Hot Spot Analysis of Mercury Contamination of Nestling Red-winged Blackbirds

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Introduction

• Methyl Mercury (MeHg) is an environmental contaminat that can have adverse effects on wildlife [1].

• Anthropogenic sources release Hg into atmosphere, Hg deposits into aquatic systems, and consumers of aquatic organisms become contaminated (Fig. 1).

• Red-winged blackbirds (RWBL) feed aquatic insects to their nestlings [2].

• Red-winged blackbirds have declined by 30% over the last 50 years, and MeHg contamination could be having an effect [3].

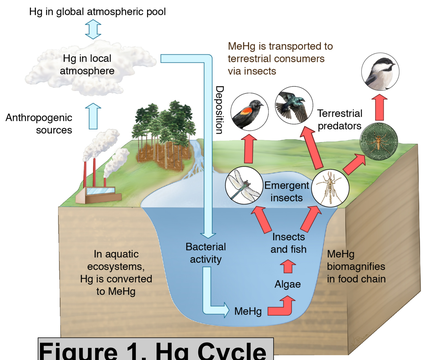


Figure 1. Hg Cycle

Objectives

1. Measure the Hg concentration of RWBL nestlings

2. Conduct a Hot Spot Analysis of nestling Hg concentration

Methods

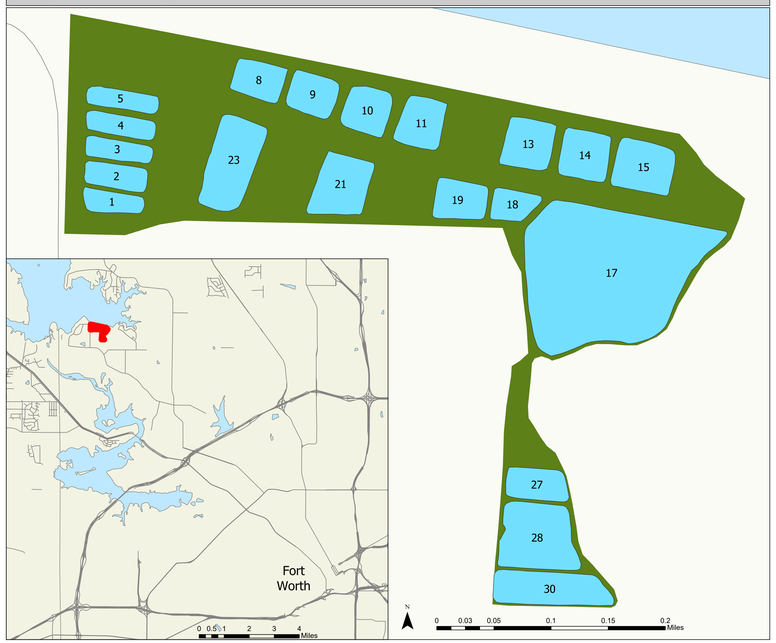
• I collected my samples from nests at the Eagle Mountain Hatchery Experimental Pond Facility in Tarrant County, Texas (Fig. 2).

• I collected blood from nestlings by puncturing the brachial vein, and I froze the blood samples at -20C.

• I used a DMA-80 at TCU to analyze blood for Total Mercury (THg) concentrations.

• I used the Hot Spot Analysis tool on ArcGIS Pro to calculate the Getis-Ord Gi statistic to see if high or low THg concentrations cluster spatially. THg concentrations were Log10 transformed, and K nearest neighbors of 8 was used for spatial neighborhoods.

Figure 2. Eagle Mountain Pond Facility



Results and Discusion

• Median THg of RWBL nests was 16.4 ppb. The Interquartile Range (75th - 25th percentile) was 10.7 ppb. Maximum THg of a nest was 89.9 ppb (Fig. 3).

• Birds begin to experience toxicological effects at approximately 200 ppb [4].

• RWBL nestlings unlikely to be experiencing detrimental Hg contamination.

• Evidence of spatial clustering of low THg values (Ponds 13 and 14) and high THg values (Pond 28; Fig. 4).

• RWBL nestlings may be eating different amounts of aquatic organisms based on where they are spatially.

Figure 3. Nestling THg Concentrations

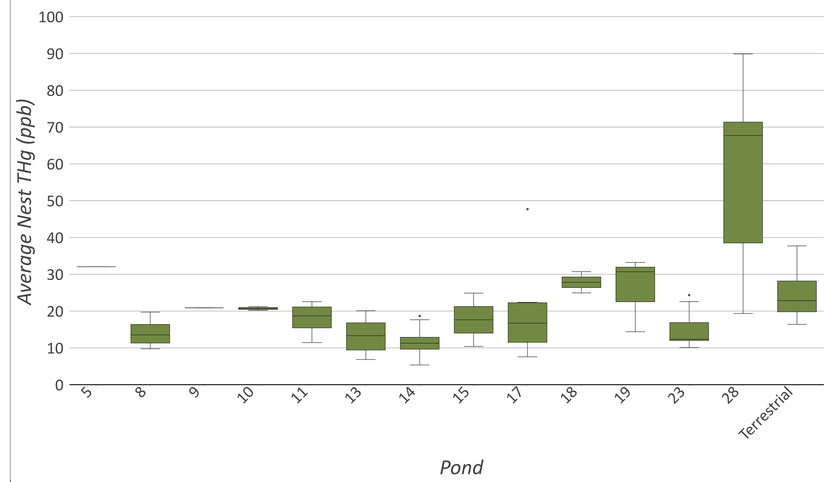


Figure 4. Mercury Hot Spot Analysis

References and Acknowledgements

(1) Wiener J.G., Environ Toxicol Chem. 2013, 32: 2175-2178. (2) Beletsky L., The red-winged blackbird: the biology of a strongly polygynous songbird. Academic Press, 1996. (3) Cornell University. 2015. http://www.allaboutbirds.org/guide/Red-winged_Blackbird/lifehistory. (4) Ackerman et al., Science of the Total Environment. 2016, 568: 749 - 769.

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