Effects of Mercury Exposure on Nest Success in Great Egrets *(Ardea alba):* The Role of Parental Care

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How does Hg affect avian reproduction?

- **Teratogenesis** leading to embryonic or chick mortality.
- **Endocrine disruption** leading to lack of egglaying, poor courtship, lack of initiation, or early abandonment.
- **Poor parental care**, leading to poor hatching and/or chick survival.
- **Postfledging mortality** resulting from impaired feeding and health.

How does Hg NOT affect avian reproduction?

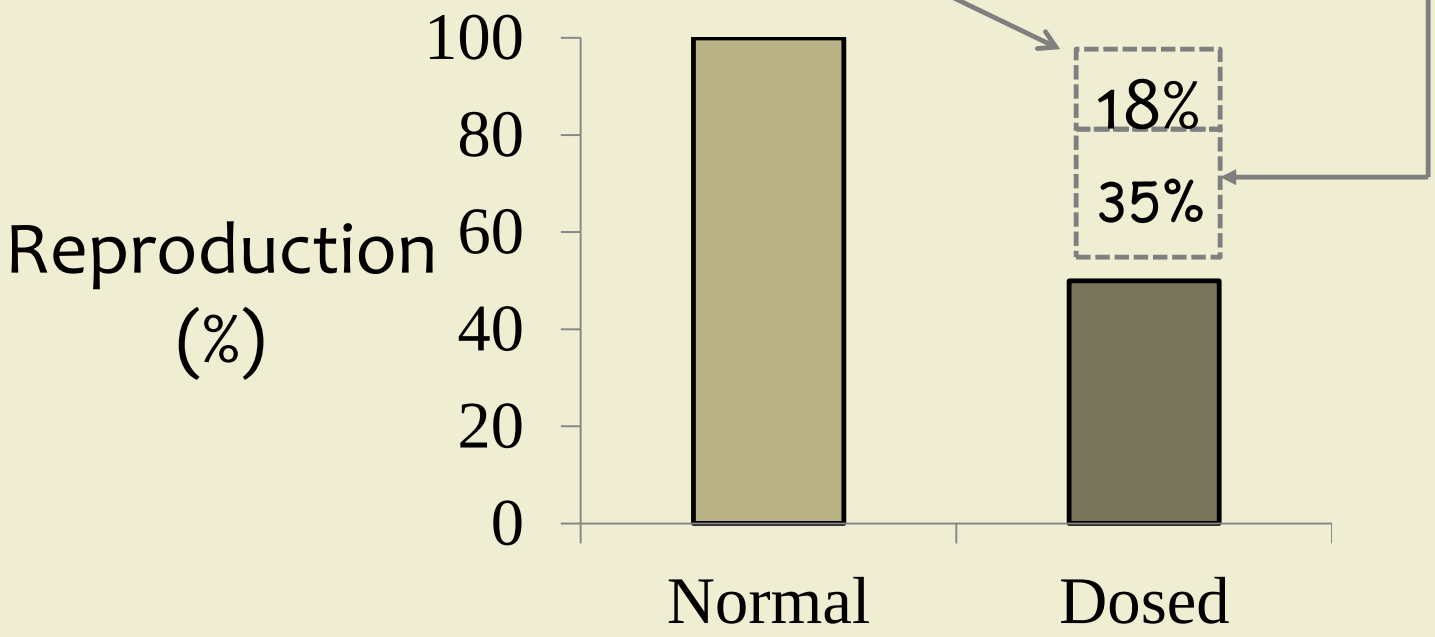
- Hatch success is high in Everglades populations
- Lack of evidence for survival effects
- Young birds are protected from mercury when growing feathers.





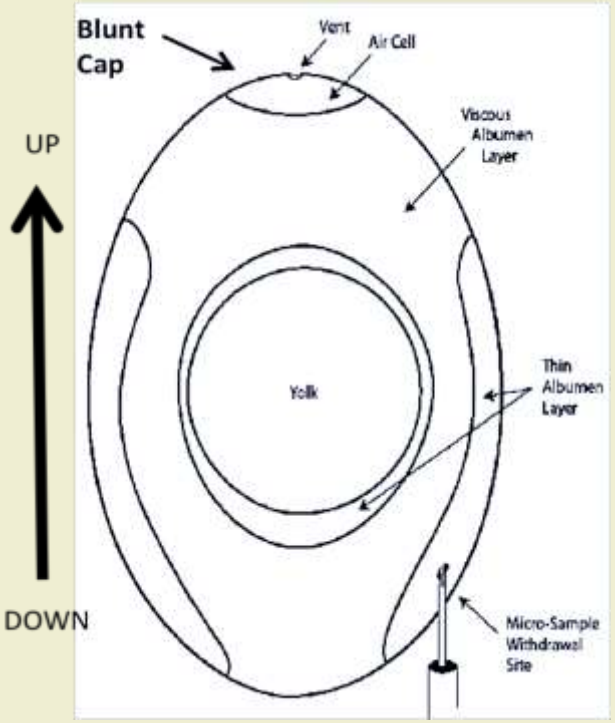
Homosexual pairing
No Eggs

Heterosexual pairing
Poor parenting, embryonic death

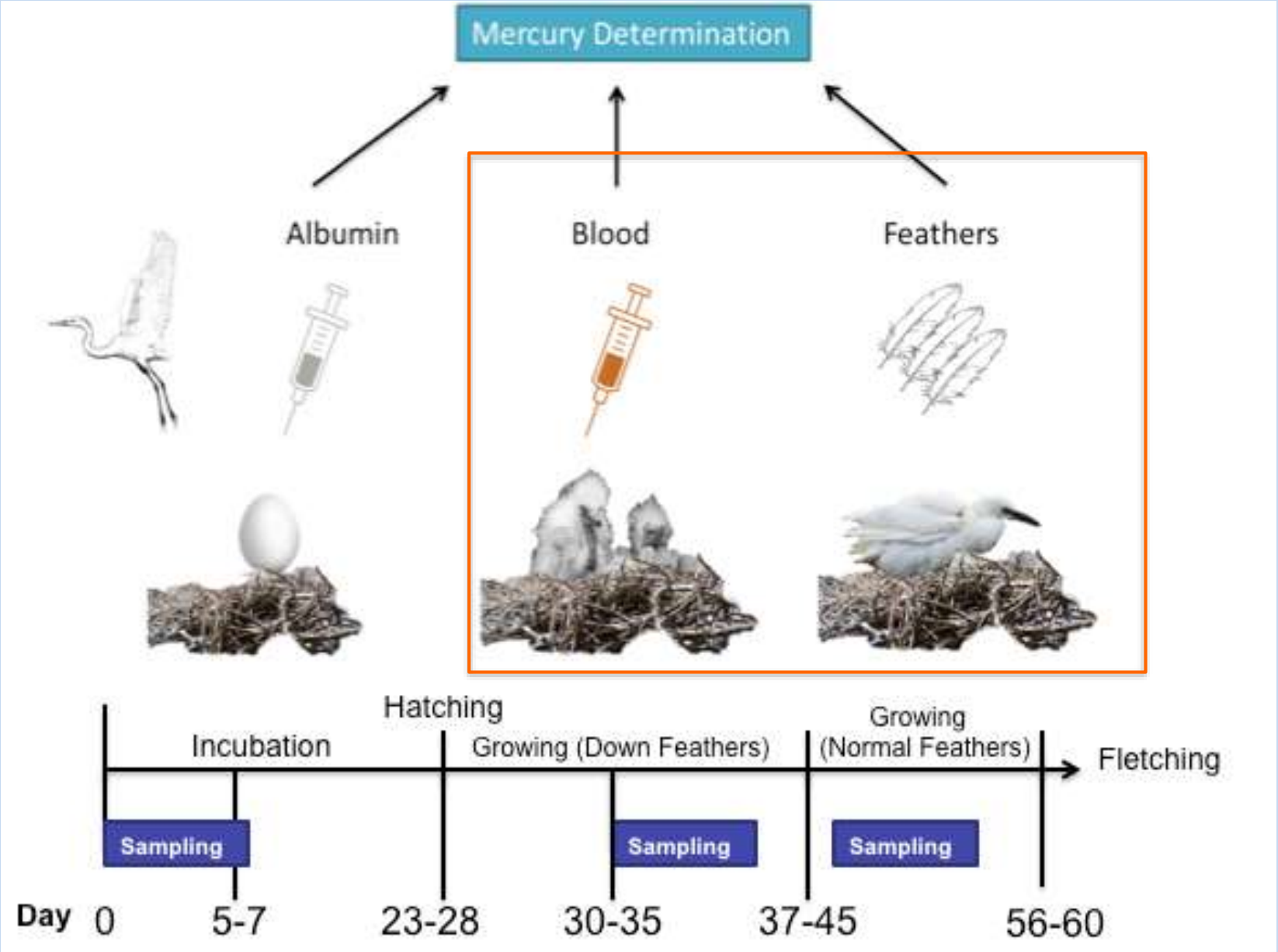


For reproduction, how important are Hg effects on parental behavior?

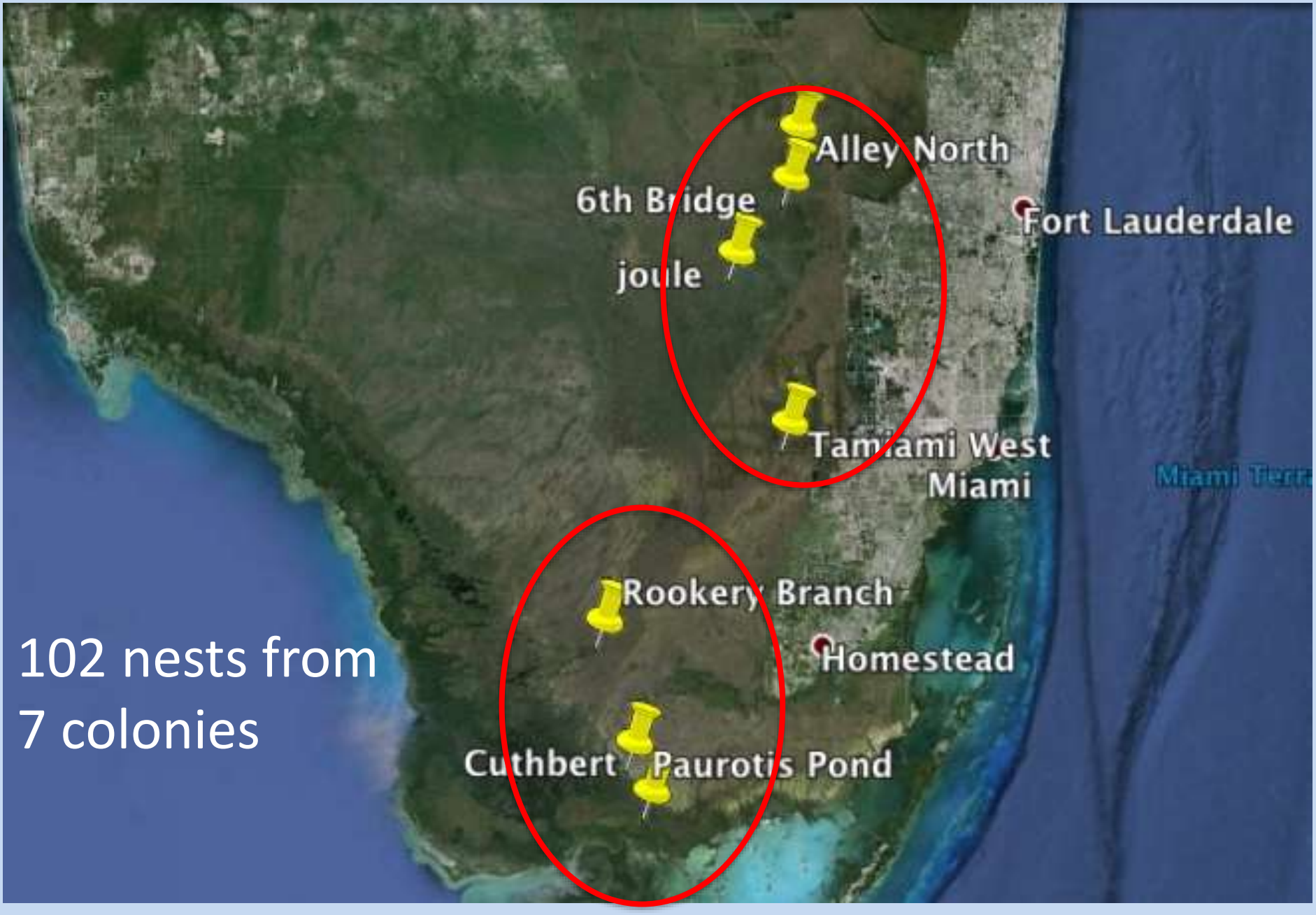
Thin albumin nondestructive sampling



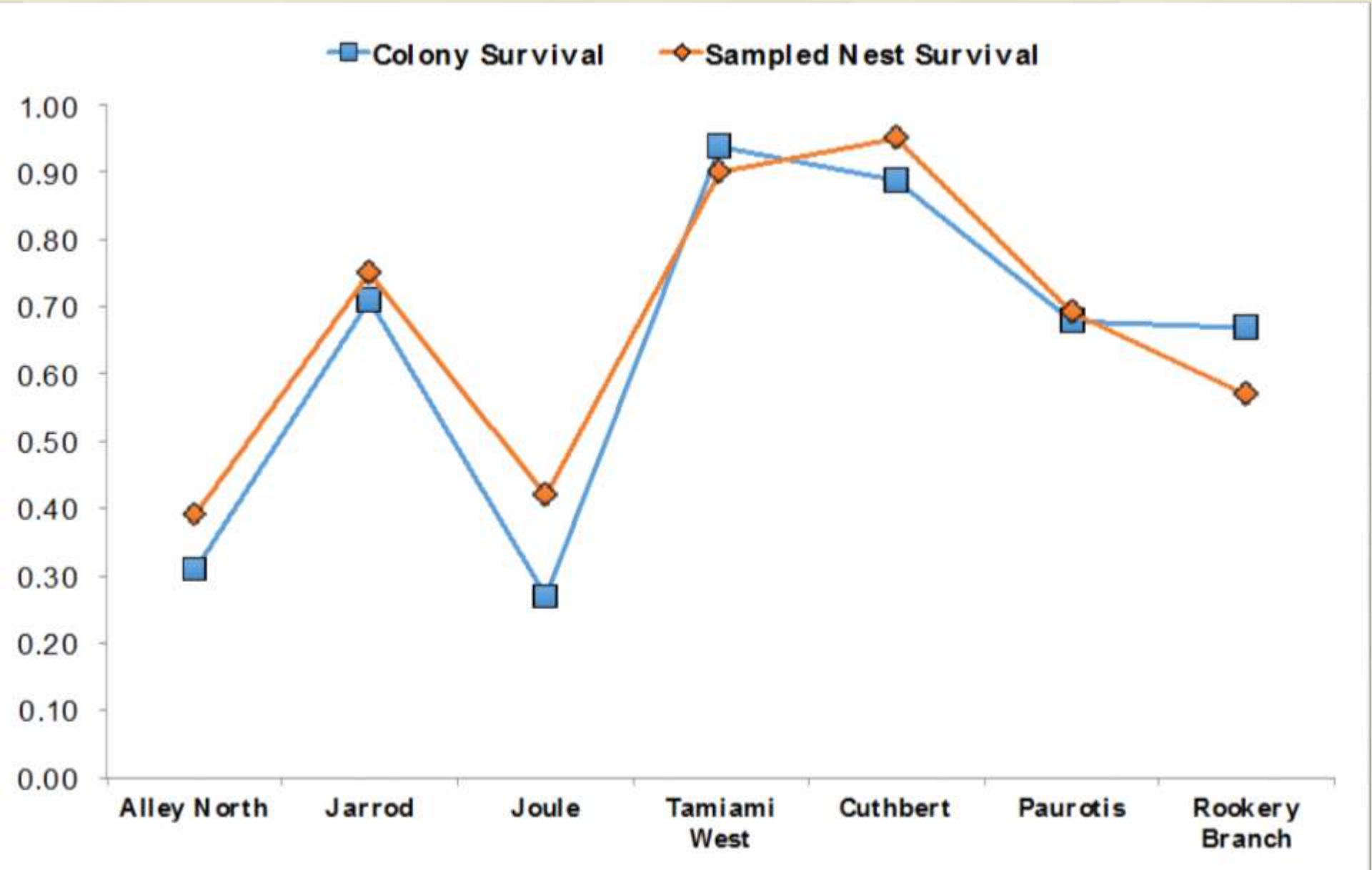
Stebbins et al. 2009 Environ. Tox. and Chem. 28: 465-470

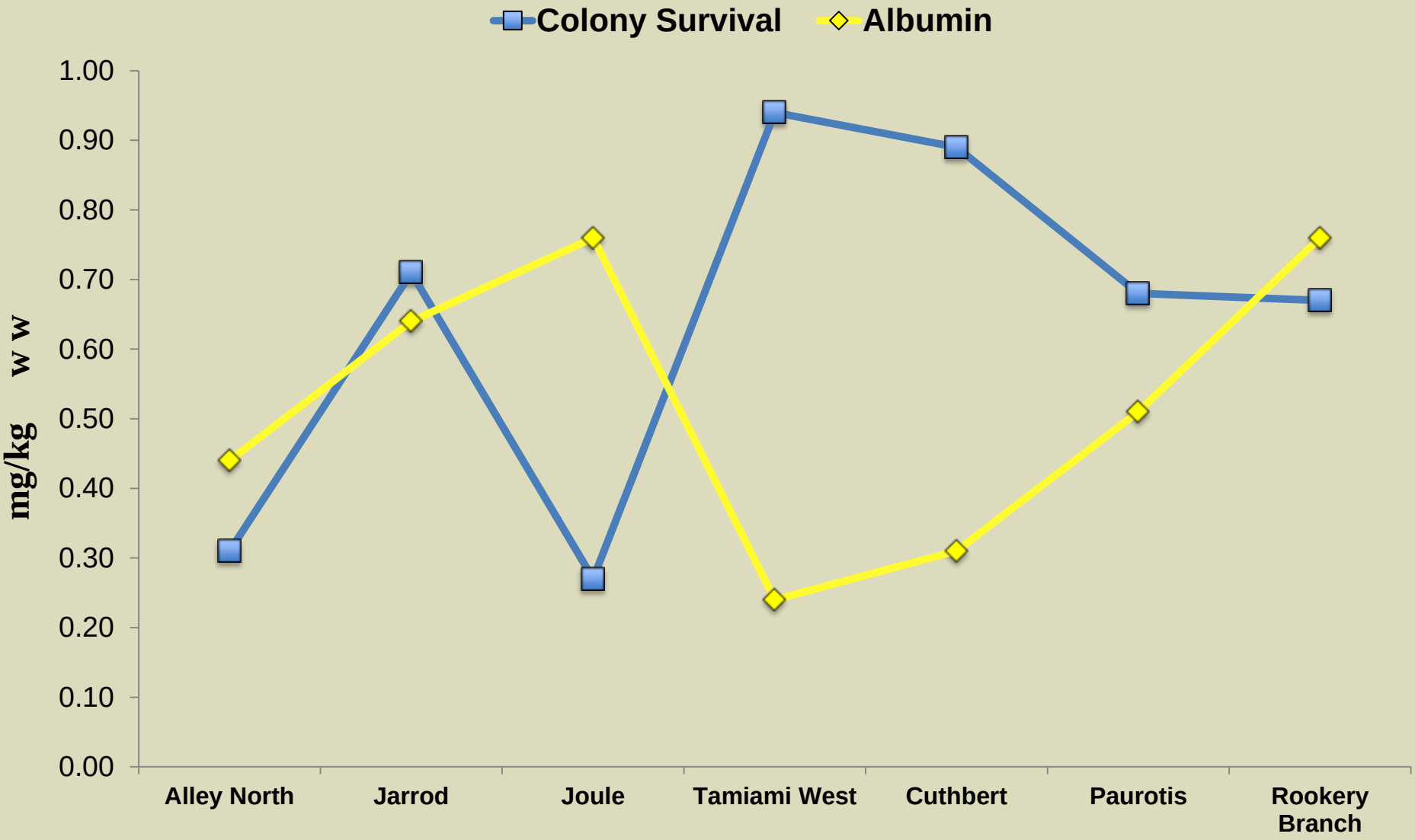


Details of sampling procedure and timing for Hg determination in Great Egrets


Alley North
6th Bridge
joule
Fort Lauderdale
Tamiami West
Miami
Rookery Branch
Homestead
Cuthbert
Paurotis Pond
102 nests from
7 colonies

Similar survival trends at colony and nest levels



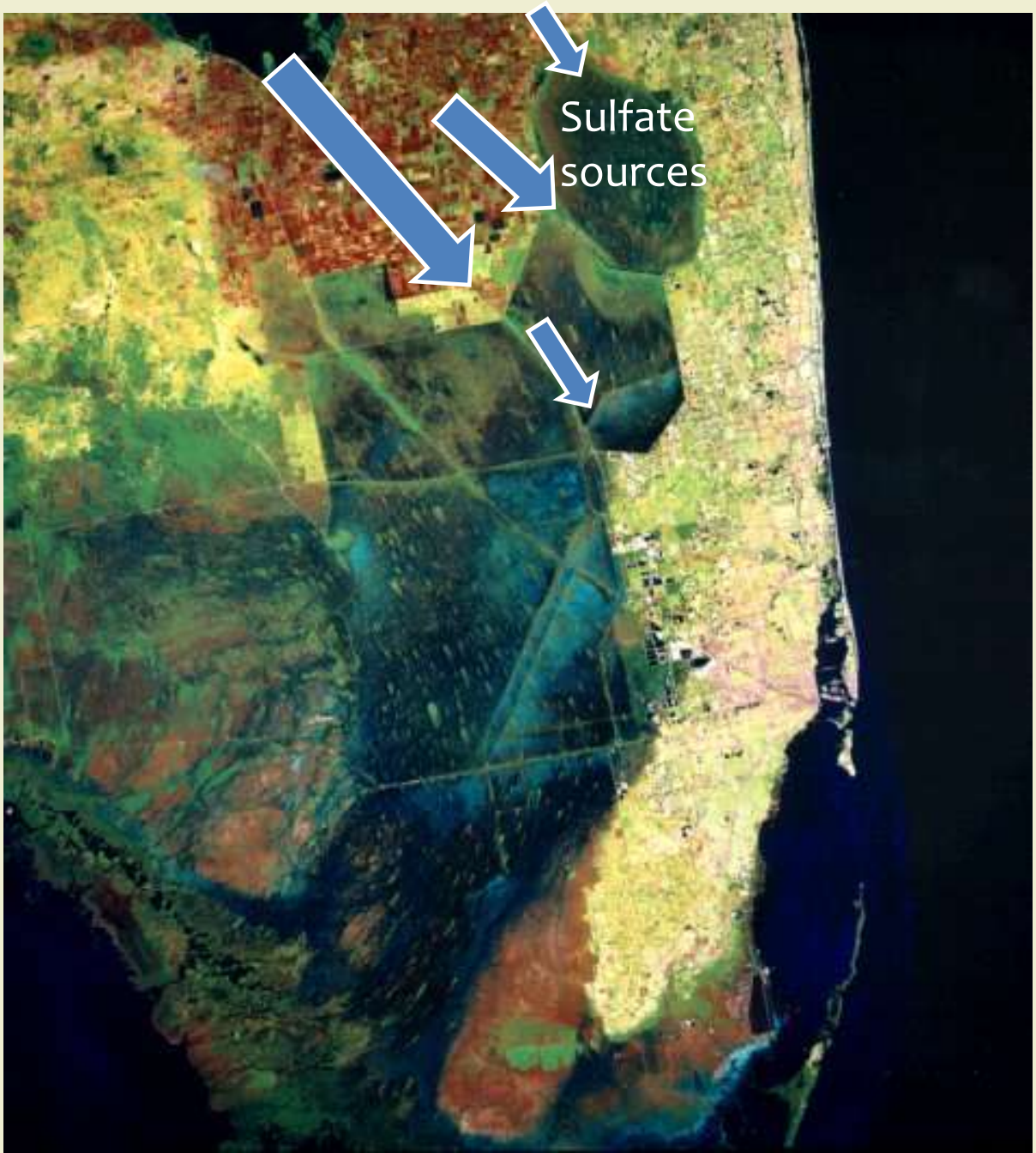


- No relationships between Hg concentration in blood or feathers and Colony (Nest) survival (GLM; $p > 0.06$)
- Colony (Nest) survival negatively correlated with Hg concentrations albumin (GLM; $p = 0.0016$)

Results

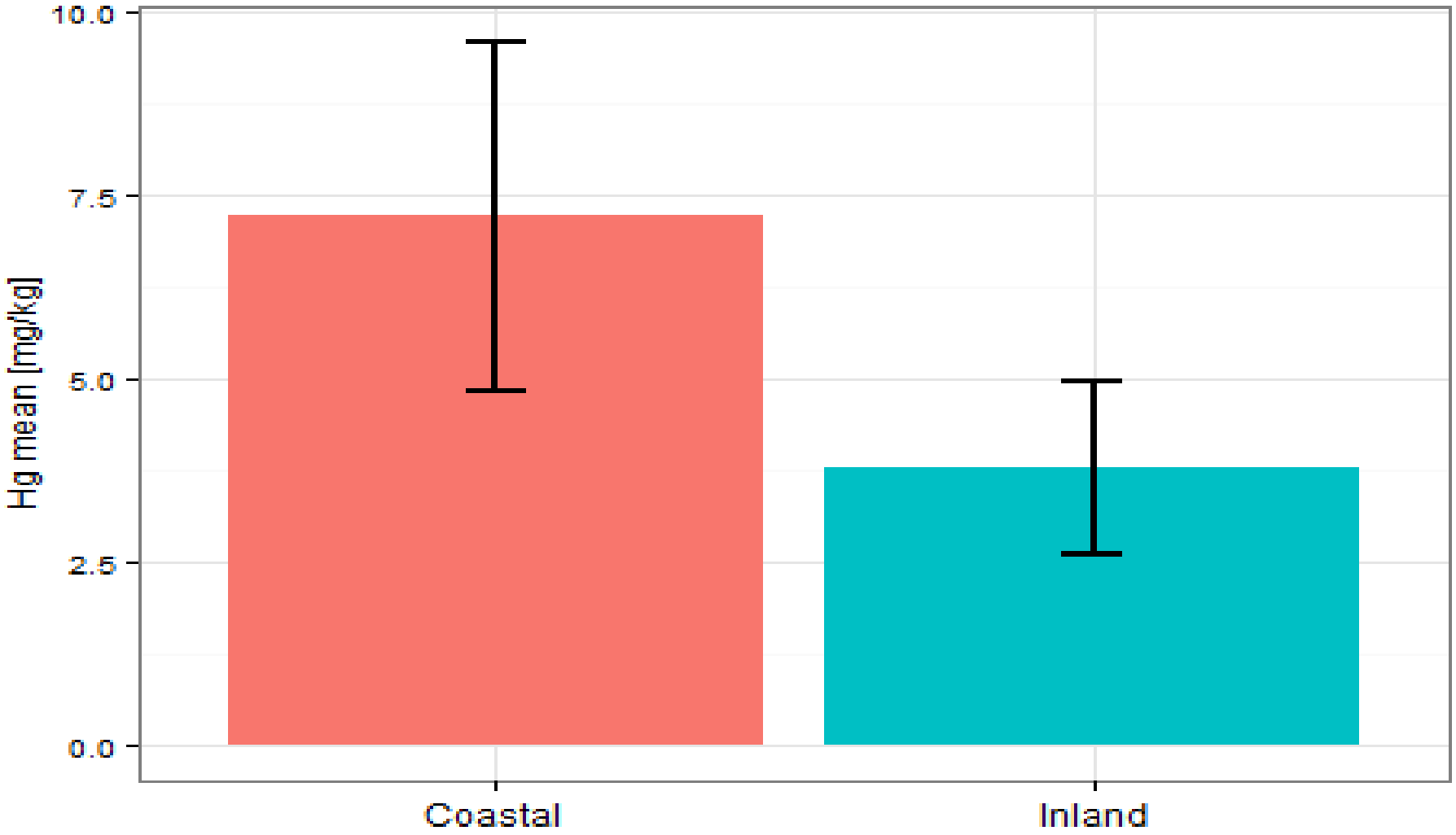
- Colony-averaged nest survival negatively correlated with Hg albumin (GLM; p =0.0016), but not to Hg concentration in blood and feathers.

- Sampled nests with average Hg concentrations in albumin lower than 0.4 mg/kg ww had nest survival probabilities of 90-95%; in contrast, sampled nests with average Hg concentrations over 0.75 mg/kg had survival probabilities of 42-57%.

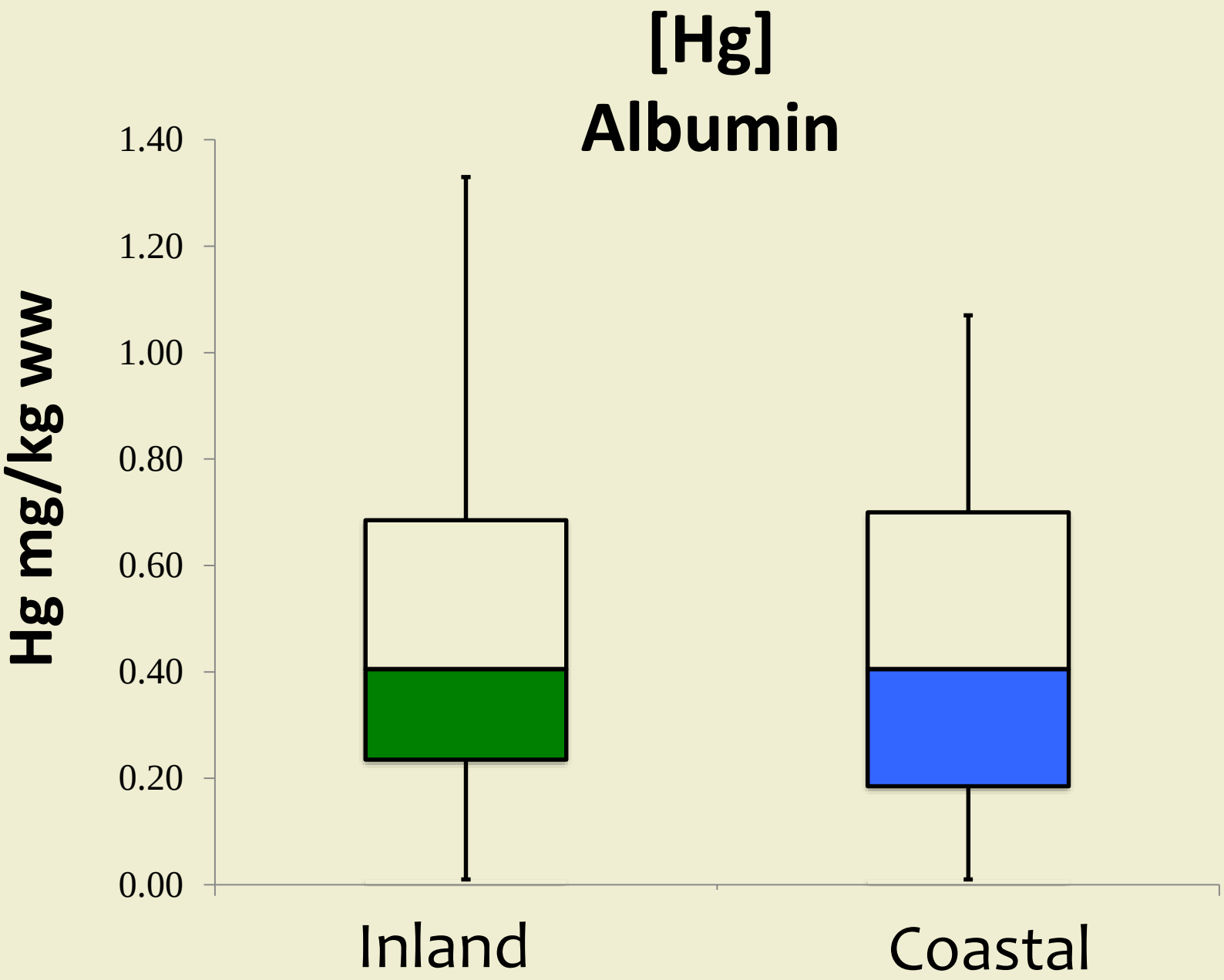


Sources of Methylmercury In the Everglades

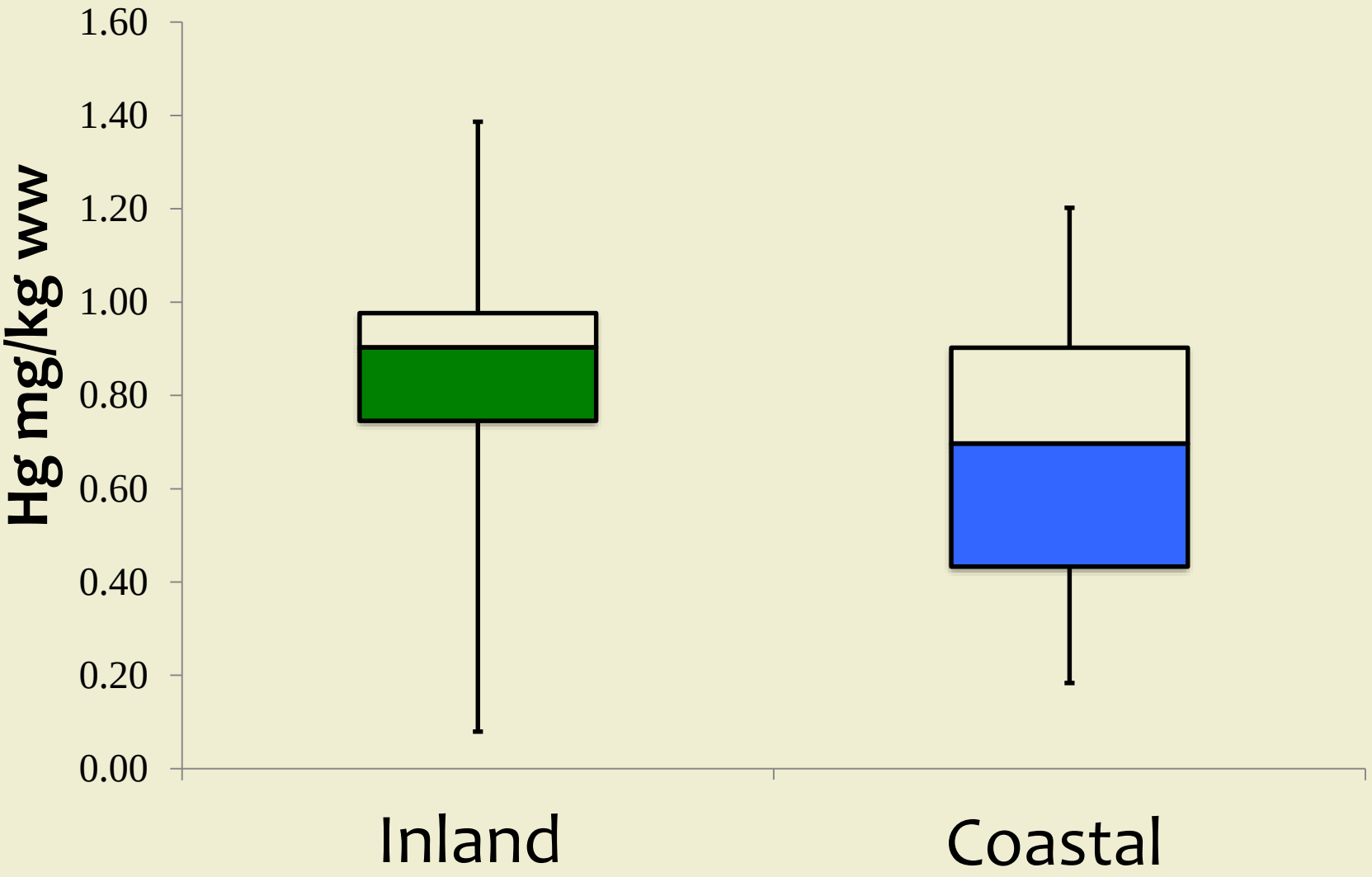
Coastal vs Inland Hg



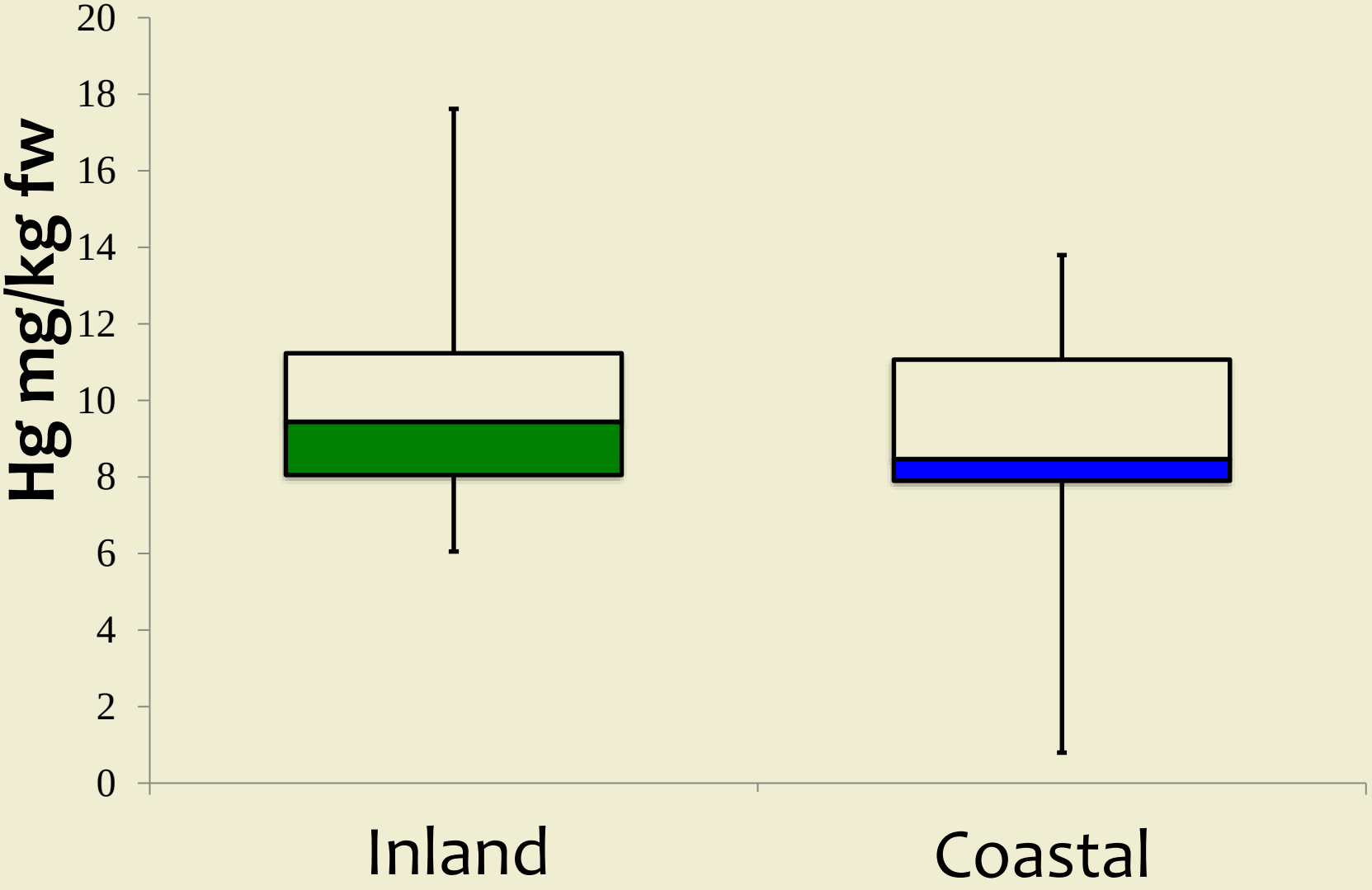
Average Hg in Wood Storks, 2013


[Hg]
Albumin
Hg mg/kg ww
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Inland
Coastal

[Hg] Blood



[Hg] Feathers



Conclusions

- No consistent differences in Hg concentrations between coastal and inland colonies.

- Nest success primarily affected by adult mercury burdens, leading to deficits in parental behavior.

Future Research

- Field behavioral observations to examine the mechanism by which Hg affects parental behavior.

- More years, more data!