Assessment of methlymercury availability to bats on the South River, Virginia - 2006

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Bats found in Virginia

Scientific Name	Common Name	Species Status*	Foraging Type
Myotis grisescens	Gray Bat	FE,SE	Regularly over water
Myotis lucifugus	Little Brown Bat	--	Regularly over water
Eptesicus fuscus	Big Brown Bat	--	Occasional over water
Lasionycteis noctivagans	Silver-haired Bat	SC	Occasional over water
Lasiurus borealis	Eastern Red Bat	--	Occasional over water
Lasiurus cinereus	Hoary Bat	--	Occasional over water
Myotis leibii	Small-footed Bat	SC	Occasional over water
Myotis septentrionalis	N. Long Eared Bat	--	Occasional over water
Myotis sodalis	Indiana Bat	FE,SE	Occasional over water
Nycticeius humeralis	Evening Bat	SC	Occasional over water
Pipistrellus subflavus	Eastern Pipistrelle	--	Occasional over water
Corynorhinus townsendii	VA Big-eared Bat	FE,SE	Forests and ridges

*FE= Federally Endangered Species; SE= State Endangered Species;

SC=Special Concern (Federal)

Existing bat Hg samples by species and state, 2005-2006

State	Species	# of Samples
VA	6	~70
NY	8	~100
ME	4	~40
MA	3	~15

Objectives for South River

PRIMARY EMPHASIS

1. Use Sonobat® technology for on-site determination of potential bat species on the South River. Emphasis is to locate federally listed Indiana Bats;

2. Emphasize further bat capture for blood/fur sampling
    a. For any riverine areas with Indiana Bats
    b. From reference areas and near- and far-downstream areas;

SECONDARY EMPHASIS (PILOT STUDIES THAT TEST TECHNIQUES)

3. Determine potential behavioral effects from Hg using on-site flight chambers

4. Use comet assay to determine DNA damage

5. Use bioassays to determine baseline and pilot data

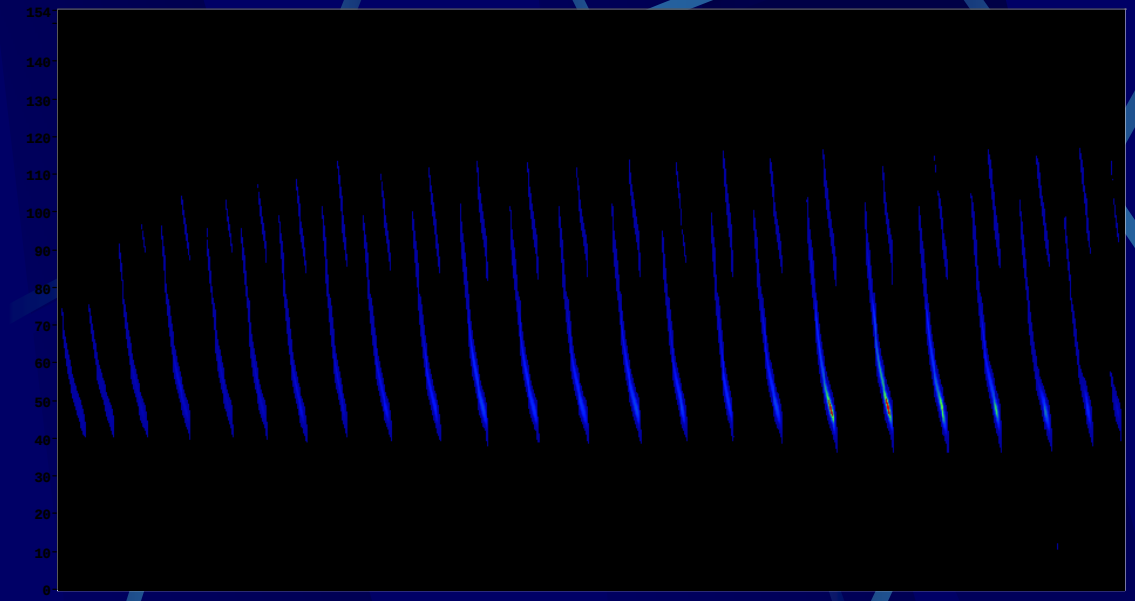
6. Use stable isotope analysis of foodweb baselines, prey, and bats to determine dietary emphasis, trophic level, and percent use of aquatic-based prey items

Capture Methods

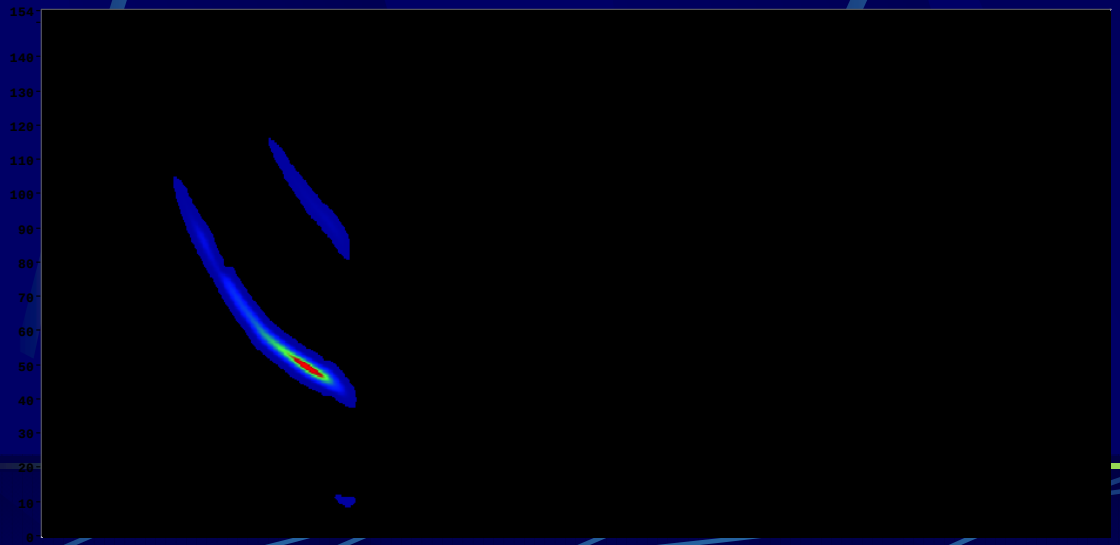
Blood Sample

Fur Sample

Sonobat®

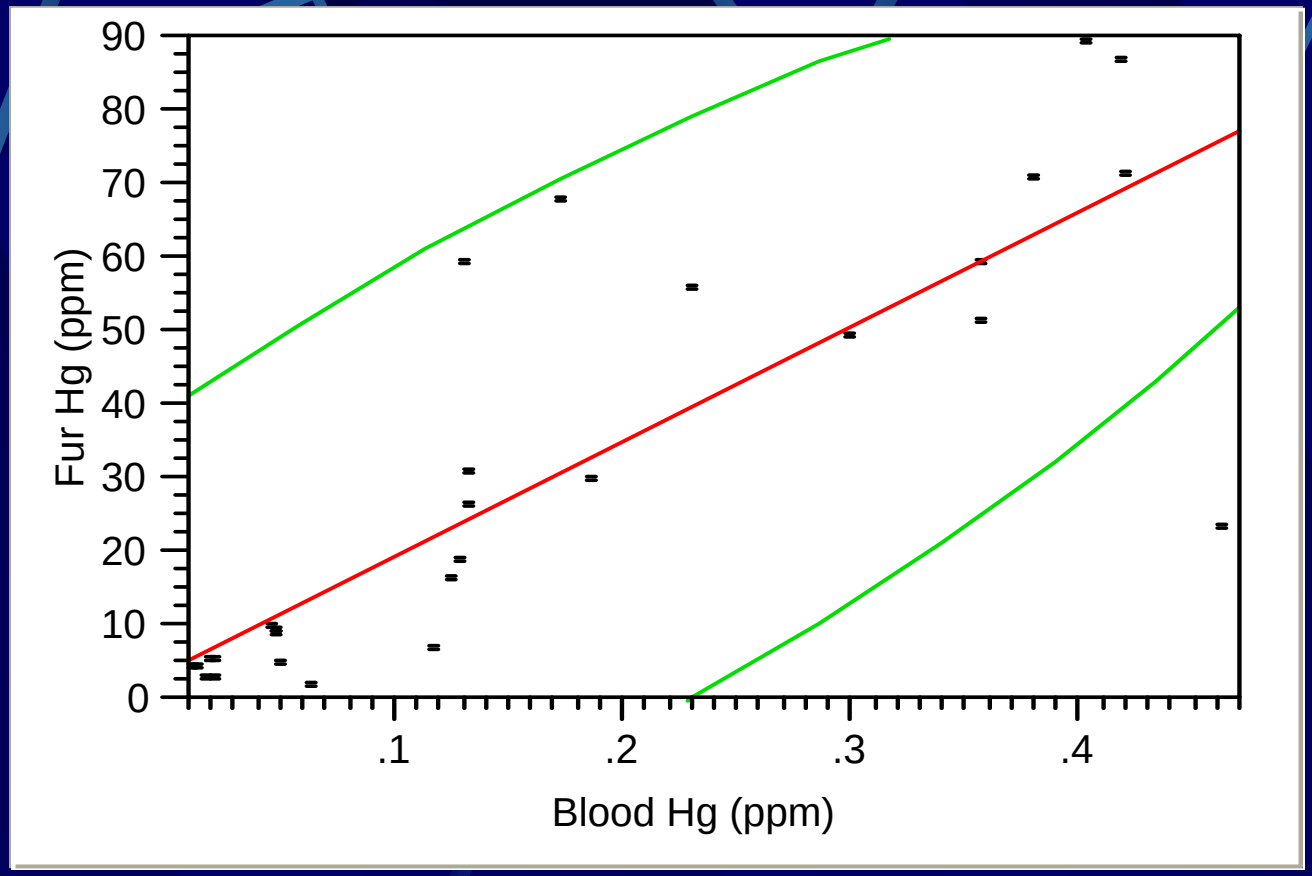


Little Brown Bat Calls



Little Brown Bat Call

Blood and fur Hg relationship

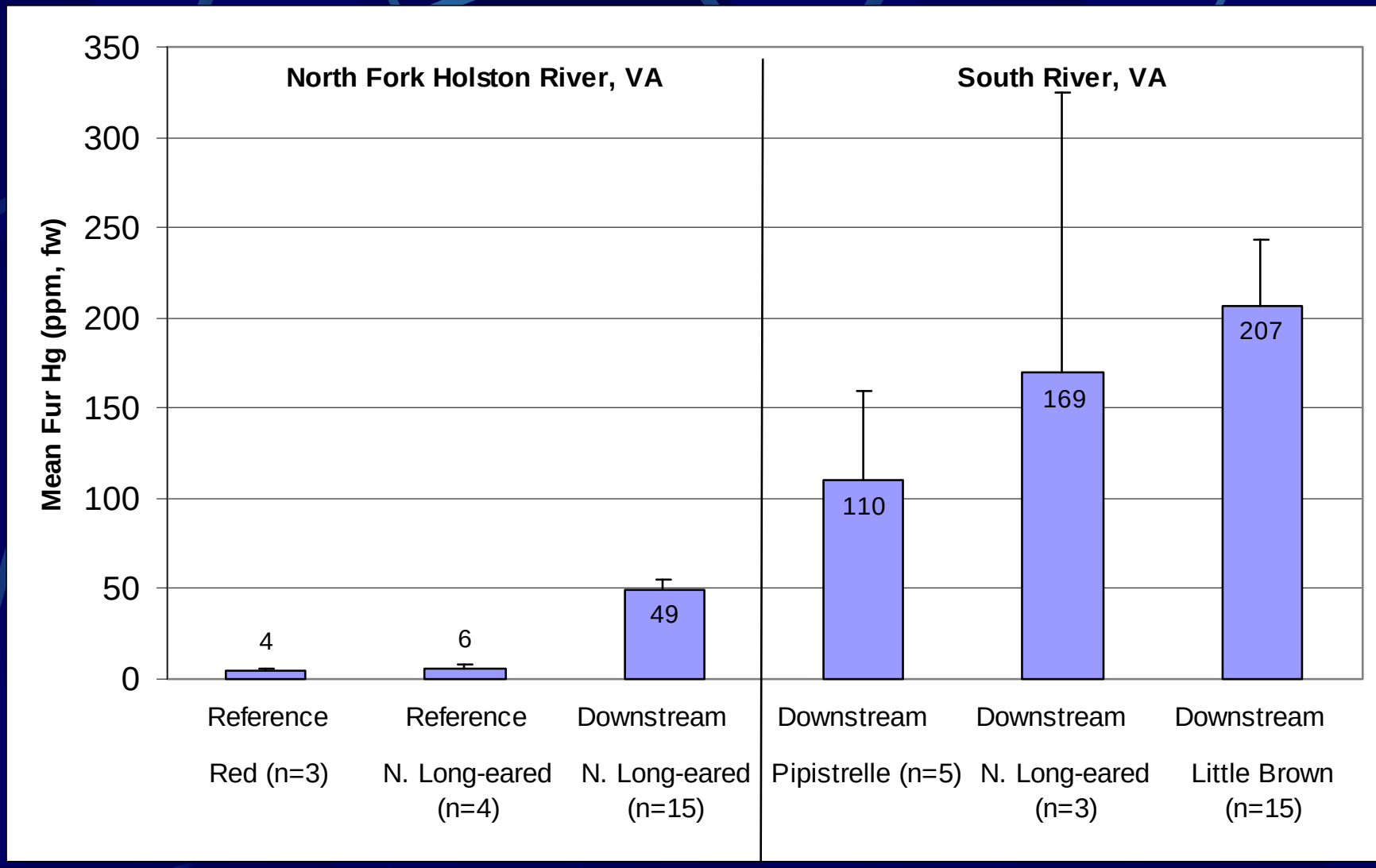


Fur and blood Hg levels were significantly correlated (r^2=0.82, p<0.001, n=28). Blood and fur represent multiple species from the N. Fork of the Holston River.

Mean Hg levels in bat fur (ppm, fw) from South River, 2006

Species	N	Min	Max	Mean	SE
Hoary	1	0.74	0.74	0.74	-
Red	5	1.13	4.97	2.16	0.72
Pipistrelle	5	0.38	225.00	110.11	49.63
N. Long-eared	3	2.81	480.00	169.47	155.40
Little Brown	15	3.51	440.00	206.83	36.71

Mean Fur Hg comparison



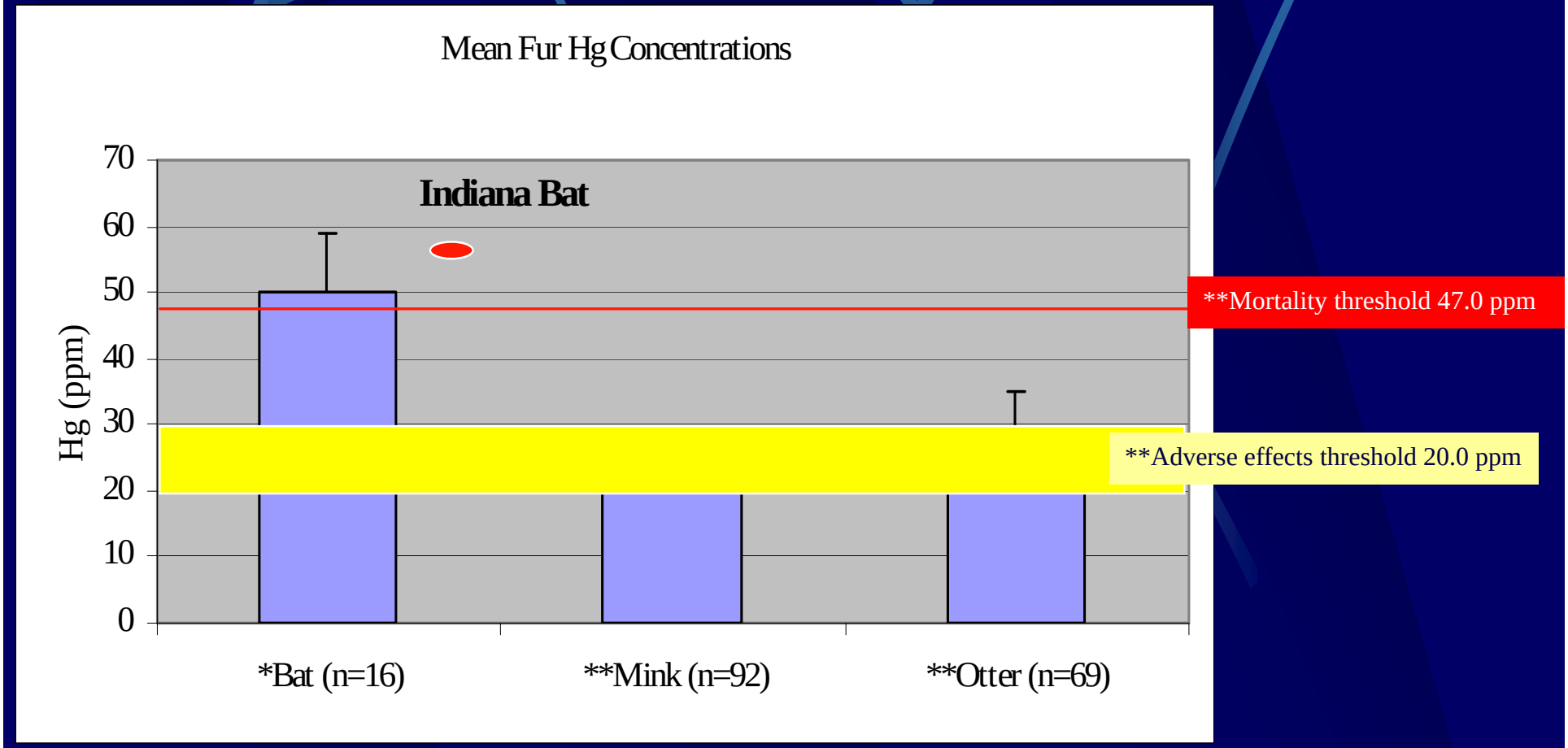
Discussion

- Researchers in Japan examined various species of Chiroptera from areas sprayed with mercury fungicides.
  - They measured total fur Hg in 1965 and 1966 and, found 33.0 ppm (+/-6.3) and 33.7 ppm (+/-4.2), respectively.

- The fur Hg concentrations found in Chiroptera from the contaminated area of North Fork of the Holston River (mean Hg 49.9 +/- 10.3ppm) and the South River (mean Hg 144.8 ppm) exceeded these values from Japan.

- In Arkansas, researchers examined various Chiroptera species from rivers in Arkansas that were under fish consumption advisories.
  - They found Hg concentrations ranging from 1 to 30 ppm in fur.
  - They concluded that Hg accumulation had exceeded the hazard criteria set by USFWS and that Hg accumulation in the bats is a serious problem that warranted further investigation.
- In eastern Ontario and Quebec, researchers found
  - 1997 pooled samples from 5 sites had Hg concentrations ranging from 2.0 to 7.6 ppm in fur.
  - 1998 samples from the same sites with fur Hg concentrations that approached 10 ppm.

Comparison of fur Hg levels in bats and mustelids



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