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European Commission

Science for Environment Policy

Mercury levels exceed safety standards for fish in six European freshwater and estuary sites

Mercury levels in bream (*Abramis brama*) collected from six European sampling sites from 2007 to 2013 exceeded the Water Framework Directive's safety limit for fish in all but one site in 2012, a new study discovers. The findings suggest greater efforts need to be made to prevent mercury pollution.

Mercury, which is often found in polluted water as methylmercury, is of great environmental concern due to its toxic properties, wide presence in the environment, and difficulty to remove. Because of its chemical characteristics, mercury can bioaccumulate: this means that predators contain a higher mercury concentration than their prey. A major proportion of the mercury in the environment originates from human activity, and some of it enters aquatic ecosystems via atmospheric deposition. Once deposited onto surfaces such as soil, vegetation and water, where it can be taken up by plants or consumed by small organisms that are eaten by predators. In this way, mercury can travel up the food chain and accumulate in the largest and longest-living predators.

The Environmental Quality Standards Directive[1] sets an environmental quality standard (EQS) for mercury in fish, intended to protect top predators from secondary poisoning through bioaccumulation. To assess mercury levels in fish across Europe, researchers selected six freshwater and estuary sites: the rivers Scheldt (Netherlands), Rhône (France), Göta älv (Sweden), Tees (UK), and Mersey (UK), and Lake Belau (Germany). The researchers tested mercury levels in bream from these sites.

Every year between 2007 and 2013 (except at the Göta älv and Mersey sites, where no sampling took place in 2009–2011), approximately 15 bream were harvested. After dissection, the muscle tissues from the different fish taken at a given site in a given year were pooled and analysed. The EU environmental quality standard (EQS) for mercury is 20 micrograms per kilogram (µg/kg), wet weight. However, the mercury levels found at the sites were between 15.9 and 251 µg/kg (wet weight) — over 12 times the standard. Almost every site and every year produced mercury level readings above the standard, except for Lake Belau in 2012[2].

In the last year of the study (2013), amounts of mercury in fish from the study sites were 1.2–9.9 times higher than the standard. Overall, Lake Belau and the River Tees showed the lowest concentrations, while the rivers Rhône, Scheldt and Göta älv displayed the highest. Secondary predators in the latter areas therefore appear to be at particular risk of poisoning.

During the sampling period, mercury levels increased in the Scheldt, Göta älv and Mersey rivers. The only significant decrease was in the Rhône, which also showed the greatest initial contamination.

Continued on next page.

1. The Directive on Environmental Quality Standards (Directive 2008/108/EC modified by Directive 2013/39/EU) is a daughter directive of the Water Framework Directive (Directive 2000/60/EC).

2. For guidance on biota monitoring and data interpretation, see Guidance Document 32 on biota monitoring (implementation of EQSbiota) under the Water Framework Directive

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Mercury levels exceed safety standards for fish in six European freshwater and estuary sites *(continued)*

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The mercury requirements for fish and fishery products intended for human consumption tend to be less stringent and allow a maximum mercury level of 500–1000 µg/kg, wet weight. None of the samples taken during this study exceeded that limit, although the levels present still pose a threat to the fish in those waters and to other fish-eating predators.

Levels of mercury differed by site due to their varying local environment and conditions. Most of the sites had poor water quality due to industrial and urban wastewater treatment plants. For example, the rivers Rhône and Scheldt have nearby chemical and metal-working factories, which may be causing some of the mercury contamination. Oil and gas refineries, such as those near the River Mersey, are also thought to contribute to mercury pollution.

The researchers say that these results reveal a need for greater efforts to reduce the levels of mercury being released into the atmosphere and water.