

# RELATIONSHIP BETWEEN WETLANDS AND MERCURY IN BROOK TROUT

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**ABSTRACT:** The purpose of this study was to determine if wetlands influence mercury concentrations in brook trout (*Salvelinus fontinalis*), benthic macroinvertebrates and stream water. On September 26, 2005, water samples, benthic macroinvertebrates and brook trout were collected from four streams in western Maryland under low flow conditions. Water samples were also collected in these four streams under high flow in January 2006. The watersheds of Blue Lick and Monroe Run did not contain wetlands, but the watersheds of the Upper Savage River (3% of upstream area) and Little Savage River (7% of upstream area) contained wetlands. We found significantly ( $p < 0.05$ ) higher average total mercury concentration in brook trout from Little Savage River ( $129 \pm 54 \text{ ng g}^{-1}$ ), intermediate concentrations ( $66 \pm 19 \text{ ng g}^{-1}$ ) in brook trout from Upper Savage River and lowest concentrations in brook trout from Blue Lick ( $28 \pm 11 \text{ ng g}^{-1}$ ) and Monroe Run ( $23 \pm 19 \text{ ng g}^{-1}$ ). Brook trout in all streams accumulated mercury at the same rates over their lifetimes, but the youngest fish had significantly different mercury concentrations (Little Savage > Upper Savage > Blue Lick = Monroe Run), which may be due to differences in mercury concentrations in the eggs or food for the fry. Mercury concentrations in brook trout were not consistent with mercury concentrations in stream water and benthic macroinvertebrates. The Little Savage River had significantly higher total and methylmercury concentrations in stream water, but mercury concentrations in the other streams and in the benthic macroinvertebrates were not significantly different among streams. The unusually high methylmercury concentrations ( $0.5$  to  $2.1 \text{ ng L}^{-1}$ ) in the Little Savage River may have been due to the production of methylmercury in the pools.

## RESEARCH QUESTIONS

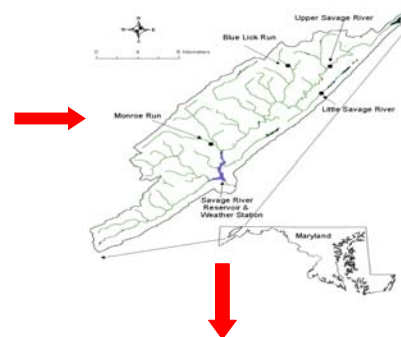
Do wetlands affect mercury concentrations in brook trout?

Can mercury concentrations in brook trout be explained by mercury concentrations in stream waters, benthic macroinvertebrates and/or sediments?

## MEASUREMENT PROGRAM

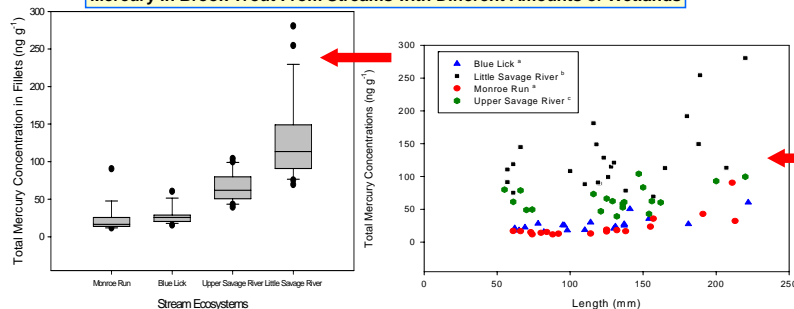
- **TIME PERIOD** – Fall 2005 – Spring 2006
- **MERCURY** – Total, dissolved and methylmercury (clean techniques with clean room).
- **QA/QC** – Blanks, matrix spikes, and inter-laboratory comparisons.

## Study Sites



Watershed Characteristics	Monroe Run	Blue Lick	Upper Savage	Little Savage
Basin Area (ha)	1360	575	2029	505
Stream Order	1	1	2	1
% Forest	96	82	73	90
% Agriculture	3.9	17	23	3
% Urban	0	0.3	1	0
% Wetland	0.02	0	3	7

## Mercury in Brook Trout From Streams with Different Amounts of Wetlands



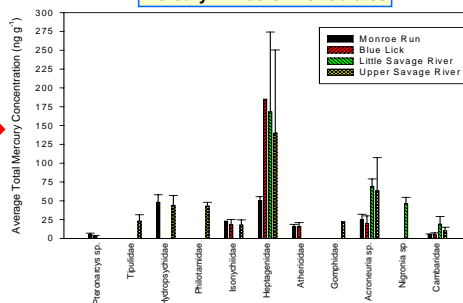
## Mercury in Stream Water

Study Streams	THg (ng/L)	THg (ng/L)	THg (ng/L)	THg (ng/L)
	Sep-05	Jan-06	Apr-06	May-06
Upper Savage	0.77	0.82	1.72	11.6
Little Savage	4.07	1.49	2.64	6.9
Blue Lick	1.03	0.52	1.31	5
Monroe Run	1.10	0.43	0.82	4.5

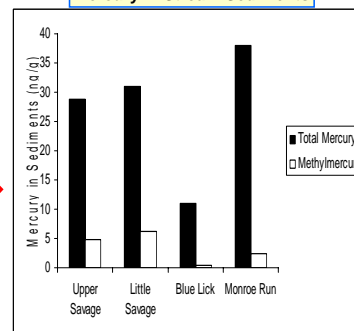
  

Study Streams	MeHg (ng/L)	MeHg (ng/L)	MeHg (ng/L)	MeHg (ng/L)
	Sep-05	Jan-06	Apr-06	May-06
Upper Savage	0.05	0.04	0.05	0.42
Little Savage	1.30	0.16	0.18	0.30
Blue Lick	0.05	0.04	0.04	0.18
Monroe Run	0.08	0.02	0.02	0.10

## Mercury in Macroinvertebrates



## Mercury in Stream Sediments



## ANSWER TO QUESTIONS:

Do wetlands affect mercury concentrations in brook trout?

Yes, (based on our limited data) there appears to be a direct correlation between average mercury concentrations in brook trout and the percentage of wetlands in watersheds upstream of the sampling locations.

Can mercury concentrations in brook trout be explained by mercury concentrations in stream waters, benthic macroinvertebrates and/or sediments?

The results were mixed. The stream with the highest mercury concentrations also had the highest mercury concentrations in brook trout. However, brook trout with low and moderate amounts of mercury had similar concentrations of mercury in stream water, macroinvertebrates and sediments.



## ACKNOWLEDGEMENTS

Research efforts were funded by a grant from the Maryland Department of Natural Resources, with additional support from the University of Maryland Center for Environmental Science.