



## Aim

The aim of this project is to combine future climate data from the UK climate projections 2009 (UKCP09) with information on current and predicted marine activities in the South and East marine plan areas to identify potential climate change impacts and benefits.

The evidence will inform marine plan policy development by reviewing, and building upon, existing climate adaptation and mitigation documents to enhance marine planning and management of climate change impacts.

## Introduction and methodology

As outlined in the UK Marine Policy Statement, the MMO is required to ensure that the use of the marine area is adequately planned and that such plans take account of potential climate change impacts. Therefore, marine plans must contain information about overarching climate change policies and will need to consider appropriate climate change mitigation and adaptation measures.

The UKCP09 projections are the leading source of climate information for the UK and its regions. Using data from the UKCP09 projections and information on the current and predicted use of the East Inshore and East Offshore, and South Inshore and South Offshore Marine Plan Areas, this report identifies which sectors within the South and East marine plan areas are more likely to be at risk from the effects of further climate change.

This report reviews existing advice on climate adaptation and mitigation strategies and includes consideration of potential impacts, both positive and negative, on usage of the marine area, highlighting areas where conflicts and potential opportunities may arise.

The following climate change drivers have been taken into account in this report: sea level rise/coastal flooding, extreme storms and waves, air and sea temperature rise, ocean

acidification, changes to terrestrial inputs (riverine flow and flooding), and changes to ocean currents. A standard risk assessment methodology has been used to compare probability against impact for these climate change variables and their impact on current and future activities has been assessed.

The information presented in the report is based on the UKCP09 projections and the interpretation of this information by the report authors.

## Results

A list of activities has been produced for the South and East marine plan areas based on existing MMO literature and the following industries or sectors have been identified as being at particularly high risk from the effects of climate change: ports and shipping, aggregate extraction, fisheries, aquaculture, tourism and recreation, protected areas, power stations, waste water management, and defence. A number of negative and positive impacts of climate change on marine sectors have been highlighted and the key risks prioritised in terms of urgency and severity.

The analysis produced ten highest scoring risks and five highest scoring benefits, in summary they are:

- Ports and shipping: structures and infrastructure are likely to be negatively affected by changes in storminess but potentially benefit through opening of northern routes through the Arctic.
- Aggregates: operations at sea may be disrupted but there will be increased need for aggregates for use in coastal defence.
- Fisheries: a decline of some traditional stocks may occur but new opportunities may arise based on incoming species.
- Aquaculture: increased risk of some diseases and nuisance species but potentially new opportunities to grow and culture novel species.



- Tourism and recreation: storm damage may occur to structures and there may be increased beach erosion but in warmer periods there could be increased visitor numbers and participation in leisure activities.
- Protected areas: potential for storm and sea level damage to certain protected habitats and shifts in species distributions beyond marine protected area boundaries.
- Power stations: site integrity and safety could be at risk from inundation and flooding.
- Waste water management: potential for increased pollution events.
- Defence: inundation and flooding of Royal Navy facilities could result in damage to equipment and structures.

The activities identified as being most at risk have been mapped spatially and these maps reveal sites of potential conflict and concern.

### Conclusions and recommendations

Marine planning has a role to play in planned adaptation by providing policies which reduce the negative impacts of climate change on marine industries and which maximise the opportunities which climate change can bring. A number of climate change adaptation recommendations are made. These may be for the MMO to consider either with regard to the South and East marine plan areas or in consultation with partners. These include (but are not limited to):

- Marine plans should take account of the information already available “off the shelf” from UKCP09 and other sources.
- The next tranche of marine plans should draw upon new probabilistic scenario outputs that will become available as a result of work underway during the preparation of this report, including the [Defra MINERVA project](#).

- The MMO should engage in “horizon scanning” to determine what, and where, activities might occur in the future.
- Marine planning policies should consider emerging marine industries (e.g. growing marine biofuels)
- The MMO should re-visit marine plan policies once new information is published, such as the reviews produced by the [Marine Climate Change Impacts Partnership \(MCCIP\)](#).
- The MMO should review how the “adaptive pathways” approach might be used within the context of marine spatial planning.

### MMO comments

This project has provided an improved understanding of relevant climate change variables and their influence on human activities at a scale relevant to marine planning. The report also identifies areas where further effort is required in order to better understand the risks and benefits of climate change.

This evidence will be useful for MMO in developing marine plans and managing the marine environment. The information is also relevant to others with an interest in the sustainable use of marine resources as many of the recommendations require input from multiple stakeholders and cannot be achieved by the MMO in isolation.

The MMO intends to continue to work collaboratively across its functions, with other agencies and with its stakeholders to improve the evidence base related to climate change and its implications for marine management.

### Further information

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