Updated fish contaminant levels and consumption advisories for Porcupine Lake

Satyendra Bhavsar, Ph.D., P.Eng.

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Ontario's Fish Contaminant Monitoring

- Consumption of fish can be a major exposure route to toxic contaminants such as mercury, polychlorinated biphenyls (PCBs), dioxins and furans, and some pesticides
- After discovery of elevated contaminants in fish in the 1960s and 1970s, the Ontario government established a program in 1976 to monitor the level of persistent toxic substances in fish and issue consumption advisories
- Over 2500 waterbodies including Canadian waters of the Great Lakes have been monitored over the last 50 years





Guide to Eating Ontario Fish

- Provides information on the types and quantities of Ontario fish that are safe to eat
- Advice is provided for both the general population as well as sensitive population of women of childbearing age and children under 15
- Updated every two years at Ontario.ca/Fishguide







Porcupine Lake fish contaminant monitoring

- Located in Porcupine; about 10 km from Timmins, in Cochrane District.
- Fish samples were previously monitored for contaminant levels in 1976, 1990, 1998, 1999.
- Lake receives inputs from multiple mines and municipal sewer bypasses. New mines may open in the area in future.
- In June 2019, fish sampling was conducted to gather updated information on contaminant levels and revise fish consumption advisories.
- The data can also provide a baseline for potential future changes in the watershed.





Sample collection

- Conducted on June 25, 2019.
- Using gill nets set overnight at multiple locations at likely fish habitats in the lake.
- Skin-removed fillets of 20 Northern Pike, 20 Walleye, 10 White Sucker and 3 Yellow Perch ranging in size (length) were collected.
- Samples were kept on ice until transported to the ministry laboratory in Toronto, and stored frozen at -20 °C.
- Fish samples were thawed and homogenized before sub-sampling for contaminant analyses.





Contaminant analysis

- Conducted at the ministry laboratories in Toronto.
- All samples monitored for mercury, which was the main contaminant of concern to date for Porcupine Lake.
- Mercury is typically the major contaminant resulting in restrictions on eating fish caught from Ontario's inland waterbodies.
- Three samples of each fish species were screened for metals, considering the low levels observed in fish samples collected during the 1990s.
- The largest White Sucker, fattiest among the four fish species sampled, was also screened for PCB (polychlorinated biphenyl) and lipid content. Total PCB levels in the remaining species can be expected to be lower considering PCBs typically accumulate at higher levels in fatty fish.





Fish Contaminant Levels - Mercury

Most Pike and Walleye exceeded the "do not eat" benchmark for the sensitive population. Some Walleye exceeded the "do not eat" benchmark for the general population. Levels in White Sucker and Yellow Perch were relatively low.





Fish Contaminant Levels - Metals

Levels of all metals, except chromium, were low.

Almost all chromium levels exceeded the "do not eat" benchmark for the sensitive population, and one of three Walleye and Yellow Perch samples exceeded the "do not eat" benchmark for the general population.



Health protection guidelines are based on hexavalent chromium (Cr6). As there is no reliable lab method to measure Cr6, total chromium concentrations are compared against Cr6 benchmarks, generating conservative consumption advice as it is highly unlikely all Cr is Cr6.



Fish Contaminant Levels - PCB

- Total PCB concentration in the largest White Sucker was below the detection limit of the analytical method (i.e., less than 20 ng/g) and below the first advisory benchmark of 26 ng/g for an unrestricted advisory for both populations
- Total PCB levels in the remaining species can be expected to be lower considering PCBs typically accumulate at higher levels in fatty fish.



Fish Contaminant Temporal Changes

Mercury levels appear to be stable between 1976 and 2019

Substantial increase in chromium levels was observed in Northern Pike between 1990 and 2019. Chromium measurements were not available for any other year or species.

Substantial increase in nickel concentrations was also observed in all three types of fish (Northern Pike, Walleye and White Sucker) between the 1990s and 2019.

For the six other metals monitored over time (arsenic, cadmium, copper, manganese, lead and selenium), the concentrations did not change dramatically (except some increases in manganese in Walleye and White Sucker).



Fish Consumption Advisories

The advisories have become more restrictive for Northern Pike and Walleye for the general population, and White Sucker and Yellow Perch for both populations.

Elevated chromium levels are responsible for the more stringent advisories. Although elevated chromium levels are of concern, the advisories are considered conservative (overly protective of human health).

Fish consumption advisories (in meals per month) for Porcupine Lake published in the 2017-2018 edition of the Guide to Eating Ontario Fish (i.e., Advisory Year 2017) and formulated using the data collected in 2019 (i.e., Advisory Year 2019). Advisories that became more restrictive are highlighted in red/bold font.

| Species | Population Type | Advisory Year | Contaminant | 15-20 cm | 20-25 cm | 25-30 cm | 30-35 cm | 35-40 cm | 40-45 cm | 45-50 cm | 50-55 cm | 55-60 cm | 60-65 cm | 65-70 cm | 70-75 cm | >75 cm |
|---------------|-----------------|---------------|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------|
| Northern Pike | General | 2017 | Mercury | | | 32 | 16 | 8 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 0 |
| | | 2019 | Chromium | | | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | Sensitive | 2017 | Mercury | | | 12 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 2019 | Mercury | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Walleye | General | 2017 | Mercury | | | | | | 2 | 2 | 2 | 2 | 2 | | | |
| | | 2019 | Chromium | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| | Sensitive | 2017 | Mercury | | | | | | 0 | 0 | 0 | 0 | 0 | | | |
| | | 2019 | Mercury | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| White Sucker | General | 2017 | Mercury | | | | | 8 | 8 | 8 | 8 | | | | | |
| | | 2019 | Chromium | | | | | 1 | 1 | 1 | | | | | | |
| | Sensitive | 2017 | Mercury | | | | | 4 | 4 | 4 | 4 | | | | | |
| | | 2019 | Chromium | | | | | 0 | 0 | 0 | | | | | | |
| Yellow Perch | General | 2017 | Mercury | 16 | 16 | | | | | | | | | | | |
| | | 2019 | Chromium | | | 1 | | | | | | | | | | |
| | Sensitive | 2017 | Mercury | 4 | 4 | | | | | | | | | | | |
| | | 2019 | Chromium | | | 0 | | | | | | | | | | |



Guide to Eating Ontario fish: Ontario.ca/fishguide





Summary

- Fish from Porcupine Lake were collected in 2019 and monitored for mercury, PCBs and metals.
- Elevated mercury and chromium levels were observed in all four species monitored.
- Levels of mercury and majority of metals monitored appear to be stable during the last two to four decades.
- Substantial increases in the levels of chromium and nickel were observed between the 1990s and 2019.
- The increased levels of chromium are resulting in more stringent fish consumption advisories, which can be considered conservative due to limitation of the current analytical method for chromium in fish.
- Considering the elevated chromium concentrations observed in the screening analysis, additional fish samples are being processed for metal measurements. Additional analyses are more for confirmation of the observed levels; they are not expected to dramatically change recently issued advisories.

