



Project 80: Birds as Indicators of Contaminant Exposure and Effects in the Great Lakes – the Maumee AOC

Christine Custer and Thomas Custer,
USGS, Upper Midwest Environmental Sciences Center
La Crosse, WI

Introduction

Why swallows?

Overview – GLRI project

Specifics for the Maumee AOC





- Contaminant research on birds since the 1970s
- Worked on the East Coast and Gulf Coast before moving to the upper Midwest in 1991
- Began working with tree swallows in the mid-1990s

Why swallows - rather than other bird species



Scope of Work for GLRI Project 80

Use tree swallows and colonial waterbirds to:

- 1) Assist States & EPA in the assessment of wildlife BUIs (n = 2 BUIs)
- 2) Evaluate remedy effectiveness
- 3) Enhance our understanding of contaminant effects



BUI assessments

1. Bird or Animal Deformities or Reproduction Problems



2. Degradation of Fish and Wildlife Populations

Wildlife BUIs



Measure tissue concentrations (e.g. PCBs, dioxins and furans, pesticides, trace elements [Hg, Se, Cd, etc.]) in eggs, and then

Compare those to effect concentrations

Directly measure reproductive rates and

Assessing other effect endpoints (EROD, -omics, genetic damage, oxidative stress)

Using genetic damage as a surrogate for polycyclic aromatic hydrocarbons (PAHs – petroleum products)



Overview and Progress -

- 60 sites in 25 AOCs (24 sites in 2010 ▲ ; 11 new in 2011 ▲ ; 12 more in 2012 ▲ ; 7 new in 2013 ▲ ; 6 new in 2014 ▲)



Toledo, OH



Ottawa River

Ottawa River (since 2010) –
pre-, during, and post-
dredging

Boxes at 3 landfills

Maumee AOC

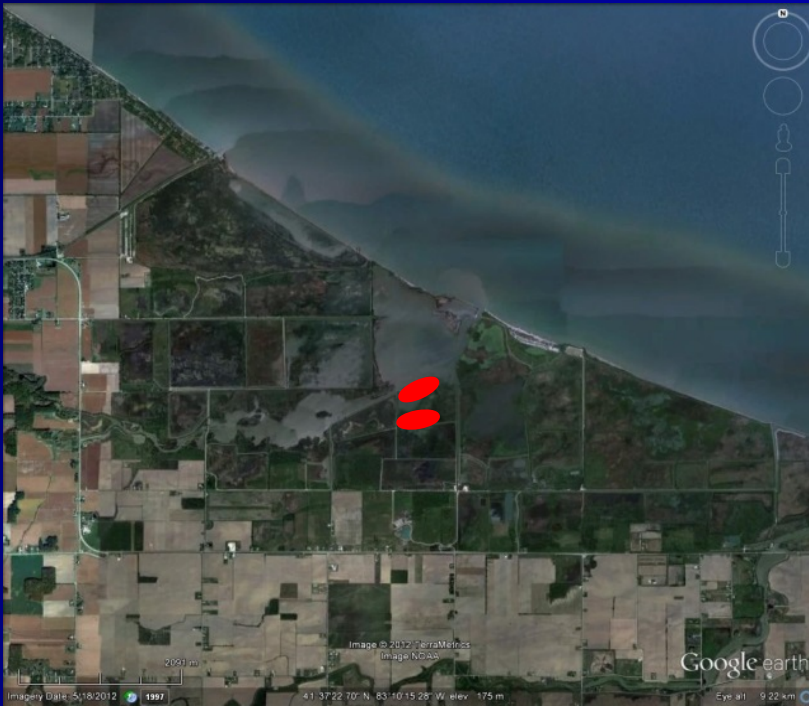
Lower Maumee River (since
2011)



Maumee River

Ottawa Nat'l Wildlife Refuge

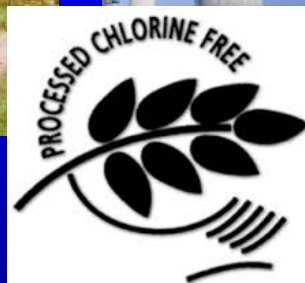
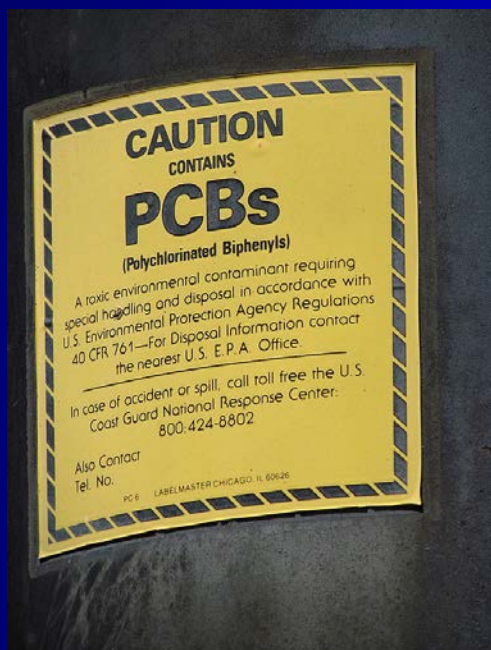
(impoundment and along Crane Creek)



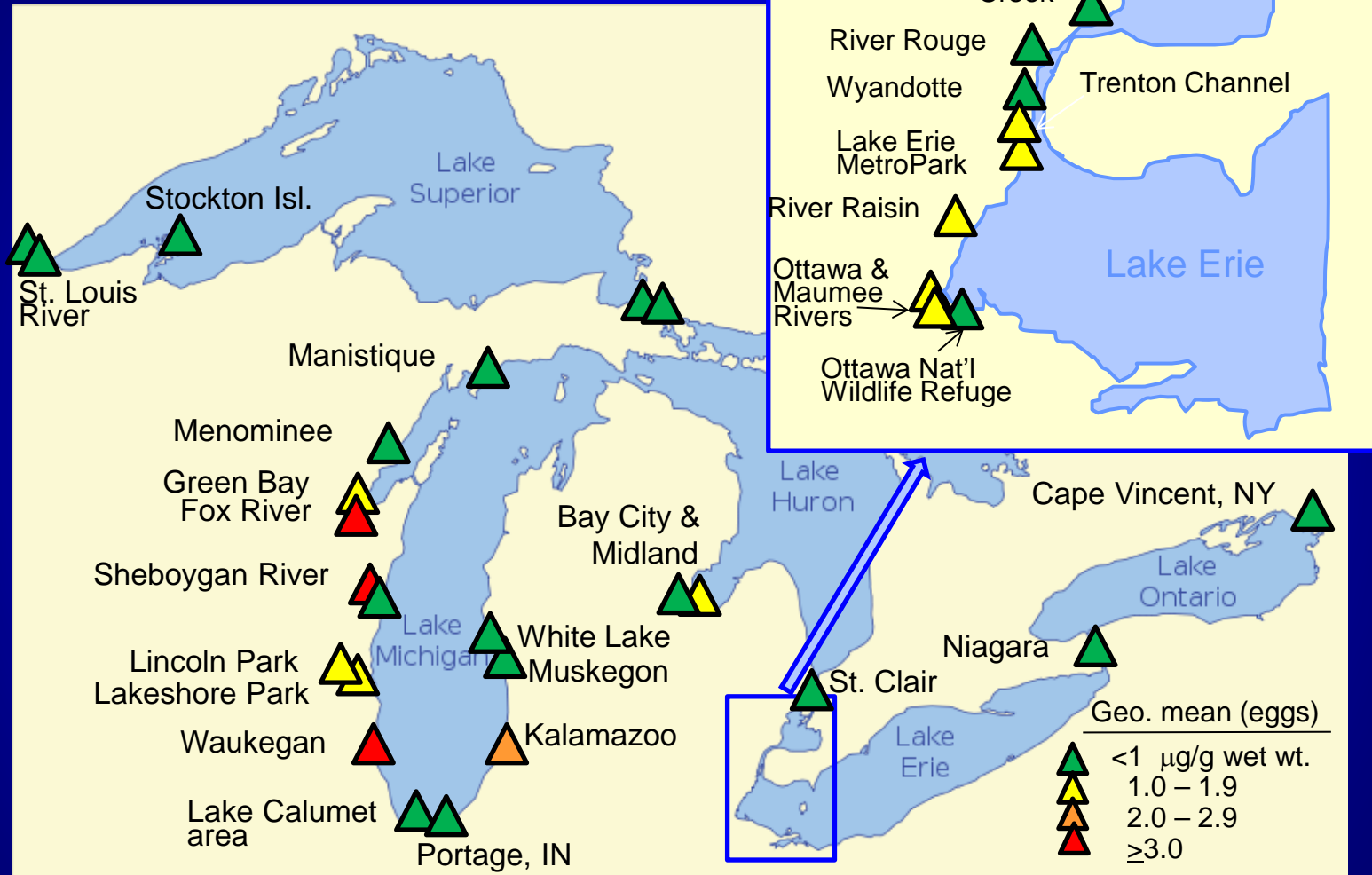
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Draft – preliminary results; please do not cite without consultation

Chemical data



PCBs – 2010, 2011, & 2012 Tree swallow eggs



Dioxins & Furans – 2010 & 2011

Tree swallows




Mercury – 2010 & 2012

Tree swallows




Additional contaminant information available



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Providing the scientific information needed by managers, decision makers, and the public to protect, enhance, and restore the ecosystems in the Upper Mississippi River Basin, the Midwest, and worldwide.



Great Lakes Restoration [link to information](#) [show all topics](#)


Scientists focus efforts on controlling Asian carp, investigating contaminant and botulism effects on birds, and understanding ecology of tributaries in support of the Great Lakes.

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National Native American and Alaska Native Heritage Month – November 2014

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The UMEC works with a wide range of [partners](#) to conduct applied research essential to solving natural resource management problems. For examples of the impact of UMEC science, click on image.



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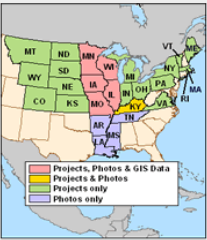
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Wildlife Toxicology

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Projects, Photos & GIS Data
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Photos only

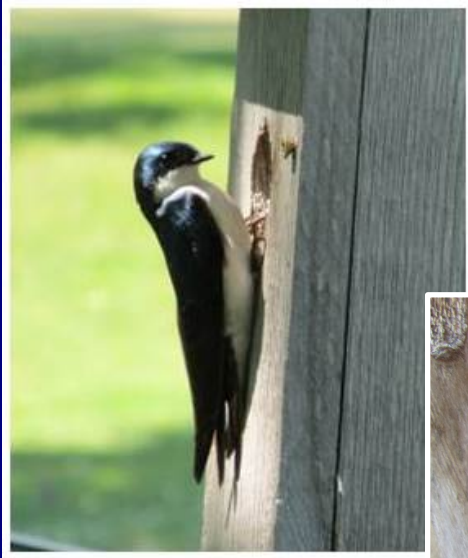
Upper Mississippi River System:

[UMRR-EMP Long Term Resource Monitoring Program](#)

The Upper Midwest Environmental Sciences Center is the science leader of the [Long Term Resource Monitoring Program](#) (LTRMP), an element of the U.S. Army Corps of Engineers' [Upper Mississippi River Restoration—Environmental Management Program](#) (UMRR-EMP). The LTRMP is the Nation's largest river monitoring program with six remote state-operated [field stations](#).

BUI – Bird or Animal Deformity or Reproductive Problems

- Number of nests initiated
- Number of eggs laid
- Number (%) that hatch
- Number of young fledged



Ottawa River sites (n=3 sites, 5 years) – normal reproduction
- Nearly all nests hatch and fledge young

Ottawa Nat'l Wildlife Refuge – normal reproduction

Maumee River site (n=1 site) – nearly total reproductive failure in 2014 and poor reproduction in 2012 & 2013



Nests are initiated, eggs are laid,
but then many nests abandoned

It's a mystery that we wish to
solve!



Options we've ruled in or ruled out.

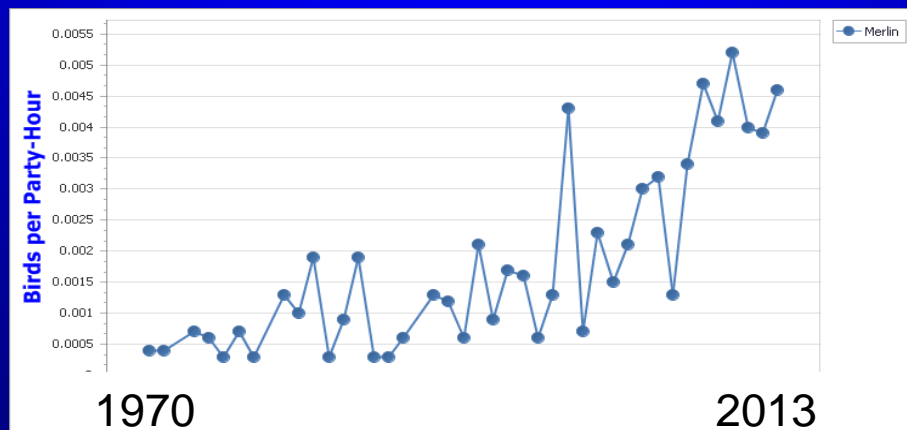
Weather – similar between Ottawa and Maumee sites

Predators – boxes are protected from ground predators, but an aerial predator could be possible

Solution: add new box arrays upstream or downstream to see if other nearby sites are similarly affected

Exposure to unidentified contaminants

Solution: biomarkers may help parse out and direct this assessment



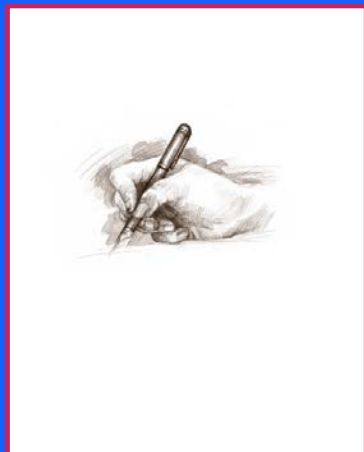
2015 and beyond

Continue collecting samples and monitoring reproduction
at the Maumee site

Expand sites on the Maumee River (upstream and downstream)
and add other locations of particular interest

See what information we can glean from our biomarker data
as well as other information for the Maumee

http://www.umesc.usgs.gov/wildlife_toxicology/glri_project80.html



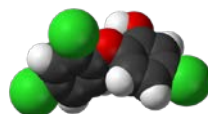
Goals and objectives



Maps and habitats at current study sites

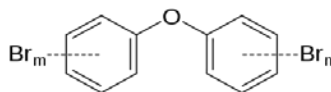


Why use swallows?



PFCs

PBDEs





Thank you