

Government Commentary on Charting Progress 2

The state of UK seas

Our marine environment

The UK Government and Devolved Administrations welcome *Charting Progress 2*, published by the UK Marine Monitoring and Assessment Strategy (UKMMAS) community in July 2010. UKMMAS was set up by the UK Government and Devolved Administrations in 2005 to provide a better integrated understanding of our marine environment.

Charting Progress 2 is the authoritative report on the state of the UK seas, gathering together a huge body of evidence from marine agencies, research institutes, universities, environmental organisations and industries around the UK. Independent peer review of all the data by national and international scientists and the estimates of confidence in the results gives all of us assurance that we can rely on the findings as the best evidence currently available.

The UK has one of the world's richest marine environments. Our sea area is over three times larger than our land area. We have about 20,000km of coastline (roughly equivalent to half way round the world) and the complexity of the western coastline is remarkable. Over 8000 species have been recorded in our seas, ranging from whales and dolphins to sponges and sea anemones.

Charting Progress 2 explores this natural environment and highlights the benefits society receives from the sea. It also assesses man's impact through exploiting marine resources and through by-products, such as pollution and litter. It allows us to assess the progress we have made

towards achieving our shared vision of clean, healthy, safe, productive and biologically diverse oceans and seas since the first *Charting Progress* report in 2005.

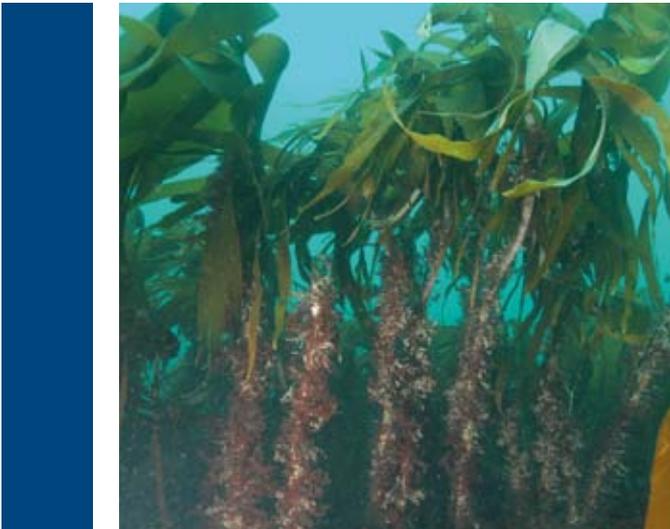
In this Commentary we highlight the important messages coming from UKMMAS's work and our approach to them. The evidence in *Charting Progress 2* is essential for policy making, planning and licensing to protect marine habitats and species, whilst using marine resources effectively. By bringing together understanding of the different elements of the marine ecosystem, with social and economic evidence to allow us to understand pressures and their impacts, *Charting Progress 2* will help to inform decisions that take into account the various aspects of ecosystems. This is essential for delivering the integration that is central to the Marine Strategy Framework Directive and to implementation of marine planning across the UK. Integrated management of our marine environment will be a major step towards achieving sustainable development in our seas.

We also identify in this Commentary where we need to improve knowledge or reduce uncertainty before we can make policy and management decisions.

Healthy and biologically diverse seas

The evidence

Charting Progress 2 provides evidence that intertidal and nearshore habitats are generally in reasonable condition, but seabed habitats in large areas of the North Sea, the Western Channel/ Celtic Sea and the Irish Sea have been impacted by mobile fishing gear.



Overall, many commercial fish stocks are still severely depleted. There are, however, signs of improvements in commercial bottom-living fish stocks (such as haddock), mainly due to improved fishing management. Species such as sharks and rays, which are particularly vulnerable to fishing pressure, are declining sharply. As a result of better management and pollution control, estuaries have become significantly cleaner since 2005, leading to an increase in both the diversity and numbers of fish. However, the numbers of elvers (young eels) have declined by 70% in England and Wales, reflecting an Atlantic-wide

down-turn of over 90% in the numbers of elvers returning to European rivers.

Most seabirds and waterbird populations increased during the latter half of the 20th century, but numbers of some species have been declining since the 1990s due to factors such as climate change, habitat loss and changes in food availability. Cetaceans, such as dolphins, are in a good condition in the North Sea and just starting to recover from a decline in numbers in the Eastern Channel. After increasing for many years, grey seal population numbers appear to be stabilising. However, harbour seal numbers in some areas have declined dramatically since 2001 and the cause of this decline is unknown.

Gaps and uncertainties in our knowledge

Charting Progress 2 includes, for the first time in UK seas, a systematic analysis of natural and human pressures on habitats and species. Maps based on survey data cover just 10% of the UK continental shelf, so data are limited. However, scientists used models and expert judgement which was peer reviewed, so we do need to look closely at the areas of concern. There are particular gaps in our knowledge of the role of microbes in the seas; turtles and cetaceans; the decline of porpoises in the eastern English Channel; lampreys, smelt, and shad; and causes of decline in salmon and eel populations in some estuaries.

Our approach

We are committed, with our EU partners, to halting the loss of biodiversity and the degradation of ecosystem services by 2020. We are taking innovative legislative measures to protect marine areas through the Marine and Coastal Access Act 2009, the Marine (Scotland) Act 2010 and in the proposed Northern Ireland legislation. These provide the tools to take an integrated approach to protecting and improving the state of our marine habitats and species, whilst using marine resources sustainably. We will establish an 'ecologically coherent' network of marine protected areas, consisting of European Sites (Special Areas of Conservation and Special Protection Areas) and marine conservation zones (marine protected areas in Scotland) established under the Acts, that will help to conserve habitats and species that are vital for the health of our marine ecosystems. Marine protected areas may also help to protect some habitats from the use of fishing gear.

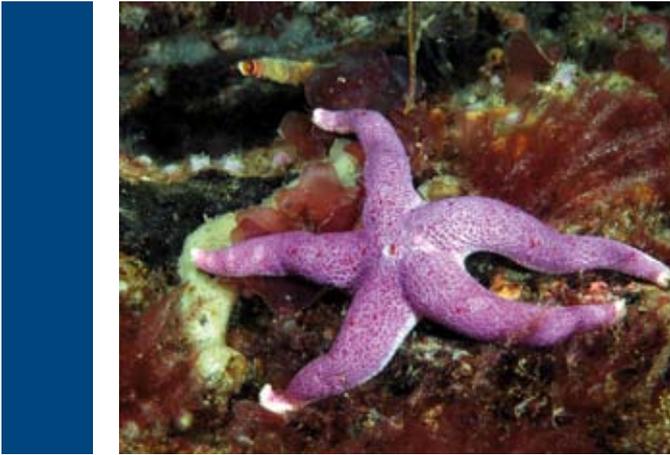
Our seas are a shared resource and international action is needed to secure our common heritage. We are seeking reform of the EU Common Fisheries Policy to achieve sustainable fisheries and healthy fish stock populations (see also page 10). This, plus marine protected areas; measures required to deliver 'Good Environmental Status' under the Marine Strategy Framework Directive; and UK fisheries management measures to reduce fishing effort and discards, will help fish populations to recover.

At a local level, we are setting up Inshore Fisheries and Conservation Authorities in England which will seek to balance the social

and economic benefits of exploiting the sea fisheries resources of their districts with the need to protect the marine environment from exploitation, or help it to recover from past exploitation. In Scotland, six pilot Inshore Fisheries Groups were established in 2009 and are being evaluated in 2010 before considering further roll-out. In Wales these functions remain the responsibility of the Welsh Assembly Government.

The implementation of the Marine Policy Statement and more effective planning and licensing of activities will also help us to protect the health and biodiversity of our seas (see also page 10). They will also ensure that the environmental impact of our actions, both alone and cumulatively, are integrated into decision-making, and that the overall health and diversity of our marine environment will be underpinned by the benefits flowing from marine protected areas.

We will support further work to assess the status of habitats and species, particularly in the development of monitoring programmes needed to meet the requirements of the Marine Strategy Framework Directive. Decisions will be based on the best available evidence and where needed we will take a precautionary view. For future assessments we will need to improve the accuracy, resolution and scope of the habitat maps; make them more cost effective through joint working where possible; and make the existing data more widely available. We are working to implement strategies on invasive non-native species, which are one of the greatest threats to biodiversity.



We will continue to work with the EU Commission and through international and regional organisations, such as OSPAR (Convention for the Protection of the Marine Environment of the North-East Atlantic), CITES (Convention on International Trade in Endangered Species), the Convention on Migratory Species, and Regional Fishery Management Organisations, to promote measures to conserve biodiversity, especially for highly threatened and vulnerable habitats, such as cold water reefs, and species such as harbour porpoises, and some sharks, skates and rays. We have also been funding research to help us to protect and manage sharks and rays through better understanding of their movements, key habitats and survivability after being caught and released.

Through the Marine Science Co-ordination Committee, we will work in partnership with the science community, both in the UK and in Europe, to address gaps in knowledge, for example of specific species, to inform management decisions. We are committed to avoiding the by-catch of cetaceans wherever possible, with effort and resources focused on monitoring areas and fisheries of most concern, while identifying ways to mitigate by-catch that are effective at deterring cetaceans over the

long term and are safe and cost-effective for the industry. We are currently focusing on research to find an effective acoustic deterrent device (Pinger) to help avoid cetaceans being caught in fishing gear. We will support further work to assess the status of lampreys, smelt, and shad, including monitoring programmes which will be informed by catch data from fishers. We will continue to join in North Atlantic Salmon Conservation Organisation (NASCO) programmes of research on marine survival of salmon; and also continue to contribute to research finding out more about European eels. The Marine (Scotland) Act 2010 specifically improves protection for seals and introduces a new licence system for their management. There are several potential reasons for the decline in harbour seals and we are investigating these.



Clean and safe seas

The evidence

Clean and safe seas matter to all of us – whether we are swimming in the sea, walking along a beach or eating fish and chips. We are making progress towards achieving clean and safe seas. Contamination by hazardous substances has reduced in most regions, due to sales of many dangerous chemicals being banned and more effective regulations reducing pollution from industry and agriculture. Some chemicals, which have been phased out or are strictly controlled may, however, take centuries to degrade. These chemicals can still be detected in sand or mud in industrial estuaries and coastal areas, and affect species such as harbour porpoises. Some persistent chemicals were also detected in deep-sea fish and marine mammals off our coasts. Eutrophication has declined and is now only a problem in 17 small harbours and estuaries.

There are only very limited concerns about radioactivity near two nuclear power stations. Since the first *Charting Progress* report in 2005, there have been no major chemical spills in UK waters, but the MSC *Napoli* oil spill affected about 3000 seabirds. Levels of oil in water discharged by the offshore oil and gas industry continue to fall in response to regulatory controls. Litter, particularly plastics, was found on all the surveyed beaches and more limited evidence shows it is also present at varying levels in the sea and on the sea floor.

Levels of microbiological contaminants in bathing waters and levels of algal toxins in shellfish

generally meet standards designed to protect human health.

Gaps and uncertainties in our knowledge

We have a good understanding of individual hazardous substances, so we have a high level of confidence in the findings. However, we have limited understanding of the cumulative impact of simultaneous exposure of the marine environment to a variety of chemicals. Similarly, although we have good information about small oil spills around the UK, it is difficult to assess their cumulative or regional impact.

We need to know more about the risks of some algal blooms that occur naturally in our seas, and which could generate toxins causing poisoning from eating shellfish, to see if we need to monitor them. We also need to investigate the levels of viruses in sea water that could affect people.

We are not yet able to assess the levels and impacts of underwater noise and litter in the marine environment.

Our approach

Better European regulation has reduced the levels of pollutants in our seas. Most problems are local in nature, particularly in industrialised estuaries and coasts, and generally associated with historic discharges or emissions from industry and agriculture. We will continue to implement European Directives which prevent pollution of the marine environment and prevent

harmful substances from being sold. Marine dumping of contaminated sediments is carefully controlled and monitored. We consider it is generally not practicable to remove the reservoirs of contaminated sediments, however, we will be encouraging the development of management plans for contaminated marine sediments. We are still finding additional man-made chemicals in marine samples, and need to keep gathering data to assess their potential impacts and the need for further controls. Measures are in place to control the nutrient inputs leading to eutrophication in the 17 affected estuaries and harbours, but recovery is likely to be slow.

Chemicals affecting fish enter the seas from all surrounding countries, so we are supporting action at the European level to deal with them. Through our marine R & D programmes we are continuing to develop our ability to detect substances through their biological effects, so that we are alert to new risks.

Radioactive particles are being retrieved from the beaches near Sellafield and Dounreay, (as well as from the seabed at Dounreay), but levels are not above the recommended levels to lead to beach closures, although harvesting seafood around Dounreay is currently banned.

We will continue to tackle problems of microbiological contaminants entering the seas from land. Water companies are committed to a significant programme of work to improve waste water infrastructure, including measures to address discharges to bathing waters and shellfish waters. Further measures will also be put in place to reduce diffuse pollution from urban and agricultural sources. Such work will offer

additional protection to shellfish harvesting areas and help to deliver compliance with the more stringent bathing water standards which will be in place from 2015. If concentrations of indicator bacteria or algal toxins in shellfish do not meet health standards, fisheries are closed or shellfish are purified before sale.

The Marine Strategy Framework Directive will be a key driver for future work in tackling marine litter. We will carry out research on the impacts of marine litter, in particular the effects of micro-particles on the marine environment. We recommend that we continue to develop the survey methodology at the regional seas level for beach litter to improve the evidence base to guide future policy and management decisions. We will extend our beach monitoring programmes to all *Charting Progress 2* regions and seek better enforcement of legislation and agreements to prevent littering on beaches and at sea. We will also continue to monitor the effectiveness of Fishing for Litter schemes. We are planning to fund research to help improve our understanding of the impacts of noise on marine animals and to develop our ability to monitor noise more effectively.



Productive seas

The evidence

Charting Progress 2 gives us an improved understanding of the economic benefits and pressures of marine industries. Oil and gas contribute the most to the national economy followed by maritime transport, telecommunications, leisure and recreation, military defence, fisheries and aquaculture, although these latter sectors can have an important role in supporting local economies, particularly in rural areas. Renewable energy and flood and coastal defence activities have more than doubled between 2003 and 2008/9.

The main pressures on the marine environment are climate change and habitat damage and loss from fishing (bottom-trawling). Other industries mainly cause localised pressure, for example aquaculture and structures on the seabed; pollution from land and marine-based sources; introduction of invasive species from maritime transport and marine aquaculture; noise from

construction and operational activities; and litter from a wide range of sources. Some industries, such as oil and maritime transport, have the potential for a severe impact on the marine environment in the event of a major spill.

Industries, such as carbon capture and storage and renewable energy, also have the potential to make effective use of marine resources which safeguard the environment for the future by reducing the pressure from climate change.

Of the twenty fin-fish stocks assessed, those being harvested sustainably and at full reproductive capacity has risen from about 10% in the early 1990s, to about 25% in 2007; and the proportion being harvested sustainably has risen from 10% to around 40% over the same time period. Most are still fished at rates above those which would provide the highest long-term yield, but further improvements in stocks have been noted recently¹.

Gaps and uncertainties in our knowledge

Charting Progress 2 has improved our knowledge of the uses of our seas and pressures on our marine environment. The UK has robust regulatory processes for marine activities but we are not yet able to assess whether all the activities in our seas, when combined together, amount to sustainable use.

We need to agree how to assess some of the pressures, especially noise, litter and invasive



¹ Biodiversity Indicators in Your Pocket 2010 (Defra)



species, and to know the impacts of increasing activity in renewable energy, coastal defence and gas storage.

We need more research on the economic value of the services our marine ecosystems give us (such as climate benefits) and the value people place on the existence of a healthy, biodiverse marine environment. We need a better way to establish the value of different economic activities, including leisure and recreation, waste disposal and carbon capture and storage. We also need to be able to work out how marine activities contribute to social values, such as upholding cultural traditions in local fishing communities.

Our approach

Under the Marine Strategy Framework Directive we have to take action to achieve 'Good Environmental Status' in our seas by 2020. This will provide the driver for new measures to reduce pressures on our seas where action is needed.

The innovative measures in the new Marine Acts provide the legislative base for marine planning systems to ensure an integrated approach to all

activities and the sustainable use of our seas. The first step in the planning systems is the Marine Policy Statement which, after consultation, we aim to adopt in spring 2011. It will articulate a joint vision and objectives for our seas and provide the strategic framework for Marine Plans. These Plans will provide clear, spatial, locally relevant guidance for policy implementation and delivery and ensure that licensing decisions contribute to national and locally specific objectives proactively shaping the future of our marine area. This new system will help us to plan for change in an integrated way. Changes will include the forty-fold increase in UK energy from renewable sources we are aiming for by 2020, which implies a significant expansion of offshore wind farms.

In April 2009, the Scottish Government established Marine Scotland and in April 2010 the UK Government set up the Marine Management Organisation for England to deliver integrated marine management, by combining delivery and evidence functions in a single body. Teams in the Welsh Assembly Government are responsible for marine management.



Fundamental reform of the Common Fisheries Policy will be essential to safeguard fish stocks, integrate fisheries management with marine conservation and reduce discards (throwing out small or over-quota fish), whilst encouraging a long-term profitable industry that enables fishers to optimise sustainable returns from the sea rather than encouraging a race to fish. For many stocks, such as North Sea cod and haddock, recovery or long-term management plans have been agreed to restore them to safe levels and manage them for long-term sustainability. We want to see long-term management plans adopted for more stocks and are working with scientists and fishermen on this. We are also working with the fishing industry to trial more selective gear to avoid catching small fish and species which they are not targeting. In the North Sea we are operating real-time closures to protect spawning or young fish. In addition, we are trialling real-time closures to protect aggregations of cod of all ages in the North Sea. We are also trialling a new way of managing fisheries, using catch quotas for North Sea cod, which allows fishers to land more of what they catch and encourages them to use more selective gear.

The UK Marine Policy Statement and the rolling programme of Marine Plans will ensure the strategic management of our seas, optimising the economic potential of our marine resources, while safeguarding our marine environment and ensuring that our seas contribute to social needs and our well-being. Marine Plans will be an essential tool for delivering the Marine Strategy Framework Directive and involving local communities in marine decision-making. We will be getting better information on the impacts of pressures from monitoring programmes

and improved licensing under the new marine legislation.

We will seek ways to develop a framework for valuing UK seas based on ecosystem goods and services. This will help us to capture in monetary terms the value of activities including pipelines, power transmission and carbon capture and gas storage. We are starting to evaluate the contribution that marine activities make to social values, for example through the Sustainable Access to Inshore Fisheries Project, which is investigating the social benefits of fishing to coastal communities. Work has started in England and we are working on possible applications of the project in Scotland.



Ocean processes and climate change

The evidence

Charting Progress (2005) identified climate change as a threat to marine ecosystems but did not include a detailed climate impact assessment. *Charting Progress 2* indicates that sea surface temperatures around the UK have risen between 0.5°C and 1°C from 1871 to 2007, much of this since the mid 1980s. This reduces the ability of the ocean to hold oxygen and soak up carbon dioxide, forcing some species to adapt, move or suffer ill-effects. In the mid-to-late 1980s rising sea temperatures were associated with the sudden shift in plankton species in our seas, which affected the marine ecosystem because plankton are food for many marine species. Some North Sea fish have moved north and to deeper waters in the last 30 years. In some areas of the north-east Atlantic, since the mid 1980s there are more harmful algal blooms due to climate change.

Unless we reduce human greenhouse gas emissions, by the end of the century the acidity of our seas may double. This could adversely affect hard-shelled marine organisms such as shellfish and coral. It could also reduce the ocean's capacity to soak up atmospheric carbon dioxide, thus aggravating climate change.

Increases in sea surface temperature contribute to rising sea levels. During the 20th century, mean and extreme sea levels have risen by about 14cm. This increases the risk of flooding and salt damage to plants; and may allow larger waves to hit the shore eroding or damaging coastal structures.

Gaps and uncertainties in our knowledge

From the work of the UK Marine Climate Change Impacts Partnership (MCCIP), set up in 2005 in response to *Charting Progress*, we know that climate change is likely to play an increasingly significant role in changing the state of our seas, even though our scientific confidence in projections of future climate varies widely, due to lack of understanding of key processes such as storms and ice sheet melting, and the difficulty of predicting changes in greenhouse gas emissions.

Since 2005, with more data and better data, plus computer modelling, scientists have been able to assess the state of ocean processes more accurately than was possible for the *Charting Progress* (2005) report. To get an even more robust picture of climate change in complex marine ecosystems, scientists need to maintain regular collection of data and improve the models further.

It is still difficult to predict how climate change could alter the natural uptake of carbon by the oceans. It is also difficult to tease out the impacts of climate change from the pressures of other activities on fish and species, such as seabirds, which feed on them.

Our approach

Charting Progress 2 brings the mounting international evidence on climate change close to home. Through the Climate Change Act 2008 and the Climate Change (Scotland) Act 2009,

we are reducing greenhouse gas emissions. We are working internationally to help to achieve global reductions and are continuing to carry out monitoring and research to get more robust information on trends and possible impacts. We are also making plans for adapting to climate change, for example taking measures to enhance the resilience of the marine environment, strengthen long-term planning and increase the adaptive capacity of marine users. We are implementing marine conservation zones in a flexible way to allow reaction to climate change.

Defra is jointly funding a major programme of research on ocean acidification with the Natural Environment Research Council (NERC) and the Department of Energy and Climate Change (DECC). It will include monitoring of ocean uptake of carbon dioxide and will explore impacts of increased ocean acidity on marine life, as well as modelling impacts of future scenarios.

We will work with MCCIP to bring in a new five-year programme, continuing the production of report cards and special topic reports, but also providing more focussed support on adaptation, an example of which is the current coastal change pathfinder programme.

We are working with the Centre for Environment, Fisheries and Aquaculture Science (Cefas) and Marine Scotland Science to continue to assess the scale of impact and monitor the changes in distributions of both commercial and other North Sea fish in response to climate change. We will work with the Sir Alister Hardy Foundation for Ocean Science to investigate whether the changing plankton populations in the North Sea will have implications for the foodwebs.



Next steps

The UKMMAS community now reports to the Marine Science Co-ordination Committee, which prepared the UK Marine Science Strategy.² The Strategy highlights as priority areas for future research: understanding how the marine ecosystem functions; responding to climate change and its interaction with the marine environment; and sustaining and increasing ecosystem benefits. It also seeks to enable greater collaboration and co-ordination between funders of marine science.

Marine research is very expensive so collaborative research is a priority. We also need to seek novel techniques to collect as much data as possible at minimum cost. Defra and the Devolved Administrations are working together closely on marine science.



² See: www.defra.gov.uk/environment/marine

Where to find more information

Charting Progress 2, its Overview and technical Feeder Reports, and *Charting Progress (2005)* are at:
<http://chartingprogress.defra.gov.uk>

The Department of the Environment, Northern Ireland and the Scottish Government will be publishing assessments of the state of the seas around their coasts which will be available at:

www.ni-environment.gov.uk

www.scotland.gov.uk/Topics/marine/science/assessment

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