

Mercury and Birds in the South River Watershed

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Targets: **Kingfisher**

Tree Swallow

Screech-Owl

Objectives:

•How do total Hg levels in target species compare to reference areas?



•Can we detect any fitness effects during the breeding season?

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Methods and Sample Size

27 Kingfisher nests found:

25 adults banded, 97 chicks banded

~15 fresh fish collected from adults



200 swallow nest boxes monitored:

125 swallow nests (61 other nests)

99 adults banded, 505 chicks banded

100 owl boxes monitored:

1 nest

16 adults banded

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Fitness measures:

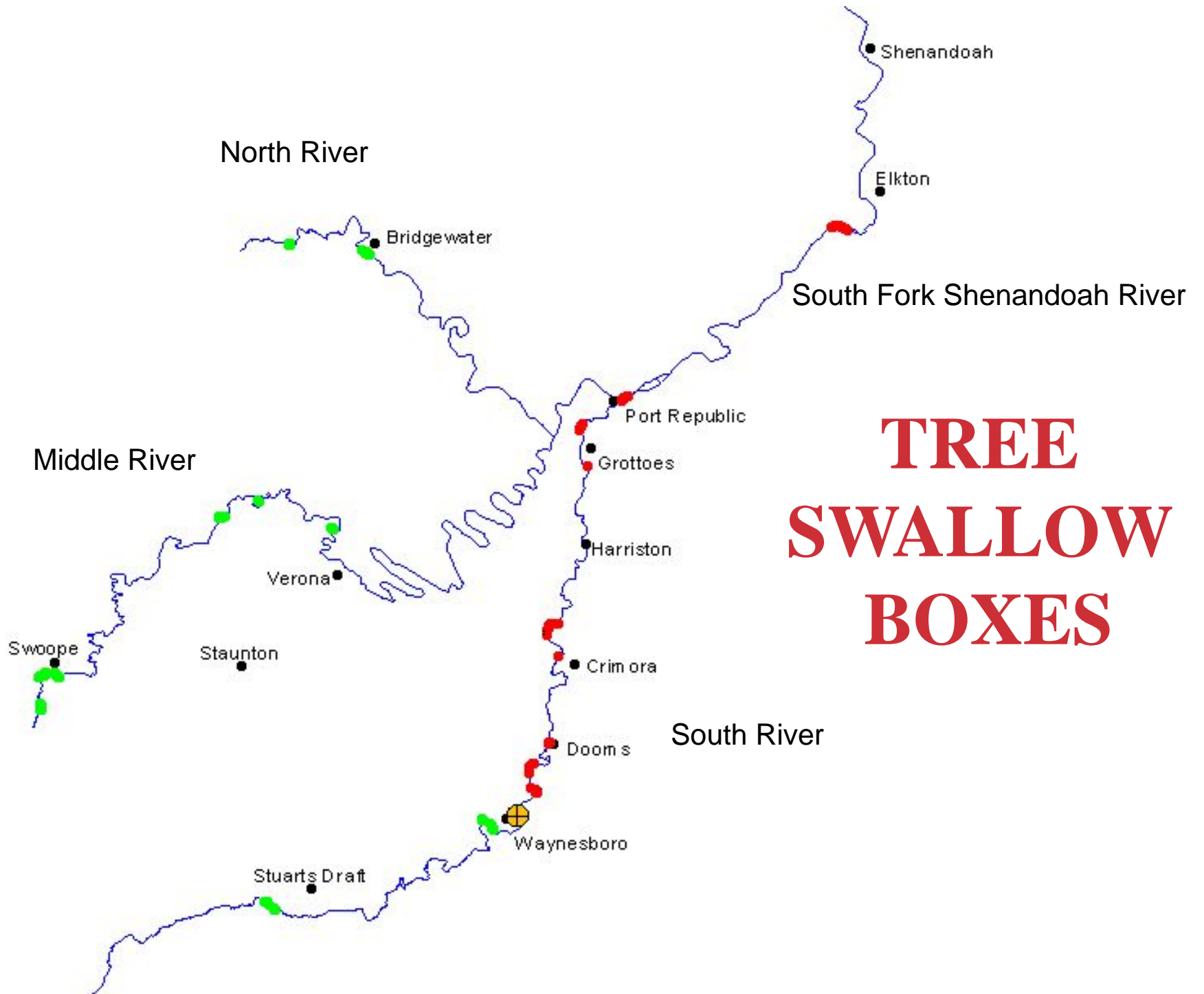
- **Kingfisher: clutch size, % hatching, % fledging,**
- **Swallow: *above* plus growth rates, fledgling mass**

Population measures:

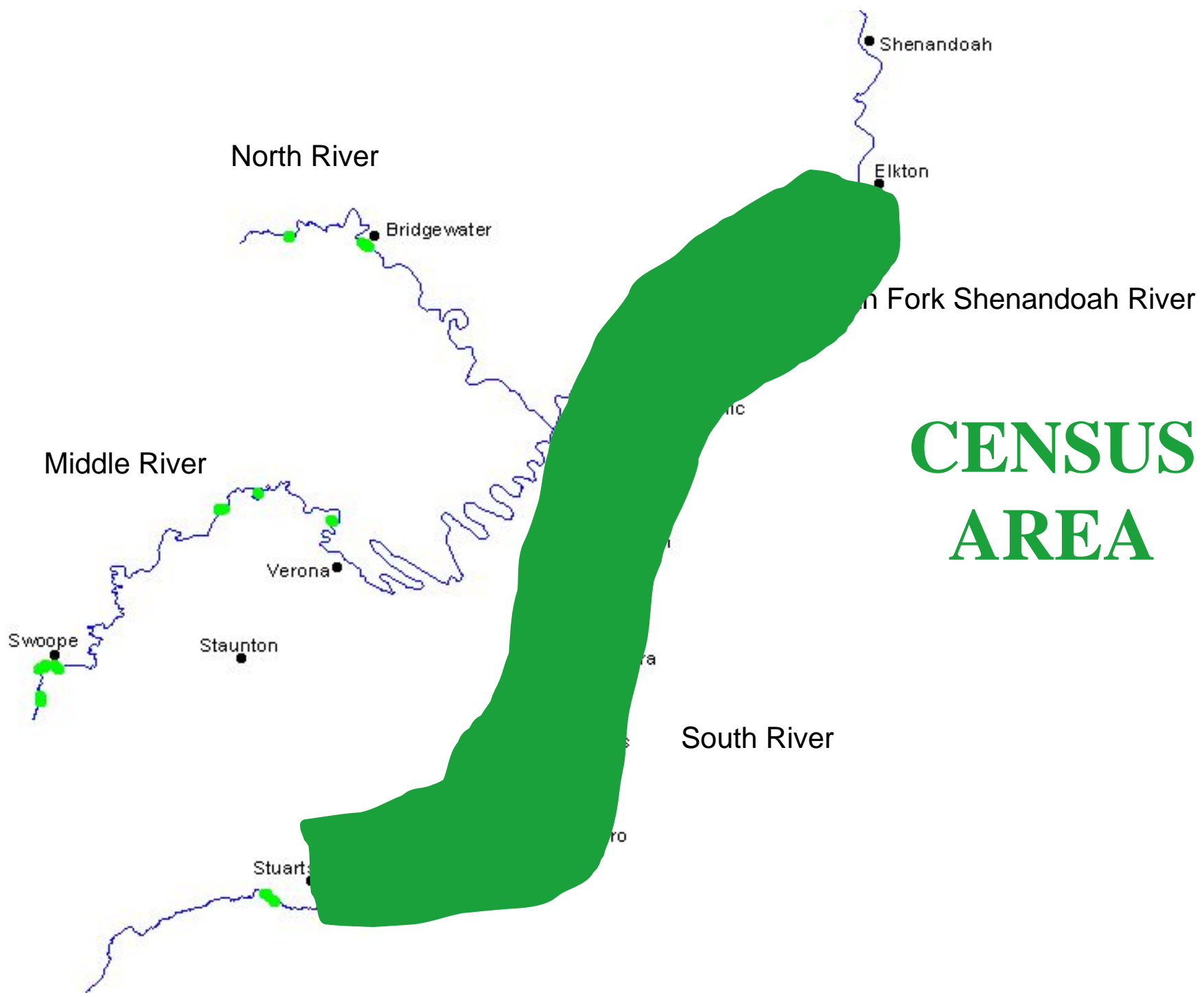
40 replicated point counts (10 min, 100 m radius)

Non-target species measures:

Feather and blood Hg from 90 birds of 22 species



TREE SWALLOW BOXES



North River

Shenandoah

Elkton

Bridgewater

North Fork Shenandoah River

Middle River

**CENSUS
AREA**

Verona

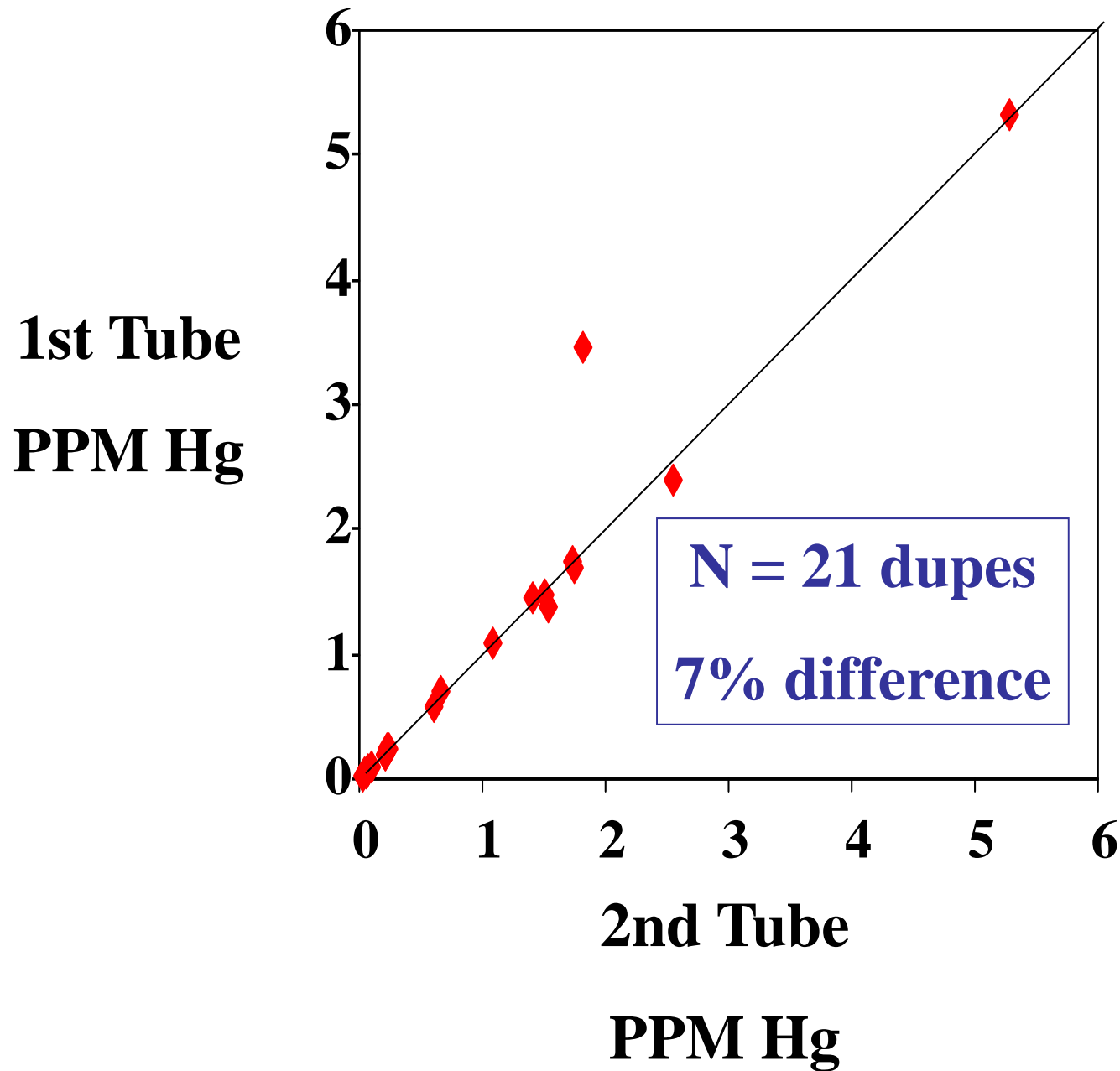
Swoope

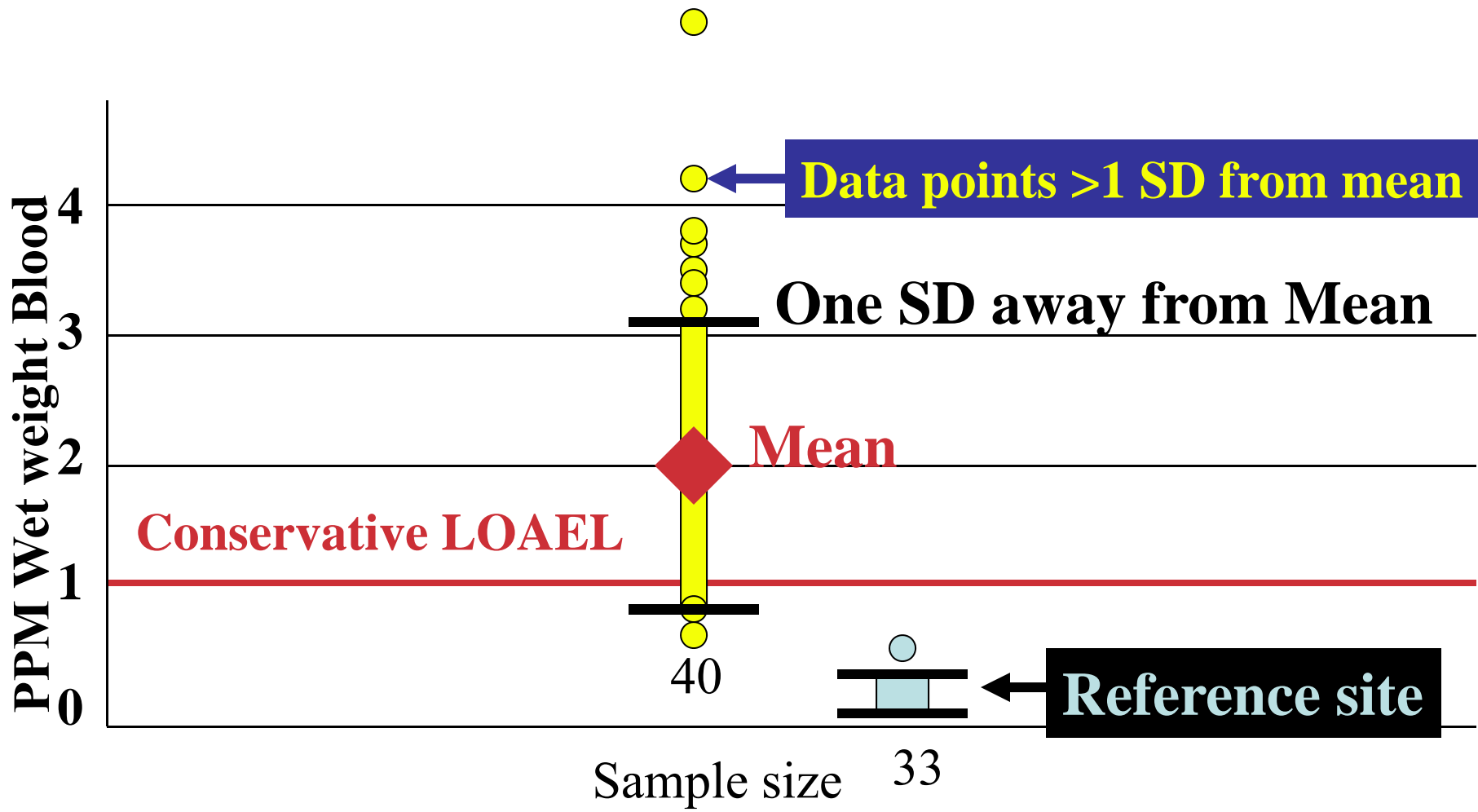
Staunton

South River

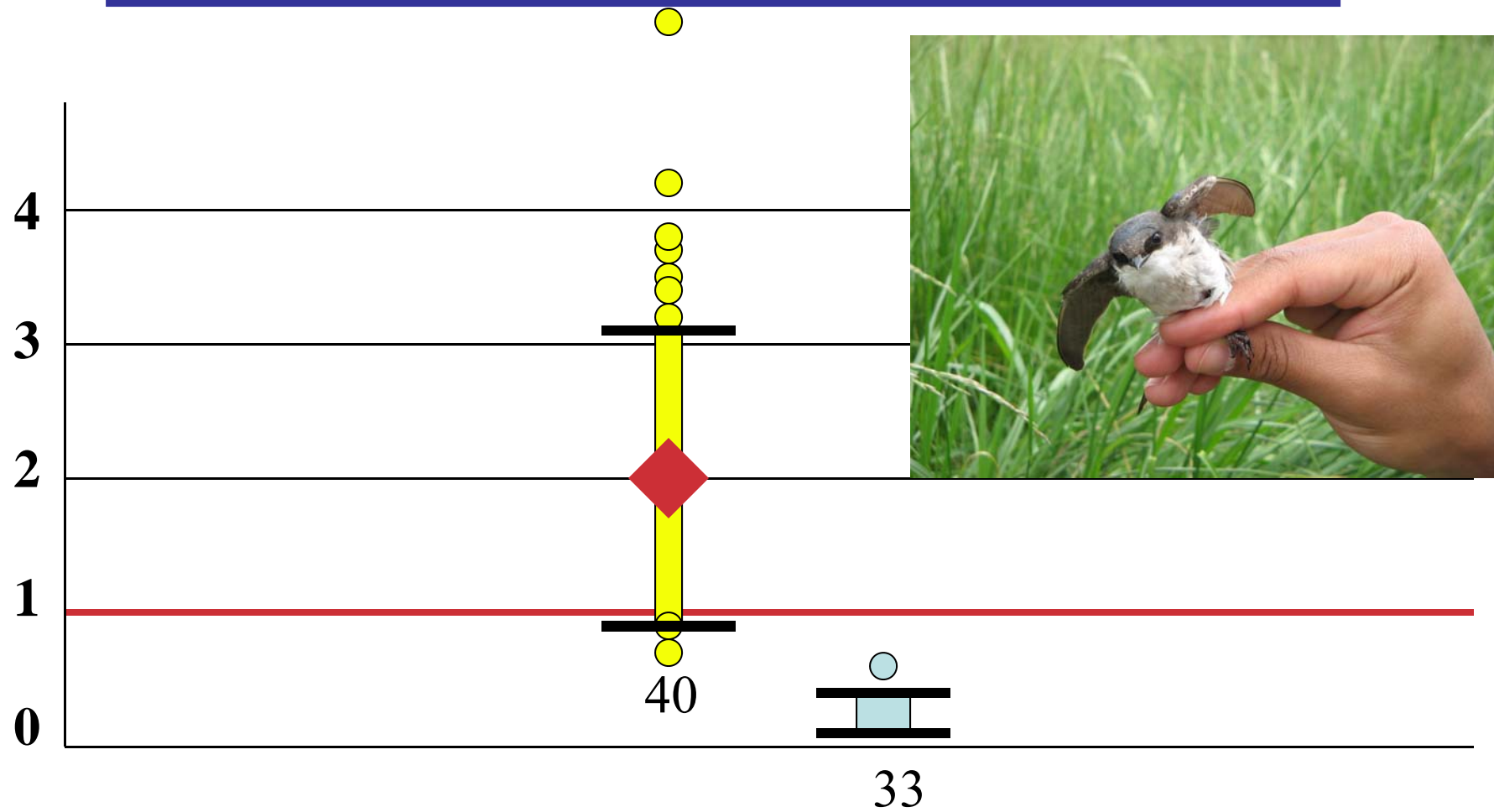
Stuart

Blind replication of samples from same bleeding



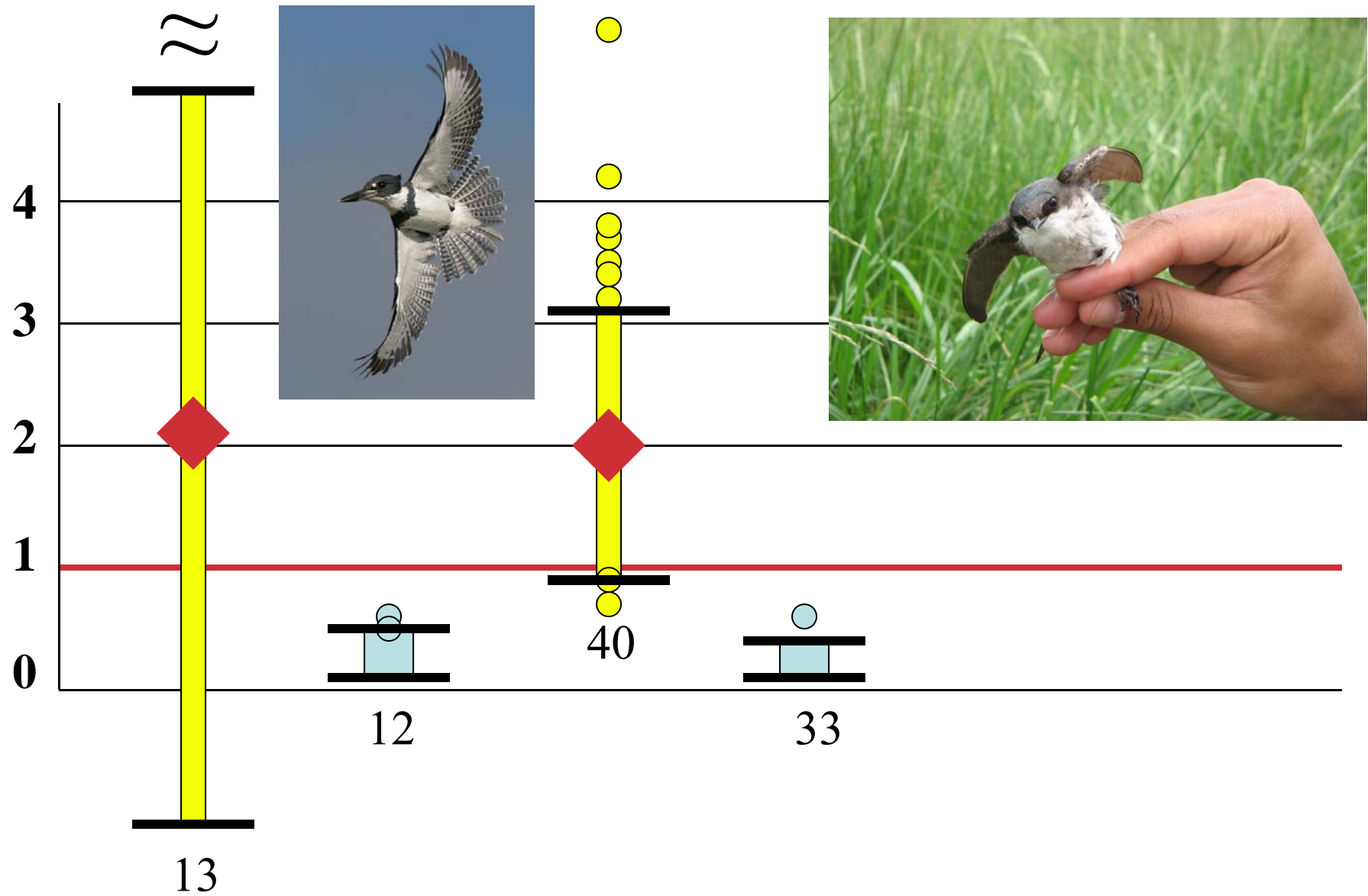


SWALLOW: Total Hg ppm wet weight blood



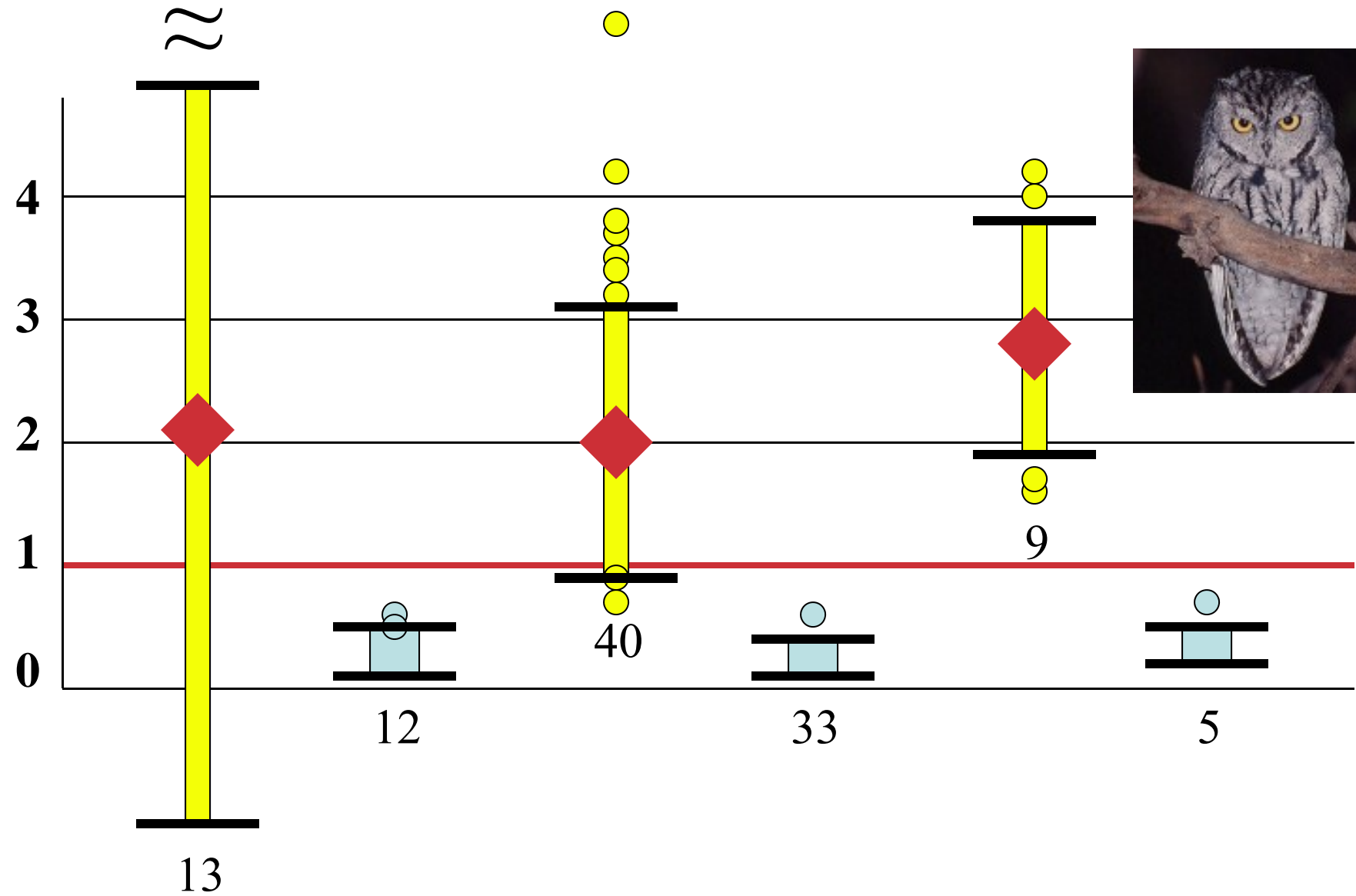
(10 ppm)

Kingfisher: Total Hg ppm wet weight blood

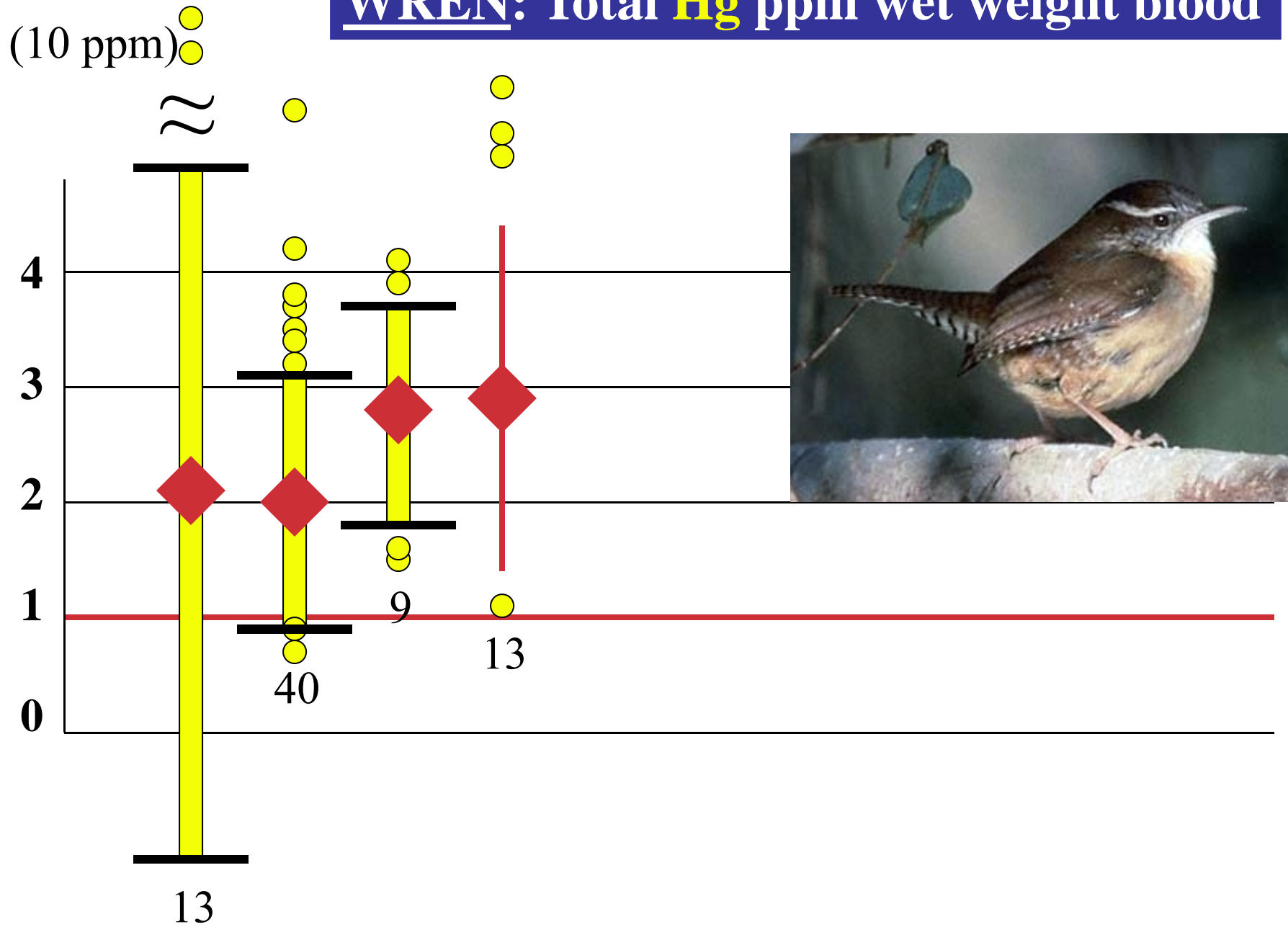


(10 ppm)

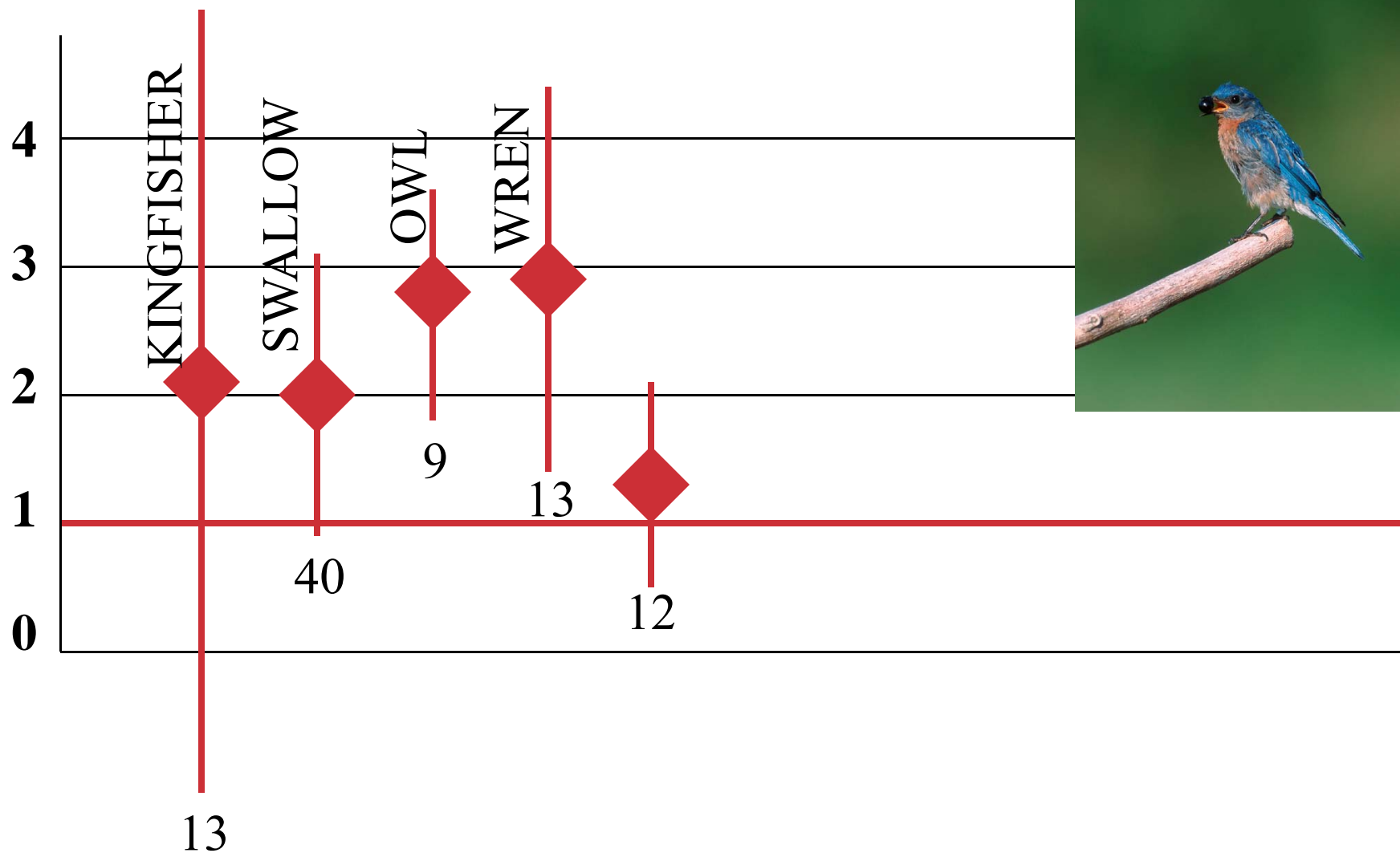
OWL: Total Hg ppm wet weight blood



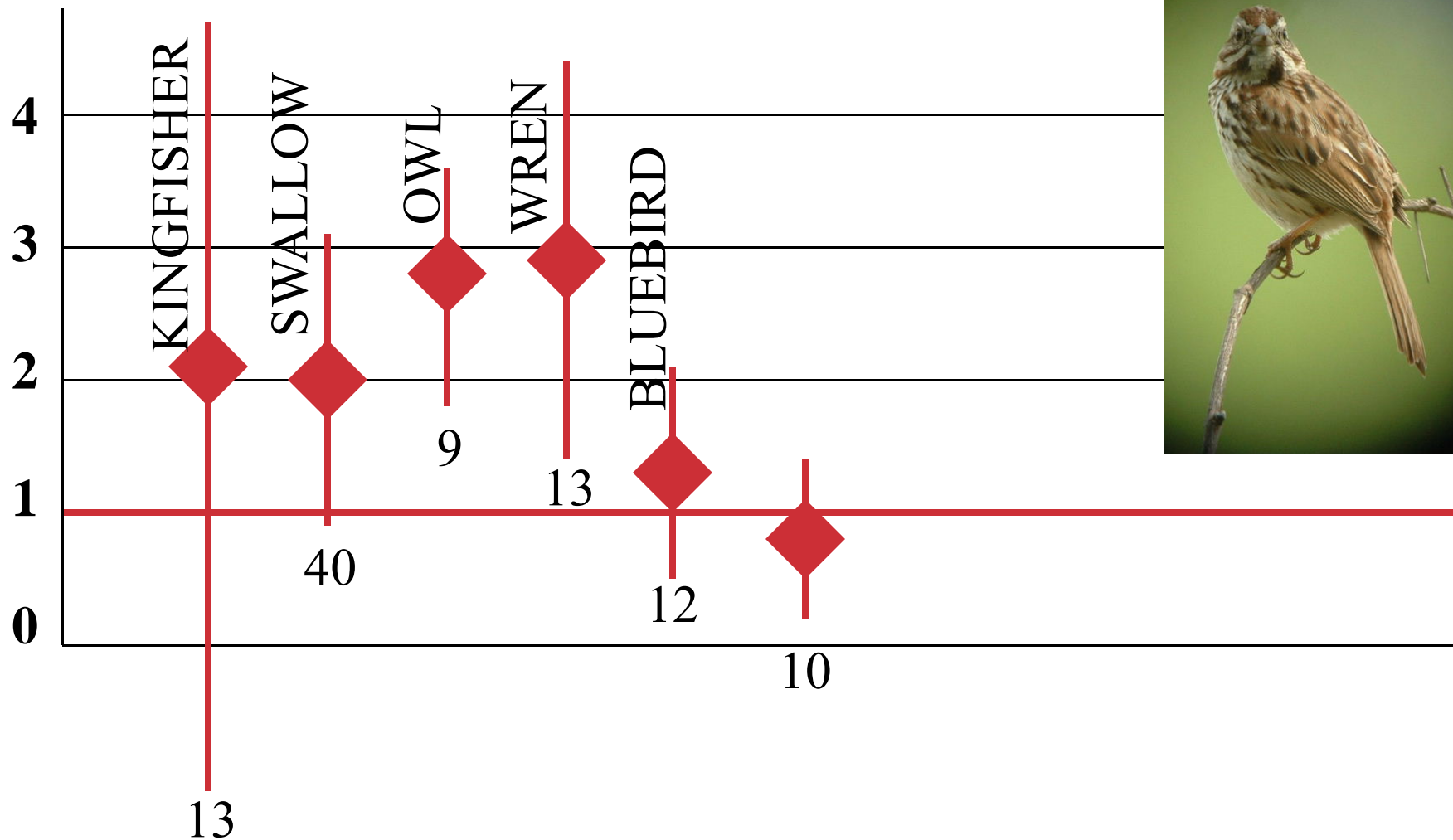
WREN: Total Hg ppm wet weight blood



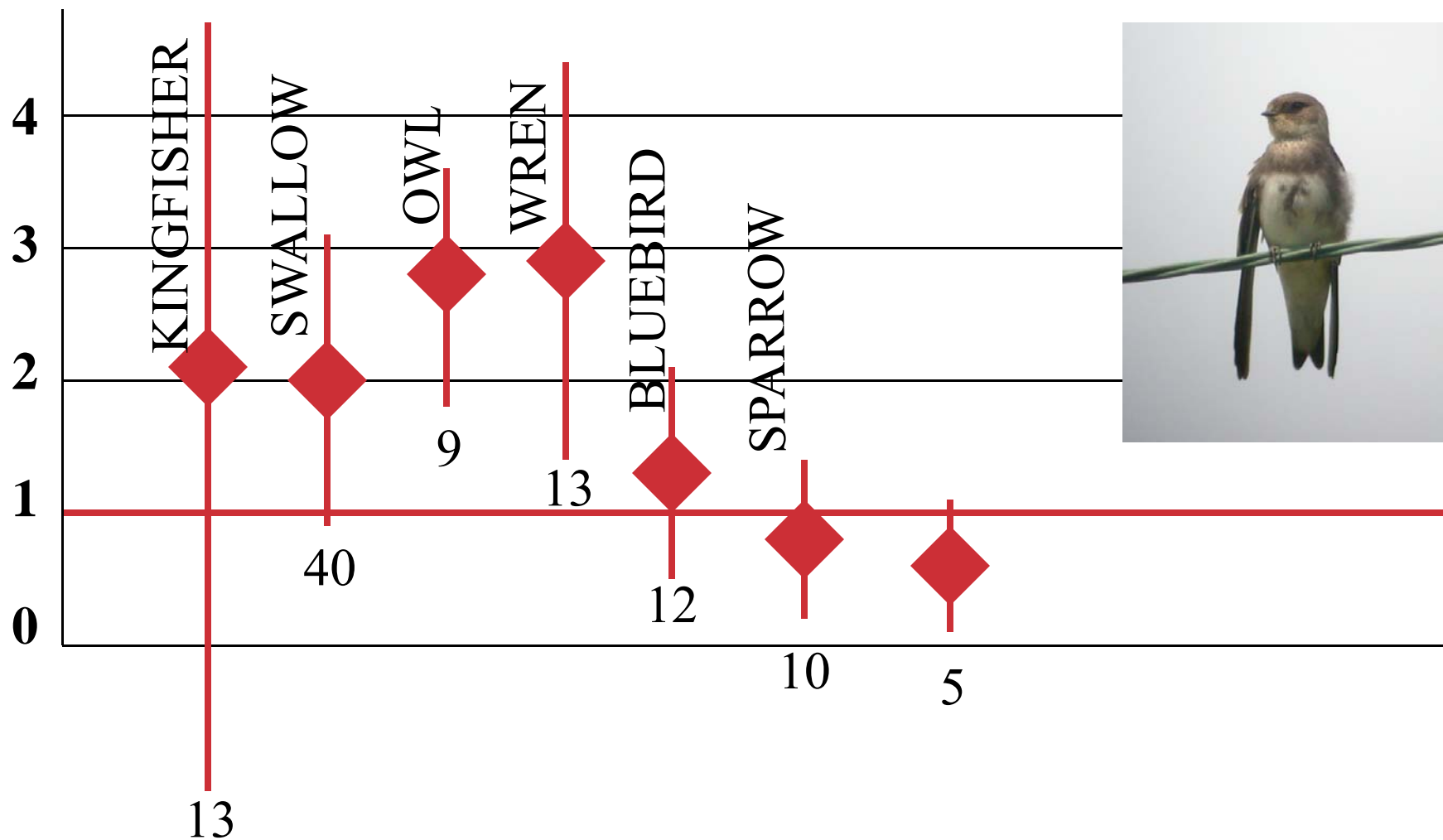
BLUEBIRD: Total Hg ppm wet weight blood



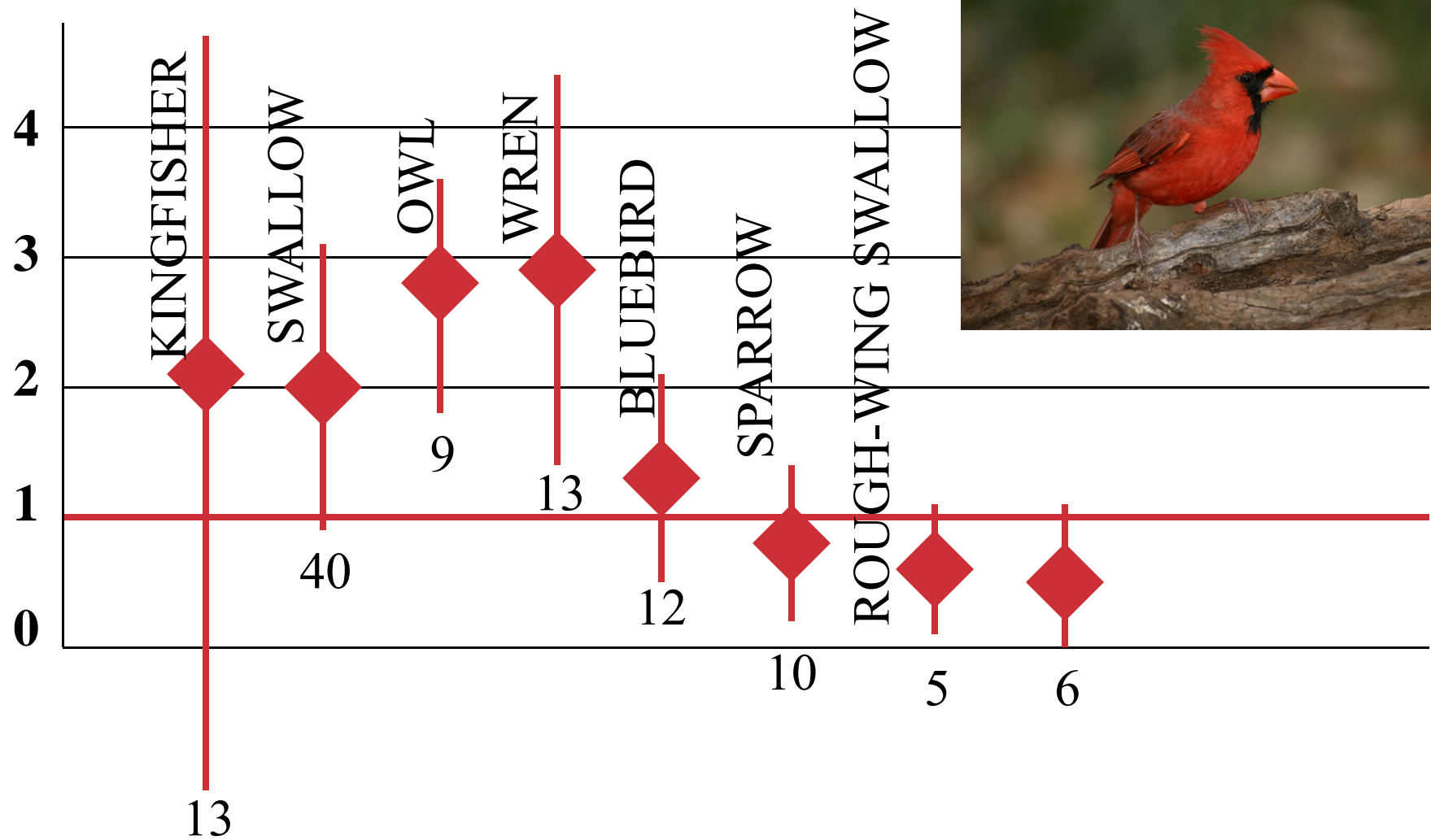
SONG SPARROW: Total Hg ppm wet weight blood



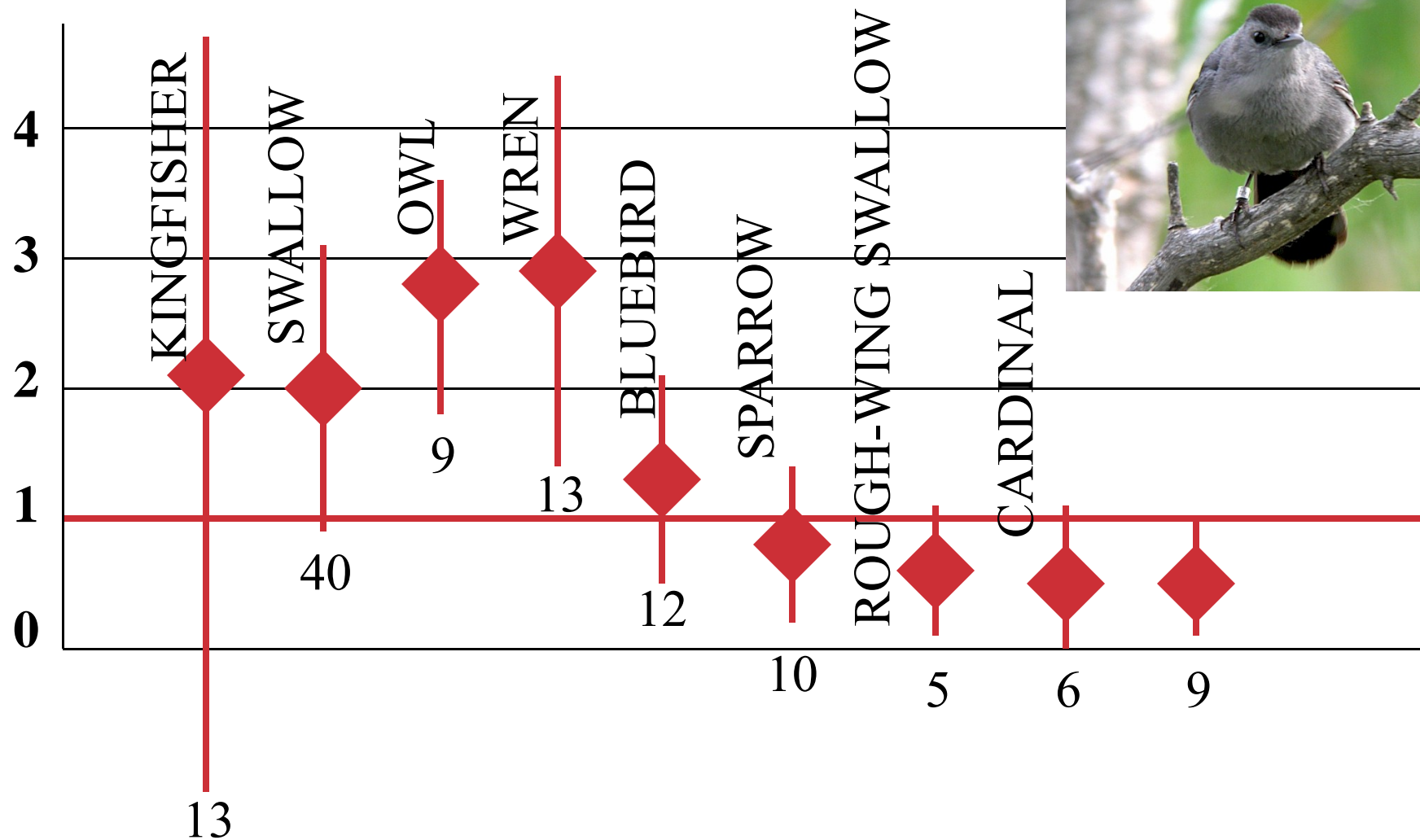
ROUGH-WINGED SWALLOW: Total Hg ppm wet weight blood



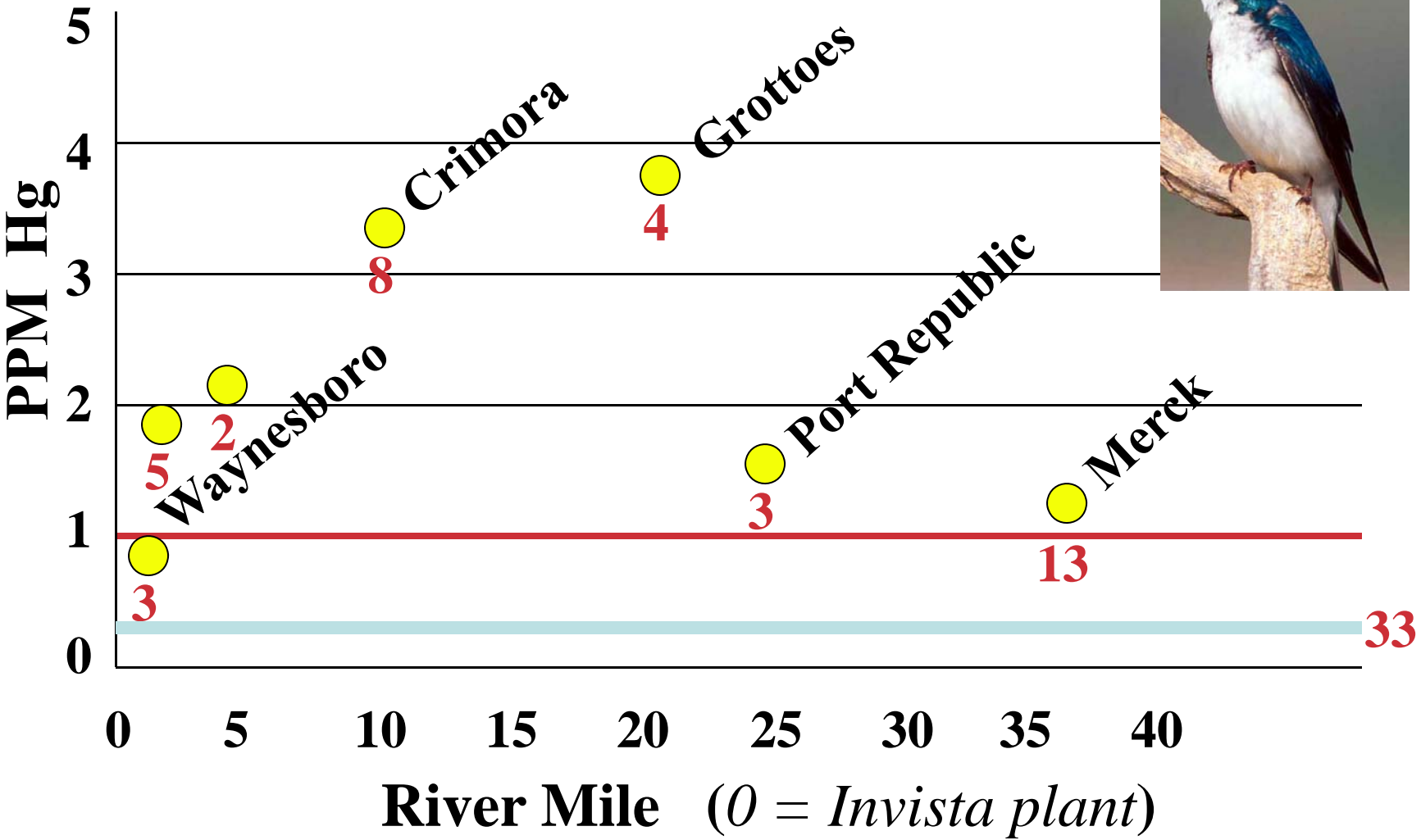
CARDINAL: Total Hg ppm wet weight blood



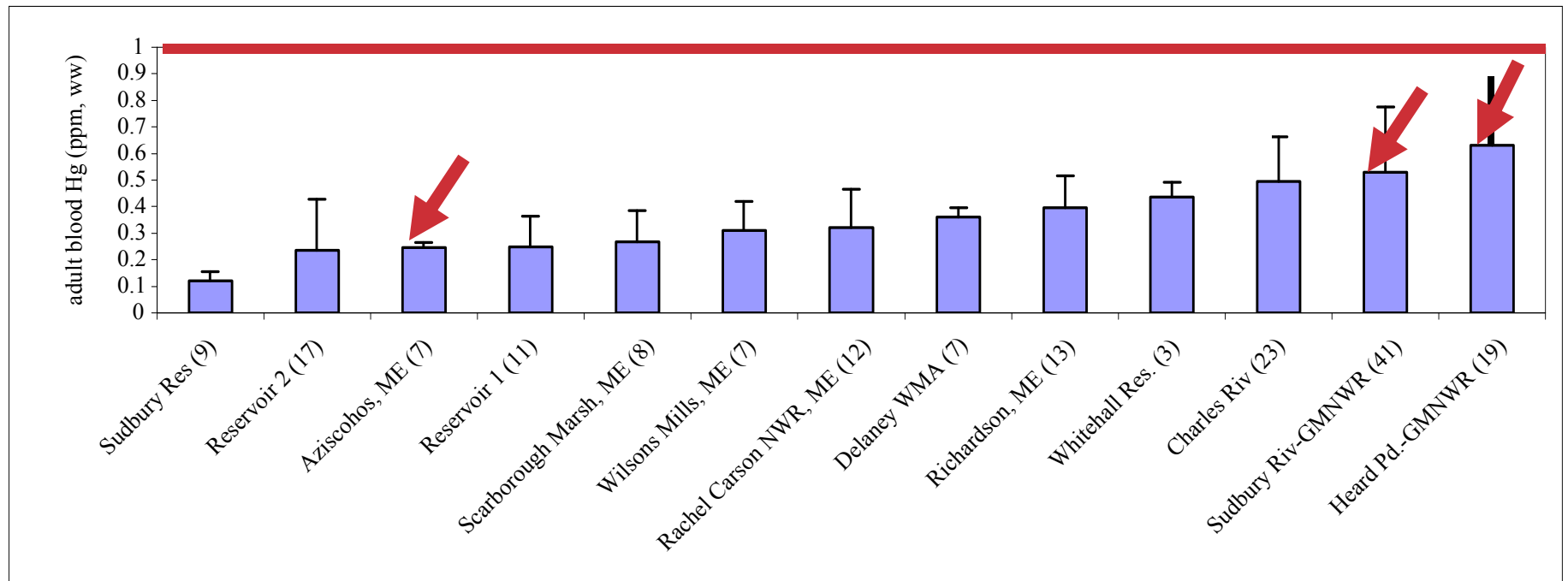
CATBIRD: Total Hg ppm wet weight blood

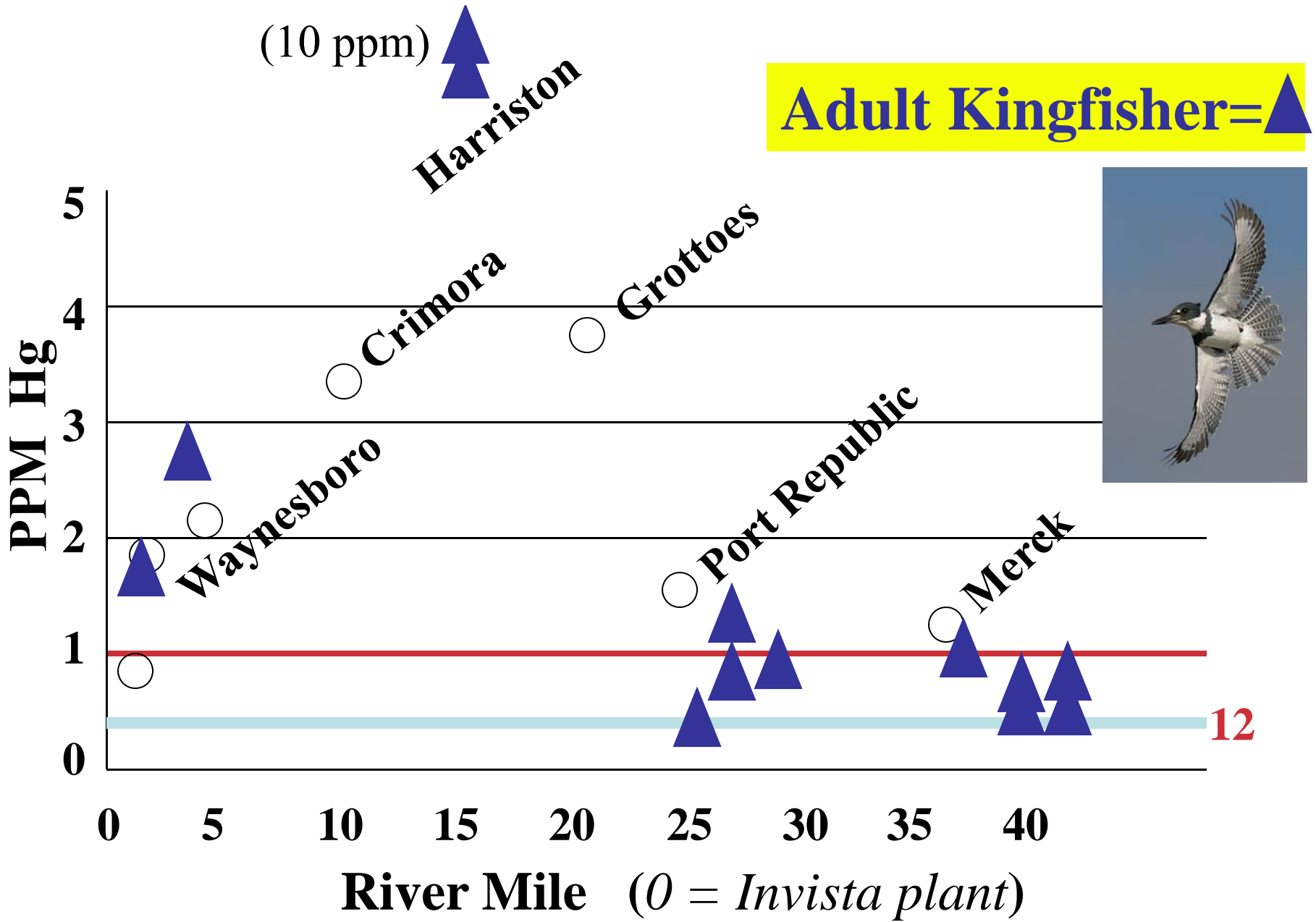


Adult Tree Swallow blood

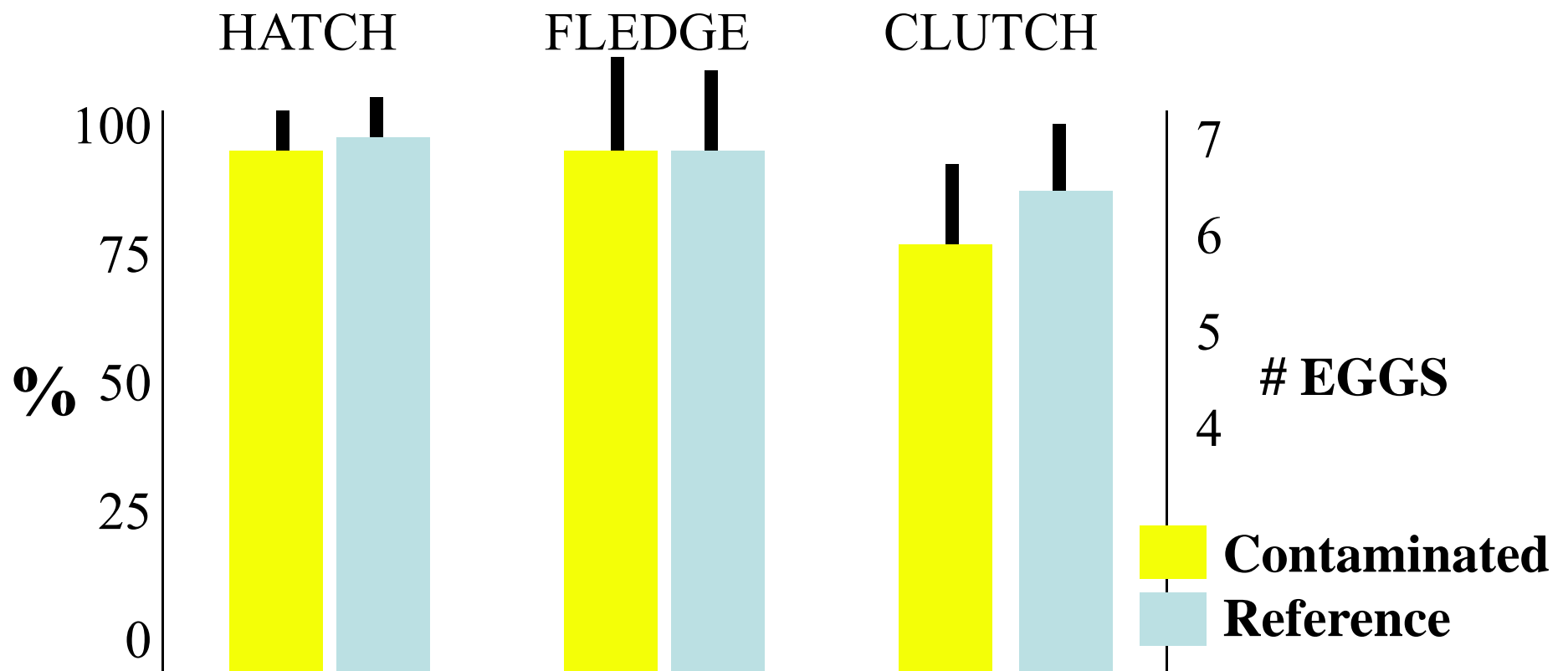


Tree Swallow data from 13 New England sites

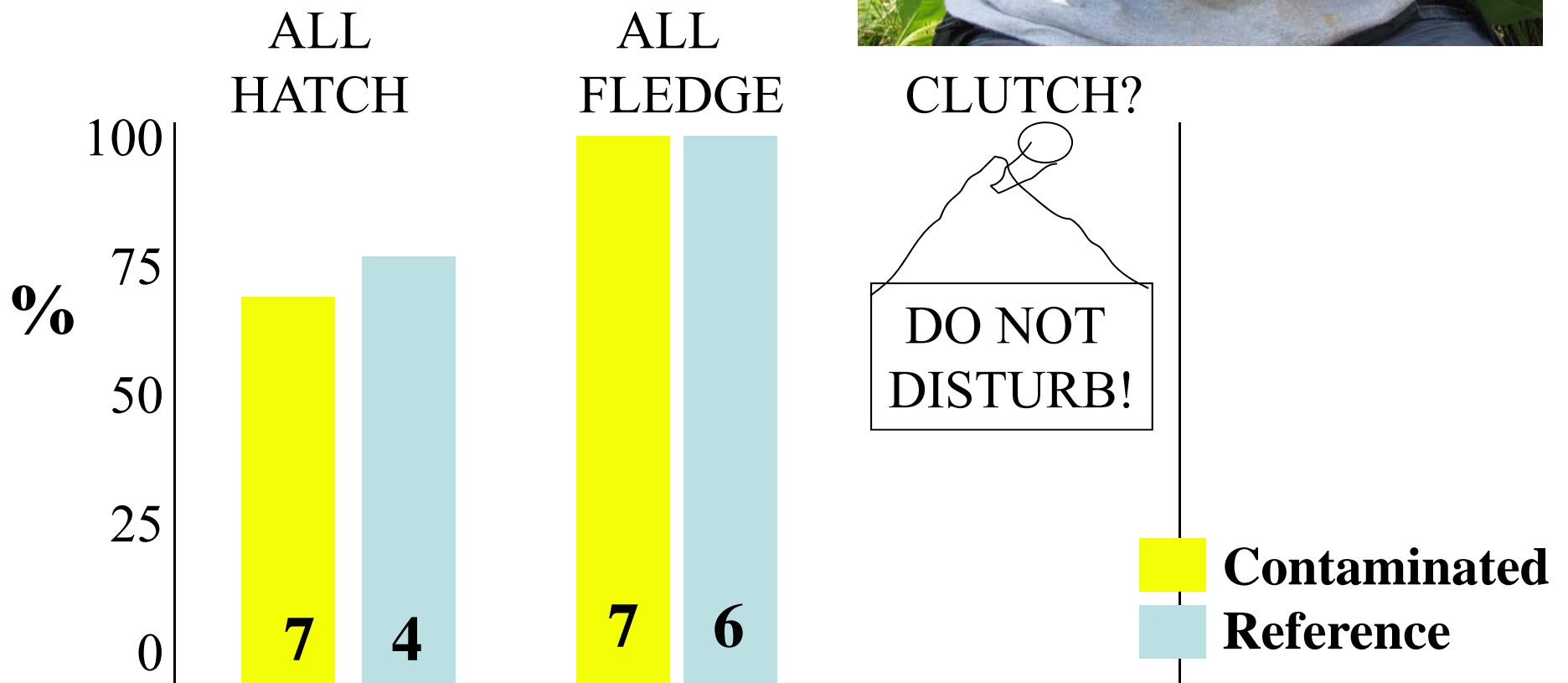




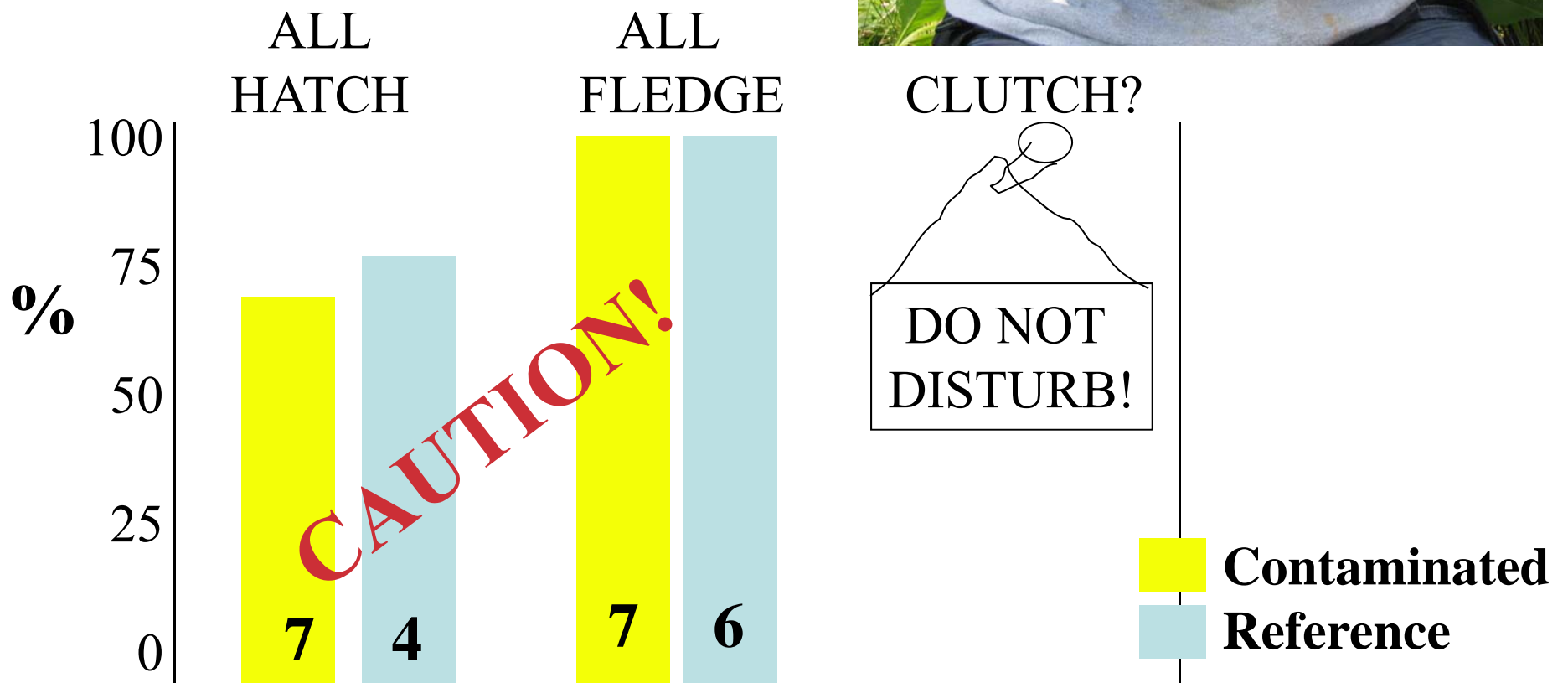
Reproductive Success: Tree Swallow



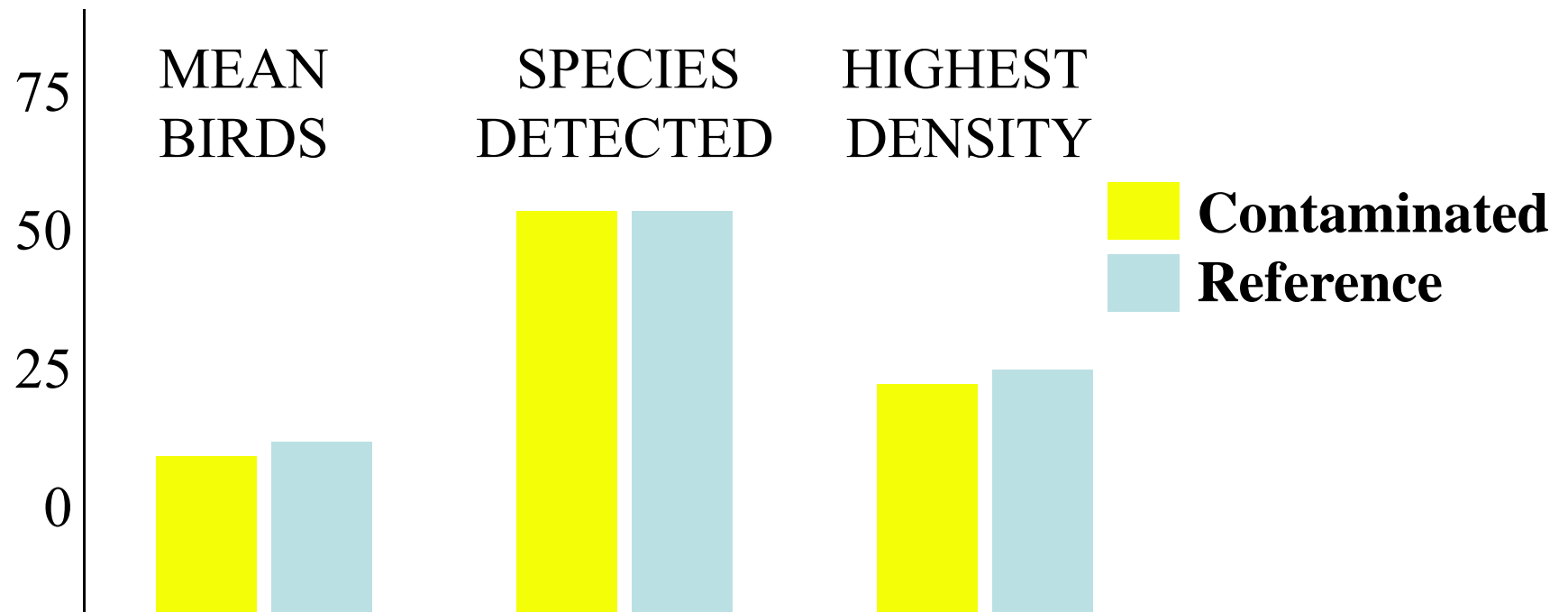
Reproductive Success: Kingfisher (estimates)



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Preliminary Results of 40 Censuses



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- kingfishers, swallows, owls, wrens, bluebirds
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- no un-recoverable change in bird communities* 

FOLLOW-UP FIELDWORK

Sample kingfishers: Crimora - Port Republic

- adult blood
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Collect eggs for Hg

- swallow
- owl

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1. Are floodplain forests/pastures the major methylation sites?
2. Is Hg widespread in plants and herbivorous insects?
3. Is songbird Hg coming mainly from spiders and Odonates?
4. What food chain length or niche puts a species at risk?
5. How many other species are bioaccumulating?
6. Can terrestrial habitat be altered to reduce bioaccumulation?
7. Songbirds are often sentinel species...what else is at risk?

First step: FOOD CHAIN

- Collect prey items from bluebirds, wrens and swallows
- Record foraging locations and time budgets
- Collect potential prey from each species foraging areas
- Determine total Hg and methyl Hg loads in diet



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1. Does blood Hg rise after feather growth stops?
2. Does even low Hg in chicks cause learning/foraging deficits?
3. Are nestlings of high Hg parents at competitive disadvantage?
4. Do they survive the summer but die before breeding?
5. Does high Hg in adults reduce chance of attracting a mate?

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- Track fledglings (owls?) until after feather growth stops
- Record changes in blood Hg and physical condition



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- Track fledgling Hg (owls?) until after feather growth stops
- Record changes in blood Hg and physical condition
- Erect MORE swallow nestboxes
- Compare return rates and condition of swallows raised on contaminated and reference sites when they return in 2006



