Do Conditions Favoring Mercury Methylating Microbes Drive Fish Tissue Methylmercury Concentrations?

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Introduction

- Exposure to mercury, a toxic metal, in humans is primarily through wild caught fish.[1]
- Mercury is ubiquitous and must be methylated in order to enter aquatic food webs. Methylation in aquatic environments occurs primarily in anoxic sediments **(Fig. 1**). [2]
- Methylmercury (MeHg) concentrations in fish tissue are unrelated to mercury deposition.[3] Bioaccumulation of MeHg is well-characterized and depends on local food web size and complexity. [1]
- Drivers of MeHg in game fishes have been studied in other parts of the United States, with findings varying by region. [4,5,6,7]
- In the Midwest, methylation of mercury in lake sediments is poorly studied.

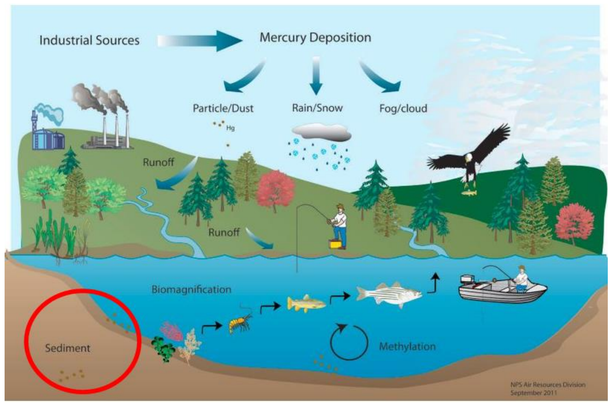

Figure 1: Mercury Cycle in Aquatic Food Webs [8]

Methods: Lake Selection

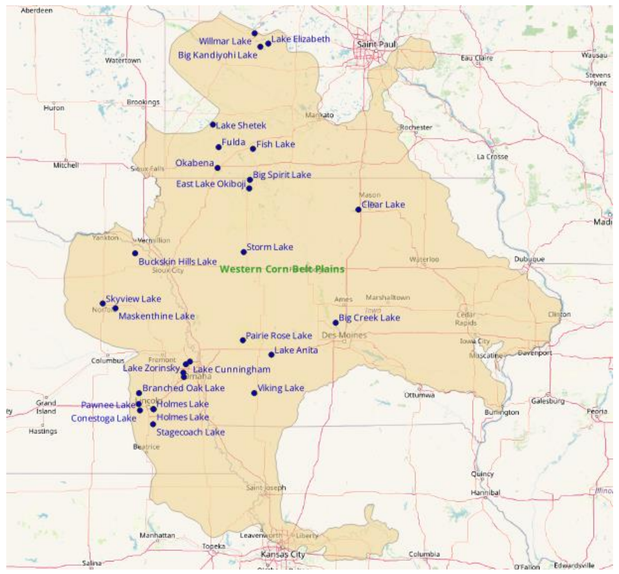

Figure 2: Study Area (Ecoregion 47) with Selected Study Lakes

Lake selection based on these factors:

- Availability of MeHg fish tissue data
- Accessibility
- Max depth > 2 meters

The map of study lakes is shown in **Fig. 2**.

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Methods: Sample Collection

Cores collected with a gravity corer at the deepest part of the lake.

YSI data collected for:

- Temp.
- DO (ppm)
- SC
- pH

Sediment 0.0, 5.0 and 10 cm:

- Fe (II/III)
- Sulfate
- DNA
- MeHg

Methods: Data Collection

Analytes examined for possible relationship with fish MeHg:

- Fe (II), Fe (III), Fe (Tot): Weber Lab, UNL
- DOC, SO_4, NO_3, *chlA*: Corman Lab, UNL
- DNA metagenomics: University of MN Genomics Center
- MeHg and Total Hg: Nebraska Water Science Center

Hypotheses

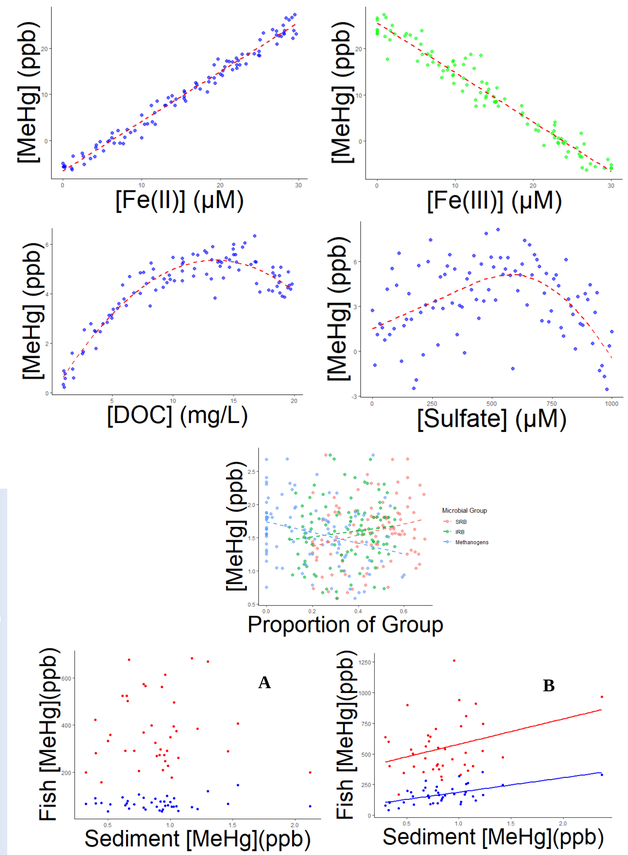

Figure 3: Synthetic data showing possible relationships between sediment [MeHg] and analytes. Bottom figure depicts sediment [MeHg] against fish [MeHg]

Data Sources

ADVANCING THE STUDY OF LAKES AT SCALE

Operated by Battelle

NEBRASKA Good Life. Great Resources. Department of Environment and Energy — Air Water Land Energy

USGS science for a changing world

Water for Food DAUGHERTY GLOBAL INSTITUTE at the University of Nebraska

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