

# Mercury Fate & Transport on the Fond du Lac Reservation

Monitoring Air, Water, Sediments and Biota

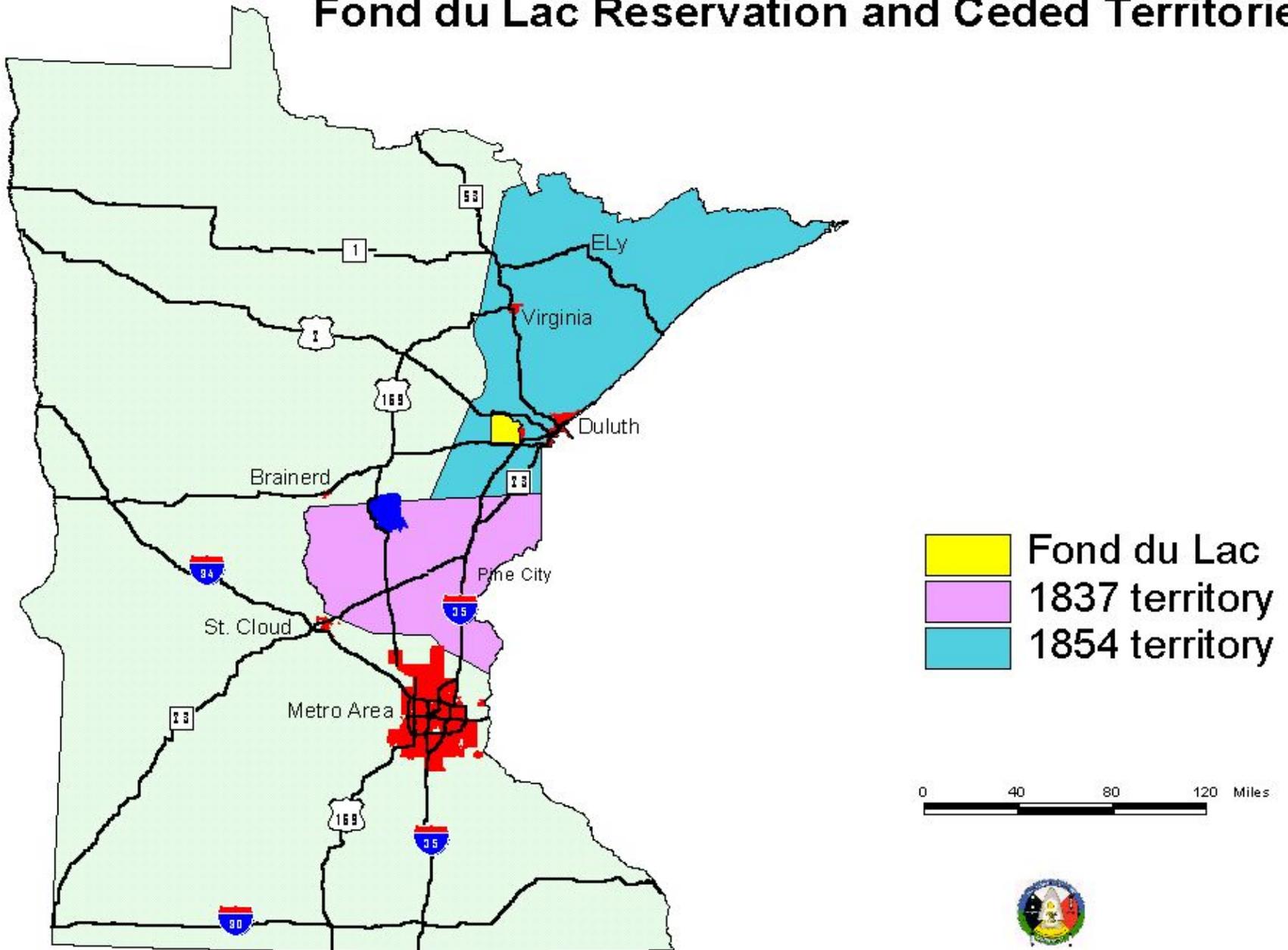
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Projects Coordinator

John Sorensen, Univ. of MN Duluth

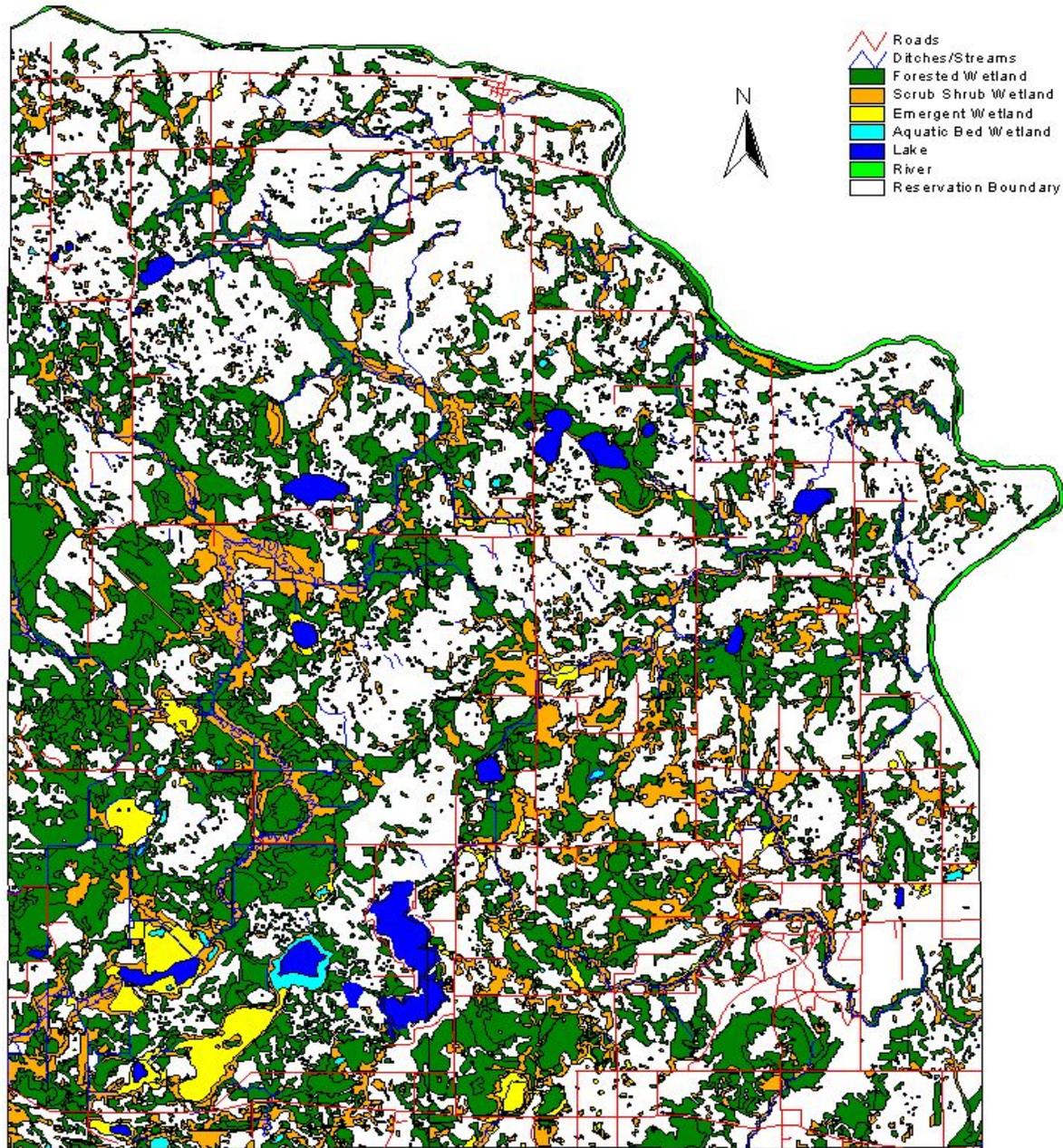
Presentation to Tribal Science Forum  
Quinault Reservation

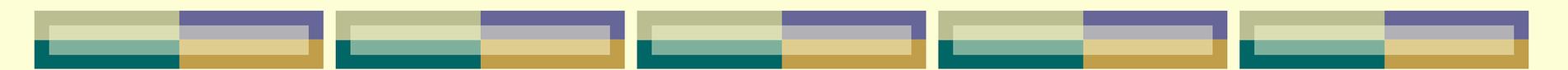


# Fond du Lac Reservation and Ceded Territories



# Map 5 - Fond du Lac Wetland Types





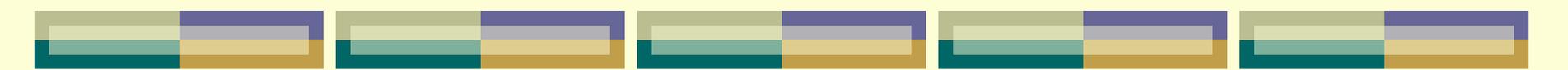
# Tribal Mercury Concerns

- Boreal forest/wetland ecoregion is especially sensitive to mercury deposition
  - Ionic and elemental forms more likely to be methylated
  - Greater bioavailability to aquatic food web
  - Bioaccumulation in higher trophic levels: piscivorous fish, eagles, osprey, loons, kingfishers, mink, otters....and people
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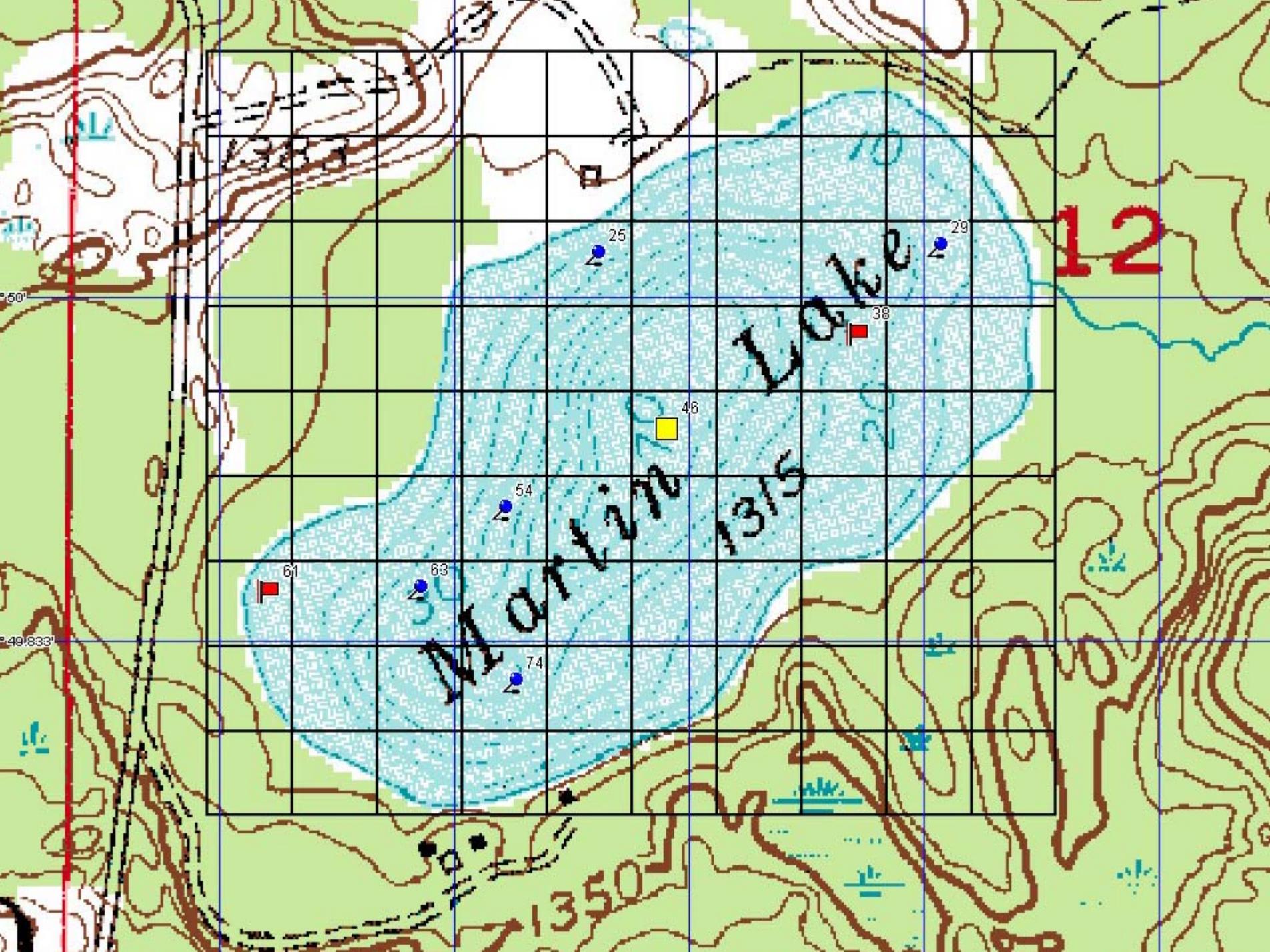
# Natural and Cultural Resources

- Tribal community relies upon natural resources for subsistence: wild rice, fish, waterfowl, game
  - Health concerns from exposure to environmental contaminants
  - Resource monitoring and protection efforts acknowledge mercury risks
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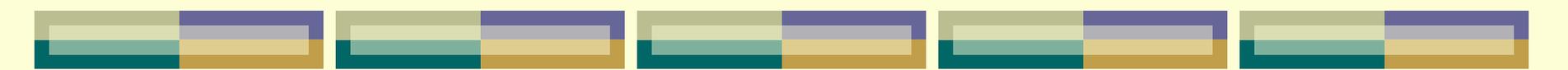


# Sediment Assessments

- GLNPO funded study of 12 reservation lakes: characterize sediments, assess contaminant levels in bioavailable portion (Hg, PCBs, Pb), toxicity tests
  - Sediment quality database developed; an additional indicator of reservation water quality; included in 305(b) report
  - Weight of evidence approach to decision-making about water resources
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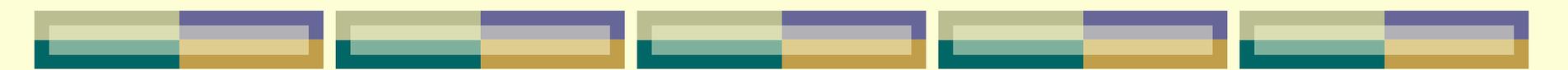






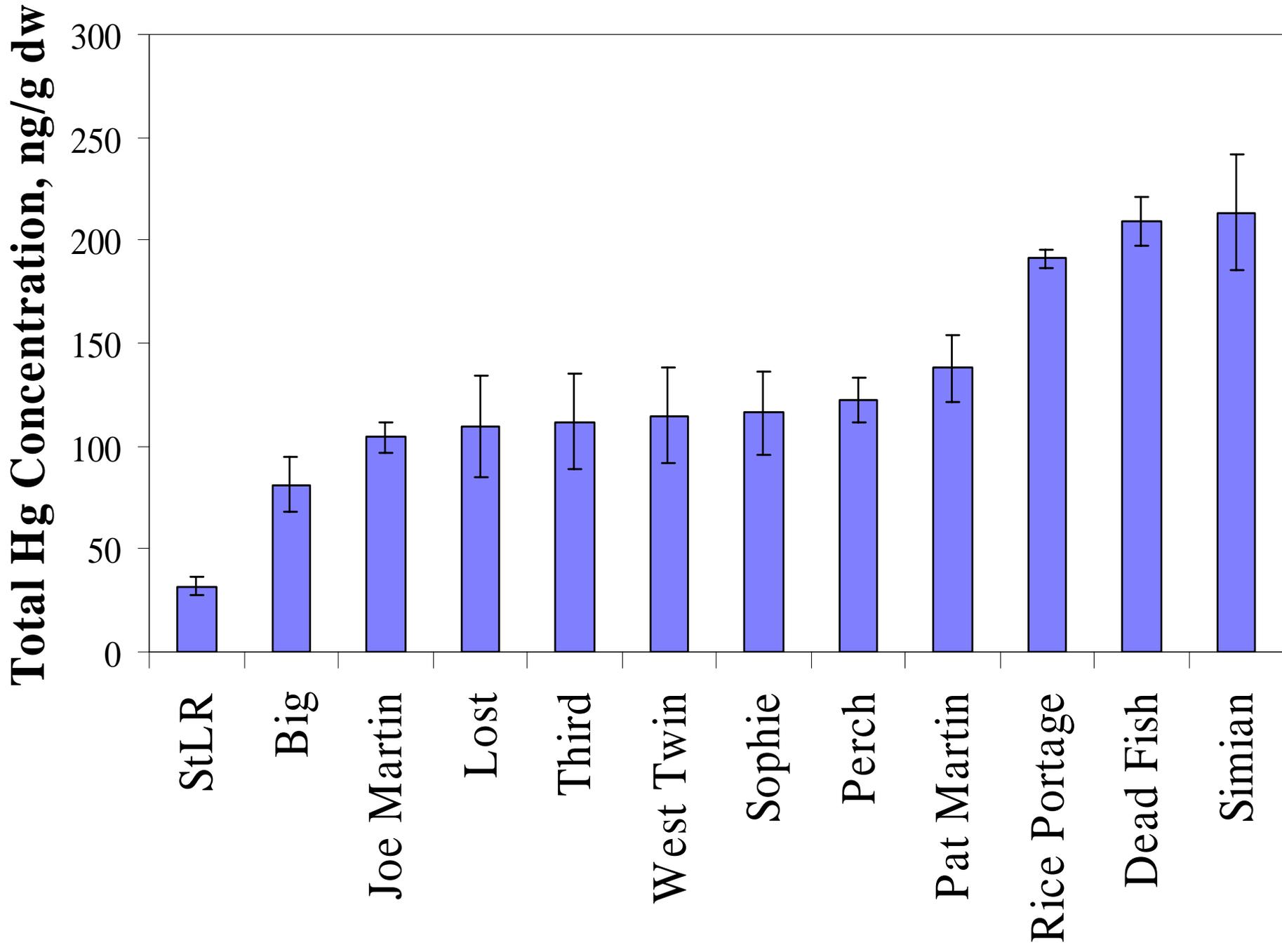
# Results

- As expected, higher Hg values associated with organic sediments
  - 30 of 96 sites had dry wt Hg exceeding Level I SQT of 0.18ug/g
  - Shallow wild rice lakes, shallow flowage lake (highly stained) had consistently higher Hg levels
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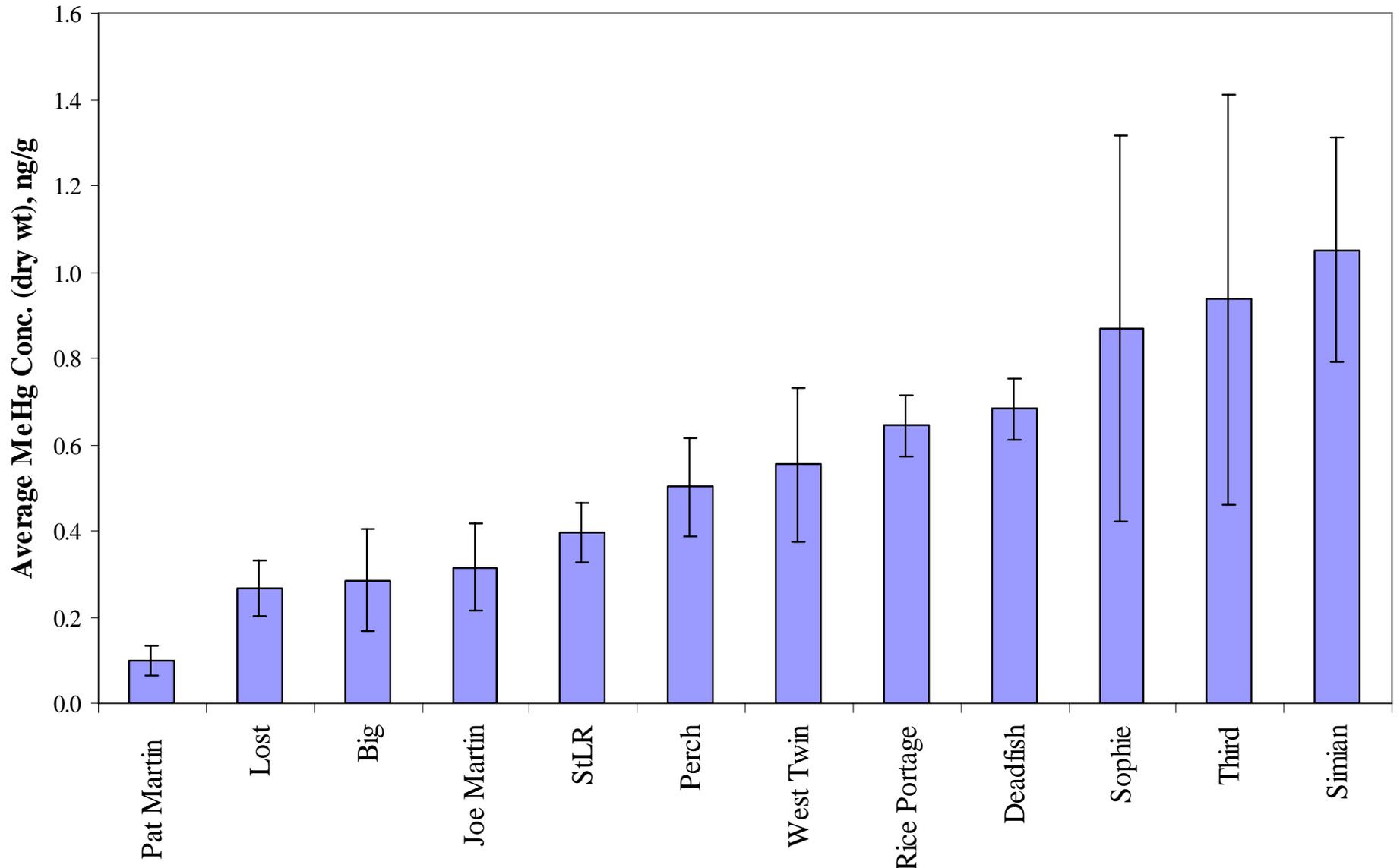


# Phase II Sediment Study

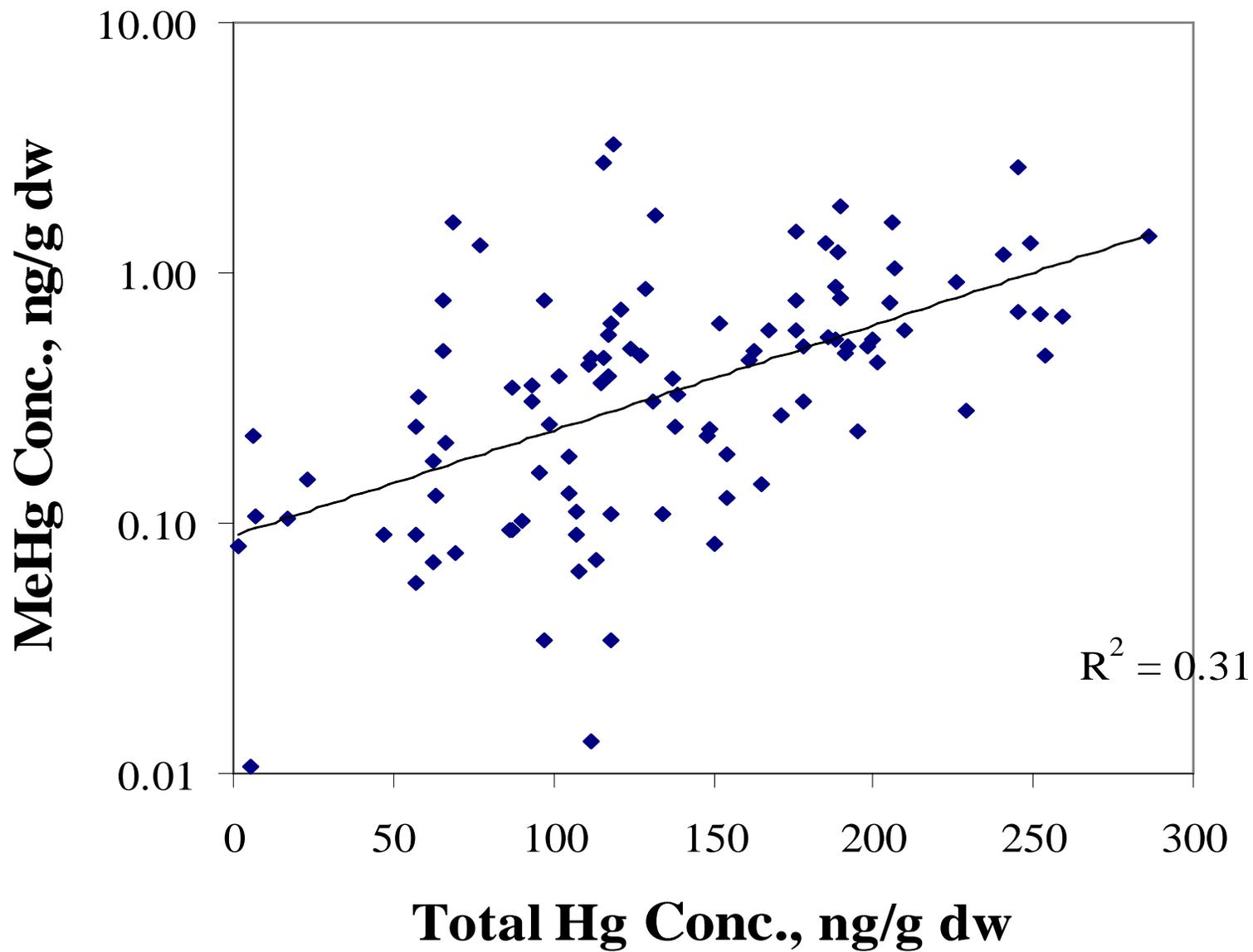
- Second GLNPO project included twelve St. Louis River sites; same parameters plus methyl mercury
  - Analyzed archived samples from first study for meHg
  - Added to database
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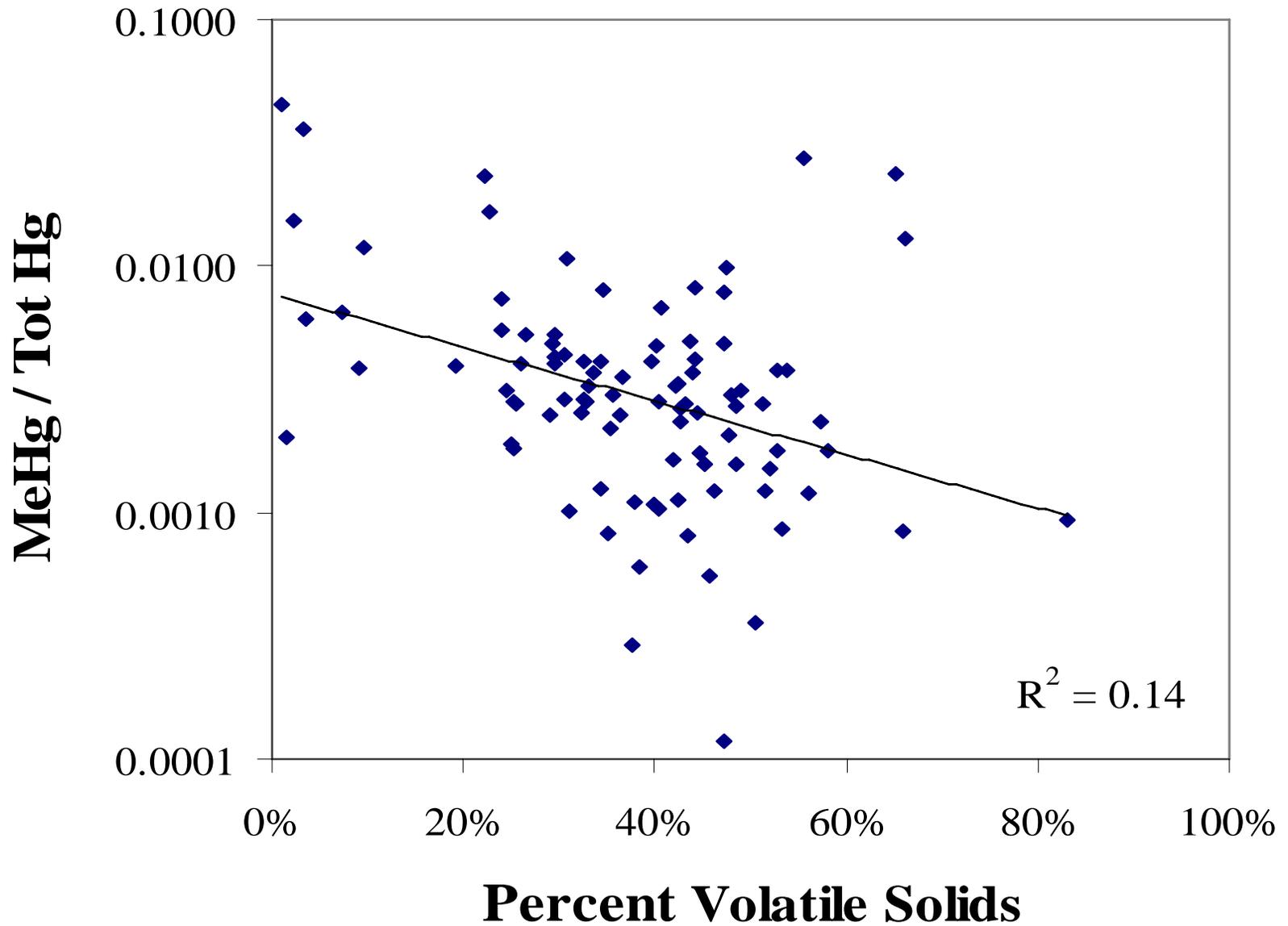
# Average Across Sites for Each Water Body



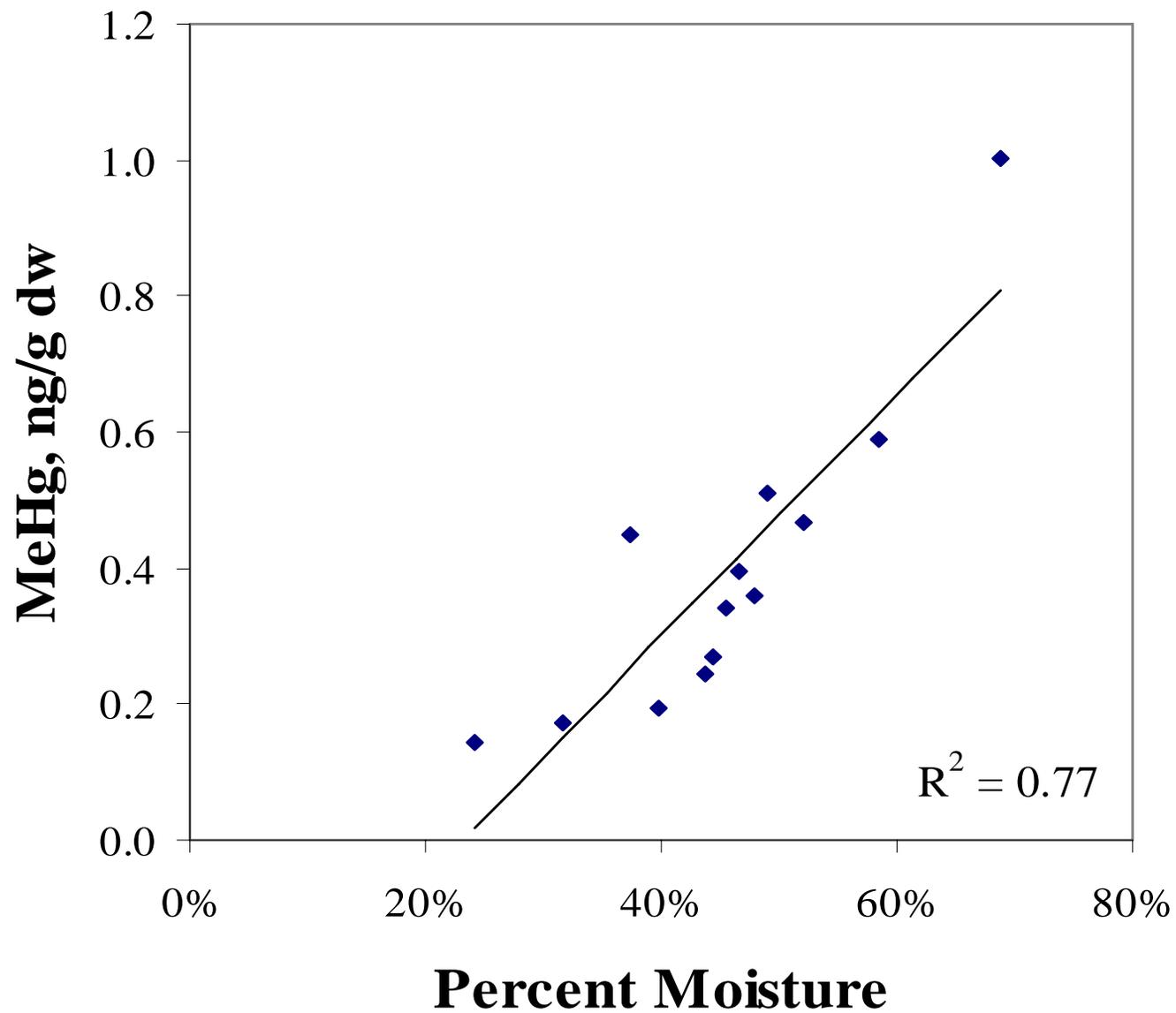
# All Lakes



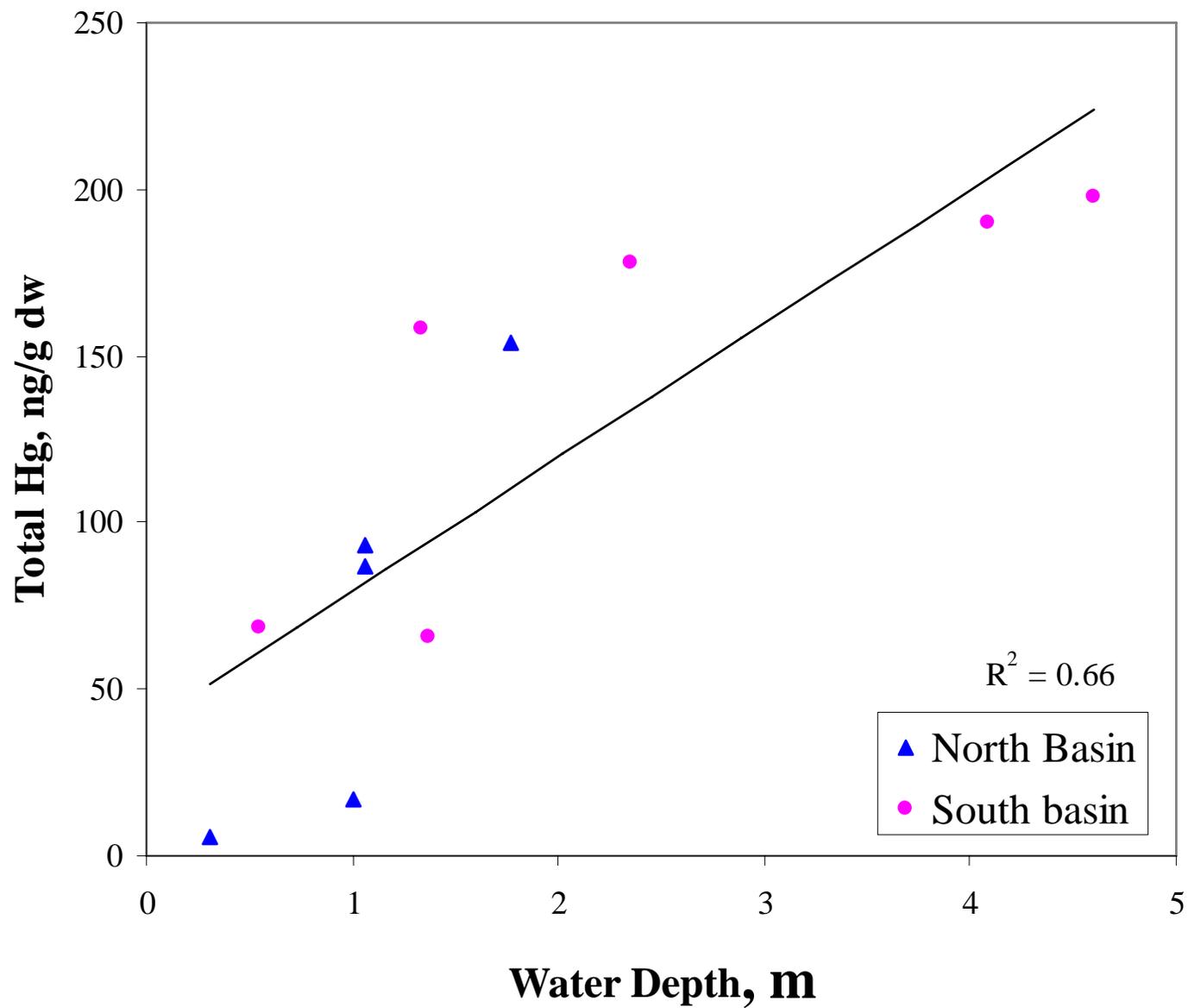
# All Lakes



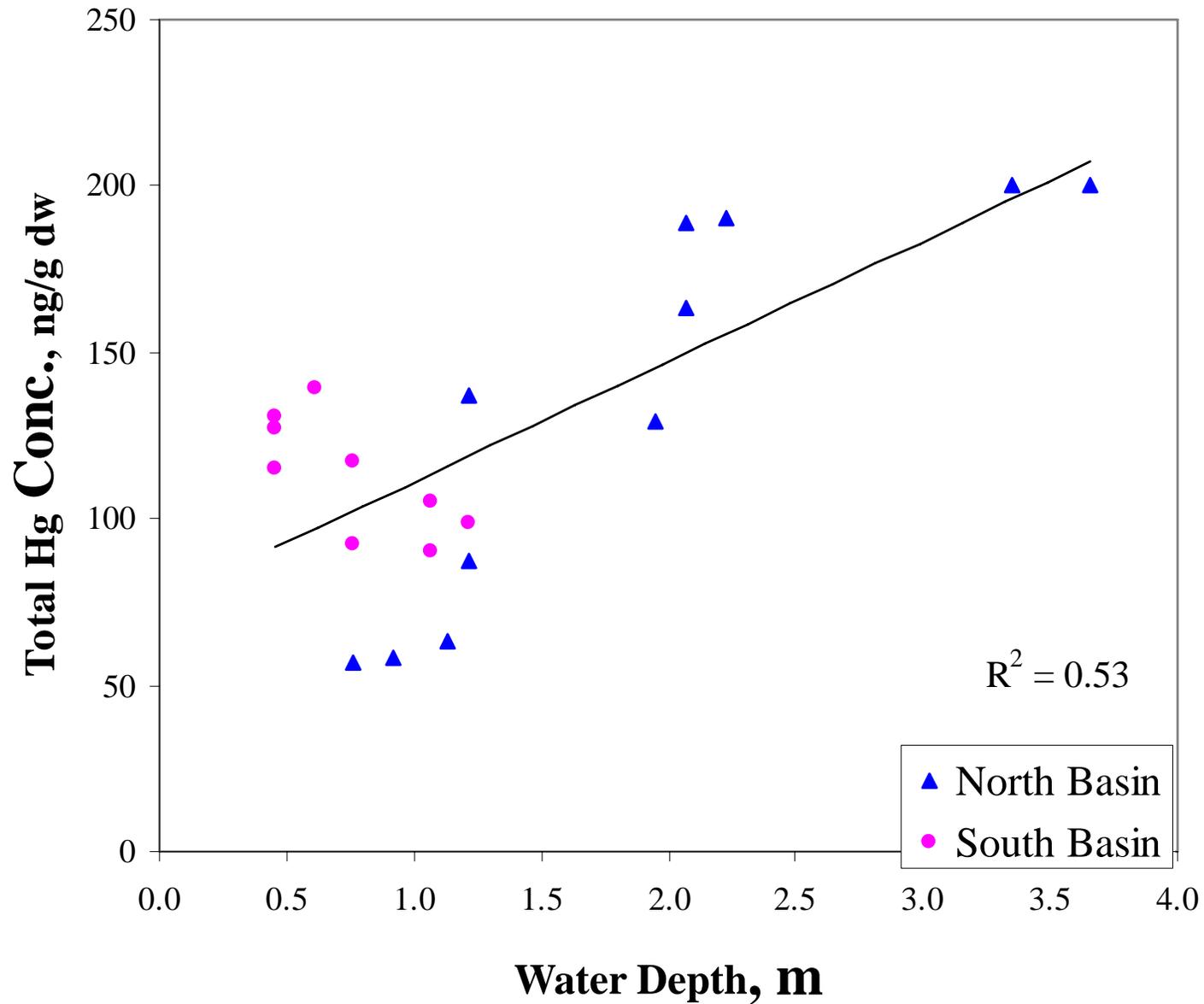
# St. Louis River



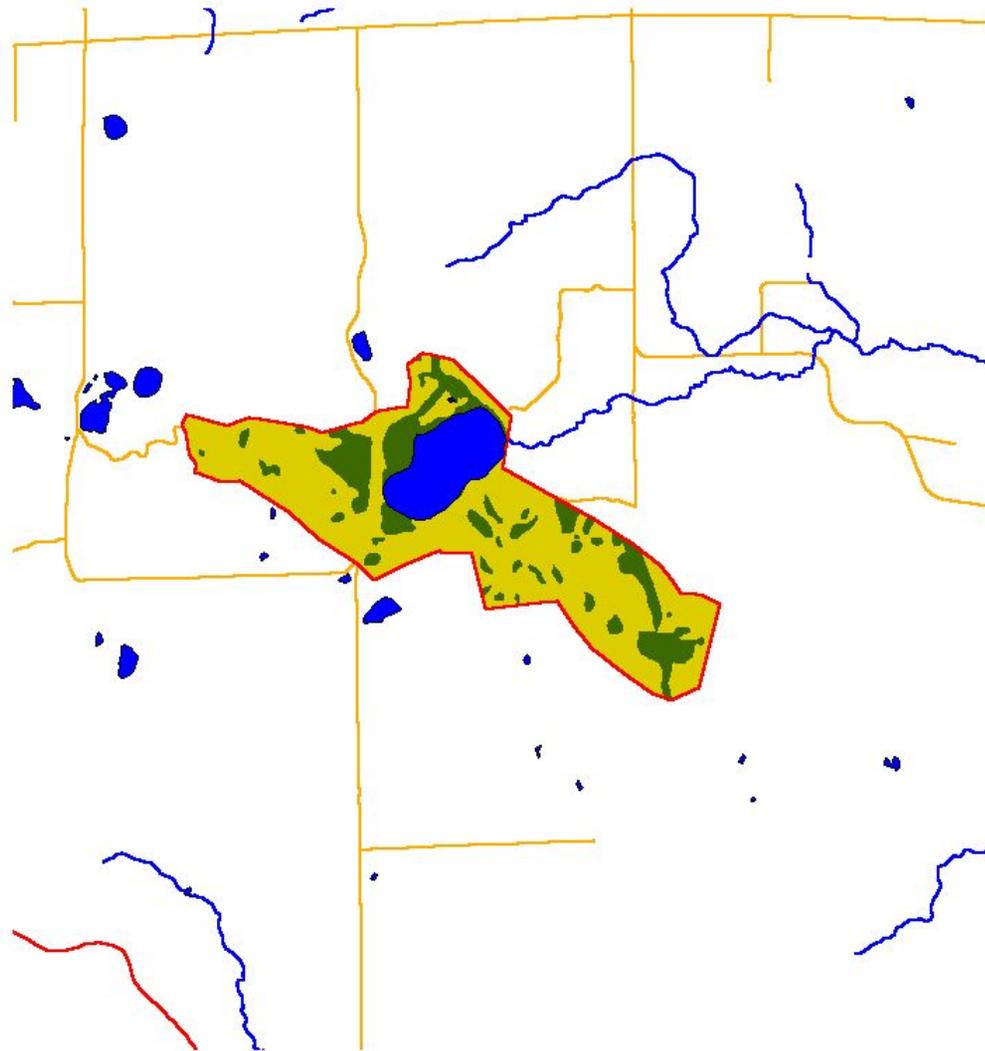
# West Twin



# Perch Lake



# Joe Martin Lake Watershed

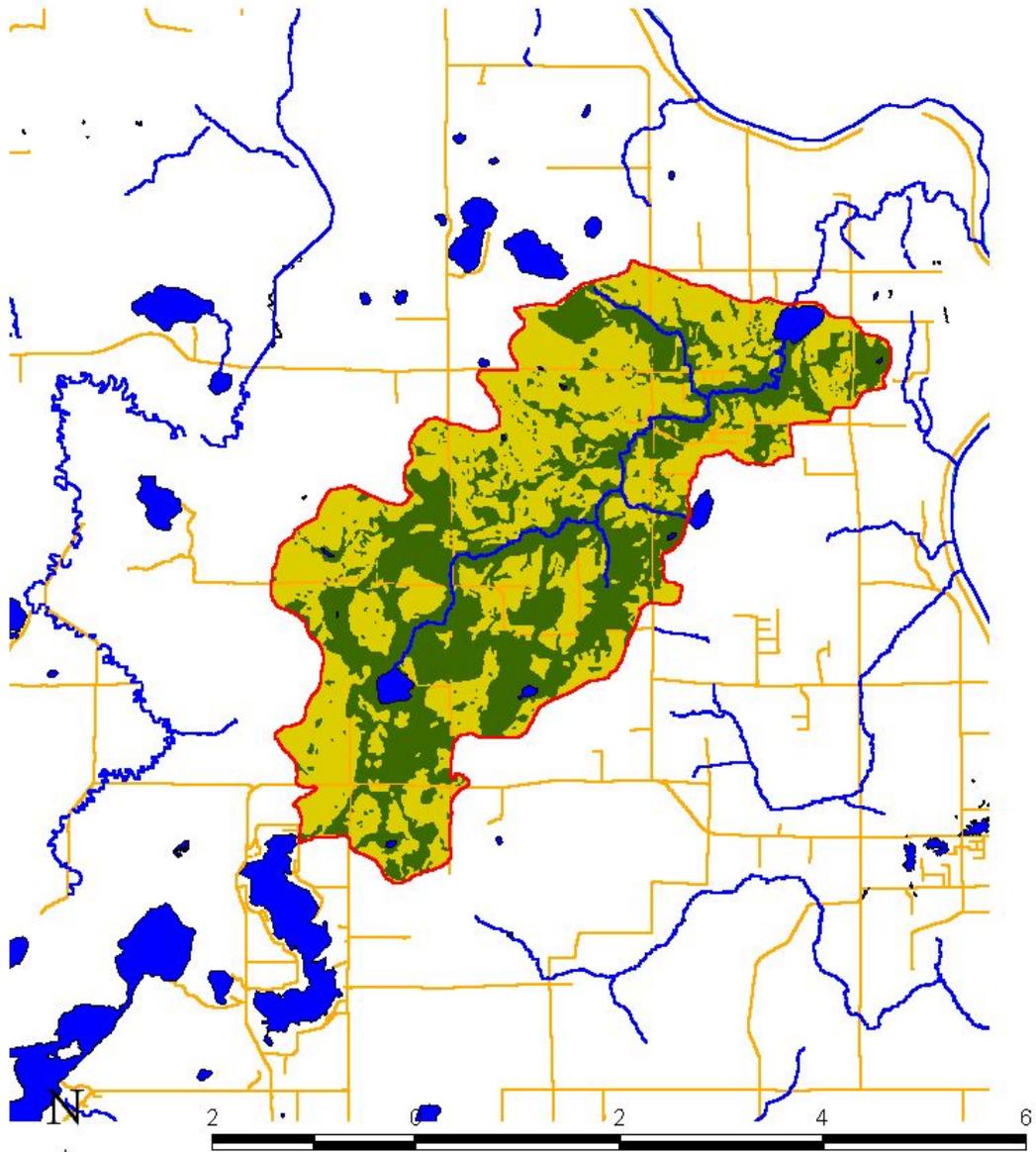


0.6 0 0.6 1.2 Miles

**Key to Features**

	Wetland		Upland
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# Simian Lake Watershed



## Key to Features

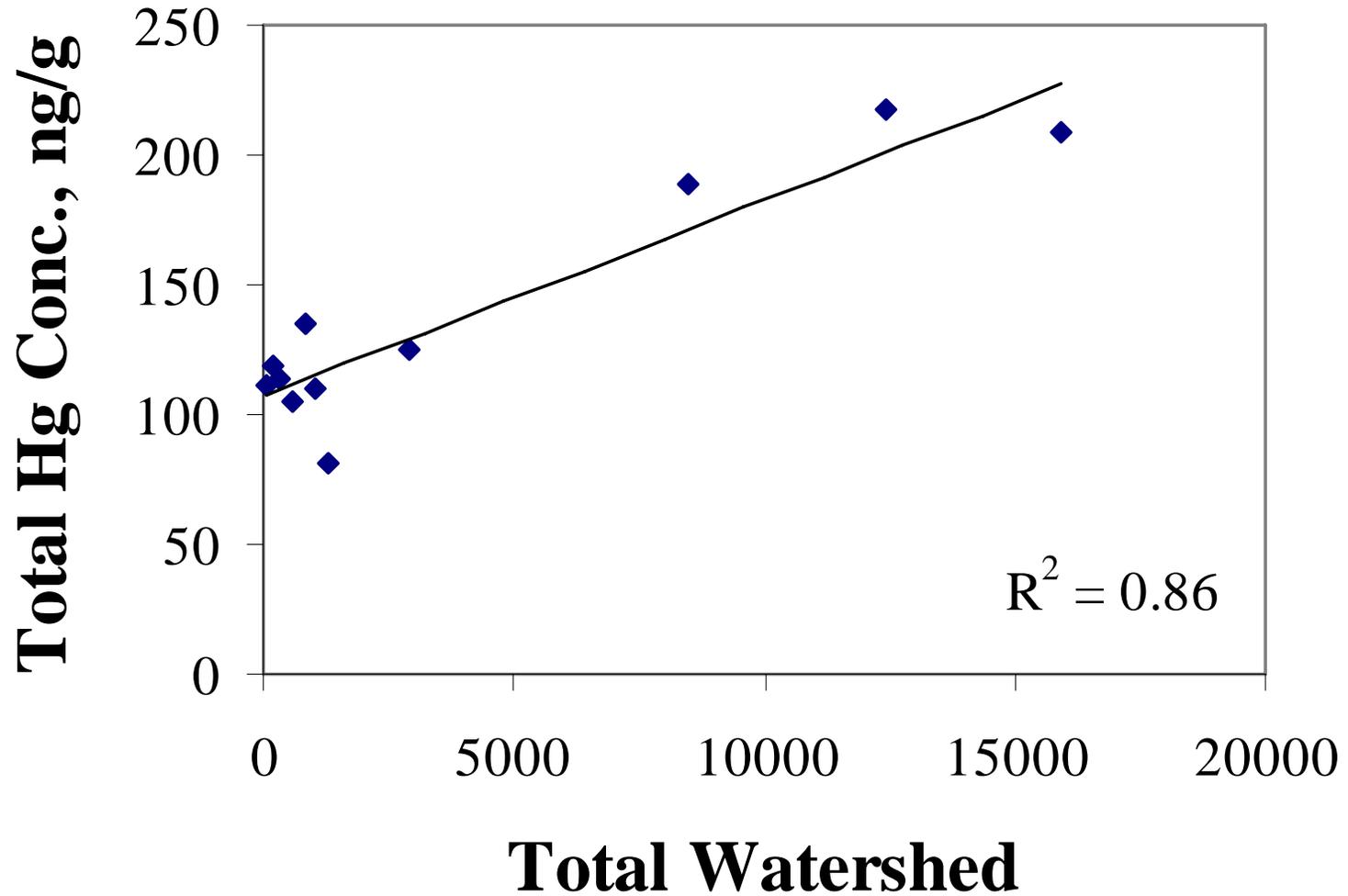


Wetland



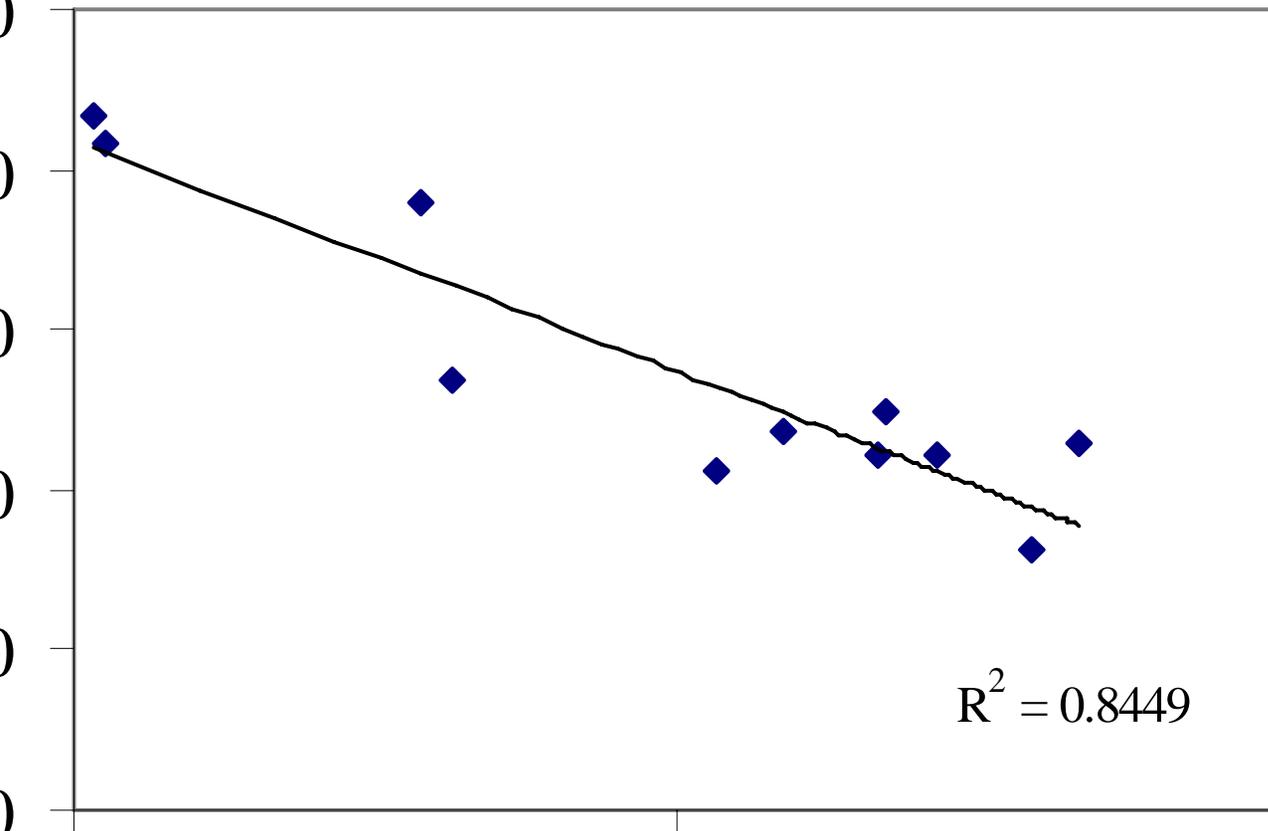
Upland

# Lake Averages



**Total Hg Conc., ng/g**

250  
200  
150  
100  
50  
0



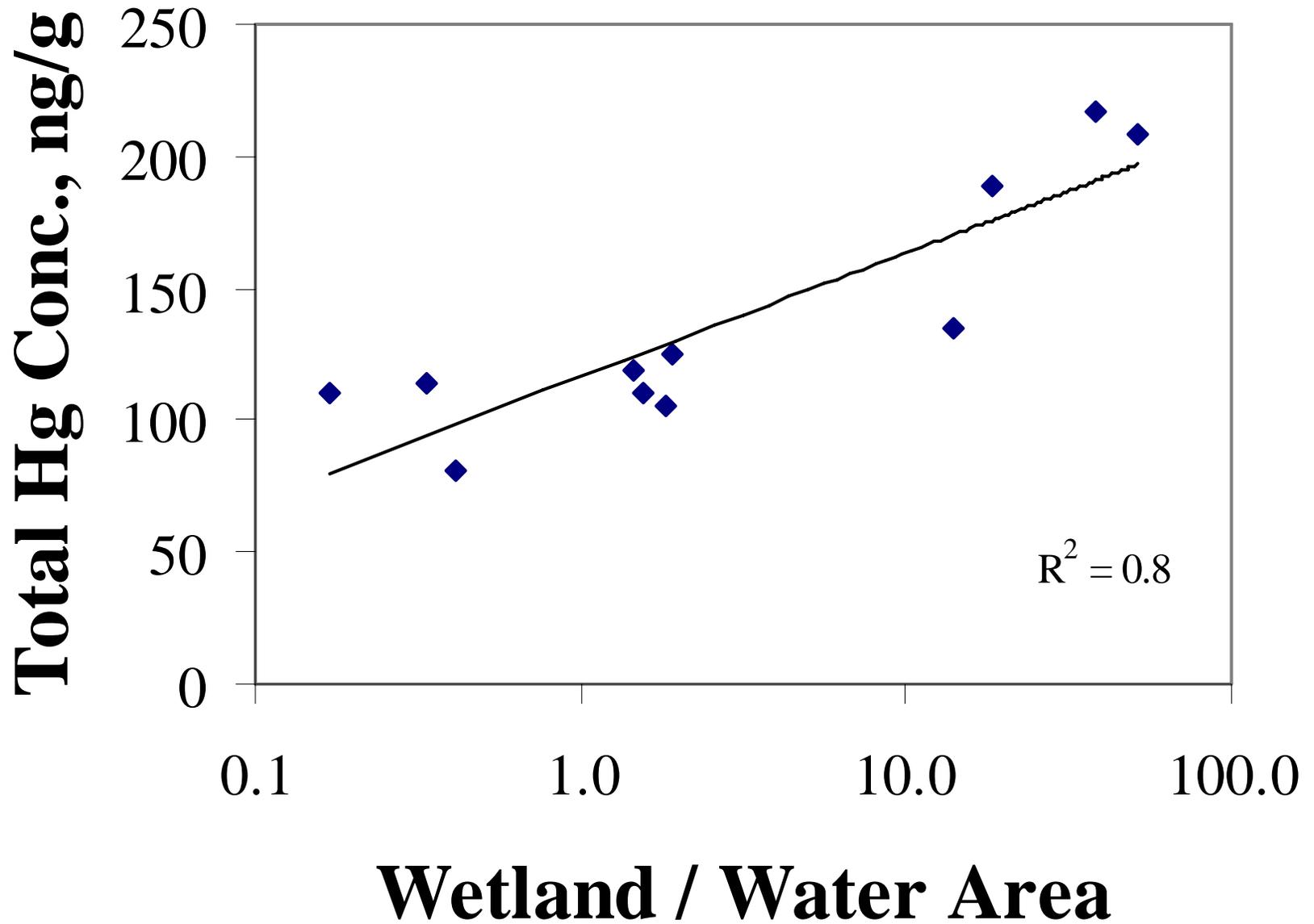
$R^2 = 0.8449$

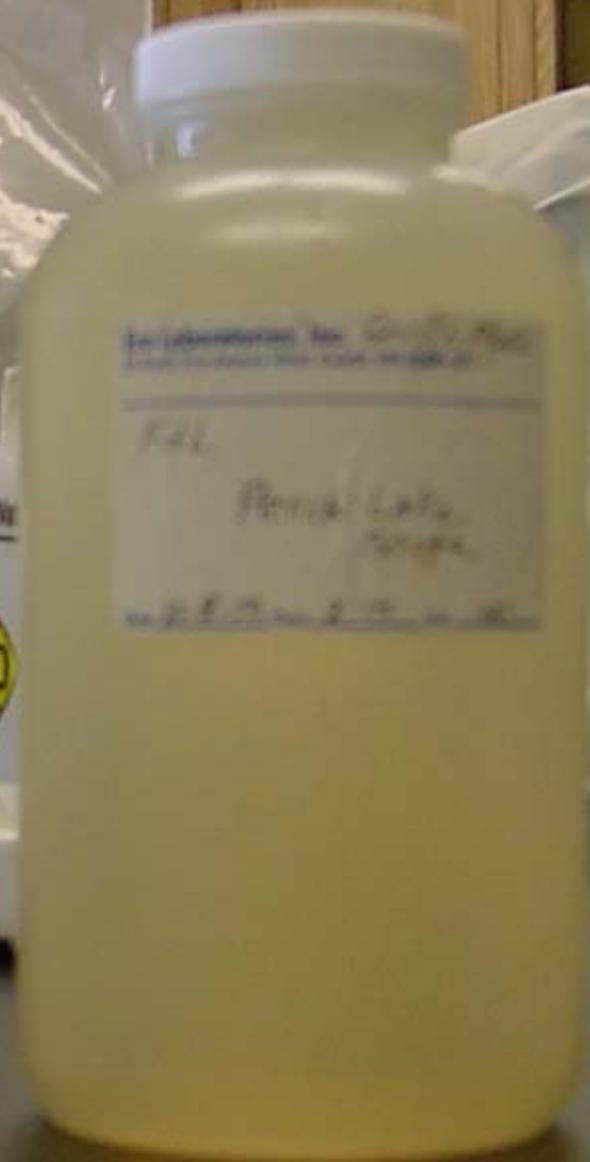
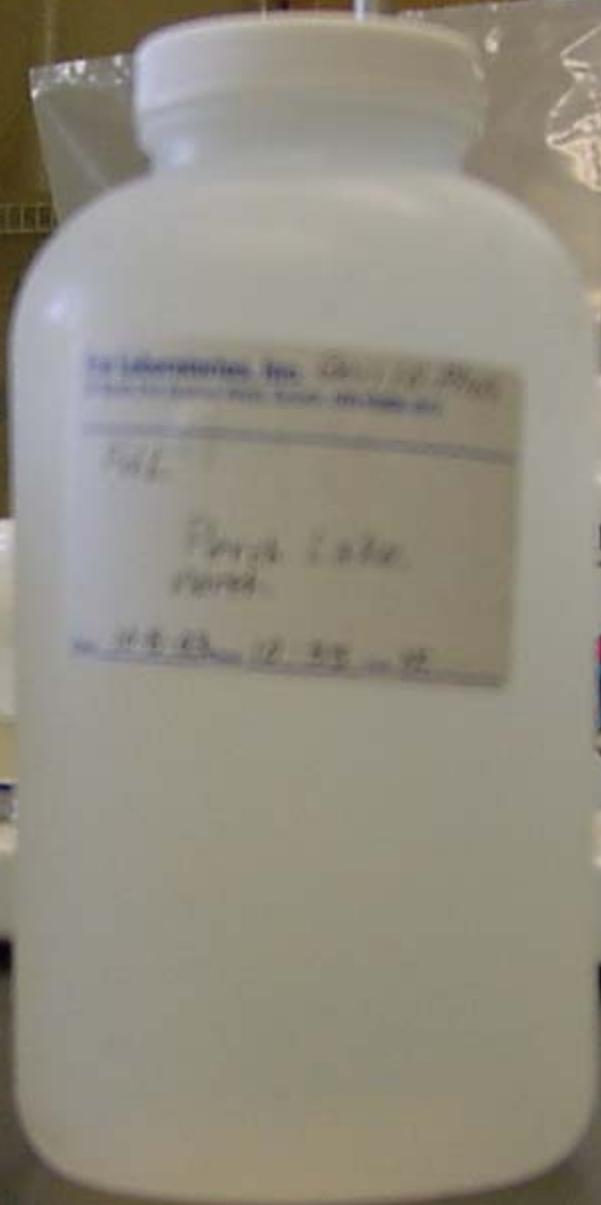
0.01

0.10

1.00

**Water / Total Area**

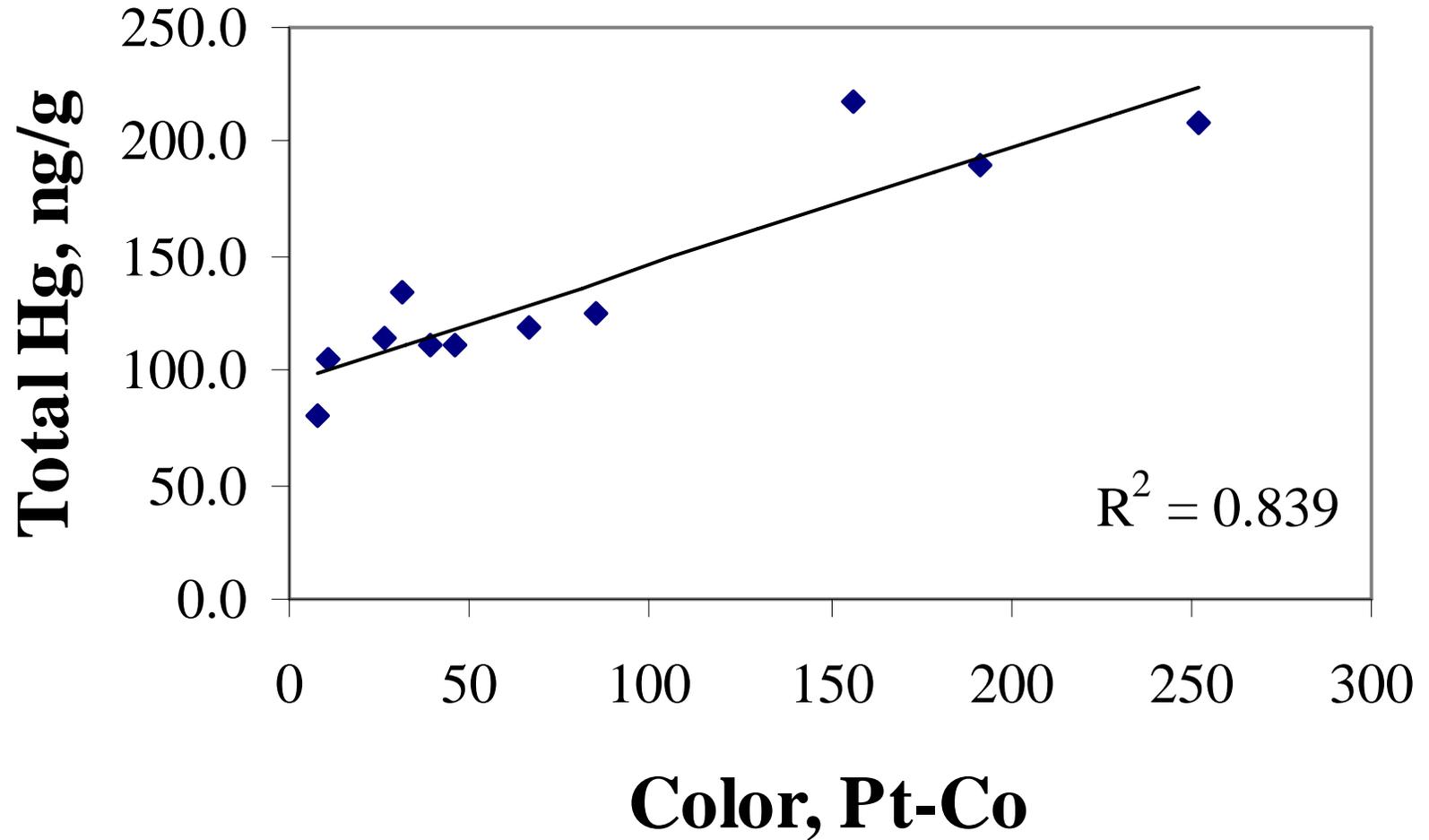




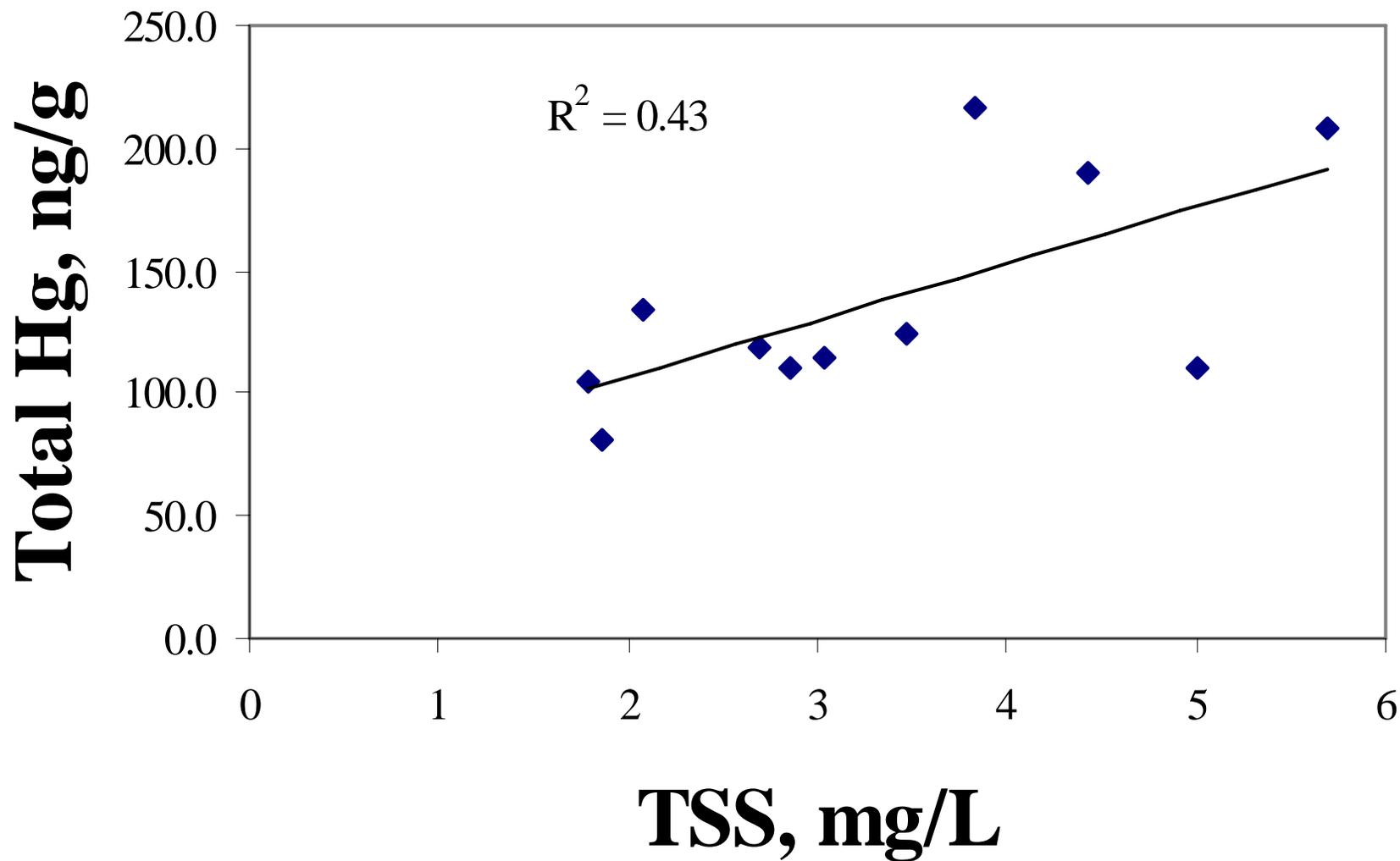
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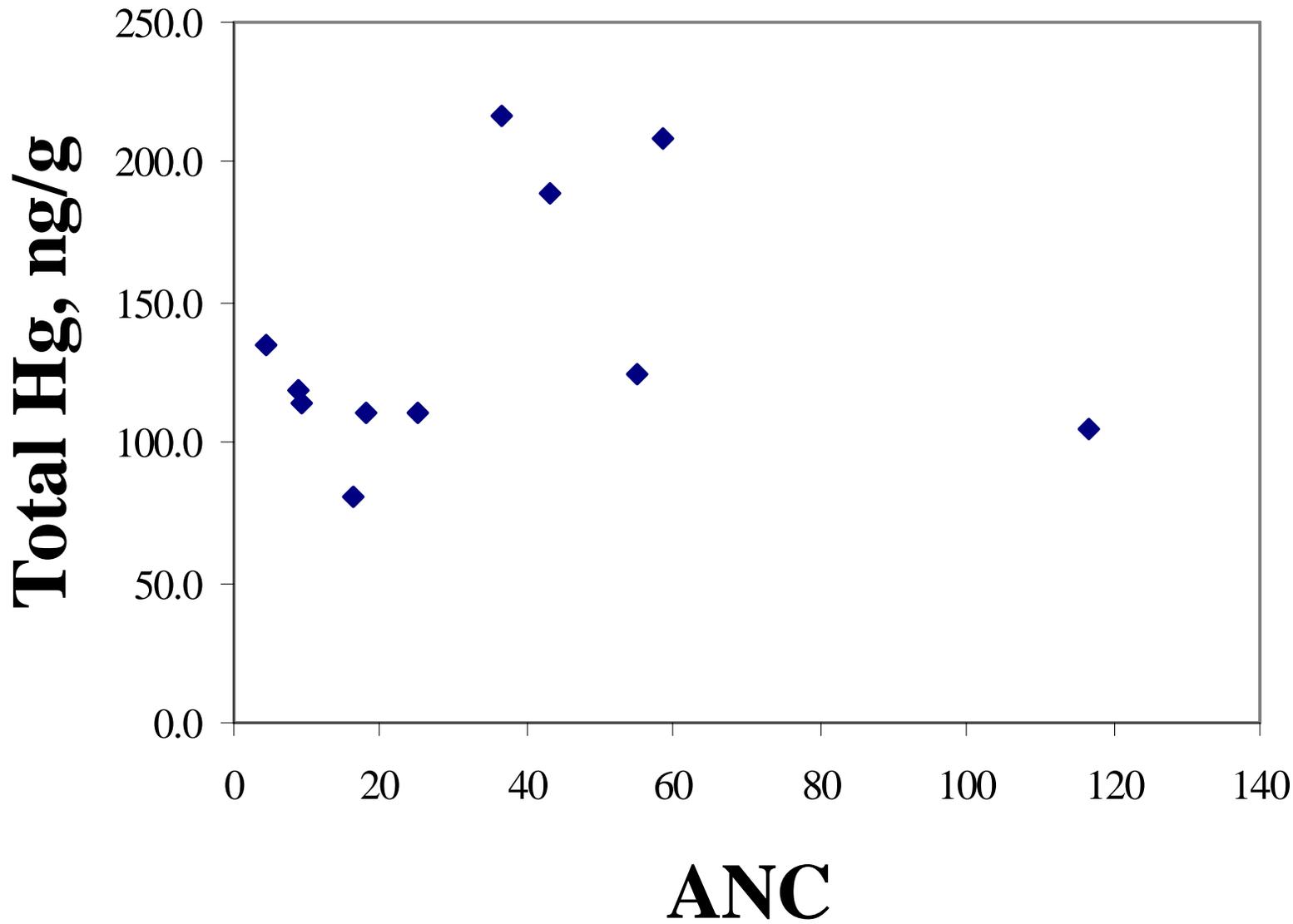


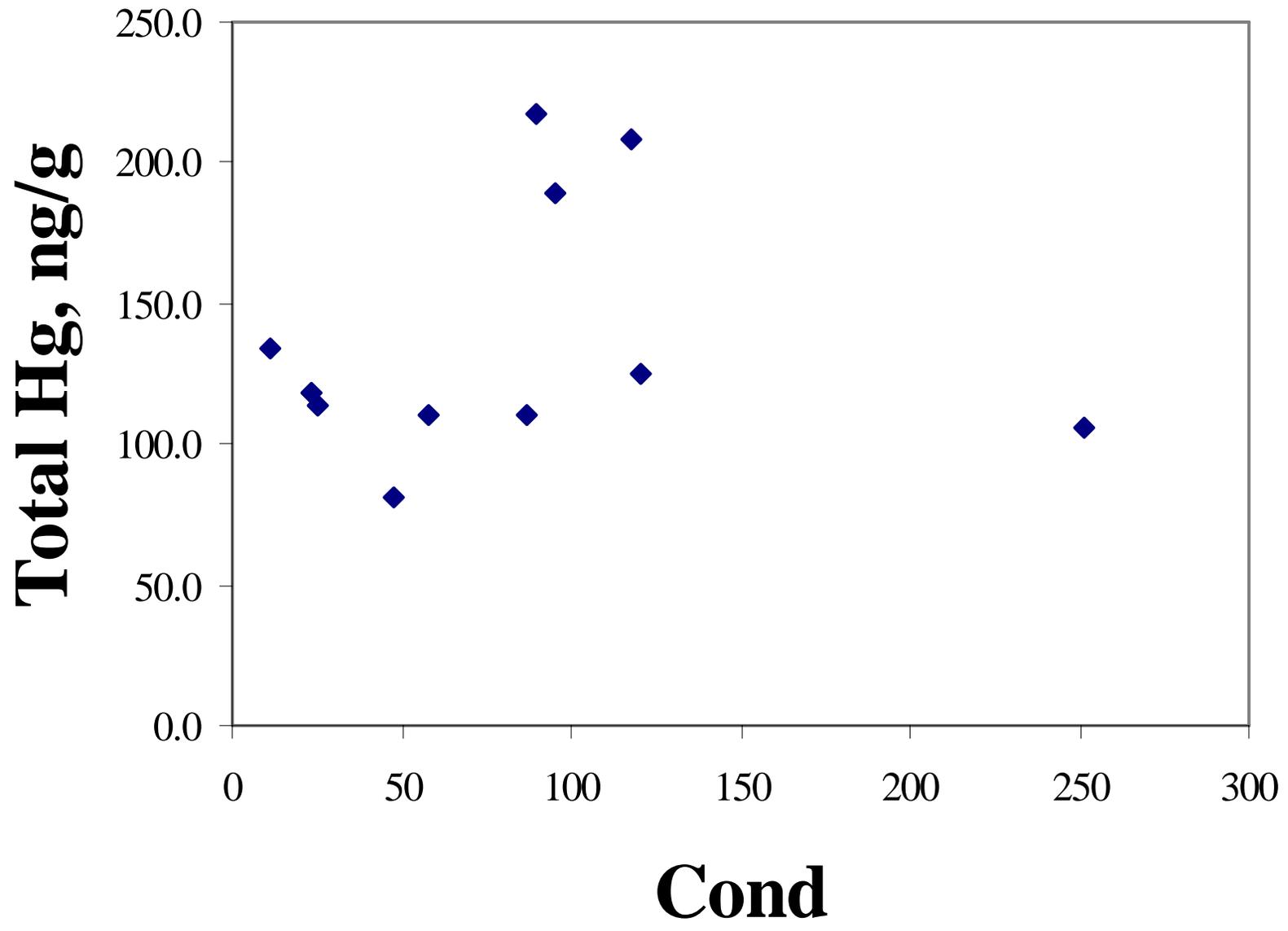
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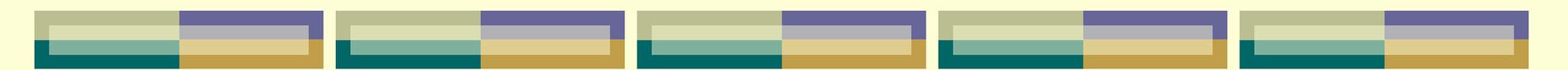


# Lake Averages



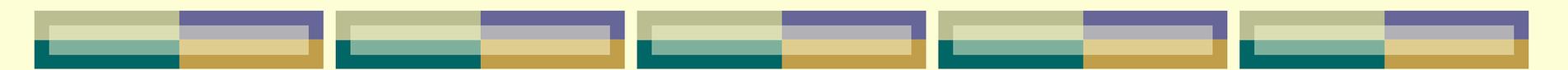






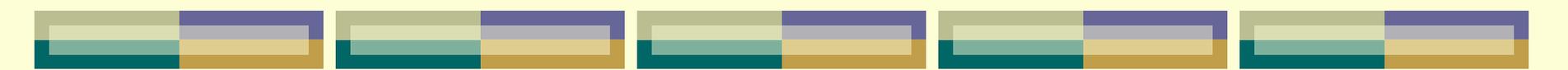
# Transfer to Biota

- Partnered with MN Dept. of Health to study fish contaminants; develop culturally sensitive consumption guide
  - Fish collected from reservation waters; targeted species that are commonly eaten
  - Mercury drives consumption restrictions (ruled out PCBs, organochlorine pesticides, toxaphene)
- 



# Wild Foods Study

- Comprehensive risks/benefits analysis funded by MN Sea Grant
  - Do cultural and nutritional benefits of wild foods (vs. market alternatives) offset contaminant exposure?
  - Wild rice, waterfowl, moose analyzed for Hg, Pb
  - Waterfowl and fish have comparable Hg
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# Continuing Studies

- Sampling more waterfowl
  - Update fish tissue data
  - Ongoing atmospheric deposition monitoring
  - Cooperator on study of mercury methylation/demethylation rates, in situ
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USEPA Region 5

EPA Great Lakes National Program Office

Minnesota Department of Health

Minnesota Sea Grant

Fond du Lac Reservation Business Committee

