# So far, fish appear to be healthy after fly ash spill

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ORNL staff member gathers data for fish health study. (Photo: Jason Richards)

(PhysOrg.com) -- Fish exposed to fly ash at the site of the Tennessee Valley Authority coal ash spill are faring better than some expected, researchers have learned.

Oak Ridge National Laboratory in collaboration with TVA has found that while small amounts of some contaminants from the December 2008 fly ash spill have been taken up by fish in the Clinch and Emory rivers, to-date, the fish collected downstream from the spill appear

healthy relative to fish from unimpacted sites.

"We are looking to see if there has been an effect on overall fish health and reproductive condition, and so far, such effects have not been evident," said Mark Peterson, leader of ORNL Environmental Sciences Division's Ecological Assessment Team and the Aquatic Ecology Laboratory.

After the spill deposited 5.4 million cubic yards of coal ash into the Emory River and an embayment adjacent to the Kingston Fossil Plant, the public was concerned that the ash and associated chemicals, particularly arsenic and selenium, could be a health hazard to local residents and also to fish and wildlife.

Likewise, Peterson and a team of ecologists in ESD, including Marshall Adams, Mark Greeley and John Smith, were interested in seeing whether trace components of the ash — such as selenium, which has been found to be toxic to fish and wildlife in large amounts — would be found in insect and fish populations immediately following the spill and for some time after the spill.

A team led by Adams was able to get into the field quickly and collected fish as early as February 2009 at sites both downstream and upstream from the spill. Species tested for contaminant uptake and fish health include bluegill, largemouth bass, channel catfish, white crappie and gizzard shad.

It is the experience assessing the legacy of contaminant deposits in the Clinch River and Watts Bar Reservoir from Department of Energy activities decades ago that provides the ORNL team with the expertise to evaluate changes in ecological conditions in these waters, researchers noted.

"We've been sampling fish from Watts Bar Reservoir since the 1980s to evaluate the impact of Department of Energy facilities, so we have some historical record of regional conditions prior to the spill," Peterson said.

However, while there are historical records from DOE-sponsored studies in some locations for which to compare water quality and fish tissue concentrations pre- and post-spill, determining potential risk to the health of fish populations is more complicated.

"Fish populations can be impacted by a range of factors at this site that are unrelated to the spill, including food and habitat availability, variations in water quality characteristics, presence of historical contaminants such as mercury and PCBs, and interactions with other biota in the reservoir," Peterson said.

Further complicating interpretation of fish health condition is that some fly ash-related contaminants may not cause effects that can be easily measured immediately after the spill. Contaminants like selenium are accumulated via the food chain and it can take some time for fish to reach equilibrium with the environment, or for contaminant exposure to result in measurable negative impacts to fish populations. The ongoing second year of fish sampling will be especially important in assessing the longer-term environmental impacts of the spill, researchers said.

A key contaminant of concern is selenium, which at high concentrations is known to cause reproductive problems in fish, including impacts to fish early life stages. A project led by Mark Greeley will be evaluating fish embryos and larvae exposed to fly ash in large laboratory tanks. Beginning in May and extending through the summer, this study will take up a large part of ORNL's 9,000-square-foot Aquatic Ecology Laboratory and is unique in its attempt to evaluate exposure and effects over longer time scales in a controlled environment.

TVA, which is engaged with ORNL and multiple university and government organizations in monitoring and assessing the effects of the fly ash spill on the environment, is providing the funds to ORNL to continue research this year.

By conducting integrated and multidisciplinary field and laboratory studies, ORNL scientists expect to provide a better understanding of the ecological risks of fly ash exposure. These regional studies will provide insights relative to scientists' broader understanding of the environmental effects and responses of fish and wildlife to various energy alternatives, such as coal-fired power plants.

Provided by Oak Ridge National Laboratory