

Science for Environment Policy

What threat do sunken nuclear submarines pose to fisheries?

Leakage of radioactive material from the wreck of the nuclear submarine *K-159* in the Barents Sea could increase levels of radioactivity in local populations of cod by a hundred times, new research suggests. However, this level remains well below 'safe' standards set by the Norwegian government.

Global fallout from nuclear weapons, dumping of radioactive [waste](#) and sunken nuclear submarines all cause radioactive contamination in the Arctic [marine environment](#). In this study, researchers investigated the potential effects of leakages from two sunken submarines, which contain large amounts of caesium-137. This [radioactive isotope](#) decays very slowly, with a half life of 30 years, and may accumulate in the body tissues of marine organisms.

The researchers used computer models of ocean currents in the Barents Sea, which lies north of Norway in the Arctic Ocean, to simulate and track a leak of caesium-137 from *K-159* from the day it sank in 2003 and continuing for five years afterwards. The researchers combined maps of the estimated caesium-137 concentration in the Barents Sea with the geographical distribution of two commercially important fish species, Northeast Arctic cod and capelin, obtained from surveys carried out between 2004-2008.

Knowing the rate that these species absorb caesium-137, the researchers then estimated whether levels in the fish would have exceeded the 'safe' standards for radioactivity set by the Norwegian authorities.

The researchers carried out a similar exercise for *Komsomolets*, a more well-studied submarine that sank in the Norwegian Sea in 1989. For each submarine, the scientists investigated the effects of two possible scenarios of leakage that may have occurred: (i) a continuous release of caesium-137 for five years, and (ii) a single initial release equivalent to 100% of the total amount contained in the submarine.

The results suggest that neither continuous leakage nor pulses of caesium-137 from *K-159* or *Komsomolets* would raise radioactivity in cod or capelin to levels considered dangerous. However, a single release of 100% of the caesium-137 from *K-159* would raise concentrations in cod to a hundred times their current level for two years after the leakage.

While the radioactivity of cod and capelin was not predicted by this study to reach dangerous levels, the researchers caution that further research is needed to assess the effects on the whole ecosystem.

In conclusion, this approach could be used to evaluate the risk of contamination of marine resources after a spill of radioactive material, say the researchers, or even to track a contaminant from where it is observed back to its source.



19 December 2013
Issue 355

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Source: Heldal, H.E., Vikebø, F. & Johansen, G.O. (2013). Dispersal of the radionuclide caesium -137 (¹³⁷Cs) from point sources in the Barents and Norwegian Seas and its potential contamination of the Arctic marine food chain: Coupling numerical ocean models with geographical fish distribution data. *Environmental Pollution*. 180: 190-198. DOI: 10.1016/j.envpol.2013.04.032.

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To cite this article/service: "[Science for Environment Policy](#)": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.