

Mercury in Maine's Freshwater Fish? Is That Still a Problem? ...and what about PFAS?

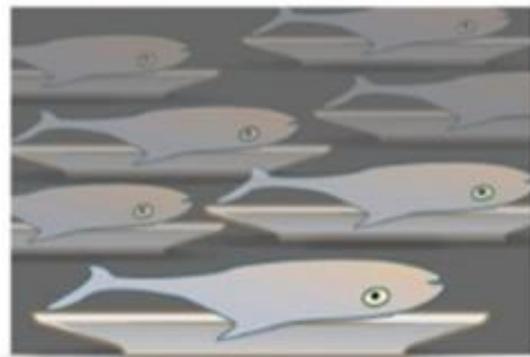
Using Maine's ice-fishing derbies to
monitor mercury concentrations in freshwater fish
and alert the public to mercury contamination

Dianne Kopec

Senator George J. Mitchell Center for Sustainability Solutions

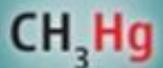
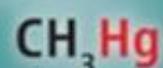
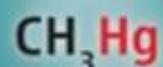
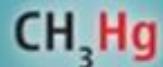
University of Maine

Long-range atmospheric transport



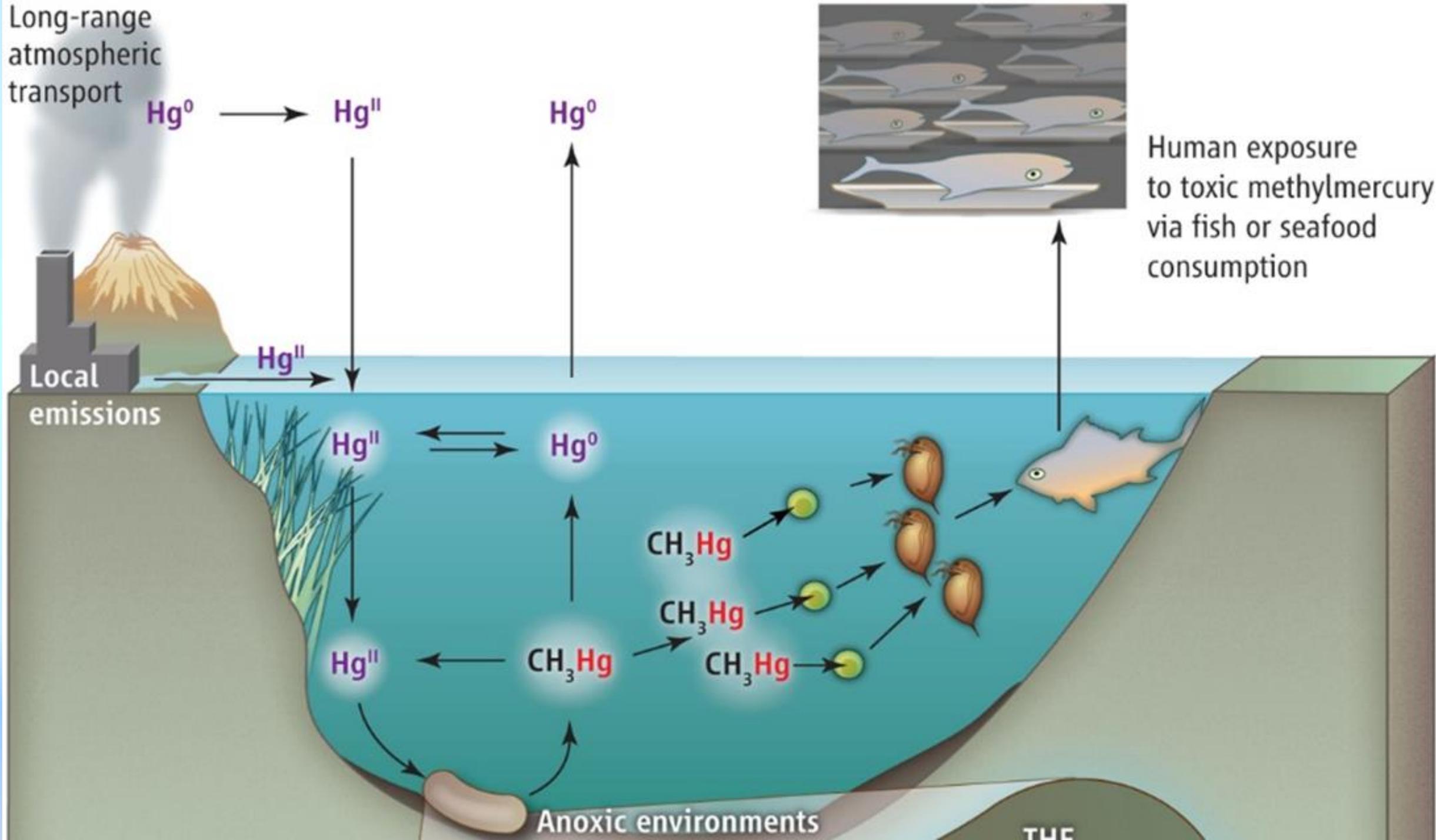
Human exposure to toxic methylmercury via fish or seafood consumption

Local emissions



Anoxic environments

THE



Maine's Fish Consumption Advisory for Mercury 1994 → today...

- Children <8 years; pregnant, nursing women; possibly pregnant women
 - No freshwater fish,
 - Except 1 meal/month: brook trout, landlocked salmon, sea-run smelt
- All others
 - 2 meals/month of freshwater fish
 - 4 meals/month: brook trout, landlocked salmon, sea-run smelt

Then I met the pike fisherman on Pushaw Stream...



- Who proudly served his 43" pike to his pregnant daughter-in-law...
- 28 years later, many do not know a fish mercury consumption advisory exists

Maine CDC advises pregnant women on the benefits and risks from fish

- 40% of pregnant women received this brochure (Engelberth et al. 2013)
- 36% read the brochure...
- many Mainers are unaware of the fish consumption advisory



The Maine Family Fish Guide: Advice from the
Maine Center for Disease Control and Prevention

Fish: 2 Meals a Week for Good Health

for pregnant women, children, and adults

Buy



Cook



Catch



Eat Out



If you're pregnant, this sign means caution.

How to increase public awareness of Fish Hg? ...and why?

- Goals:
 - Reduce human Hg exposure
 - Reduce wildlife exposure, especially invertebrate + fish eaters

WE CANNOT FIX A PROBLEM IF WE DO NOT KNOW IT EXISTS

- Mercury is a global problem – the US can address as a nation
 - Federal regulations have reduced mercury emissions in last 20 years
 - More work remains
- Create a press event? Generate new Hg data? Community science?

Ice Fishing for Mercury - 2022

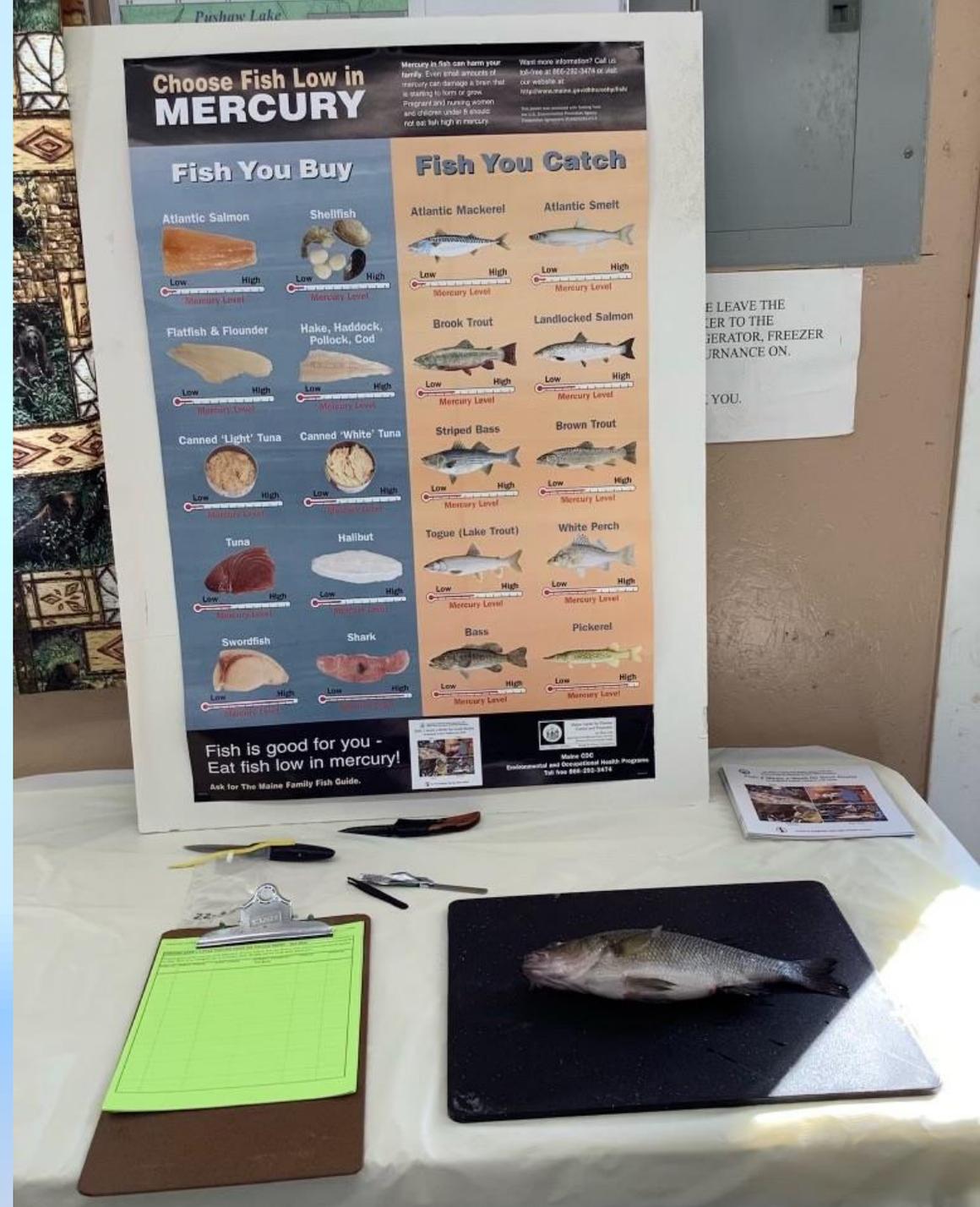
- Pushaw Lake Snowmobile Club Ice Fishing Derby
 - Agreed to cooperate and allow fish sampling at weigh-in area
- Greater Pushaw Lake Association + Kukunsook Camp Owners Association
 - Split analytical costs (\$330) and volunteered
- Maine CDC, Andy Smith
 - Posters and *Eat Healthy Fish* brochures

- Press
 - BDN – Pete Warner
 - News Center Maine – Alex Haskell
 - Maine Public – Carol Bousquet



Supplies for Derby Weekend

- Folding tables + disposable plastic covers
- Nylon cutting board
- Scalpels + handles; heavy knife
- Fish board and scale (derby)
- ID tags – cardboard tag tied to tail
- Whirlpaks (plastic bags) for samples
- Data sheet + lake map
- Paper towels, water bottles, waste bucket





BASS	Jamie True 4.59 20 1/2"
PICKEREL	Colby Waters 2.37 22"
WHITE PERCH	Shelley Fahey 1.19 12 1/4"
PIKE	Alicia Halloran 17.22 Pounds 38 1/2"
TOTAL lbs PIKE	1 ALEX GAGNON 20.43 2 ALICIA HALLORAN 20.43

Field collections of ~1-inch cubes of dorsal muscle



Subsampled using Hg-clean methods at Sawyer Lab, UMaine

...wicked busy
at the final
weigh-in...



Newspapers, TV, and radio helped spread the word...

An ice fishing derby will help officials measure how much mercury is in Pushaw Lake



by **Pete Warner**

February 5, 2022

“We really want to emphasize that fish are incredibly healthy to eat, especially for pregnant women and young children,” Kopec said. “But you have to choose what species of fish you eat because the level of mercury in the fish changes from species to species.”



In this February 2020 photo, Zach Pond resets his ice fishing trap at Pushaw Lake. The annual ice fishing derby to be held Saturday and Sunday also will allow anglers to donate samples of their fish to study mercury levels. Credit:

Courtesy of Terry Ferren



OUTDOORS

Ice fishing derby provides researchers an opportunity to measure mercury in Pushaw Lake

Fish in Pushaw Lake have not been tested for mercury since 2011.



Fish in Pushaw Lake have not been tested for mercury since 2011.



Author: Alex Haskell (NCM)
Published: 7:56 PM EST February 6, 2022
Updated: 2:30 PM EST February 7, 2022



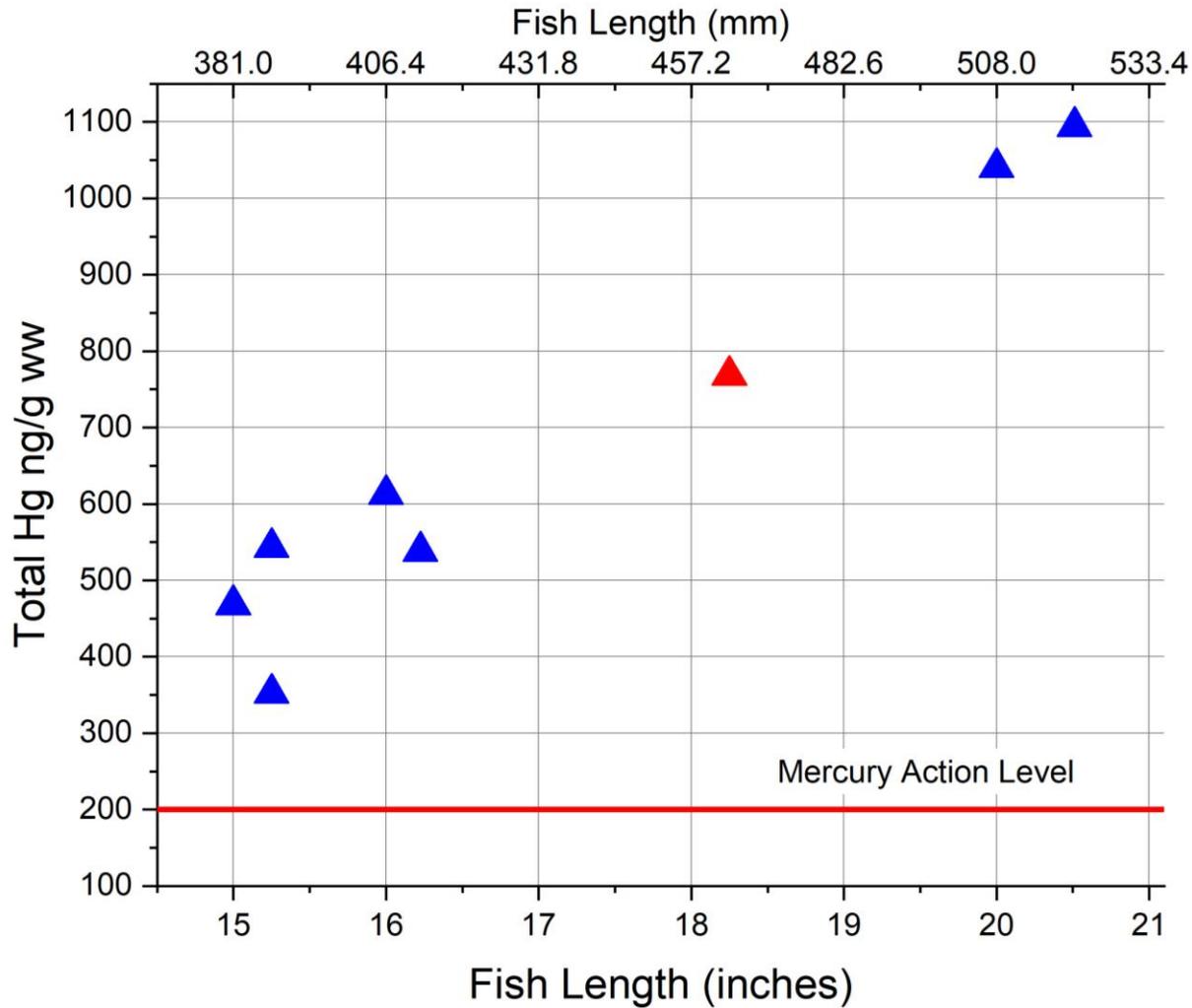
Pushaw Lake
Feb 2022

56 fish
sampled

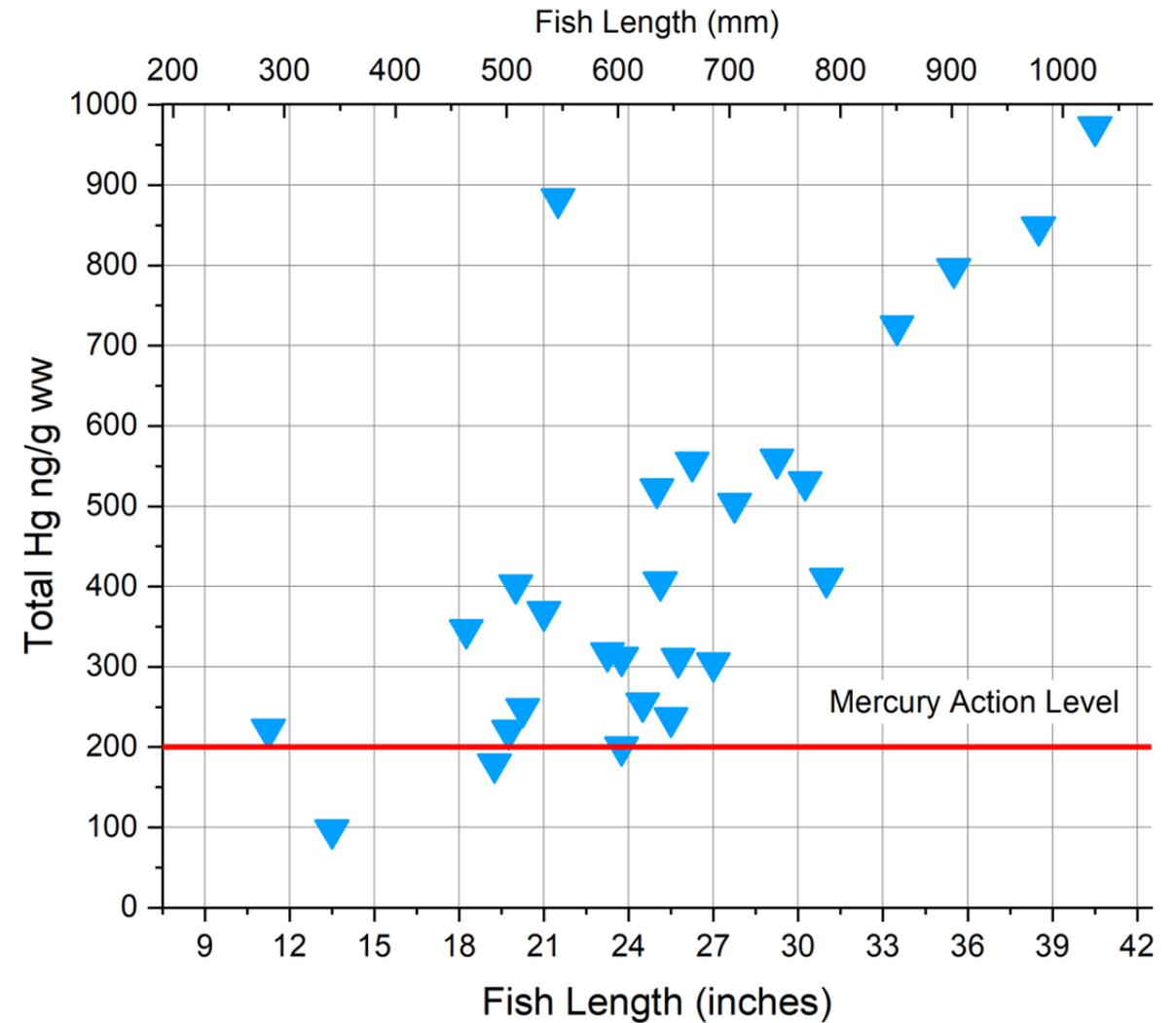
SPECIES	n	LENGTH (mm)	WEIGHT (g)
LM Bass	7	430 ± 60 380-520	1,165 ± 504 700-2,080
SM Bass	1	465	1,480
N Pike	28	640 ± 170 285-1,030	2,245 ± 2,125 135-7,810
Pickerel	9	505 ± 60 425-560	775 ± 290 460-1,175
WH Perch	8	295 ± 30 255-325	360 ± 100 220-540
YE Perch	3	255 ± 30 220-275	200 ± 70 135-275

mean ± SD
min-max

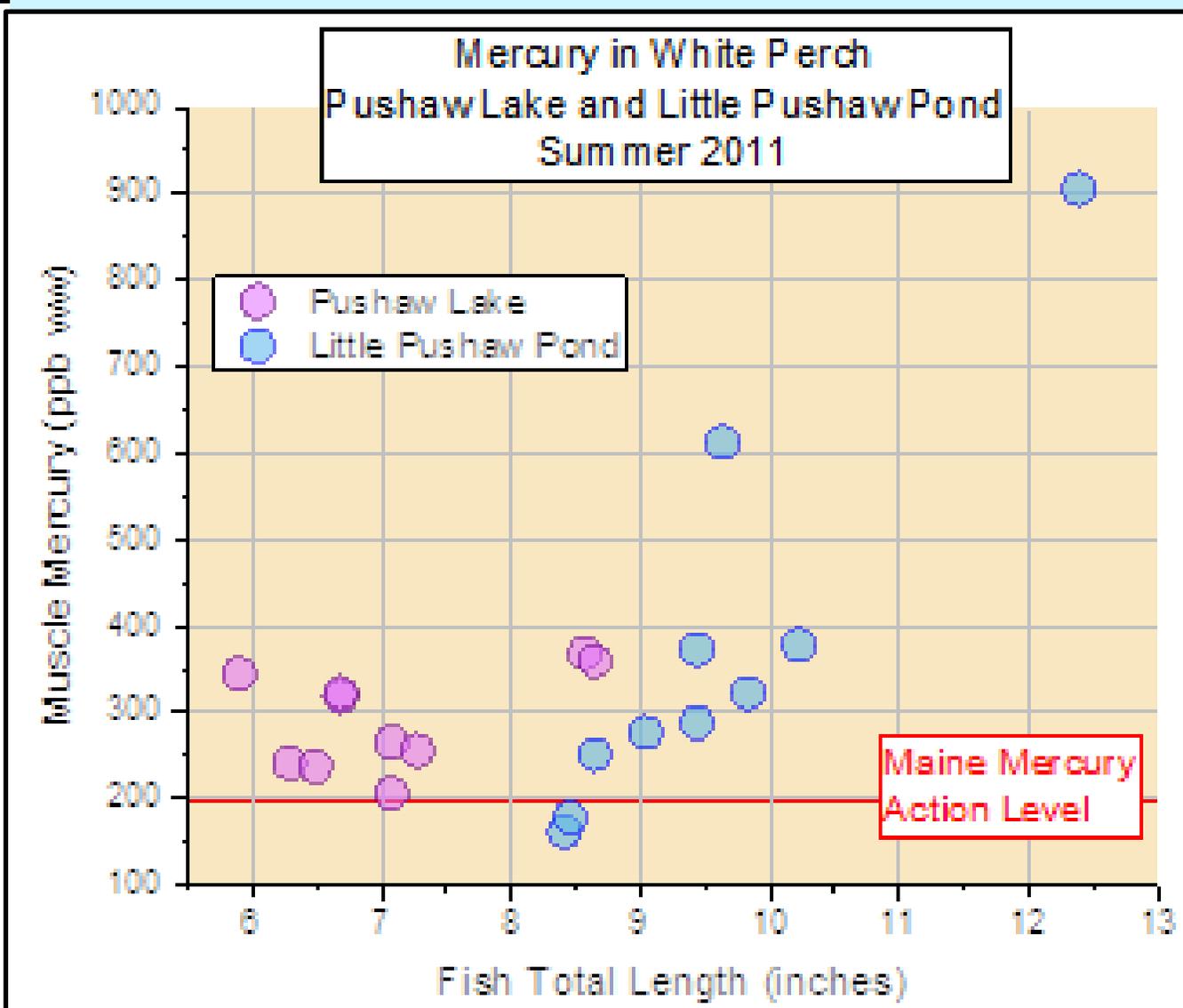
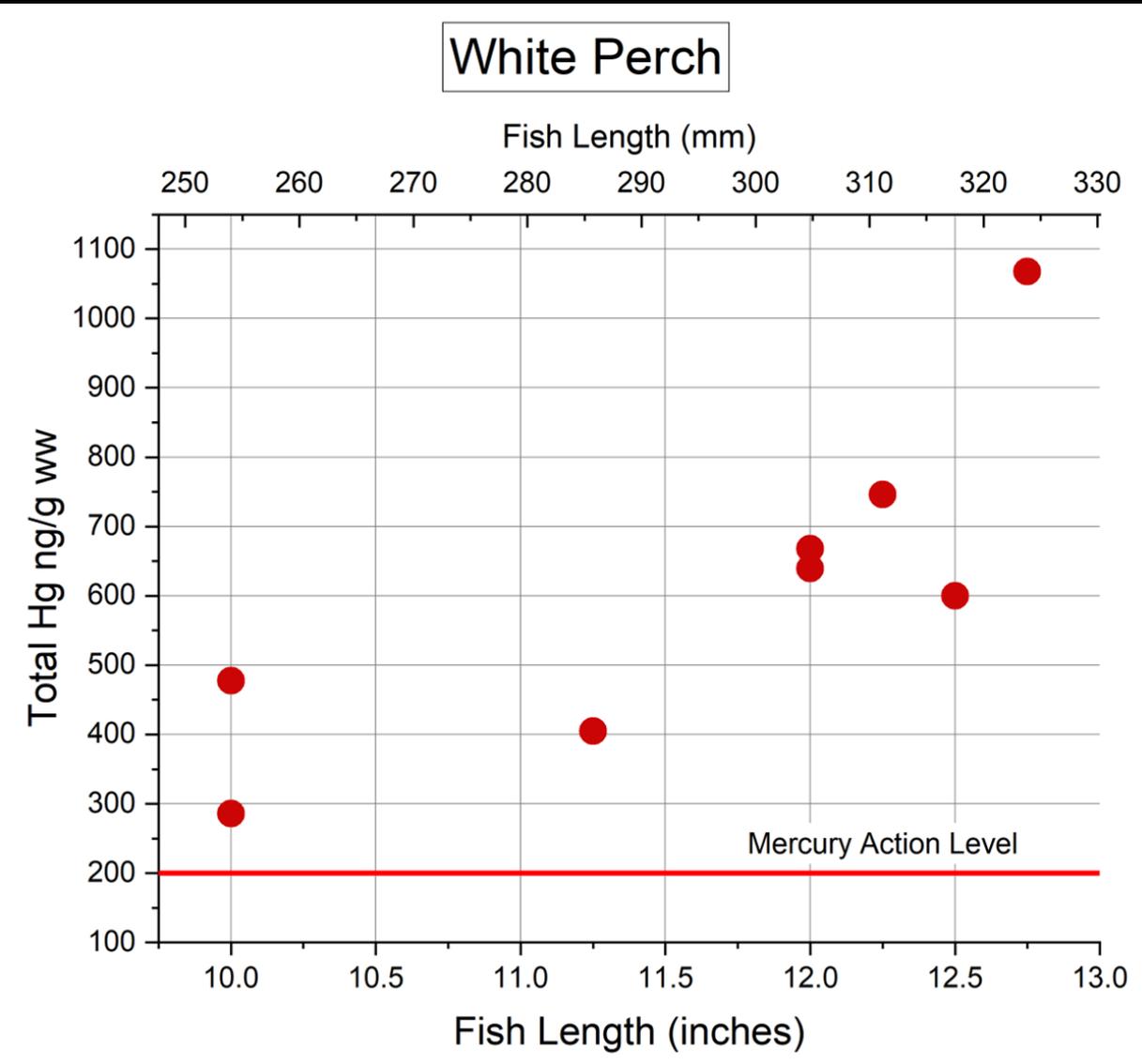
Largemouth + Smallmouth Bass



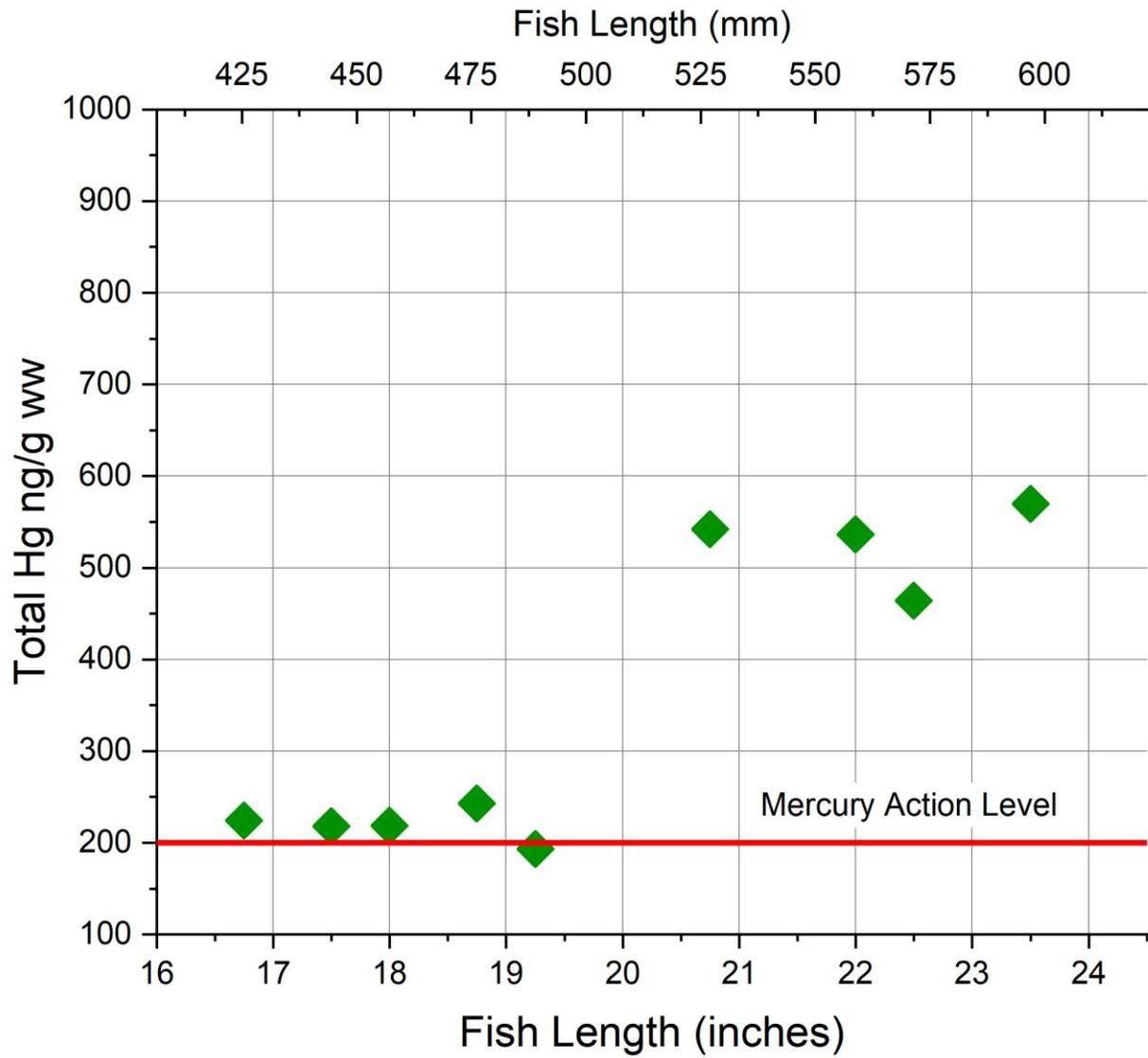
Northern Pike



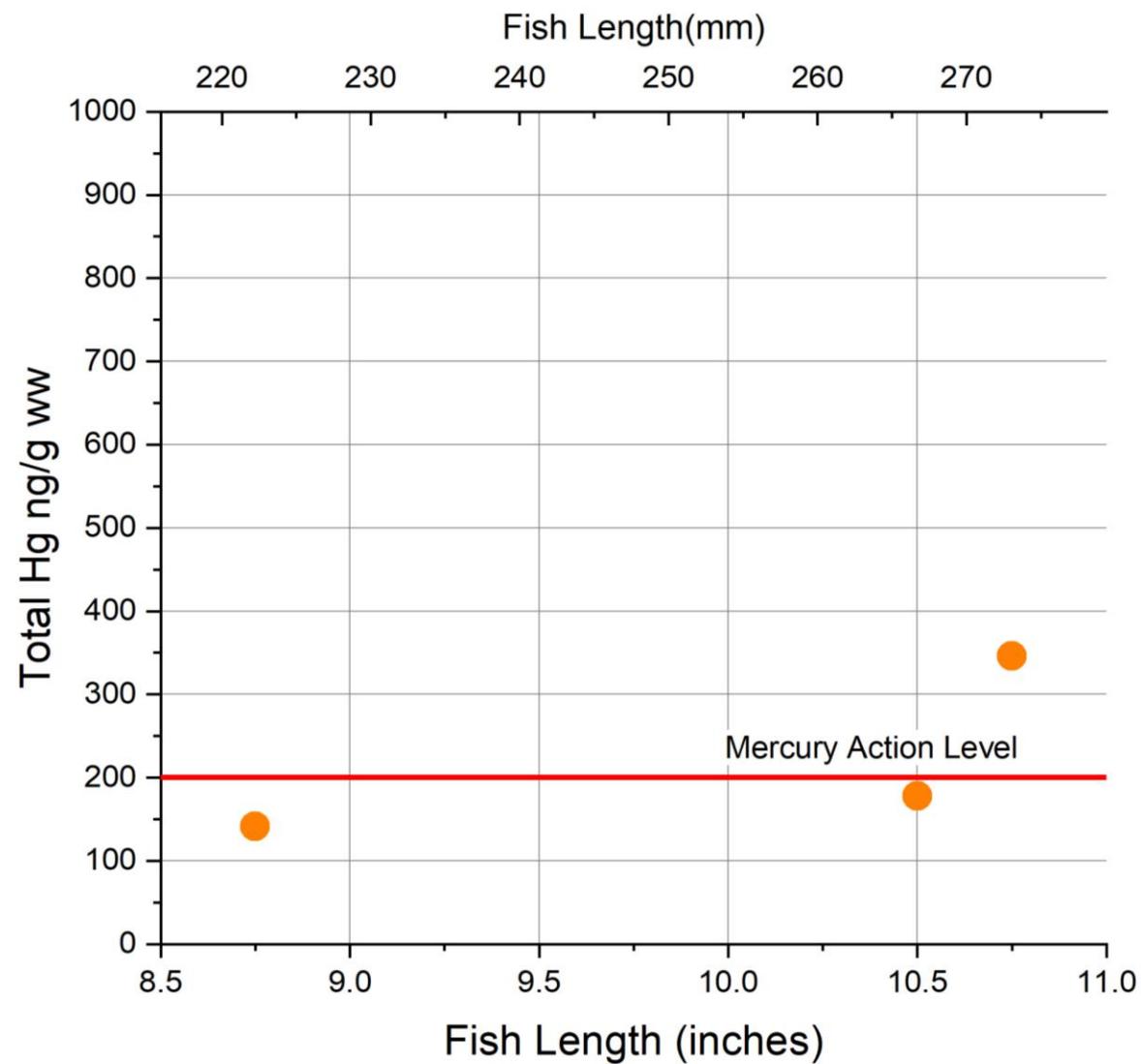
Hg in White Perch, Pushaw Lake - 2022 vs 2011



Chain Pickerel



Yellow Perch





ADVERTISE WITH US

LET'S TALK ABOUT IT

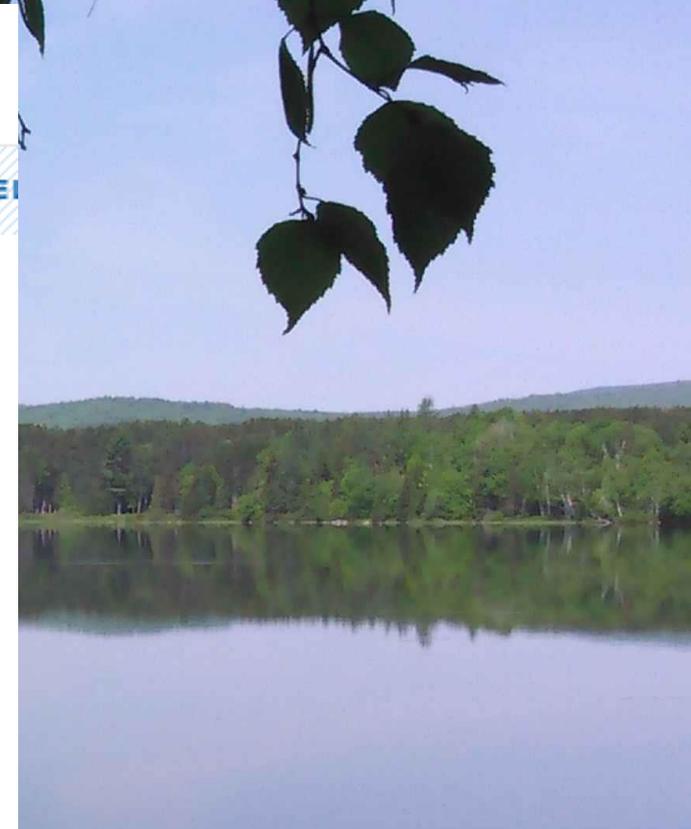
VOICE OF THE VOTER

CLOSINGS AND DEL

OUTDOORS

Maine researchers find high levels of mercury in Pushaw Lake's fish

—
Researchers said the mercury concentrations at Pushaw Lake give reason to be concerned about other bodies of water across Maine.

**PUSHAW LAKE FISH TESTED FOR MERCURY**

- High levels of mercury found
- Mercury highest in larger and older fish
- Greater than 1,000ppb mercury levels in oldest fish
- 200ppb mercury levels safe to eat

maine.gov/ifw/fishing-boating/fishing/laws-rules/consumption-advisory.html#:~:text=Safe%20Eating%20Guidelines%3A%20Mercury&text=DO%20NOT%20EAT%20any%20...

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Home → Fishing & Boating → Fishing → Laws & Rules → Freshwater Fish Safe Eating Guidelines

Fishing
Laws & Rules
Licenses & Permits
Maine Fishing Guide
Fish Stocking Report

Freshwater Fish Safe Eating Guidelines

For more information visit the Maine Center for Disease Control and Prevention website:
maine.gov/dhhs/fishandgamesafety

Mercury in Fish Guidelines

Warning: Mercury in Maine freshwater fish may harm the babies of pregnant and nursing mothers, and young...



Safe Eating Guidelines: Mercury

Who	Guidelines
Pregnant and nursing women, women who may get pregnant, and children under age 8	<p>DO NOT EAT any freshwater fish from Maine's inland waters.</p> <p>Except, for brook trout and landlocked salmon, 1 meal per month is safe.</p>
All other adults and children older than 8	<p>CAN EAT 2 freshwater fish meals per month.</p> <p>For brook trout and landlocked salmon, the limit is 1 meal per week.</p>

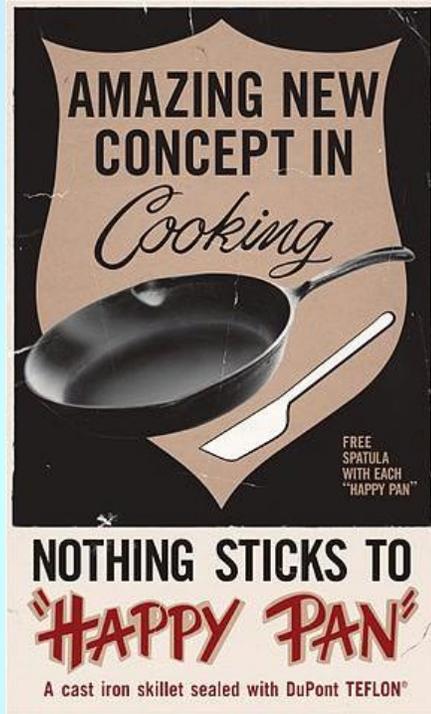
Small amounts of mercury can harm a brain starting to form or grow. That is why unborn and nursing babies, and young children are most at risk. Too much mercury can affect behavior and learning. Mercury can harm older children and adults, but it takes larger amounts. It may cause numbness in hands and feet or changes in vision. The Safe Eating Guidelines identify limits to protect everyone.

A promotional image for the movie 'The Sandlot'. It features a giant white foot stepping on a man in a military helmet. Another man's face is visible in the foreground, looking up. The background is blue with clouds and a small plant growing from the foot. The text 'AND NOW FOR SOMETHING COMPLETELY DIFFERENT' is written in large, bold, yellow letters on the right side.

AND NOW FOR
SOMETHING
COMPLETELY
DIFFERENT

What
about
PFAS in
Maine
fish?

The Forever
Chemicals...



repels oil stains

New 3M discovery repels all oil and water-base stains . . .
resists dirt, dust, soil . . . provides never-before protection
for upholstery and apparel fabrics . . . suede leathers, too

SCOTCHGARD®

STAIN REPELLER

I stains just stand there in contempt. Frustrated spots refuse to be blasted away. Think of the long life served, the lasting good looks, the added sense of living with clothing and furniture fabrics that keep stains away.

Furniture by
Sofa and
World's
Mark in
Sofa's
fabric. An
product of
3M's Scotchgard.



Groups call for ban on
more Maine farms

Maine Public

PFAS

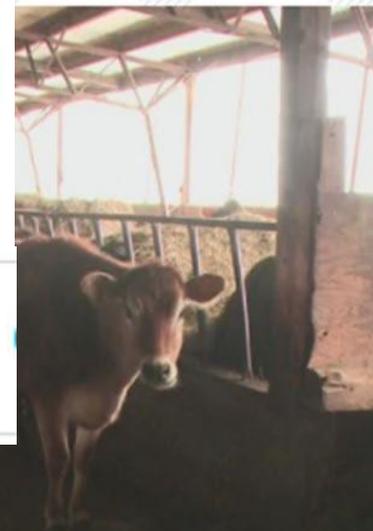
Maine farmers push for tens of millions to address PFAS

—
"That land is never going to produce food for humans."

Maine wants to know how widespread PFAS are in food packaging



by Sawyer Loftus
March 17, 2022



Chemicals

New research raises concerns about PFAS chemicals in Maine fish

pressherald.com/2022/03/27/new-research-raises-concerns-about-pfas-chemicals-in-maine-fish/

By Jordan Andrews

March 27, 2022

How did PFAS get in our farm fields?



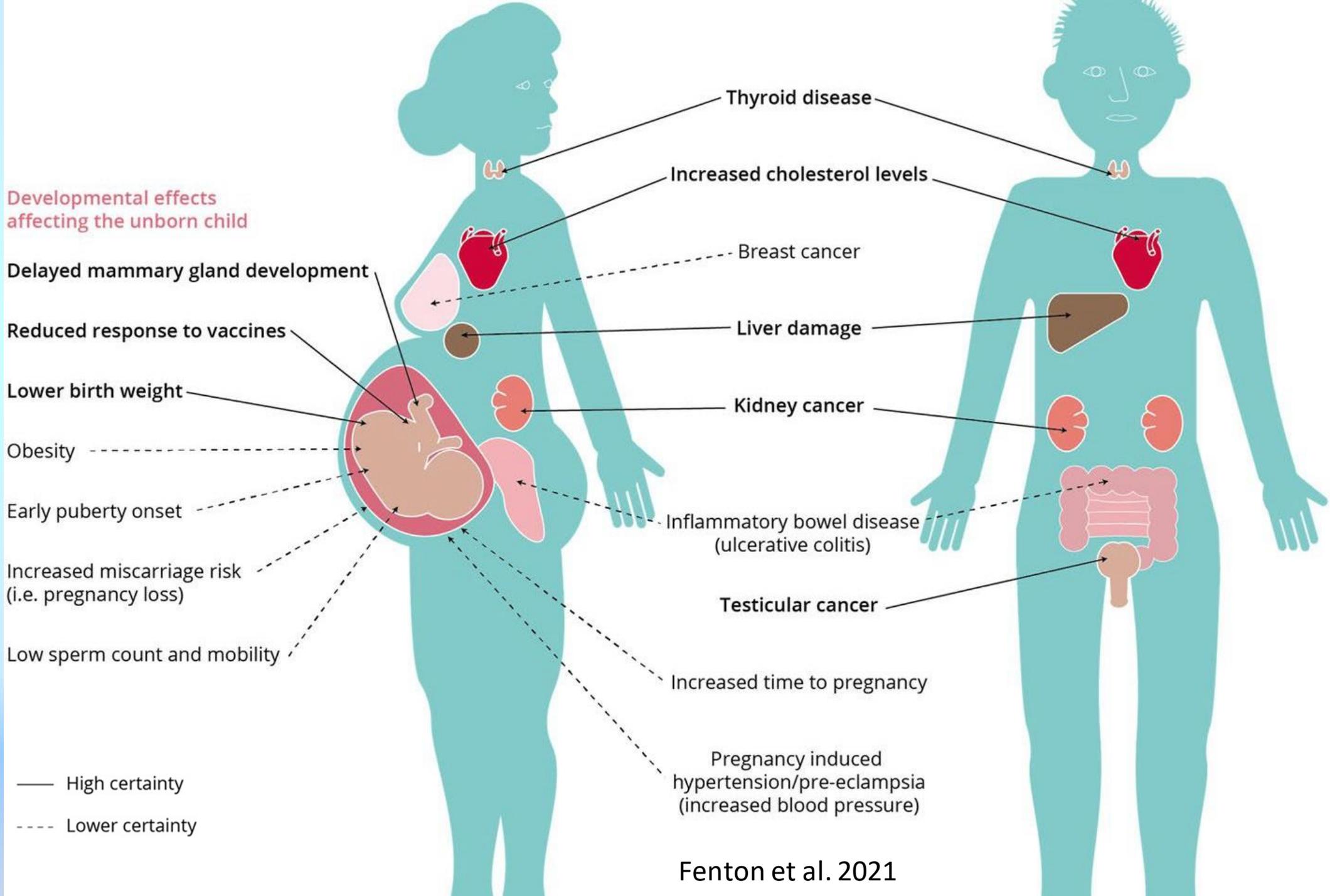
Sludge Floats on the Androskoggin River Above Gulf Island Dam at Lewiston



Sludge Deposits in the Androskoggin River, Seen from the Bridge at Turner

Fixing one problem
created another

PFAS
toxicity
...
why we
care



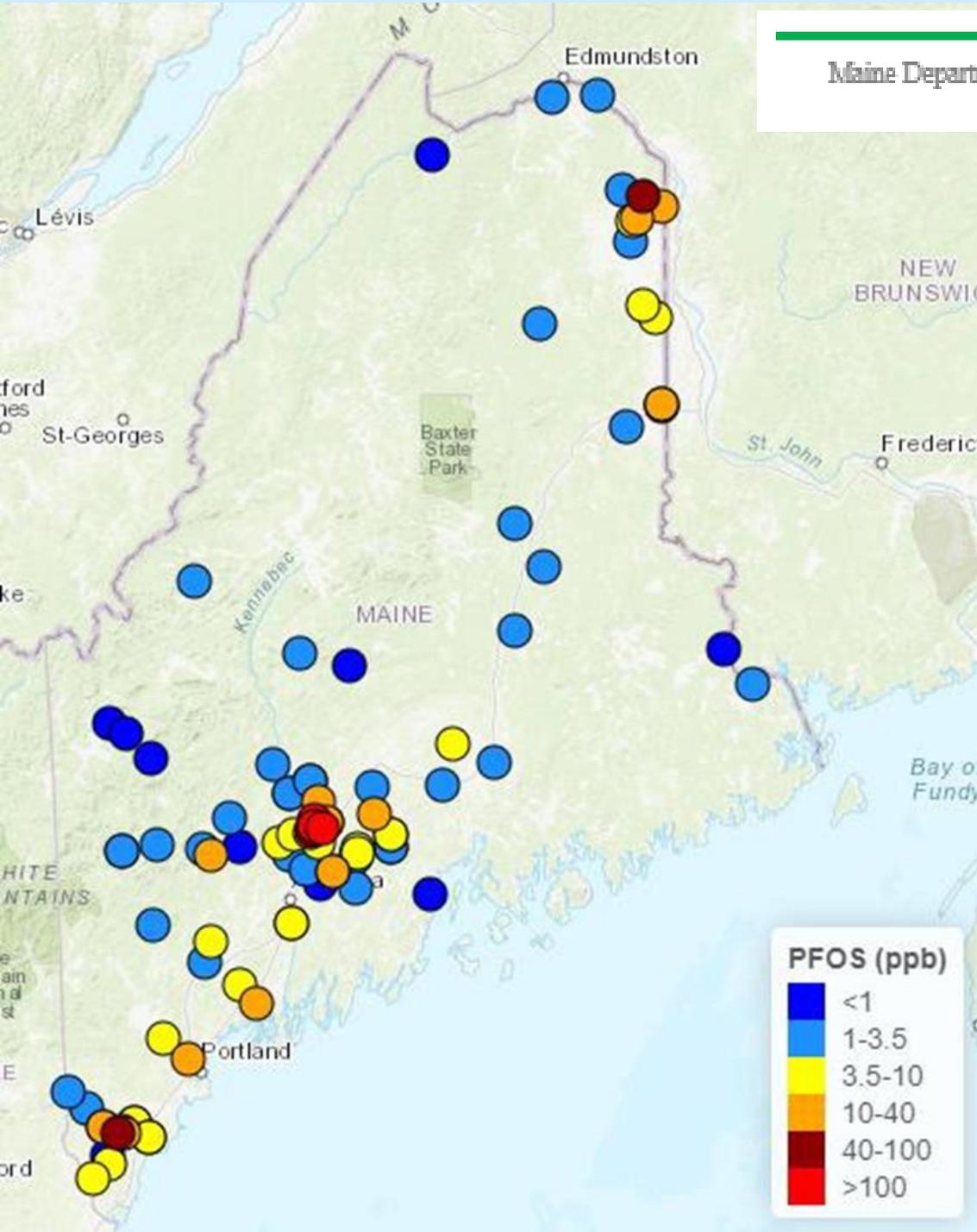
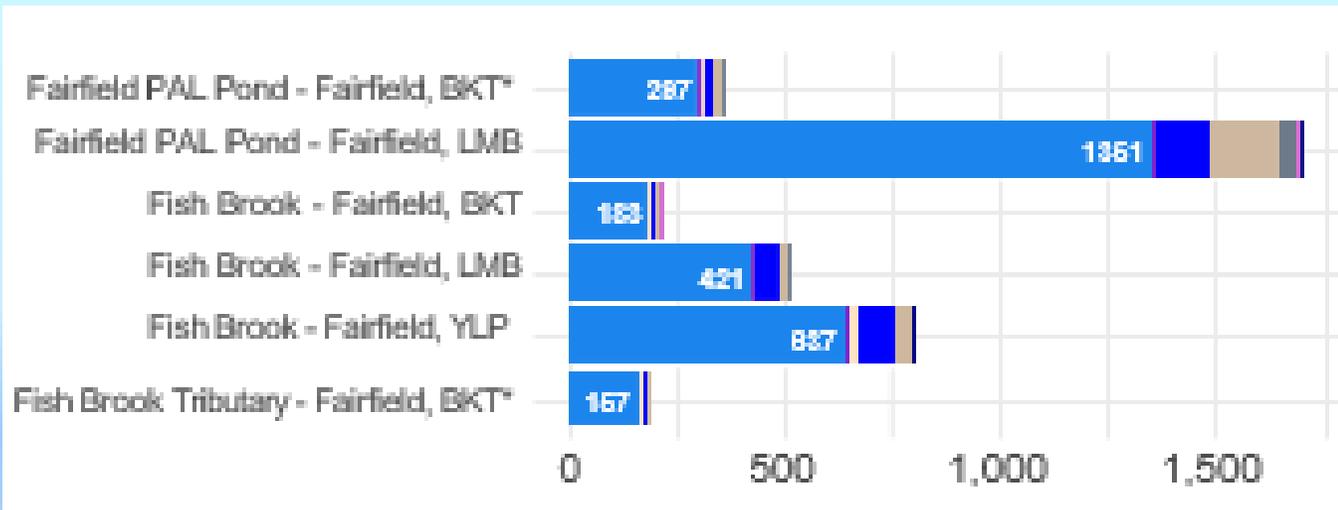


Figure 9. Map of sample sites with average PFOS concentrations (ng/g, ppb) of skinless fillets of all fish caught at sites from 2014 - 2022.



PFAS in Fish Guidelines

Fish tested in several locations found levels of per- and polyfluoroalkyl substances (PFAS) above Maine CDC's recommended levels for regular consumption. Exposure to certain PFAS chemicals has been associated with:

- changes in liver and kidney function,
- changes in cholesterol levels,
- decreased immune response to vaccines in children,
- complications during pregnancy, and
- increased risk of kidney cancer and possibly testicular cancer.

Limit or eliminate consumption of all fish or certain fish species from the waterbodies listed in the table below.

Safe Eating Guidelines: PFAS

Area	Waterbody	Guidelines
Albion	Fifteenmile Stream from the Yorktown Brook inlet at the Hussey Road to Route 137/202 in Albion	No more than 2 meals per month of brook trout.
China	All of China Lake	No more than 1 meal per month of any fish species.
Fairfield	Fish Brook, including any tributaries, from the headwaters to the confluence with Messalonskee Stream	Do not eat any fish from these waters.
Fairfield	Police Athletic League (PAL) Ponds	Do not eat any fish from these waters.
Fairfield	Kennebec River from the Carrabassett Stream inlet just north of Route 23 to the Lockwood Dam in Waterville	No more than 9 meals per year of smallmouth bass.
Limestone	All of Durepo Pond and Limestone Stream from Durepo to the Canadian border	No more than 4 meals per year of brook trout and do not eat smallmouth bass from these waters.
Sanford/Alfred	The Mousam River from below the Number One Pond Dam to Outlet Dam on Estes Lake, including all of Estes Lake	No more than 3 meals per year of any fish species.
Sanford	All of Number One Pond	No more than 1 meal per month of largemouth bass.
Thorndike/Unity	Halfmoon Stream from the Shikles Road in Thorndike to the Berry Road in Unity	No more than 2 meals per month of brook trout.
Unity	Unity Pond	No more than 6 meals per year of black crappie and no more than 12 meals per year for all other fish species.
Waterville/Oakland	Messalonskee Stream from the Rice Rips Dam in Oakland to the Automatic Dam in Waterville	No more than 3 fish meals per year of any fish species.
Westbrook/Falmouth	The Presumpscot River from Saccarappa Falls in Westbrook to Presumpscot Falls in Falmouth	No more than 4 fish meals per year of any fish species.



Thank You!

- Pushaw Lake Snowmobile Club
- Greater Pushaw Lake Association
- Kunkunsook Camp Owners Association



Mercury Action Level Formula

- Uses the EPA developmental reference dose
 - 0.0001 mg Hg/kg bw-d

$$\textit{Action Level} = \frac{\textit{Reference Dose} \times \textit{Body Weight}}{\textit{Fish Consumption Rate}}$$

- Maine Hg action level = 200 ng Hg/g tissue (muscle; ppb)
 - Safe to eat one 8-oz (227 g) fish meal per week