



# SALMON + NUCLEAR WASTE

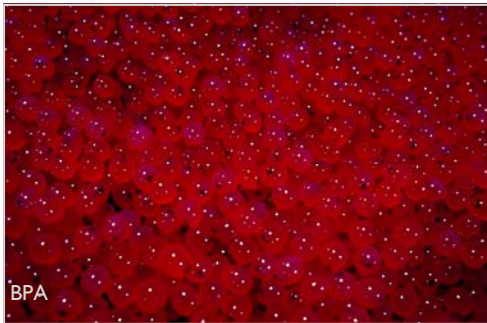
*The Hanford Nuclear Site threatens salmon with pollution.*

The Hanford Reach is the last remaining stretch of the mainstem Columbia River where salmon spawn in significant numbers. <sup>1</sup> The Reach is home to 43 species of fish, including the threatened Upper Columbia River spring-run Chinook salmon, Steelhead, and bull trout. The Hanford Reach provides critical habitat for spawning, foraging, and migration of salmon and steelhead. This vital habitat, however, is threatened by toxic radioactive plumes from the adjacent Hanford Nuclear Site. <sup>2</sup>



ODFW

*The Hanford Reach is a paradox— cool water and relatively undisturbed environment provides exceptional salmon habitat, yet radioactive plumes threaten salmon runs.*



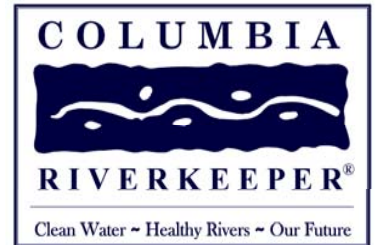
BPA



USFWS

Major contaminants present in the Hanford Reach include chromium, nitrate, tritium, strontium-90, technetium-99, and uranium. <sup>3</sup> Many of these contaminants reach the Columbia River via groundwater plumes that flow into the river. Discharges of contaminated Hanford groundwater into the Columbia River peak during the river's low-flow periods in fall and winter. <sup>2</sup> Salmon spawn in the Hanford Reach from mid-October to late-November, peaking in mid-November. Egg and fry development occurs from mid-October through May. <sup>4</sup> Salmon, therefore, are most likely to come into contact with the toxic pollution during their most sensitive life stages— spawning and development. <sup>2</sup>

*Chinook salmon are affected by toxins at all stages of development in the Hanford Reach— as adults (photo above), eggs (photo top-left), and as fry (photo bottom-left).*



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## Contaminants + Effects

Chemical and radioactive pollution threaten salmon, including:

### CHROMIUM

**Hexavalent Chromium** is highly toxic to salmon and other aquatic life. <sup>2</sup>The Hanford Reach contains chromium pollution at levels over 1000% greater than the safe level determined by scientists. <sup>5</sup> Salmon and other aquatic life readily take up the hexavalent form of chromium, which is the most dangerous form. At high concentrations chromium is lethal. <sup>2</sup> Chromium can impact fertilization success by:

- Acting on fertilized eggs causing embryos to die. <sup>6</sup>
- Acting on egg and sperm individually, thereby impeding fertilization. <sup>7,8</sup>
- Impacting survival of early life stages. <sup>7,8</sup>
- Reducing growth rates of juveniles. <sup>7,8</sup>

### STRONTIUM-90

The Columbia River at Hanford contains unsafe levels of radioactive **Strontium-90**. This pollutant remains dissolved in water, allowing it to be very mobile in aqueous environments. Strontium-90 is a **“bone-seeker”** and is prone to accumulate in organisms that also accumulate calcium. Fish can absorb Strontium-90 through direct absorption from the water, or through food consumption. <sup>9</sup> Because Strontium-90 can accumulate in fish tissue, scientists have measured greater concentrations in fish tissue than in the surrounding water. <sup>10</sup>

## Protecting Hanford’s Salmon Runs + Habitat

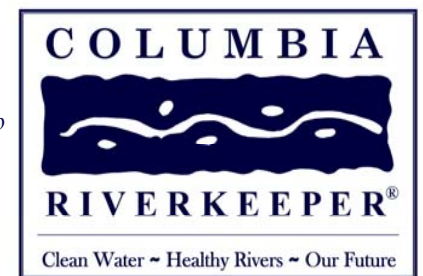
*Thorough clean-up of Hanford’s wastes and long-term protection of the Reach will ensure salmon continue to return to the last best spawning grounds on the Columbia River. To protect salmon, we must control existing nuclear and chemical waste and prohibit the shipment of more nuclear waste to Hanford. Current plans call for making Hanford our nation’s nuclear waste dump. Join us in speaking out! Demand: **CLEANUP FIRST, NO NEW WASTE, and PROTECT OUR SALMON.***



### SEX REVERSAL IN HANFORD’S SALMON?

*Scientists found that 84% of Chinook in the Hanford Reach that physically appeared to be female tested positive for DNA indicative of a Y-chromosome— in other words, DNA of a male fish. These feminized male fish may result from exposure during early stages of development to contaminants such as estrogenic steroids or estrogen mimickers, including detergents, plasticizers and pesticides. <sup>11</sup>*

Columbia Riverkeeper is a 501(c)(3) nonprofit organization with thousands of members in Washington and Oregon. Our mission is to protect and restore the Columbia River, from its headwaters to the Pacific Ocean. Since 1989, Riverkeeper has played an active role in monitoring and improving cleanup activities at Hanford. Learn more at [www.columbiariverkeeper.org](http://www.columbiariverkeeper.org).



Citations available at [www.columbiariverkeeper.org](http://www.columbiariverkeeper.org)

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# SALMON + NUCLEAR WASTE CITATIONS

For more information, please contact [crk@gorge.net](mailto:crk@gorge.net)

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