DESCRIBING SPATIAL DISTRIBUTIONS OF TOTAL MERCURY WITHIN THE SEDIMENTS OF THE GRAND RIVER ON THE STANDING ROCK RESERVATION.

By Louis Walking Elk
Environmental Science
Sitting Bull College

INTRODUCTION

- Element on the Periodic Table
- Heavy Metal
- Trace Metal
- Naturally found in the….
  1. Atmosphere
  2. Water
  3. Soil

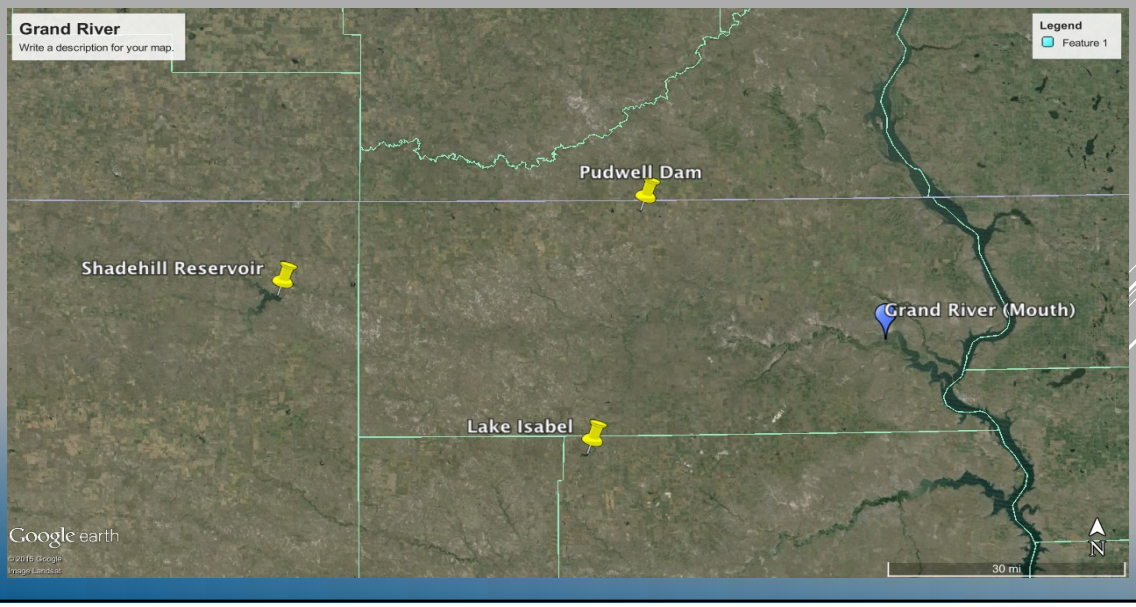
WHY STUDY MERCURY?

- Many uses and applications
  1. Fluorescent Light Bulbs
  2. Gold Mining
  3. Teeth Fillings
- Used for 1000's of years.
- All forms of mercury are toxic.
- Methyl mercury is the most deadly and it bio-accumulates.

WHY STUDY MERCURY?

- What does Mercury have to do with Standing Rock?
- Pudwell Dam
- Lake Isabel
- Coal Spring Reservoir

GRAND RIVER



ENVIRONMENTAL CHEMISTRY

- Very Unique Chemically and Physically
- Only metal that's a liquid at room temperature
- Low Boiling Point and High Vapor Pressure
- Forms metallic bonds certain other metals.
- Strong covalent bonds with carbon.
- Global Contaminate
  1. 1 year resonance time in Atmosphere
  2. Deposit and Re-volatilize

EMISSION SOURCES

Anthropogenic

Natural

ENVIRONMENTAL CHEMISTRY

- Three Valance States
  1. Elemental Mercury (Hg^0)
  2. Mercurous Mercury (Hg^I)
  3. Mercuric Mercury (Hg^{II})
- Elemental Mercury Dominates the Atmosphere (95%)
- Hg^I is highly unstable
- Hg^0 & Hg^{II} can undergo photoreactions.
- Also reacts with a number of different environmental constituents.
- Hg^{II} is the main form that deposits on surface waters and terrestrial environments.

STUDY AREA

- Grand River on Standing Rock
- 137 miles long
- Drains about 5,200 total sq. miles
- Meandering and Single Thread
- North Fork starts in Bowman County N.D. and South Fork starts in Harding County S.D.
- North and South Fork meets at Shade Hill Reservoir by Lemon S.D.
- Mouth Drains into the Missouri River.

EXPERIMENTAL DESIGN

- 108 Total Samples
- 4 sites
  1. Stink Creek
  2. Fire Steel Creek
  3. Dirt Lodge Creek
  4. Black Horse Creek

- 27 samples per site
  - 9 samples down stream
  - 9 samples up stream
  - 9 samples in tributary
- Samples will be taken at 25, 50, & 75 meters per stream section.

STINK CREEK

FIELD METHODS

- Ohio EPA method for sample area selection.
- Hand sampled with plastic cylinder or AMS Sampler.
- Top 5cm will be placed in a labeled Ziploc bag immediately and put into a cooler for transport.
- Samples will be stored in freezer at the SBC.

ANALYSIS

- Analyzed with a Teledyne-Leeman Hydra C Direct Mercury Analyzer.
  1. Thermal Decomposition
  2. Relatively No Sample Prep
  3. Cold Vapor Atomic Absorption
- All data will placed in excel.
- Statically analyzed in JMP12.
  1. ANOVA
  2. Tukey Test
  3. ANCOVA

LIMITATIONS

- Significant knowledge gaps
  1. Aquatic and Atmosphere Interactions
  2. Findings contradict by location
- Time Constraints
  1. Relatively short holding time for mercury samples.