



Department
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Marine Science Yearbook 2011/12

March 2013

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Contents

Economic and social research in the marine environment.....	1
Projects completed between April 2011 and March 2012	1
Projects continuing in 2012/13	2
Projects starting in 2012/13.....	3
Human pressures and impacts on the marine environment.....	4
Projects completed between April 2011 and March 2012	4
Projects continuing in 2012/13	5
Projects starting in 2012/2013.....	10
State of the marine environment.....	11
Projects completed between April 2011 and March 2012	11
Projects continuing in 2012/2013	13
Projects starting in 2012/2013.....	16
Science for integrated marine management	17
Projects completed between April 2011 and March 2012	17
Projects continuing in 2011/2012	21
Projects starting in 2012/2013.....	28

Economic and social research in the marine environment

Projects completed between April 2011 and March 2012

External peer review for review of Impact Assessment and supporting draft materials for potential Marine Conservation Zones in England

([MB5101](#)) Start date: August 2011 Completion date: December 2011

To ensure that the methodology for examining the impacts of Marine Conservation Zones on human activities is robust and, for a sample of sites, correctly applied to calculate costs and benefits. To review other aspects of the Impact Assessment including the costs and benefits of the cumulative impacts of the network of potential Marine Conservation Zones (pMCZs) and the evidence on socio-economic impacts.

This project provided an external peer review of the Impact Assessment for Marine Conservation Zones, which is being used in decision-making on proposed sites. The designation of Marine Conservation Zones can take into account economic or social factors so it is important to ensure that evidence is robust.

Development and piloting of low cost vessel monitoring technology on English inshore vessels

([MF1214](#)) Start Date: March 2010 Completion date: March 2012

To address a number of the limitations of a Vessel Monitoring System (VMS) and investigate additional opportunities, including developing a sensor system to detect and record when a vessel is fishing, and piloting VMS on a voluntary basis on 30 inshore (under 15 metre) vessels in the South West.

This project is informing a range of policy making including Common Fisheries Policy (CFP) reform; reform of the management of domestic fisheries; enforcement of marine protected areas nationally; and development of the Marine Management Organisation's inshore fisheries enforcement procedures.

Assessing the economic impact of changes to fishing opportunities in 2011

([MF1218](#)) Start date: September 2010 Completion date: November 2011

To assess the impact of changes in fishing quota and days at sea on the economic viability of the UK fishing industry as part of a Defra impact assessment on European legislation.

This project helped to identify changes needed to achieve sustainable fisheries and informed the UK position for fisheries negotiations.

Market-led sustainability programme

([MF1219](#)) Start date: November 2010 Completion date: December 2011

To provide detailed insight for developing effective ways of intervening in the market for fish and to identify the barriers and the incentives needed to produce effective market-driven behaviour changes to maximise the value from the existing catches (using a broader range of species). To reduce reliance on the pressure stocks and wastage of natural resources; support fishing communities; increase revenue for fishermen and promote efficiency in the supply chain.

This project is helping to deliver Defra's objectives to 'promote increased domestic food production' and 'pursue a zero waste agenda'. It is also contributing to reducing discards under the Common Fisheries Policy.

Projects continuing in 2012/13

Adapting to future climate change in the marine environment

([ME5102](#)) Start date: September 2009 Completion date: August 2012

To investigate the extent to which existing and future management measures and legislation (e.g. Marine and Coastal Access Act, EU Habitats Directive, EU Marine Strategy Framework Directive) are robust to future climate change, by exploring 10 year variations in climate change (associated with ocean-atmosphere processes) that might mask the overall warming trend of coastal waters over the next 20 to 30 years.

This project will provide insight into the socio-economic consequences of climate change in the marine environment and will help the 'future-proofing' of marine policies. It will indicate whether statutory instruments, targets and reference points might need future revision.

Designing 'business as usual' projections of the marine environment to Inform the UK implementation of the Marine Strategy Framework Directive

([ME5104](#)) Start date: January 2011 Completion date: March 2013

To develop 'business as usual' projections for the likely changes in the Marine Strategy Framework Directive descriptors of Good Environmental Status and key ecosystem services for 2007/08 to 2030. The projections will be developed within a conceptual framework linking the Driving force -Pressure-State-Impacts-Response (DPSIR) framework to the concepts of Good Environmental Status and ecosystem services.

This project will contribute to implementation of the Marine Strategy Framework Directive.

Strategic support for the OSPAR regional economic and social analysis

([ME5105](#)) Start date: June 2011 Completion date: March 2013

To provide an overview of types of marine sectors and/or uses and definitions in national data sets and carry out a detailed analysis of one sector to learn lessons for future data co-ordination and joint analysis. To assess the availability and comparability of national data and recommend improvements. To produce a regional overview of the analyses of use of marine waters and costs of degradation for the OSPAR North East Atlantic Environment Strategy.

This project will help to ensure that the economic and social analysis required by the EU's Marine Strategy Framework Directive is consistent and co-ordinated across the OSPAR region and/or sub-regions.

Projects starting in 2012/13

Marine Strategy Framework Directive valuation of benefits/marginal changes

([ME5106](#)) Start date: December 2012 Completion date: January 2015

To provide a model or framework that helps to understand the changes in regulating and provisioning services from marginal changes in the state of benthic habitats.

To provide valuation of regulating, provisioning and cultural benefits that would arise from targets set under Marine Strategy Framework Directive.

This project will help in the implementation of the EU Marine Strategy Framework Directive.

Marine protected areas recreational services and valuation

([ME5107](#)) Start date: December 2012 Completion date: March 2013

To review existing evidence on the impacts of marine protected areas on recreation and tourism and apply this evidence to assess the impact of UK Marine Conservation Zones on the recreation and tourism value of offshore and onshore sites. To recommend a method for a more detailed valuation of recreation and tourism benefits for a marine protected area.

This project will increase understanding of the benefits of marine protected areas.

Human pressures and impacts on the marine environment

Projects completed between April 2011 and March 2012

Lyme Bay: A case study – assessing recovery of benthic species, spill over effects and socio-economic impacts

([MB0101](#)) Start date: August 2008 Completion date: March 2012

To measure the recovery of benthic communities using indicator species and record changes to the scallop population in the area of Lyme Bay which, in July 2008, was permanently closed to scallop dredging and bottom trawling. To assess any socio-economic effects of the restrictions on fishing.

This project is being used to assess the effectiveness of marine protected areas in achieving conservation objectives; improve understanding of the socio-economic effects of restricting fishing; indicate where fisheries management and conservation objectives could be integrated; and establish an approach for cost-effective monitoring.

Assessing discard mortality of commercially caught skates (Rajidae) – testing results concluded from laboratory experiments

([MB5202](#)) Start date: September 2009 Completion date: March 2012

To identify the skate species discarded in representative UK fisheries, their condition and discard survival rates, focusing on the fisheries with a high proportion of UK skate landings and on species/stocks of greatest management concern. To improve current estimates on discard mortality to allow better stock assessments.

This project has identified the risks to stock sustainability of continuing with current fishing practices and highlighted where fishing practices can be improved to reduce discard mortality.

Monitoring and assessment of contaminant-related effects in the marine environment

([ME5203](#)) Start date: April 2009 Completion date: March 2012

To develop a road map for changes to the offshore biological effect monitoring programme. To apply OSPAR's integrated approach to monitoring biological effects of contaminants on fish and invertebrates in coastal and estuarine ecosystems. To develop genomic technologies (e.g. genemicroarrays) to improve monitoring and analytical quality control procedures in line with OSPAR requirements.

This project is contributing to the development of a more integrated approach for monitoring biological effects of contaminants and a more fit-for-purpose biological effect UK monitoring strategy under the Clean and Safe Seas Environmental Monitoring Programme. It is also helping to develop and validate biological effects techniques, fulfilling our commitments under the OSPAR Joint Assessment and Monitoring Programme and the Co-ordinated Environment Monitoring Programme. With continued development, biological effects tools will help to determine Good Environmental Status, required under the EU Marine Strategy Framework Directive, and to define environmental quality standards under the EU Water Framework Directive.

Projects continuing in 2012/13

CSIP Cetacean Strandings around the UK coast

([MB0111](#)) Start date: April 2011 Completion date: June 2014

To collate, analyse and report data for all cetacean strandings around the coast of the UK. To determine the major causes of death in stranded cetaceans, including bycatch and physical trauma; and undertake surveillance on the incidence of disease in stranded cetaceans to identify any substantial new threats to their conservation status. To investigate the potential interaction between feeding behaviour, fisheries and stranded cetaceans by examining stomach contents; and recording any evidence of litter.

This project will maintain the Cetacean Strandings investigation Programme (CSIP) database, which brings together accurate locational data on strandings and also post mortem data, and can be interrogated online. It will provide data for Government Departments, Devolved Administrations and the Government's statutory nature conservation agencies to inform policies for the marine environment. This project follows on from the work done under project [WC0601](#)

National inshore fisheries data layer

([MB0117](#)) Start date: November 2011 Completion date: March 2014

To add extra data to the data layer annually for three years to allow analysis of changes over time in the distribution and intensity of inshore fishing activities. To assess how static or nomadic the activities of the inshore fishing fleet are to understand the likely displacement of activities by developments or management measures, including seeing if the data identifies changes around recently closed areas such as offshore windfarms or Lyme Bay candidate Special Area of Conservation. To further develop the zone of influence methodology for each fishing port in England which builds on work funded by the Aggregate Levy Sustainability Fund.

This project (using data held by Inshore Fisheries and Conservation Authorities and the Marine Management Organisation, with outputs validated by them) by identifying zones of influence will contribute to the way impact assessments of new offshore developments can consider the effect on coastal communities. It will also improve our understanding of the impacts of inshore fishing on the state of the marine environment; of interactions with marine protected areas; and displacement caused by any management measures for Marine Conservation Zones.

National evaluation of populations of threatened and uncertain elasmobranch stocks (NEPTUNE)

([MB5201](#)) Start date: September 2009 Completion date: March 2015

This project is a continuation of ([MB5202](#)) from March 2012 and was formally known as Assessing the survivability of bycaught porbeagle and spurdog and furthering our understanding of their movement patterns in UK marine waters.

To assess the survivability of porbeagle (*Lamna nasus*) and spurdog (*Squalus acanthias*) which are caught as by-catch but returned. To identify the times of year or particular localities where porbeagle and spurdog may be most vulnerable to capture as by-catch in commercial fisheries. To gather data on movement patterns of these two species to help build up data on the identification of important areas of aggregation for key life stages.

This project will combine these findings with assessments of the survival rates of porbeagle and spurdog after being discarded to develop a qualitative assessment of the vulnerability of stocks to fisheries. Information will also be used to inform conservation measures that may be needed.

Cetacean bycatch observer monitoring system

([MB5203](#)) Start date: May 2011 Completion date: June 2014

To continue monitoring the levels of bycatch in certain fisheries, gear types and areas and use the data to indicate the scale of overall bycatch levels within fisheries.

This project will help to assess the effectiveness of acoustic deterrent devices in reducing bycatch.

Ocean acidification research programme

([ME5201](#)) Start date: February 2009 Completion date: March 2014

To reduce uncertainties in predictions of carbonate chemistry changes and their effects on marine biogeochemistry, ecosystems and other parts of the Earth System. To understand responses to ocean acidification and other stresses related to climate change affecting marine organisms, biodiversity and ecosystems, including improving understanding of their resistance or susceptibility to acidification. The programme is jointly funded by Defra, the Natural Environment Research Council, and the Department of Energy and Climate Change.

This programme aims to provide data and effective advice to policy makers and managers of marine bioresources on the possible size and timescale of the risks of ocean acidification to allow for development of appropriate mitigation and adaptation strategies.

Chemical hazards and impacts in the marine environment

([ME5204](#)) Start date: September 2009 Completion date: March 2014

To review existing research and techniques, fill knowledge gaps and plan for the future in relation to chemical hazards and impacts in the marine environment. The project covers passive sampling; emerging contaminants; flood risk sediments; modifiers to chemical risk; and human exposure to chemical contaminants.

This project will contribute to the current understanding of the impacts of chemicals on the marine environment, which is a priority for Defra under its national and international commitments (EU Marine Strategy Framework Directive, EU Water Framework Directive, EU Climate Change Directive, and UK Marine and Coastal Access Act).

Effects of underwater noise on coastal fish and crustaceans: behavioural responses in the field

([ME5205](#)) Start date: September 2010 Completion date: August 2013

To carry out experiments to obtain data on the direct effects of human-generated noise on a number of commercially important fish and crustacean stocks, including trying to define harm/disturbance and the sources and sound levels. To provide an evidence-based tool to forecast the effects of human-generated noise on marine species.

This project will increase understanding of the effects of sound on fish and shellfish behaviour. It will inform Defra policy making and provide evidence for the assessing and setting targets for Good Environmental Status under the EU Marine Strategy Framework Directive. It will also inform industry and guide regulatory and consenting agencies, such as the Marine Management Organisation, in assessing applications for activities. It may lead to more precise valuations for cost benefit exercises when conflicting interests arise from the multiple uses and users of the UK's coastal areas.

The impact of anthropogenic noise on fish and invertebrates at the individual, population and community level

([ME5207](#)) Start date: September 2010 Completion date: August 2013

To conduct experiments on how different human-generated (anthropogenic) sound sources and noise types (e.g. continuous) affect the tolerance, welfare, behaviour and development of individual organisms of a variety of species of fish or invertebrates at different life stages.

This project will feed into the model being created by project [ME5205](#) and add to the information [ME5205](#) provides. By considering the impact of noise at both individual and ecosystem levels, we should be able to predict future population sizes and community structures, which affect economic and policy decisions. It may also help to provide evidence to underpin conditions on licensing decisions, such as stopping piling work at spawning or migration times for certain marine species.

Marine renewables

([ME5208](#)) Start date: December 2009 Completion date: December 2014

To determine impacts and benefits of large scale marine renewable energy projects to enable Defra to demonstrate the benefits of including environmentally-focused, as opposed to technologically-driven science, in thinking about energy needs.

This project will help to answer questions on the extent to which ecosystems can continue to deliver essential life supporting services when wave energy is extracted from the marine system; on the magnitude and extent of the consequences/impacts of wave energy extraction on ecosystem services; and on whether there is a balance to be struck. It will also assist in delivering the environmental science needed to inform marine renewable energy development, while meeting EU Marine Strategy Framework Directive requirements and designating marine protected areas.

Using northern fulmars as an ecological monitor of marine litter in line with indicators set for the MSFD descriptor 10

([ME5209](#)) Start date: July 2010 Completion date: March 2013

To investigate the amount of plastic in the stomachs of northern fulmars, which are oceanic foragers, as a way of monitoring the amount of litter on the surface of the sea. To add 2006-2011 data to the 2002-2006 data which the Netherlands supplied to the UK.

This project will inform the EU Marine Strategy Framework Directive (MSFD) descriptor 10 on marine litter. It will give the UK a data set to use to indicate the presence of marine litter in the environment, and any trends over time. It will contribute to OSPAR EcoQO monitoring in the North Sea, providing a comparison between OSPAR regions.

Monitoring ambient noise for the Marine Strategy Framework Directive

([ME5210](#)) Start date: October 2010 Completion date: March 2013

To provide information on the current state of ambient (continuous low frequency) noise in UK marine waters and to identify baseline values for different environmental conditions. To collect data on ambient noise at strategic sites to assess site specific sound levels and to investigate seasonal variations in noise.

This project will provide the data needed for the ambient noise indicator for measuring Good Environmental Status under descriptor 11 in the EU Marine Strategy Framework Directive. It will be used to assess the monitoring effort needed by the Directive for underwater noise, including the location of monitoring stations, the equipment necessary and the most cost effective way of monitoring.

NERC Biogeochemistry Research Programme

([ME5211](#)) Start date: September 2011 Completion date: April 2016

To improve information on nutrient and carbon dynamics in UK/European shelf seas; their wider role in global biogeochemical cycles; and their response to climate change and other drivers caused by human activities.

This programme will significantly improve predictive marine biogeochemical and ecosystem models over a range of scales, providing evidence for marine policies and implementation of the EU Marine Strategy Framework Directive.

Marine Bioresources Joint Programme

([MF0812](#)) Start date: April 2007 Completion date: March 2013

To address issues relating to long term variability and change; regional ecosystems functioning; spatial and temporal dynamics; and governance and ecosystem management.

This project will increase our understanding of widespread marine ecosystem change as a result of human activity, especially the impact that fishing has on marine biodiversity loss. It will also see whether we are impairing the ocean's capacity to provide food, maintain water quality, and recover from perturbations, and whether if current trends continue many commercial fish stocks may not recover.

Practical steps towards reducing discards and developing more environmentally responsible fisheries

([MF1002](#)) Start date: April 2008 Completion date: March 2013

To develop technologies which minimise discarding (and therefore environmental impact) to the practicable minimum across all English and Welsh fishing fleets. To work with the fishing industry and other agencies using techniques and tools developed under project [MF0738](#) to reduce discards, for example gear modifications, improved onboard catch handling, and fishing pattern alterations.

This project will provide advice and tools for the industry and allow Defra to quantify the patterns and causes of discards, including assessing the effectiveness of new ways of reducing discards. It is hoped that the work will help the industry to shift towards reduced discarding and more environmentally-responsible fishing. The project is also using social research to understand fishers' discarding behaviours and help facilitate local solutions to the problem. Project 50% was a pilot under this project to combine social research with gear selectivity trials to help improve the long-term uptake of more selective gear designs to reduce discards. (see: www.cefas.co.uk/our-science/fisheries-information/marine-fisheries/fishing-gear-technology/project-50.aspx)

Projects starting in 2012/2013

Cetacean bycatch mitigation/enforcement

([MB0121](#)) Start date: October 2012 Completion date: March 2013

To support the setting up of the Marine Management Organisation's (MMO) programme of enforcement of the EU regulation requiring over 12 metre vessels in certain bottom set gill

net or entangling net fisheries to carry acoustic deterrent devices to reduce the bycatch of dolphins and porpoises.

This project will help the MMO to check that acoustic deterrent devices are fitted and operational to reduce cetacean deaths.

State of the marine environment

Projects completed between April 2011 and March 2012

Marine protected areas – gathering/developing and accessing the data for the planning of a network of Marine Conservation Zones

([MB0102](#)) Start date: October 2008 Completion date: December 2011

To develop data-layers for identifying and designating a network of Marine Conservation Zones. To review webGIS access systems available for marine data display; assess end-user needs for webGIS; and advise on the suitability of existing systems and development of a system for planning marine protected areas.

This project is providing data for selecting Marine Conservation Zones to ensure that they are based on the best available science; and also data for marine planning by the Marine Management Organisation.

Continuous plankton recorder

([ME3108](#)) Start date: August 2006 Completion date: March 2012

To maintain and increase data collected for many decades by the continuous plankton recorder over the north-west European Shelf and in the eastern and western north Atlantic. To retain and improve our survey skills in logistics, maintenance of equipment, taxonomy, identification, analysis and data processing. The data will be analysed for climatically-forced, human impact and natural plankton variability.

This project provided data for investigating the effects of pollution and increased inorganic nutrient loads on pelagic ecosystems; monitoring changes in marine biodiversity to help develop indices of ecological health of UK regional seas; and informing Defra agencies and initiatives (e.g. climate and ecosystem modellers). It has contributed to Defra's understanding of the health of marine ecosystems and provided key data for policy commitments (e.g. OSPAR Quality Status Reports and ICES, climate change, and the ecosystem approach). It has also annually updated the plankton database (WinCPR).

Research supporting the extended SmartBuoy network

([ME5304](#)) Start date: August 2009 Completion date: March 2012

To extend the network of SmartBuoys to a further two sites in UK coastal waters, by adding biogeochemical sensors to an Irish Meteorological Buoy in the Celtic Sea. To carry out research to improve our understanding of the current environmental status of our coastal waters and of methods for improving detection of its status.

This project supported Defra's need for an improved evidence base for assessing eutrophication to meet a range of policy drivers including OSPAR, the Urban Waste Water Treatment Directive and the Nitrates Directive.

Evaluating shelf-wide spatial and temporal changes in fish larval distribution over the last half century in relation to environmental factors and adult distributions

([MF1101](#)) Start date: July 2007 Completion date: March 2012

To analyse Sir Alister Hardy Foundation for Ocean Science (SAHFOS) Continuous Plankton Recorder (CPR) fish larval samples from UK Shelf seas from 1948 to the present day and explore changes in larval abundance, distribution, timing and size in relation to the environment, plankton and adult fish. To assess how different species of fish have responded to past environmental changes at the critically-important larval stage.

This project is helping managers to understand better and take account of the impacts of environmental change on commercial stocks and therefore manage fish stocks more effectively. It will also maximise the use of the long time-series of CPR data.

Macro-ecology of marine fish in UK waters

([MF1102](#)) Start date: April 2007 Completion date: March 2012

To improve our understanding of population biology and ecology for key species of commercial fish (e.g. cod, plaice, sole) and fish of conservation interest (e.g. skates and rays). To study relationships between fish population sub-units in spawning areas, on nursery grounds and on feeding grounds, how these vary year-on-year, and the contribution of the environment to such variation.

This project is providing the biological knowledge necessary to improve the management of fish populations into the future against a broad range of policy objectives and to reduce uncertainty in management advice.

Spatial and temporal patterns in scallop recruitment and their implications for management

([MF1104](#)) Start date: April 2007 Completion date: March 2012

To investigate the key biological and hydrographical processes governing the recruitment of scallops in the English Channel, and the possible effects of climate change on these processes. To develop a computer-based forecasting model for scallop populations, which includes information on where scallops are at different stages in their lifecycle based on new insights into scallop recruitment gained during the research.

This project has improved the quality of Cefas' advice to Defra on the management of scallop stocks, especially through management plans.

The Continuous Plankton Recorder survey: fisheries investigations (CPR VI)

([MF1105](#)) Start date: May 2007 Completion date: March 2012

To monitor and analyse the changes in plankton production and biodiversity associated with hydroclimatic changes in the north Atlantic over about 70 years. To further investigate links between plankton data and long-term changes in fish stocks over the north-west European shelf and in the north-east Atlantic.

This project is helping to develop new approaches to fisheries management and conservation strategies. This is a continuation of Project [MF0430](#).

Projects continuing in 2012/2013

R&D data collection programme for recommended Marine Conservation Zones

([MB0120](#)) Start date: December 2011 Completion date: March 2013

To co-ordinate the collection of scientifically robust and cost-effective marine survey data for a selection of recommended Marine Conservation Zones (MCZs). The acoustic and biological validation surveys will be carried out by public and private sectors research vessels.

This project will provide data to fill some of the evidence gaps and limitations in the supporting evidence base for recommended MCZs identified by the independent Marine Protected Areas Science Advisory Panel.

Mapping the structure, function and sensitivity of seabed sediment habitats to support assessment of the sea-floor status and the broad scale monitoring and management of the benthic environment

([ME5301](#)) Start date: April 2009 Completion date: March 2013

To develop quantitative measures of the ecological function of seabed sediments and apply these to map the sensitivity of sediment habitats which, when combined with maps of human pressures, will enable evidence-based assessments of the health of the seabed.

The project will inform the assessment of 'sea-floor integrity' under the EU Marine Strategy Framework Directive and provide measurements for setting environmental targets. It will also contribute to the development of the Directive's monitoring programme and the indicators for achieving Good Environmental Status.

Research supporting improved understanding and assessment of ecosystem health

([ME5302](#)) Start date: April 2009 Completion date: March 2013

To build on project [ME2202](#) to improve our understanding and assessment of eutrophication through work on three themes: 1) Assessing eutrophication and ecosystem health, which is a descriptor for the EU Marine Strategy Framework Directive and addresses the requirement to reduce human-induced eutrophication; 2) Pixels to Policy, which aims to ensure Defra benefits fully from the outputs of the EU MyOcean programme, a three-year action plan to create an European 'Marine Core Service' looking at ocean monitoring and forecasting; and 3) Diversification and analysis of existing data to ensure the full range of data required for the Marine Strategy Framework Directive can be met.

This project will help to improve the monitoring, assessment and management of eutrophication in the context of wider pressures on ecosystem health, as required by the Marine Strategy Framework Directive.

The Marine Environmental Change Network (MECN) – phase 4

([ME5305](#)) Start date: September 2010 Completion date: September 2013

To develop novel approaches for data analyses and to address issues of comparability of the marine data sets and monitoring methodologies.

This project supports the work of MECN which provides policy makers and other end users with information enabling them to produce more accurate assessments of ecosystem state and gain a clearer understanding of factors influencing change in marine ecosystems. It will contribute to the assessment needed for the EU Marine Strategy Directive and to assessments by the UK Marine Monitoring and Assessment Strategy community and the Marine Climate Change Impacts Partnership.

Further development of the EMECO datatool to produce a common system for assessment of Good Environmental Status for the Marine Strategy Framework Directive

([ME5307](#)) Start date: April 2011 Completion date: March 2013

To build on project [ME5303](#) to develop an assessment and reporting system for the EU Marine Strategy Framework Directive by extending the principles relating to eutrophication to cover the broad requirements of the Directive, but with an initial focus on the descriptors for litter, commercial fisheries and potentially hydrography.

This project will help with the integration of data, assessment of each descriptor of Good Environmental Status and monitoring for the Directive. The reporting tools are of interest to a range of marine organisations including the Marine Management Organisation and Natural England, as well as industry.

The Continuous Plankton Recorder survey: Monitoring marine biodiversity and environmental change in the world's oceans

([ME5308](#)) Start date: April 2011 Completion date: 2021

To understand long-term ecological changes in the oceans, to provide a critical long-term and geographically extensive biological observing system in the marine environment. To develop the Water and Microbial Sampler and DNA microarrays for Harmful Algal Blooms to allow the survey to monitor the full size range of plankton in the oceans from the larger plankton (which the Recorder already samples) to the nano and pico plankton size ranges.

This project delivers scientific evidence needed to inform governments, scientists and society about changes to the health and diversity of our oceans.

Determination of the size at maturity of the whelk (*Buccinum undatum*) in English waters

([MF0231](#)) Start date: April 2011 Completion date: March 2013

To provide biological information to inform stock managers about likely implications of various management or conservation strategies, particularly information on the size at which both sexes of the whelk become sexually mature to set suitable minimum landing sizes to protect the spawning stock. Ten areas will be studied, with priority for the most important whelk fisheries in the North Sea, English Channel, Bristol Channel and Irish Sea in the first year.

This project will help to improve the management of whelk fisheries by providing a better basis for minimum landing sizes and for stock assessments.

Demersal fish recruitment processes in the Irish Sea – generating and testing hypotheses based on high-resolution data on eggs, larvae and prey collected since 1995

([MF1106](#)) Start date: August 2009 Completion date: March 2013

To investigate whether changes in fish recruitment associated with mortality at early stages affect the recovery potential of cod and haddock, using existing data on eggs and larvae of demersal fish and the zooplankton prey of the larvae in the Irish Sea. To test whether mismatches with suitable prey in location or time; or different responses to their environment; or direct interactions between species can explain the difference in productivity of Irish Sea cod and haddock stocks observed over recent years.

This project will help in the development of effective management strategies for the Irish Sea demersal fisheries.

One hundred years of change in fish and fisheries

([MF1108](#)) Start date: October 2009 Completion date: March 2013

To recover, digitise, store and make accessible long-term electronic datasets from scientific research surveys and fisheries data dating back to the beginning of the 20th century. To map changes in the distribution of catches and effort of the fishing fleet over the last 100 years and identify changes in the size and age of fish and their relative abundance. To use this data to investigate how climate change and fishing have affected the distribution of fishing effort, fish abundance and food webs.

This project will provide long-term data sets which can be used to help calibrate models which reconstruct past changes in the ecosystem and fisheries. These models can be used to predict responses to future change

Projects starting in 2012/2013

Development of the UK Integrated Marine Observing Network

([ME5309](#)) Start date: August 2012 Completion date: March 2013

To start integrating non-statutory observing and monitoring programmes with existing statutory monitoring, as a step towards a UK Integrated Marine Observing Network (UK-IMON).

This project will implement a series of actions towards an integrated network, including projects to demonstrate the use and value of the IMON. Improved co-ordination could increase the quantity, geographic coverage and time periods of data in a cost-effective way to improve our knowledge and understanding of the marine environment and will make our assessment of its condition more robust.

Pelagic ocean science: ecology and interconnectivity of diverse ocean networks

([MF1112](#)) Start date: February 2012 Completion date: March 2017

To monitor the population size and distribution of a range of pelagic species and improve our understanding of their role in the ecosystem, focussing on mackerel in the North Sea and the small pelagic fish community off the south-west coast of England. Integrating the data with data collected by other countries EU will increase understanding of environmental factors affecting abundance.

This project will contribute to advice on the sustainable management of UK commercial pelagic fish stocks, providing evidence for influencing operation of the Common Fisheries Policy.

Science for integrated marine management

Projects completed between April 2011 and March 2012

MCZ project – lessons learned and knowledge sharing

([MB0112](#)) Start date: August 2011 Completion date: February 2012

To report on lessons learned and good practice from the stakeholder-based decision making process used in the Marine Conservation Zone project and prepare four regional reports setting out the knowledge transferred from the regional Marine Conservation Zone projects to Defra and the Statutory Nature Conservation Bodies.

This project has provided information which can be used for further stakeholder-based projects by Defra and its Arms Length Bodies.

Ecological consequences of dredging – a review of current practice

([ME1101](#)) Start date: October 2008 Completion date: March 2012

To develop approaches, tools and guidelines for assessing the environmental impacts of dredging on sediments and the wider ecosystem.

This project, with the Environment Agency, is assisting Defra in assessing the potential benefits from using dredged material for coastal protection and habitat conservation and enabling the UK to support international and regional conventions involving dredged

material disposal and biodiversity issues (e.g. OSPAR, RAMSAR, Rio Convention on Biodiversity).

Implementation of risk assessment methodologies for oil and chemical spills in the European marine environment

([ME1312](#)) Start date: August 2008 Completion date: September 2011

To develop fingerprinting tools for heavy oils and new products (hazardous noxious substances) and to assess their risk in spills in different European regional seas. The project will use the same data and the same protocols where necessary as project [ME1311](#).

This project involved multidisciplinary co-operation between leading European research groups in risk assessment of oil and chemical spills in the marine environment. It defined a European strategy for risk assessment of accidental marine pollution and is helping to support Defra's 2006 commitments to OSPAR.

Improving our understanding of climate change in relation to marine habitats and species

([ME3204](#)) Start date: December 2005 Completion date: March 2012

To run an effective Secretariat for the UK's Marine Climate Change Impacts Partnership (MCCIP).

This project assisted MCCIP in providing a co-ordinating framework for Great Britain and Ireland for the transfer of high quality evidence of impacts to the marine climate and advice to policy makers.

Combining sea and coastal planning in Europe

([ME5401](#)) Start date: July 2008 Completion date: December 2011

To achieve a seamless, integrated approach to land and sea planning and management, providing the foundation for strong, vibrant and sustainable coastal economies, which are in harmony with the environment.

This project, in partnership with the Belgian Government, helped to address pressures facing the coast from development, climate change, and competition for space between maritime sectors.

Pollution response in emergencies – marine impact assessment and monitoring

([ME5407](#)) Start date: April 2009 Completion date: March 2012

To develop and maintain guidelines setting out methods and information required for impact assessment in the short, medium and long term for responding to oil or chemical spill in English and Welsh marine waters. To establish and maintain a network of national and regional experts, samplers, fisheries contacts, analytical providers and facilities that may be required at short notice to respond after an incident.

This project put in place the expertise, resources, networks and logistical planning needed for prompt and effective impact assessment and monitoring of marine pollution, drawing on the national contingency plans and environmental advice mechanisms of the national authorities responsible for marine spill response in English and Welsh waters.

Ecosystem approach to fisheries management

([MF1001](#)) Start date: April 2007 Completion date: March 2012

To develop, test and report on indicators that allow managers and stakeholders to assess the status of the ecosystem and the impacts of fishing, and to develop decision tables that allow managers and stakeholders to see the effects of different management options and to choose from among them.

This project is conducted a pilot of an ecosystems approach to fisheries management in the south-west of England, providing information for policy makers on developing this type of approach.

Vulnerable marine ecosystems in the Northwest Atlantic Fisheries Organization regulatory area

([MF1004](#)) Start date: January 2009 Completion date: March 2012

To map potential vulnerable marine ecosystems in the Northwest Atlantic Fisheries Organization (NAFO) regulatory area at depths less than 2000 metres. To study the distribution of fishing effort in the NAFO Regulatory Area and propose closure of sensitive areas to seabed bottom trawling fisheries.

This project will help NAFO to comply with United Nations General Assembly Resolution 61/105 and complement mapping by Spain.

A risk analysis framework for fisheries management

([MF1201](#)) Start date: April 2007 Completion date: March 2012

To investigate how to adapt risk analysis theory, as currently developed and applied in a variety of fields, into a common framework for the identification, assessment, management and communication of risk for UK and European fisheries. To cover the full process from stock assessment, projection and advice, via management decisions, to the practical implementation of the management measures. To apply this to selected case studies working with others including Defra and EU project teams, ICES, Regional Fisheries Management Organisations and Regional Advisory Councils.

This project provided a framework which is increasing our capacity to understand and incorporate uncertainty and risk into fisheries management decisions. It is helping to evaluate management choices on the trade-offs between biological, ecological, economic and social objectives.

Improved understanding and management of shellfish fisheries

([MF1204](#)) Start date: April 2007 Completion date: March 2012

To model the possible responses of shellfish stocks and shellfish fishing fleets to different management options, using satellite monitoring data and catch and effort returns from the shellfish licensing scheme. To assess relationships between inshore and offshore shellfish populations and their response to exploitation, and assess the impact on the breeding potential of crustacean stocks of exploitation patterns which differ between sexes.

This project has given fisheries managers a better understanding of the way in which shellfish stocks and fleets respond to exploitation and has improved the evidence base for advice on the sustainable management of shellfish stocks.

Development of tools for estimation of stock status under uncertainty

([MF1205](#)) Start date: April 2008 Completion date: March 2012

To develop and evaluate alternative methods for stock assessment and management focusing on stocks with limited data available. To develop approaches for generating robust management and assessment methods for a wide variety of stocks, fisheries and management regimes.

This project has helped fisheries managers to develop management measures, including providing them with better estimates of uncertainty in stock assessments.

Developing the scientific basis for using real-time closures as a fishery management measure

([MF1220](#)) Start date: December 2010 Completion date: January 2012

To model data from VMS, landings and discard databases as well as biological studies of cod movement to provide information to improve the basis for using Real Time Closures as a fisheries management measure. To provide evidence for the most effective way of identifying areas of high cod abundance, and recommend the extent of closures, and provide a means of evaluating their effectiveness.

This project has improved the basis for the current real-time closure mechanism in the North Sea. In the medium and longer term it will contribute to the scientific evidence base on using real-time closure as an effective fisheries management tool – including through the Cod Recovery Plan review and under a reformed Common Fisheries Policy.

Projects continuing in 2011/2012

A review of effectiveness of management schemes for European Marine Sites

([MB0113](#)) Start date: December 2011 Completion date: March 2013

To evaluate the lessons that can be learned from existing arrangements for managing European Marine Sites (Special Areas of Conservation and Special Protection Areas) under the EC Habitats and Birds Directives in English waters.

This project will summarise the strengths and weaknesses of these existing marine protected areas and will highlight aspects where improvements are needed. It will advise on how a refined set of management measures might be applied to Marine Conservation Zones designated under the Marine and Coastal Access Act 2009.

The contribution of marine protected areas to protecting highly mobile species in English waters

([MB0114](#)) Start date: December 2011 Completion date: March 2013

To review the likely effectiveness of the existing and planned marine protected area network in protecting highly mobile species in English waters. These species include seabirds, sea mammals (dolphins, porpoises, whales and seals), fish and turtles. To review factors, such as human activity, threatening these species and recommend how these could be managed within marine protected areas to maximise conservation benefits, while minimising negative effects. Where there are gaps in knowledge, to advise on ways of addressing them.

This project will enable policy makers to understand, from the best available scientific evidence, the likely effectiveness of the existing and planned marine protected area network for protecting highly mobile species. They will also be able to assess if the network will meet government obligations to protect these species, for example under the Marine Strategy Framework Directive and the Convention on Biological Diversity, or whether further action is needed. Recommendations on maximising conservation benefits (and how to minimise any negative effects) of existing and proposed marine protected areas will allow policy makers to deliver the best value for money when designating and managing these areas.

In-depth review of evidence supporting MCZs recommendations

[\(MB0116\)](#) Start date: January 2012 Completion date: March 2013

To review the ecological evidence collected by the Marine Conservation Zone (MCZ) Regional Projects to support designation and management of MCZs and improve the evidence base by identifying any additional available evidence and providing a confidence assessment of the evidence.

This project will ensure that the evidence base for MCZ proposals is as sound and transparent as possible. The outputs will help to identify priorities for any further survey work and inform decisions on proposed conservation objectives and management measures.

MAREMAP project – Investigating the feasibility of using AUV and glider technology for mapping and monitoring of the UK marine protected area network

[\(MB0118\)](#) Start date: March 2012 Completion date: March 2013

To establish the current and future capabilities of the Government-owned Autonomous Underwater Vehicle (AUV) and glider fleet and compare it with commercially available systems worldwide. To explore the limits of deployment in UK waters, including the effects of high tidal flow, turbulence and commercial shipping/fishing activity. To assess the costs/benefits, advantages/disadvantages and operational risks of different survey methods.

This project will provide several case studies in English and Scottish waters, including existing candidate Special Areas of Conservation and recommended Marine Conservation Zones. These will allow comparison of the resolution, area of coverage, calibration/repeatability and quality of data collected with different survey methods, including both deep and shallow water AUV and glider deployments and boat-based mapping in varied environments.

R&D to support the licensing of dredging, disposal, renewable and general construction and associated monitoring under the Food and Environment Protection Act, Coast Protection Act and the Marine and Coastal Access Act

([ME5403](#)) Start date: May 2009 Completion date: March 2014

To identify methods to enable better, more transparent assessments of various human activities in the marine environment and provide guidance for stakeholders and the wider public on the approaches used to assess and manage these activities.

This project will inform Defra's policy for managing and advising on the impacts of human activities in the marine environment and will help the Marine Management Organisation to deliver its licensing activities.

A fit-for-purpose plan to deliver key aspects of contaminant science under the Marine Strategy Framework Directive

([ME5404](#)) Start date: April 2010 Completion date: March 2014

To deliver a flexible, fit-for-purpose monitoring strategy for UK contaminants that directs and supports current and future monitoring activities, providing state and trend data as needed.

This project is feeding into the data and evidence collection in UK offshore waters to support OSPAR and the EU Marine Strategy Framework Directive, which requires assessment of Good Environmental Status at a broad, regional scale. This approach contrasts with the scale of traditional site-based (Habitats Directive) or water body (Water Framework Directive) assessments and requires comprehensive judgements on a wide range of ecosystem components.

Strategic support for the Marine Strategy Framework Directive

([ME5405](#)) Start date: April 2009 Completion date: March 2013

To design a robust method for integrating the information on each Good Environmental Status descriptor to form an overall assessment of Good Environmental Status, taking account of variations in outcomes due to changes in monitoring scales and different levels of uncertainty.

This project will help the UK to meet its obligations in a co-ordinated way under the Marine Strategy Framework Directive, which requires EU member states to take measures to achieve Good Environmental Status in marine waters by 2020. It will also contribute to work for OSPAR and in Europe to deliver effective, pragmatic solutions for implementing the Directive.

Knowledge-based sustainable management for Europe's seas

([ME5406](#)) Start date: April 2009 Completion date: March 2013

To provide an 'assessment toolbox' for developing and implementing emerging EU policy, at a regional sea scale and in member states' Exclusive Economic Zones. To develop the 'toolbox' using an ecosystem and socio-economic approach, working with regional liaison groups and a multi-sector project advisory board.

This project's 'toolbox' will be used to model the economic and social impacts of changes to ecosystem goods and services, and the costs and benefits of following options available through existing or proposed policy instruments (e.g. EU Marine Strategy Framework Directive and the Maritime Strategy Blue Book).

Developing a fit-for-purpose marine litter monitoring programme

([ME5415](#)) Start date: November 2010 Completion date: March 2013

To assess the amount and composition of litter in the water column, including floating and suspended litter, and accumulation on the sea floor. To develop a cost effective monitoring programme for determining trends over time for EU Marine Strategy Framework directive monitoring.

This project will provide information needed for implementation of the Marine Strategy Framework Directive.

Determining the extent to which marine microparticles can cause 'harm'

([ME5416](#)) Start date: April 2011 Completion date: March 2015

To establish the extent to which microplastic debris might cause harm to organisms in the marine environment, including whether common chemical additives in plastics persist after ageing in the marine environment and are made bioavailable on ingestion; how microplastics are passed on through food web interactions and the implications for populations and ecosystems; and whether biodegradable plastics differ in their potential 'harm' impacts.

This project will help with implementation of the EU Marine Strategy Framework Directive.

Towards a Marine Adaptation Climate Change Action Plan

([ME5417](#)) Start date: June 2011 Completion date: March 2013

To scope out what is required in the Defra Climate Change Action Plan, particularly information needed on maritime industries/activities and legislation. To determine adaptation responses to ensure that maritime policies and legislation continue to be 'fit for

purpose' with a changing climate. To scope out adaptation options to ensure that industries/activities in the UK remain robust to future marine climate change. To identify the key organisations and individuals responsible for implementing marine climate change adaptation policies/activities in the UK, including an assessment of adaptive capacity.

This project will contribute to delivery of the Climate Change Act 2008 which requires that a National Adaptation Programme to address the most pressing climate change risks. The first Programme will be published in 2012 and this project will help Defra with preparation of its input to the Programme.

Fishing for litter

([ME5418](#)) Start date: August 2011 Completion date: March 2014

To influence the behaviour of the fishing community by encouraging them at no extra cost to bring ashore marine litter which has been caught up in their nets during normal fishing activity.

This project is part of the Fishing for Litter initiative which aims to reduce marine litter by involving one of the key stakeholders, the fishing industry and involves the direct removal of litter from the sea, as well as raising awareness of the problem in the fishing industry.

Developing fisheries management indicators and targets (project 1)

([MF1206](#)) Start date: October 2009 Completion date: March 2013

To develop the tools to determine the economically optimal level of exploitation of European ecosystems under changing climatic conditions, while ensuring that the pressure exerted on both commercial stocks and susceptible fish species is biologically sustainable.

This project will provide information for policy makers and fisheries managers.

Bycatch and discards: management indicators, trends and location

([MF1211](#)) Start date: August 2009 Completion date: March 2013

To describe the species and size composition of total catches and to analyse the factors determining the amount of discards. To investigate fishers' behaviour to understand if discarding is part of their fishing strategy.

This project will give fisheries managers an understanding of the general patterns and causes of discards. It will provide key information for developing operational indicators and propose ways of reducing discards.

Developing fisheries management indicators and targets (project 2)

([MF1212](#)) Start date: October 2009 Completion date: June 2012

To produce operational models of fish stock dynamics, taking into account the ecosystem changes caused by climate change and commercial fisheries harvesting. To combine these models with economic models taking into account broad social goals when applying values to fisheries production and management.

This project will develop fisheries resource indicators that combine economic, social and biological indicators that can be fed into the wider model produced by the project.

Developing fisheries management indicators and targets (project 3)

([MF1213](#)) Start date: October 2009 Completion date: March 2013

To produce the tools to determine the economically optimal level of exploitation of European ecosystems under changing climatic conditions, while also ensuring that the pressure on both commercial stocks and susceptible fish species is biologically sustainable. Work will include evaluating management options for protecting non-target species.

This project will reveal the trade-offs in performance across a range of management objectives. It will provide fisheries managers with the information on which to make rational decisions, given their objectives, preferences, and attitudes to risk.

Low-cost VMS data analysis: assessment and applications

([MF1217](#)) Start date: July 2010 Completion date: August 2012

To build on project [MF1214](#) by reviewing and analysing the data collected by the 30 vessels equipped with the low cost inshore Vessel Monitoring System (VMS)

This project will inform the future development and implementation of the VMS and provide insights into the validity of using this data to estimate fishing effort.

A survey of shore-based and private boat recreational sea angling activity, and economic value of sea angling, in England. (Contribution to the Sea Angling 2012 project)

([MF1221](#)) Start date: April 2011 Completion date: March 2014

To assess the shore-based and private-boat recreational sea angling in England, in terms of participation, fishing effort, target species, patterns of fishing and catch-rates. To evaluate methods of estimating total recreational catches (retained and released fish of individual species), focusing on cod, bass, and sharks, as required by the EU Data

Collection Framework. To evaluate sampling information from all three strands of the Sea Angling 2012 project and recommend options for future cost-effective methods of collecting data to meet EU obligations. To estimate the economic value of recreational sea angling in England.

This project addresses the need to collect up-to-date information to support Defra and Inshore Fisheries and Conservation Authorities in achieving a balanced approach to developing their policies on recreational and commercial fishing. The results of the surveys to estimate catches of the target species will contribute to meeting the UK's data collection obligations under the EU Data Collection Framework and data will be available for use by ICES or STECF for stock assessments.

Gathering evidence for the potential piloting or direct implementation of improved catch-rights-based management (C-RBM) systems in English fisheries

([MF1222](#)) Start date: November 2011 Completion date: March 2013

To identify and describe an improved catch rights-based management (C-RBM) system (or systems) for English fisheries, based upon available data and consultation with stakeholders.

This project will help to develop an effective system which is economically and biologically efficient, and also capable of gaining the maximum level of industry support.

Trial of catch quota management in fully documented North Sea cod and Western Channel sole fisheries, using CCTV and remote electronic monitoring

([MF1223](#)) Start date: March 2012 Completion date: March 2013

To trial catch quota management in North Sea and West Channel fisheries and test enforceability of a catch quota system for North Sea and South West mixed fisheries. To trial the effectiveness and reliability of CCTV and remote electronic monitoring (REM) on five inshore vessels, including analysis of footage.

This project will provide data for Defra, the Marine Management Organisation and the European Commission to help increased selectivity, reduced discards, lower total mortality and increased landings. It will particularly inform Defra about the use of REM and CCTV as a monitoring tool.

Discarded fish survival study (1)

([MF1224](#)) Start date: January 2012 Completion date: December 2012

To determine the survival rates of selected flatfish species (plaice, sole) as well as cuttlefish, all of which are currently discarded from the south-west beam trawl fishery in the western English channel.

This project will fill gaps in our knowledge on the survival rates and contribute to fisheries management.

Under 10 metre automated shellfish data collection pilot study

([MF1226](#)) Start date: March 2012 Completion date: January 2013

To trial a more automated system to improve the quality of commercial data and fishing effort for under 10 metre vessels. Participating fishermen will either fill in monthly returns online, or complete a form designed to be computer read.

This project, if successful, could provide a system to replace the current Monthly Shellfish Activity Returns system. This would help to improve data for shellfish stock assessments and for checking the effectiveness of any future management measures.

Management of marine finfish fisheries and monitoring under the EU data collection regulation Cefas fish stock monitoring contract – ongoing

To provide the best scientific advice on the status of finfish stocks of interest to the UK, through monitoring and assessment of the most important commercial stocks.

Projects starting in 2012/2013

JPI Oceans

([ME5420](#)) Start date: September 2012 Completion date: September 2015

To contribute to the EU Joint Programming Initiative on Healthy and Productive Seas and Oceans ([JPI Oceans](#)), which is co-ordinating marine and maritime research. To help it move to its operational phase by supporting the project governance in establish the project; proposing procedures and tools for co-operation; helping to develop an agenda for strategic research and innovation.

This project will build momentum for European co-operation on marine and maritime research, making JPI Oceans self-sustaining.

Assessment of pressures in support of risk-based management

([ME5421](#)) Start date: September 2012 Completion date: March 2013

To ensure robust methods underpin the use of data for assessing pressure on fish stocks from inshore and offshore fishing.

This project will provide information on the best methods for assessing pressures on fish stocks to enable fisheries managers to take a risk-based approach to management.

Maritime climate change: working in partnership to evaluate risk and facilitate adaptation

([ME5422](#)) Start date: September 2012 Completion date: March 2013

To allow the new Cefas Marine Climate Change Centre to co-ordinate current thinking on marine climate change risk, and provide a clear response to the key challenges facing the UK (and devolved administrations) over the coming years, working in partnership with other key UK organisations

This project will help to address the issue of marine risks often being overlooked in national or international assessments of climate change impacts and economics and will inform UK marine adaptation programmes.

Response of ecosystems and fisheries to management in a changing environment

([MF1228](#)) Start date: June 2012 Completion date: May 2017

To investigate the ecosystem approach to fisheries management, via five interrelated workstreams: 1) trade-offs in mixed fisheries; 2) climate and human impacts on ecosystems and fisheries; 3) indicators of food webs and fishing; 4) economic and social evaluation; 5) applied ecosystem modelling.

This project will provide information to improve our understanding of how to achieve Maximum Sustainable Yield in mixed fisheries. It will help to approach long-term fisheries management plans from the ecosystem perspective and to integrate fisheries management measures with objectives for achieving Good Environmental Status for our seas under the Marine Strategy Framework Directive.