COLORADO
Water Quality Control Division
Department of Public Health & Environment

Analysis & Recommendation
Fish consumption - Animas River

Public Recommendation

The Colorado Department of Public Health and Environment has determined that eating trout caught from the Animas River is safe at this time. CDPHE analyzed fish tissue from rainbow and brown trout from the Animas River in August 2015, shortly after the Gold King mine spill, and again in March 2016in order to evaluate potential impact to human health from eating the fish (and not to evaluate fish health). In the fall of 2015, most of the post event fish tissue analyzed showed metals below detectable levels and all results fell below risk screening levels. Because there is a potential for the fish to concentrate metals in their tissue over time, Colorado Parks and Wildlife collected fish again in the spring of 2016, and these fish also contained metals below detection limits, and all results fell below screening levels. Monitoring of fish tissue metal levels will continue and new data will be analyzed and the results will be reported when available.

Analysis and Rationale for Recommendation

Ten fish were collected from the Animas River downstream of Durango on August 14, 2015 and again on March 18, 2016. In the fall, the fish samples consisted of five brown trout ranging in size from 13 to 20.6 inches (weights ranged from 13.9 to 62.6 ounces) and five rainbow trout ranging in size from 11 to 13.8 inches (weights ranged from 8.7 to 15 ounces). In the spring, five of each species were again collected, with brown trout ranging from 15.1 to 19.3 inches (18.5 to 40 ounces) and rainbow trout ranging from 14.4 to 21.3 inches (17 to 37 ounces). The fish were filleted and muscle (fillet) samples submitted to the department's Laboratory Services Division. Fish tissue from the ten fish were analyzed for 13 metals including aluminum, arsenic, beryllium, cadmium, cobalt, copper, lead, manganese, mercury, nickel, selenium, uranium, and zinc in the fall. In the spring, the fish were analyzed for the same metals, except beryllium and cobalt. The fish collected in August 2015 showed levels of beryllium, cadmium, lead, and uranium less than the detection limits, while low levels of the other parameters were detected. The fish collected in March 2016 showed detectable levels of aluminum, arsenic, and mercury, while all other metals were less than detection limits. Detection limits for the metals in the spring were somewhat higher than those for the fall, but still low enough to inform risk assessment.

WQCD consulted with Colorado's Fish Consumption Advisory Technical Advisory Committee, which consists of members from the Water Quality Control Division, Disease Control and Environmental Epidemiology Division and Colorado Parks and Wildlife. Detectable metal levels were compared to EPA regional screening levels in a manner similar to risk assessment of water and sediment from the Animas River. In this case, the mine spill is a relatively short term event and this risk assessment generally focuses on non-cancer health effects.

Aluminum: In the fall, eight out of ten fish samples had aluminum levels reported above the detection limit, while in the spring, all ten samples showed detectable levels. We evaluated the data against the screening level of 1,500 mg/kg. All data reported were well below this level, however the maximum aluminum level in the spring (1.4 mg/kg) was smaller than the maximum level detected in the spring (10 mg/kg). While have no concerns at this time with aluminum in the fish tissue with regards to human health, the apparent increase in aluminum levels from August to March could represent a slight accumulation of aluminum in fish tissue. Future monitoring of fish tissue could determine whether this potential increase represents accumulation, or just resulted from relatively small sample sizes.

Arsenic: Fish tissue samples are analyzed for total arsenic. It is generally considered that organic arsenicals are substantially less toxic than the inorganic forms. As a result, fish consumption advisories for organic arsenic are not generally issued by the state and federal agencies. However, the EPA has developed screening level fish consumption limits for inorganic arsenic. The general consensus in the literature is that 85% to >90% of arsenic found in edible portions of marine fish and shellfish is organic arsenic and that approximately 10% is inorganic arsenic. A screen of organic to inorganic arsenic ratios in Colorado fish supports the use of the assumption that fish arsenic levels are composed of less than or equal to 10% inorganic. The default percentage of 10% was applied to the total arsenic results for the fish samples. The inorganic portion in these 10 fish collected in August ranged from 0.006 mg/kg to 0.056 mg/kg and from less than detection limits to 0.02 mg/kg in March. The fall 2015 maximum detected levels in both Brown Trout (0.056 mg/kg) and Rainbow Trout (0.015 mg/kg) appear to be higher than the Spring 2016 maximum detected levels in Brown Trout (0.02 mg/kg) and Rainbow Trout (<0.0066 mg/kg). We compared this data to the EPA RSL for inorganic mercury of 0.46 mg/kg. All inorganic arsenic found in the fish (10% of the reported total arsenic) was below this screening level.

Cobalt: Only the fall 2015 samples were analyzed for this metal. Half of the fish samples had detectable levels of cobalt. The maximum detected cobalt concentration was 0.09 mg/kg, which falls well below the screening value of 0.46 mg/kg. We have no concerns at this time with cobalt in the fish tissue.

Copper: Copper was detected in all of the fall fish samples, but at levels below 1.0 mg/kg. Copper was not detected in the spring fish samples. Because the screening level for copper is 62 mg/kg, we have no concerns about copper levels in the fish at this time.

Manganese: Levels of manganese ranged from 0.06 to 0.3 mg/kg in the ten fish samples collected in August 2015, and were below detection limits in the March 2016 fish. We evaluated the data against the screening level of 220 mg/kg, which is well above the maximum detected value. We have no concerns at this time with manganese in the fish tissue.

Mercury: CDPHE uses a threshold of 0.3 mg/kg to evaluate whether a Fish Consumption Advisory is warranted. Mercury is currently the only toxic substance which Colorado evaluates in fish tissue, has established a threshold and issues advisories. We also evaluated the data against a more stringent EPA screening level of 0.15 mg/kg, which is a screening threshold used to determine whether further investigation is warranted. Mercury in the ten fish collected in August 2015 ranged from <0.02 mg/kg to 0.093 mg/kg, so mercury levels were below both thresholds. In March 2016, mercury levels ranged from < 0.03 to 0.22 mg/kg. None of the fish exceeded the Colorado threshold for an advisory and only one fish exceeded the EPA screening level. With one fish out of the ten tested in March exceeding the screening level, further investigation of mercury levels in Animas River fish may be warranted, but we do not yet have enough evidence to warrant concern for human health. Furthermore, a mercury level of 0.22 mg/kg is within the range of mercury levels found throughout Colorado. The apparent increase in mercury levels from August to March could represent accumulation of mercury in fish tissue and future monitoring of fish tissue could determine whether this increasing trend continues.

Nickel: All ten fish showed detectable levels of nickel in August, which ranged from 0.19 to 0.29 mg/kg. The March fish showed levels below the detection limit. All nickel data fell well below the nickel screening level of 17 mg/kg. Thus, we have no concerns about nickel in fish at this time.

Selenium: In the fall of 2015, all selenium results were reported above the detection limit while they fell below detection limits in the spring of 2016. We evaluated the data against the EPA screening level of 7.7 mg/kg. All data reported was well below 7 mg/kg, in fact, it was all below 1 mg/kg (0.38 mg/kg - 0.58 mg/kg). We have no concerns at this time with selenium in the fish tissue.

Zinc: Zinc was detected in all of the August fish samples, but at levels below 4.5 mg/kg. Zinc was not detected in any of the March samples. Because the screening level for zinc is 460 mg/kg, we have no concerns about zinc levels in the fish at this time.

The levels of all tested metals in Animas River rainbow and brown trout fall within the range of levels in available Colorado fish data, and thus, most likely represent background levels and do not indicate a change due to the mine spill.

Thus, the division has recommended that Animas River fish may be consumed without additional health risks due to the Gold King mine spill. The division will continue to work with Colorado Parks and Wildlife continue to monitor fish to examine possible accumulation and elimination of metals over time, with particular interest in aluminum and mercury due to apparent increases from fall 2015 to spring 2016.