

## Economic and social research in the marine environment

### Projects completed between April 2010 and March 2011

#### **Women in fisheries**

**([FC1302](#)) Start date: January 2010 Completion date: April 2010**

To report views from women in fishing across the country and investigate how women could play a more prominent role in fisheries management.

This project provided information and advice for the Sustainable Access to Inshore Fisheries (SAIF) project, in particular its engagement strategy. It was partially funded through the European Fisheries Fund.

#### **Further development of marine pressure data-layers and ensuring the socioeconomic data and data-layers are developed for use in the planning of marine protected area networks**

**([MB0106](#)) Start Date: October 2008 Completion date: March 2011**

To map the distribution of human activities in UK marine waters and provide information on the pressures associated with different human activities.

This project used the data collected by project [MB0102](#) and provided maps (pressure data-layers) to identify where socio-economic activities interact with conservation features to support the regional Marine Conservation Zone projects in Marine Conservation Zone site selection and for use in wider marine planning.

#### **Economic and social assessment for the Marine Strategy Framework Directive**

**([ME5103](#)) Start Date: March 2010 Completion date: January 2011**

To assess current and expected data availability, tools and methods for regional analysis, and recommend their practical application and priorities for further development. To help OSPAR assess options for regional economic and social analysis meeting the EU Marine Strategy Framework Directive's requirements. With OSPAR's guidance, to develop a detailed specification for a regional scale economic and social analysis for the Directive.

This project helped in understanding the Directive's requirements for economic and social assessment and contributed to co-ordination of EU member states' national programmes of measures required under the Directive by 2015.

#### **Social impacts of fishing**

**([NE0108](#)) Start date: August 2009 Completion date: February 2011**

To investigate the social impacts of fishing. Working together with fishing communities, to explore the tangible and non-tangible impacts fishing has on fishermen and wider fishing communities.

This project provided social evidence in relation to the inshore fleet, an area of research which had previously been identified as underexplored, and this evidence help to inform domestic fisheries management reform.

## Projects continuing in 2011/12

### **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: June 2011**

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.

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

**(MF1214) Start Date: March 2010 Completion date: December 2011**

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 will inform policy making including on Common Fisheries Policy (CFP) reform and the Sustainable Access to Inshore Fisheries (SAIF) project; 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: March 2012**

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 will help to deliver Defra's objectives to 'promote increased domestic food production' and 'pursue a zero waste agenda'. It will also contribute to reducing discards under the Common Fisheries Policy.

## **Projects starting in 2011/12**

### **External peer review for Impact Assessment and supporting evidence for potential Marine Conservation Zones in England**

**(MB5101) Start date: August 2011 Completion date: March 2012**

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 and the evidence on socio-economic impacts.

This project provides an external peer review of the Impact Assessment for Marine Conservation Zones, which will be 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.

# Human pressures and impacts on the marine environment

## Projects completed between April 2010 and March 2011

### **Determining the toxicity profile of major oils transported in the European maritime area to establish the applicability of biological effects techniques**

**([ME1311](#)) Start date: May 2008 Completion date: September 2010**

To profile by toxicity the major oil types and hazardous and noxious substances transported in EU waters using the bioassays and biomarkers recommended by the International Council for the Exploration of the Sea (ICES) Working Group on the Biological Effects of Contaminants, and to produce a guidance document on the use of biological effects techniques for oil spills.

This project met the request by the Oslo and Paris Conventions for the protection of the marine environment of the North-East Atlantic (OSPAR) Commission in 2006 for ICES to assess the long-term impact of oil spills on marine and coastal life.

### **Development and improvement of analytical methods for marine monitoring**

**([ME4117](#)) Start date: May 2005 Completion date: March 2011**

To review annually existing analytical methods, used by Defra and other organisations, which assess a range of determinants, such as sensitivity and selectivity for organic and inorganic chemicals including novel compounds. To recommend new or modified techniques for analysing environmental samples, such as fish, shellfish, seawater and sediments.

This project underpinned the UK monitoring effort (National Marine Monitoring Programme, OSPAR and EU Water Framework Directive), and ensured Defra had access to accurate, effective, economic and up-to-date methods for environmental assessment. It also ensured that Defra remains at the forefront in method development, and can meet new demands for monitoring contaminants and combinations of contaminants in the marine environment.

### **Environmental indicators**

**([ME4118](#)) Start date: May 2005 Completion date: April 2010**

To provide a consistent approach to using environmental indicators to assist the regulation of human activities at sea, focusing on the operational use of indicators.

This project helped Defra, other Government departments and industrial stakeholders in defining or meeting marine environmental quality standards and performance measures under the Driving Forces-Pressure-State-Impact-Response approach.

## **Identifying a range of options to prevent avian collision with wind turbines, using a UK-based case study**

**(ME5206) Start date: March 2010 Completion date: October 2010**

To inform licensing of round three wind farm developments by collating key information on the collision risk to birds from offshore wind installations; identifying the range of existing and novel ways of reducing bird collisions; estimating the extent to which these options could minimise collisions; and contributing to the development of a quantitative model for the wind energy industry to use as a tool to reduce bird fatalities.

This project helped to fill a gap in evidence on the effects of wind farms on birds. The current mitigation option of a compulsory shut down of some or all wind turbines in a wind farm during, for example, migration or breeding seasons, seriously affects the financial viability of wind farm proposals and could halt the future expansion of offshore wind farms.

## **Mitigating cetacean bycatch**

**(MF1003) Start date: April 2008 Completion date: March 2011**

To work with the fishing industry and Seafish to test and develop methods to reduce cetacean (dolphin and porpoise) bycatch in nets, particularly through the use of acoustic deterrent devices (also known as 'pingers'). To analyse data, for example collected by the observer bycatch monitoring scheme, to match bycatches of non-target species with particular fishery characteristics.

This project built on our understanding of how certain species (notably harbour porpoises and common dolphins) become entangled in fishing gear. It provided advice and technical solutions to industry to reduce bycatch of cetaceans.

## **Projects continuing in 2011/12**

### **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 will be 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 survivability of bycaught porbeagle and spurdog and furthering our understanding of movement patterns in UK marine waters**

**(MB5201) Start date: September 2009 Completion date: October 2012**

To assess the survival rates of porbeagle (*Lamna nasus*) and spurdog (*Squalus acanthius*) which are caught but returned to the sea. They will be tagged with electronic and simple marker tags and the information from these tags will be used to identify the times of year or particular localities where these species may be most vulnerable to capture as bycatch in commercial fisheries; to gather data on movement patterns of these species to help build up data to identify areas where they aggregate during key life stages; and to evaluate the technical measures that could help minimise bycatch mortality.

This project will combine these findings with assessments of the survival rates of porbeagle and spurdog after being discarded to assess the vulnerability of stocks to fisheries. It will also inform conservation measures that may be necessary.

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

**(MB5202) Start date: July 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 will identify the risks to stock sustainability of continuing with current fishing practices and highlight where fishing practices can be improved to reduce discard mortality.

## **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.

## **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. gene

microarrays) to improve monitoring and analytical quality control procedures in line with OSPAR requirements.

This project will contribute 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 will also help 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.

## **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: December 2012**

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.



## **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](http://www.cefas.co.uk/our-science/fisheries-information/marine-fisheries/fishing-gear-technology/project-50.aspx))

## **Marine Bioresources Joint Programme**

**(MF0812) Start date: April 2007 Completion date: March 2012**

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 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.

## **Projects starting in 2011/2012**

### **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](#)

## **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.

## **State of the marine environment**

### **Projects completed between April 2010 and March 2011**

#### **Mapping the seabed of Torbay to Lyme Bay Special area of conservation**

**([MB0109](#)) Start date: December 2010 Completion date: March 2011**

To provide information on the condition and extent of bedrock and stony reef in the Lyme Bay and Torbay candidate Special Area of Conservation (cSAC). Using acoustic and groundtruthing data collected by Natural England and a new multibeam echo sounder survey of the Torbay part of the Lyme Bay and Torbay cSAC, to prepare a habitat map showing EUNIS (European Nature Information System) habitats and Annex I habitats, and to assess the extent and condition of the Annex I reef habitats in the cSAC.

This project provided an accurate evidence base on the condition and extent of the Annex I reef in the cSAC for developing Conservation Objectives and Advice on Operations for the cSAC. It will help the Marine Management Organisation and the Inshore Fisheries and Conservation Authorities to set appropriate management measures for activities in the cSAC to ensure the reefs remain in favourable condition.

#### **Investigation of England and Wales for nursery grounds for Risso's Dolphin**

**([MB5302](#)) Start date: December 2010 Completion date: March 2011**

To investigate the Risso's dolphin population(s) along the western coasts of the UK, including population sizes, status and habitat use around the Llyn Peninsula, Isle of Lewis and Cornwall. To determine the relationship between the dolphins in these areas and to collect data on the relationships within the dolphin groups.

This project helped meet the requirements of the EU Habitats Directive to undertake surveillance of the conservation status of cetaceans. The results will inform work on marine protected areas, marine planning decisions and contribute to the conservation of these dolphins.

#### **Marine ecosystem connections**

**([ME3205](#)) Start date: May 2005 Completion date: March 2011**

To determine key ecosystem connections that are susceptible to change through

understanding the flows of carbon and nitrogen between marine ecosystem components and how changes in environmental conditions, or human disturbances, can impact on these components. To advise on the undesirable effects of nutrient enrichment, and the development of indicators for assessing these effects.

The project advised Defra on all aspects of ecological indicator selection for the marine environment, supporting the ecosystem approach to environmental management and commitments to OSPAR and the Fifth North Sea Conference.

## **Support for UK input to the OSPAR Quality Status Report and Charting Progress 2**

**(ME4130) Start date: October 2007 Completion date: March 2011**

To produce the UK information for the OSPAR Quality Status Report. To develop a specification for a UK (and regional) annual report card to supplement the Charting Progress report by enabling regular reporting on data showing progress towards achieving the EU Marine Strategy Framework Directive's descriptors of Good Environmental Status.

This project ensured the UK fulfils OSPAR requirements and is in a good position to deliver the UK report on the initial assessment of our marine environment under the Marine Strategy Framework Directive, required as the first stage of implementing the Directive. It also contributed to the production of Charting Progress 2 and will assist an annual review of progress.

## **Defining the degree of acidification of UK waters and potential future changes**

**(ME4133) Start date: August 2008 Completion date: January 2011**

To enable new information on acidity (pH) to be set in the context of the variability in hydrographic and biogeochemical conditions determining acidity through observations as part of existing marine fieldwork programmes at key locations around the UK.

This project provided essential information for assessing the potential threat to UK marine waters of acidification resulting from the uptake of increased levels of CO<sub>2</sub> into the sea.

## **The EMECO Western Shelf Observatory**

**(ME5303) Start date: September 2009 Completion date: March 2011**

To enable a group of UK, US and Canadian fisheries scientists to compile a list of priority experiments that need to be conducted to understand the likely impacts of increasing ocean pH and CO<sub>2</sub> levels on fish and shellfish.

This project provided ICES and other interested parties with information on future research needs; encouraged shared use of facilities; reduced duplication of experiments; and considered how to share responsibilities for conducting experiments and co-ordinating progress and results.

## **BTO range expansion for fulmar collection**

**(ME5306) Start date: October 2010 Completion date: March 2011**

To extend to south-west Britain the British Trust for Ornithology's (BTO) current collection by volunteers of fulmar corpses washed up on the tide line of the Orkneys, Shetland and Eastern England.

This project contributed to project [ME5209](#).

### **Spatial dynamics of edible crabs in the English Channel in relation to management**

**([MF1103](#)) Start date: April 2007 Completion date: March 2011**

To provide improved knowledge of the movements of edible crabs (*Cancer pagurus*) in the English Channel at local and regional scales.

This project provided advice to Defra on the management of crab stocks, including the scale at which management measures are likely to be appropriate and effective.

### **Trends in the inshore marine community of the east and south UK coast: 1970s to present**

**([MF1107](#)) Start date: September 2009 Completion date: March 2011**

To assess trends in species and community indicators and evaluate the effects of environmental factors and human activities on those indicators using data on the abundance and distribution of young fish, shellfish and epibenthos (animals and plants living on the sea bottom) in inshore habitats, collected by Cefas since the 1970s as part of the Young Fish Survey.

This project provided information on ecosystem health, indicating how the status of inshore habitats has been affected by human impacts including climate change. It is informing management of the species studied, the ecological status of these areas and future activities that could be permitted within them.

### **DAPSTOM Phase 3 – Understanding trophic interactions in the Irish Sea**

**([MF1109](#)) Start date: April 2009 Completion date: September 2010**

To use fish stomach content data to describe how fish feeding preferences have changed in the last century and understand how changes in the abundance of cod in the Irish Sea has affected Norway lobster, as cod is thought to be its most important predator.

This project provided more accurate predictions of the potential impact that changes in cod abundance might have on Irish Sea Nephrops stocks for use in fisheries management.

### **The effect of climate variability on the distribution and abundance of squid in the North Sea**

**([MF1110](#)) Start date: October 2009 Completion date: January 2011**

To investigate the effects of climate on the abundance and distribution of squid in British waters, using data from the International Bottom Trawl Survey and fisheries activity and discard database. To assess the value of squid as a commercial species and estimate their potential impact on commercial species at higher levels in the food chain.

This project increased knowledge of the relationship between squid and the environmental and climatic factors affecting them and their effect on the ecosystem.

### **Cetacean strandings around the UK coast**

**(WC0601) Start date: April 2007 Completion date: June 2010**

To analyse data for all cetacean strandings around the UK coast and determine the major causes of death in stranded cetaceans, including bycatch and physical trauma. To check the incidence of disease in stranded cetaceans to identify any substantial new threats to their conservation status. To investigate possible links between feeding behaviour, fisheries and stranded cetaceans by examining their stomach contents. To develop an integrated database on strandings and post-mortem findings which allows interrogation of data via the internet.

This project provided a co-ordinated approach to surveillance of cetacean strandings and investigation of major causes of death of stranded cetaceans in the UK. It is assisting the UK in meeting its commitments under the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) and the EU Habitats Directive. This work is continuing through project [MB0111](#).

## **Projects continuing in 2011/2012**

### **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 will provide data for selecting Marine Conservation Zones to ensure that they are based on the best available science. It will also be useful 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 provides 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 will contribute to Defra's understanding of the health of marine ecosystems and provide key data for policy commitments (e.g. OSPAR Quality Status Reports and ICES, climate change, and the ecosystem approach). It will also annually update the plankton database (WinCPR).

## **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.

## **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 supports 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.

## **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 endusers 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.

## **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: June 2011**

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 will help 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 will provide the biological knowledge necessary to improve the management of fish populations into the future against a broad range of policy objectives and will 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 will improve 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 will help to develop new approaches to fisheries management and conservation strategies. This is a continuation of Project [MF0430](#).

## **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: July 2012**

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: September 2012**

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 2011/2012**

### **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.

## **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.

## **Science for integrated marine management**

### **Projects completed between April 2010 and March 2011**

#### **Strategic review of offshore wind farm monitoring data associated with FEPA licence conditions**

**(ME1117) Start date: October 2008 Completion date: December 2010**

To review the monitoring reports on nine UK offshore wind farms prepared under the Food and Environment Protection Act (FEPA); compare findings against international information sources; report lessons learned; and make recommendations for future monitoring.

This project provided an overall picture of the effects of offshore wind farms in preparation for further development. It also provided an update to the April 2007 OSPAR report on the current state of knowledge on the environmental impacts of the location, operation and removal/disposal of offshore wind farms.

#### **Chemspill**

**(ME1313) Start date: January 2009 Completion date: June 2010**

To provide a tool combining the best available hydrodynamic and wind field data with ecotoxicological information for modelling chemical spills, which are complex and less well understood than oil spills.

This project provided information to allow prediction of the biological impacts of a chemical spill and it increased the understanding of potential risks to humans, fisheries interests, coastal resources and the marine environment.

## **Database development to increase the capacity for collection and analysis of marine litter data and the development of a training programme**

**(ME5412) Start date: September 2010 Completion date: March 2011**

To develop a new Marine Conservation Society database, meeting Marine Environmental Data and Information Network (MEDIN), OSPAR and EU Marine Strategy Framework Directive requirements. To train Marine Conservation Society officers to follow the OSPAR beach litter monitoring manual to ensure the collection and recording of high quality data, following the revised OSPAR protocol.

This project is enabling the Government to meet its responsibility under the EU Marine Strategy Framework Directive to monitor marine litter on the surface and in pelagic, benthic and beach/coastal zones. It is also enabling the Marine Conservation Society to report to OSPAR on behalf of the UK.

## **Microplastics in the marine environment - Literature review**

**(ME5413) Start date: October 2010 Completion date: March 2011**

To build up our evidence base to understand what constitutes harm from microplastics in the marine environment for the EU Marine Strategy Framework Directive.

This project provided an overview of current scientific research and identified evidence gaps which may need to be addressed.

## **Rame Head environmental impact study**

**(ME5414) Start date: September 2010 Completion date: December 2010**

To review whether the original conditions under which the licences were granted to the Rame Head disposal site remain valid and environmental effects remain tolerable. To assess whether the existing evidence is fit-for-purpose and to advise the Marine Management Organisation on the nature of the sedimentary materials previously found at the site. To establish the range of local views on the disposal activities at the site.

This project informed the independent review of the Rame Head disposal site led by the Marine Management Organisation. It also highlighted any future social, economic and environmental risks likely to be linked to the disposal site, including a sense of local scale and impact.

## **Devon and Severn IFCA Severn Estuary management plan evidence desk study**

**(MF0911) Start date: February 2011 Completion date: March 2011**

To collate, review and summarise available data and research material for the broad spectrum of potential responsibilities and objectives of the Inshore Fisheries and Conservation Authority (IFCA). To undertake a gap analysis of the evidence, relative to the expected research and data requirements of the IFCA to identify key areas of future work.

This project provided a sound evidence base for developing a management plan for the IFCA area. It also gave Defra an independent evidence base for future decisions in the Severn Estuary.

**Bottom vulnerable marine ecosystems (VMEs) in the NAFO Regulatory Area**  
**(MF1004) Start date: January 2009 Completion date: March 2012**

To map potential vulnerable marine ecosystems which may occur in the Northwest Atlantic Fisheries Organisation (NAFO) Regulatory Area at depths less than 2000 metres. To study the distribution of fishing effort in the Regulatory Area.

This project will allow fishery managers to propose the closure of sensitive areas to bottom fisheries. Studies of vulnerable marine ecosystems are an important aspect of Regional Fisheries Management Organisations' compliance with United Nations General Assembly Resolution 61/105.

**A strategic evaluation of ecosystem models in support of fisheries management**

**(MF1202) Start date: April 2008 Completion date: March 2011**

To assess how important the interactions are between predators and their prey in comparison with other sources of uncertainty in fisheries models, and help to predict knock-on, ecosystem implications of future management actions. To test and evaluate the usefulness of different modelling approaches for exploring wider ecosystem considerations of fisheries in the marine environment. To focus on two case study regions: the North Sea and the Western Approaches.

This project provided guidance for applying multispecies and fisheries-related ecosystem modelling approaches which feed into fisheries management decisions.

**Improved understanding and management of recreational sea angling**

**(MF1203) Start date: April 2008 Completion date: March 2011**

To analyse and evaluate existing management measures and current recreational activity through case studies of species (bass, cod, tope, grey mullet and salmon), both in the UK and elsewhere (e.g. striped bass in the U.S.A.). To develop and pilot methods to estimate the level of recreational participation and catches in bass fisheries. To evaluate costs and benefits of potential management options for bass fisheries and to develop assessment and modelling techniques.

This project will allow fisheries managers to understand the impacts of the different sectors on fish populations and the implications of management on biological sustainability. It is supporting Defra's work to improve the management of fisheries for recreational sea angling in the UK, particularly in England.

**Using fishery observer data to investigate technical interactions and management options for mixed fisheries**

**(MF1208) Start date: April 2009 Completion date: August 2010**

To investigate alternative approaches to managing mixed fisheries using highly detailed data on fishing activity collected by Cefas observers. To identify the conditions that would need to be met for these measures to be effective in a mixed fishery.

This project provided information for policy makers and fisheries managers.

## **Food security, governance and FPA desk study**

**([MF1216](#)) Start date: March 2010 Completion date: April 2010**

To study food security, governance and Fisheries Partnership Agreements (FPAs) to describe the links between the Common Fisheries Policy and international fisheries governance. To identify aspects that could be included in Common Fisheries Policy reform to have a positive impact on international elements and those that need to be dealt with through other channels.

This project is informing the UK input to the reform of the Common Fisheries Policy.

## **Projects continuing in 2011/2012**

### **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, will assist Defra in assessing the potential benefits from using dredged material for coastal protection and habitat conservation and enable 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 involves multidisciplinary co-operation between leading European research groups in risk assessment of oil and chemical spills in the marine environment. It aims to define a European strategy for risk assessment of accidental marine pollution and will help 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 assists 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, will help to address pressures facing the coast from development, climate change, and competition for space between maritime sectors.

## **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).

## **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 will 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.

## **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: November 2010 Completion date: March 2013**

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.

## **Ecosystem approach to fisheries management**

**(MF1001) Start date: April 2007 Completion date: March 2013**

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 conducting 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.

## **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 will provide a framework which will increase our capacity to understand and incorporate uncertainty and risk into fisheries management decisions. It will help 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 will give fisheries managers a better understanding of the way in which shellfish stocks and fleets respond to exploitation and will improve 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 will help fisheries managers to develop management measures including providing them with better estimates of uncertainty in stock assessments.

## **Developing fisheries management indicators and targets (project 1)**

**([MF1206](#)) Start date: October 2009 Completion date: June 2012**

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: August 2012**

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: June 2012**

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: March 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) including comparing data with that collected by the VMS on over 15 metre boats.



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.

### **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 will improve 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.

### **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 2011 Completion date: February 2012**

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.

### **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 2011/2012**

### **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 will provide information which can be used for further stakeholder-based projects by Defra and its Arms Length Bodies.

## **Towards a Marine Adaptation Climate Change Action Plan**

**(ME5417) Start date: June 2011 Completion date: February 2012**

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 2013**

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.

## **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: December 2012**

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: August 2012**

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.