Coastal waters

Almost all (97%) of Scotland's coastal waters are in good or high condition, but there are local impacts from commercial fishing, aquaculture and diffuse pollution. Growth in industries such as aquaculture and renewable energy may increase pressure on coastal waters.

Summary

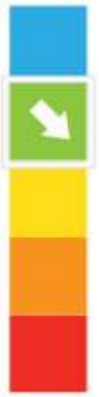
Key messages

- Scotland has approximately 48,000 km^2 of coastal waters, which vary from sheltered sea lochs to exposed shoreline.
- The overall status of 97% of Scottish coastal waters is 'high' or 'good', with only 3% rated as 'moderate'.
- A new marine-planning structure, including a National Marine Plan, is being developed to manage the many demands on coastal waters.

State and trend

State: Good - high agreement, high evidence

Trend: Stable/declining - medium agreement, medium evidence



There is an explanation of the diagram and further information on how we carried out the assessments on the summary pages.

- This is based on a Water Framework Directive perspective.
- Most coastal waters are in a better condition but some are in a worse one based assessments of the current "average condition".The overall trend for coastal waters is that condition is improving but for some waters they are stable or declining.Making any overall assessment is necessarily a simplification.
- We have taken account of the scale of any damage to the environment in these assessments; impacts can be locally damaging, but may have little effect on a national scale.
- We have stated how confident we are in the assessments based on the level of agreement between the specialists involved, and the quality and quantity of the supporting evidence.

Overview

Coastal waters in Scotland are defined as extending from the 3 mile limit up to the limit of the highest tide. Scotland has approximately 48,000 km^2 of coastal waters, which vary from sheltered sea lochs to exposed shoreline. A wide range of coastal-water habitats supports a diversity of marine life. Many of these habitats and animals are protected.

They include:

- Sites of Special Scientific Interest (SSSIs) – coastal waters classed as SSSIs are intertidal areas, which contain seal populations and intertidal features of interest (such as eelgrass beds, saline lagoons, sand flats and reefs);
- Special Protection Areas with marine or coastal components – these are designated to protect birds;
- Special Areas of Conservation – these include a range of habitats supporting species such as the bottlenose dolphin, harbour seal and grey seal.

Marine habitats and their diversity of organisms provide a range of ecosystem services and benefits of significant value to Scotland. These are discussed in detail in the Marine chapter of the National Ecosystem Assessment.

Coastal waters support a range of commercial activities such as fishing, aquaculture, and ports, as well as recreational activities such as sailing, diving, angling, bathing, and bird watching. The oil and gas industry, and the developing renewable energy industry, is located further offshore.

State

In Scotland, 97% of coastal waters have a high or good status, with 3% affected by inputs of pollutants and damage to habitats. They remain under pressure from a wide range of human activities.

The quality of coastal waters is classified using the Water Framework Directive (WFD) system. Coastal waters with a 'high' status show very little human alteration from undisturbed conditions (i.e., their water quality, habitats and tidal regime are very similar to unaltered coastal waters). 'Good', 'moderate', 'poor' and 'bad' statuses show progressively more impact from human activities. You can find more details about the classification scheme in the 2008 State of the water environment report, and the scheme is explained further in the Policy Statement relating to the Water Environment and Water Services (Scotland) Act 2003.

Waters in a good condition:

- are free from pollutants at concentrations that would harm the water plants and animals they support;
- show minimal changes to their habitats;
- are not negatively affected by invasive non-native species (INNS).

In Scotland, 97% of coastal waters have a high or good status (Table1). Only 3% are in moderate or poor status, which is due to inputs of pollutants or physical damage of the sea bed

Table 1: Classification of Scotland's coastal waters, 2012 data

Indicator	Status									
	High		Good		Moderate		Poor		Bad	
	Number of water bodies	Area (km^2)	Number of water bodies	Area (km^2)	Number of water bodies	Area (km^2)	Number of water bodies	Area (km^2)	Number of water bodies	Area (%)
Overall status/ potential	146	5,917	299	40,468	12	1,324	0	0	0	0
Water quality	254	30,433	201	17,175	2	101	0	0	0	0
Bed and shores	444	47,059	7	411	4	232	2	7	0	0

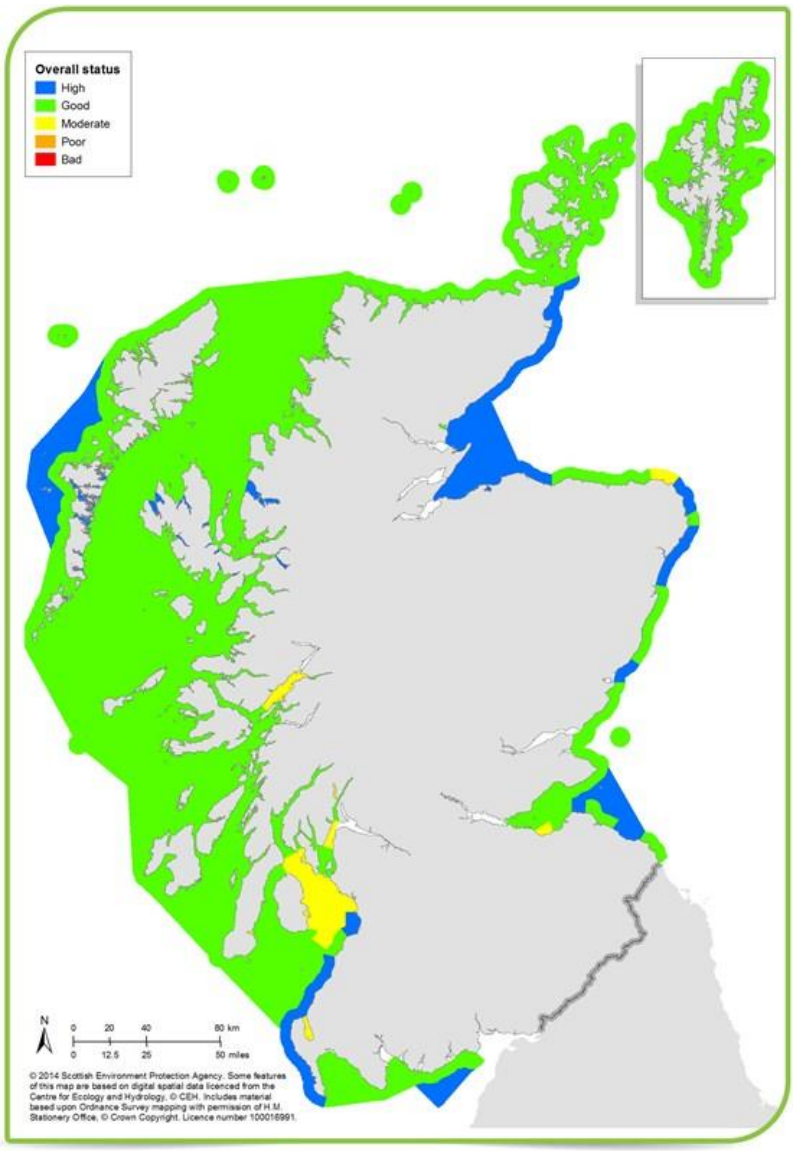


Figure 1: Classification of Scotland's coastal waters, 2012

Water quality

Pollutants from human activities that are discharged into coastal waters harm water, plants and animals in several ways.

Hazardous substances, such as trace metals, pesticides, oils and flame retardants enter the sea through waste water discharged from homes and industry, accidental spills, anti-fouling paint on ships, the dumping of dredge spoil, and from the atmosphere in the form of rain. Contaminants often become bound in sediments or accumulate in fatty animal tissue.

Contaminant concentrations in sediments, mussels and fish in Scottish coastal waters are measured and assessed against international standards. These concentrations are generally low, although there are localised problems.

In the Firths of Clyde and Forth some contaminants are present in sediments, including those in harbours, and in mussels.

Polychlorinated biphenyls (PCBs), organochlorines and trace-metal contaminants have been found in stranded whales, dolphins and porpoises. Since 1990, the UK Cetacean Strandings Investigation Programme (CSIP) has been monitoring contaminants and has found that while the concentrations of some are on a downwards trend, PCBs still occur at relatively high levels.

Although a rich nutrient supply makes our coastal waters productive, too much can upset the balance of the ecosystem, leading to eutrophication. This can reduce the amount of oxygen in the water, making it uninhabitable for aquatic animals.

Habitats

Parts of the Scottish coastline have been modified by the construction of sea defences, ports and harbours. These modifications are often necessary to support the use of coastal areas for shipping, and to protect property from flooding and erosion. One section of the Scottish coast, on the southern shore of the Firth of Forth, has been modified to the extent that the associated water body has been downgraded to moderate status.

Bathing-water quality

Where bathing waters meet the criteria to be designated under the EC Bathing Water Directives the water quality must meet the standards set out in the Directive. Designated bathing waters are reviewed each year and the number has increased from 23 in 1988 to 83 in 2013. All but three of the designated bathing waters are coastal waters. Currently the compliance for each designated bathing water is calculated from the season's results. In 2013 no sites failed, with 36 (43%) achieving the mandatory standard and the remaining 47 (57%) the stricter EU Guideline standard for the presence of bacteria in the water. From 2016, bathing waters will be classified based on the previous 4 years performance. Diffuse pollution and discharges from combined sewer overflows are the most significant risk to coastal bathing waters.

Shellfish

Water quality is protected in coastal waters used for the commercial cultivation of shellfish. There are currently 84 designated shellfish waters, mostly in sea lochs in the north and north-west. Around one-third do not achieve the more stringent guideline values for faecal coliform bacteria in shellfish.

The Food Standards Agency (Scotland) classifies shellfish harvesting areas in Scotland every year on a seasonal basis. Most sites in Scotland are class A/B or A all year round. Shellfish from class-A sites can go direct for human consumption, while those from class-B sites must be processed first.

The Food Standards Agency (Scotland) also monitors shellfish harvesting areas for the presence of biotoxins and biotoxin-producing algae. Biotoxins are natural substances produced by marine algae (phytoplankton), which can accumulate in shellfish and, if eaten, are a danger to human and animal health. The shellfish monitoring results are updated weekly and a shellfishery is closed if the toxins are above permitted levels.

Invasive non-native species

Invasive non-native species can cause serious problems in coastal waters. They can harm native species and alter the ecology. Twenty coastal waters have been downgraded from high to good status because of the presence of INNS, and they are recognised as a threat to the coastal ecosystem. The "Current condition and challenges for the future" report estimated that almost 10% of coastal waters are at risk of failing to meeting environmental objectives because of INNS.

Litter

Litter can be found below the high-tide level, lying on the sea bed and floating in the sea. The Marine Conservation Society monitors litter on UK beaches through the annual Beachwatch surveys. The results show that there were nearly 2,000 items of litter per kilometre of beach in the UK in 2010.

The amount of litter found on the 57 beaches surveyed in Scotland is slightly above the UK average, and there is a higher percentage of sewage-related (20%) and fly-tipped (1.6%) debris in Scotland compared with the UK averages of 7% and 1% respectively.

Radioactive substances in coastal waters

Radioactivity in the marine environment arising from licensed sites is reported annually in the Radioactivity in Food and the Environment reports. Radioactivity in the environment is well below the allowable rate. However, there are localised issues due to radioactive fuel particles entering the environment at Dounreay in the past, and the historic dumping of radioactive waste at Dalgety Bay.

Pressures affecting coastal waters

Climate change

The Marine Climate Change Impacts Partnership (MCCIP) publishes annual report cards (ARCs) on our understanding of how climate change is affecting UK seas. The latest one, ARC 2013, tells us that:

- temperature records continue to show an overall upward trend despite short-term variability;
- changes to plant growth are expected throughout the UK;
- climate change projections suggest fish species distribution will shift northwards at a faster rate than at present.

Marine climate change could affect the UK's marine leisure industry, which is an important sector of the economy. It identifies three big issues for the industry.

- Sea-level rise, wind and storm surges could damage site infrastructure.
- Changing weather conditions may reduce the number of people taking part in marine leisure.
- There need to be improvements to environmental legislation and more awareness (of carbon emissions in particular).

Regional assessments show that fewer changes attributed to climate change occur in Scottish waters than in English waters. An increased tendency for stratification (where freshwater and salt water doesn't mix thoroughly) leading to offshore blooms of algae (including those associated with killing fish) is predicted for the Scottish west coast.

Many marine scientists consider ocean acidification to be the biggest threat to the marine environment. In the last 200 years ocean acidity has increased by 30%, a rate much faster than at any time in the last 65 million years. Many organisms in the water and on the sea bed could become extinct as a result.

Fishing

The sea bed in coastal areas is inhabited by invertebrates, such as worms, shellfish, sea urchins and starfish. These provide an important role by recycling nutrients, and are a significant food source for fish that feed on the sea bed. In coastal waters, this habitat is under pressure from mechanical damage caused by scallop dredging and bottom trawling. Nets, pots and creels can also damage the sea bed.

Inshore fisheries operate in predominantly coastal waters (Figure 2) using a wide range of fishing techniques and equipment to catch finfish and shellfish species. This activity results in the following pressures.

- Killing and removing the species being fished for.
- Accidentally killing species not being fished for (known as by-catch).
- Damage to the habitat.
- Wearing away of the sea bed.
- Siltation rate changes (arising from sediment re-suspension).

As well as killing fish and by-catch species directly, dragging nets and fishing equipment over the sea bed also causes damage. Although some damage results from static fishing (using pots and creels), most is caused by mobile equipment (trawling and scallop dredges).

Fishing also results in other pressures, such as underwater noise, but their impact is relatively minor.

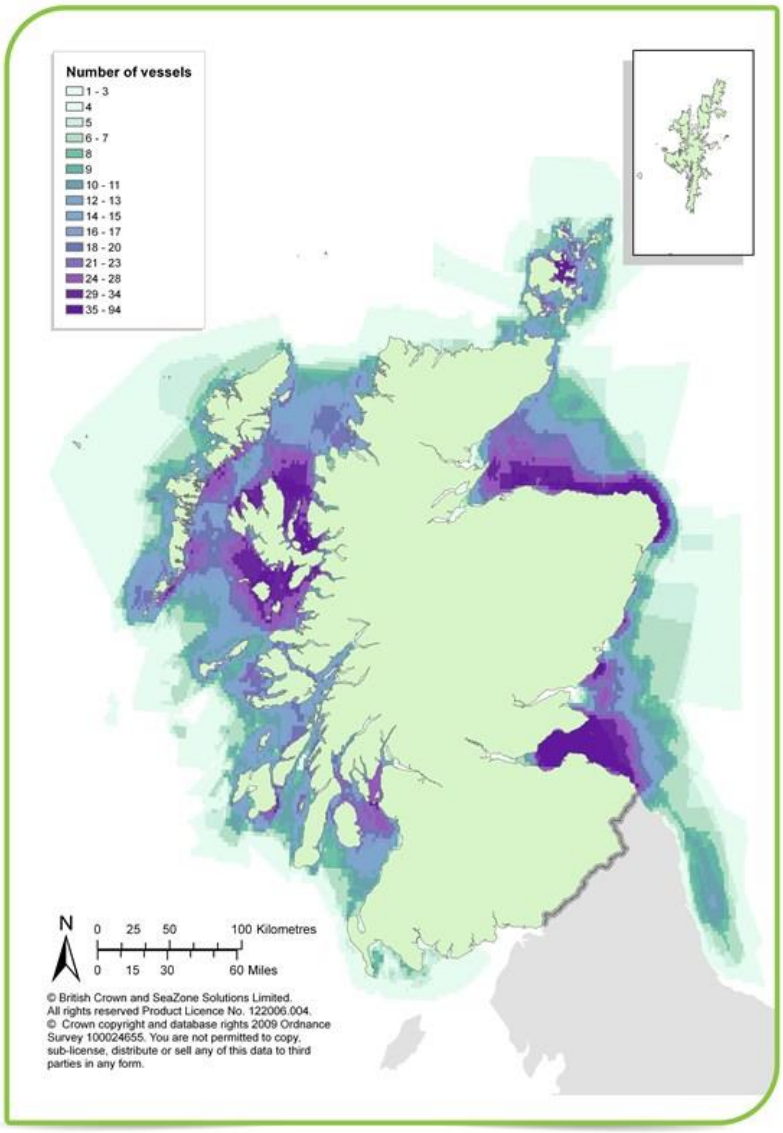


Figure 2: ScotMap output number of vessels fishing. All gear types (2007-2011)

Source: Marine Scotland Science

In coastal waters, killing target and non-target species by creeling, potting and trawling, as well as sea-bed abrasion and habitat damage from trawling, may have a negative effect on the ecosystem.

Stirring up sediment may release pollutants from the sediment, although the extent of this issue is unknown. Re-deposited sediment can smother organisms on the sea bed and may kill some sensitive species.

Inputs of nutrients to coastal waters

Nitrogen originates from run-off from land, especially in agricultural areas. The amount of nitrogen in coastal waters depends on the volume flowing from rivers into the sea, and this, in turn, depends on rainfall.

Contaminants

Contaminants enter coastal waters from discharges, run-off from land and rivers (direct and via estuaries) and are deposited from the atmosphere. Levels of some contaminants (phosphate, cadmium, copper, lead, nickel, zinc, mercury and lindane) entering coastal waters have been monitored at the tidal limit of rivers and in major discharges to estuaries and coastal waters since 1990. Data from this monitoring programme show that inputs from point source discharges have decreased.

The number and volume of oil and chemical spills are collated and reported by the Advisory Committee on Protection of the Sea (ACOPS). Most spills in coastal waters occur in ports and harbours and are generally small (less than 220 litres). These spills usually result in localised contamination of harbour sediments. Larger spills are generally related to damage to vessels. One of the biggest recent spills followed the grounding of a deep-sea fishing vessel on St Kilda in 2008.

Overall, the concentration of contaminants in Scottish coastal waters is low and they do not exceed WFD chemical standards.

Dredging and dumping

Disposal of dredged material is licensed and allowed only from ports, harbours and marinas. In general, only dredged material with contaminant concentrations below a threshold can be disposed of at sea, and dredged material may be re-used for land reclamation or beach nourishments when contaminant concentrations are low. There are currently 66 active disposal sites affecting 42.36 km^2 of sea bed. The majority are in coastal waters.

Aquaculture

Scotland is the third-largest producer of farmed salmon in the world. Fish in floating net cages are fed specially formalised pelleted diets. Faecal matter and waste food, often containing medicines used to control sea lice, are deposited on the sea bed beneath fish-farm cages. Stocking densities and the use of medicines are regulated to minimise the impact on the environment. Escaped fish may carry disease, and can interbreed with wild fish, leading to a dilution in genetic integrity of the wild population.

Microbiological contamination

Discharges of human and animal waste can lead to microbiological contamination. Human waste is discharged to the marine environment through treated sewage (from either sewage treatment works or septic tanks) and storm-water discharges. These sources are managed to minimise their impact, although sewage from treated discharges and from storm-water discharges remains a significant cause of pollution for coastal bathing waters.

It is more difficult to manage animal waste, which can enter coastal waters via rivers and run-off, as well as direct from wildlife and dogs on beaches. This has been linked to microbiological contamination of bathing beaches and shellfish waters.

Noise

Underwater noise is generated by dredging, shipping and construction. This may cause species that communicate by sound to avoid important areas (for example, spawning grounds) and reduce their ability to detect food. It may even damage their hearing, affecting their ability to communicate with each other about food, danger and reproduction. More evidence is needed on the extent of noise disturbance and its impact on wildlife.

Litter

The impact of litter on wildlife has not been quantified, but there are concerns about increasing amounts of litter on beaches, the sea bed, in the water and floating on the surface. The Beachwatch surveys have identified plastic as the main type of litter, with sources including:

- litter dropped by the public;
- sewage-related debris (such as cotton buds);
- discarded fishing gear;
- litter dumped at sea (deliberately or washed overboard from ships).

There is a particular problem with high densities of cotton-bud sticks on beaches in the Inner Firth of Clyde. Cotton-bud sticks pass through the screens on sewage outfalls and are slow to degrade.

A recent Fishing For Litter project press release showed that fishing vessels in Scotland have voluntarily removed more than 600 tonnes of marine litter from Scotland's seas. Although the amount of litter floating in coastal waters has not been measured, 45% of birds found in Scottish waters contained plastic in their stomachs.

Invasive non-native species

Invasive non-native species can be introduced by visiting ships and recreational craft (attached to the hull or in ballast water), floating litter and by aquaculture (escape of the farmed species or, more commonly, unintentional introduction alongside the farmed species).

Invasive non-native species can significantly alter the ecology of our native communities, as well as causing problems for shipping and aquaculture. An example is the carpet sea squirt, which was found in a marina in Largs in October 2009. The carpet sea squirt spreads rapidly, smothering the sea bed and underwater structures.

What is being done

Regulation is currently the main mechanism for protecting coastal waters. In addition, some good-practice initiatives are in place, such as the development of marine spatial plans and voluntary coastal zone management partnerships.

Policy and legislation

Water Framework Directive

One of the main aims of the Water Framework Directive is to ensure that coastal waters achieve an ecological status of 'good', or equivalent (as defined in the directive) by 2015.

The European Water Framework Directive provides a framework for protecting and improving the condition of the water environment across Europe, through the development of River Basin Management Plans (RBMPs). In Scotland we are implementing the WFD through the Water Environment and Water Services (Scotland) Act 2003, which makes SEPA responsible for coordinating the development of the RBMPs, working in partnership with many sectors, public bodies and non-governmental organisations, These same sectors and organisations are responsible for the successful implementation of the plans, by developing partnership initiatives, and delivering public investment programmes and responsibilities.

Any new activities likely to have an adverse impact on the water environment are controlled under the Water Environment (Controlled Activities) (Scotland) Regulations 2011, known as 'CAR'. These include discharges of wastewater or industrial effluent, cooling water abstractions and engineering activities that can affect coastal waters.

The targets for improving the status of all coastal waters to at least good are shown in the river-basin management plan. Sea-bed damage is the main cause of downgrading in coastal waters. A long-term target has been set for improving coastal waters damaged by fishing, as this involves a collaborative approach to managing and improving the environment. River-basin management planning is designed to do manage coastal waters, and offers opportunities for more effective co-ordination between partners. Actions needed to improve the quality of coastal waters to good environmental status are detailed in individual Water Bodies Data Sheets.

Table 2: Targets for improvements to the status of coastal waters to be achieved through the Water Framework Directive (WFD)

Overall status/potential	Target area (km^2) by year		
	2015	**2021**	**2027**
High	15,649	15,649	15,649
Good	28,698	29,388	31,532
Moderate	3,362	2,672	528
Poor	0	0	0
Bad	0	0	0
Total	**47,709**	**47,709**	**47,709**
Proportion of total at good or better status (%)	**93**	**94**	**99**

Litter

The recent European Marine Strategy Framework Directive includes litter as a descriptor of good environmental status. Member states will have to agree methods to assess litter, and set targets for achieving good status for litter by 2020. Other legislation designed to reduce litter in coastal waters include:

- International Convention for the Prevention of Marine Pollution from Ships, which prohibits the at-sea disposal of plastics and rubbish from ships;
- EU Port Waste Reception Directive on port reception facilities for ship-generated waste and cargo residues.

Marine Strategy Framework Directive

The European Marine Strategy Framework Directive (MSFD) was transposed into UK legislation in July 2010. The directive requires member states to manage their seas to achieve good environmental status by 2020. The MSFD applies to coastal water and seawater out to the territorial limit, and it does not apply to estuaries. The MSFD lists 11 qualitative descriptors of good environmental status.

Key requirements of the MSFD:

- An assessment of the current state of UK seas.
- A detailed description of what GES means for UK waters, with a set of associated targets and indicators.

These two elements (above) were published in the Marine Strategy Part One on 20 December 2012. Monitoring to measure progress towards environmental status should be established by July 2014. Member states must establish a programme of measures to achieve good environmental status by 2016.

Marine (Scotland) Act

The Marine (Scotland) Act helps balance competing demands on Scotland's seas. It aims to protect and enhance the marine environment and boost economic investment and growth in areas such as marine renewables. The Act will be implemented in the following ways.

- The marine planning system balances the need for resources with the need to protect our marine environment. The National Marine Plan sets out objectives and national priorities, while regional marine plans provide the context in which conflicts between different sectors can be resolved and key areas for key uses can be defined.
- There is a marine licensing system for developments in coastal waters that require approval.
- There are new powers to designate Marine Protected Areas (MPAs). This provides greater flexibility for Ministers to use area-based measures to conserve marine biodiversity as well as nationally important historic assets such as historic shipwrecks. The Scottish Government is in the process of establishing new (MPAs) of national importance to meet international commitments for protecting our seas.
- Improved protection for seals and a new comprehensive licence system will ensure appropriate management when necessary.

Sustainable resource management

Shellfish waters

Actions required to improve the quality of shellfish waters are outlined in individual Pollution Reduction Plans. Scottish Water has made significant investment in sewage treatment to reduce microbiological inputs to these waters; however, studies have shown that run-off from land contaminated with animal faeces is a significant source of contamination in some waters. Rules are in place to help control diffuse pollution, and initiatives are used in some areas to tackle diffuse sources entering rivers.

Inshore fisheries

Fishing provides fish and shellfish for human consumption. Inshore fisheries are managed to maintain our fish stocks.

Scottish Government is currently assessing the potential effects of a ban on certain types of fishing gear within 1 or 3 miles of the coast.

Bathing waters

At some locations electronic signs are being used to provide bathers with daily predictions of water quality. These signs are located at 23 bathing waters and contain individual beach profiles with information about pollution sources and risks.

Contaminants and nutrients

The Oslo and Paris Commission (OSPAR) has been working for more than 20 years to reduce levels of hazardous substances entering the marine environment by regulating industries and phasing out the use of some toxic substances.

There is some evidence of a decrease in the use of a third of the 26 priority chemicals identified by OSPAR. Water-borne cadmium, lead and mercury entering coastal waters are decreasing, and there has been a decrease in lindane. However, polychlorinated biphenyls can still be detected in sediments and biota. More information is required to determine whether the ban on brominated flame retardants has been successful.

Best Management Practices guidance for agriculture and Sustainable Drainage System guidance have been produced to address the problem of diffuse pollution.

Dumping material at sea has progressively reduced since the 1980s as bans were imposed on the dumping of radioactive wastes (1982), colliery mine stone (1995) and sewage sludge (1998). The disposal of wastes is currently allowed only at licensed sites at ports, harbours and marinas. These restrictions have led to an overall reduction in disposal of dredge spoil at sea since 2005.

Chemicals used to control diseases in farmed fish are licensed and their use is monitored.

Litter

There are several practical initiatives to reduce litter in Scotland's environment.

- Scottish Water's Bag It and Bin It campaign aims to stop contamination of beaches caused by sanitary waste through the sewerage network.
- The Keep Scotland Beautiful beach award scheme.
- The Forth Estuary Forum and Firth of Clyde Forum actively campaign to reduce litter on beaches in their areas.
- The Fishing For Litter project encourages fishermen to return litter caught in their trawls for monitoring and proper disposal. It has been estimated that litter costs the marine fishing industry up to £30,000 per year per boat, due to contamination of catches, broken gear and fouled propellers.

Recreation

The Green Blue organisation gives guidance to recreational boat users on how to reduce their impact on the water environment. The Green Blue's Marine Toolkit is designed to help managers of leisure-boating businesses and leaders of boat clubs keep to the regulations and reduce waste.

Oil spills

Port authorities have a responsibility to respond to spills from boats in their harbour area. Clearwater Forth is an example of an emergency response plan for the Forth.

In the event of a major spill from shipping or offshore oil and gas installations, the national contingency plan is implemented.

Invasive non-native species

The Invasive Non-Native Species Framework Strategy for Great Britain sets out the agreed hierarchical approach to invasive non-native species:

1. prevention;
2. early detection, surveillance, monitoring and rapid response;
3. mitigation, control and eradication.