Contaminants in Unexpected Places

by Jim Haas, Jay Bigelow, and Lisa Heki

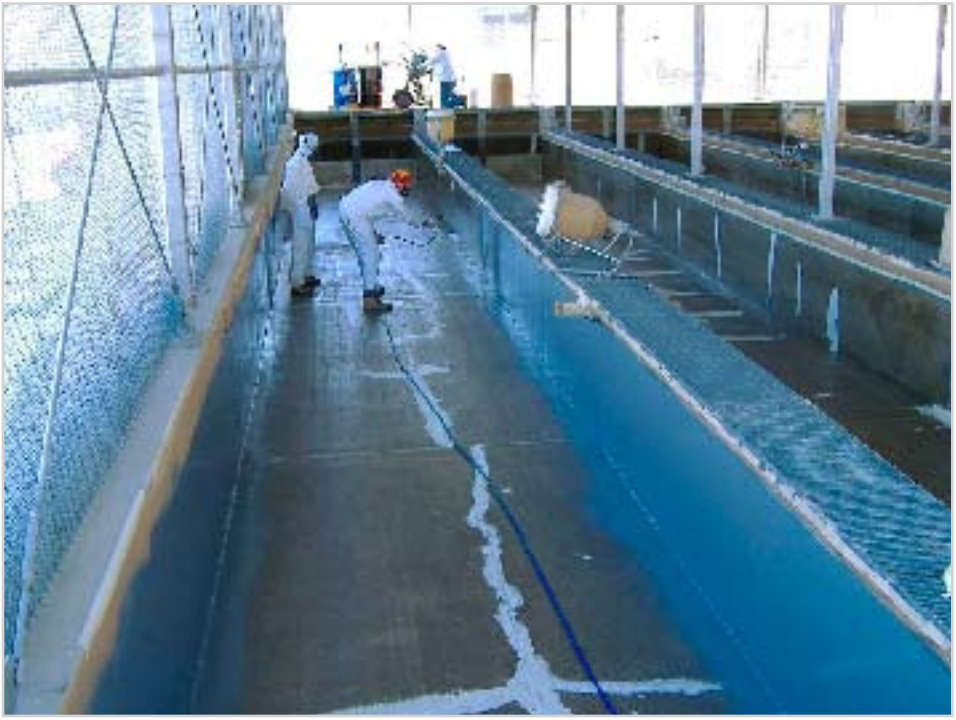
Fish hatcheries are an important tool in the Fish and Wildlife Service's efforts to restore threatened and endangered aquatic species. Unfortunately, these facilities sometimes face the same contaminant risks encountered by commercial hatcheries. When such issues are identified, the Service's Division of Environmental Quality and its environmental contaminants specialists—who have expertise in sampling and analytical methods, ecotoxicology, and risk assessment—are uniquely poised to help.

Concern over potential contaminants in fish raised at Service hatcheries and released for recreational fisheries arose in 2004, when Dr. Ronald Hites of Indiana University and others reported in the journal Science that farm-raised salmon sampled from locations in Europe and North and South America were higher in organochlorine contaminants than wild salmon from the same areas. Hites and his co-authors considered the primary source of exposure in these fish to be commercially-prepared fish feed.

At the time, the Service's Abernathy Fish Technology Center in Longview, Washington, was engaged with the U.S. Geological Survey's Biological Resources Division in a study of contaminants in fish feed at various hatcheries in the Service's Pacific Region. However, no data were then available to evaluate whether fish reared in Service hatcheries were affected to the same degree as commercially-reared salmon. Biologists in our Northeast Region hatcheries initiated a sampling program for contaminants in fish that could be given to states for recreational fishing programs. Service biologists in our Pacific and Mountain-Prairie regions also conducted smaller-scale sampling following the Northeast Region protocols.

The results of this limited program showed that most fish sampled had polychlorinated biphenyl (PCB) and dioxin/furan concentrations within the ranges that could trigger consumption advisories based on Environmental Protection Agency guidelines. The Lahontan National Fish Hatchery (NFH) in Nevada, which produces fish as part of the recovery program for the threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), or LCT, was no exception. Composite samples of LCT from the 2002 and 2003 year classes that were

Contractors applying an environmentally safe coating in an LCT runway at Lahontan NFH.



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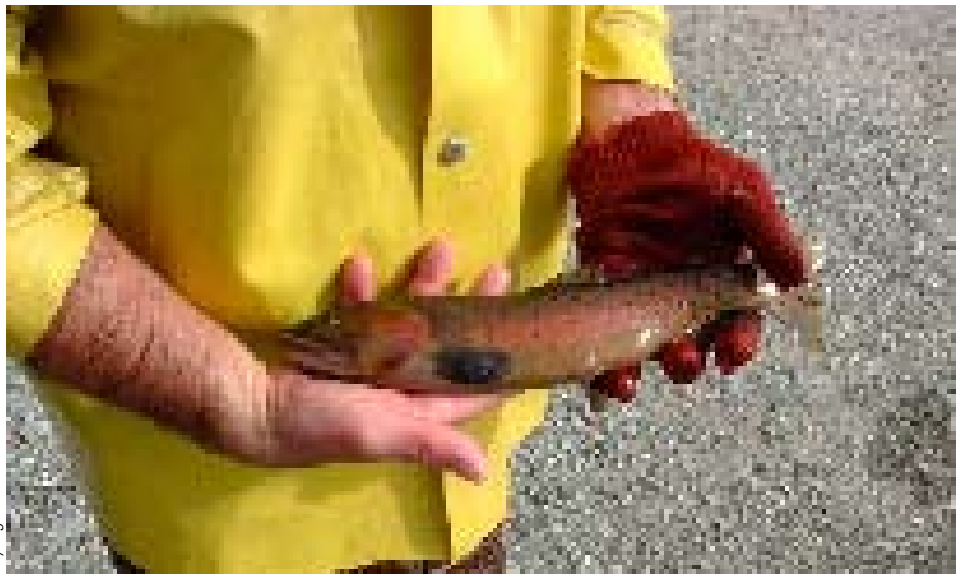

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The threatened LCT is reared at Lahontan NFH.

submitted for chemical analysis showed concentrations of PCBs and furans that were noticeably higher than in the other Pacific Region samples.

Concern over both public health and the future of the LCT restoration program prompted action to identify and remove the sources of contamination from the hatchery. The possible sources we considered were 1) fish feed, 2) the well water that supplies the hatchery, and 3) components of the water recirculation system. Dioxin and furan compounds are often by-products of PCB formulation, and prior to 1977 many paints and plasticizers were formulated with PCBs to improve water and chemical resistance. Contaminated old paint and other PCB-containing compounds have been implicated at several state and commercial fish hatcheries in the recent past as sources of PCBs in fish.

In June of 2004, we began limited follow-up sampling at the Lahontan NFH of one-year-old LCT, fish feed, well and recirculated water, and paint from different surfaces to evaluate possible sources of contamination.

We found that fish feed samples contained PCBs and dioxin/furans; however, the concentrations were too low to account for the concentrations we observed in the fish. This result was subsequently supported by the Abernathy study, which found organochlorine contaminants to be ubiquitous at low levels in a variety of commercial fish feeds. While concentrations of contaminants in fish feed remain a concern, a resolution of this problem is beyond our ability to control locally. A national effort is underway to address the issue with feed manufacturers and evaluate the risk to fish.

Our results also eliminated well water as a contaminant source; however, several paint samples were found to have PCB residues, so we focused attention on the water supply system at the hatchery. Working with the Service's Engineering Division during planned maintenance, we conducted additional sampling of paint, gaskets, and caulking used in the water circulation system and raceways to remove or seal possible sources of PCB contamination. At the same time, we evaluated the possible effects of various maintenance activities. We periodically sampled fish reared in fiberglass tanks with minimal exposure to the water distribution system and compared their PCB tissue concentrations to those of same-age fish that were reared in the raceways. As of this year, the maintenance activities (removal or sealing of contaminated paint, gaskets, and caulking) at the hatchery have resulted in lower concentrations of contaminants in LCT from the raceways, bringing them more in line with the fish reared in fiberglass tanks and under the average levels across the Service. We consider the problem to be largely resolved.

Our experience at the Lahontan NFH underscores the importance of cross-program cooperation in the recovery of threatened and endangered species. While expertise in the biology and recovery of such species resides primarily within the Fisheries and Endangered Species programs, both the Division of Environmental Quality and the Division of Engineering can bring their specialized expertise to unexpected contaminant problems. This cross-program synergy makes the whole recovery effort stronger than the sum of its parts.

Reference:

Hites, R.A., J.A. Foran, D.O. Carpenter, M.C. Hamilton, B.A. Knuth, and S.J. Schwager. 2004. Global assessment of organic contaminants in farmed salmon. Science 303:226-229.

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