Estuaries and coastal

Scottish coastal and estuarine habitats are full of rich, diverse and fragile sea life that is under considerable pressure and shows signs of damage, but may be recovered through sustainable management.

Summary

Key messages

- Scotland has 18,672 km of coastline, with a wide variety of coastal and estuarine habitats that provide places for thousands of species to live.
- These habitats and their wildlife are a major asset for Scotland, but they have been severely affected by a variety of human activities.
- A number of industries, including fishing, tourism and aquaculture, rely on healthy coasts and estuaries.
- It is essential to recognise our dependence on this ecosystem and manage our coasts and estuaries sustainably to reduce damage and promote recovery of our inshore wildlife.

State and trend

A summarised assessment of the state and trend has not been made for this topic.

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

Overview

Scotland's inshore and coastal resources are enormous. Scotland has an estimated 18,672 km of coastline, which makes up 8% of Europe's coast. The sea areas less than three nautical miles from the coast are known as coastal waters (Figure 1).

These range from brackish (slightly salty) to full salinity, and reach a depth of 120m.

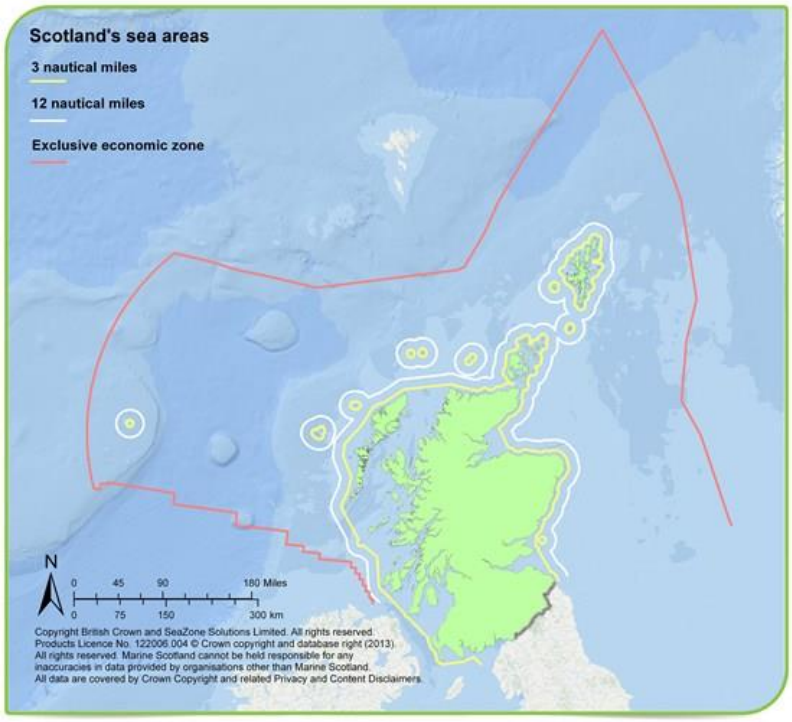

Figure 1: Scotland's coastal and estuarine waters

Scotland's coasts and estuaries have been extensively described in Scotland's Marine Atlas and in a video clip. The vast array of habitats helps us understand the biological richness of our inshore waters. Our coasts include estuaries, bays, sea lochs, voes and cliffs. Underwater, this complexity continues, with underwater cliffs and mountains, valleys, boulder slopes, and vast areas of gravel, sand and mud. Scottish coasts have extremes of temperature, wave exposure and salinity. The coastal waters vary from the clear blue found around the Hebrides, where light penetrates to 50 metres deep, to the dark and green-tinged waters of the east-coast estuaries.

A number of industries rely on healthy sea life – including fishing, tourism and aquaculture. Estuaries and coasts provide us with many benefits, including a source of food, educational interests, and a place for recreation and quiet relaxation. Many people spend their recreation time on inshore waters and surrounding shores, such as the seaside or on coastal footpaths. Whether it is simply for views of the sea, wildlife watching or taking part in fishing and water sports, people enjoy the sea and the nature it sustains.

Plants and animals

Scotland's coastal waters are among the world's most biologically diverse; the plants and animals that live here vary from large charismatic mammals to fingernail-sized shrimps that inhabit rock pools.

Figures 2 to 4 below show cross-sections of a typical Scottish sea loch. Scotland's sea lochs are some of the richest areas for sea life and are typically flooded 'U'-shaped valleys carved during the last ice age. They contain a vast array of habitats – from salt marshes at the head of the loch, to steep boulder slopes, sheer cliffs and often a sill at the sea mouth of the loch.

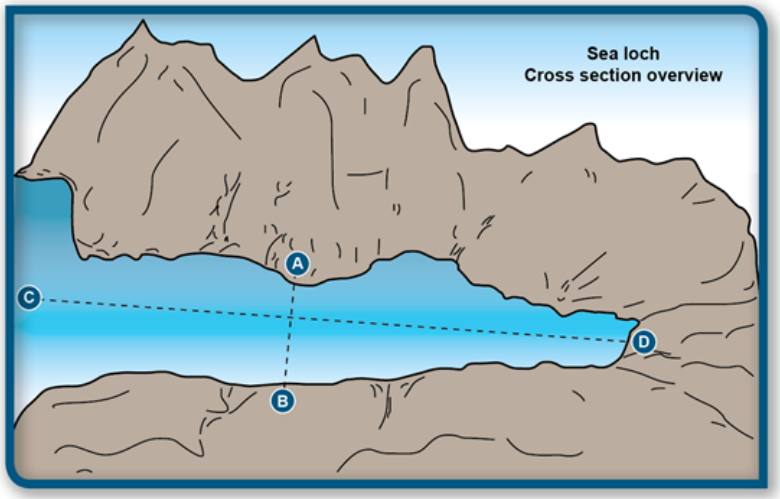

Figure 2: Cross section overview of a sea loch

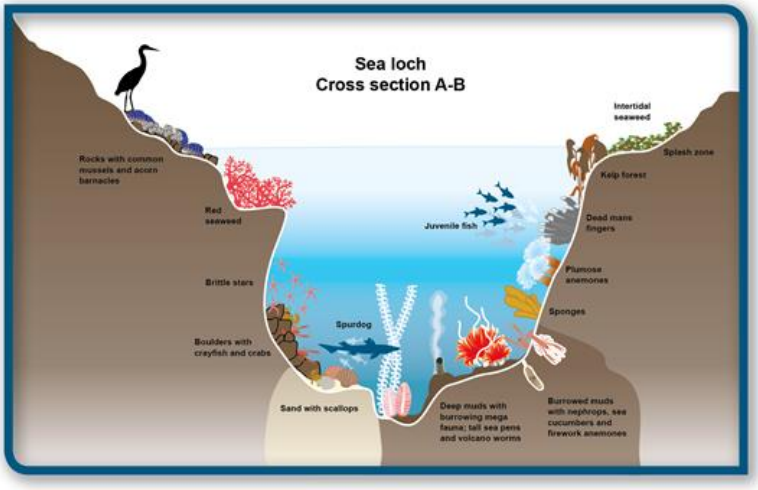

Figure 3: Cross section A-B of a sea loch

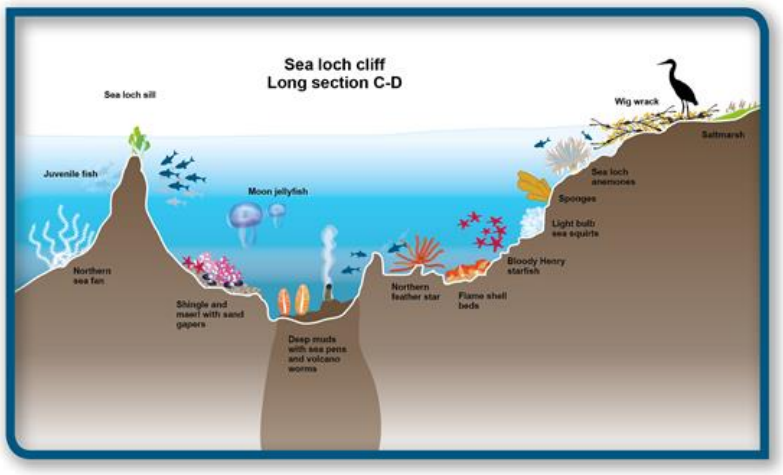

Figure 4: Long section C-D of a sea loch cliff

Scottish sea lochs are mostly found on the west coast of Scotland and are sheltered habitats that can host fragile species such as Serpulid reefs, flame shell beds and brittle stars. Their deep waters close to the shore are host to species such as the northern feather star, the wispy sea-loch anemone and the tall sea pen. Their deep, soft sea-loch muds are home to burrowing animals such as Norway lobsters, sea cucumbers and the firework anemone. These deep inlets are sheltered nurseries to many juvenile fish, including the endangered spurdog and the thornback ray. Follow this link to experience a simulated dive in Loch Sunart to see where some of these species live (this may take a few seconds to load).

- **Fish** live and breed in Scotland's estuaries and open coasts. The many different fish species include common species like butterfish and sand eels; northern species such as wolf fish; colourful fish such as leopard-spotted goby; familiar commercial species, such as mackerel, cod and herring; demersal (sea-bottom dwelling) fish like flounder, gurnard and dragonet, and fish caught by sea anglers, such as tope, wrasse and skate.
- **Invertebrates** (animals without backbones) make up the most colourful and prolific proportion of creatures found in Scottish inshore waters. Coastal and estuarine invertebrates burrow in sediments, hide in rocky crevices or are attached to man-made objects, such as piers and moorings. Examples include breadcrumb sponges; sea anemones; candy-striped worms; sea urchins; crabs and lobsters; starfish; sea-slugs; scallops and octopuses.
- **Birds** also find shelter on the Scottish coastline. Many are transient, resting onshore or rafting (floating in groups) on sheltered waters during their migration. Some species come specifically to breed. For example, gannets have formed the largest single-rock colony in the world on the Bass Rock in the Firth of Forth.
- **Reptiles**, such as leatherback turtles, have been reported all round our coasts.

- **Marine mammals** are seen more frequently than reptiles. Twenty-three species of cetaceans (whales, dolphins and porpoises) have been recorded in Scottish waters over the last 25 years. Of these, 11 species are regularly sighted and are the focus of a thriving coastal-wildlife tourism industry. Resident mammals, such as grey seals and harbour seals live in Scottish waters and haul out on shores for breeding and moulting.
- **Seaweed** (marine algae) is the most obvious marine **plant** and various types are found on shores and in shallow waters. Seagrasses and tasselweeds are mostly found in coastal lagoons and, like all sea plants, they provide food and shelter for many marine animals.
- **Plankton** is a mixture of **Phytoplankton** (microscopic plants) and **zooplankton** (made up of small creatures, such as copepods, and larval forms of marine animals). These microscopic plants and animals drift in water or settle on estuarine and coastal sediments. They are the basis of the sea's food webs and oxygen cycles, and are the food source for large species like herring and basking sharks and filter-feeders such as oysters and tubeworms.

Estuarine and coastal ecosystems are complex and changes can have consequences far beyond inshore waters. Scotland's estuaries and coastal waters have been identified as important spawning and nursery areas for important commercial species; loss or damage to their habitats affects the fishing industry and local coastal communities, and consequently affects Scotland's economy. The loss of living habitats such as kelp forest would not only be biologically and economically damaging, but may also be physically damaging. For example, on the west coast of Scotland this would lead to a reduction of physical shelter from prevailing westerly storms that damage Scottish coasts.

State

There are many concerns about Scotland's inshore sea life due to the pressures on their habitats and their supporting food webs.

The overall assessment within Scotland's Marine Atlas for species and habitats shows the poor state of marine biodiversity. On the whole, Scotland's inshore biology has suffered a decline in status. Figures 5 and 6 show the assessments for inshore waters from Scotland's Marine Atlas, and the prevalence of orange and green labels indicates there is concern for the species and habitats in these waters.

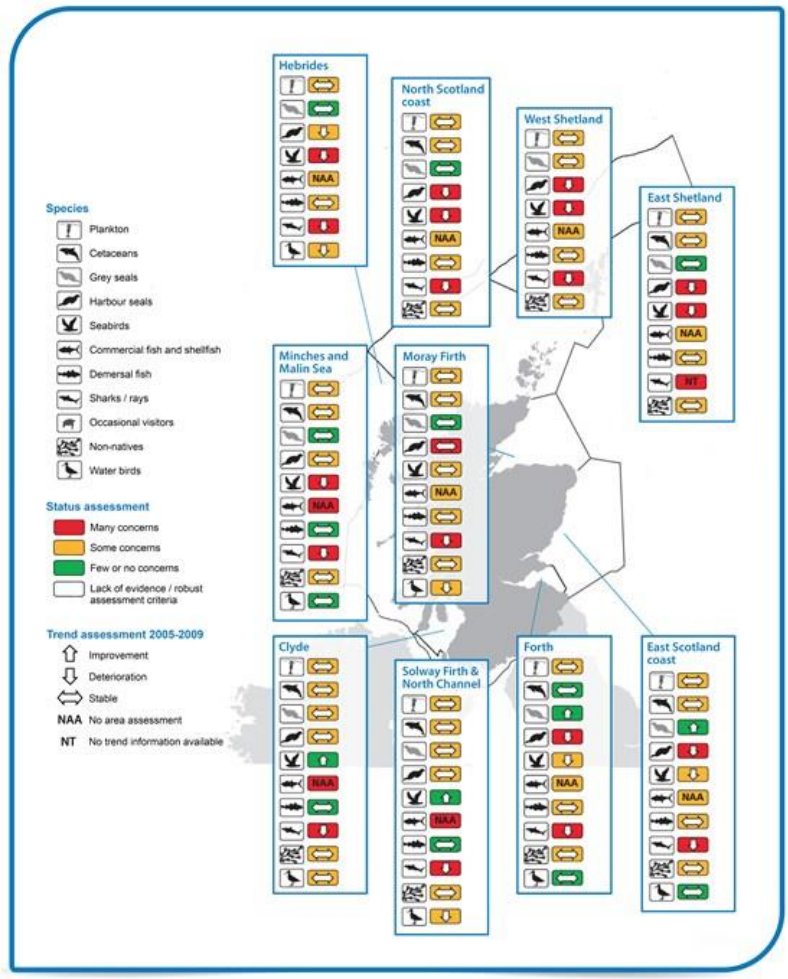

Figure 5: Species assessment

Source: Scotland's Marine Atlas overall assessment

The assessment for species in inshore Scottish waters highlights declining trends for many inshore populations of seals, seabirds, sharks and rays. These trends include lower numbers of harbour seals in haul-out areas, lower bird numbers attaining breeding success and fewer, or total absence of, shark and ray species reported during tagging exercises. In particular, seabirds have continued to decline in 2012, falling to 46% of the population seen in 1986. All 10 areas assessed have species that are declining to a point that it is of concern. In some cases (for example, demersal fish and plankton) the trend stabilised, and yet there is still concern; this is because their states are still poor, but the trend has stabilised at this level. Of particular interest in this assessment is that nine of the 10 areas have non-native species present, although this trend has stabilised – possibly due to better public knowledge and biosecurity measures.

Populations of wading birds in the Firth of Forth, east coast, Minches and the Malin Sea appear to be stable, and populations of seabirds in the Solway and Clyde Firths appear to be improving.

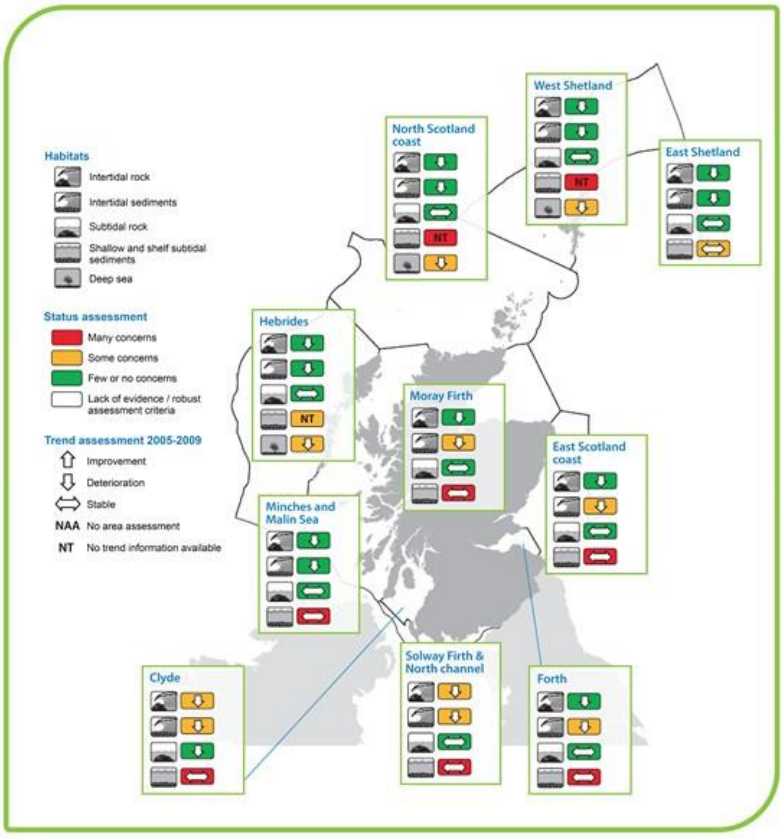

Figure 6: Habitat assessment

Source: Scotland's Marine Atlas overall assessment

The overall condition of Scotland's inshore habitats is declining. Inshore sediment habitats directly support particularly fragile assemblages of species that live on them, as well as provide food and nursery areas for more mobile and wider ranging species. Habitats within Scottish inshore waters are declining, or are stable but still of concern. For example, there is concern about their ability to recover from damage and return to a condition that will support all their associated species. Of the 10 areas assessed, no habitats are improving. In all 10 areas, intertidal rock and sediment is declining and sediments are damaged.

Damage to habitats means that they lose the capacity to support species; when the condition of habitats declines, this is reflected in a decline of species. Therefore, the decline of species seen in Figure 5 may be related to the poor habitats available to support them rather than pressures that affect the species directly. The recovery of Scotland's sea life is dependent on the recovery of these habitats.

Pressures affecting wildlife in estuaries and coasts

The decline of estuarine and coastal species and habitats is directly related to human activities putting pressure on particular areas of inshore waters. The degree of impact from the pressures varies and has been summarised in the overall assessment in Scotland's Marine Atlas.

Pressures on estuaries come from activities associated with urban and coastal development that cause permanent loss of vulnerable habitats. Some pressures have a high impact, but can be recovered from if the pressure is removed or sustainably managed. Other, long-term pressures tend to affect the environmental health of estuaries and coasts. Species and habitats can be affected by individual pressures or by combinations of pressures.

Many pressures on Scotland's seas are being managed and this is contributing to a better quality environment, but species and their crucial habitats are still being lost. Estuarine and coastal habitats can be particularly at risk because these areas are used more.

The main pressures on estuarine and coastal habitats are:

- fishing;
- aquaculture (farming of marine species);
- litter;
- development;
- pollution;
- non-native species.

Fishing

Within Scotland's coastal waters there has been a move towards sustainable methods of fishing that reduce damage on the marine environment. However, fishing activities still remove non-target species (species not being fished for), and damage the habitats of species that live on the sea bed by scouring and smothering them.

Aquaculture

Scotland has a large-scale industry of commercially farming shellfish, crustacea and fin-fish. Although the industry is moving towards sustainable and low-impact methods, aquaculture can still put pressure on coastal sea life, particularly fin-fish farming. The impacts come from licensed discharges of nutrient and waste products and contamination from veterinary chemicals. There is biological contamination from sea lice and micro-organisms that thrive in cage systems, and species and diseases could be introduced into the wild if they escape from cages or are accidentally transported into Scotland by aquaculture operations.

Litter

On Scottish beaches, litter from land and marine sources is a persistent, long-term problem and is mostly made up of non-biodegradable plastics that blow around, float on the water surface, drift in the sea, and get entangled on shores and on the sea bed. Damage caused by litter to Scottish species and habitats includes smothering and abrasion, and it can indiscriminately choke and kill species that ingest it.

Coastal development

A vast amount of infrastructure is required to develop, maintain and allow access to coastal activities and marine industries. This includes shipping and navigation facilities; oil and gas pipelines; renewable-energy cabling and connectors; and support for a range of small and local industries associated with ports, jetties and harbours. Noise from coastal development can affect wildlife. It also affects wildlife through disturbance and complete loss of habitats, as well as pollution and chemical contamination from accidental spills.

Pollution

Pollution can have a long-term impact on inshore wildlife, which can be seen in subtle changes in species occurring in impacted areas. Although improvements in the condition of estuarine and coastal waters are reflected in the Water Framework Directive monitoring results and Clean Seas Environment Monitoring Programmes, concentrations of hazardous substances from contamination in the past still exist, and increased concentrations of nutrients (nitrogen and phosphorus) continue to be released into Scotland's coastal waters. Nutrient inputs from aquaculture are predominant on the west coast, whereas on the east coast run-offs from agriculture and urban wastewater discharges are the main sources of nutrients.

Non-native species

Non-native species represent the biggest threat to biodiversity worldwide, and in Scotland non-native species are reported as widespread and established, resulting in subtle changes in species composition. Marine non-native species can be invasive and alter entire ecosystems, affect fish farming and destroy inshore fisheries, causing serious problems to the environment and the local economy.

Combinations of pressures

Decreased numbers of a top predator species from individual pressures could lead to a change in the dominant species in local marine ecosystem. It is thought that jellyfish swarms are due to a decrease of large fish that prey on the planktonic stages of jellyfish. Jellyfish swarms affect industries such as tourism and aquaculture and have disrupted power generation.

If the ecosystem becomes imbalanced (for example, due to nutrient inputs), this can cause exaggerated seasonal increases in particular species. For example, increased nutrient inputs and certain weather conditions can cause algal blooms, which can be a danger to human health and reduce levels of light and oxygen in the water, poisoning other marine species.

What is being done

Marine planning for Scottish waters, including estuaries and coasts, aims to make sure they are clean, healthy, safe, productive and biologically diverse.

Under the new marine planning regime, wildlife in coastal and estuarine waters will be given more protection in areas classified as Marine Protected Areas. There are also 80 priority marine features that have been identified as being important for conservation. These have been proposed for the focus of wider conservation policy and planning.

We are responding to pressures on our wildlife in coastal and estuarine waters on three levels:

- national and international;
- sectoral;
- local and individual.

National and international responses

Under the EU Marine Strategy Framework Directive, Scotland has been working with other countries on a strategy to achieve or maintain Good Environmental Status (GES) in Scottish seas by 2020. Because of the nature and use of the Scottish marine environment, there is a strong emphasis on international co-operation.

- The Marine (Scotland) Act 2010 introduces a new marine planning system to balance the many competing demands on Scotland's seas, taking an ecosystem-based approach to promote development that is sustainable for the economy, society and the environment.
- The Marine Strategy Forum, established in July 2009, allows members of the public to contribute to the planning process. The forum considers the needs of marine leisure, conservation, aquaculture, fishing, transport, industry and public-sector organisations.
- Marine and coastal sea life will be protected through Marine Protected Areas, actions to protect particular species, and wider measures to make sure that the development in Scottish waters is done in a way that protects biodiversity.

- There is an overlap of protection measures within Scotland's estuaries and coasts. Many features of Scotland's estuarine and coastal habitats and species are included in protected areas with land elements, such as Sites of Special Scientific Interest (SSSIs), national nature reserves and European Natura sites, (Special Protection Areas (SPAs) and Special Areas of Conservation (SACs)). These sites have been designated to help protect fragile coastal habitats that support important marine species, and include important haul-out areas for seals or loafing and feeding areas for seabird species.

Sectorial response

In Scotland some of the biggest responses by society have been by sectorial groups working with the government.

Fishing

Within Scotland's coasts and estuaries the Scottish Inshore Fisheries Groups are a strategic framework for inshore fisheries that enables this sector to work with others to develop plans for sustainable inshore fisheries. There are Inshore Fishery Groups covering all the Scottish coast (except Shetland which has its own management arrangements). The groups are taking forward and developing inshore fisheries management plans for their area within the context of the Scottish marine plans.

Aquaculture

Although aquaculture can impact on the marine environment, it is generally localised. The Scottish Government has updated its Locational Guidelines, which helps decision makers to manage fish farm pressures. This advice is based on the capacity of inshore waterbodies to assimilate impacts on the seabed and nutrient enhancement from this industry. Within the aquaculture industry, codes of conduct have been adopted to reduce damage. Good practice includes decreased stocking densities, as well as longer or even synchronised, fallow periods in some sea lochs. More consumers are choosing to buy organically grown fin-fish, but there is still debate around whether feeding farmed fish with protein feed made from fish caught in the wild is acceptable.

Marine litter

Marine litter has been raised as an issue under the EU Marine Strategy Framework Directive and the Scottish Government is finalising a Scottish marine litter strategy to co-ordinate action on this complex issue. Groups, such as Surfers Against Sewage (SAS), have long promoted awareness of sewage and sewage-related debris found on UK beaches. The Marine Conservation Society (MCS) runs the Beachwatch project to record levels of rubbish on beaches, and the information gathered by this project has provided the evidence for policy and anti-litter campaigns.

Marine non-native species

The Wildlife and Natural Environment Act (2011) has introduced legal measures for controlling non-native species in Scotland.

Marine Scotland is working with other UK organisations such as the GB Non-Native Species Secretariat to co-ordinate the management of non-native species in the UK. The best way of preventing non-native species from spreading is by making sure everyone who uses the marine environment, for business or pleasure, follows certain biosecurity advice. Good examples of biosecurity advice include the Green Blue advice for boat owners and alien invasive species and the oil and gas industry advice, and local biosecurity plans have been drafted at local levels by the Solway Firth partnership and the Firth of Clyde Forum.

Local and individual response

Through volunteering, many individuals and groups are improving our knowledge about marine and coastal biodiversity and protecting it. There are organised projects staffed by volunteer experts, and informal reporting of sightings and incidents by individuals.

Monitoring wildlife

Many people give up their weekends and evenings to take part in organised recording projects to monitor wildlife. Examples include:

- the Scottish Sea Angling Conservation Network (SSACN) Shark Tagging programme;
- the MCS's lead in Scotland for the UK's Seasearch programme;
- the British Trust for Ornithology (BTO) bird surveys for volunteers, including the Bird Atlas, the Wetland Birds Survey (WeBS) and, with the RSPB, the Breeding Bird Survey, which all include coastal bird counts as well as observation of the impacts of marine litter on coastal and marine birds;
- an international appeal by JellyWatch for the public to report and photograph sightings of jellyfish swarms;
- Sealife Tracker, published by the British Sub Aqua Club and UK agencies is a tool that enables the public to submit information on marine non-native species and species likely to be affected by changes in sea temperature caused by climate change.

Many people actively report on wildlife seen during recreational activities, such as walking, or scuba-diving in the St Abbs & Eyemouth Voluntary Marine Reserve. People can ask experts to help identify findings via forums like i-spot and i-record. The Marine Conservation Society records sightings of basking sharks, marine turtles and jellyfish in Scottish waters by the public through their Wildlife Sightings initiative.

Responsible recreation

Skippers can follow Green Blue's boat protocol, Prevention of spread of marine non-natives. The marine-wildlife-watching industry follows the Scottish Marine Wildlife Watching Code, and canoeists and kayakers have a code of conduct. Sea anglers have handling and tackle advice to reduce the impact of fishing on fish returned to the sea.

Management and conservation

Local communities of marine users have set up conservation management measures for their local marine and coastal areas; for example, the Community of Arran Seabed Trust (COAST). Scottish Local Biodiversity Action Plan groups are made up of the public and local officers, who create local plans and projects on biodiversity. Where possible, they work with local coastal forums to put these into place.

The Scottish Coastal Forum is a national group of local coastal forums that act as co-ordinated central points of communication for people living and working in marine and coastal areas, and where people can give their opinions on marine and coastal issues. Local coastal partnerships include: Coast Hebrides, the East Grampian Coastal Partnership, the Firth of Clyde Forum, the Forth Estuary Forum, the Moray Firth Partnership, the Solway Firth Partnership and the Tay Estuary Forum.