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# **Reproductive Health and Development of Aquatic Wildlife in the St. Clair River Area of Concern (Ontario)**

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- Research and monitoring of effects of toxicological and ecological stressors on wildlife
- Measurement of contaminants (PCBs, metals, pesticides, etc) in body burdens
- Assessment of health



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# Wildlife Species Studied in the St. Clair River AOC (Ontario)

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- Two aquatic species studied: northern leopard frog and snapping turtle
- Examined reproduction, deformities & contaminant burdens to assess the status of the wildlife reproduction and deformities Beneficial Use Impairment in the AOC



# Northern Leopard Frogs

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Studies conducted at two important developmental stages:

- 1) Early embryonic stage in the laboratory – two exposure studies to assess hatching success and embryonic deformities
- 2) Early transformation stage following metamorphosis – surveys of wild populations of froglets to assess:
  - deformities
  - contaminants



# Northern Leopard Frogs Collection Sites in the St. Clair River AOC





# Embryonic Development of Leopard Frogs

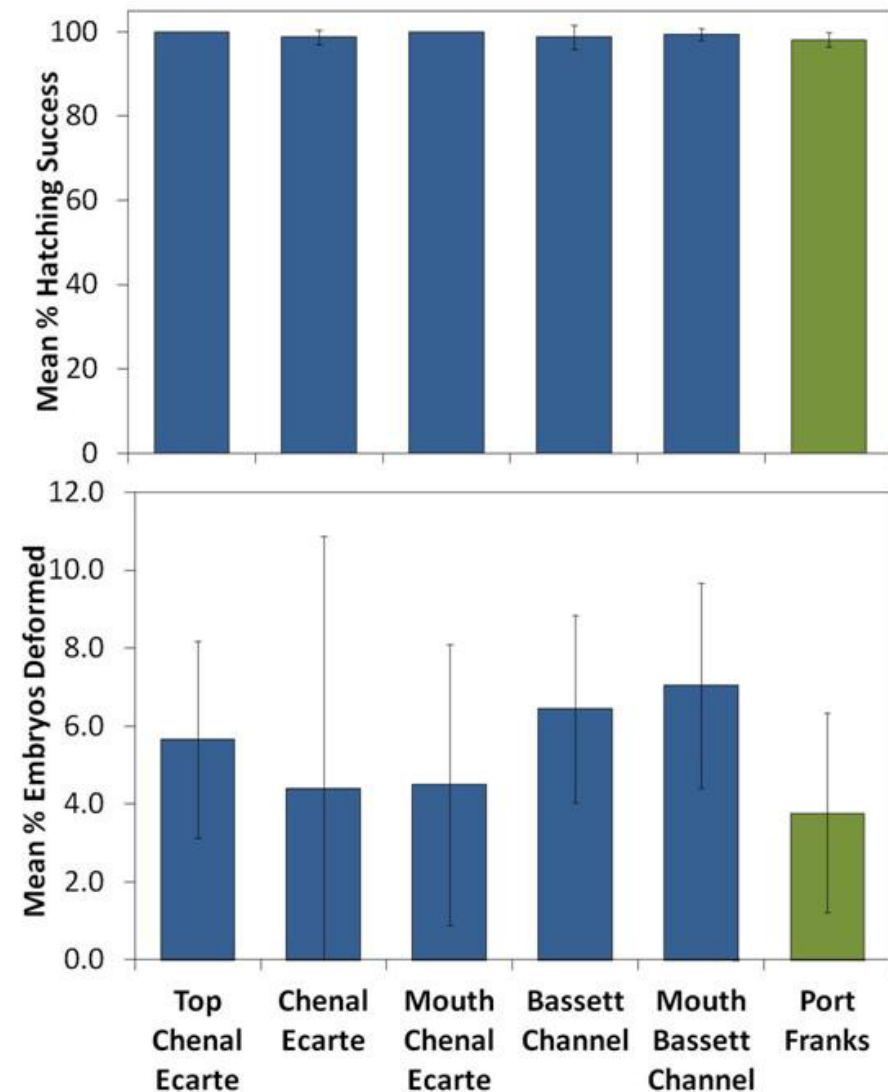
- Laboratory exposures: embryos raised in water (2007) and water and sediment (2011) from St. Clair River AOC and reference sites
- Examined hatching success and embryonic development (i.e., frequency of deformities)



# Northern Leopard Frogs

## Exposure to Water & Sediment Study 2011

- Both hatching success & frequencies of deformities in embryos were statistically similar to frequencies at the non-AOC reference site.
- Similar results found for exposure to water study (2007).



# Northern Leopard Frog Surveys 2006, 2007, 2011 & 2014

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Summer = newly transformed froglets

- Examine for deformities in 100 frogs

Fall = pre-hibernation young of year frogs

- Measure contaminant burdens



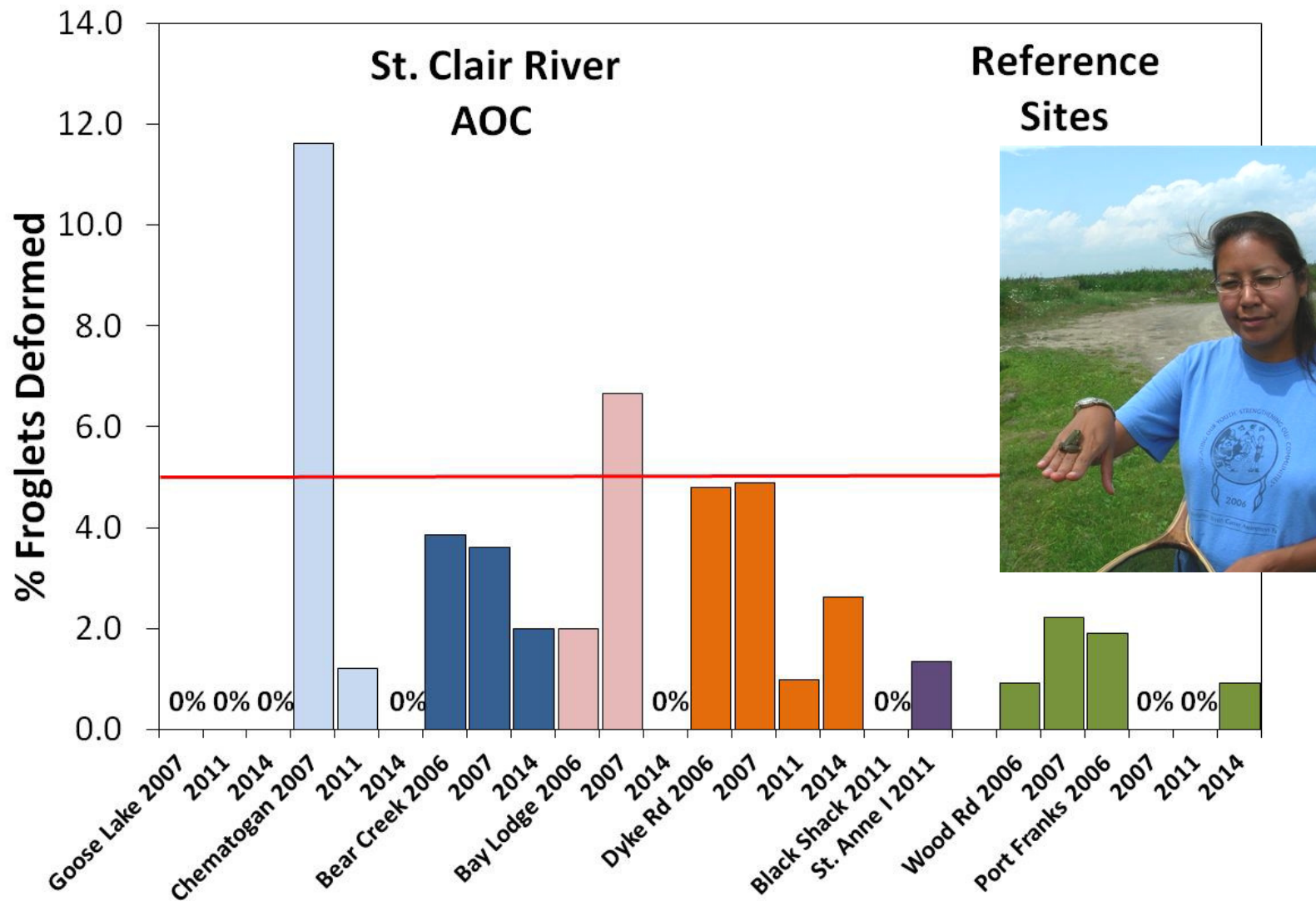


# Deformities in Wild Populations of Newly Transformed Froglets

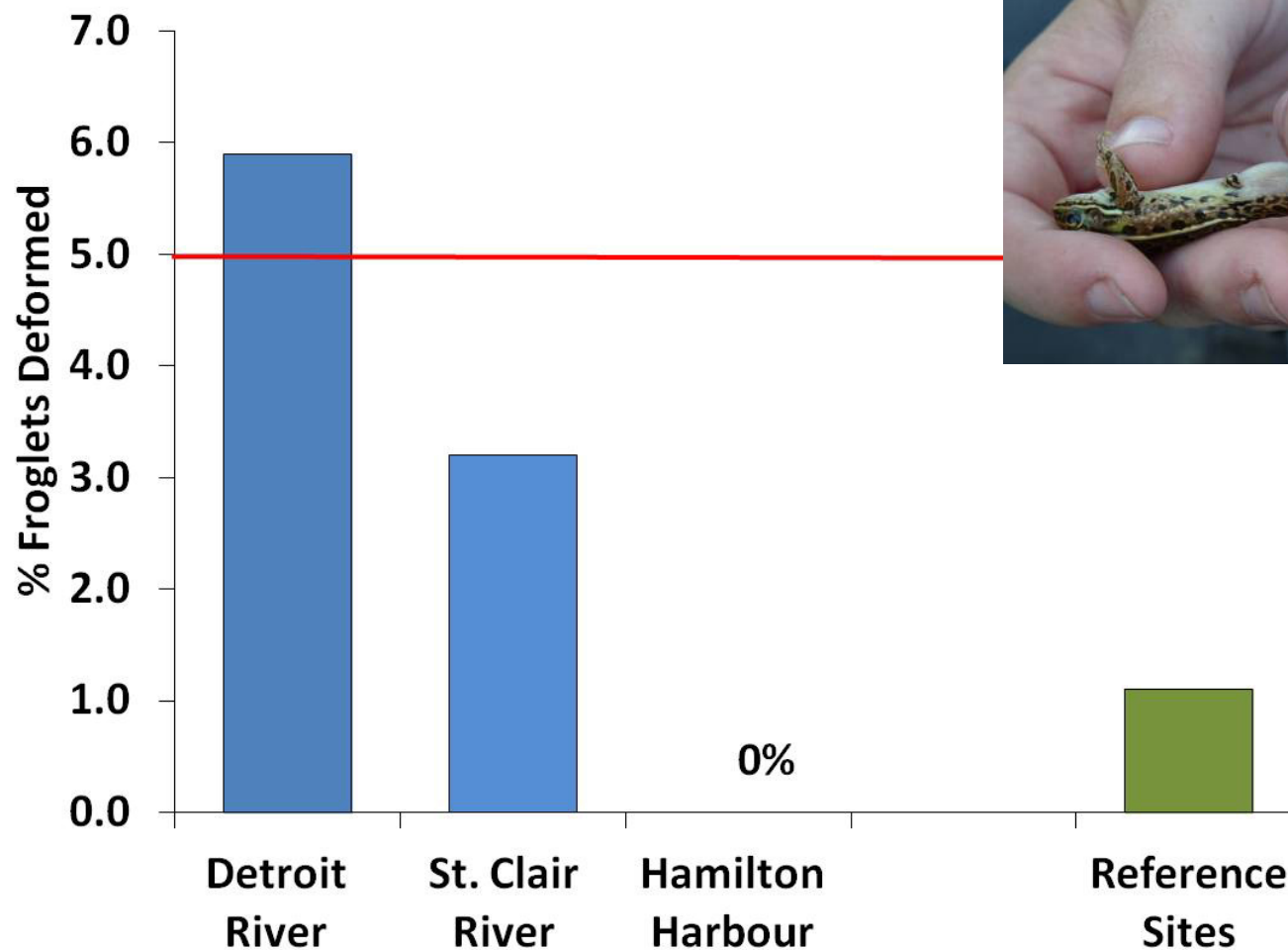
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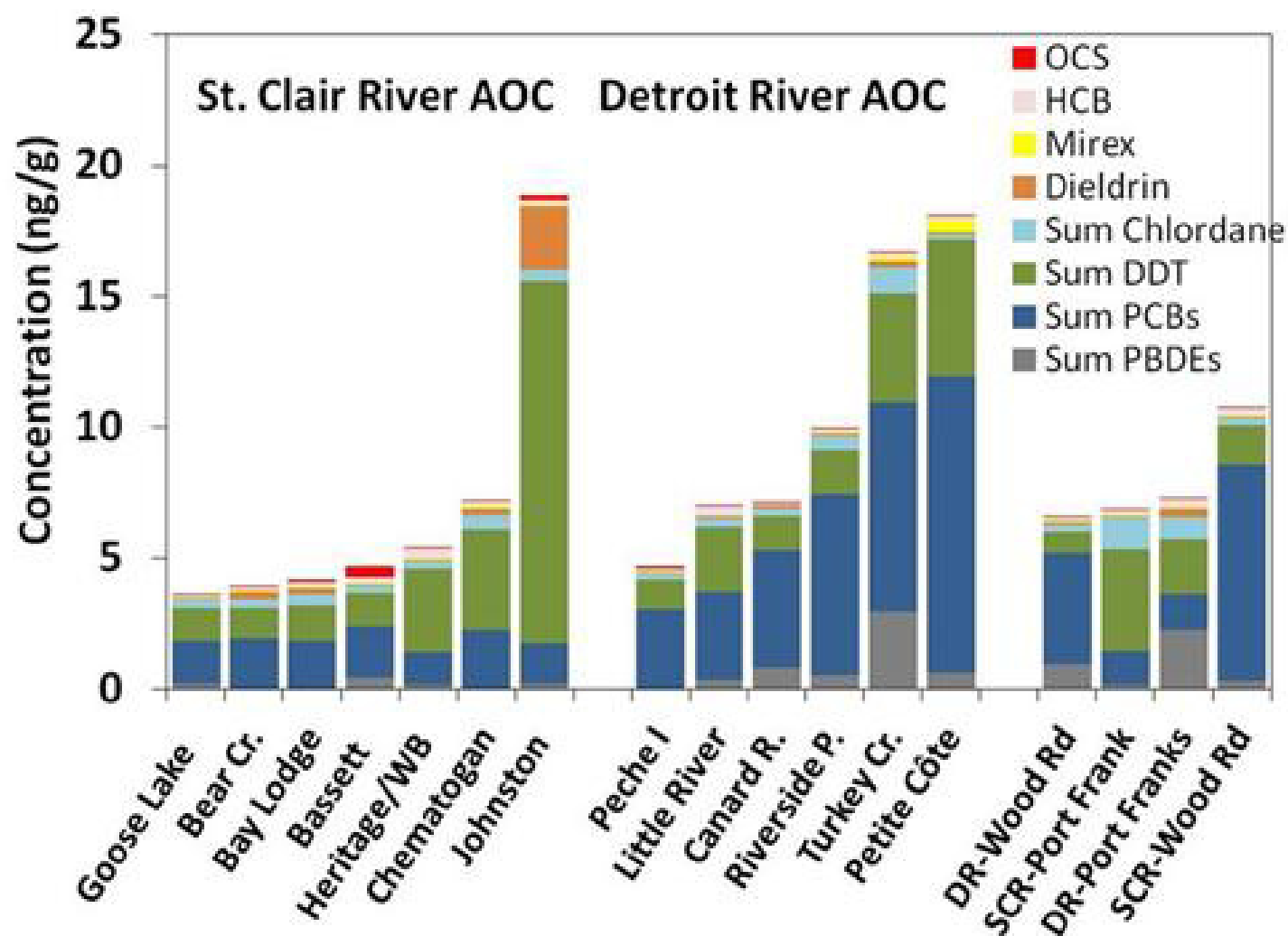
# Prevalence of Deformities in Froglets 2006, 2007, 2011 & 2014



# Prevalence of Deformities at other Great Lakes Sites, 2006-2012

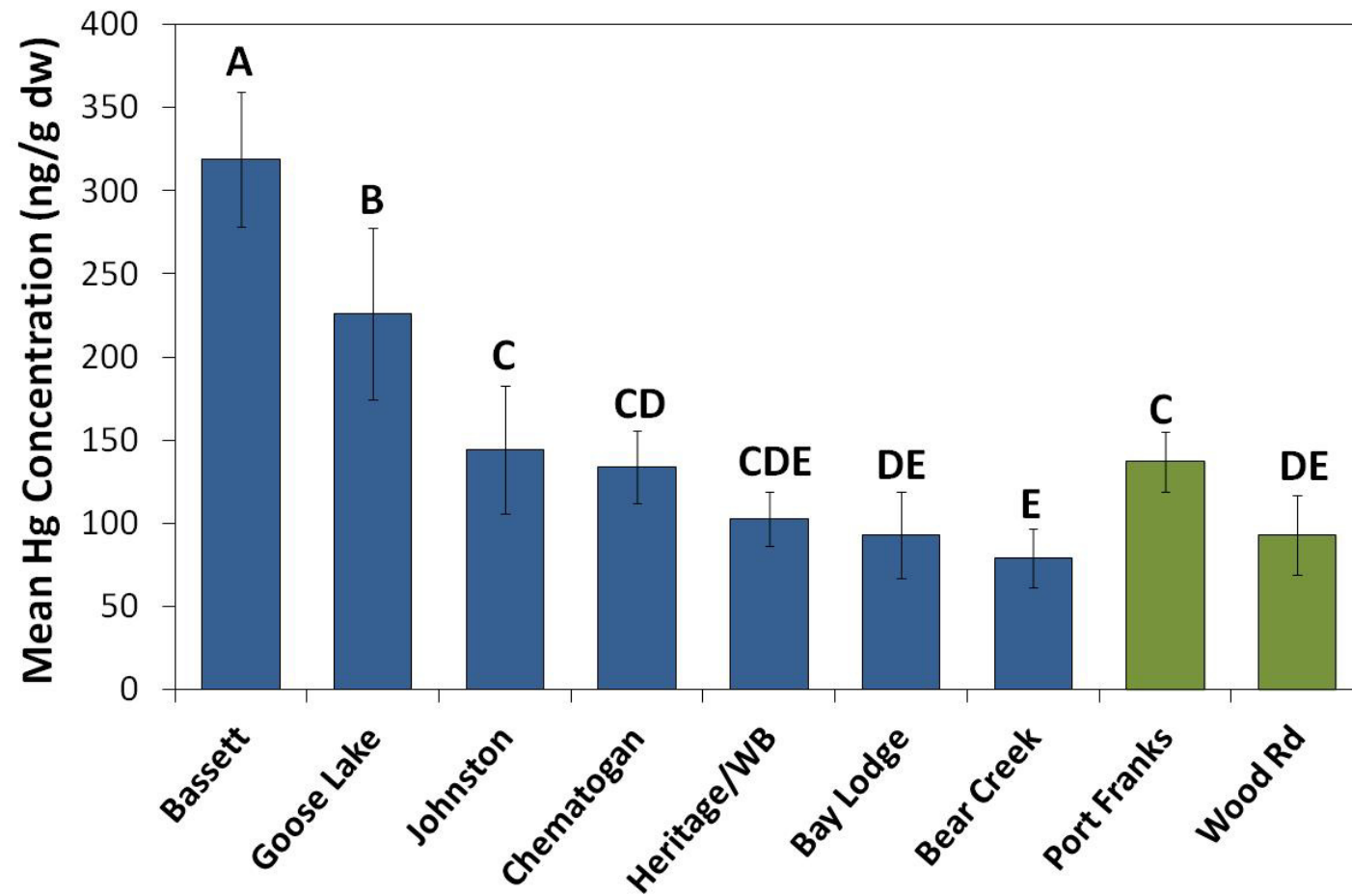


# Cumulative Totals of Contaminants in Frogs from SCR and Detroit R. AOC





# Mercury in Frogs



# Snapping Turtles

Artificially-incubated eggs were collected from multiple AOC sites in Walpole Delta (2011) to assess:

- hatching success
- hatchling deformities
- contaminant burdens



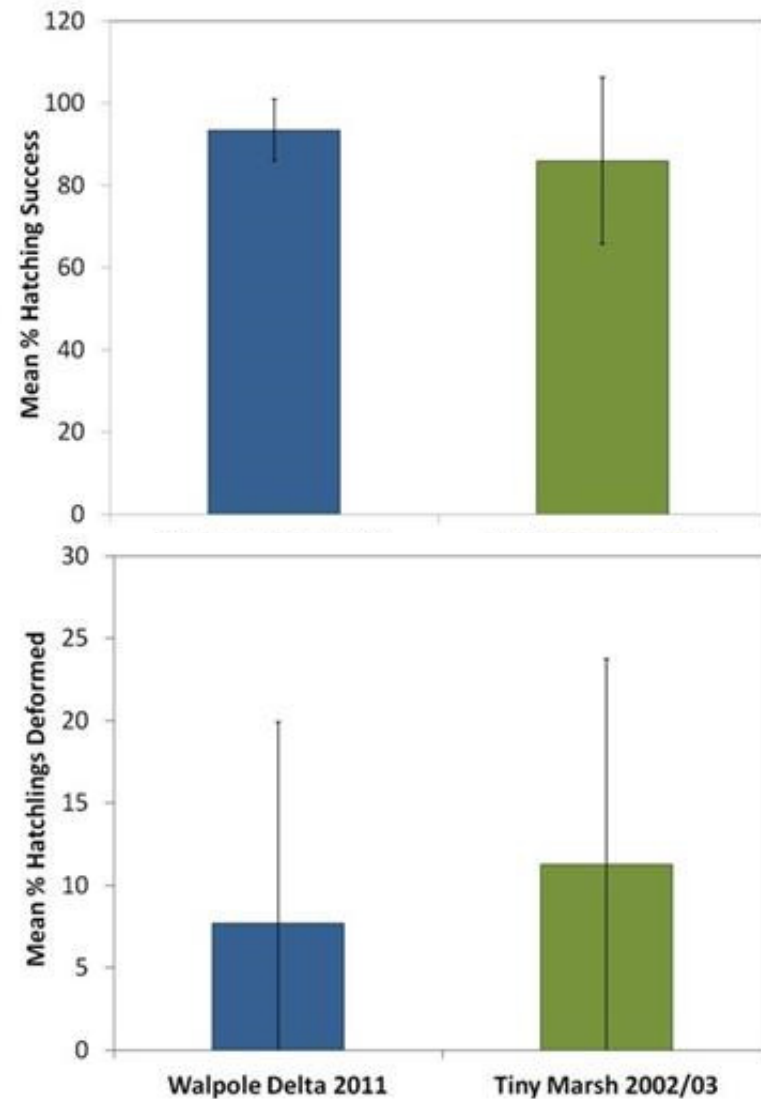
# Snapping Turtles

## Clutch Collection Locations (41)



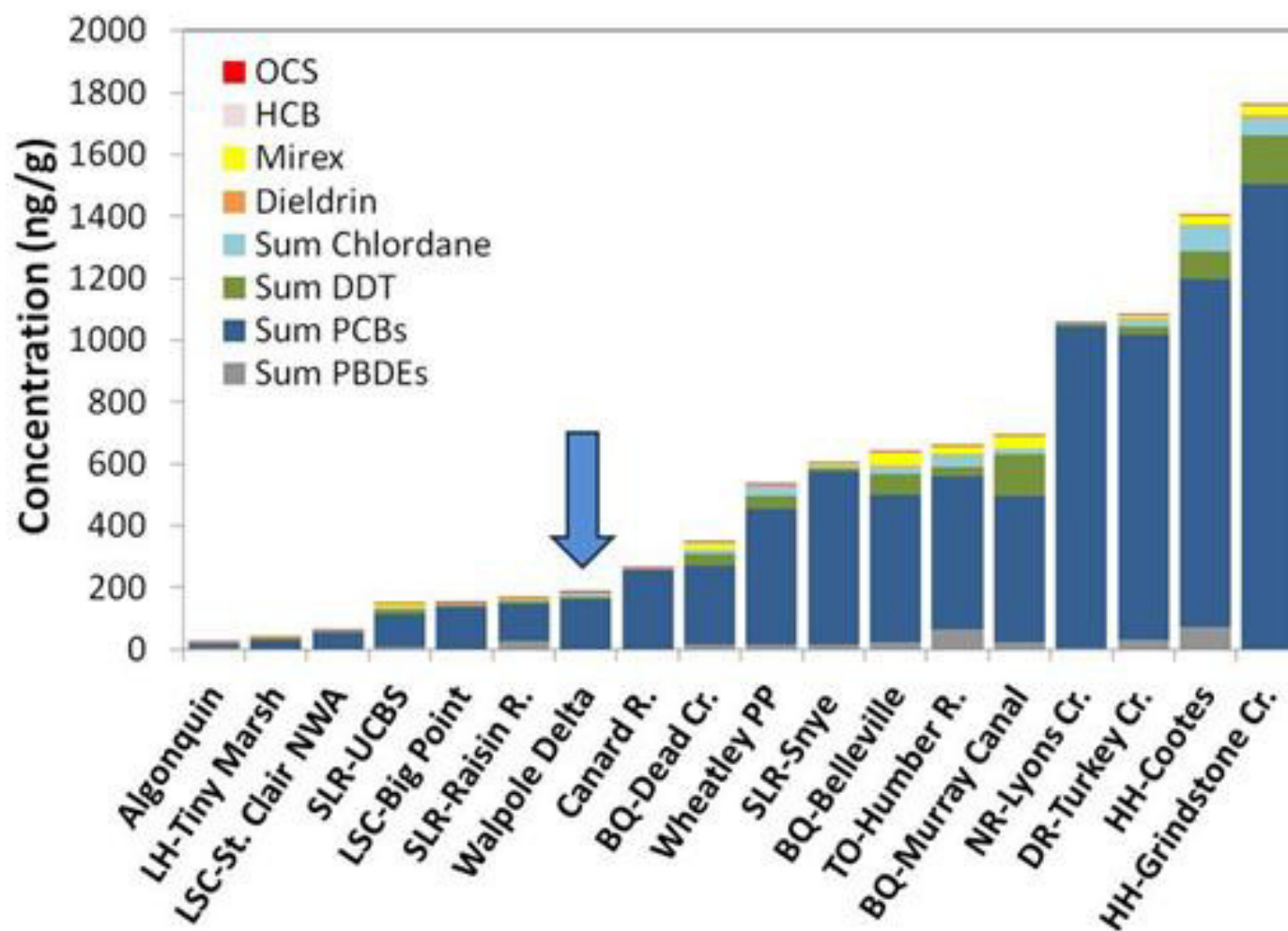
# Turtles - Hatching Success and Hatchling Deformities

- Both hatching success & frequencies of hatchling deformities were statistically similar to frequencies at the non-AOC reference site.

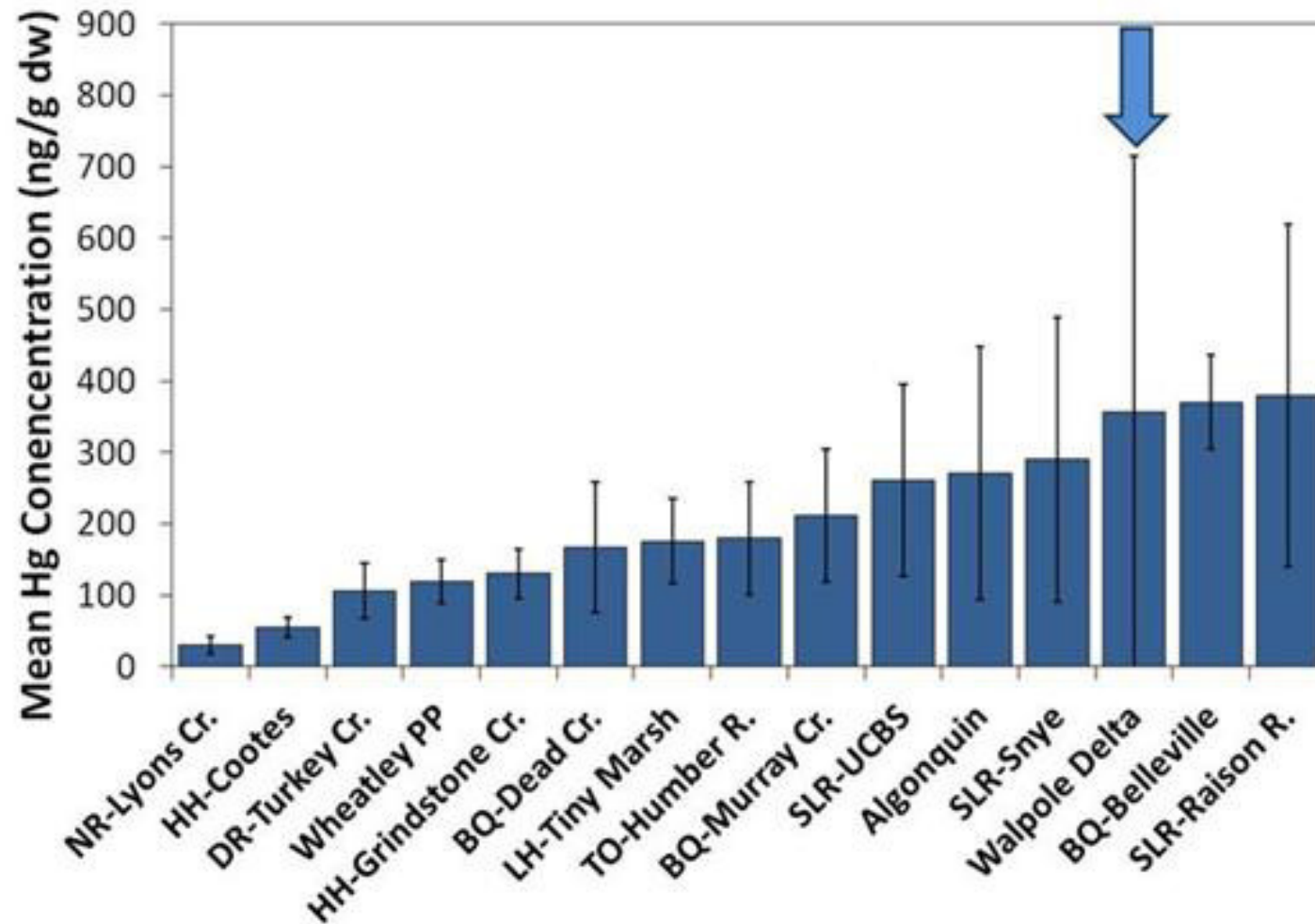




# Cumulative Totals of Contaminants in Turtles from Great Lakes



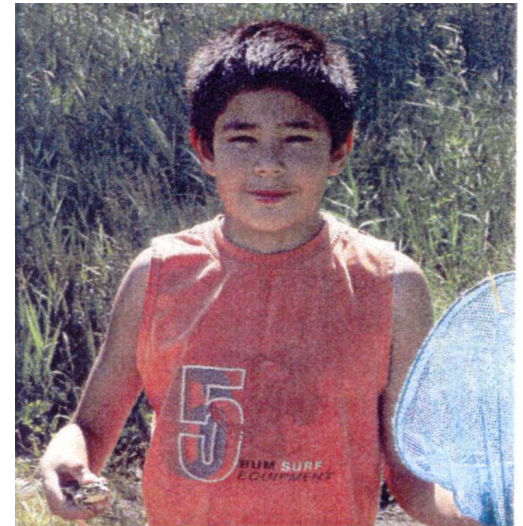
# Mercury in Turtles from Great Lakes



# Summary - Reproduction & Deformities in Aquatic Wildlife

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- High hatching success and low incidence of deformities in frogs and turtles from the St. Clair River AOC based on laboratory studies.
- Deformity frequencies in froglets were below 5% threshold in 16 of 18 surveys conducted in AOC over four years.
- At the two locations in one year (2007) where an exceedence was found, no evidence of deformities were found in subsequent surveys conducted at these locations in 2014.



# Summary – Contaminants in Frogs & Turtles

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- Contaminant burdens in frogs and turtle eggs were low overall for organochlorines including PCBs and below concentrations associated with reduced survivability.
- Hg concentrations in both species were variable among collection locations and potential effects associated with exposure at these locations are unknown.

**CONCLUSION:** Based on the current available data, no evidence of contaminant-induced impairment of reproduction or development in aquatic wildlife in the St. Clair River AOC (Ontario).



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# Thanks!

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- The authors thank the many volunteers that helped with frog surveys, water and sediment collections including Naomi Williams and our collaborators from the Walpole Heritage Centre, Ken Drouillard from GLIER and many student interns, contractors and colleagues from EC.



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