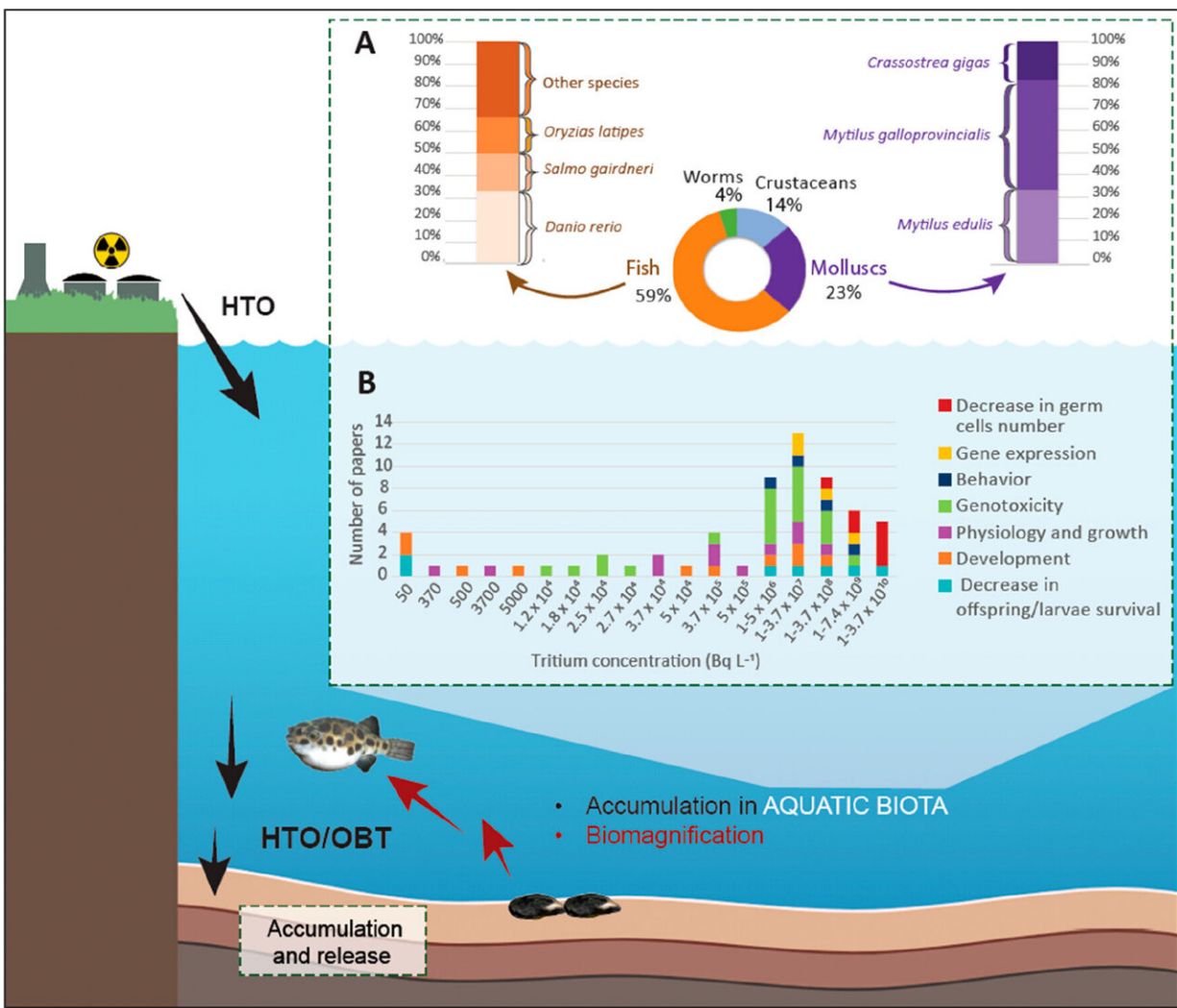


Could Fukushima's radioactive water pose lasting threat to humans and the environment?

March 8 2024, by Alan Williams



Assessment of the behavior of tritium (³H) in the aquatic environment and impacts on biota. (A) Animal groups covered and (B) biological effects reported

according to data compiled by Ferreira et al. (3) Abbreviations: HTO, tritiated water; OBT, organically-bound tritium. Credit: *Environmental Science & Technology* (2024). DOI: 10.1021/acs.est.3c08702

The meltdown of Japan's Fukushima Daiichi power plant, caused by the devastating earthquake and tsunami of March 2011, represents the most severe nuclear power accident of the 21st century so far.

However, a new study highlights how the decision by the Japanese government to begin releasing the radioactive water stored within it—a decision approved by the International Atomic Energy Agency (IAEA)—has generated scientific and [public debate](#), given its potential to cause [environmental harm](#) for decades to come.

[Writing](#) in the journal *Environmental Science and Technology*, researchers say the water cannot be stored indefinitely due to the ongoing risk of earthquakes and tsunamis in the region.

But they say not enough is known about the long-term impacts of tritium—the primary radionuclide present, with a half-life of 12.6 years—to ascertain if the release of more than one million tons of water can be considered safe or not.

As a result, they have called for assurances that regular monitoring will be carried out in different components of the region's ecosystem to examine any impacts the release might be having on the environment.

They have also suggested more evidence is needed about the future effects of tritium in the presence of multiple and emerging stressors, such as hypoxia, rising ocean temperatures, and microplastics, given that environmental contamination can occur in many combinations.

The study was carried out at the University of Plymouth, where researchers have been examining the environmental impacts of radioactive material for almost three decades.

"The Japanese tsunami of 2011 was devastating for people living along this whole coastline. The presence of a nuclear power plant within the region left a lasting threat, and this study highlights some of the complex challenges that need managing and scientific questions that still need addressing."

"Being in a region prone to earthquakes and tsunamis, there is an obvious danger in simply storing [radioactive water](#) there indefinitely. But based on our research, not enough is known about the impacts of tritium on both environmental and [human health](#) to say that releasing the water into the ocean is completely safe," says Awadhesh Jha, professor in genetic toxicology and ecotoxicology and corresponding author on the research.

The new study includes a review of existing literature on the behavior of tritium in the environment and studies that have assessed its impact on individual species.

That includes studies that have highlighted how tritium can be absorbed into sediments and soils, raising concerns about its potential transfer to the water cycle and the food web.

There has also been research showing that tritium can cause DNA damage to certain [fish species](#), which could impact their physical and reproductive fitness and—ultimately—the genetic diversity of a population.

However, the researchers say there is little data available on the distribution, behavior, and potential effects of tritiated water and

organically-bound tritium, and therefore assessing the broad risks is almost impossible.

They also say the Fukushima situation cannot be compared with the Chernobyl accident, as some authorities have attempted to do, given the differing geographical locations of the two plants and the fact the long-term environmental impacts of Chernobyl are still being debated.

"Through our study, we have found research showing that fish have transported radioactive particles generated by the Fukushima incident far and wide. Like a number of other nuclear accidents before it, that makes what happened at Fukushima a global concern."

"As such, we urgently need global research into the impacts of [tritium](#)—and how they might be managed—especially with the nuclear power industry set to expand significantly. If it does indeed expand, the construction of nuclear power plants, especially in [coastal regions](#), should also take into account worst-case scenarios of flooding, earthquakes, and tsunamis as part of a fundamental goal to minimize radioactive discharges to the environment," says Professor Jha.

More information: Maria F. Ferreira et al, Controlled Release of Radioactive Water from the Fukushima Daiichi Nuclear Power Plant: Should We Be Concerned?, *Environmental Science & Technology* (2024). [DOI: 10.1021/acs.est.3c08702](https://doi.org/10.1021/acs.est.3c08702)

Provided by University of Plymouth

Citation: Could Fukushima's radioactive water pose lasting threat to humans and the environment? (2024, March 8) retrieved 27 April 2024 from <https://phys.org/news/2024-03-fukushima-radioactive-pose-threat-humans.html>

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