Trace amounts of Fukushima radioactivity detected along shoreline of British Columbia

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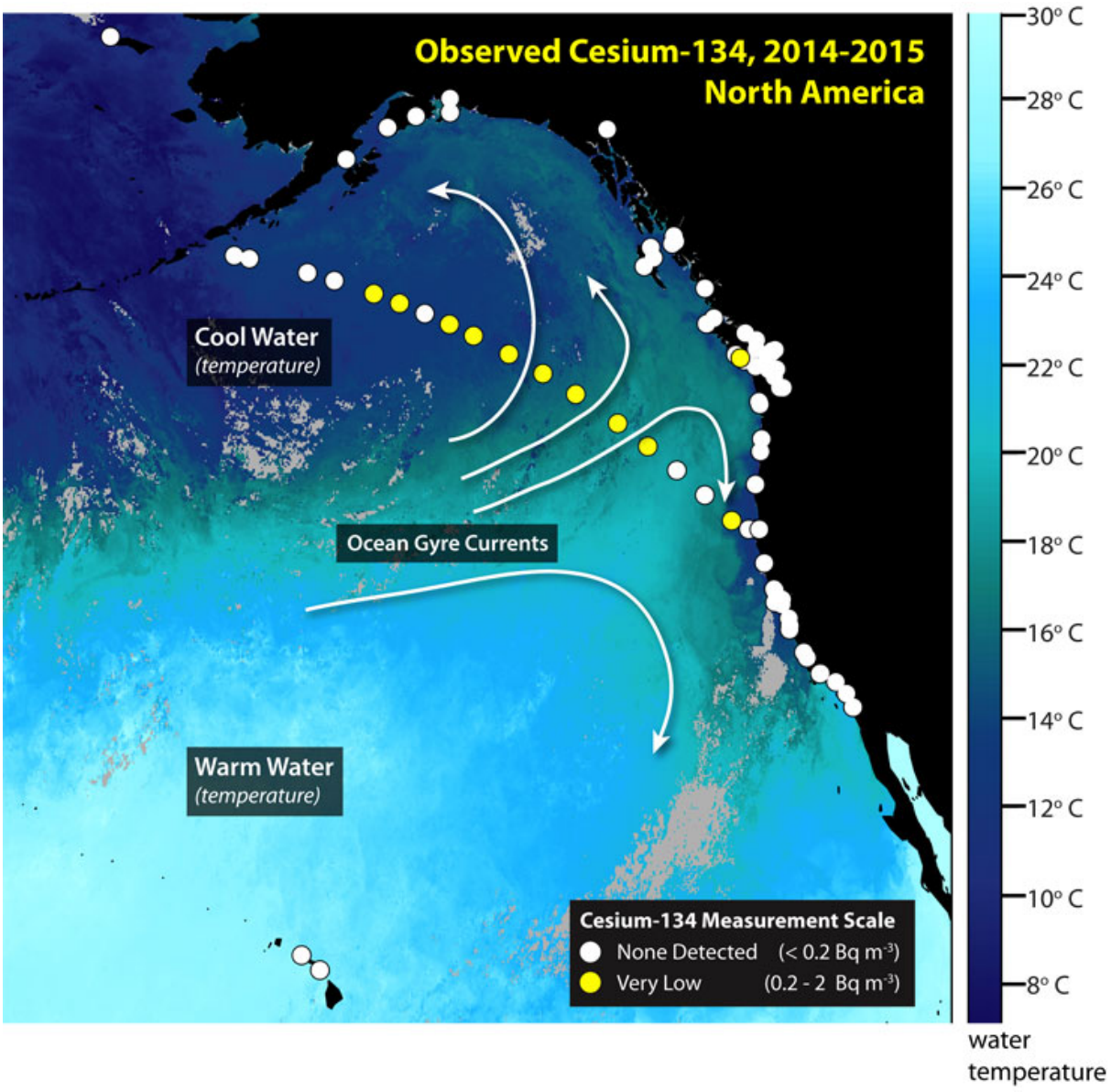

Satellite measurements of ocean temperature (illustrated by color) and the direction of currents (white arrows) help show where radionuclides from Fukushima are transported. Large scale currents transport water westward across the Pacific. Circles indicate the locations where water samples were collected. White circles indicate that no cesium-134 was detected. Blue circles indicate locations were low levels of cesium-134 were detected. Small amounts of cesium-134 have been detected in a water sample taken Feb. 19, 2015, from a dock in Ucluelet, British Columbia. In Novemeber, low levels were detected offshore. Credit: Woods Hole Oceanographic Institution

Scientists at the Woods Hole Oceanographic Institution (WHOI) have for the first time detected the presence of small amounts of radioactivity from the 2011 Fukushima Dai-ichi Nuclear Power Plant accident in a seawater sample from the shoreline of North America. The sample, which was collected on February 19 in Ucluelet, British Columbia, with the assistance of the Ucluelet Aquarium, contained trace amounts of cesium (Cs) -134 and -137, well below internationally established levels of concern to humans and marine life.

The WHOI scientists, with the help of citizen volunteers, have collected samples at more than 60 sites along the U.S. and Canadian West Coast and Hawaii over the past 15 months for traces of radioactive isotopes from Fukushima. Last November, the team reported their first sample containing detectable radioactivity from Fukushima 100 miles (150 km) off shore of Northern California. However, no radiation had yet been found along any of the beaches or shorelines where the public has been sampling since 2013.

"Radioactivity can be dangerous, and we should be carefully monitoring the oceans after what is certainly the largest accidental release of radioactive contaminants to the oceans in history," said Ken Buesseler, a marine chemist at WHOI who has been measuring levels of radioactivity

in seawater samples from across the Pacific since 2011. "However, the levels we detected in Ucluelet are extremely low."

Scientists at WHOI are analyzing samples for two forms of radioactive cesium that can only come from human sources. Cesium-137, the "legacy" cesium that remains after atmospheric nuclear weapons testing, is found in all the world's oceans because of its relatively long, 30-year half-life. This means it takes 30 years for one-half of the cesium-137 in a sample to decay. The Fukushima reactors added unprecedented amounts of cesium-137 into the ocean, as well as equal amounts of cesium-134. Because cesium-134 has a two-year half-life, any cesium-134 detected in the ocean today can only have been added recently—and the only recent source of cesium-134 has been Fukushima.

The Ucluelet sample contained 1.4 Becquerels per cubic meter (Bq/m3) (the number of decay events per second per 260 gallons of water) of cesium-134, a telltale sign of having come from Fukushima, and 5.8 Bq/m3 of cesium-137. These levels are comparable to those measured 100 miles off the coast of Northern California last summer. If someone were to swim for 6 hours a day every day of the year in water that contained levels of cesium twice as high as the Ucluelet sample, the radiation dose they would receive would still be more than one thousand times less than that of a single dental x-ray.

Ken Buesseler, a marine radiochemist at WHOI, seen standing on a research vessel with the Fukushima Dai-ichi nuclear plant in the background, organized the first international oceanographic expedition to the region following the Fukushima disaster. He created OurRadioactiveOcean.org, a citizen science sampling effort to collect seawater samples along the West Coast and analyze them in his WHOI lab. The results of his analysis are posted on OurRadioactiveOcean.org and accessible to anyone. Credit: Ken Buesseler

Monitoring Effort

Buesseler has had to rely on a crowd-funding and citizen-science initiative known as "Our Radioactive Ocean" to collect samples because no U.S. federal agency is responsible for monitoring radiation in coastal waters. The results are publicly available on the website

OurRadioactiveOcean.org.

"We expect more of the sites will show detectable levels of cesium-134 in coming months, but ocean currents and exchange between offshore and coastal waters is quite complex," said Buesseler, "Predicting the spread of radiation becomes more complex the closer it gets to the coast and we need the public's help to continue this sampling network."

Provided by Woods Hole Oceanographic Institution