The Relationship **Between Bottlenose Dolphins Home Range** (Tursiops truncatus) and **Mercury Concentrations** in Biscayne Bay. **Heather Neal**



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BACKGROUND

- Studies show that anthropogenic pressures affect dolphin health and behavior.
- In 2007, researchers found that there were higher levels of POPs in northern Biscayne bay than in the south due to human urbanization (Litz et al., 2007).
- Based on previous studies it is likely that POPs and Mercury differ in the spatial variation of their concentrations in Biscayne Bay (Kiszka et al. 2017).

METHODS

- 17 Dolphin skin biopsies were collected below the dorsal fin in 2019 and total mercury concentrations were measured.
- Sighting histories of dolphins in Biscayne Bay have been collected from 1990 to 2020 using photo ID.
- Home ranges of dolphins were calculated by Kernel Density Estimation (KDE) and Minimum Convex Polygon (MCP) methods, using ArcMap.
- Home range size and mercury concentrations were compared for each dolphin.





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Fig.1)

How Does a Dolphin's Home Range Relate to Mercury Contamination?



Individual 518 had the highest concentration of mercury at 20.4 ppm. • The area of the home range was 199.816 Km^{2.}



- Individual 378 had the lowest mercury concentration at 2.46 ppm.
- The area of home range was 24.257 Km²



Mean Mercury Concentrations of Bottlenose



The stacked bar graph illustrates two methods used to find the area of each individual's Home Range. MCP represents the largest area due to its sensitivity to outliers. The KDE values are more accurate to the true area of home range.

Fig.2) The bar graph above represents the difference in means of mercury concentrations for the North and South regions of Biscayne Bay. Error bars represent the standard deviation of the mean.

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 Above mercury concentrations are represented by colored dots. Green dots represent a light concentration, Yellow represents moderate concentration and red represents high concentration.



Fig 3.) The scatter plot above illustrates a positive relationship between home range size and mercury concentrations in bottlenose dolphins. (p-value 0.0103)(R² 0.36)



KDE VS. MCP

KDE

- More accurate due to its lack of sensitivity to outliers -Influenced by sample size

MCP Example:



MCP

-Simple -Sensitive to outliers, which leads to over- and underestimation of home range

DISCUSSION

Dolphin prey in the south are exposed to more mercury than in the north due to the larger abundance mangroves.

As mercury is more readily available it bioaccumulates up the food chain. Thus, it is likely these southern dolphins consume more highly contaminated prey than the northern dolphins.



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