

Concentrations of radioactive substances in the North-East Atlantic



Concentrations of radioactive substances in the North-East Atlantic are close to or lower than historic levels. These concentrations would not result in a significant radiological impact to humans or the marine environment.

Background

Society's need for energy, industrial processes, health and wellbeing and national security have resulted in past and present human activities that have led to the introduction of radioactive substances to the marine environment. We know that radiation can be harmful and that the presence of radioactive substances in the environment as result of human activities is of high public concern.

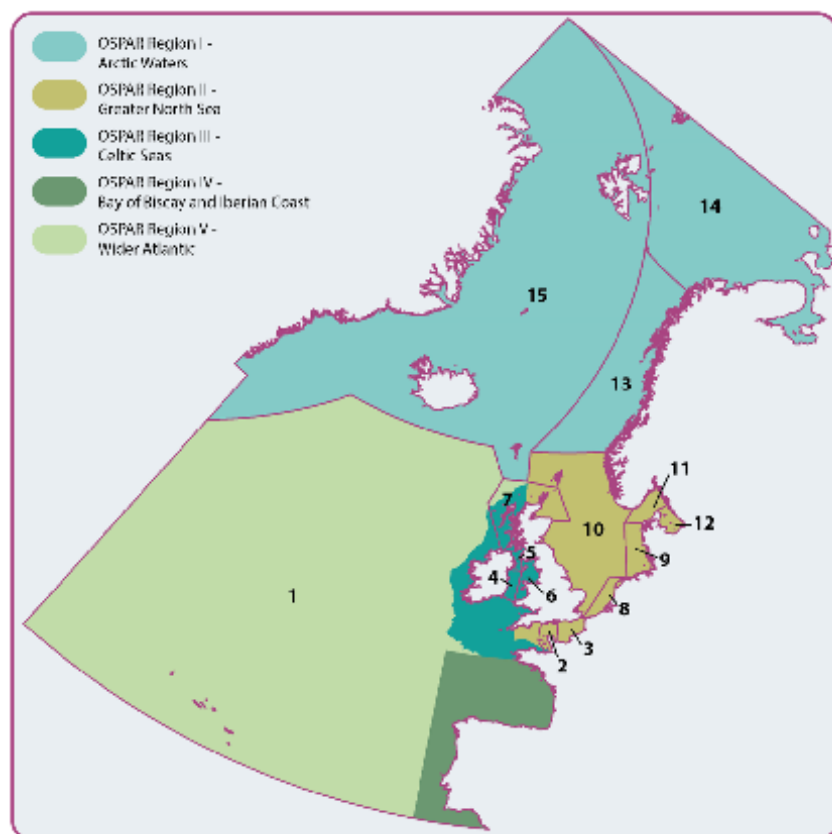
In 1996 OSPAR committed to making progressive and substantial reductions in discharges of radioactive substances so that by the year 2020 concentrations in the environment were no higher than historic levels.

Since 1995 OSPAR has been collecting data on environmental concentrations of radioactive substances so that trends may be understood and the impact on people and the environment assessed.

Our monitoring is focused on "indicator radionuclides" that are representative of the discharges we know are occurring, in different parts of the marine environment "indicator compartments". Our monitoring data is allocated to 15 sub-regions in the OSPAR Maritime Area which were created to take into account the location of discharging facilities and prevailing ocean currents.

Measurements of environmental concentrations in the marine environment include contributions from past and contemporary discharges from the nuclear industry as well as historical accidents and events such as the Chernobyl Accident.

We have developed statistical tests that allow us to say with confidence whether environmental concentrations (in the period 2012-2018) have changed compared to historic levels (in the period 1995-2001). We have also worked with the International Atomic Energy Agency to develop a method to assess the radiological impact on people and the environment (Agreement 2009/06).



INDICATOR RADIONUCLIDES

Concentration of H-3 in seawater

Concentration of Tc-99 in seawater and biota

Concentration of Cs-137 in seawater and biota

Concentration of Pu-239,240 in seawater and biota

Figure 1: Comparison of established OSPAR Radioactive Substances Committee sub-regions and the five main regions of the OSPAR Maritime Area

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Why is this important?

The assessments show that OSPAR's commitment to ensure that concentrations in the environment are no higher than historic levels has been fulfilled. There is clear evidence that environmental concentrations of the majority of indicator radionuclides in the assessment period are close to or lower than historic levels (Figure 2).

However, in the Channel East (sub-region 3 in Figure 1), there was evidence of an increase in environmental concentrations of tritium (H-3) in seawater. This probably reflects the influence of the discharges from the French nuclear fuel reprocessing facility at La Hague and that the industrial scale abatement of tritium in the liquid effluent of nuclear power stations and nuclear reprocessing facilities is currently not technically feasible.

In terms of radiological impact, the annual doses from the environmental concentrations of the majority of indicator radionuclides would not result in a significant radiological impact to humans or the marine environment. This includes the instance where there was evidence of an increase in environmental concentrations of H-3 in seawater. However, for the Irish Sea (sub-region 6 in Figure 1), the impact from plutonium-239,240 (Pu-239,240) in seawater was not below the level at which its impact would be considered as trivial. However, more focused assessments have been carried out by the United Kingdom which concluded that the radiological impacts resulting from Pu-239,240 in seawater in this sub-region are very low.

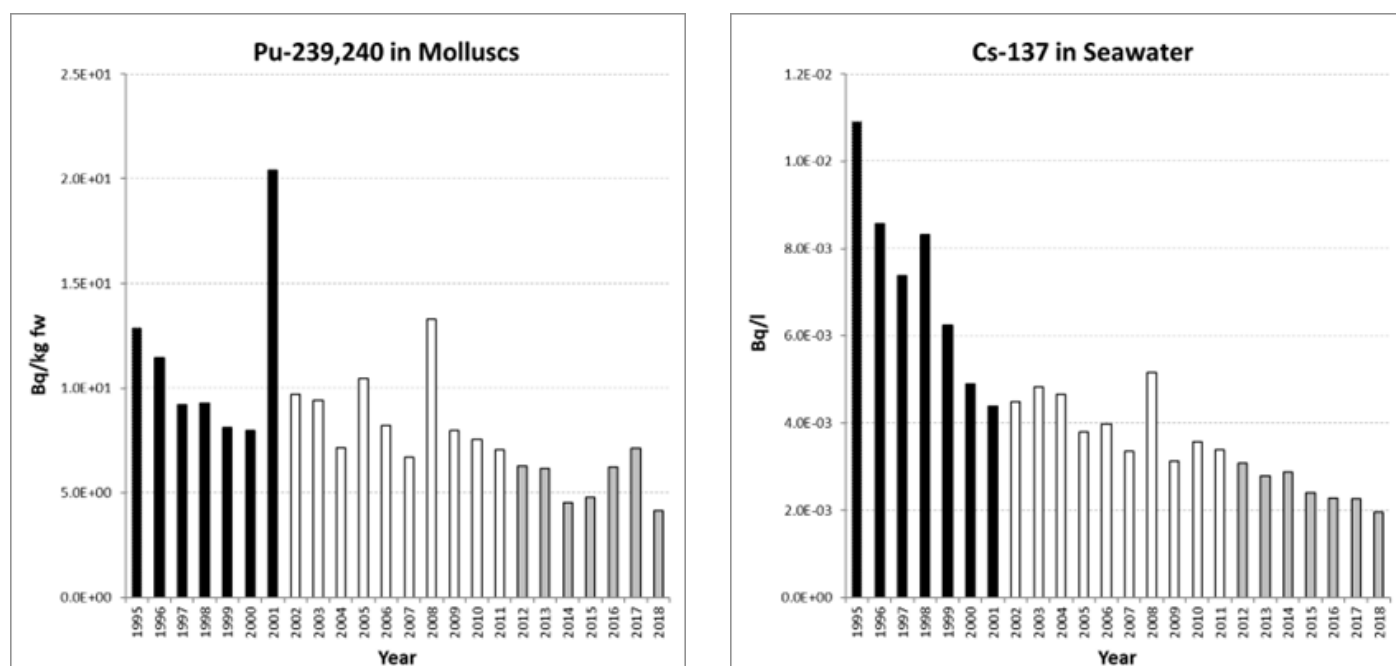
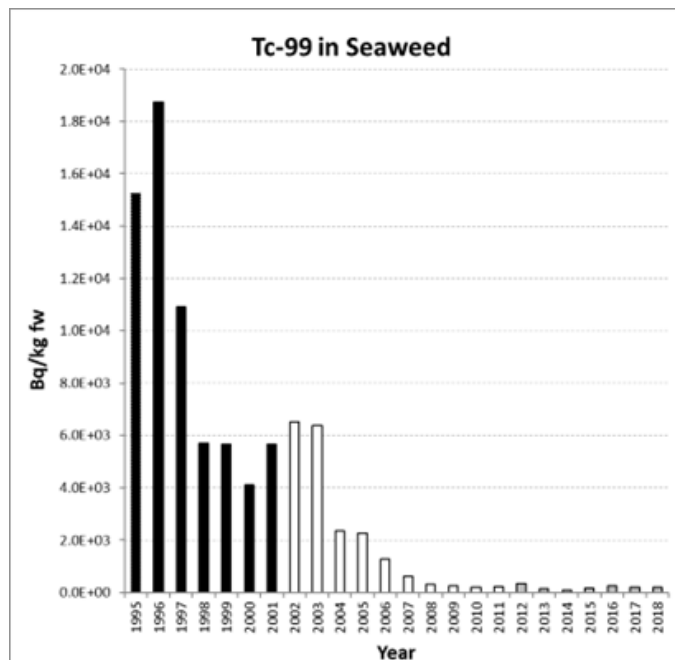
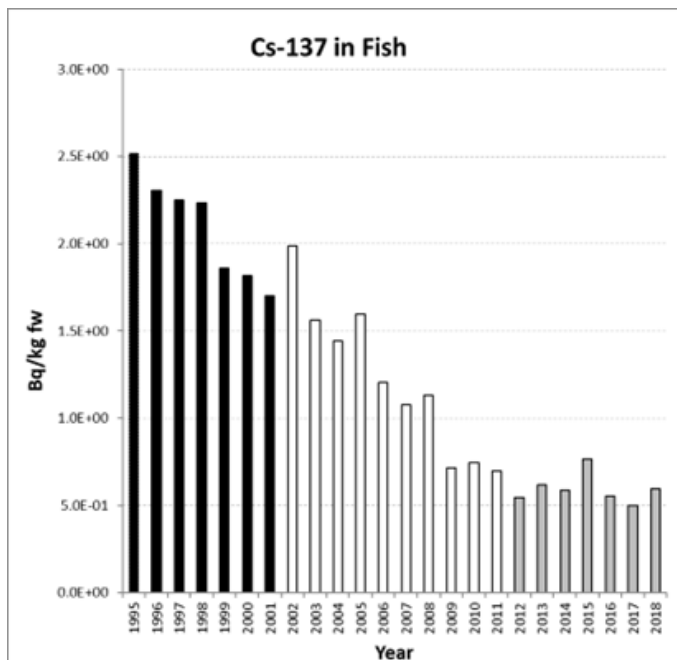


Figure 2. Examples of environmental concentrations, showing Cs-137 in seawater in OSPAR RSC sub-region 10, Pu-239,240 in molluscs for OSPAR RSC sub-region 6, Cs-137 in fish for OSPAR RSC sub-region 12 (overleaf) and Tc-99 in seaweed (overleaf) in OSPAR RSC sub-region 6 (evidence of a reduction in all cases). Time periods indicated are baseline period 1995-2001 (black columns), assessment period 2012-2018 (grey columns) and intervening years (white columns). Note, different scales are used for the vertical axes in the examples above.

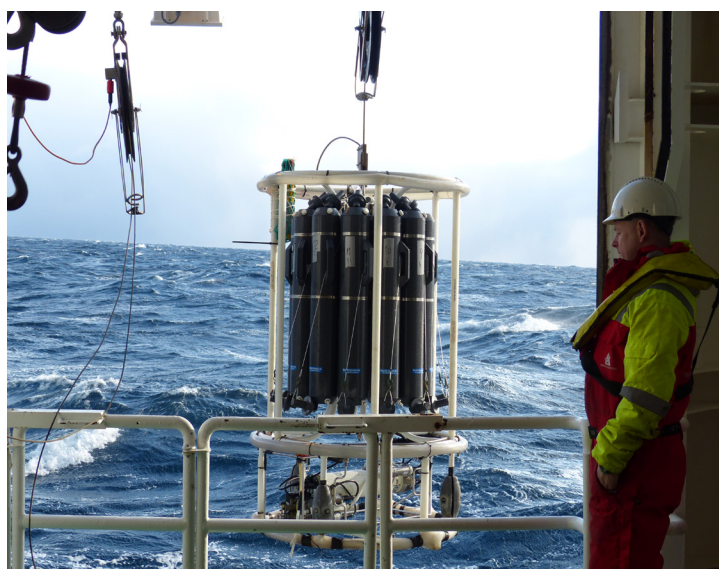
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How will this impact the North-East Atlantic?

Current environmental concentrations of radioactive substances would not result in a significant radiological impact to humans or the marine environment. Therefore, there is no scientific evidence for any impacts on ecosystem services from the current levels of radionuclides in the OSPAR Maritime Area although it is acknowledged that views may exist on impacts to ecosystem services related to cultural services as a result of human activities that lead to the input of radionuclides to the marine environment.

Preventing the pollution of the OSPAR Maritime Area from radioactive substances is an ongoing task and so OSPAR has agreed new objectives for radioactive substances under OSPAR's North-East Atlantic Environment Strategy 2030 that include identifying and considering any obstacles in achieving further reductions in environmental concentrations of radioactive substances in the marine environment and examining possible solutions where appropriate.



ECOSYSTEM SERVICES

Ecosystem Services are the direct and indirect contributions ecosystems (known as natural capital) provide for human wellbeing and quality of life. This can be in a practical sense, providing food and water and regulating the climate, as well as cultural aspects such as reducing stress and anxiety.

For more information visit OSPAR's Quality Status Report 2023 <https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/>

Photo: Deployment of a water sampler ©Dr Justin Gwynn