

Gruber's Grove Bay Mercury (Hg) Site Assessment

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Fish Consumption Advisories

Advice for eating fish from the area you selected:

County: Columbia, Sauk

Advisory Area: WISCONSIN RIVER AT WISCONSIN DELLS TO THE PRAIRIE DU SAC DAM (INCLUDES LAKE WISCONSIN) Includes: LAKE WISCONSIN, WISCONSIN RIVER

Women up to age 50 (child bearing age) and children (under age 15) may safely eat:

1 Meal Per Week	bluegill and sunfish, bullheads, crappies, inland trout, yellow perch
and	
1 Meal Per Month	bass, carp, catfish, lake sturgeon less than 70", pike, walleye, all other species and sizes
6 Meals Per Year	lake sturgeon larger than 70"
Do Not Eat	muskies

All men (15 and older) and older women (50 and older) may safely eat:

Unrestricted	bluegill and sunfish, bullheads, crappies, inland trout, yellow perch
1 Meal Per Week	bass, catfish, pike, walleye, all other species and sizes
and	
1 Meal Per Month	carp, lake sturgeon less than 70", muskies
6 Meals Per Year	lake sturgeon larger than 70"

The above advice is due to the following pollutants: MERCURY, PCB

Fish consumption advisories are present in many Wisconsin waterways



WI DNR Fish Advisory Query https://dnr.wisconsin.gov/topic/Fishing/consumption

Objective

Determine if mercury (Hg) concentrations in sediments from Gruber's Grove Bay (GGB) are higher than sediments from upstream sites in Lake Wisconsin and Weigand's Bay



Sampling was conducted in the Spring of 2019 by the USGS Mercury Research Lab (MRL)- Middleton, WI

Sediments were collected at 2-inch depth via boat and a piston corer (see picture above)

Soil was collected onsite in historic settling ponds of the Badger Army Ammunition Plant (BAAP); vegetation was removed, and samples were taken at 5-inch depth



Symbols on the maps show sampling locations



ng g^{-1} = nanograms of Hg per g of sediment





Gruber's Grove Margin refers to samples taken at Gruber's Grove Bay confluence with the Wisconsin River

Mercury (Hg) Concentrations-Soils Compared to Sediments



Gruber's Margin refers to samples taken at Gruber's Grove Bay confluence with the Wisconsin River







Summary of Sediment Hg Concentration Results

- Sediment mercury concentrations in GGB are the highest near the former inflow point from the Badger Army Ammunition Plant
- Sediment mercury concentrations decrease away from the head of GGB, and at the margins of the Bay mercury concentrations are similar to those observed in Weigand's Bay (a site with no known direct Hg contamination)
- Soils samples from the Badger Army Ammunition Plant settling ponds show widely varying concentrations that are generally higher than those observed in sediments from GGB

Objectives

Apply mercury isotope fingerprinting techniques to better define the source of mercury in GGB and other nearby Lake Wisconsin sites



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New Advances in Mercury Science- Source Fingerprinting



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Mercury (Hg) Isotope-Source plot for Sediments





Mercury (Hg) Isotope-Source plot for Sediments







Mercury (Hg) Isotope-Source plot for Sediments

Summary of Sediment Mercury Isotope Fingerprint Results

- Mercury isotope signatures from the Badger Army Ammunition Plant soils are the most positive of any samples we analyzed and are likely indicative of the original mercury source
- Sediments from GGB show similar characteristics to these soils, but are less negative suggesting a mix of mercury from sources on Badger Army Ammunition Plant and mercury from the Wisconsin River/Lake Wisconsin
- Sediments from Weigand's Bay and upstream sites have an isotopic fingerprint of mercury that is similar to the Wisconsin River, but different than the Badger Army Ammunition Plant
- Suspended sediment from upstream Wisconsin River sites is isotopically similar to Weigand's Bay and upstream bottom sediments indicating mercury on particulate matter in the water column is mostly from the Wisconsin River/Lake Wisconsin
- Mercury from atmospheric deposition is likely the major contributor of mercury within the Wisconsin River/Lake Wisconsin though other industrial/urban sources (other than BAAP) were not assessed and cannot be ruled out based on this initial assessment.

Technical Recommendations for Future Assessments:

Pre-Dredging

- Conduct a more detailed sampling effort of soils, groundwater, and runoff, with specific attention placed on Settling Pond 4
 - To determine how mercury is delivered into Gruber's Grove Bay and if elevated levels might reestablish again after the next dredging
- Conduct sampling of smaller fish species (pan fish) within Gruber's Grove Bay
 Determine if Hg from Gruber's Grove Bay is bioaccumulating into the local food web

Post-Dredging

- Conduct a post-dredging sampling of sediments and smaller fish species within Gruber's Grove Bay
 - Assess remedy effectiveness of dredging effort

Products and Engagements

- USGS Scientific Investigations Report (SIR) detailing results and interpretations of previous mercury assessment - 2021
- Publication of all results, including follow-up work, within a peer reviewed open access scientific journal-2024
- Continued participation in RAB meetings by USGS Mercury Lab regarding GGB project updates

Data from this presentation has been released by the USGS and is available to the public: <u>https://doi.org/10.5066/P990MFHU</u>

Questions?

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USGS Mercury Research Lab: https://wi.water.usgs.gov/mercury-lab/research/index.html