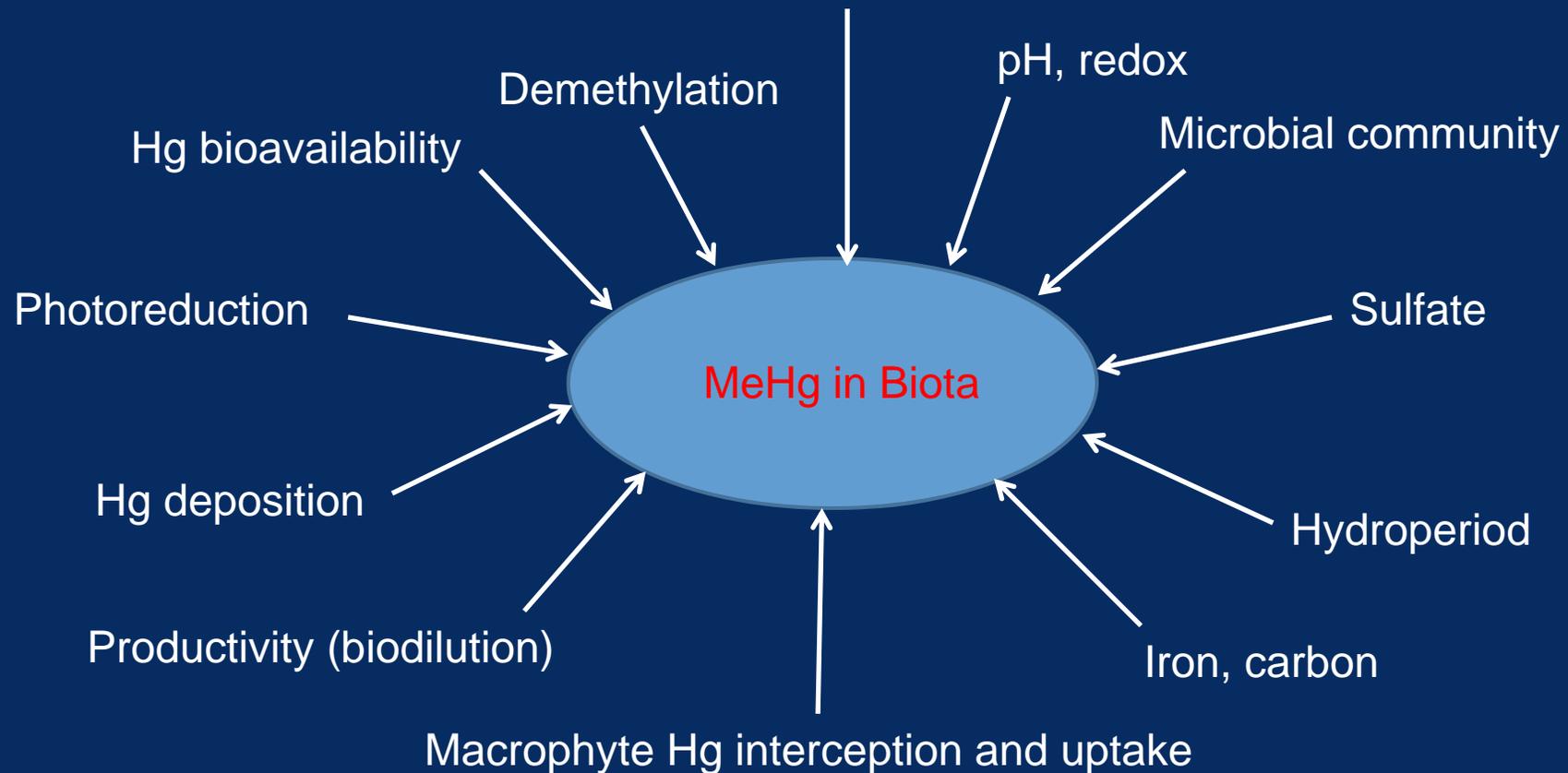


Factors Affecting Hg Concentrations in Biota

Bioaccumulation/trophic level interactions



Community-Related Trophic Variability Contributes to Variations in Mosquitofish (*Gambusia holbrooki*) Mercury Concentrations in Water Conservation Area 2A

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Janelle Potts¹, Nichole Larson¹, and Ben Gu²

¹ DB Environmental, Inc., Rockledge, FL, USA

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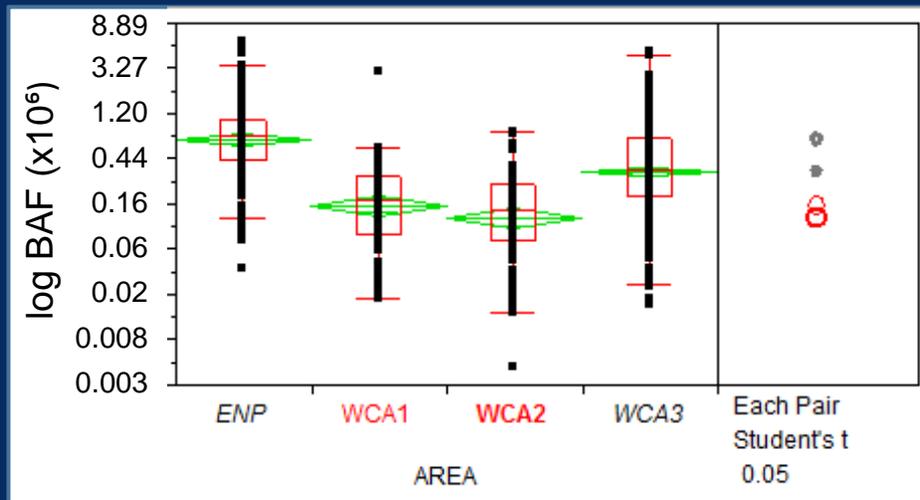
Special Session on Mercury Cycling, Transport, and Effects in the Everglades
GEER 2015
Coral Springs, FL

April 23, 2015

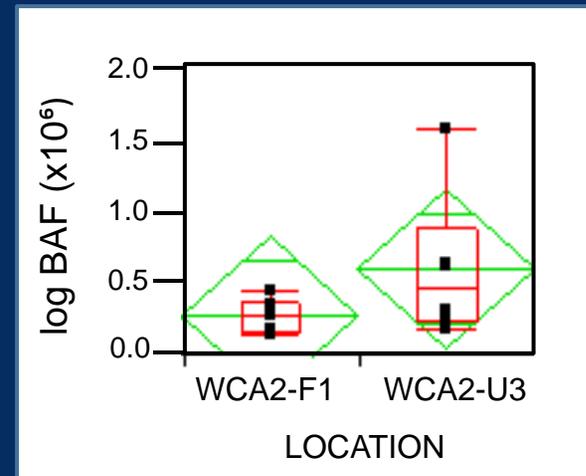


Gambusia bioaccumulation factors (fish THg:water MeHg) among and within major Everglades compartments

R-EMAP (1995-96, 1999, 2005)



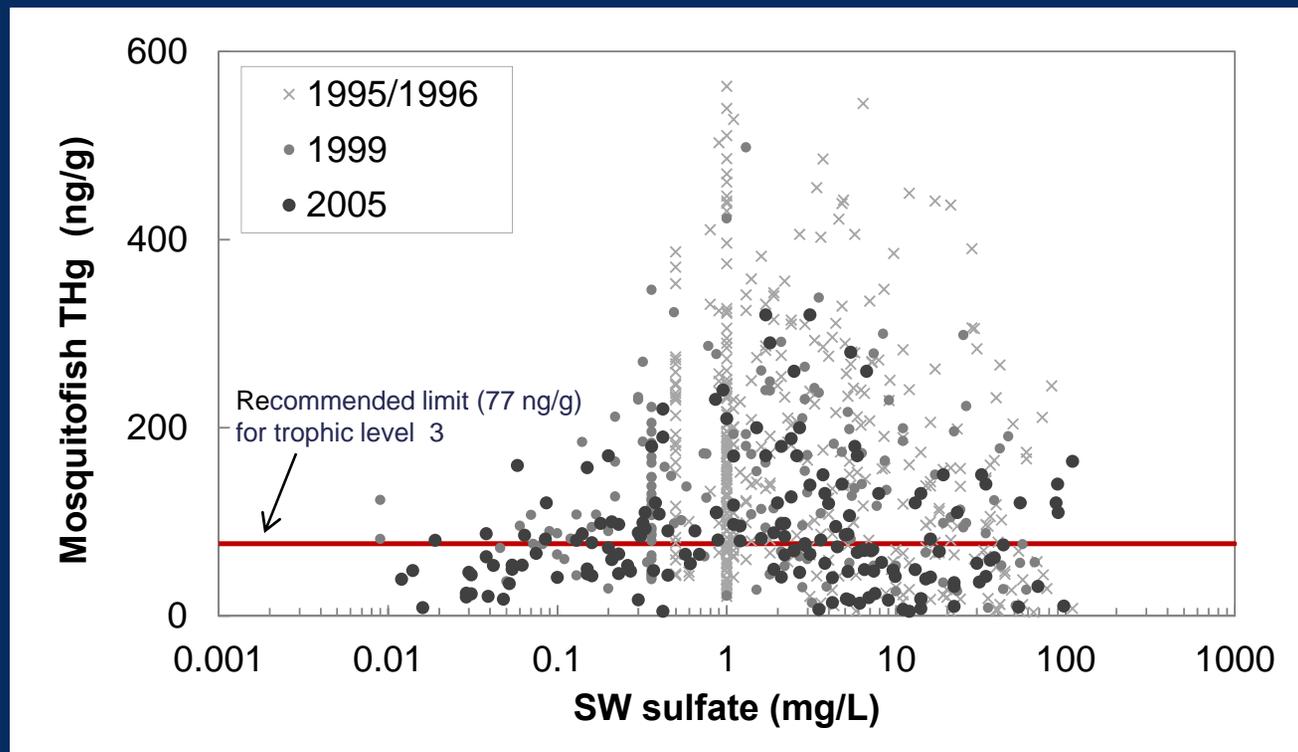
EMHS (2010-13)



Hypothesis: Trophic level and interactions between *Gambusia* and their food items are important variables in accounting for differences in Hg body burdens of *Gambusia* across the Everglades landscape.

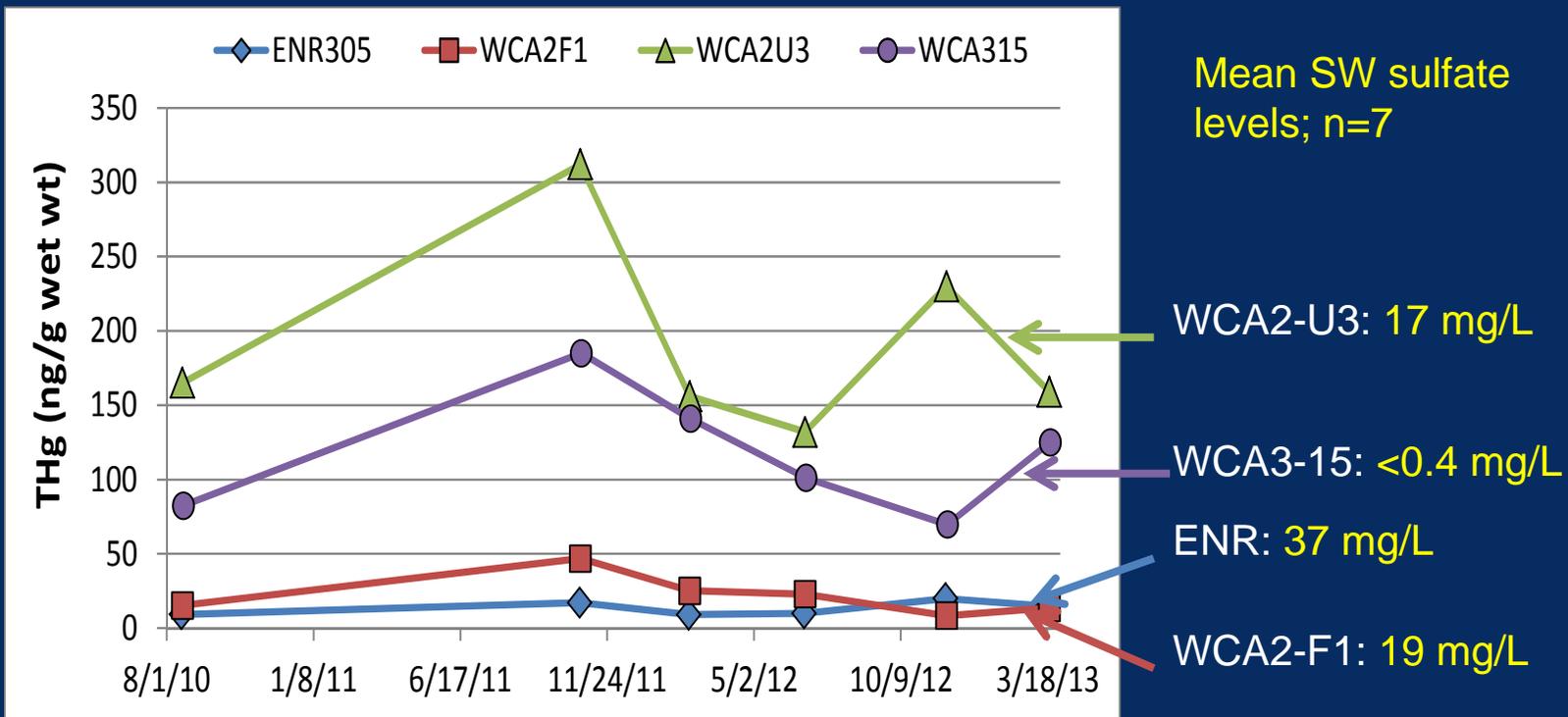
Rationale:

1. *Gambusia* Hg poorly correlated to water and soil MeHg, and sulfate (REMAP 2005)
2. Wide variation in *Gambusia* Hg within a given sulfate concentration (REMAP 1995-96, 1999, 2005)

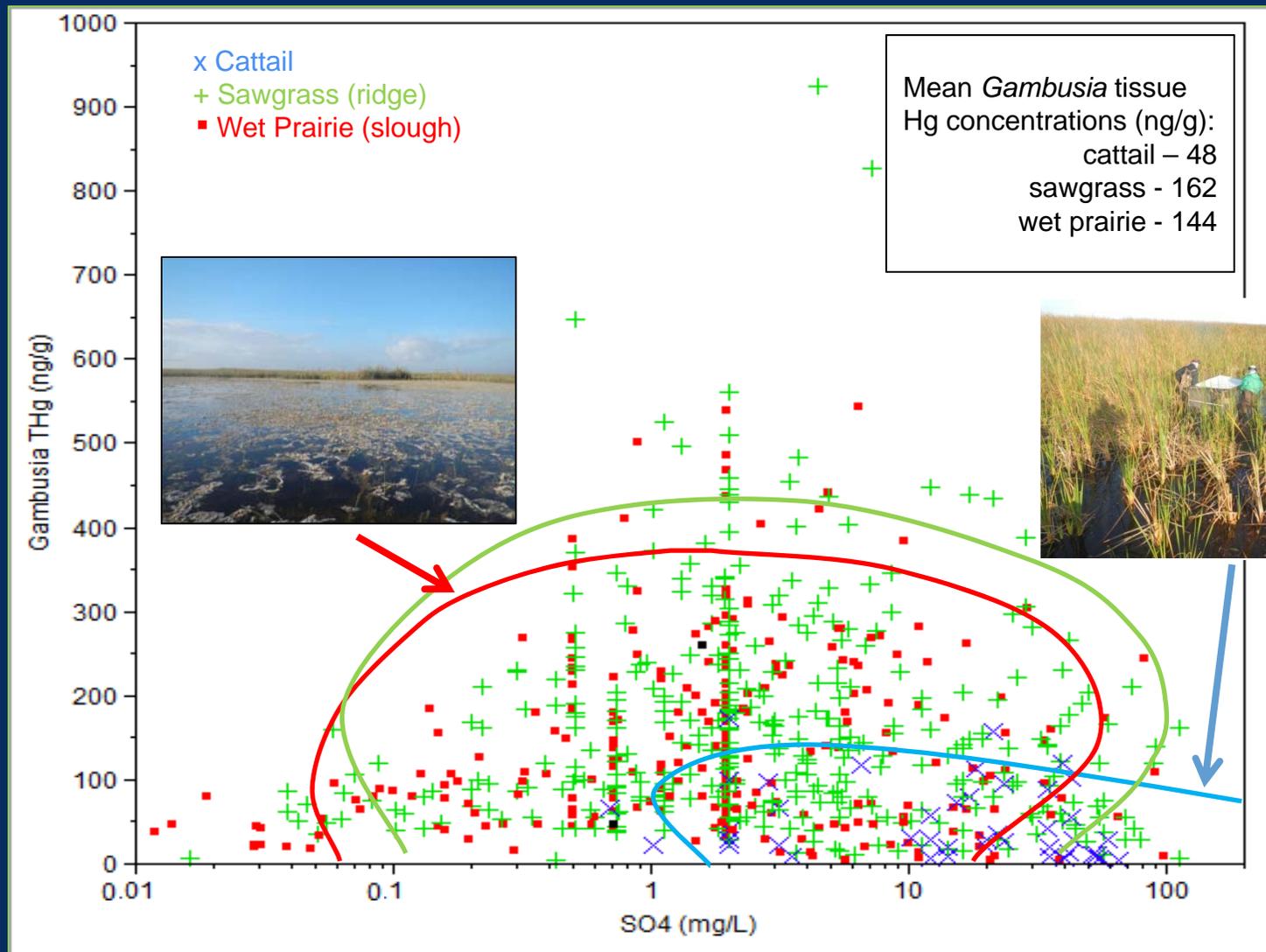


Rationale – cont.

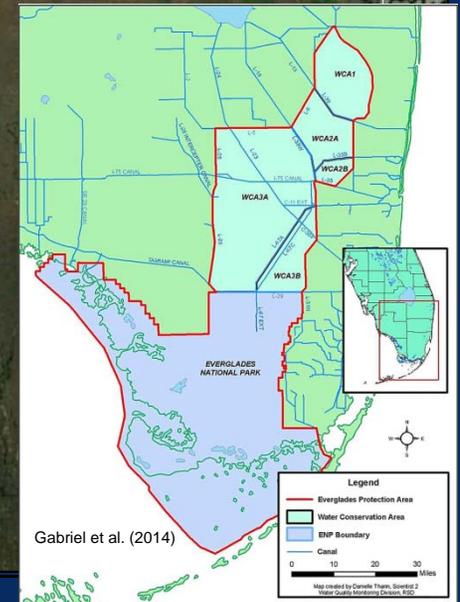
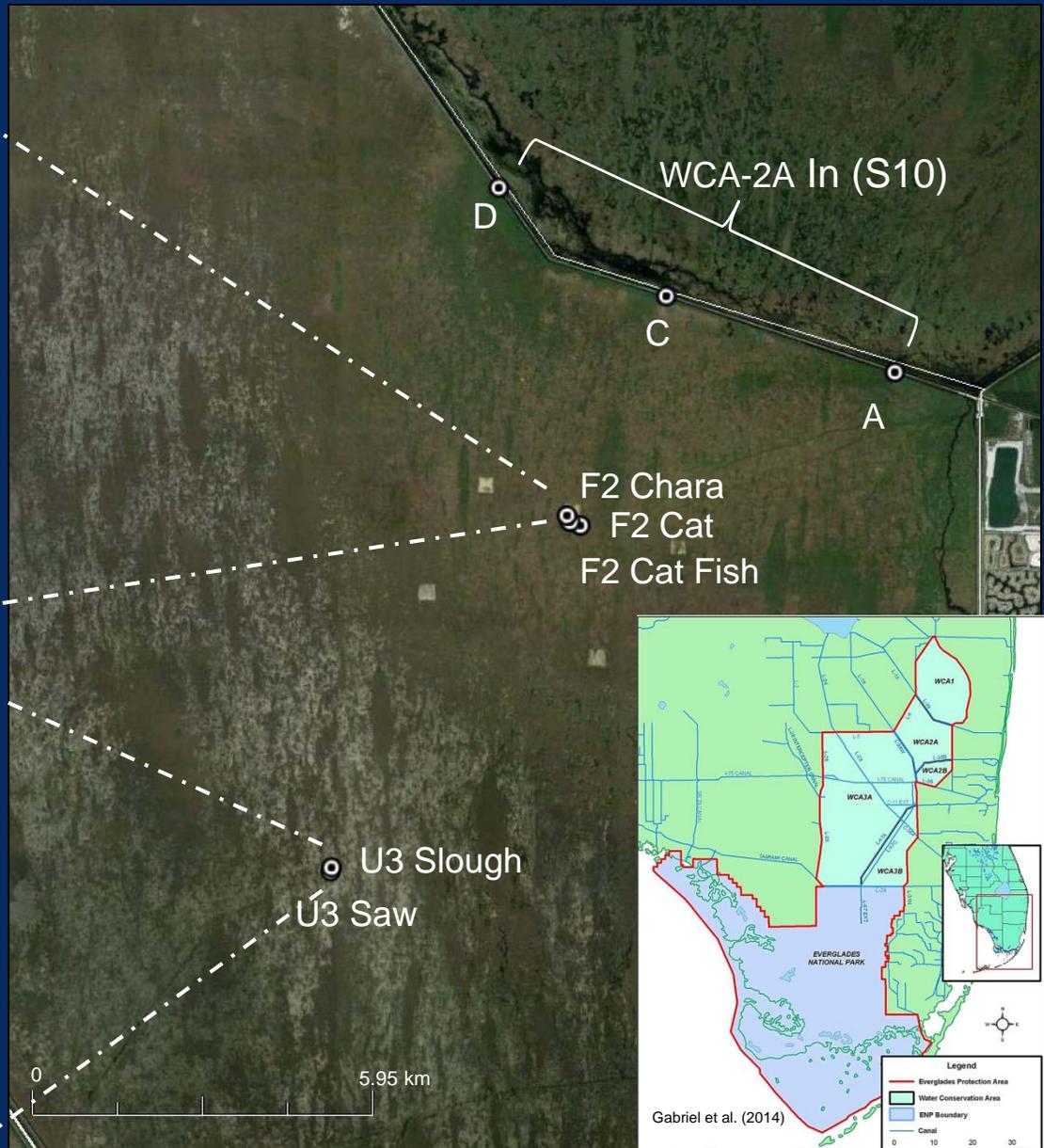
3. Persistent differences in *Gambusia* Hg among sites not attributable to sulfate (EMHS)



Bivariate Normal Ellipses ($P=0.90$) of *Gambusia* Tissue Hg vs. Sulfate as a Function of Vegetation Community Type from R-EMAP Wet and Dry Seasons in 1995-96, 1999, and 2005



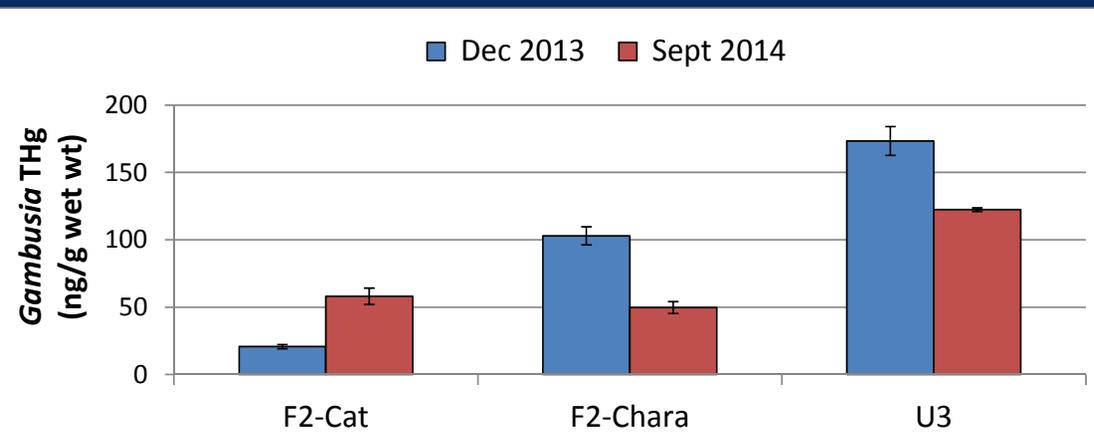
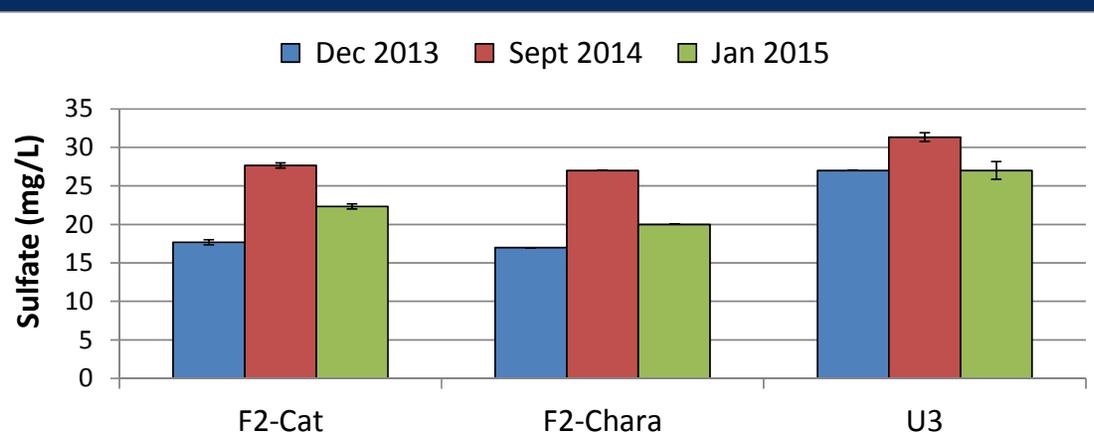
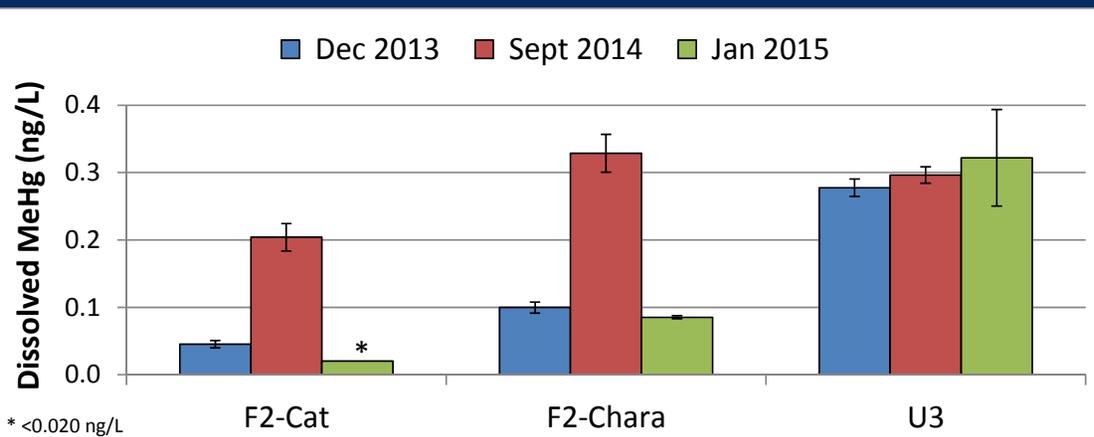
Field Sampling Locations



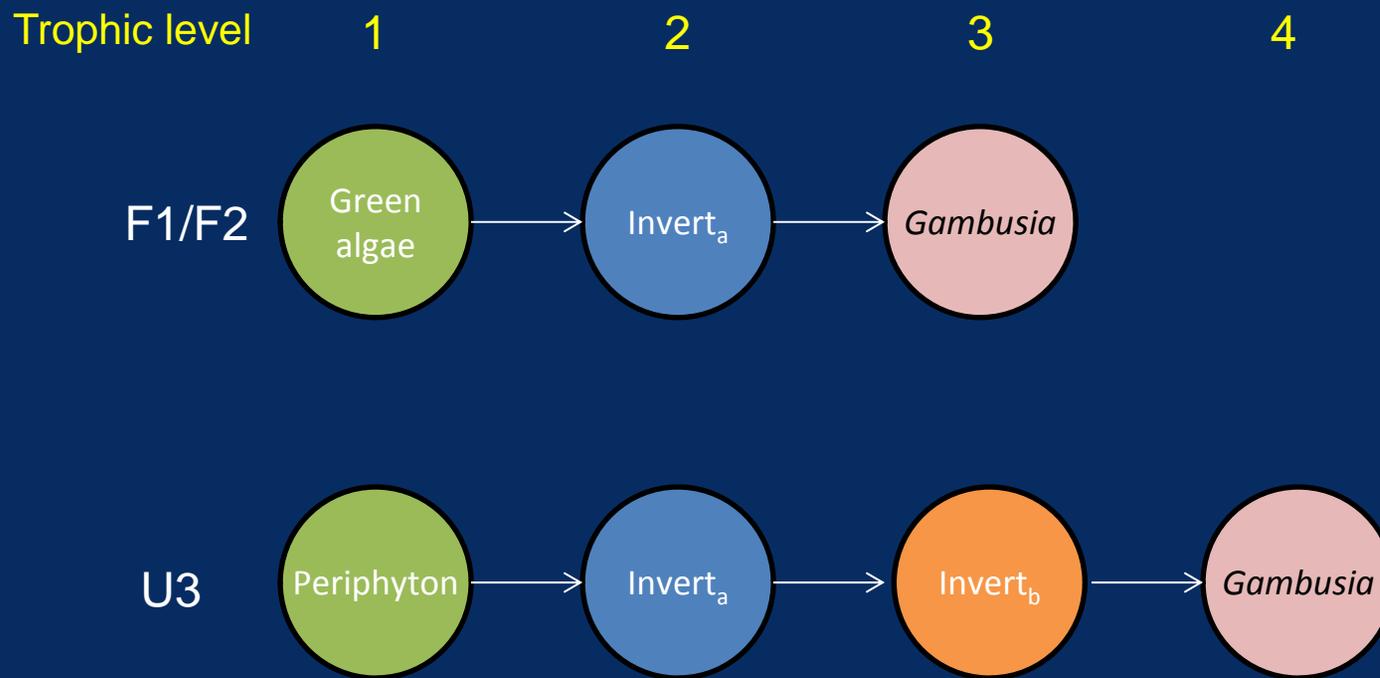
Recent Record of Surface Water Dissolved MeHg, Sulfate, and *Gambusia* THg Concentrations in WCA-2A

Surface Water:
 n=3 for F2-Cat, F2-Chara and U3 Jan 2015
 n=6 for U3 2013 and 2014

Fish:
 n=3



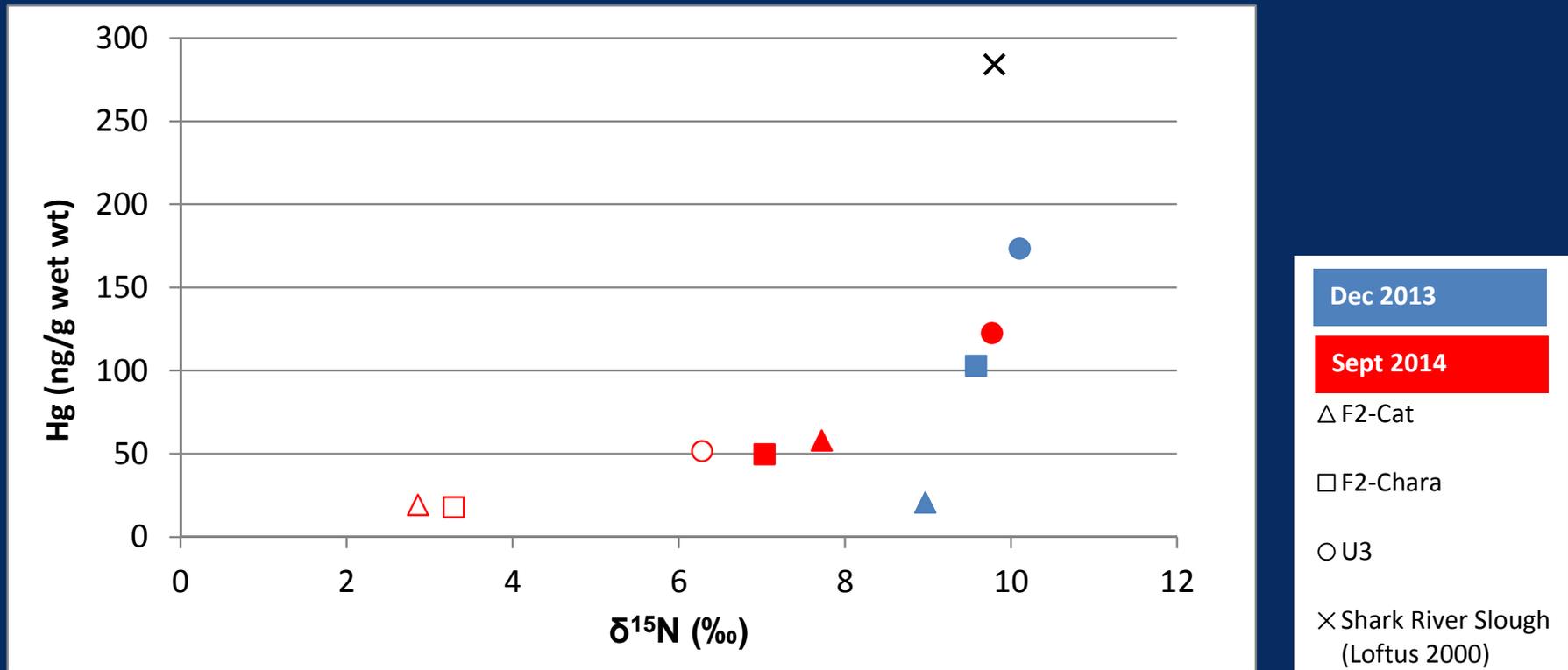
Do *Gambusia* Hg “hotspots” across the Everglades landscape reflect local areas of longer food chains and differing diet, resulting in greater biomagnification (Loftus 2000; Abbey-Lee et al.2012; Hagerthey et al. 2014)?



“Bioaccumulation through the diet is a major determinant of Hg concentration in fishes and invertebrates in the Everglades” –Loftus (2000)



Hypothesis Restated: *Variations in Gambusia diet and number of steps in the food chain over time, and among locations, may explain observed temporal and spatial differences in fish tissue and gut Hg content within Everglades marshes*



Open symbols – MeHg in gut contents
 Closed symbols – THg in Mosquitofish



Conclusions

- Persistent trends in Everglades mosquitofish THg not well explained by geochemical factors.
 - e.g., fish THg at F1/F2 consistently low compared to U3; apparent higher levels of fish THg in *Chara* vs. cattail communities at F2
- U3 fish tissues and gut contents enriched in ^{15}N , suggesting higher trophic position.
- For several WCA-2A and WCA-3A sites, additional food chain stable isotope and Hg analyses currently underway.
- Among and within Everglades compartments, need to consider trophic position as a key parameter that can influence *Gambusia* tissue Hg levels.



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2. Florida Department of Environmental Protection
3. Florida Department of Agriculture and Consumer Services
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