



**World Health
Organization**



**Food and Agriculture
Organization of
the United Nations**



Impact on seafood safety of the nuclear accident in Japan

The Tohoku earthquake and tsunami of 11 March 2011 caused extensive damage to the Fukushima Daiichi nuclear power plant. Radioactive contamination of the Pacific Ocean following the nuclear incident has raised public concerns about seafood safety. Based on currently available information, some seafood in the direct vicinity of the nuclear power plant has been found to be contaminated at levels above the regulatory limits set by the Japanese Government, and control measures are in place to prevent its distribution. Radionuclide contamination, if any in seafood outside these areas, will be significantly below any public health concern, even in Pacific islands with high seafood consumption. Any additional radiation levels will contribute only a small amount to natural background radiation exposure. Further developments will be closely monitored and updates provided as appropriate.

1. Pathways of contamination of the marine environment

The Fukushima power plant is located on the east coast of the island of Honshu, 200 km northeast of Tokyo. Radioactive pollution of the marine environment has occurred through:

- direct leakage of highly-contaminated water used to cool the damaged reactors;
- voluntary discharge of low-contaminated water to increase the on-site storage capacity for highly-contaminated water;
- transport of radioactive pollution by rainwater run-offs of contaminated soils; and
- radioactive fallout of the atmospheric plume on the surface of the Pacific up to tens of kilometers from Fukushima.

2. Radionuclides in the marine environment

To date, mainly iodine 131, Cs-134 and Cs-137 have been measured in the marine environment.¹

No long-term impact is to be expected from I-131. It rapidly decays, (I-131 has a half-life of 8 days) and will soon no longer be detectable and is not expected to be transported over long distances by ocean currents.

The two longer lived caesium-isotopes (Cs-134, 2 years half-life and Cs-137, 30 year half-life) could be transported over long distances by ocean currents, mainly eastwards by the Kuroshio current system. The great quantity of water in the Pacific Ocean, however, will rapidly disperse and dilute these radioactive materials. Testing of marine water 30 km off the coast of Japan has shown that the concentrations of radionuclides have dropped rapidly to very low levels.

¹ Near the discharge areas a few other mostly short-lived radionuclides have been detected. The levels of Sr-90 and Plutonium-isotopes seem to be relatively low, but further analyses have to be awaited.

Some marine organisms can accumulate radioactive material (by a factor of 10 to several thousands, according to the types of radionuclides and the species considered) and radiological monitoring programs will be important in order to ensure a high level of consumer health protection.

3. Radionuclides in seafood

(a) Seafood in Japan

The Japanese regulatory authorities have imposed provisional regulation limits for radionuclides and other restrictions (<http://www.mhlw.go.jp/english/topics/2011eq/index.html>) for food, including seafood, and are monitoring fish caught in the prefectures surrounding the damaged nuclear power plant. The Japanese sand lance is the only fish for which levels of radionuclides exceeding their provisional regulation limits have been measured to date. This fish is not exported and contaminated products will not enter the local market. Results of the inspection in fisheries products are published by the Japanese Fisheries Agency (<http://www.jfa.maff.go.jp/e/inspection/index.html>).

(b) Migratory fish from Japanese waters

Migratory fish, such as the Juvenile North Pacific albacore tuna or the Alaska salmon, spend most of their transoceanic migration period outside of Japan's coastal or offshore waters. Moreover, because of the time required for the fish species to migrate, be harvested and sold on the market, the level of short-lived radionuclides such as I-131 would drop significantly through natural radioactive decay. Radioactive caesium will also decline when fish leaves contaminated waters as caesium is not bound in the body and will gradually be excreted. The biological half-life of caesium in sea fish is typically between 5 to 100 days. To date no elevated levels of radioactivity have been reported. Hence there are no health concerns at this point from this food source.

(c) Seafood in other parts of the world

Levels of radioactivity in seafood collected away from the waters surrounding Japan are expected to remain significantly below levels of any public health concern. Any contamination will be dispersed and diluted and it will take months, if not years, to reach riparian Pacific countries.

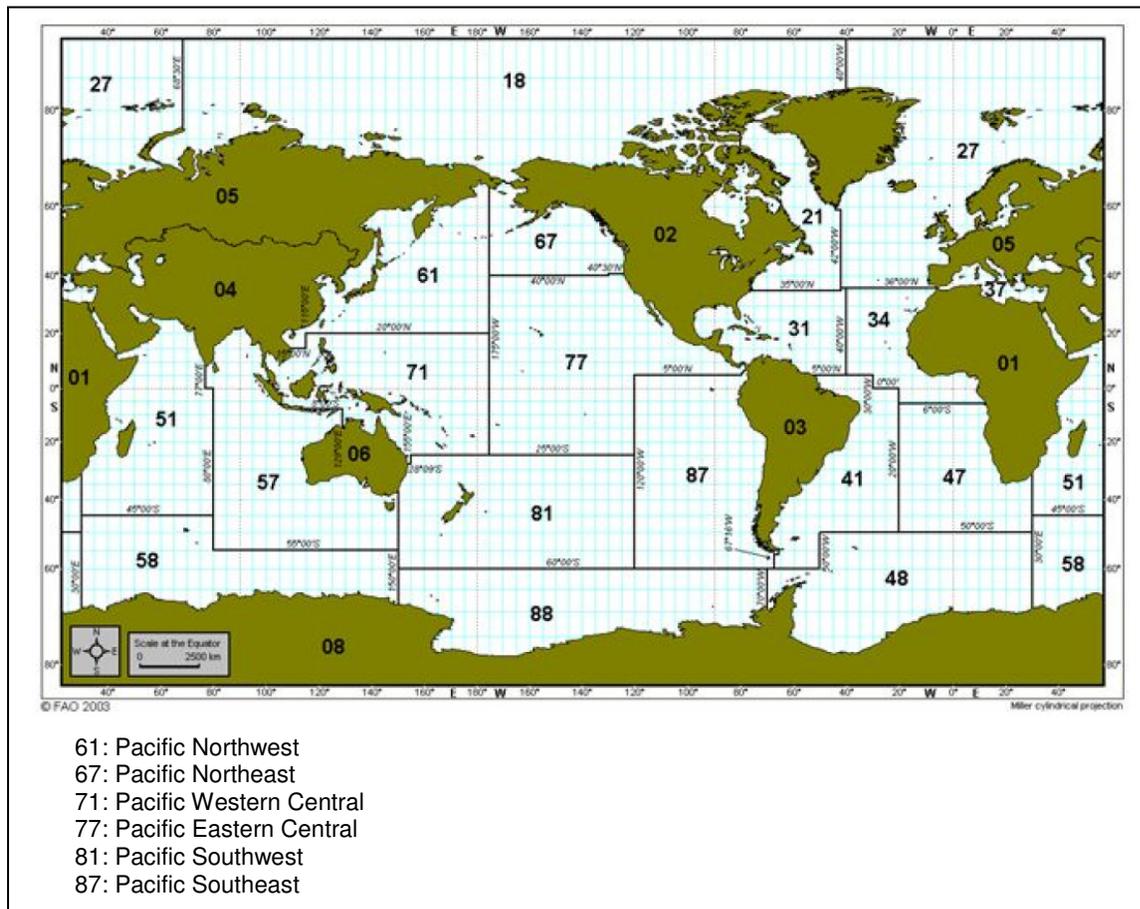
4. Control Measures

Limits for various radionuclides in fish have been implemented by several authorities.

The Japanese government is monitoring the presence of I-131, Cs-134 and Cs-137 in local seafood. Regular sampling of seawater takes place at 16 different sites (near-shore, at 3 km, 8 km and 15 km off-shore). The establishment of additional sampling points has been announced by the Japanese Government. Moreover, steps have been taken to prevent further spreading of contaminated water into the sea (such as the installation of steel plates, silt fences, sandbags filled with zeolite etc. at the power plant).

Some countries and regions outside Japan have put measures in place to monitor seafood, either imported from Japan or caught in specific fishing grounds. For examples, the European Commission recommends its Member States to monitor on a random basis the radioactive levels in seafood caught in FAO Major Fishing Area 61 as well as (of lesser importance) in FAO Major Fishing Areas 67, 71 and 77 (see Figure 1 below).

Figure 1. Map of Major Fishing Areas



The authorities in the U.S.A. are monitoring levels of radioactivity in seafood imported from Japan and have not detected any longer-lived radionuclides (such as Cs-137) so far.

References:

- NOAA-EPA-FDA Statement "U.S. Seafood Safe and Unaffected by Radiation Contamination from Japanese Nuclear Power Plant Incident; U.S. Monitoring Control Strategy Explained" <http://www.fda.gov/ucm/groups/fdagov-public/@fdagov-foods-gen/documents/document/ucm253896.pdf>
- IRSN report on impact on marine environment of radioactive releases resulting from the Fukushima NPP accident (April 2011) http://www.irsn.fr/EN/news/Documents/IRSN_Fukushima-Accident_Impact-on-marine-environment-EN_20110404.pdf
- Information from IAEA Marine Environment Laboratories, Monaco
- EC Note "Recommendation on the monitoring of the presence of I-131, Cs-134 and Cs-137 in fish and fishery products (and derived/processed products thereof) originating in/caught in certain fishing areas of the Pacific Region" http://www.salute.gov.it/imgs/C_17_pubblicazioni_1527_allegato.pdf