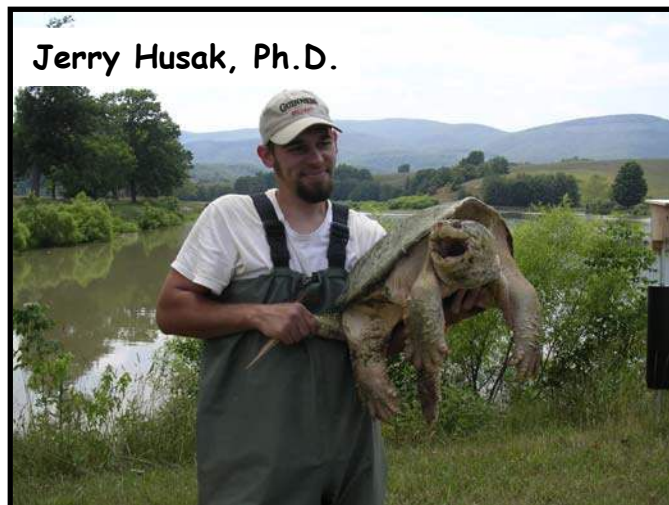


Differential Bioaccumulation & Speciation of Hg Among Four Species of Turtles in the South River



The people who did all the work...



Broad Objectives

Determine what species of herpetofauna are present in the South River, and what sites are best suited for study

Determine whether herpetofauna accumulate Hg in their tissues and if factors such as site, species, sex, or size influence Hg accumulation

Determine whether herpetofauna accumulate Hg at high enough levels to warrant further studies on reproductive success



Why are Turtles Critical Additions to the South River Ecological Study?

Long-lived

Trophic Position

Ectothermic Physiology

Aquatic/Non-migratory

Important Prey

“Seven types of meat”



The cast of characters...





Snapping turtle
(Chelydra serpentina)

Stinkpot
(*Sternotherus odoratus*)



Painted Turtle
(*Chrysemys picta*)

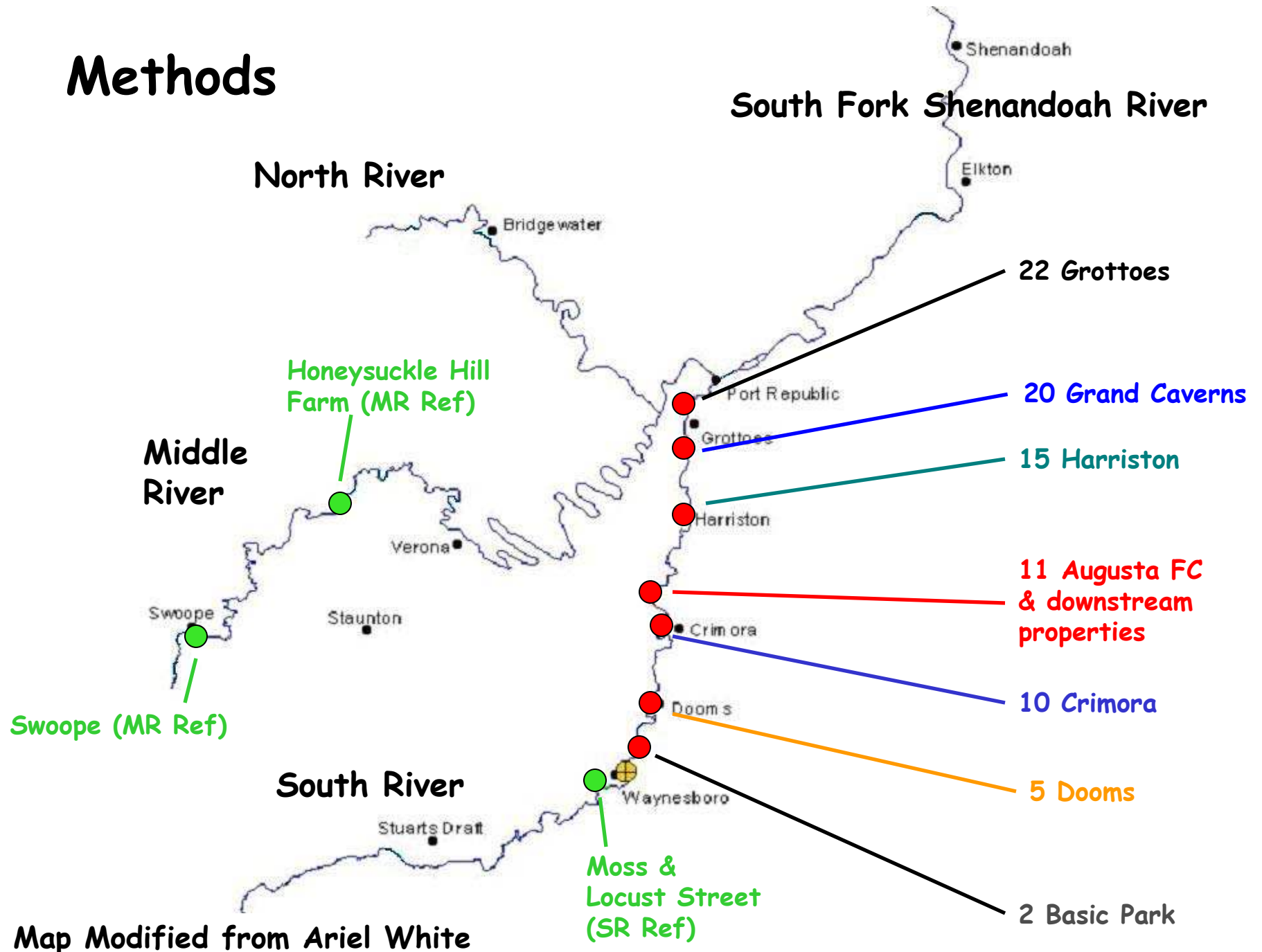


Red Bellied Turtle (*Pseudemys rubriventris*)



Husak et al., in prep

Methods



Methods



Baited Hoop Traps





Mass, sex, carapace & plastron dimensions

1 ml blood from tail or cervical sinus (2 sample subset)

Permanently marked with unique ID



A photograph of a turtle, likely a snapping turtle, resting in a white plastic container. The turtle is positioned on the left side of the frame, facing right. Its shell is dark and textured. To the right of the turtle are several red, rectangular foam blocks arranged in a row. A white paper or cloth is placed under the blocks and the turtle. The container has a white plastic rim. The background is a light-colored, textured surface.



Analytical methods

Total Hg:

Direct Hg Analyzer

Methyl Hg/Total Hg:

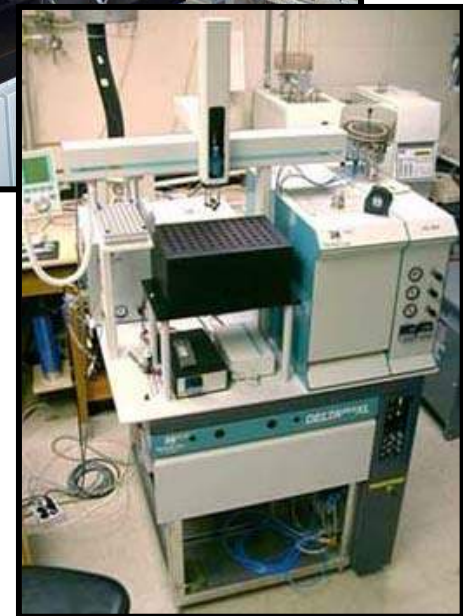
gas chromatographic cold-vapor atomic
fluorescence spectrometry (GC-CVAFS)
& ICPMS

Selenium:

ICPMS

Stable isotopes:

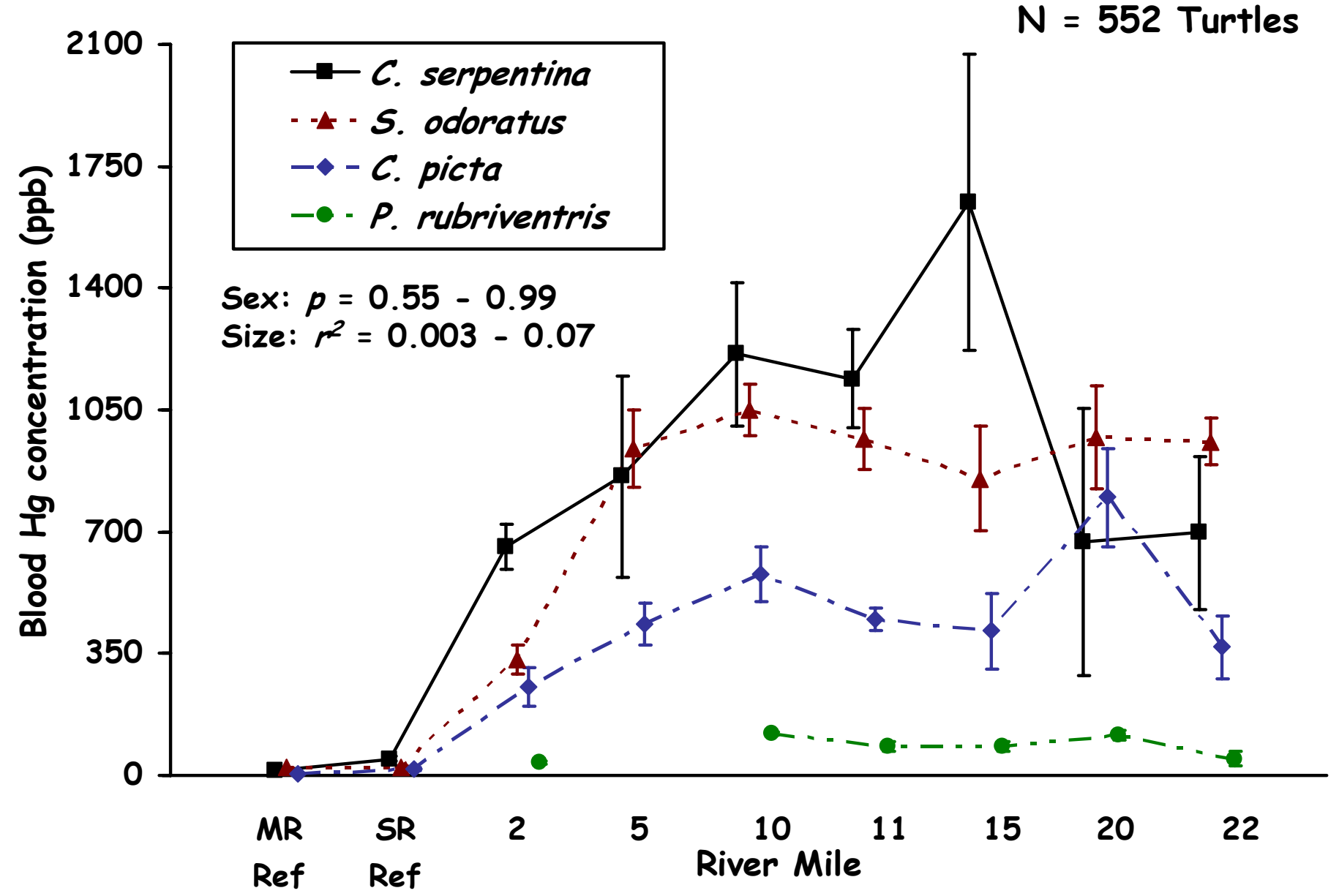
Isotope Ratio Mass Spectrometry



**Advanced Analytical Center
for Environmental Sciences**

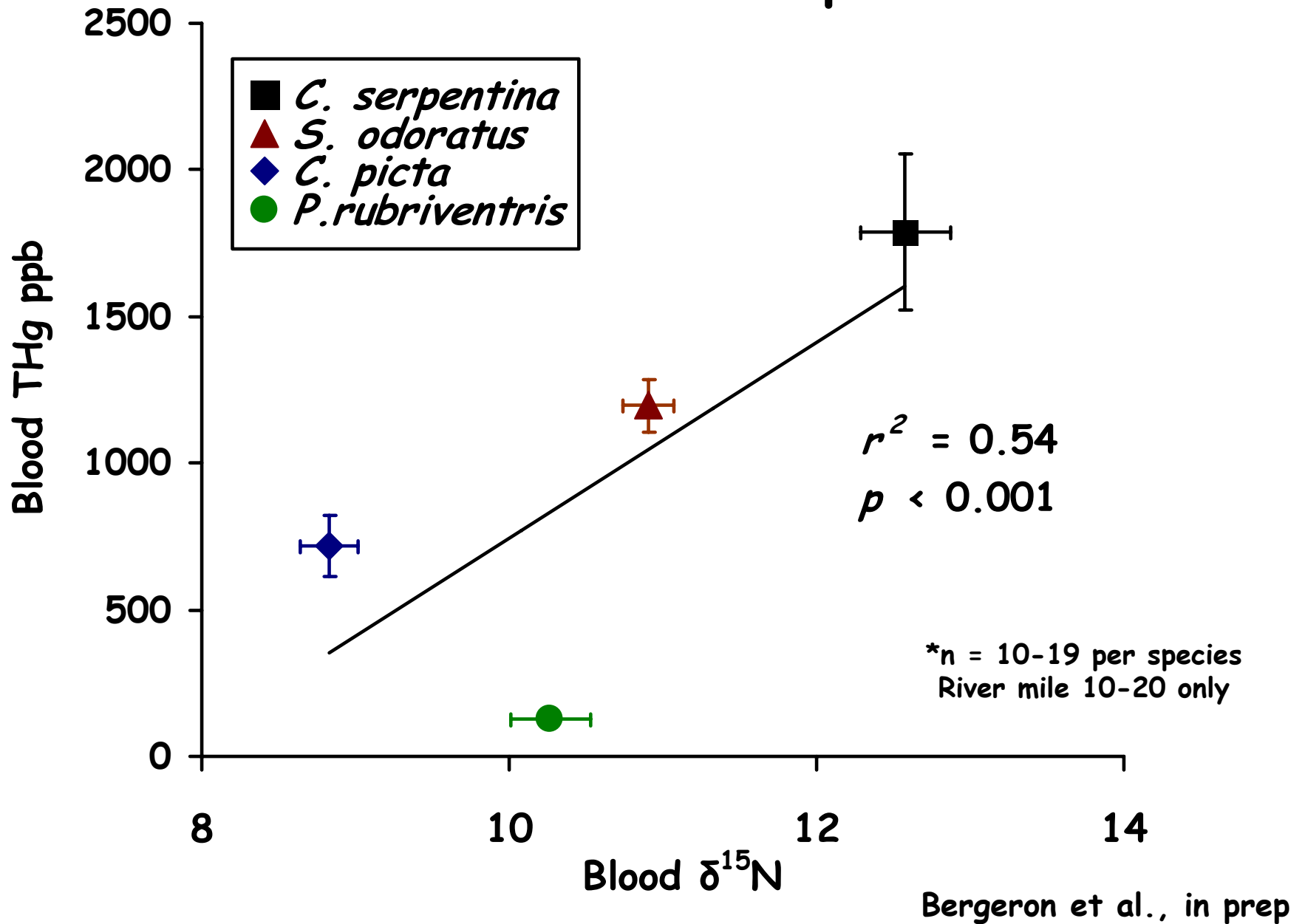
Sample Sizes

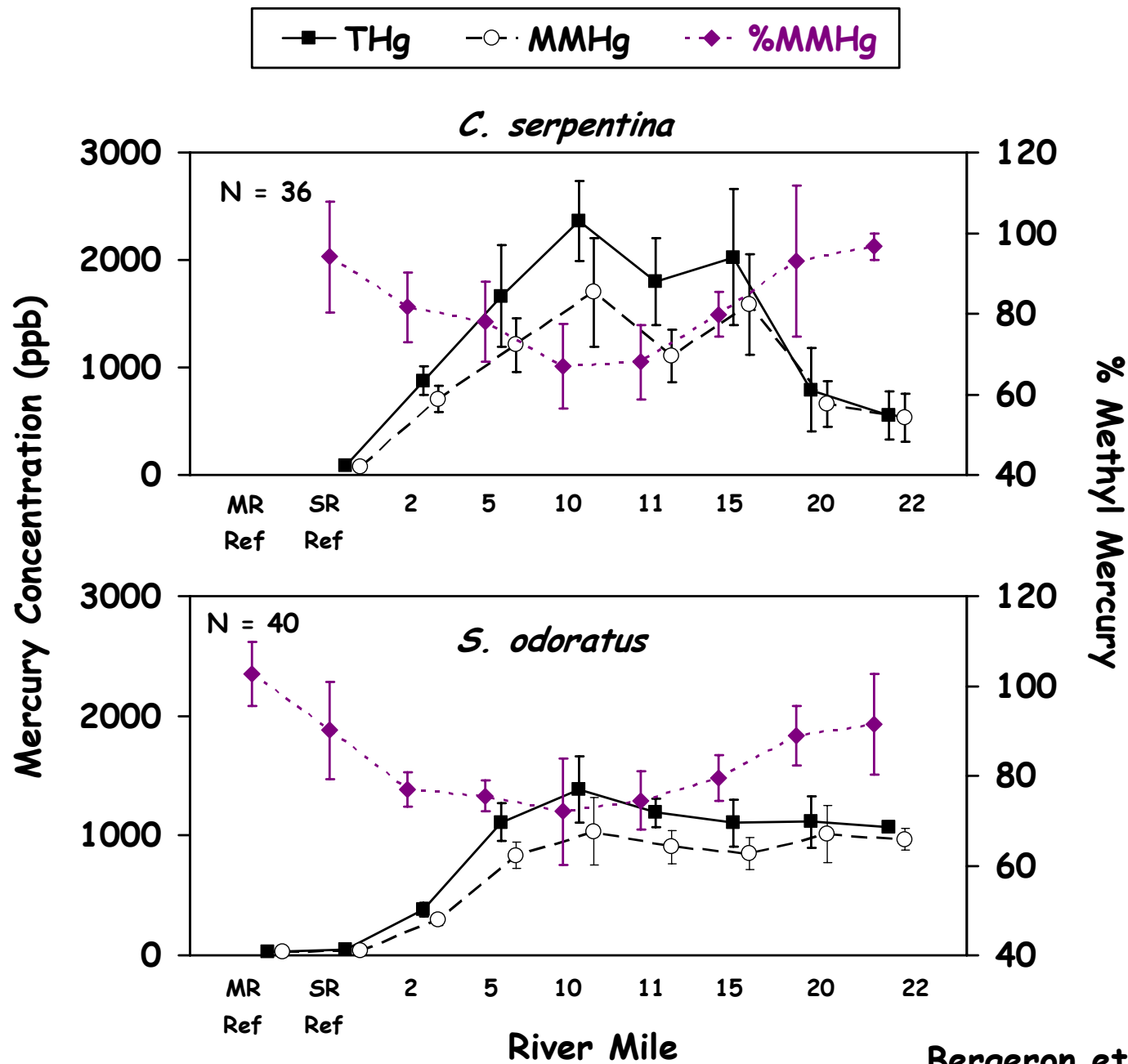
Site	<i>C. serpentina</i>	<i>S. odoratus</i>	<i>C. picta</i>	<i>P. rubriventris</i>	Totals
MR Ref	38	4	100	0	142
SR Ref	14	7	6	0	27
2	30	5	11	13	59
5	8	22	20	0	50
10	14	17	29	2	62
11	24	9	84	11	128
15	9	8	8	4	29
20	4	5	4	2	15
22	10	12	14	4	40
Totals	151	89	276	36	552



Bergeron et al., in prep

Stable Isotopes





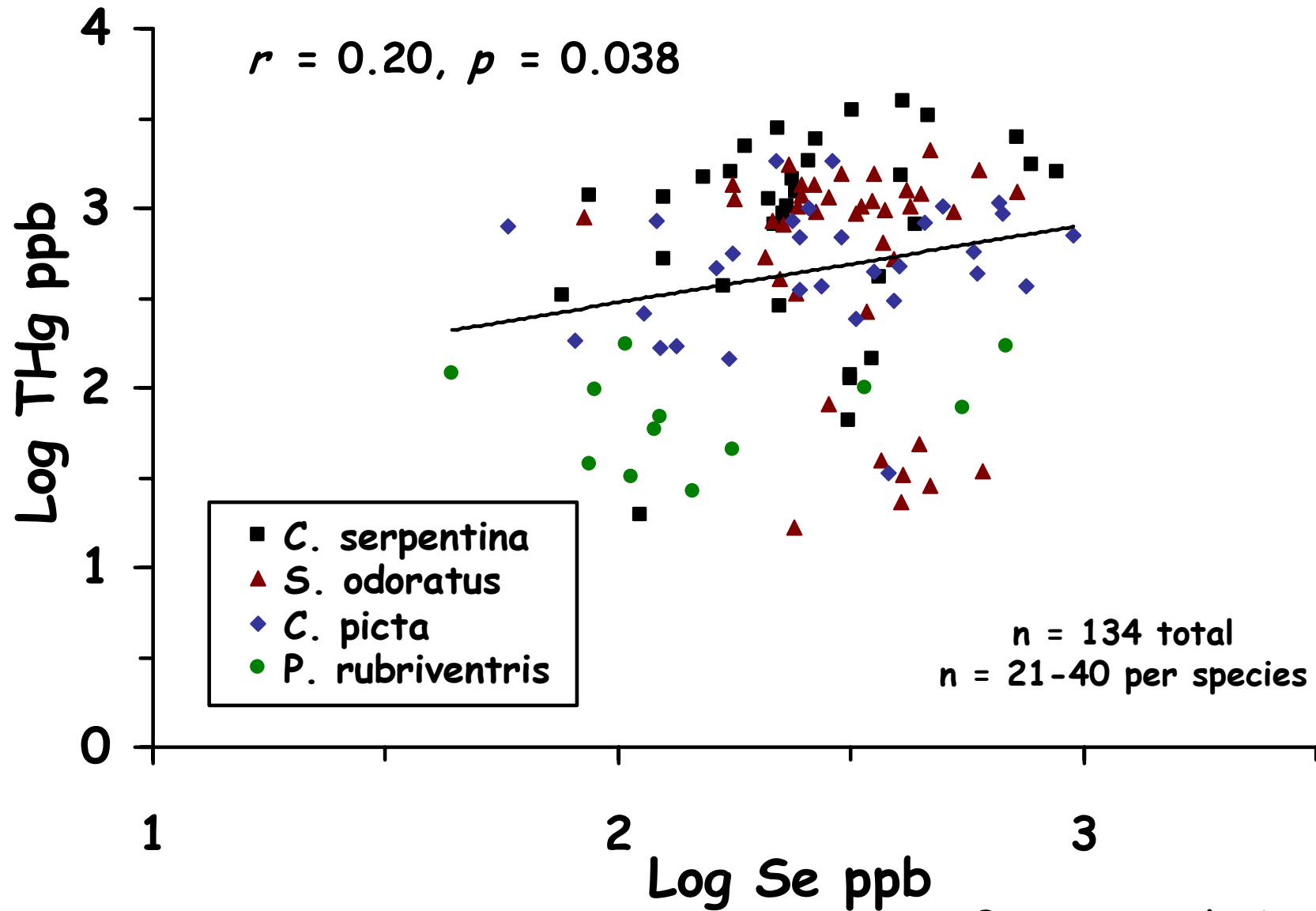
Bergeron et al., in prep

Do the observed Hg concentrations in turtle blood warrant further studies on reproductive success?

First clutch of
P. rubriventris ever
found west of the
Northern Piedmont



Relationship between Hg and Se in Blood



Bergeron et al., in prep

Conclusions

Turtles inhabiting the South River have elevated [Hg] in their blood compared to reference turtles, but accumulation is species-dependent

[Hg] in blood were not as high as we predicted based on the life history and ecology of some turtles

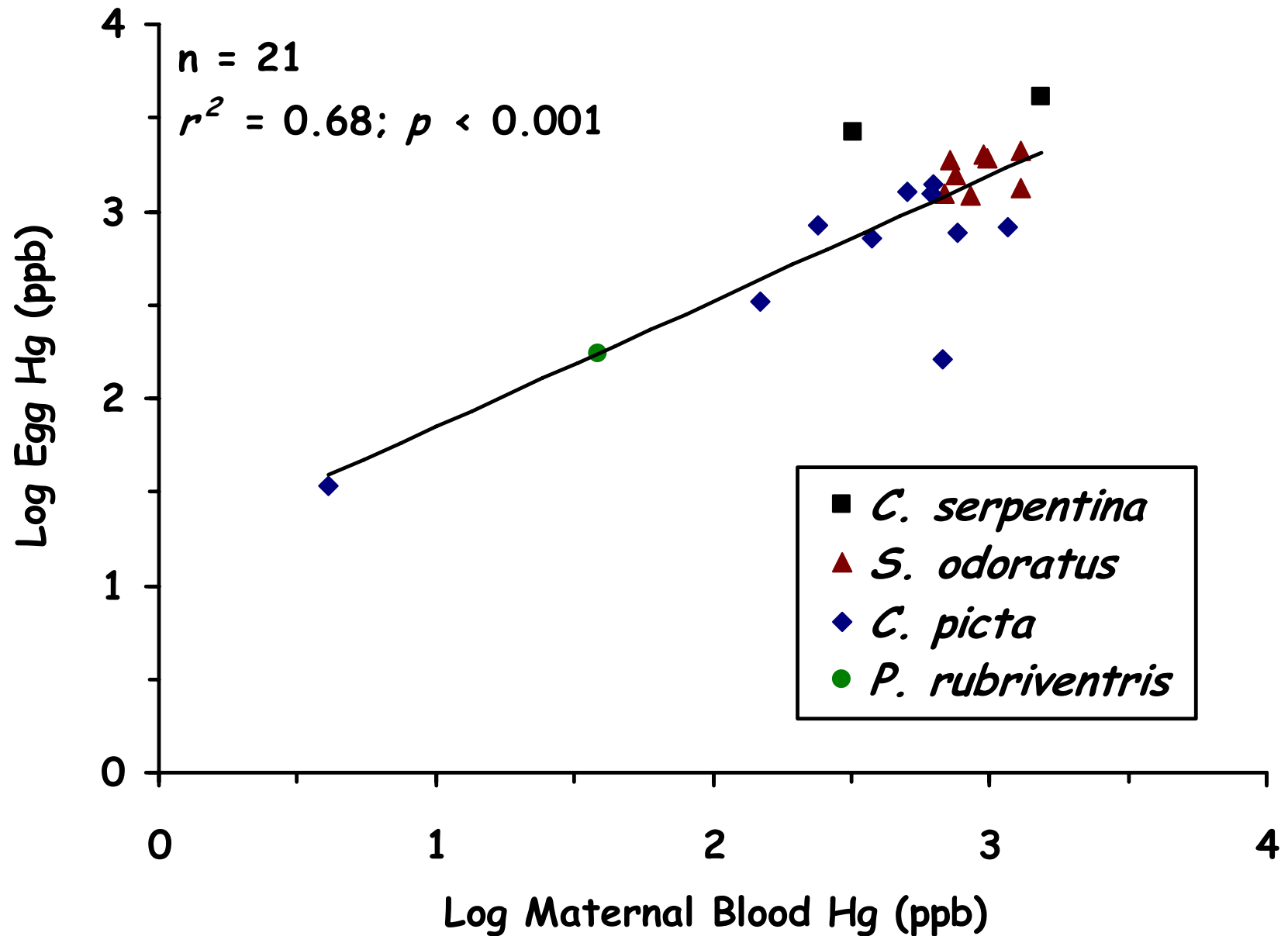
THg in blood is predominately MMHg (75-100%) in all species, but interesting trends exist among sites

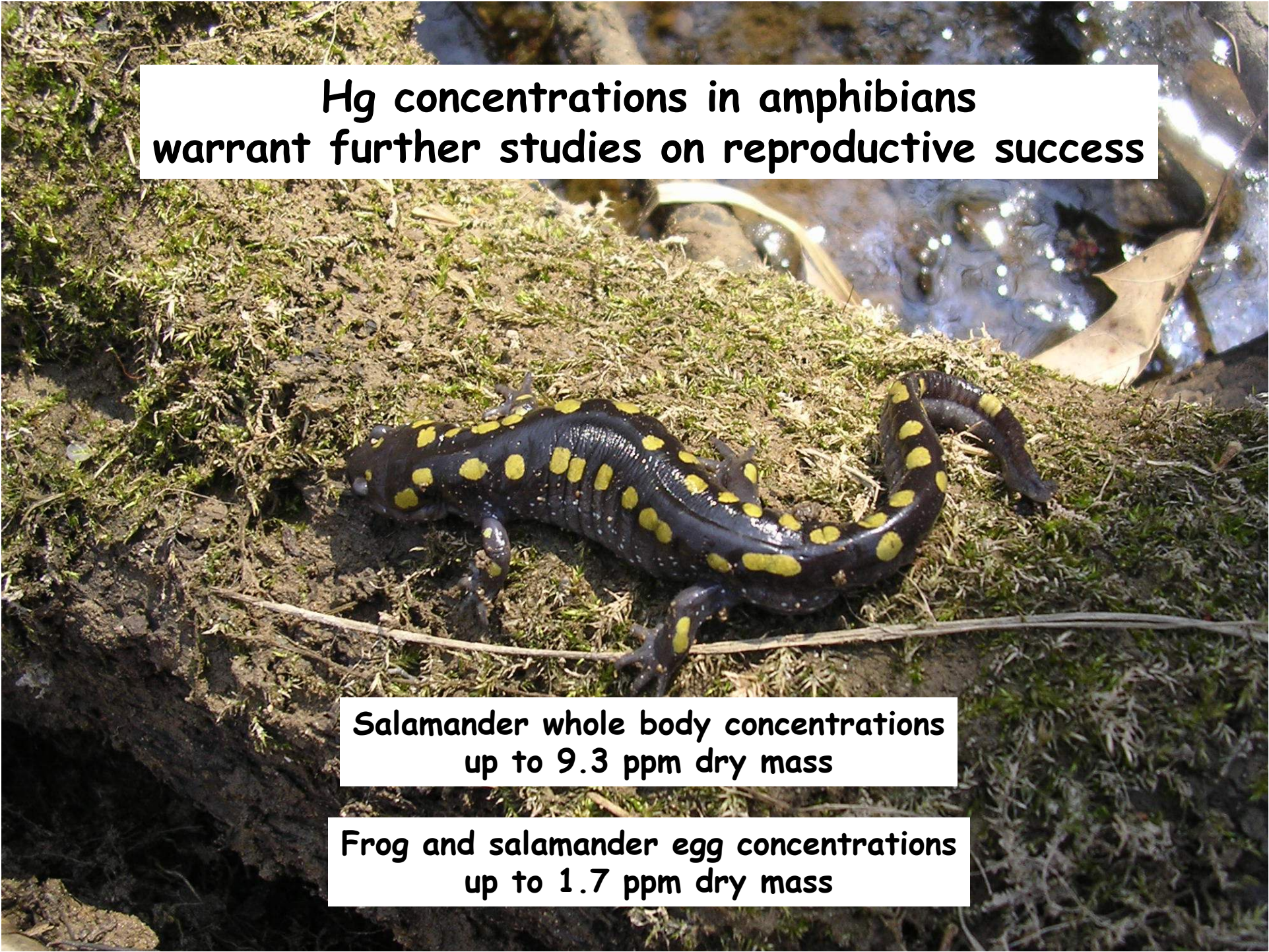
[Hg] in turtles warrant effects-based studies, but Se could be protective against Hg toxicity???



Preliminary
Reproductive Data

What about Hg in turtle eggs?



A black salamander with bright yellow spots is resting on a mossy bank next to a stream. The stream is visible in the upper right corner, with some fallen leaves and debris in the water. The background is a dense forest floor with moss and small plants.

**Hg concentrations in amphibians
warrant further studies on reproductive success**

**Salamander whole body concentrations
up to 9.3 ppm dry mass**

**Frog and salamander egg concentrations
up to 1.7 ppm dry mass**

The Path Forward...

Amphibian Reproduction
(January - April 2007)

Spatial Hg Patterns
Species Hg Patterns
Female-Egg Hg Relationships
Egg Hg-Hatching Relationships

Turtle Reproduction
(April - July 2007)

Female-Egg Hg Relationships
Egg Hg-Hatching Relationships

Incorporate Findings Into
Larger Food Web Study



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Landowners along the
South and Middle Rivers



The University of Georgia

Savannah River Ecology Laboratory

The best reason to
study herpetofauna...

