Mercury and molt: no strong Hg trend across songbird primaries

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Mercury

- Mercury is distributed across landscapes from various point sources - can be natural and/or anthropogenic sources.
- Anaerobic organisms transform inorganic mercury into methylmercury; this occurs primarily in aquatic ecosystems.
- Organic methylmercury can be absorbed into tissues. For most organisms, MeHg is accumulated through diet.
- Biomagnification within the food web - concentration increases with trophic levels
- Bioaccumulation in individuals

Hg in Songbirds

- Mercury is present in the food a songbird has eaten. It is incorporated into the bloodstream where it can be stored in fat deposits and body tissues or sequestered into egg shells and feathers.
- This project helps to examine the efficacy of using feathers as a MeHg indicator.
- Hg is excreted into feathers during their growth • Hg in bloodstream attaches to keratin and is sequestered into feather during growth. When growth stops, the feather contains a stable concentration of mercury which can be tested.

Feathers - What is Known?

- Songbird primary feathers have a known molt order (1-10)
- Seabirds have the same chronological molt process for their primaries.
- Studies have shown a pattern of Hg deposits with primary feather number in seabirds; Primary feathers grown first have a higher Hg concentration than the feathers grown last in molt order.
- This has been understudied in other bird species. Is this same pattern evident in songbirds?

Hypothesis and Methods

- Hg concentration will decrease with increasing primary feather number.
- Whole bird specimens needed to test primary feathers • Birds deceased due to natural causes or accidents donated by Chintimini Wildlife Center and local ornithologists.
- Turdidae and Passeridae (Catharus ustulatus, Ixoreus naevius, Turdus migratorius, Melospiza melodia, Zonotrichia atricapilla, Passerella iliaca, Pipilo maculatus, Junco hyemalis) (N = 30)
- Primary feather 10 was too small in the DMA to obtain a reliable result; not included in the graphs.

Preliminary Results

- The trend visually is similar to seabirds, but lower variation in Thrushes and Sparrows indicates that these differences may not be biologically significant.
- No effect of primary feather number on ppm (p=0.2700 in mixed effects repeated measures test with ppm as the fixed effect and bird i.d. as a random effect).

Challenges with Feathers

- Factors influencing Hg deposition to feathers:
  • Diet shifts
  • Deposition into other body tissues and feather tracts may be occurring at the same time as primary feather growth

Path Forward

- Analyze tissue samples for mercury in the same specimens to compare with feather Hg concentrations.

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