Progress Update on 2009 South River Biota Projects

SRST Meeting July 21, 2009

A. Condon, USFWS

E. E. Mack, DuPont

Projects for 2009

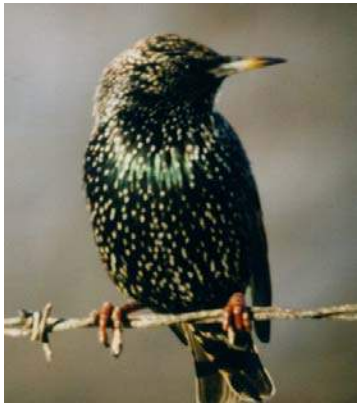
- Avians (3)
  - Cristol, Folsom/Evers (BRI), FWS
- Fur-bearing mammals (1)
  - Yates/Evers (BRI)
- Amphibians & Reptiles (2)
  - Hopkins
- Trophic Modeling (1)
  - Newman

Avians

Dan Cristol, College of William & Mary

Mercury Dosing Study

- Proposed:
  - Determine sublethal effects level for songbirds fed a constant low-dose of mercury (realistic conditions)
  - Mortality, reproductive impairments, immune suppression, endocrine disruption, neurological damage, behavioral abnormalities



Mercury Dosing Study Progress

- Aviaries built (except drainage, more wren cages)
- Working with engineers to deal with waste disposal
- Aviaries under construction now
- Starlings (88) and Zebra Finches (40) are in aviary
- Wrens will be captured after breeding season, acquiring Federal permits
- Post-doc began July 6
- Dietary doses to begin once drainage is approved

Avians

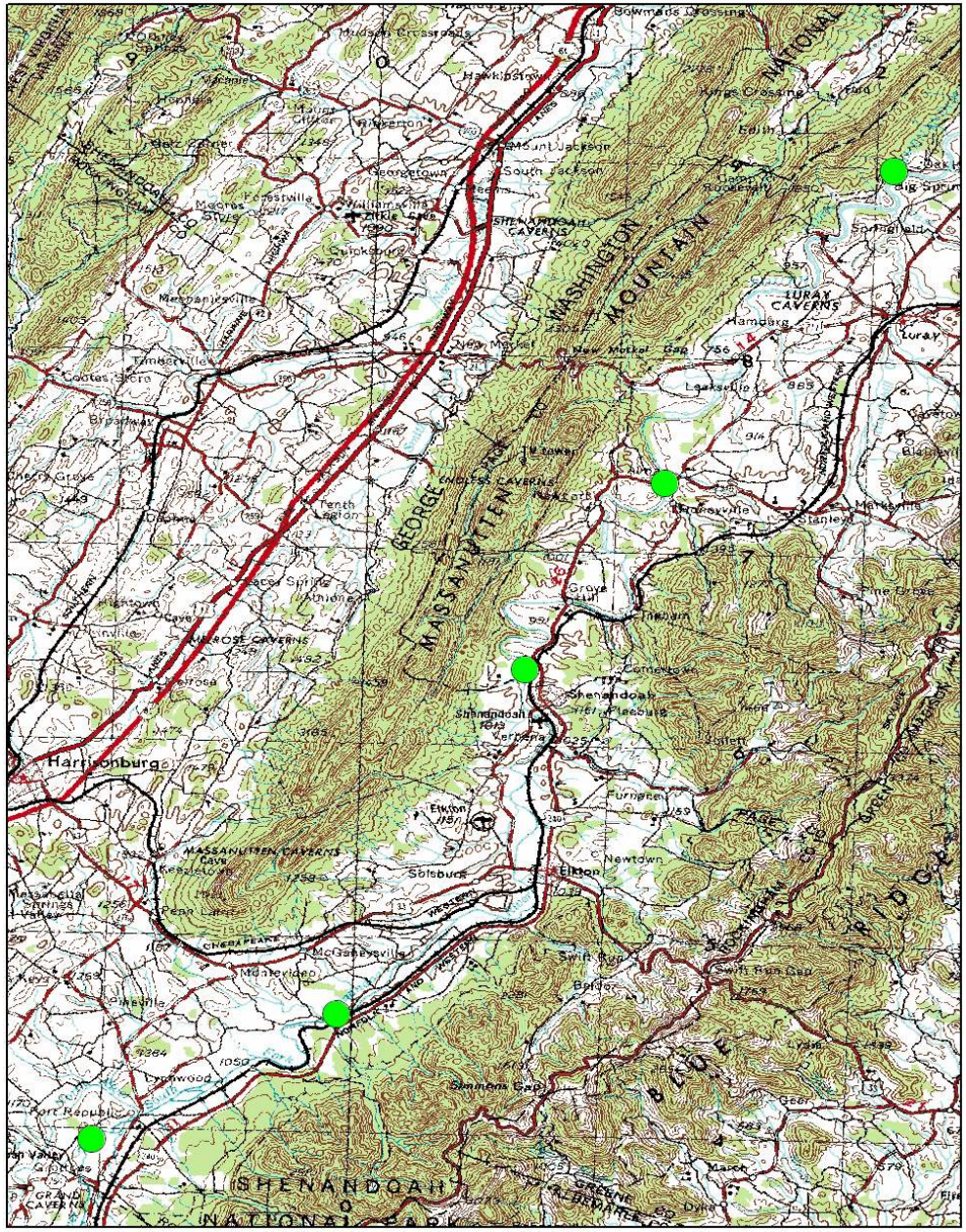
Dave Evers/Sarah Folsom, Biodiversity Research Inst.

Spatial trends of Mercury in Songbirds

- Proposed:
  - Determine geographic extent of mercury contamination downstream in South Fork Shenandoah River (in Songbirds)

Spatial Trend Study Progress

- 1 reference site (Waynesboro Nursery), 5 downstream sites
- May 18 – July 10
- Mercury is being analyzed at WM in July/August



COMMON SPECIES SAMPLED:

- Carolina Wren (80)
- Song Sparrow (72)
- Red-eyed Vireo (51)
- Carolina Chickadee (24)
- Indigo Bunting (54)
- Eastern Tufted Titmouse (18)
- Northern Cardinal (53)
- Gray Catbird (59)
- American Goldfinch (24)

Results

*Site Name- Approx. River Mile**	*Tier 1*	*Tier 2*	*Tier 3*	*Other*	*Total*
Bealers Ferry (SFSR)- **RM63**	32	12	6	16	66
Shuller Island (SFSR)- **RM20**	30	10	10	11	61
Longs Bend Farm (SFSR)-**RM30**	31	18	17	40	106
Power Dam (SFSR)- **RM7**	37	15	6	26	84
Grottoes City Park (SR)	32	29	4	27	92
Ridgeview Park (SR-Reference)	11	6	6	4	27
Waynesboro Nursery (SR-Reference)	29	13	46	25	113
Grand Total	**202**	**103**	**95**	**149**	**549**

***Approximate river mile (RM) from the confluence of the South River (SR) and the South Fork of the Shenandoah River (SFSR)**

Avians

USFWS

Carolina Wren Reproductive Success

- Proposed:
  - Monitor Carolina Wren nests
  - Collect data on clutch initiation date, number of eggs, number of nestlings hatched, number of fledglings, mercury levels of adult(s), nestlings
  - Nest box cameras (supplement dosing study)

Carolina Wren Nest Success Study Progress

- Nest boxes monitored
    - 210 reference, 175 contaminated
  - Began box checks April 7, will continue to mid-August

	# nests	# failed (eggs or nestlings)	# fledged (all or some)	# still active
Reference	10	5	3	2
Contaminated	15	10	5	0

- 19+ Adult blood/feather samples collected
- Analyzed July-August

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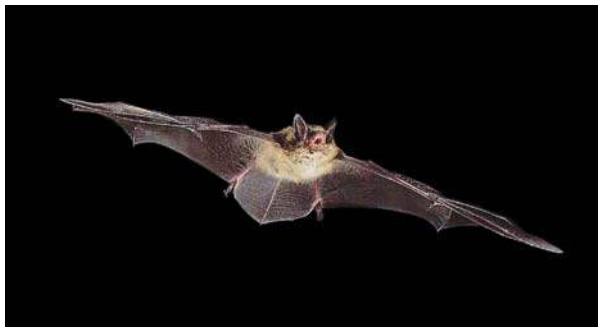
Bats

Dave Evers/Dave Yates, BRI

Spatial trends of Mercury in Bats

- Proposed:
  - Use radio telemetry to establish distance bats are travelling from South River (RM 10-20)
  - Determine geographic extent of mercury contamination downstream in South Fork Shenandoah River (in bats; 5 subreaches)



Spatial trends of Mercury in Bats

- Progress:
  - Started June 1
  - Tracking June 1-mid July
  - Started mist-netting downriver July 15
    - 5 sites
  - Will continue to August 15

Spatial trends of Mercury in Bats

- Results
  - 5 new maternity roosts
  - 25 bats with transmitters (table next slide)
  - 1st site downstream complete ~40 bats captured

Spatial trends of Mercury in Bats

Capture Location/Species	Little Brown	Eastern Pipistrelle
AFC	2	2
Craige Barn	4	0
Freeds	2	3
Grottoes Park	2	3
Port Republic	5	0
Renkin	3	0

Amphibians & Reptiles

Bill Hopkins, Virginia Tech

Mercury Effects in Snapping Turtles and American Toads

- Proposed:
  - Turtles (pilot study):
    - Effects of mercury on reproduction
    - Samples for trophic models
    - Determine mercury levels in edible tissues
  - Toads:
    - Determine relative importance of trophically derived vs. maternally derived mercury on toad success
      - Larval → metamorphosis
      - Survival and growth of post-metamorphic Juveniles

Amphibians & Reptiles

- Progress -1:
  - Reptiles:
    - Snapping Turtles
      - Tissue collections completed in June, samples will be analyzed in August
      - New graduate student on board in August

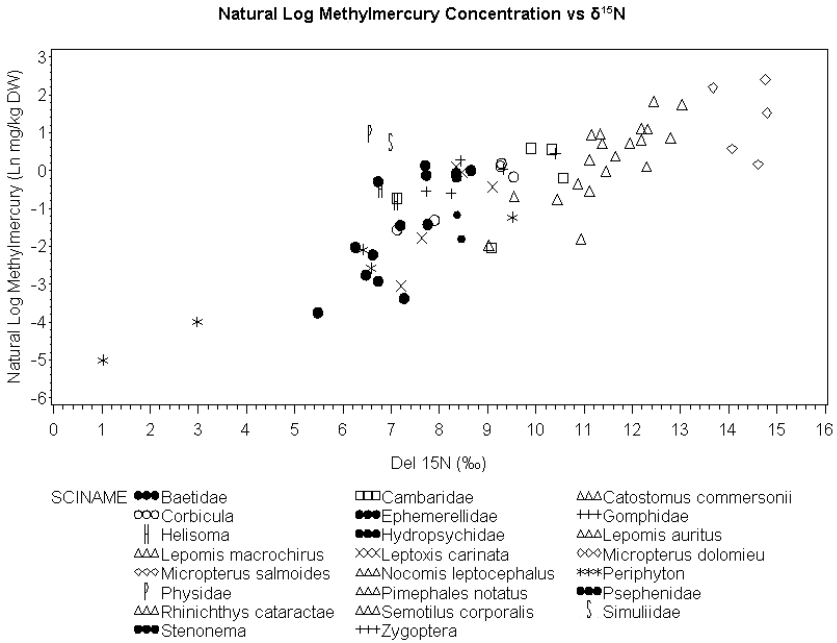
Amphibians & Reptiles

- Progress-2:
  - Amphibian Studies (American Toad)
    - Mesocosms (3,200 tadpoles)
      - Hatchlings +/- maternal Hg X +/- predators (dragonfly larvae).
      - Currently wrapping up expt, looking at survival, time to metamorphosis and size at metamorphosis
    - Diet I (150 tadpoles held individually)
      - Hatchlings +/- maternal Hg X control, low, or high Hg diet
      - Tadpole locamotory performance data (speed and responsiveness) has been collected
      - Currently in middle of metamorphosis, once complete toadlet locomotory performance (hopping distance, speed, and responsiveness will be evaluated.
    - Diet II (1,800 tadpoles held communally)
      - Hatchlings +/- maternal Hg X control, low, or high Hg diet
      - Currently wrapping up and analyzing data on metamorphosis and survival.
      - Individuals are either entered into terrestrial enclosure expt, performance studies (hopping distance and prey capture efficiency) or euthanized for Hg analysis
    - Terrestrial Enclosures (288 toadlets)
      - Toadlets +/- Maternal Hg X control or High Hg diet
      - Toads have been marked and placed in pens. Will conduct a census shortly and at regular intervals through next year to track growth and survival

Trophic Modeling

Mike Newman (VIMS)

- Proposed:
  - Develop preliminary floodplain trophic models
  - Apply existing aquatic models to remediation scenarios
  - Explore effects of phase II manipulations on mercury in periphyton, settling fine solids, and 1° consumers



Trophic Modeling

- Progress:
  - Completed collections for initial terrestrial food-web analysis
    - Great help from BRI &USFW
    - Detritivores → rodents & song-birds → Screech Owls
    - Will explore current BRI samples for additional avian samples
  - Completed collections for additional aquatic insects at different life stages
    - Great help from URS
    - Additional collections planned for August
  - Samples are in prep for stable isotope and Hg analyses