

MERCURY IN FISH INVESTIGATION FOR WILLISTON-DINOSAUR BASINS

OVERVIEW OF 2016 PRELIMINARY FINDINGS

Introduction

The Fish & Wildlife Compensation Program (FWCP) recognizes that mercury concentrations in fish caught in Williston and Dinosaur reservoir basins are a priority concern for local First Nations and stakeholders. Our [Action Plan for Reservoirs \(2014\)](#) identifies mercury as a high-priority issue and defines objectives, and specific actions to address mercury in our Peace Region. One of those actions is to collaborate with First Nations and liaise with appropriate agencies in implementing a study to investigate mercury concentrations in fish for Williston-Dinosaur basins. Our Peace Region board selected Azimuth Consulting Group Partnership (Azimuth) to conduct a multi-year investigation to study mercury from key fish species in Williston and Dinosaur Basins. The goal is to improve our understanding of mercury in fish in all parts of the reservoir system, and to provide this information to agencies responsible for advising the public on fish consumption. This document is an overview of the process and preliminary findings based on 2016 data collection. Read the full report: [2016 Data Analysis Report: Mercury Sampling Program May 2017 \(PDF\)](#)

Scope of Work

Azimuth began this work on behalf of FWCP in May 2016 focussing on Parsnip and Finlay reaches, including two reference lakes; Fraser Lake (Lake Trout and Lake Whitefish) and Thutade Lake (Bull Trout and Kokanee). Small numbers of Rainbow Trout and Burbot were also collected. First Nations were involved in the collection of fish tissue for mercury analysis and engaged with their communities to gather creel data (i.e., fish consumption patterns).

Three main fish sampling programs were conducted in 2016. The largest sampling program targeted Parsnip Reach, gathering tissue samples from 129 fish. Mercury and stable carbon and nitrogen isotopes were analysed from Lake Trout (42), Bull Trout (9), Lake Whitefish (24), Mountain Whitefish (9), Rainbow Trout (9) and Burbot (1). The second sampling program was conducted opportunistically on Finlay Reach. In total, 56 fish were measured for mercury and stable isotopes including 4 Lake Trout, 13 Kokanee (Osilinka River) and 39 Bull Trout from Ingenika River (10), Davis River (14), Swannell River (7), Chowika River (5) and Osilinka River (3). Some Rainbow Trout, Longnose Sucker and Mountain Whitefish were also collected from Dinosaur Reservoir. Finally, two reference lakes were sampled – to compare mercury data from Williston to fish from nearby lakes that are not connected to the reservoir. In Fraser Lake, 64 fish were captured, focusing on Lake Trout (32) and Lake Whitefish (20) In Thutade Lake, 21 fish were captured focusing on Kokanee (12) and Bull Trout. Small numbers of Burbot, Rainbow Trout and Mountain Whitefish were also measured for mercury. No Bull Trout in Thutade Lake were caught in 2016 but 27 were caught in 2014/2015.

Overview of Preliminary 2016 Results

2016 is the first of a three-year study to characterize fish mercury concentrations across a range of species, from different geographic areas within the Williston – Dinosaur watershed, relative to nearby reference lakes. *It is important to note that data presented here are preliminary and may change, as further data from the reservoirs and their tributaries are collected.* Therefore, the report does not go into depth to describe observed patterns. The [2016 Data Analysis Report: Mercury Sampling Program May 2017 \(PDF\)](#) report is available at www.fwcp.ca/mercury-in-fish-investigation-in-williston-dinosaur-basins/.

The report presents a series of summary tables and graphs, depicting relationships between fish size, age and tissue mercury concentration as well as stable carbon and nitrogen isotopes relative to fish size and mercury concentration. Stable isotopes in fish tissue were examined with mercury data to shed light on the fish's food web position and what it feeds on at different life stages. Where on the food chain the fish sits and what its preferential diet is, are key factors in determining the mercury concentration of individual fish.

As expected, carnivorous Lake Trout and Bull Trout from Williston Reservoir had higher mercury concentrations than other species, such as Lake Whitefish and Rainbow Trout. In both Williston Reservoir and Fraser Lake, mercury concentrations in Lake Trout ranged over an order of magnitude, from 0.15 up to 1.3 ppm, with large, old fish having highest concentrations. These early data suggest that mercury concentrations in Lake Trout from Parsnip Reach and Fraser Lake (reference lake) were similar across the wide size range of fish examined.

Mercury concentrations in Bull Trout ranged from 0.1 to 1.0 ppm, a bit lower than for Lake Trout. While mercury concentrations in Bull Trout from Finlay Reach were similar to Thutade Lake (reference lake) for most fish, the largest Bull Trout from Williston were somewhat higher in mercury than the largest trout from Thutade Lake, although sample size was small. Finally, there was wide overlap in mercury concentrations between Bull Trout from Williston Reservoir, Thutade Lake and Crooked River (2012 data), suggesting that differences in mercury concentrations between these waterbodies are small.

A similar pattern was observed in Lake Whitefish as for the other species. As expected, mercury concentrations in Lake Whitefish were lower (up to 0.33 ppm) than Bull Trout and Lake Trout. Unlike trout however, there was no apparent relationship between increasing fish size and mercury concentration in Lake Whitefish. Although Lake Whitefish from Fraser Lake reached a larger size (up to 400 mm) than Williston Reservoir (300 mm), the range in mercury concentrations for this species between the reservoir (0.05 – 0.33 ppm) and Fraser Lake (0.05 – 0.33 ppm) were similar.

A small number of Kokanee were caught from Finlay Reach (13) and Thutade Lake (12) in 2016, and Kokanee from the reference Thutade Lake had a lower concentration (0.05 ppm) than in Finlay Reach (0.05 – 0.14 ppm). Mercury concentrations in Mountain Whitefish (9), Rainbow Trout (9) and Burbot (1) from Parsnip Reach were all relatively low (<0.20 ppm), with similar concentrations for the same fish species from the reference lakes (Thutade and Fraser lakes), although sample sizes are small.

In summary, the range and magnitude of mercury concentrations between Williston and Dinosaur Reservoir fish and reference area fish from Fraser and Thutade lakes were similar for most species, across the range of sizes measured. Stable isotope results indicate that the key species occupy similar positions in the food chain and have similar dietary preferences.

Next Steps

The focus of 2017 work is on Peace Reach, with continuing efforts to fill data gaps in Finlay Reach, Dinosaur Reservoir and lakes and rivers fished by First Nations members. More data will be gathered from regional lakes, to better put Williston and Dinosaur Reservoir fish in context.

About Mercury

Mercury is found naturally in air, water, sediment, soil, plants, animals and fish. The creation of a new reservoir leads to the conversion of naturally occurring inorganic mercury in flooded soil and vegetation into methylmercury. This is the form of mercury that bioaccumulates in fish that prey on other fish. Over time, the concentration of mercury in fish in reservoirs returns to a new baseline level, usually within 25 years after reservoir creation. Learn more at www.fwcp.ca/mercury-in-fish-investigation-in-williston-dinosaur-basins/