use (in terms of amenity value and use values) of the marine environment. Many industries rely upon the environment for their goods or services. These same **industries have impacts on the environment**, and growth in those sectors could therefore increase those impacts. Sectors such as tourism and recreation rely upon the ability of those involved to be able to enjoy the environment and to use it in a number of ways, be this passive use through enjoyment of views and the wider setting, to the need for clarity in the water column for diving, or for high quality water for all water sports. Fishing and aquaculture both rely upon the ability of the environment to support fish stocks, which relates to both the habitats that support fish stocks and the quality of the water and levels of nutrients and pollutants in it. Aggregate extraction also impacts on the environment but can also support it through the use of dredged material in habitat creation and natural flood defences. Some activities, such as fishing and aggregate extraction, may impair the ability of certain areas to support viable fisheries through impacts to stocks and important nursery and spawning grounds. If growth in all activities is to be achieved or supported in order to maximise economic benefits, then the impact upon the environment needs to be understood, avoided or minimised and mitigated where appropriate. **Climate change has potential to impact on the marine environment**, thus affecting the goods and services it supports. Some impacts may be seen as opportunities, ie increased sea and air temperatures may attract more tourism and encourage people to participate in marine recreational activities, with others posing further risks to the marine environment and activities reliant on it. For example, increases in sea temperature may encourage

	invasive species, increase levels of water-borne diseases, change the growth rate of aquaculture species and affect migratory fish routes impacting on fishing opportunities. This emphasises the fragile nature of the marine environment in relation to climate change and its ability to have significant knock-on effects on marine activities which provide a wealth of socio-economic benefits to visitors and coastal communities alike. **Sector-level issues** • growth in visitor numbers may impact positively on the economy, but negatively on the environment and could benefit from the promotion of responsible/ecotourism • consideration of the impact of multiple marine recreational activities on both marine designations and the wider marine environment should be considered, especially with the predicted overall, long-term growth of the sector. As previously mentioned, there are a number of studies that have looked at the impact of recreation on the natural environment • marine recreation relies heavily on a healthy marine environment, especially so for water quality, as healthy beaches and clean waters attract people to the coast and enable participation in water-based recreation in a safe manner. In turn, long term growth of recreational activities may cause a negative impact on the marine environment, therefore a balance between them must be considered • tourism, recreation, fisheries and shellfisheries all rely on, and are influenced by, a healthy marine environment, which includes good water quality. Without this, these activities and industries could be impacted economically and socially, so maintaining good water quality is important to not only the environment but the goods and services it provides to these sectors • as noted in section 2.13, water quality is of high importance to the aquaculture industry. Poor water quality can lead to reduced species growth and an increased risk of disease for both shellfish and humans via consumption. • tourism, recreation, fisheries and shellfisheries all rely on, and are influenced by, a healthy marine environment, which includes one with low, or ideally, no levels of marine litter. Without this, these activities and industries could be impacted economically and socially so reducing litter is important to not only the environment but the goods and services it provides to these sectors • increasing activity in other marine sectors is putting additional pressure on the marine environment and the services it provides. Interactions with renewables offshore wind farms, shipping and fisheries activities can cause displacement from feeding grounds and the most efficient flight paths, increasing the energy requirements for birds

	• healthy bird and mammal populations bring value for tourism and recreation through wildlife watching and employment at reserves. However, interactions with coastal tourism and recreation can cause disturbance to birds and other organisms. This may restrict or alter their natural behaviours particularly foraging and eating. In more localised areas there are also issues of collision with recreational users • continued operation of ports depends upon the ability to respond to the needs of markets and, an ability to accommodate trends in international cargo movement, such as the need for deeper or new channels for vessels with deeper draughts. Many ports and harbours are located in designated areas in estuaries where there is a drive to maintain, and where possible improve, conditions for biodiversity. There may be an ongoing balance to be struck between maintaining the flexibility that enables thriving ports and the long term management of natural resources. Ports play an active role in the management of resources in adjacent estuaries, through implementation of their own plans and acting upon their responsibilities, as well as being actively involved with other initiatives such as Estuary Management Plans, Port and harbour developments tend to involve conservation interests from an early stage, help to overcome issues before they arise • water quality is of high importance to the aquaculture industry. Poor water quality can lead to reduced species growth and increased risk of disease, both to the shellfish and to humans via consumption • certain shellfish species (oyster in particular) are known to help purify water and thus maintaining healthy shellfish stocks could be beneficial. However, sustainable shellfish cultivation on the South coast depends on co-operation with others including water companies, who deliver major capital schemes to improve coastal water quality under the requirements of the Water Framework Directive • as water quality is poor in many estuaries, shellfish companies are struggling to maintain a water quality status that allows for reduced processing of the harvested shellfish. In addition the reduced quality status means that they are unable to command as high a price as they potentially could • health of the marine environment, especially the water quality, is very important to tourism and recreation (see section on recreation and on water quality) • development of tourism opportunities, both in terms of new infrastructure and increased in footfall in rural areas, may adversely affect the environment by changing the landscape and character of an area potentially harming or disturbing species and habitats. support is given to tourism infrastructure concentrated in existing towns and urban areas, where visitors can stay and travel to and from rural areas • climate change could lead to increased flooding and coastal erosion, which in turn could lead to increased sediment loading in estuaries and coastal areas. This could impact upon port and shipping activity as further dredging of sediment may be required (which has an economic impact) to enable them to continue

their activities

- the work of Local Authorities highlight issues where the environment and sectors come into potential conflict, but where the sectors involved are dependent on the environment. For example at Dawlish Warren Spit; a Special Area of Conservation, Special Protection Area, National Nature Reserve and a popular tourist destination in Teignbridge District. The Council, now and in the future, aims to balance biodiversity, conservation, tourism, coastal squeeze and impacts of climate change and coastal community flooding
- effects of climate change posed by sea level rise, the role of the aggregates industry in supplying marine sand and gravel for coast protection and amenity purposes will become increasingly important over the lifetime of the marine plans
- climate change impacts on the aquaculture sector will vary by species, but are likely to be felt particularly strongly in the South plan areas. Impacts include
    - disease and fouling increases (including via storm water overflow)
    - alterations to habitat and water quality (including sediment re-suspension)
    - changes in growth rates
    - increases in invasive species
    - potential effects of ocean acidification on calcification of shells (oysters are particularly sensitive to changes in pH and may need to move offshore to survive).

Core Issue 11: Economic growth is reliant upon existing and new infrastructure. The position, scale and magnitude of impact of new infrastructure cannot always be predicted currently.

All economic activities in the South marine plan areas depend on some form of infrastructure. As the majority of sectors expect to grow, requirements for **additional infrastructure** are likely; this will have a physical impact which will vary by sector. Some types of infrastructure require exclusive use of an area and may impair the growth of other sectors, both where they are physically located and beyond. For example, if a substation for electricity transmission is sited in an area where tourism is dependent upon the natural environment, it may impair the enjoyment of tourists and result in a decline in their numbers.

Furthermore, **new and existing infrastructure needs to be resilient and flexible to the changing climate**. Increased risk of flooding and coastal erosion and sea level rise, as a result of climate change, has the potential to impact on infrastructure and therefore the location and level of risk needs to be considered.

Sector-level issues

	• Space should be left to ensure this tidal stream can happen in the most cost effective areas to ensure the continued development of the industry
	• other sectors potentially affected by the installation of tidal or wave energy devices include:
	  o offshore wind energy installations
	  o the built environment
	  o coastal infrastructure
	• access restrictions may arise should dredging regimes not be maintained, or if future port development opportunities are restricted. This may result in the following issues:
	  o ports which cannot meet the requirements of users operating within the global market place may cease to be commercially attractive, with consequent loss of trade
	  o loss of revenue would potentially have an effect on direct and indirect employment levels in the local and regional economy and reduce the potential for future private investment, a key requisite and commercial imperative for any major port operation
	• the variations in scale and markets served by ports in the South Marine Plans Areas means that their resultant impacts and benefits will be different. Marine plans will need to understand this in order to add value to existing policy
	• traditional activities associated with ports in the South Inshore plan area include commercial shipping (management of related goods), provision for recreation and landing of aggregates. Increasingly, facilitating the installation and maintenance of offshore renewable energy projects will become a part of the port activities
	• current dredging fleet is aged the South plans could influence the marine aggregate industry's next cycle of capital investment, estimated to be £1 billion
	• requirements for large volumes of construction aggregate to support local major infrastructure projects taking place in the marine plan area (port developments, offshore wind farms) can be expected to increase over the marine plan period
	• increased demand for capital dredging and disposal sites due to a trend towards larger ships, particularly in bulk and container shipping
	• as recreational boating demands increase, and as vessel size continues to rise, port expansion will have an impact on the amount of maintenance and capital dredging that will be required overall, supporting the local economies of scale within the sector
	• it is important for marine planning to take account of appropriate locations and landfall sites for subsea cables, for both telecommunications and to support offshore developments like tidal or wind energy

	installations or further interconnectors, alongside other uses of marine space • while there is anticipated growth in the number of subsea cables in the South marine plan areas, it is difficult to quantify the amount and location of increase in cables. However where any emerging marine energy installation is proposed a cable will be required to connect it to the National Grid • proximity of the development sites and cable infrastructure with existing marine aggregate interests result in potential for direct interaction with marine aggregate interests which could have a negative impact on an existing cable installations • the combination of shipping, fishing, recreational activity and other coastal uses and designations could constrain appropriate areas for cable landings as well as appropriate locations for communications or grid infrastructure such as terminal stations for communications, converter stations for direct current cables from offshore wind farms or grid connections • The Crown Estate believes that regulatory bodies should look to co-location of aquaculture with other marine interests, most notably capture fisheries. The idea is that land based infrastructure for the two industries is similar, with many transferable skills, meaning there is scope for positive interactions between the sectors. Relationship building with capture fisheries are key; the fisheries sector needs to see aquaculture as complementary not as a direct competitor • The impact of climate change upon sea levels may also constitute a long-term issue for ports and harbours to consider in terms of access management. Larger ports and harbours, recognised as key infrastructure providers, have submitted detailed adaptation plan reports as part of directions to report under the Climate Change Act 2008. Overall it is recognised that there is a need for ports to respond to sea-level rise, storm surges, temperature change, high winds, increased rain and snow. This situation being kept under review as uncertainty in predictions makes it difficult to adopt more stringent design thresholds for port and harbour adaptation. Risks include the potential for sea level rise and flooding leading to inundation of port facilities.

Opportunities for employment, investment and regeneration	**Core Issue 12: Some seaside towns are in decline and need regeneration and investment. Growth in key marine sectors can help to drive this investment.** Parts of the south coast where traditional industries such as 'seaside' tourism and fishing dominate the local economy are experiencing decline as a result of **overdependence on one or two sectors of the economy**, especially where those industries are undergoing change. New and emerging industries such as tidal and offshore wind energy along with continued growth of ports and shipping and new forms of tourism and fishing, offer opportunities for these areas to diversify, building on their existing skills. For example Newhaven has been selected as the preferred operations and maintenance base for the Rampion offshore wind development, with expected resultant benefits for local businesses. Some opportunities will need investment, for example in dockside infrastructure, for their benefits to be maximised and through this **regeneration** of under-used space could occur. Regeneration and reuse of existing marine infrastructure and space is highlighted in several local plans and economic strategies as a key objective for economic development **Sector-level issues** • Some seaside towns are in decline and need regeneration and investment. • Two Round 3 offshore wind farms (Navitus Bay and Rampion) currently divide local opinion due to conflict between employment creation and adverse effects on visual impact and access to marine space. Local people may be more supportive of development of the powerful tidal streams around the Isle of Wight and off Portland, particularly if access to space is not unduly compromised • the core issue for economic activities primarily relate to the ability to maximise benefits for local areas (particularly those experiencing high levels of deprivation) from expansion in marine sectors • all tourism that is associated with the ocean, is heavily influenced by climate change, global economic and socio-political conditions, and their interactions. Climate change, through impacts on ecosystems, can reduce the appeal of destinations, increase operating costs, and/or increase uncertainty in a highly sensitive business environment. Increased storminess for example will have economic implications on the provision and maintenance of beaches and coastal defence infrastructure • passenger vessel routes between the UK and near continental destinations are located at several ports within the plan area (notably, Weymouth, Poole, Portsmouth and Newhaven). Transit of tourists through these ports will have economic implications (benefits include, purchases of lodgings, fuel, food, car parking

	etc. but also bring a cost to the area in the form of maintaining supporting infrastructure) • development of tourism opportunities outside of the summer visitor season by stimulating/supporting out of season activities and events to encourage economic regeneration, whilst retaining the existing identity of the natural environment • marine recreation is an important economic contributor to the South coast of England, particularly sailing and can play an important role in regeneration and investment opportunities. Maintaining this and ensuring opportunities for sustainable growth will be challenging in amongst the growth of other marine sectors and activities
	Core Issue 13: Marine developments can provide opportunities for access to employment for coastal communities, who may have a skills base that match those needed by marine sectors. These **opportunities can offer local employment as well as growth and diversification,** chances for local businesses, bringing significant economic benefits to communities. Portsmouth and Gosport are deprived areas with opportunities to use existing skill sets to contribute towards marine manufacturing, through the reuse of ports and associated infrastructure to attract businesses to the area and support new job opportunities. Expansion of the aquaculture industry is likely to lead to increased jobs in coastal communities at various skill levels, especially if combined with the capture fisheries sector. Opportunities at a variety of skill levels is important, especially in areas with a diverse labour market; 'matching' economic opportunities to areas most suited to them from a skills viewpoint, increases the chances for local economic benefit to be realised. **Sector-level issues** • In weaker economies, such as Hastings, quality of local jobs, skills deficit and poor transport and connectivity to other places are the main barriers to economic growth. These are compounded by social issues such as housing shortages and high house prices • the Solent Ocean Energy Centre, on the Isle of Wight, has submitted a Marine Licensing application that if approved and developed could provide offshore testing facilities for tidal stream devices as well as related potential employment opportunities • aquaculture is also being promoted as an activity which can contribute to the conservation of particular habitats and therefore maintain to some extent biodiversity and is seen as a "legitimate and responsible partner with other natural resource users. Increased regulation and inspection could add to the costs of operation. However, this could positively contribute to continued professional development of staff in relevant environmental management and legislative knowledge (Lantra 2006). Restrictions due to site

availability, environmental carrying capacity and availability of investment and labour (due to emigration) could hamper growth

- the National Oceanographic Centre at Southampton University and the Centre for Environment, Fisheries and Aquaculture Science laboratory at Weymouth generate economic and social benefits and provide a general focus for the wider south coast in conjunction with other providers such as Plymouth Marine Laboratory
- in addition to displacement causing direct effects on the industry, indirect effects such as possible impacts on tourism or effects on secondary industries such as restaurants in active fishing ports such as Brixham and Hastings are also a concern
- expansion of the aquaculture industry is likely to lead to increased jobs in coastal communities at various skill levels, especially if joined with capture fisheries.

Core Issue 14: Investment in maintaining or enhancing infrastructure associated with marine sectors is necessary to ensure future employment opportunities.

Infrastructure needed for marine activities in coastal areas can often be complementary (such as facilitating access to the sea), but the use of such infrastructure is often exclusive to one activity (for example marinas and ports serve very different markets, despite both facilitating access to the sea.).

It is important that associated facilities (marinas, clubs) and **infrastructure** (slipways, moorings), both on land and in the sea, **are maintained and developed to facilitate growth** within the marine recreation and tourism industries, which are important economic contributors to the South plan areas' economy. Tourism and recreation are also reliant upon landward infrastructure such as transport networks.

Other forms of **infrastructure,** such as cable landfalls or substations that are linked to other industries, **are not complementary and can impact negatively** upon opportunities for tourism and recreation, whilst themselves having the potential for generating employment opportunities in their own right. Coastal defences and protection can attract investment by providing certainty for developments, though they may limit the opportunities available through their visual impact. Development of infrastructure that is linked to existing and potential business opportunities is key to achieving economic growth.

Sector-level issues

- Maintenance of transport networks and access to the coast for tourism and recreational users

	• passenger vessel routes between the UK and near continental destinations are located at several ports within the plan area (notably, Weymouth, Poole, Portsmouth and Newhaven). (See shipping section 2.8). Transit of tourists through these ports will have economic implications (benefits include, purchases of lodgings, fuel, food, car parking etc. but also a bring a cost to the area in the form of maintaining supporting infrastructure) • transport networks are a core issue for areas supporting tourism and are a potential limiting factor for visitor numbers to certain areas having a direct impact on the social, economic and environmental sustainability of an area through infrastructure improvement and maintenance. • associated facilities (marinas, clubs) and infrastructure (slipways, moorings), both on land and in the sea need to be maintained and developed to facilitate sustainable growth within the marine recreational industry • physical access to the water is limited because of the low number of public access slipways. Many privately owned marinas on the South coast enable access to the water, but more publicly accessible slipways would enable more visitors to participate in boating as well as other recreational activities such as the use of different forms of personal watercraft • cables location, particularly in the inshore area, may conflict with recreational activities that require anchorages. Consideration will be required on the location of either any new anchorage areas or cabling. • port development could impede access to the marine area although the Department for Transport's guidance on the production of Port Master Plans clearly states, under paragraph 81, that measures should be taken to ensure that leisure activities in the vicinity of the port are protected from the impacts of proposed developments • The National Policy Statement EN6 highlights a number of impacts from nuclear power including: o socio-economic o human health and wellbeing.

Annex 2 – Points to note

During the consultation and associated workshops, we received a large amount of evidence and information for marine planning to consider. Some of this information and the associated issues were regarding more general points where that, from experience gained through the development of the East marine plans, we know the contribution of marine plans is limited. A summary of these issues is outlined below including examples, which we wanted to highlight early in the development stages of the South marine plans. This will enable a better understanding of the approach to these general or wider points and focus on the core issues, outlined in this document, to be taken forward as part of the South marine planning process.

Level of detail in marine plans

Marine plans must seek to address issues which apply across the marine plan area. Localised issues, such as management of jet skis within a harbour, are already managed through byelaws, voluntary agreements by harbours and users or existing legislative mechanisms and thus this is not something marine plans would address.

Marine planning does not replace or duplicate existing measures. Marine planning adds value through addressing or supporting specific issues through a plan-area scale response.

Focusing on core issues

A focus of both the South Plan Areas Analytical Report consultation and associated workshops were the core issues. Building on how we identified issues for the East planning process, we have tried to focus on the core issues at an earlier stage in the process, using sector or topic level examples to ensure the detail is not lost. We recognise that issues identification is an iterative and ongoing process and this is not an exhaustive list. Ongoing engagement and analysis of evidence may lead to more issues being identified and, if appropriate, we will include these in the process. As we move through the planning process, we may refine and narrow the number of core issues that could be addressed by the South marine plans. We will also look to add further detail , where needed and we will work closely with stakeholders to do this.

For marine plans to add value it is important to draw out the most important issues that are relevant to, amenable to can be being influenced by, and needing to be addressed by marine planning, as opposed to existing measures.

Remit of marine planning

For many issues marine plans can complement existing measures and there are some specific areas below where this has been identified through the development of and consultation on this document.

Marine focus

Land-based issues are primarily the responsibility of terrestrial planning authorities. Marine plans cover from mean high water spring tides out to 200 nautical miles or where we meet bordering nations. Within these areas, decisions must be made in accordance with the respective marine plans (or where a marine plan does not exist,

the Marine Policy Statement).[490] Marine plans do not have a remit, nor do they or apply, on land (beyond mean high water springs) therefore so the influence marine plans can have over issues such as population growth, residential development or agricultural run-off from freshwater water bodies is limited, except through integration with existing plans in the development process as there is a need to consider them alongside any activities that may affect the marine area.

It is important that marine plans integrate with terrestrial plans (and vice-versa) and we have worked with local planning authorities (and others) analysing all local plans or equivalent documents assessing the marine relevance of these local plans to ensure they are not contradicted. Terrestrially-focused issues highlighted through the consultation and/or workshops may be noted in this report but are unlikely to be taken forward in the marine planning process as they are outside the remit of marine planning. Marine plans have a limited response to such issues. Additionally this analysis of local plans helps to avoid duplication between statutory plans.

European and UK legislation and existing measures

There are many existing European and UK drivers which apply to England's marine area. Many of these are signposted in this report such as the Water Framework Directive and the Ambient Air Quality Directive. These directives have plans in place to support their delivery and are managed by other organisations such as local authorities or the Environment Agency. Marine plans can support the delivery of these directives and their associated plans through signposting. Signposting within marine plans allows us to highlights to developers, users and decision-makers any other considerations that should be taken into account. If there are specific issues relating to these plans which interact with marine sectors or related topics then this is where marine plans could add value through a possible marine plan objective and/or marine plan policy. We will work with the relevant organisations to identify these specific issues and pursue them as part of the marine planning process.

Project level assessment

Marine plans do not replace the requirement for project level assessments. Activities that currently require a marine licence will continue to do so. Examples raised as issues through the consultation and workshops include:

- disposal of dredged materials in a sensitive area
- consideration of retrofitting tidal devices to offshore wind turbines
- the impact of marine industries on the environment (assessed through Environmental Impact assessments).

[490] The Marine and Coastal Access Act requires that all public authorities taking authorisation or enforcement decisions, must to do so in accordance with marine policy documents (marine plans and the Marine Policy Statement) unless relevant considerations indicate otherwise. Where a relevant decision is not taken in accordance with the appropriate marine policy documents, the public authority must state its reasons. Applications for development consent for nationally significant infrastructure projects under the Planning Act 2008 must be determined, by the relevant Secretary of State, in accordance with the relevant National Policy Statement, subject to certain exceptions, and having regard to the Marine Policy Statement and marine plans

Marine plans can give a steer as to the best locations for different activities or areas to avoid due to specific reasons (sensitive habitat). The specific details of an activity or development still require project level assessment to meet the requirements of other legislation such as the Habitats Directive and Birds Directive.