Offshore waters

Our seas are biologically diverse and relatively unpolluted. Some fishing is unsustainable, and energy production competes for space and increases pollution risks.

Summary

Key messages

- Scotland's seas are mainly clean and safe, although there are some localised areas of concern.
- Our seas support a diverse array of habitats, and nationally and internationally important populations of certain species.
- They also contribute to the economy, supporting a wide range of human activities.
- The two widespread significant pressures on offshore waters are:
    - human activity contributing to climate change.
    - fishing, which impacts on the sea bed and species.
- Decision-making is being improved through marine planning and the development of the National Marine Plan.

State and trend

A detailed assessment of Scotland's Seas was made in Scotland's Marine Atlas (2011).

Please read the topic for more information; if you have any questions about Scotland's offshore waters please feel free to contact us using the comment button above.

Overview

Scotland's seas support around 6,500 species of plants and animals. Examples include:

- **seabirds** – in breeding colonies around the coasts of Scotland;
- **seals** – grey seals;
- whales, dolphins and porpoises, collectively known as **cetaceans**;
- sharks, rays and skates, including the basking shark, which is the world's second-largest fish;
- deeper-water species, such as cold-water corals and deep sea sponges;
- occasional visitors; for example, leatherback turtles and bearded seals;

- **plankton** – microscopic plants and animals at the bottom of the food chain.

Scotland's 'offshore waters' begin three nautical miles from the coast and extend to the Exclusive Economic Zone (EEZ) limit, generally about 200 nautical miles, covering a sea area of **462,263** square kilometres (km^2). Beyond the EEZ is the seabed forming the continental shelf. The sea areas less than three nautical miles from the coast are known as 'coastal waters'.

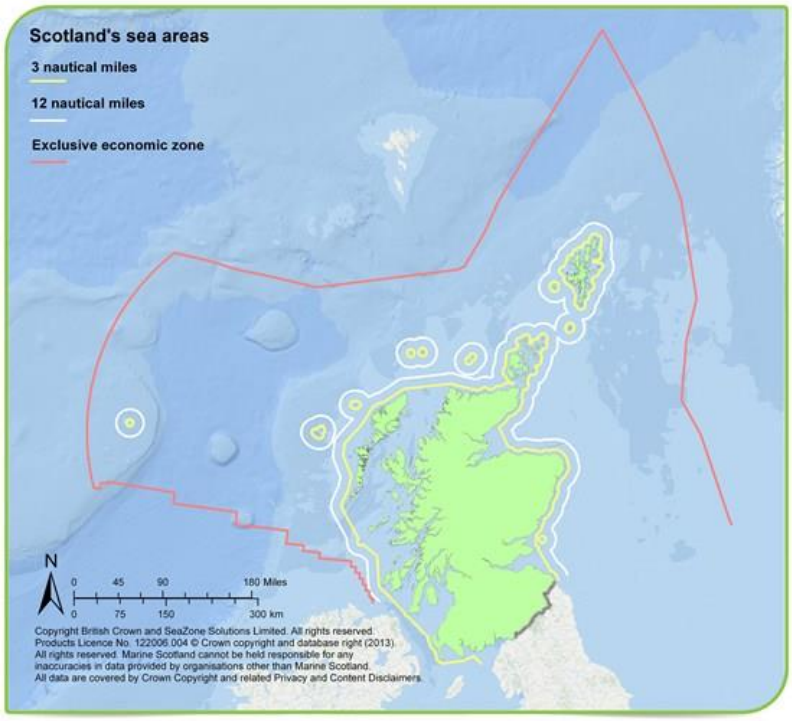

Figure 1: Scotland's marine limits

Table 1: Scotland's sea areas

Description of sea area	Geographical limit	Area of sea covered (km^2)	Legislative description
Waters covered by the Water Framework Directive (WFD)	High water mark to yellow line in Figure 1	48,710	Limit to which WFD measures have been implemented
Territorial waters outside WFD limits	Yellow line to white line in Figure 1	41,694	Territorial sea limit – limit of Scotland as defined in the Scotland Act
Territorial waters	Low water mark to white line in Figure 1	55,484	

Offshore waters	White line to red line in Figure 1	371,859	
Scotland's seas	Yellow line to red line in Figure 1	413,553	
Area within fishery limits	High Water Mark to red line in Figure 1	462,263	Exclusive Economic Zone (EEZ)

Scotland's seas range from shallow shelf seas (less than 200 m deep) to deep oceans (more than 2000 m deep). The shelf seas contain features like banks and deep channels, whereas the deep oceans have complex, varying depths broken up by steep ridges, seamounts (mountains under the sea) and banks. The seas around Scotland contain a wide variety of habitats and species. This diversity is due in part to the geographic position of Scotland, with influences from warm Gulf Stream waters in the west and cooler waters from the Arctic in the north and east.

Mud, sand and coarse sediments predominate in the North Sea and in the area to the west of the Hebrides and north of the mainland. By contrast the sea bed to the far west and north is characterised by mud and fine clay, with coarser sediments in shallower water and on banks and seamounts.

There is limited, but increasing, knowledge of the sea-bed habitats in waters more than 200 m deep. However, we do know that these habitats contain cold-water coral reefs, coral carbonate mounds, submarine canyons, seamounts and deep-sea sediments.

Seawater circulation

A position on the continental shelf means that the seas around Scotland are directly affected by several oceanic currents (Figure 2). The processes that cause deep and shelf waters to mix are complex, and have a significant impact on conditions in Scottish waters. For example, processes that cause mixing in the sea to the west of Scotland bring nutrients closer to the surface. This encourages plankton growth, which is an important food source for commercial fish stocks.

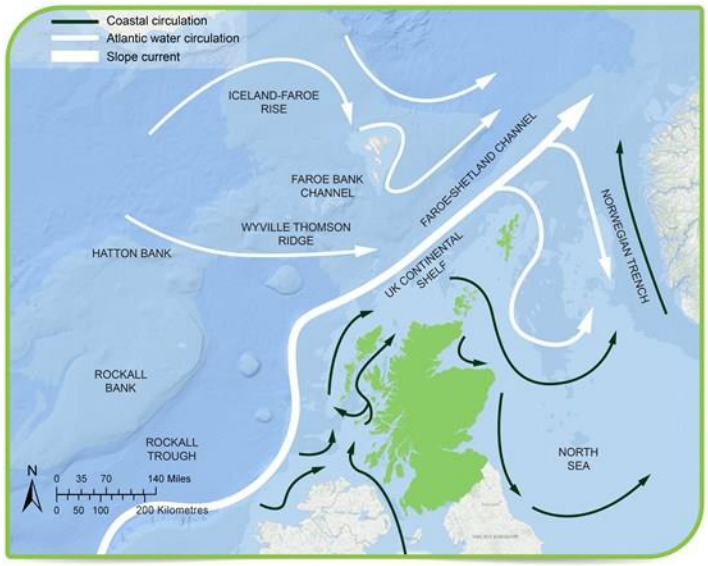

Figure 2: Scotland's seawater circulation

Offshore waters and the economy

Fishing has a long history in Scotland, and it is important to the economy because of the value of the catches landed as well as for the employment it provides, often in more remote communities where employment opportunities are scarce. In 2012, 411,765 tonnes of fish were landed from Scottish waters, with a sale value of £464 million.

In 2011, Scotland accounted for over 60% of European Union oil production, and approximately one-third of EU total hydrocarbon production. Most oil and gas extraction in Scottish territorial waters takes place in offshore waters. The main benefit to Scotland is employment, in exploration as well as support services.

Development of offshore renewable energy sources will help to provide Scotland with secure, clean energy supplies in the future. For example, the two demonstrator wind turbines located in the outer Moray Firth, and recent decisions have given the go-ahead for further offshore developments Wave and tidal energy is also developing currently.

Many leisure and recreation activities take place along the beaches and inshore coastal waters but offshore waters are also used, for example, for diving on wrecks, yachting and some wildlife watching.

State

The warming of the Earth's oceanic surface and pressures from fishing are affecting offshore marine wildlife.

Scotland's Marine Atlas is the main source of data on the condition of Scotland's seas. Key data are summarised below.

Offshore habitats and species

Scotland has internationally important numbers of 24 species of breeding seabirds that are important indicators of the state of the marine environment. Scottish populations of these birds are studied as part of the UK Seabird Monitoring Programme. This shows a decline in the abundance of seabirds since the early 1990s, stabilising to approximately 72% of the 1986 level by 2007-2010.

Numbers of grey seals increased until the 1990s but recently this increase has slowed down.

Some Cetaceans can range widely, whereas others are more localised. Their greatest diversity in Scottish waters is found off the continental shelf to the north-west of Scotland.

All species of Sharks and rays are on the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic list of threatened and declining species due to fishing for these species in particular, and as a result of them being inadvertently caught when fishing for other species.

We know less about deeper-water habitats, such as cold-water corals, and it is difficult to estimate their state.

Plankton is monitored mainly in coastal waters, and changes have been observed that may be linked to climate change. There has been a northward shift in the distribution of many species of plankton over the last 50 years, and the timing of plankton production has also changed.

Several non-native species are present in Scottish waters and some are considered to be invasive, such as acorn barnacles and wireweed.

Overall, the assessments of habitats and species show declines in many areas, pointing to changes in biodiversity throughout Scotland's seas.

Commercial fish and shellfish stocks

Commercially important fish and shellfish species fall into the following groups.

- **Widely distributed stocks (around the north and west of Scotland)** – the most important species are mackerel and blue whiting, with lesser fisheries for megrim, anglerfish, saithe, hake and Atlanto-Scandian herring. The mackerel stocks are in good condition, as are the stocks of Atlanto-Scandian herring, but there is concern about blue whiting stocks. Megrim and anglerfish stocks are currently under assessment, but recent surveys point to an increase in megrim and the anglerfish stock is generally stable.
- **North sea stocks** – cod, haddock, whiting, herring, sole and plaice are the six main stocks. Herring, haddock and plaice are being fished sustainably, but sole and cod are being fished above sustainable limits. It is very difficult to assess the numbers of whiting, and the status of this stock is unknown.
- **West of Scotland stocks** –two haddock stocks are present (in separate locations) and are fished close to the set limits, along with the cod stock, which is in very poor condition. West-coast herring is fished at a broadly sustainable rate and data for the whiting fishery are sparse, but the indications are that the stock is in a very poor condition.
- **Shellfish** – nephrops, scallops, lobster, brown crab and velvet crab represent almost one-third of the value of all landings by Scottish vessels in 2011. Most edible crab stocks are fully exploited or overexploited, as are lobsters. There are underexploited stocks of brown crabs to the north and west of the Hebrides. The nephrops stocks in the North Sea are also underexploited. Scallop stocks to the west of the Hebrides and off the north-east coast are overexploited or nearly so, whereas stocks around the Shetland Isles appear to be the healthiest.

The warming of Scotland's seas has changed plankton communities and the incidences of more southerly fish species migrating northwards has increased.

The implications for the fishing industry are fewer opportunities to catch and sell some species. For example, it appears that the environmental conditions for cod in the North Sea are less favourable than in the past.

Hazardous substances

Hazardous substances are released into the environment as a result of human activities or natural processes. They can be present in the water column, sediment and wildlife (including fish), and include:

- polychlorinated biphenyls (PCBs);
- polybrominated diphenyl ethers (PBDEs);
- trace metals (e.g. copper, zinc, lead, cadmium, arsenic);
- endocrine disruptors.

Offshore monitoring is difficult, particularly the deep seas to the west of Scotland, but the limited data for hazardous substances in the offshore environment do not show any problem areas.

For example, deep water fish (currently non-commercial species in Scotland – black scabbard, black dogfish and roundnose grenadier) caught at depths of 400–1500 m off the west coast of Scotland have low concentrations of PCBs and PBDEs. These concentrations are probably due to diffuse atmospheric inputs.

Oil and gas exploration

Several surveys (e.g. Fladen Ground and East Shetland Basin) of hydrocarbons in sea-bed sediment, which gives an indication of the amount of oil released in waste drill cuttings, show that the concentrations of hydrocarbons more than 5 km from drilling platforms have decreased since the first surveys in 1986. The overall assessment is that there are few or no concerns and that there is no indication of hydrocarbon contamination more than 5 km away from any oil installation.

Although dumping drill cuttings contaminated with oil or diesel into the sea has been prohibited since 2000, problems may still be caused by previously dumped drill cuttings close to oil installations. Intensive studies of drill cuttings piles have shown that over time the extent of pollution and associated biological effects is decreasing, and that there are clear signs of recovery further than 500 m from the platform.

Accidental oil and chemical spills

The Advisory Committee on Protection of the Sea produces annual reports on oil and chemical spills in coastal and offshore UK waters.

Oil and chemical spills are monitored to manage any contamination of the sea or harm to wildlife. The Maritime and Coastguard Agency (MCA) is responsible for taking action in relation to oil and chemical spills in Scottish seas. Most offshore spills occur at oil and gas installations, which are located mostly in the East Shetland, Fladen and Forties sea areas. There are very few spills elsewhere. The most recent published data are for 2011 (ACOPS 2011), and these reported that the spills were minor. They had no significant impact, and many were so small that they dispersed naturally.

Eutrophication

Eutrophication occurs when excess nutrients in water increase the growth of algae and plants. This leads to undesirable effects; for example, fish deaths caused by decaying algae removing oxygen from the water. The key nutrients that cause marine eutrophication are nitrogen and phosphorus. These nutrients occur naturally but their concentrations can be increased by domestic waste and run-off from farmland. This can affect coastal waters the most, so most monitoring of nutrient concentrations is carried out in coastal waters. Offshore waters in the northern North Sea have also been monitored, and the nutrient concentrations do not show any problems.

Litter

Marine litter is defined as 'any persistent manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environments, including material lost at sea in bad weather'. Plastic is the main type of litter found in our seas. Other types of litter include paper, textiles, rubber, wood and metal. Marine litter in our offshore waters comes from the land, shipping, and other industries. It is also carried by currents from other countries. Litter on beaches is recorded by the Marine Conservation Society. Data on the amounts and types of offshore litter are limited due to limited monitoring. The KIMO Fishing for Litter project provides fishing boats with bags to collect marine litter caught in nets and fishing gear. This is then brought ashore and weighed. Plastic and polystyrene makes up the bulk of this litter.

Noise

For most marine mammals, many marine fish and possibly shellfish, sound is important for communication and navigation, searching for prey and for avoiding predators and hazards. There are many sources of man-made noise in the sea, such as:

- shipping;
- seismic surveys;
- offshore construction and industrial activities;
- sonars (sound navigation and ranging).

There are currently not enough data to assess noise pollution in Scottish waters. As part of the Marine Strategy Framework Directive implementation, noise is being studied and a 'noise registry' being established.

Pressures affecting Scotland's seas

Increasing average temperatures and changes in water chemistry are putting pressure on marine ecosystems.

There are two significant, widespread pressures on the Scottish marine area:

- warming of the Earth's oceanic surface and the consequent changes in seawater salinity (saltiness), temperature and circulation;
- fishing, which affects the sea bed and species.

Pressures that could have a more localised impact are:

- marine litter, from both land and sea sources;
- accidental oil and chemical spills, from transport and energy exploitation ;
- noise, for example from renewable and traditional energy exploitation ;
- invasive non-native species, arriving due to climate change or being transported;

Commercial fishing

Many commercial fisheries target a range of species, and catching non-target species may be unavoidable. This may reduce stocks of species not being targeted. Fish can get trapped in lost or abandoned fishing nets or lobster creels, which can further reduce fish stocks.

Fishing gear dragging along the sea bed can damage the sea bed habitat. Noise and litter also have a physical impact, although how this affects marine life is not yet fully understood.

Climate change

Scotland's maritime climate is largely influenced by the water temperature, its salinity, the circulation of currents and the exchange of heat, water and gases with the atmosphere. Changes in these climatic influences affect Scotland's seas. In recent decades Scotland's seas have become warmer and the shelf seas and ocean waters to the north and west of Scotland have become more saline. As a consequence of this, cold-water species have moved further north, and the likelihood is that warmer-water species will replace them. Warmer conditions in the North Sea have triggered a change in plankton abundance and distribution, and this has had a knock-on effect on some seabird species due to reduced availability of prey.

Acidification

Acidification of seawater, which happens when the sea absorbs carbon dioxide from the atmosphere, is also on the increase. The effects of this are complex, affecting things like marine biogeochemical and ecosystem processes and organisms that need calcium carbonate to grow their shells.

Offshore marine litter

The damaging effects of marine litter are found throughout the seas. Wildlife can ingest litter or become entangled in it. Plastics and microplastics can transport hazardous substances around the world's oceans. Invasive non-native species can also be transported on marine litter.

Offshore renewable energy

Renewable energy may cause noise pollution and habitat loss. Noise can be generated during construction and from turbines moving. Habitats can be lost or damaged during construction activities. There is also more risk that ships could collide with the equipment, causing pollution due to accidental spillages.

Offshore oil and gas

The oil and gas industry has been active in Scottish waters since the late 1960s. The main pressures arising from this industry are:

- habitat damage or loss arising from the physical presence of exploration structures and pipelines;
- chemical pollution due to accidental spills;
- noise pollution.

Noise

The increase in offshore construction will have at least a local impact on noise levels in the sea. There is also noise generated at offshore installations as well as by shipping.

Invasive non-native species

Non-native species are introduced both accidentally and deliberately into the Scottish marine environment. One of the main causes is ballast water from ships. When established, non-native species can multiply and spread in ways that damage native species.

What is being done

Legislation is paving the way for practical measures that will improve the management of all Scotland's seas, including offshore waters.

Policies and legislation

The European Marine Strategy Framework Directive (MSFD) requires Member States to prepare national strategies to manage their seas to achieve or maintain Good Environmental Status (GES) by 2020. The MSFD covers a wide range of environmental indicators, including biological diversity, marine food webs, levels of noise and marine litter.

The Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 are important pieces of legislation for marine planning and conservation in Scottish seas to their EEZ limits. The Marine Scotland Act (2010) implements the European Marine Strategy Framework Directive and sets obligations relating to global and regional (North Atlantic and European) legislation and directives.

Internationally there are a number of instruments to safeguard the seas. The International Maritime Organisation (IMO, the United Nations agency responsible for the security and safety of shipping and the prevention of marine pollution from ships), oversees the implementation of the MARPOL Convention (covering prevention of pollution of the marine environment by ships from operational or accidental causes) and the London Convention (promotes the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter). In addition, the EU Birds and EU Habitats Directives provide for designations to protect marine habitats and species.

Sustainable management

Sustainable fisheries

Reform of the Common Fisheries Policy and new approaches to managing Scotland's inshore fisheries aim to ensure that fishing activities are sustainable and can also be used to protect habitats and other species. This action will contribute to cooperative strategies under the EU Marine Strategy Framework Directive to ensure our marine environment is in Good Environmental Status.

Litter

Fishing for Litter is a scheme to clean up the North Sea. It involves fishermen returning the litter caught in their trawls for measuring and disposing of properly. Currently, 162 fishing vessels and 17 harbours in Scotland are signed up to this. By March 2011, 200 tonnes of litter had been removed from the North Sea, ranging from plastic debris to mattresses and fridges.

Ballast water legislation

The International Convention for the Control and Management of Ships' Ballast Water and Sediments is part of IMO and aims to prevent the potentially devastating effects of the spread of harmful aquatic organisms carried by ships' ballast water from one region to another.

OSPAR

The OSPAR Convention guides international co-operation on the protection of the marine environment of the North-East Atlantic. Work to implement the OSPAR Convention and its strategies is taken forward through the countries agreeing to legally-binding decisions.

Oil and chemical spills

The Maritime and Coastguard Agency (MCA) responds to oil and chemical spills at sea.