



# Mercury Gradient from a Coal-Fired Power Plant Site

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## Introduction:

- Mercury is a ubiquitous environmental contaminant originating largely from the atmospheric waste streams of coal-fired power plants.
- “Hotspots” of mercury deposition/accumulation have been suspected and this concern has led some states to resist cap-and-trade of mercury.
- We wished to investigate this concern by measuring the total mercury burden of a common forest spider (*Micrathena gracilis*, Fig. 1) relative to their distance from a retired coal-fired power plant.
- Our hypothesis: The total mercury burden of our test spiders will increase in spiders collected closer to the power plant site.
- Assumptions for our investigation: 1) despite its retired status, mercury from the plant will remain in the environment where deposited, 2) mercury in the bodies of the spiders will represent mercury concentrations deposited in the general area where collected, and 3) spider mercury burdens largely resulted from prey types and amounts.



Figure 1. *Micrathena gracilis*, a common forest spider.

## Materials and Methods:

- Transects
  - Two transects were chosen in proximity to the power plant. **Transect A** followed the river in a general NE-SW direction along the Susquehanna River corridor, while **Transect B** followed a power line running NNW-SSE (Figure 2).
  - Spiders were collected at nine locations along Transect A and six locations along Transect B.
- Spiders
  - Five to twelve female spiders were collected at each location during July and frozen for analysis.
- Lab Analysis
  - The total mercury burden was determined with a direct mercury analyzer (DMA-80, detection limit = 0.005 ng Hg). Entire spiders were analyzed.

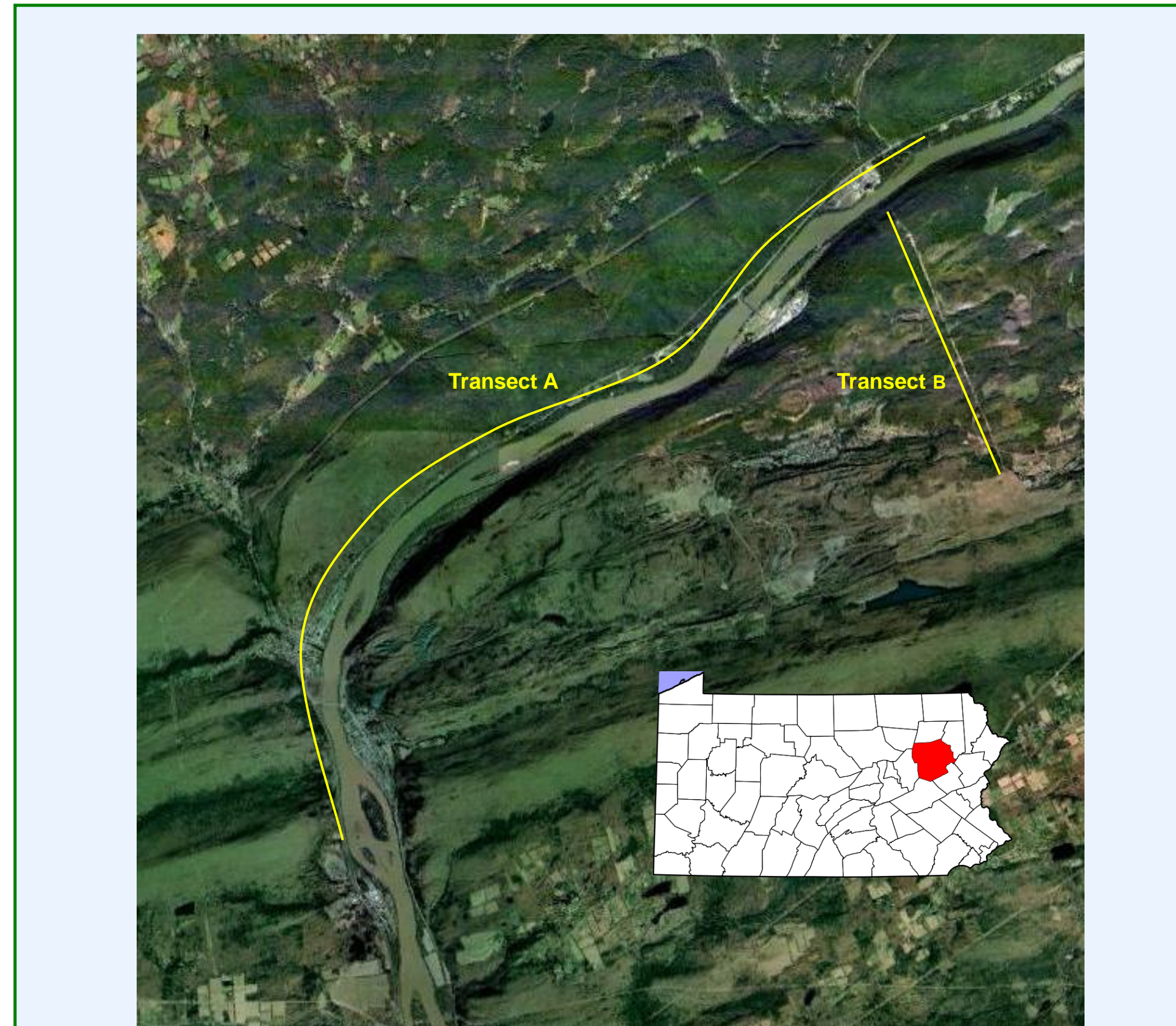


Figure 2. Transect A followed the Susquehanna River corridor and Transect B followed the power line from the power plant. The power plant site is located in Luzerne County.

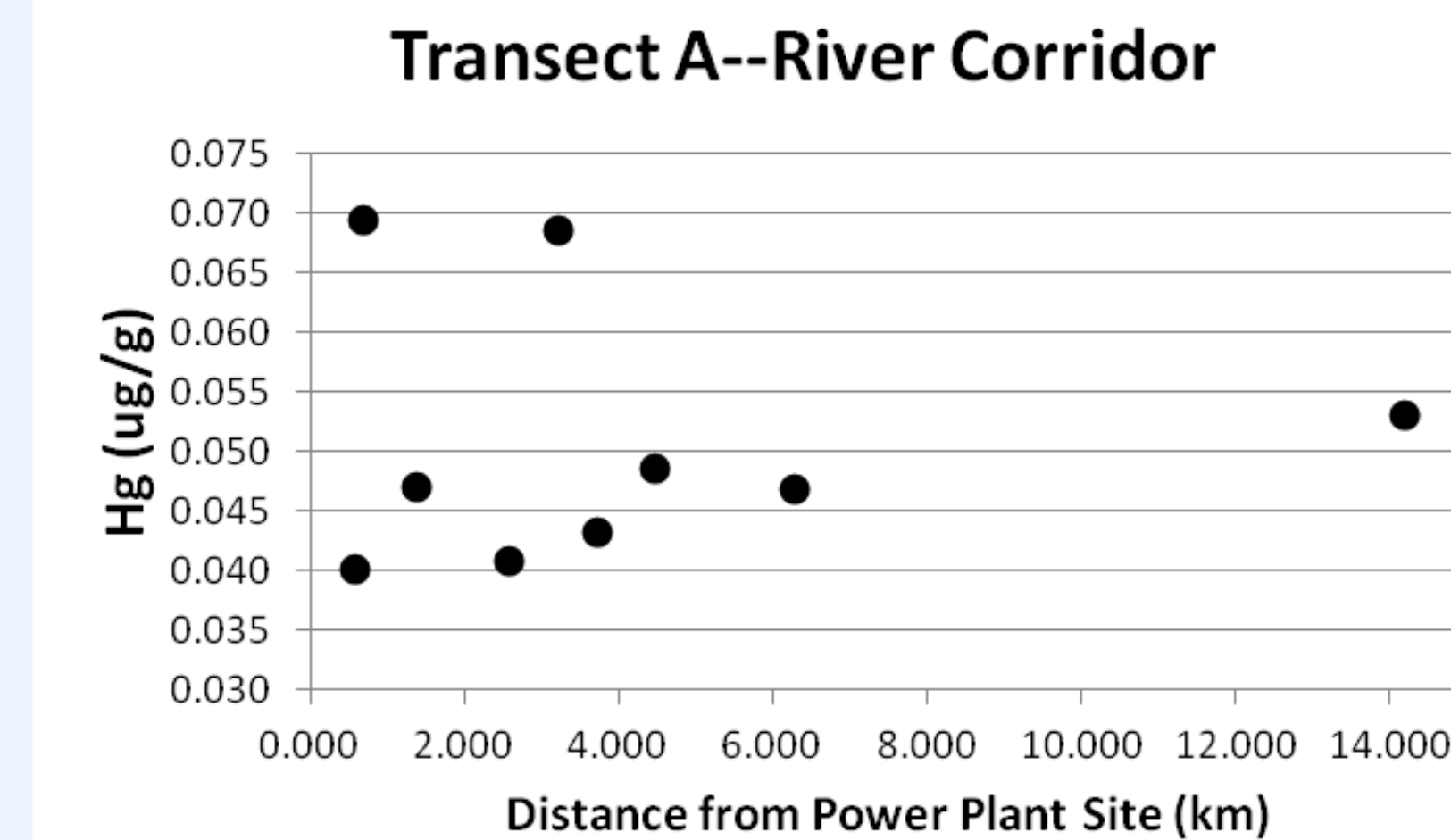


Figure 3. Transect A had plots with higher average total Hg concentrations near the plant site, but showed no evident gradient or trend with distance.

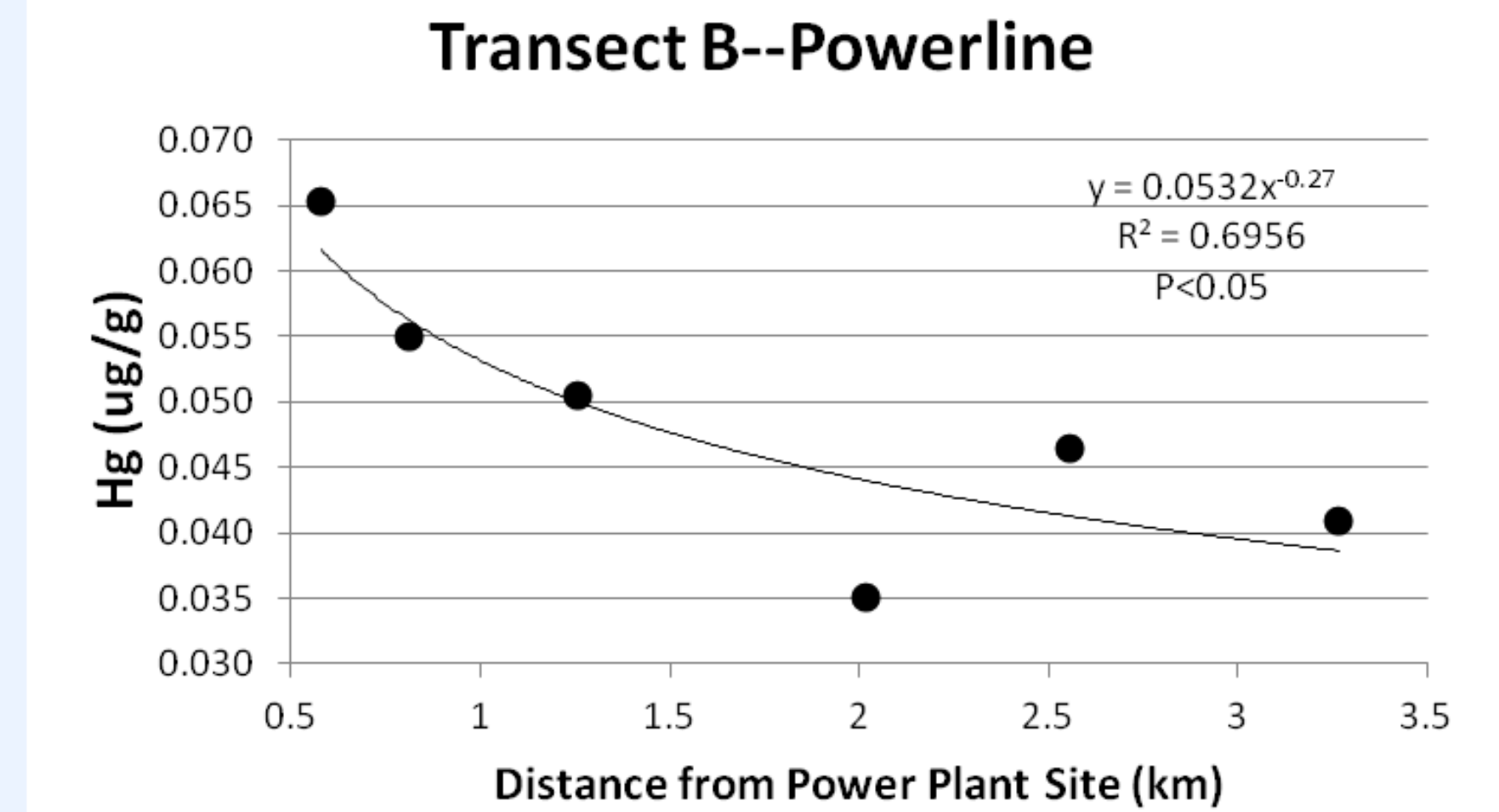


Figure 4. Transect B showed a significant increasing trend in total Hg concentration at sites closer to the plant.

## Results and Conclusions:

- Total mercury concentrations in spiders were highest at sites near the plant in both transects, but only Transect B showed a significant trend between concentration and distance.
- Transect B's elevation better matched the elevation of the smokestacks at the power plant, perhaps increasing the efficacy of mercury deposition in this direction.
- The observed variation in total mercury concentration between our individual sampling sites suggest that true “hotspots” of mercury deposition can occur in the environment.
- In general, these results support our hypothesis that the concentration of mercury in spiders increases nearer the retired coal plant site.
- Additional testing should be done of soil samples along these same transects to see if soil concentrations of mercury support the findings we observed in spiders.

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