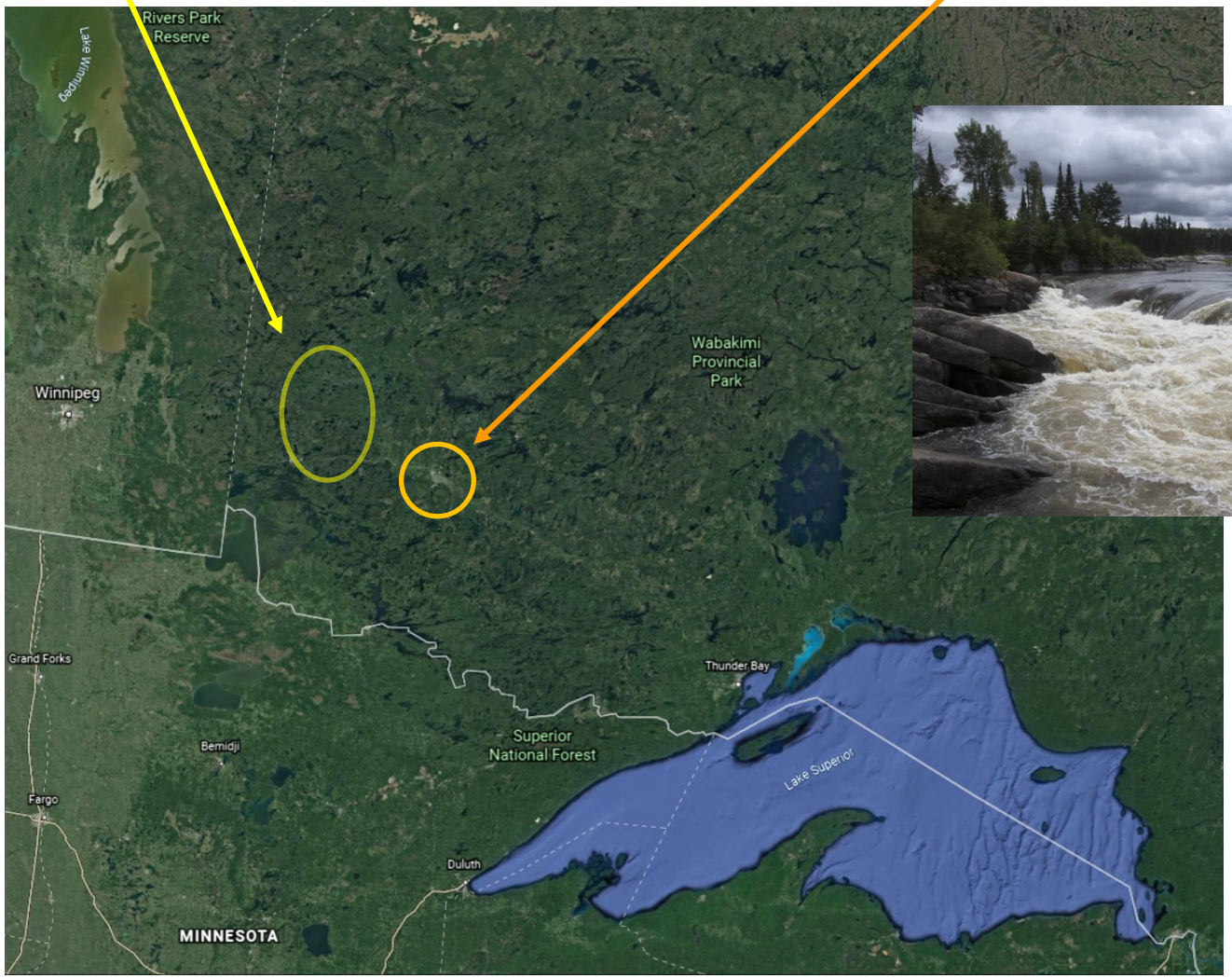
Grassy Narrows FN Community and Dryden, ON



Grassy Narrows FN Community – This is Living Downstream

Health in Grassy Narrows 'significantly worse' than other First Nations: report

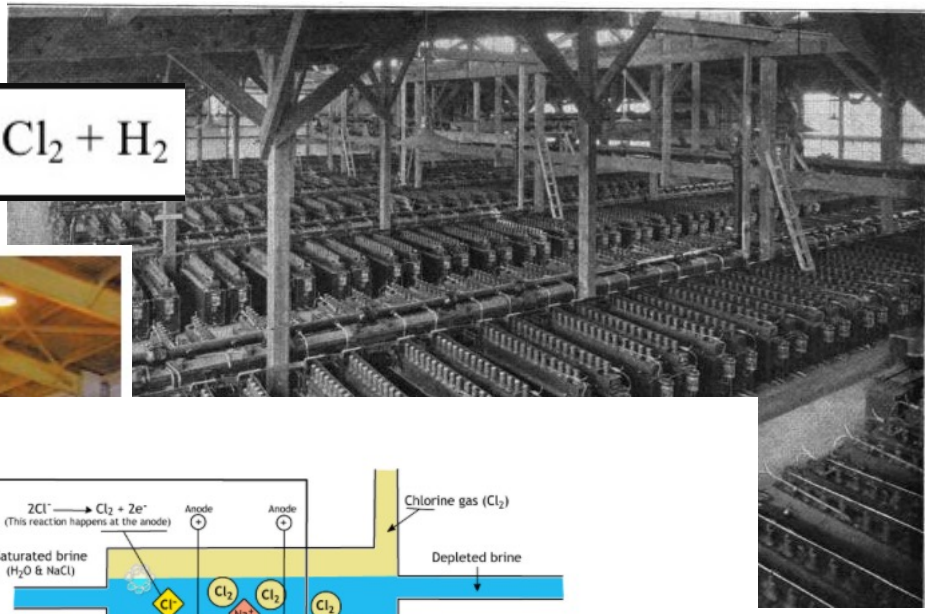
Dryden, ON - Mill Site History

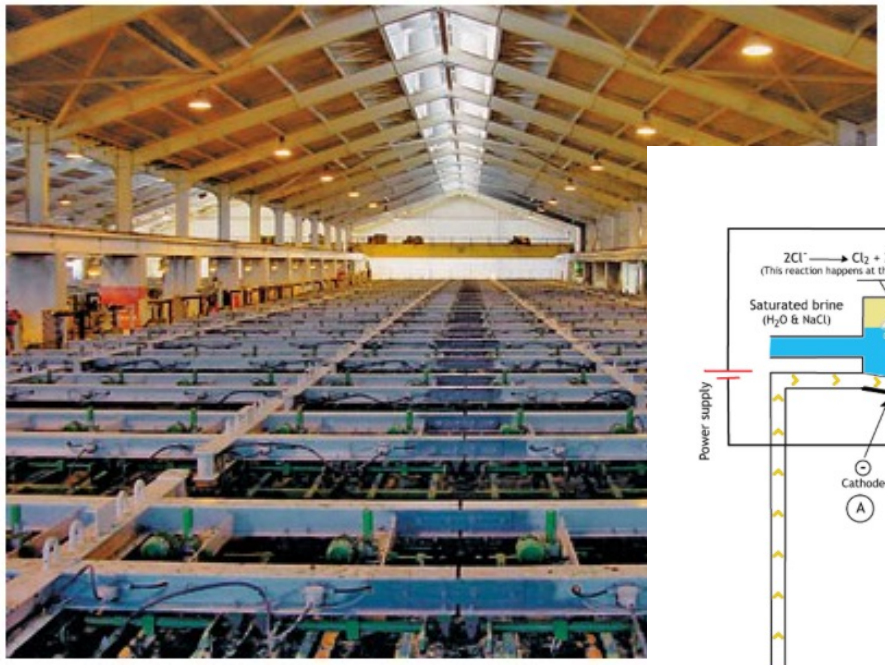
- A mercury cell chlor-alkali facility was constructed in Dryden in 1962
- Process uses mercury in an electrolytic cell to generate caustic soda and chlorine from brine
- Facility operations released ~ 10 tons of mercury into the river (plus unquantified volume into the atmosphere)

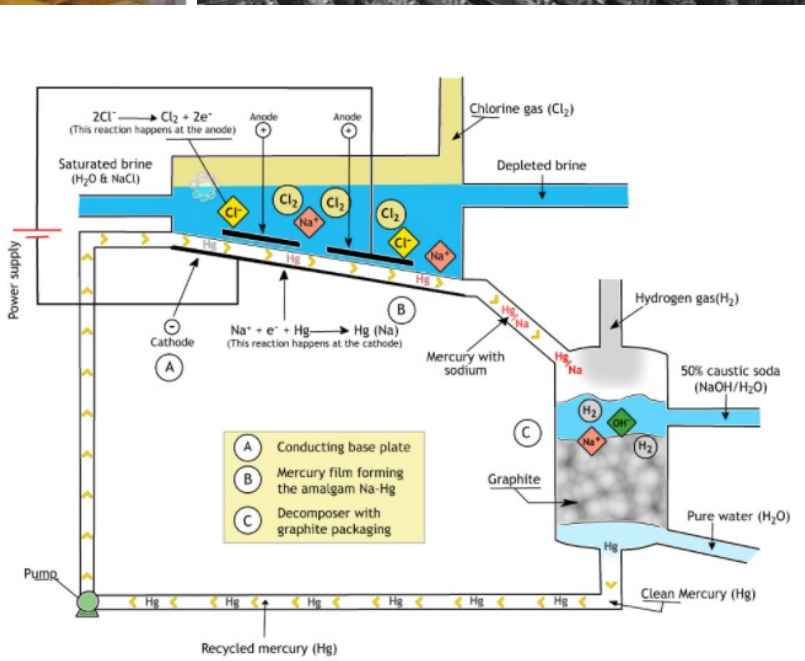
site was one of ~ 200 such sites operating globally from (1950 – now) that use(d) the mercury cell process to make caustic soda and chlorine (bleach, PVC, DDT)

Mercury cell chlor-alkali process

$$2NaCl + 2H_2O + \text{☼} \rightarrow 2NaOH + Cl_2 + H_2$$







Grassy Narrows FN Community

Toronto Star
November 11, 2017

CANADA

Ontario knew about Grassy Narrows mercury site for decades, but kept it secret

A confidential 2016 report says provincial officials were told in the 1990s that the site of a paper mill near Grassy Narrows First Nation was contaminated with mercury — and that the poison is likely still present.

Mercury exposure and premature mortality in the Grassy Narrows First Nation community: a retrospective longitudinal study

Aline Philibert, Myriam Fillion, Donna Mergler

Summary

Background Little is known about the influence of toxic exposures on reduced life expectancy in First Nations people in Canada. The Grassy Narrows First Nation community have lived with the consequences of one of the worst environmental disasters in Canadian history. In the early 1960s, 10 000 kg of mercury (Hg) was released into their aquatic ecosystem. Although Hg concentration in fish, their dietary staple, decreased over time, it remains high. We aimed to examine whether elevated Hg exposure over time contributes to premature mortality (younger than 60 years) in this community.

Methods We did longitudinal and case-control analyses with data for individuals of the Grassy Narrows First Nation community. In 2019, the community obtained their historical Hg biomarker data from a government surveillance programme, which was then shared with the authors. A matched-pair approach allowed us to compare longitudinal hair Hg concentration between cases (individuals who died aged younger than 60 years) and controls (individuals who lived beyond 60 years). Matching criteria included year of birth (allowing 2 years either side), sex, and a minimum of four hair Hg concentration measures, of which at least two were in the same year. Analyses included change-point detection, interrupted time series, mixed models, and Cox survival models.

Findings We analysed data collected between Jan 1, 1970, and Jan 31, 1997, for 657 individuals (319 women and 338 men, born between 1884 and 1991) for whom we assembled a retrospective database of yearly measures of hair Hg concentration (n=3603). Hair Hg concentration decreased over time. A subgroup of 222 individuals (107 women and 115 men) reached or could have reached 60 years old by August, 2019. There was an increased risk of dying at a younger age among those with at least one hair Hg measure of 15 µg/g or more (adjusted hazard ratio 1·55, 95% CI 1·11–2·16; p=0·0088). Among the deceased individuals (n=154), longevity decreased by 1 year with every 6·25 µg/g (4·35–14·29) increase in hair Hg concentration. Analyses of 36 matched pairs showed that hair Hg concentration of those who died aged younger than 60 years was 4·7 µg/g higher (3·4–5·9) than controls.

Interpretation The consistent findings between our different analyses support an association between long-term exposure from freshwater fish consumption and premature mortality in this First Nation community. There is a ne to do risk-benefit analyses of freshwater fish consumption in environmentally contaminated regions.

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This online publication has been corrected. The corrected version first appeared at thelancet.com/planetary-health on May 11, 2020, and further corrections have been made on July 15, 2020

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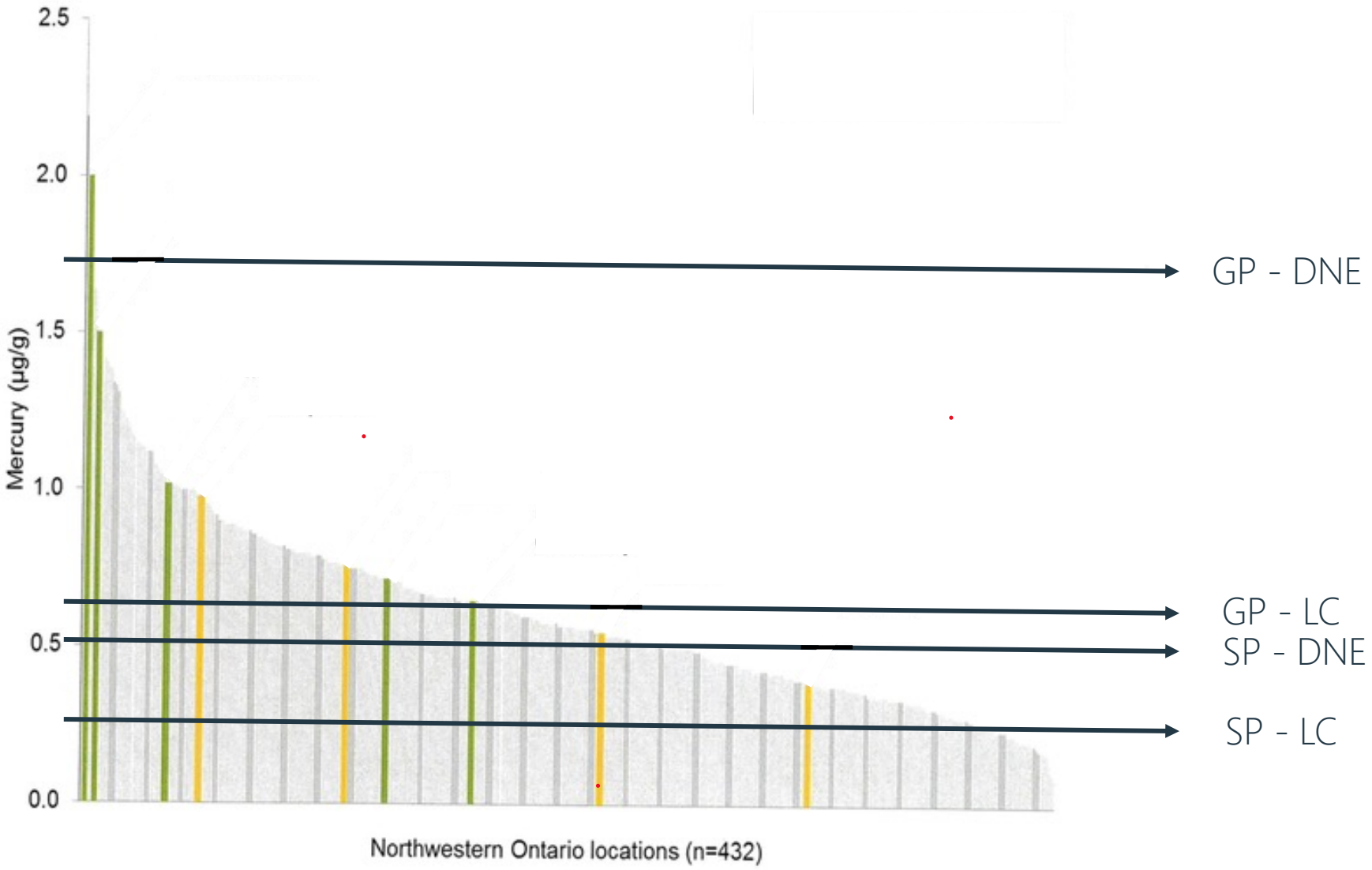
Mercury in Length-Standardized Walleye – NW Ontario



How Do We Understand the Problem?*

PHYSICAL
Glaciated landscape with little sediment to bury historical contamination

BIOLOGICAL
Multi-trophic level food chain with a top predator species that is frequently consumed and culturally significant

CHEMICAL
Mill effluent that contributes BOD and SO_4^{2-}, consumes D.O. and degrades water quality

SOCIO-CULTURAL
Who is harmed?
Who has power?
Whose wisdom is heard?
What does remediation mean?
Is it the same as healing?
What is 'success'?
Who defines it?

*Do we actually understand the problem?