

ST. MARYS RIVER AOC: ASSESSMENT OF THE BIRD OR ANIMAL DEFORMITIES OR REPRODUCTIVE PROBLEMS BUI



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Background

- The Bird or Animal Deformities or Reproductive Problems BUI was not originally listed as impaired in the 1992 RAP
- The 2002 & 2004 RAPs indicated that the BUI required further assessment
- In 2006-2007 the BUI was listed as impaired so that BUI could be assessed under the state's restoration criteria
- The restoration criteria was accepted by the BPAC
- The listing is based on common tern collapse on Lime Island in 1999
- Collapse may have been due to dioxins, furans, and dioxin-like PCBs (Senthilkumar et al., 2003)
- Increase in contaminant levels in terns may have been due to mobilization of contaminated sediments following flood event

Introduction

- 2008--DEQ developed BUI delisting guidance document
- 2010--USFWS provided funds to DEQ to assess the Bird or Animal Deformities or Reproductive Problems BUI (“Wildlife BUI”)
- 2012--DEQ finalized assessment report
- 2013--AOC staff are examining report findings to determine whether BUI removal is warranted

DEQ Restoration Criteria

Approach 1: Observational Data & Direct Measurements

- Observational data – If deformity or reproductive problem rates are not statistically different than inland background levels or no reproductive or deformity problems are identified, then the BUI is restored. If the rates are statistically different or the amount of data is insufficient, then:
- Tissue contaminant levels – If contaminant levels in eggs, young, and/or adults are lower than the Lowest Observable Effect Level (LOEL) or are not statistically different than inland control populations, then the BUI is restored.

Approach 2: Fish Tissue Contaminant Levels as an Indicator of Problems

- If fish tissue concentrations of PCBs, dioxins, DDT, or mercury are at or lower than the LOEL known to cause reproductive or developmental problems in fish-eating birds and mammals then the use impairment is restored.

OR

- If fish tissue concentrations of PCBs, dioxins, DDT, or mercury are not statistically different than the associated Great Lake, then the BUI is restored. For connecting channels, either the upstream or downstream Great Lake may be used for comparison.

DEQ Report

- Report focused on data from Michigan's wildlife and fish contaminant monitoring programs
 - herring gulls
 - bald eagles
 - carp
- Report also examined data for other species of wildlife
 - mink, terns, herons, turtles, etc.

Herring Gulls



Herring Gull Colonies



Egg Benchmarks

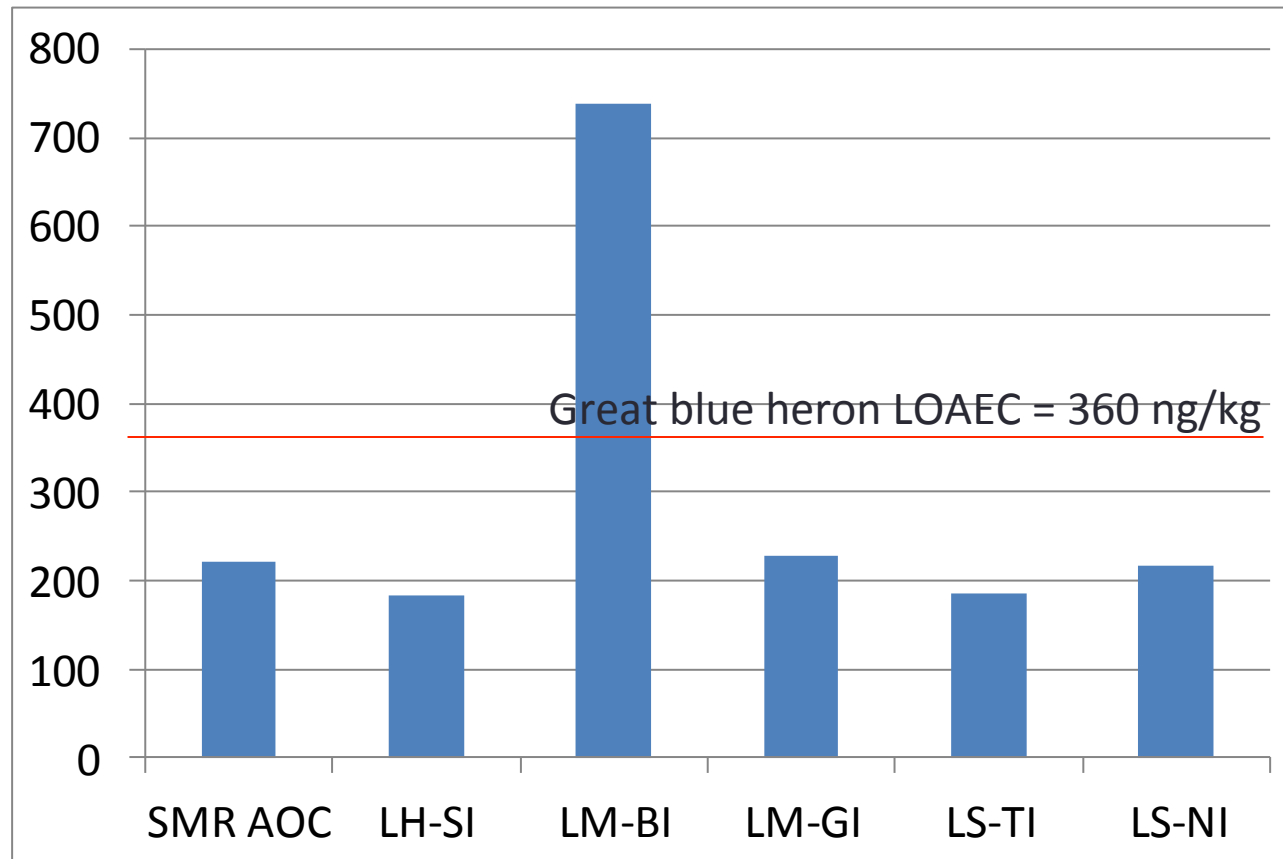
Lowest effect levels in eggs

Contaminant	Concentration	Species
TEQs	360 ng/kg	Great blue heron
TEQs	2,180 ng/kg	Forster' s tern
TEQs	1,200 ng/kg	Double-crested cormorant

TEQs is the toxic equivalent to dioxin (2,3,7,8-tetrachloro-p-dioxin)

Herring Gull Eggs

Concentration of TEQs (ng/kg) in eggs (2002-2006)



TEQ concentration in the SMR AOC = 222ng/kg

LOAEC = lowest Observable Adverse Effect Concentration

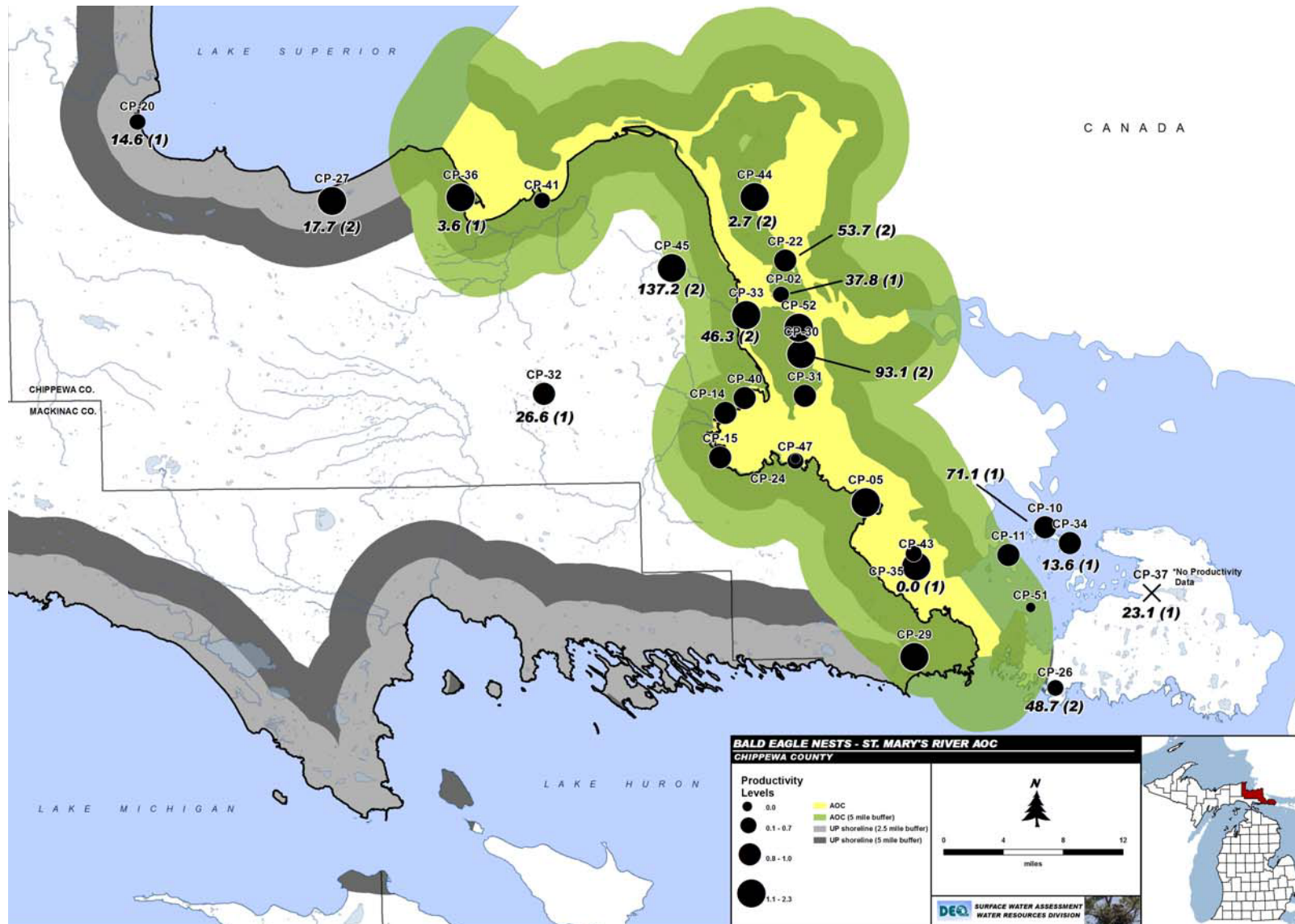
Bald Eagles



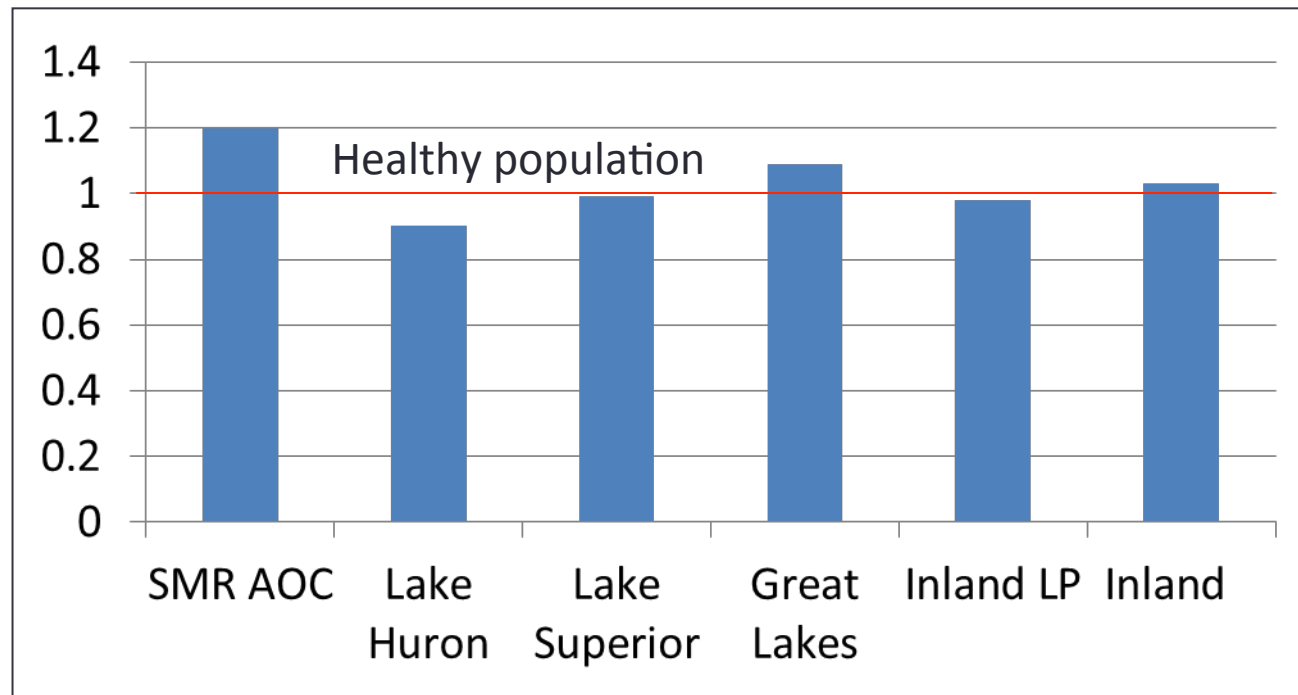
Bald Eagle Productivity

- Productivity (# fledged young / occupied nest) of 1.0 = healthy population
- 5-year average productivities used to reduce “noise” caused by non-contaminant factors
- PCB plasma concentration of $\leq 35 \mu\text{g/kg}$ associated with a healthy population

Bald Eagle Territories



Bald Eagle Productivity (2006-2010)

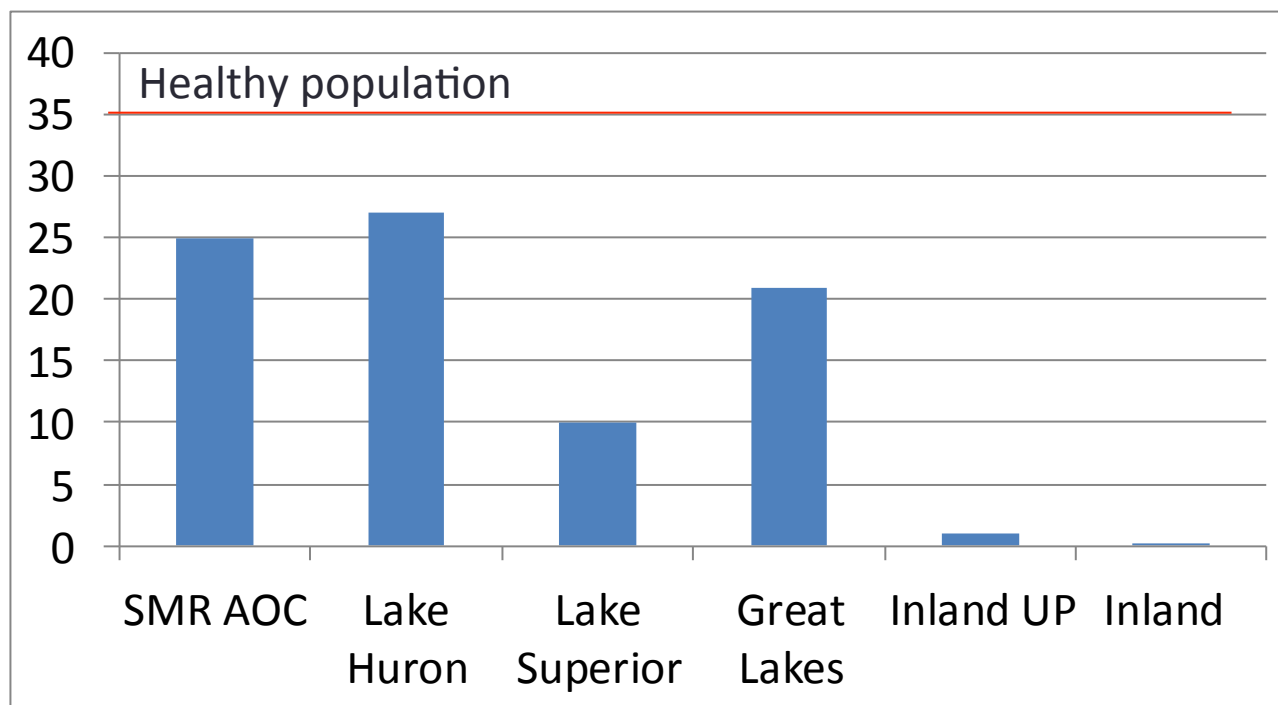


Productivity for the SMR AOC = 1.2

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Bald Eagle PCB Levels

Plasma PCB concentrations ($\mu\text{g/kg}$) (2004-2008)



PCB levels in the SMR AOC = $25.0 \mu\text{g/kg}$

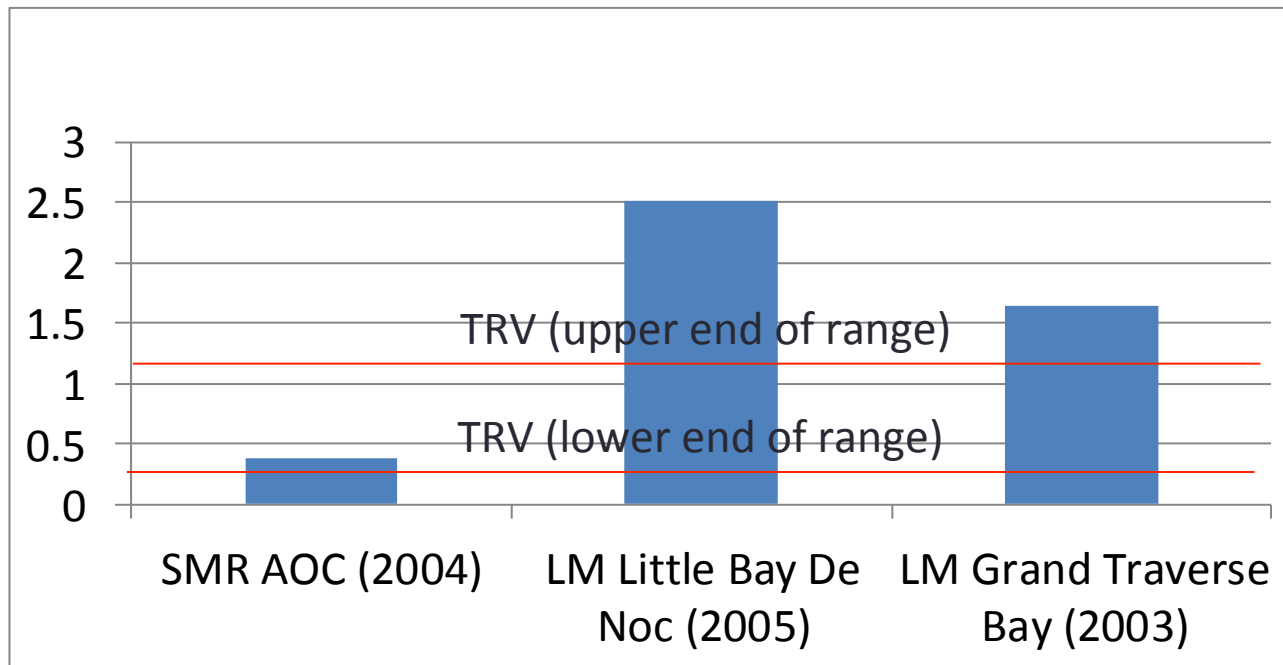
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Carp



Carp PCB Levels

Whole carp PCB concentrations (mg/kg)



- TRV = Toxic Reference Values
- The TRVs on this slide indicate the fish tissue range considered to be protective of mink (0.25 – 1.1 mg/kg)
- PCB concentrations in the SMR AOC = 0.39 mg/kg based on larger fish than normally consumed by wildlife

Carp Size

Carp collected by DEQ (> 20 inches) are larger than fish normally consumed by wildlife

Species	Length of fish (inches)
Common terns	2.4 to 5.9
Bald eagles	6 to 18 (average = 14)
Mink	1.0 to 7
Otters	1.0 to 20 (normally 6 to 7)

Conclusions for Herring Gulls

Conclusions:

- PCB and TEQ concentrations in herring gull eggs are lower than lowest effect level benchmarks (benchmark: 360 ng/kg; SMR: 222 ng/kg)
- TEQ concentrations in herring gull eggs are lower than 5 of the 8 colonies located outside the AOC
- Results of CWS study critical for determining whether common terns are currently being impacted

Restoration Criteria:

- Meets criteria under Approach #1: Tissue contaminant levels are lower than the Lowest Observable Effect Level (LOEL) and are not statistically different than inland control populations.

Conclusions for Bald Eagles

Conclusions:

- Productivity data indicate a healthy bald eagle population (healthy population: 1.0; SMR: 1.2 fledged nestlings/occupied nest)
- Bald eagle productivity was higher than the 5 comparison populations
- PCB concentrations in bald eagle plasma are lower than benchmarks (benchmark: $\leq 35 \mu\text{g/kg}$; SMR: $25 \mu\text{g/kg}$)

Restoration Criteria:

- Meets criteria under Approach #1: Observational data is not statistically different than inland background levels and no reproductive or deformity problems were identified. In addition, PCB concentration are lower than benchmark.

Conclusions for Carp TRVs for Mink

Conclusions:

- PCB concentrations in carp exceed the low end (0.25 mg/kg), but not the high end (1.1 mg/kg) of the fish tissue range considered to be protective of mink
- PCB concentration in the SMR is lower than comparison sites
- It is expected that large carp would have higher concentrations of PCBs than fish consumed by most wildlife. If the ratio of PCB concentration in forage fish to carp in the SMR is equivalent to that in Lake Huron then the estimated PCB concentration in SMR forage fish is 0.04 mg/kg (well below the fish TRV).

Restoration criteria:

- Meets criteria under Approach #2: Fish tissue concentrations are not statistically different than the associated Great Lake. Also, PCB concentrations are below the high end LOEL range

Questions and Comments

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