Update on South River Biota Studies

E. E. Mack, DuPont

And a cast of thousands who actually do the work (or serve as samples)…

SRST Study Updates

- **Biota Studies**
  - Amphibians
  - Avians
  - Mammals

- **Mercury Trophic Transfer Modeling Study**

Amphibians – Bill Hopkins, Virginia Tech.

- **Scope:**
  - Determine effect of maternally derived and/or trophically derived mercury on hatching, development and metamorphosis of american toad larvae.

- **Progress:**
  - All field collections and laboratory hatching studies completed
  - Mesocosm and laboratory-feeding studies are in progress
  - Microscopy work determining effect of Hg on morphology has been completed.
    - Data is currently being decoded.

Avians (Mallards) - Lucas Savoy, BRI

- **Scope:**
  - Assess Hg exposure in mallards through blood, feather and egg testing.
  - Assess changes in Hg exposure to mallard eggs in re-nest attempts

- **Progress:**
  - **Field-work is complete**
  - **Trap sites**
    - 8 trapping sites on South River
      - At least 1 hen was captured and radioed from each sampling site except for Bradburn Park

  - **Mallard Sampling:**
    - Total of 61 Mallards were trapped and sampled for blood and feather for Hg and SI
      - 9 Mallards sampled in 2007 were recaptured and sampled in 2008
    - 12 hens were captured and equipped with a radio transmitter
      - 176 Mallard eggs were collected, from a total of 17 clutches for Hg and SI
      - 2nd clutches collected from 6 hens

  - **By-catch**
    - **Waterfowl:** 7 Canada Geese, 1 Blue-winged Teal, 74 Wood Ducks
    - **Other:** Great Blue Heron, Beaver, Raccoon

  - **Samples sent for analysis:**
    - 78 eggs, 25 blood, and 25 feather Mallard samples were shipped to UCONN lab for Hg analysis
    - 25 Mallard blood samples have been shipped to Boston University for isotope analysis

Avians (Swallows & Prey Items) - Dan Cristol (College of William and Mary)

- **Scope:**
  - Completion of swallow lifetime reproductive success relative to Hg exposure.
  - Determination of the source of dietary mercury to spiders
  - Modeling study to determine the role of foraging behavior and habitat structure on exposure risk
  - Endocrine and immune disruption as potential mechanistic links between mercury exposure and reduced survival in tree swallows along the river (Bill Hopkins, Haruka Wada, Virginia Tech)

- **Progress:**
  - Captured and sampled 99% of nesting females and over 200 males for rate of return, lifetime reproduction and endrocrine studies
  - Collected spiders upstream and downstream of sewage outfalls for stable isotope tracer study
  - Modeling of bird foraging in different habitats underway
  - Collections for the swallow endrocrine / immune study are complete

Mammals (Bats and Furbearers) - Dave Yates, BRI

- **Bat assessment**
  - **Scope:**
    - Assess Hg exposure in bats relative to their location (South River or Reference site) through sampling of fur and blood.
    - Assess reproductive status of bats on South River and Reference Sites
    - Assess effects of Hg exposure on biomarkers in bats on South River and Reference sites.
  - **Progress:**
    - Currently in the middle of field season
      - Maternity roosts located on South River and Reference sites (used radiotracers on captured bats)
        - Pregnant and juvenile bats observed at all sites
        - Blood and fur collected for Hg analysis
        - Blood collected for bacterial killing assay
        - Wing punches collected for stable isotope and genotoxicity assays
    - Changes in scope dictated by lab and field conditions:
      - Replace progesterone assays with genotoxicity assays
      - Refocus analysis from pregnant, lactating, and post-lactating bats to lactating, post-lactating and juvenile bats
- **Furbearer Pilot (anticipated start date in September ’08)**
  - **Scope:**
    - Assess mercury exposure to shrews and muskrats on the South River through sampling of fur and blood.

Mercury Trophic Transfer Modeling – Mike Newman, VIMS

- **Scope:**
  - Relationship between suspended/settleable solids and periphyton mercury concentrations
  - Probabilistic risk analysis for selected piscivorous species
    - Sharp Shinned Hawk
    - Screech Owl
  - Examine isotope/Hg data and design terrestrial modeling effort

- **Progress**
  - Basic Hg total and MeHg trophic transfer models completed
  - Sediment traps and artificial substrates placed
  - First collection of sediments, artificial substrates and natural periphyton and resetting of traps and artificial substrates completed.