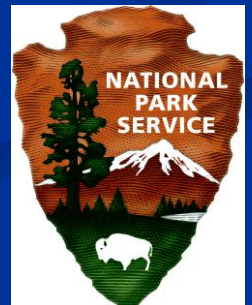


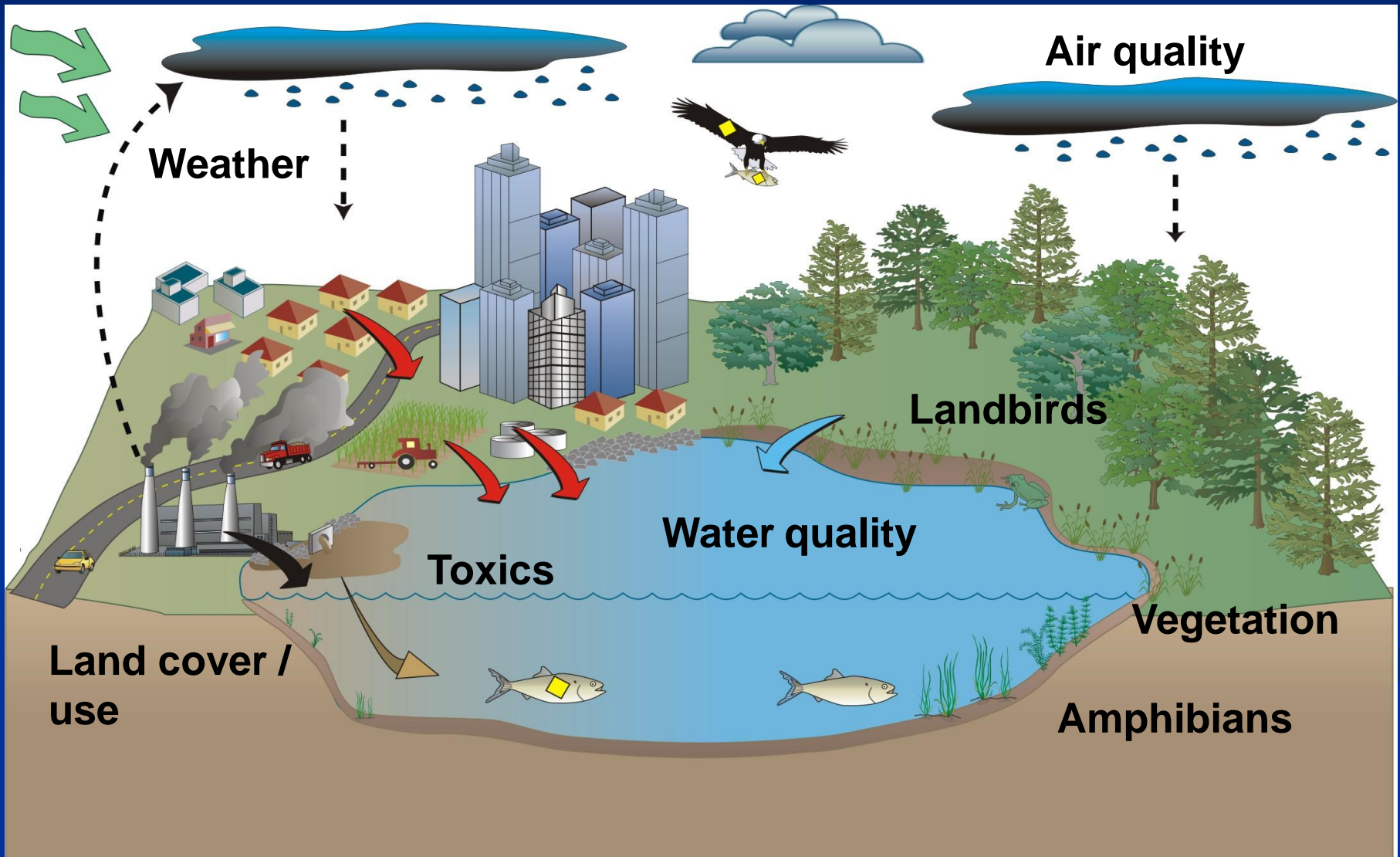
# MONITORING PERSISTENT CONTAMINANTS IN BALD EAGLES

Bill Route, National Park Service, Great Lakes  
Network

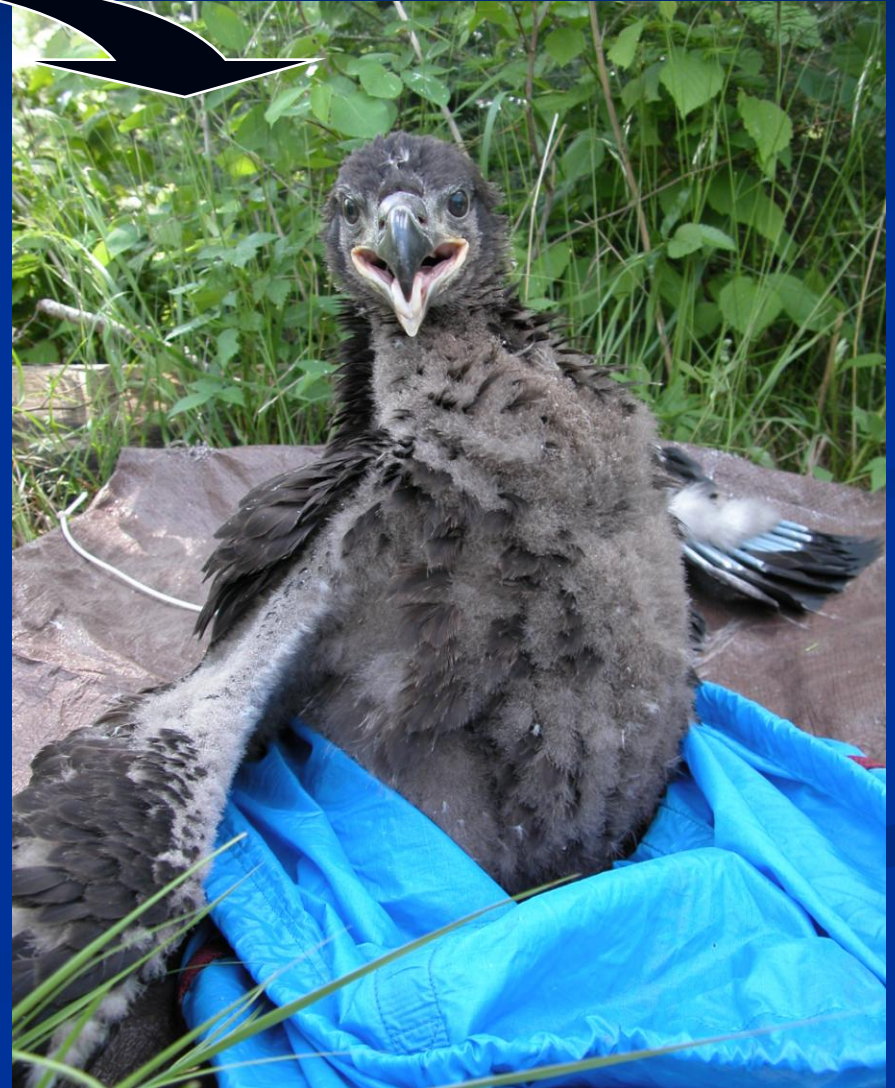
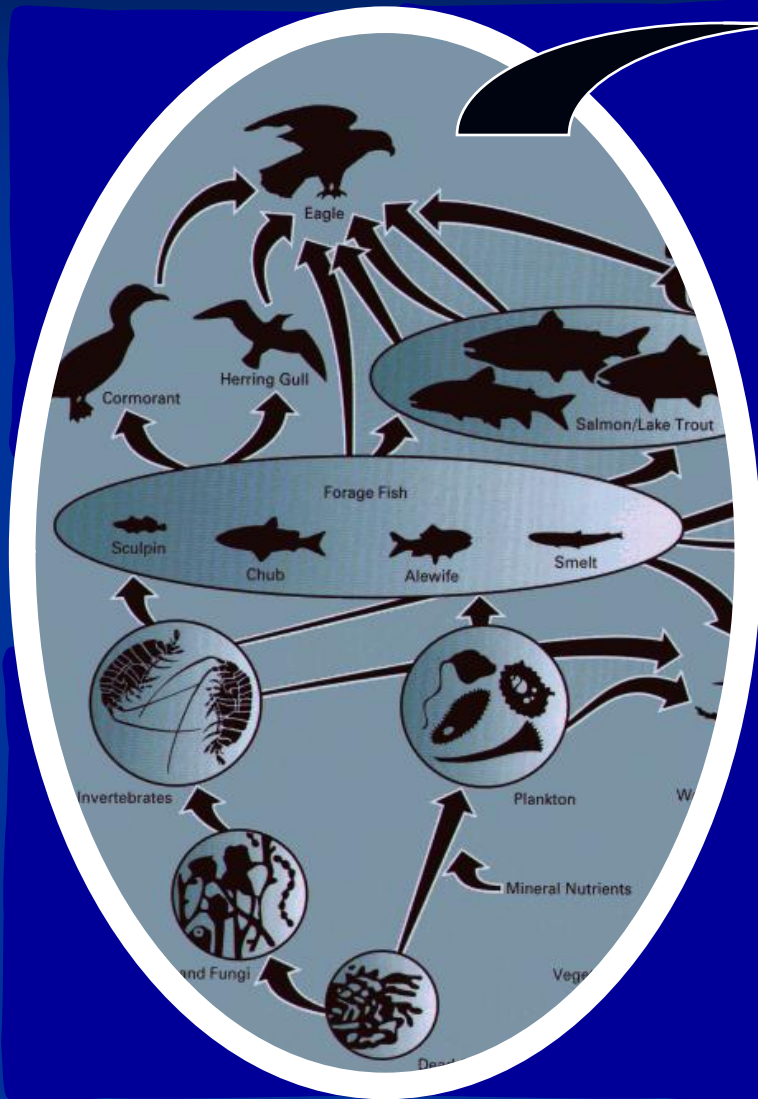
Mike Meyer, Wisconsin Department of  
Natural Resources



# Ecosystem approach



# Bald Eagle as a Sentinel



# Contaminants Monitoring at 3 Parks

## Heavy Metals

- Mercury (THg)
- Lead (Pb)

## Banned

- PCBs (75 congeners)
- DDT (DDE & DDD)

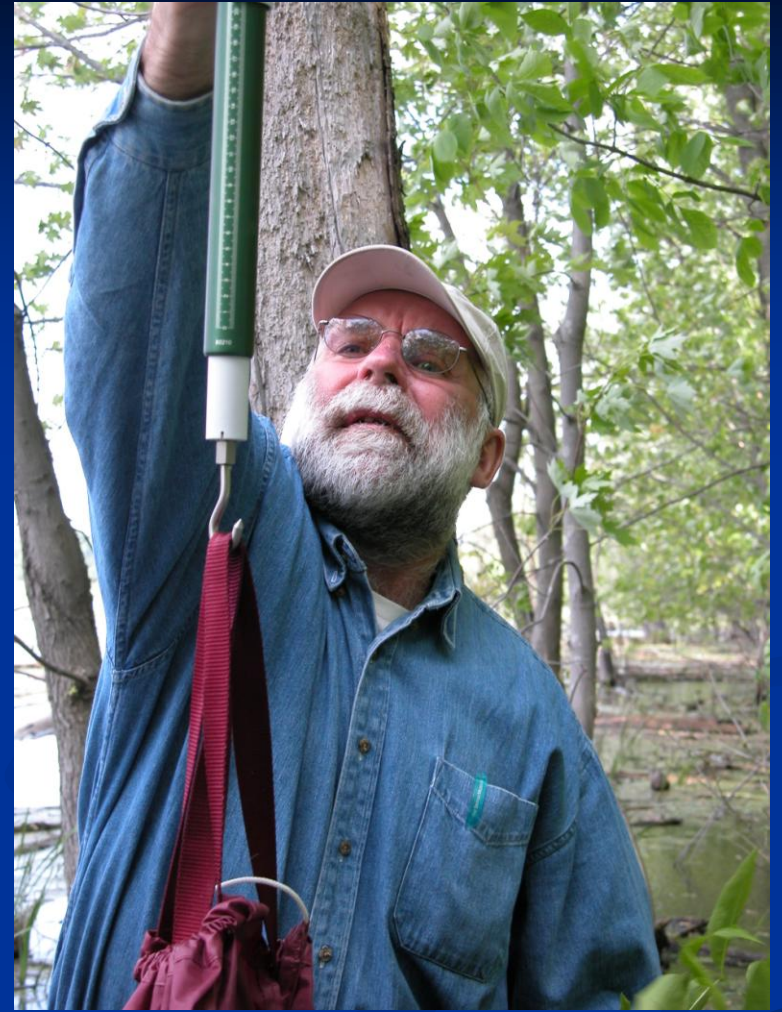
## New & Emerging

- Brominated flame retardants (PBDEs; 9)
- Perfluorinated compounds (PFCs; 16)













# Back in the Nest







# Quality Assurance

National Park Service  
U.S. Department of the Interior

Natural Resource Program Center

## Protocol for Monitoring in Bald Eagles - V Great Lakes Invento

Natural Resource Report NPS



## Methods for Analyzing and Presenting Bald Eagle Productivity and Contaminants Data



Departme

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has com  
for the examinatio

Protocol for M  
National Pa

DRINKING WATER - GROUP II UNREGULATED CONTA  
MICROBIOLOGY, DRINKING WATER - PRIMARY INOR  
DRINKING WATER - RADIOCHEMISTRY, NON-POTAB  
NON-POTABLE WATER - METALS, NON-POTABLE WAT  
TOXICITY, NON-POTABLE WATER - VOLATILE ORGANIC  
MATERIALS - GENERAL

## ESS ORG METHOD 1810

### Blood Serum for PCB Congeners, Pesticides and PBDE Congeners

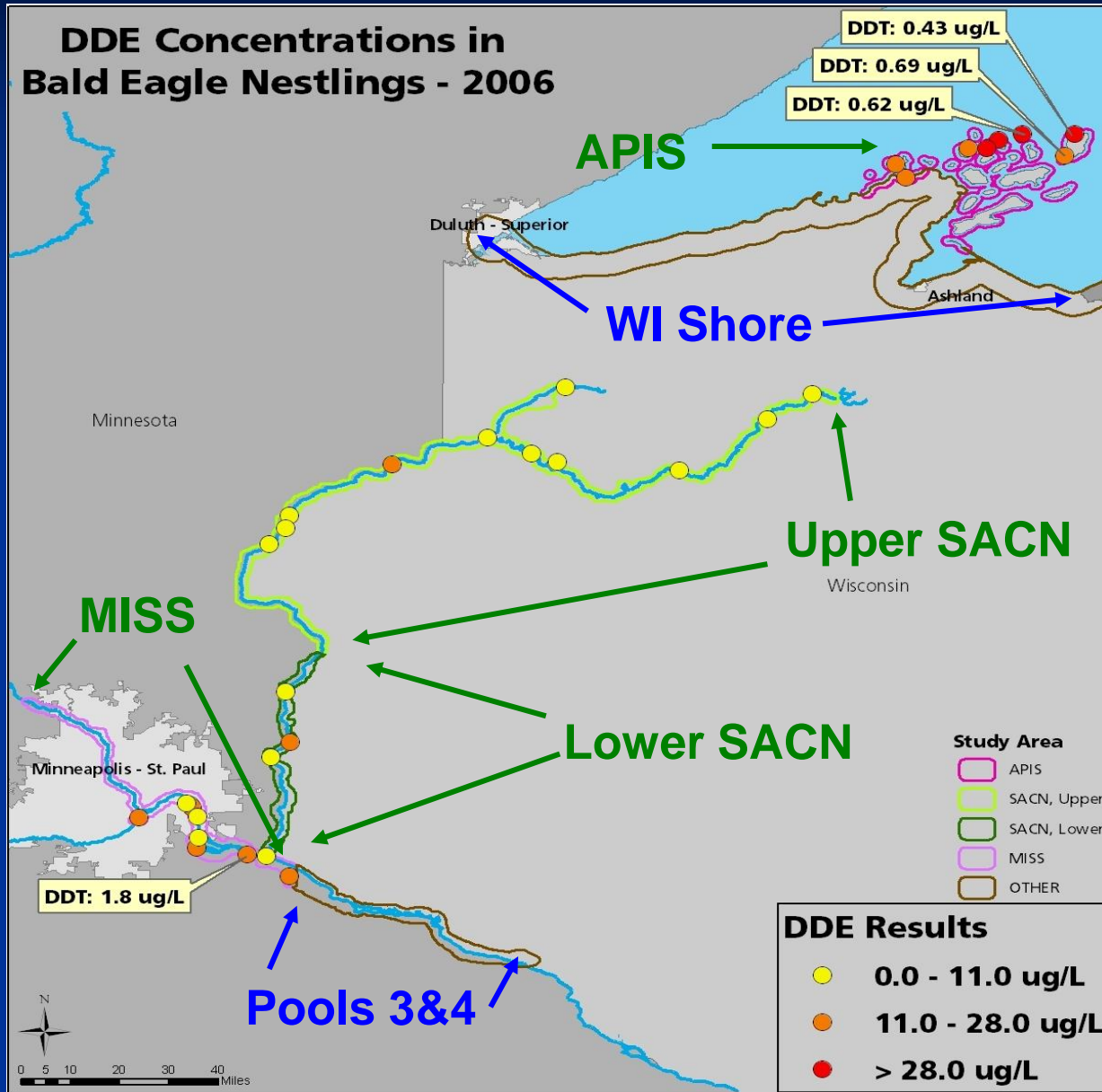
Matrix: Serum

#### Scope and Application

- 1.1. This method may be used to analyze human or other blood serum for PCB congeners and chlorinated pesticides. PCB congeners included in this method are quantitated using the "Mullin 1994" mixture of Aroclors.
- 1.2. This method may be used to analyze human or other blood serum for polybrominated diphenyl ethers (PBDEs) by GC-(negCI)MS.

PCB Congener BZ # *(Ref D)	LOD (µg/l)	LOQ (µg/l)	PCB Congener BZ # *(Ref D)	LOD (µg/l)	LOQ (µg/l)
#3	6.0	20.0	#97	0.10	0.33
#4/10	0.70	2.3	#87	0.10	0.33
#7/9	0.15	0.50	#85	0.10	0.33
#6	0.20	0.66	#136	0.20	0.66
#8/5	0.40	1.3	#77/110	0.10	0.33
#19	0.15	0.50	#82	0.10	0.33
#18	0.15	0.50	#151	0.10	0.33
#15/17	0.20	0.66	#135/144	0.10	0.33
#24/27	0.15	0.50	#123/149	0.10	0.33
#16/32	0.20	0.66	#118	0.15	0.50
#26	0.15	0.50	#146	0.10	0.33
#25	0.15	0.50	#132/153/105	0.15	0.50
#28/31	0.30	0.99	#141	0.10	0.33
#33	0.15	0.50	#137/176	0.10	0.33
#53	0.20	0.66	#163/138	0.15	0.50
#51	0.10	0.33	#158	0.15	0.50
#22	0.20	0.66	#178	0.10	0.33
#45	0.10	0.33	#187/182	0.070	0.23
#46	0.10	0.33	#183	0.070	0.23
#52	0.10	0.33	#128	0.070	0.23
#47/48	0.10	0.33	#167	0.10	0.33
#44	0.10	0.33	#185	0.070	0.23
#37/42	0.10	0.33	#174	0.070	0.23
#41/71/64	0.15	0.50	#177	0.070	0.23
#40	0.10	0.33	#202/171	0.070	0.23
#63	0.10	0.33	#172	0.10	0.33
#74	0.10	0.33	#180	0.10	0.33

# DDT/DDE Distribution



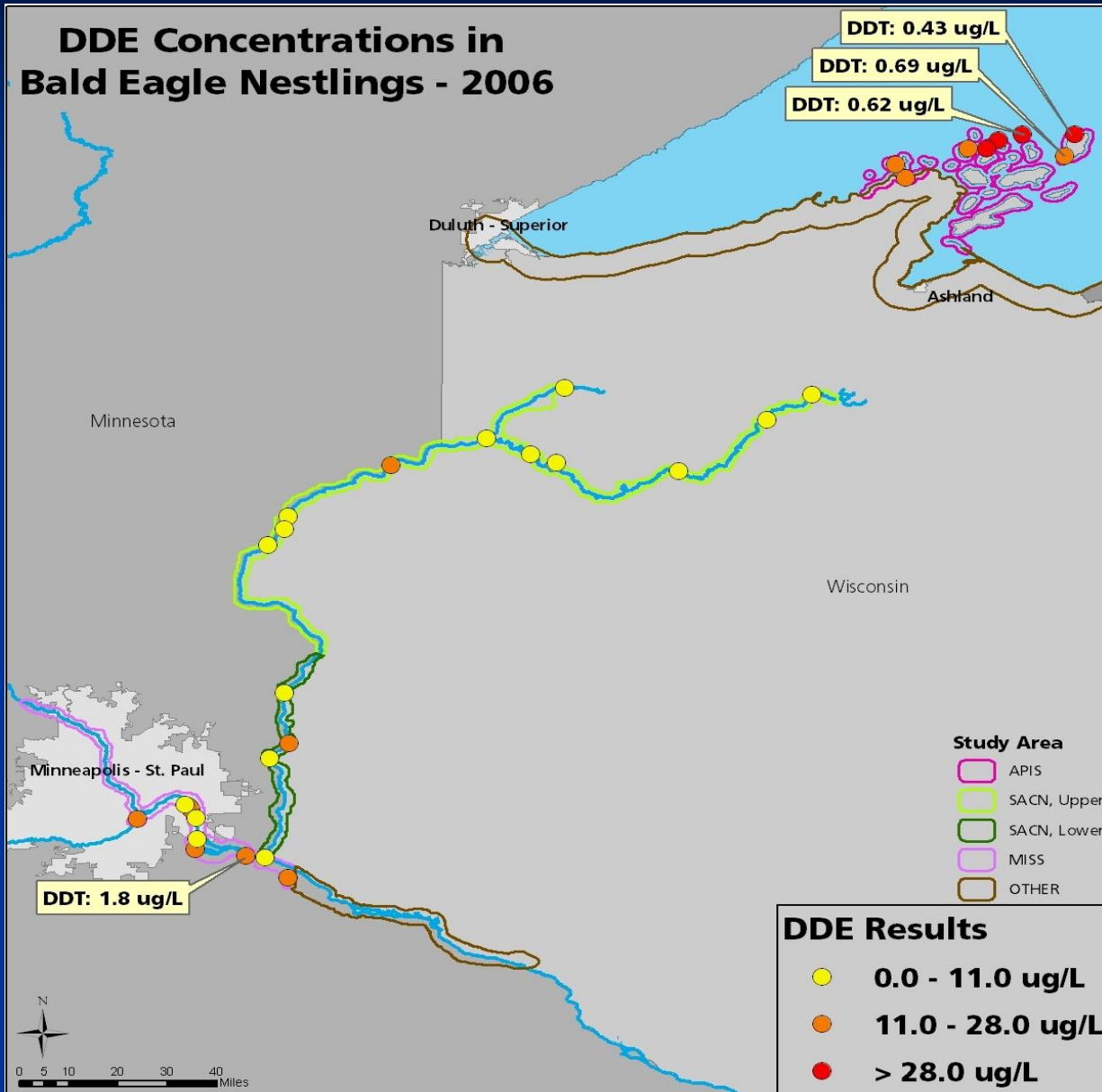
ppb

Lower

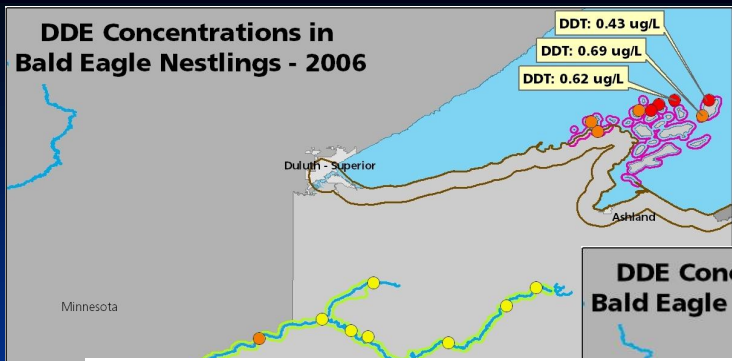
Higher



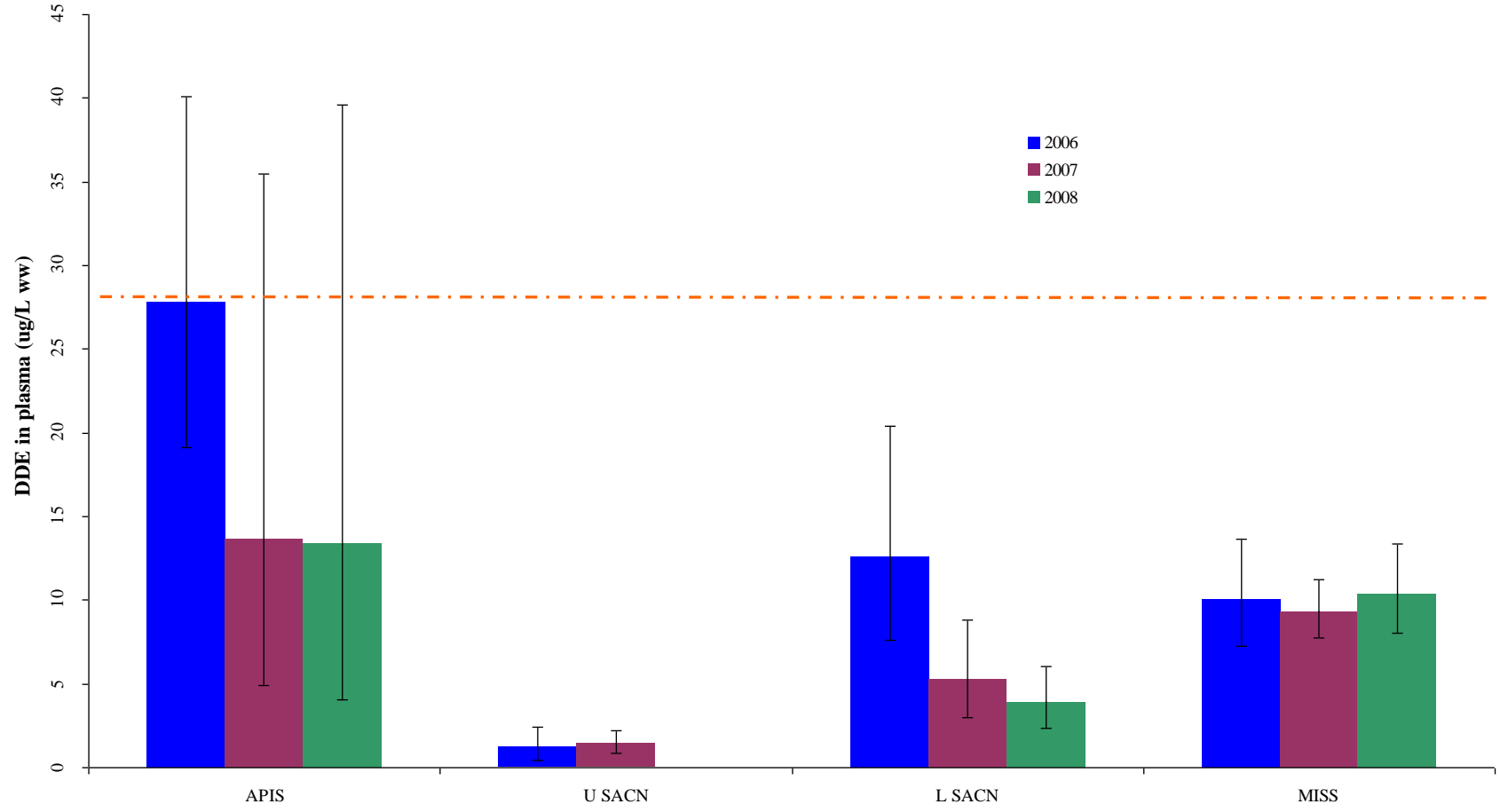
# DDT/DDE Distribution



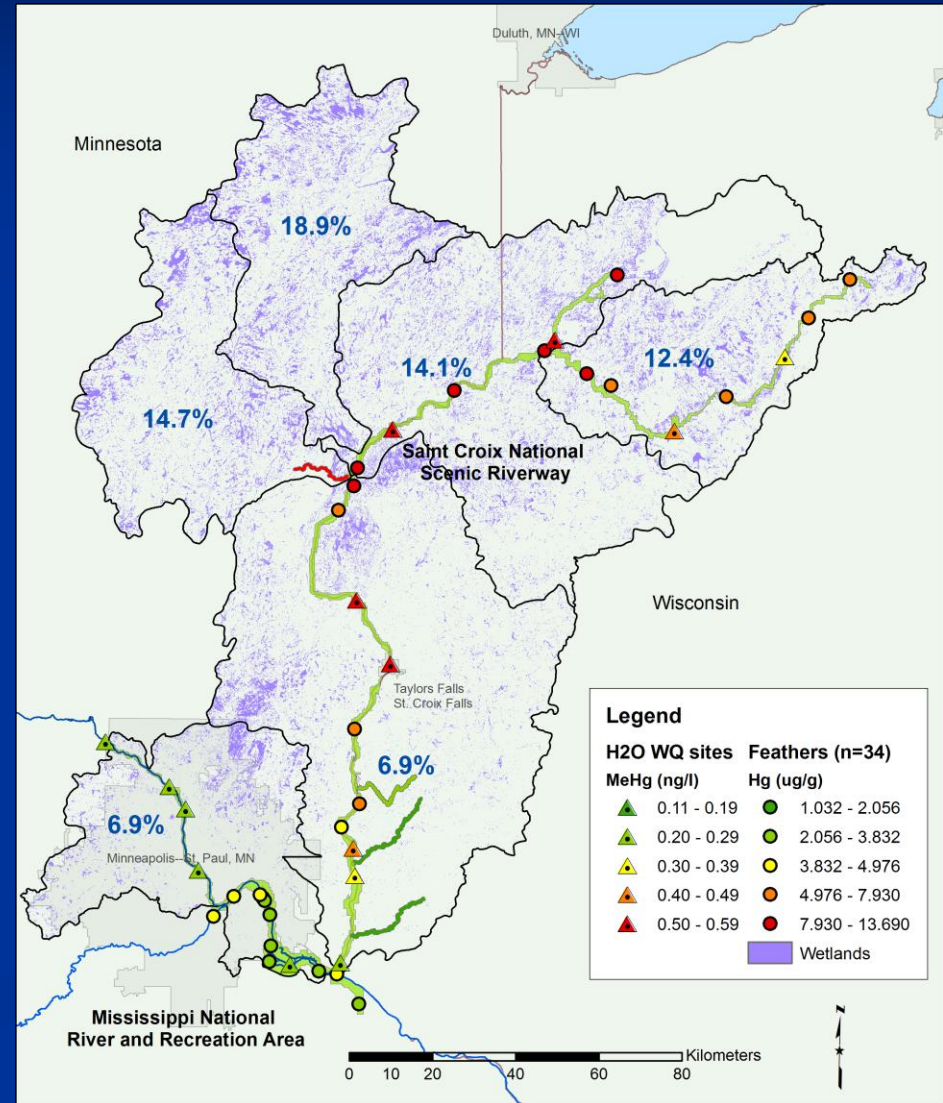
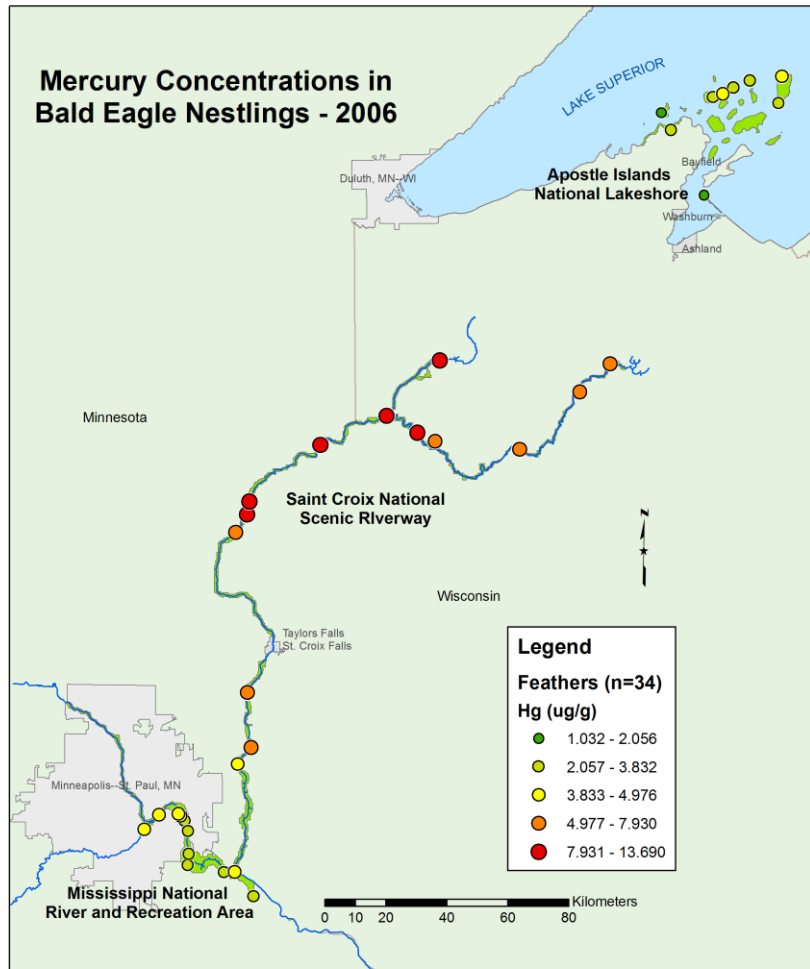
### DDE Concentrations in Bald Eagle Nestlings - 2006



### DDE Concentrations in Bald Eagle Nestlings - 2007

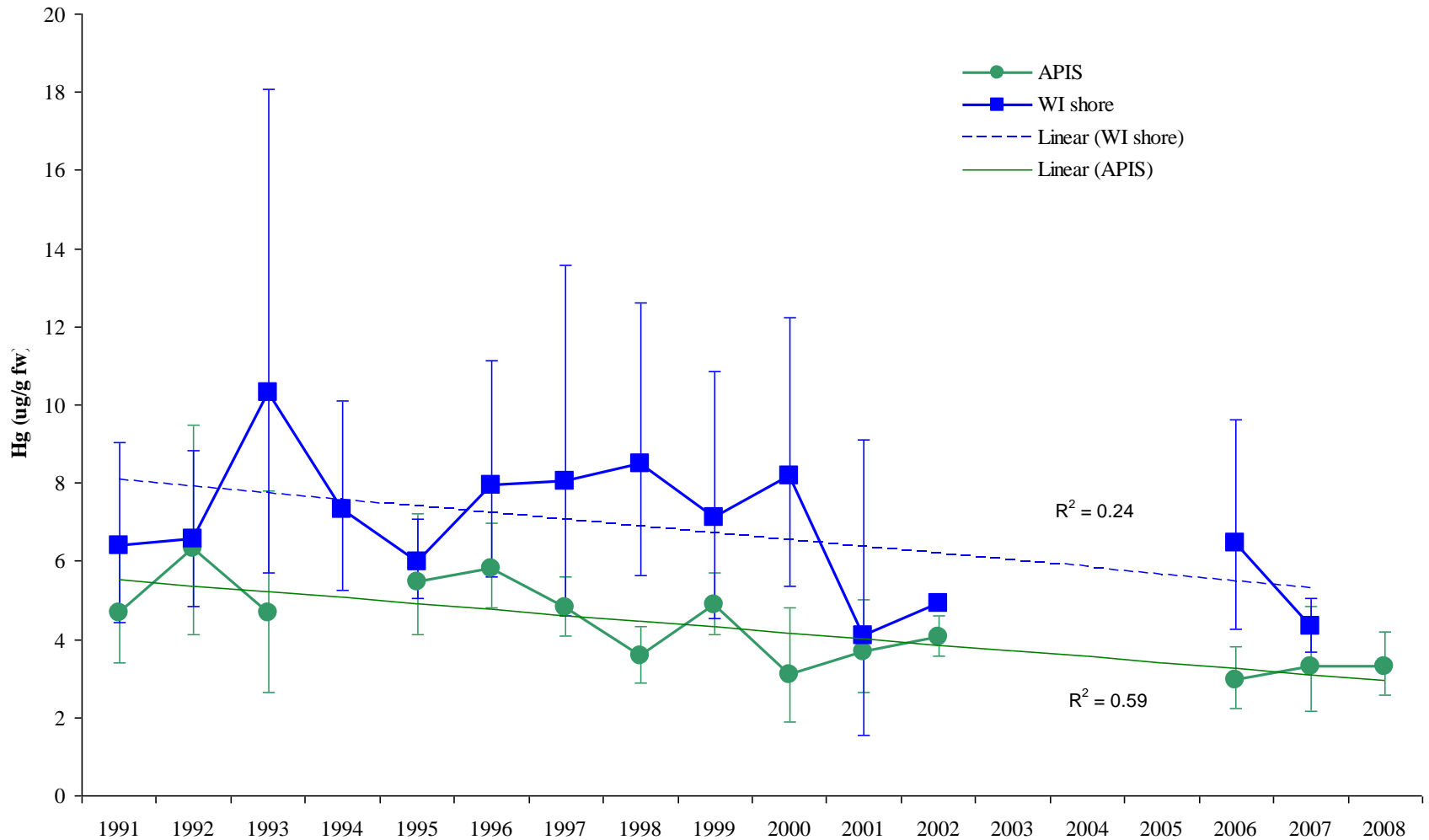


# Mercury Distribution

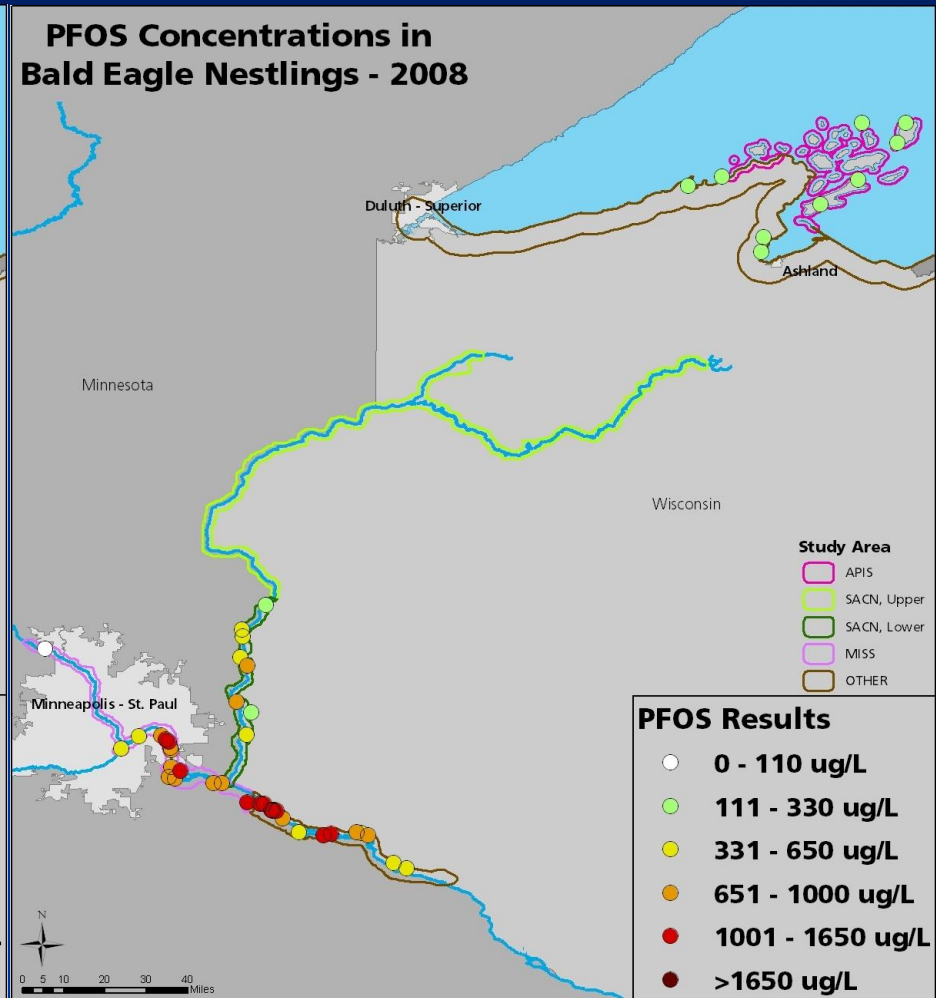
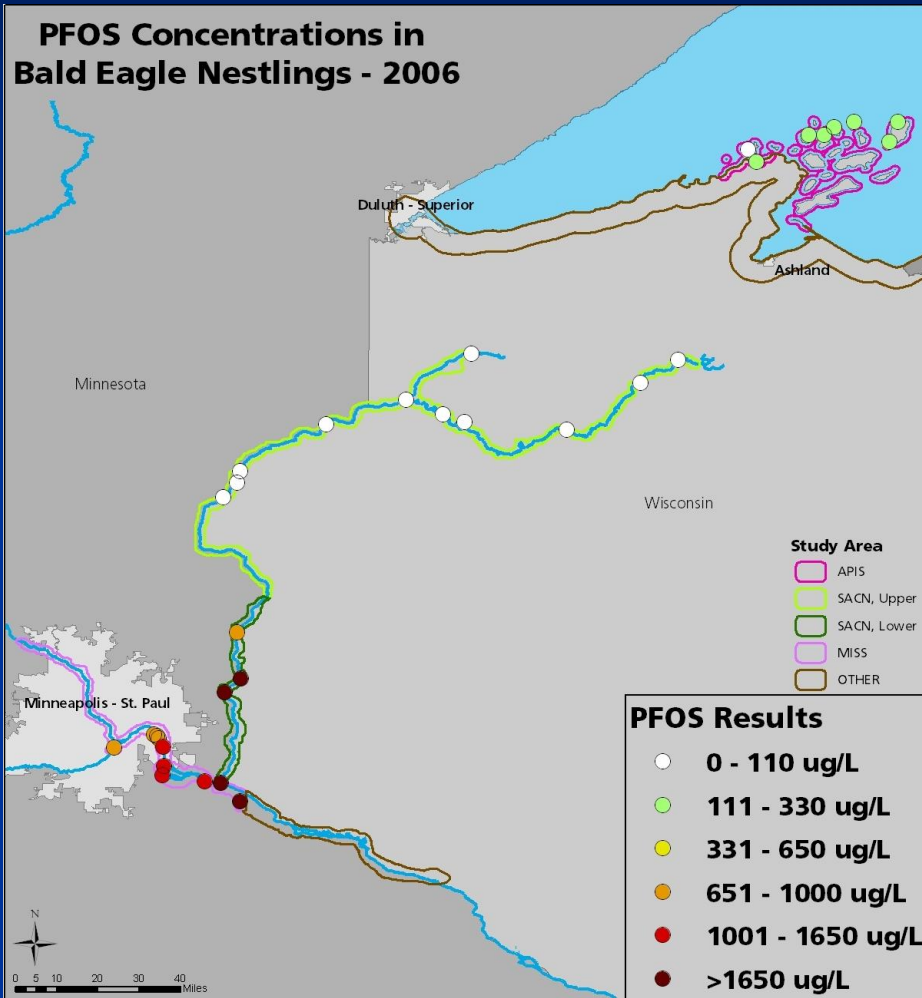




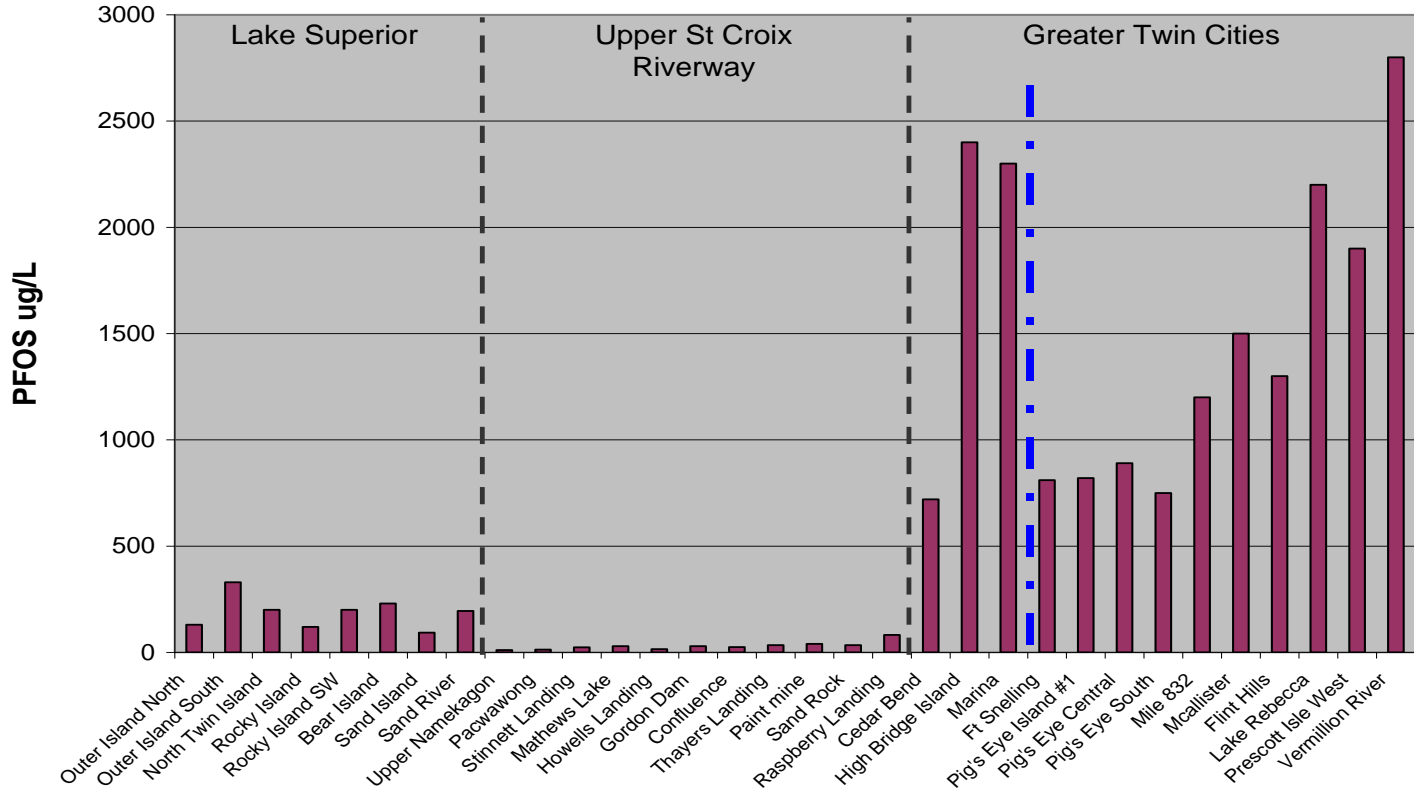
# Geometric mean and 95% CI for THg Lake Superior study areas



# PFOS Distribution



2006

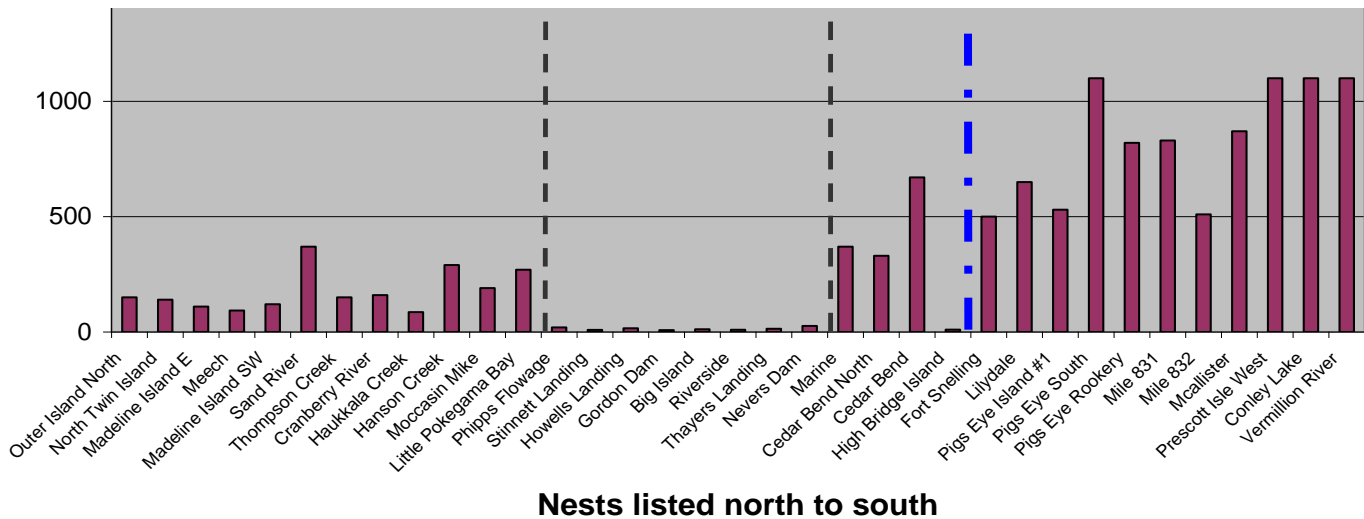


93,000 X

0.03

36,000 X

2007

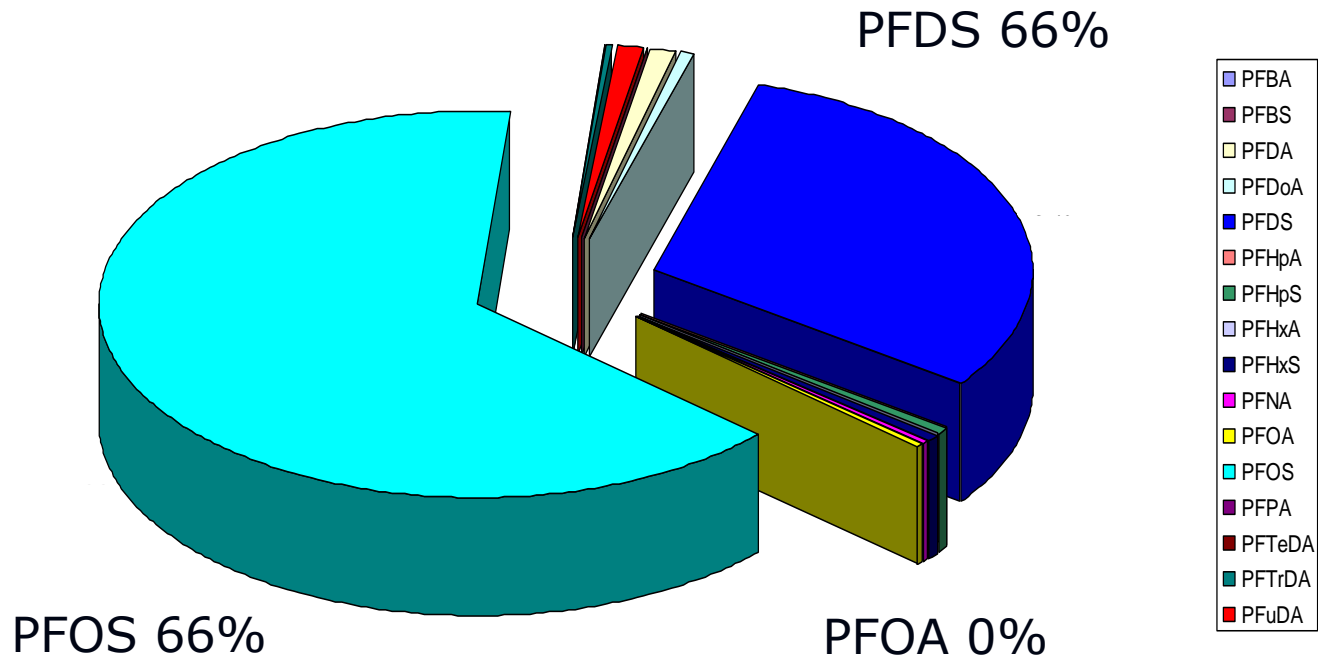


36,000 X

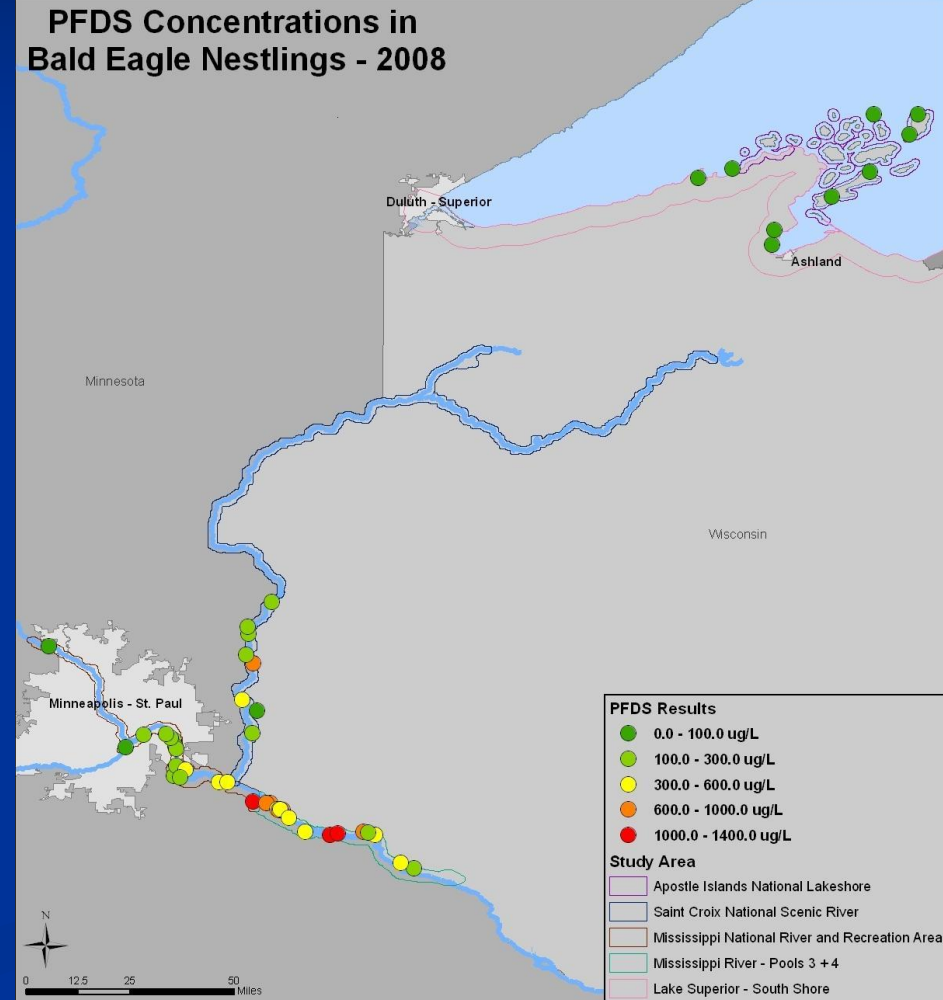
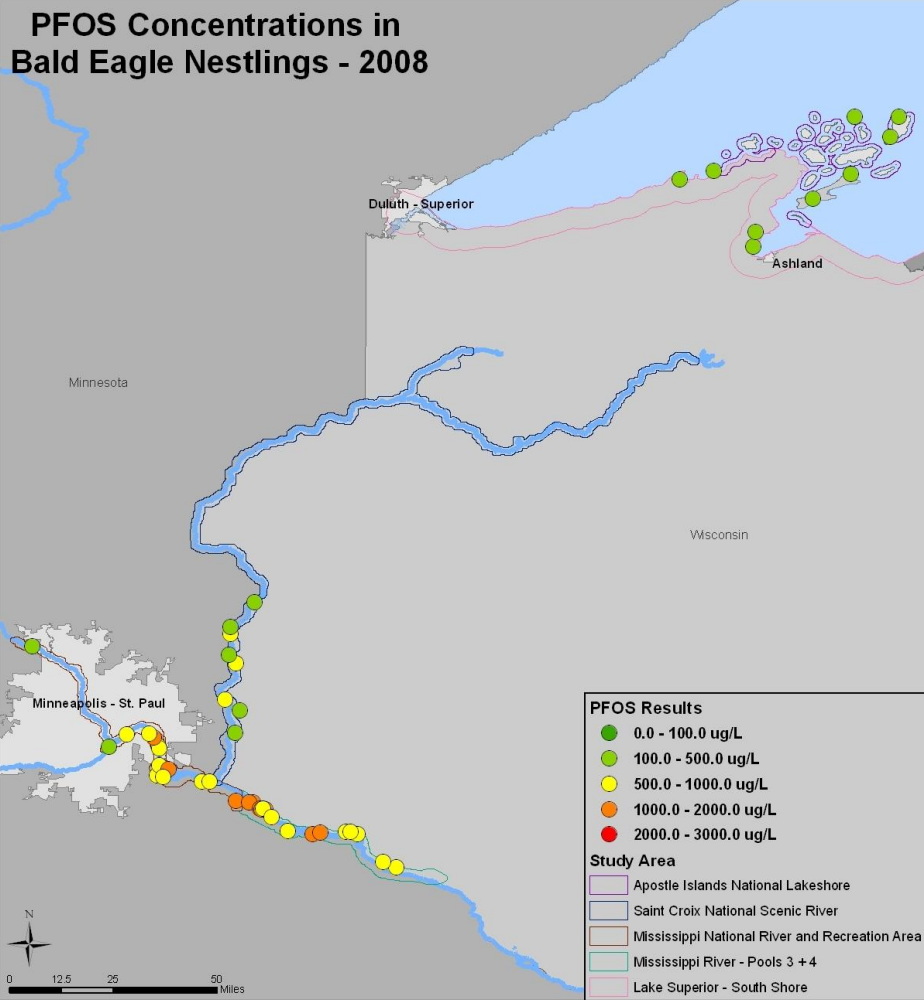
# Composition of PFCs

16 telomers assessed in 2008 samples

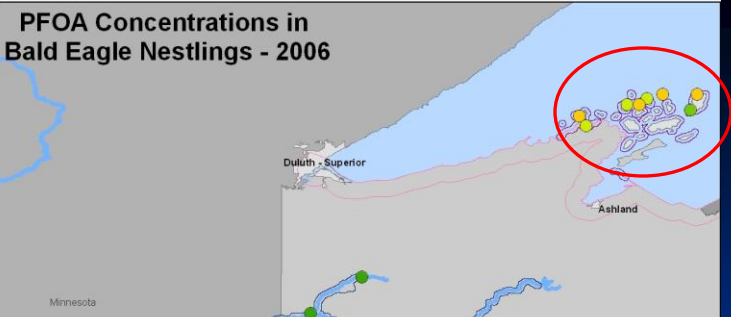
Mississippi River 2008 (n = 30)



# Distribution of PFOS & PFDS

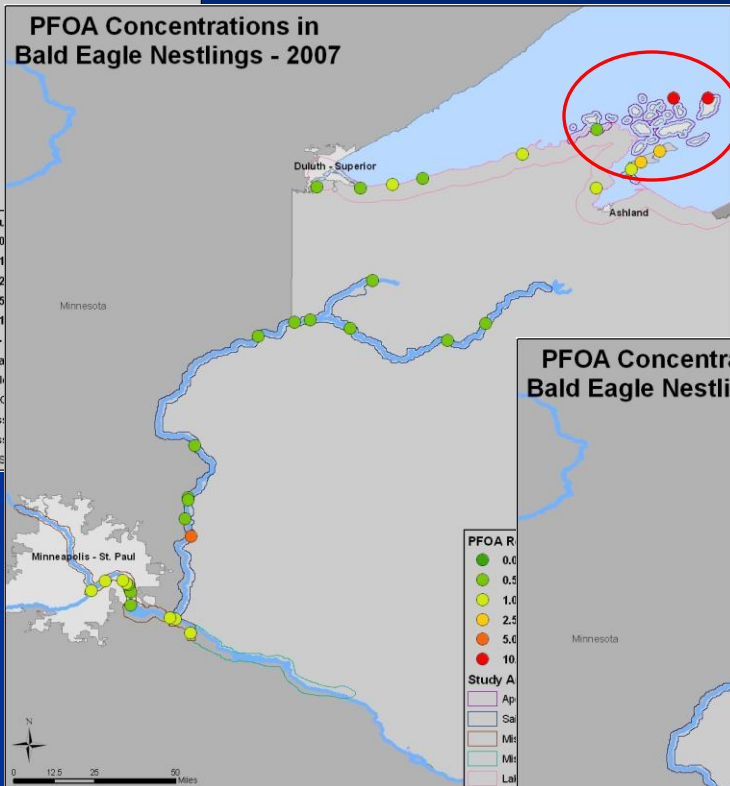


**PFOA Concentrations in Bald Eagle Nestlings - 2006**

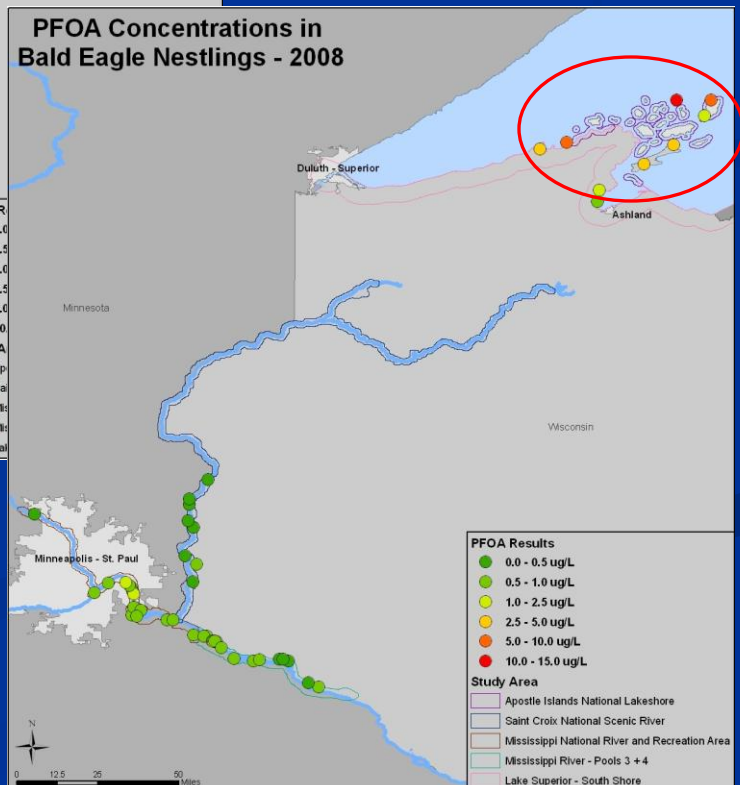


# PFOA Distribution

**PFOA Concentrations in Bald Eagle Nestlings - 2007**



**PFOA Concentrations in Bald Eagle Nestlings - 2008**



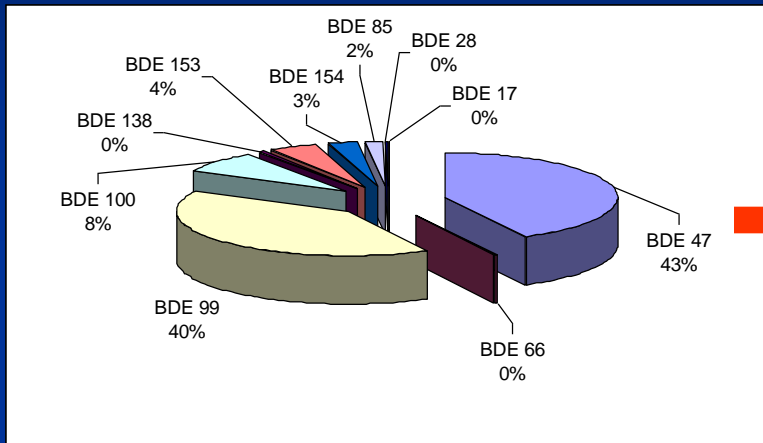
- PFOA Results**
- 0.0 - 0
  - 0.5 - 1
  - 1.0 - 2
  - 2.5 - 5
  - 5.0 - 10
  - 10.0 -
- Study Area**
- Apostli
  - Saint C
  - Missis
  - Lake S

- PFOA R**
- 0.0
  - 0.5
  - 1.0
  - 2.5
  - 5.0
  - 10
- Study A**
- Ap
  - Sa
  - Mi
  - Mi
  - La

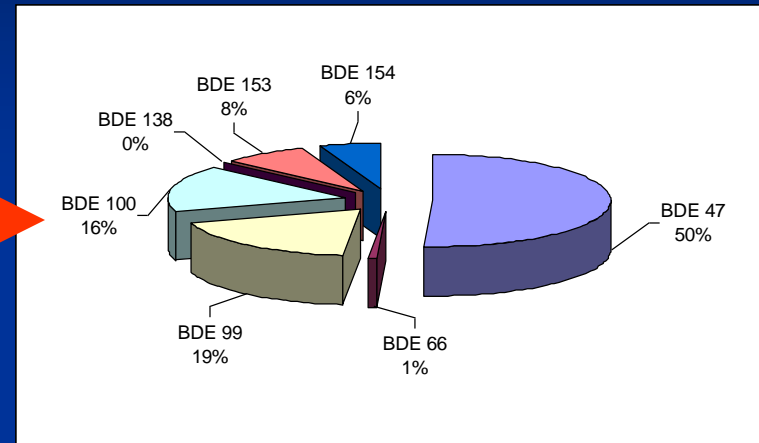
- PFOA Results**
- 0.0 - 0.5 ug/L
  - 0.5 - 1.0 ug/L
  - 1.0 - 2.5 ug/L
  - 2.5 - 5.0 ug/L
  - 5.0 - 10.0 ug/L
  - 10.0 - 15.0 ug/L
- Study Area**
- Apostle Islands National Lakeshore
  - Saint Croix National Scenic River
  - Mississippi National River and Recreation Area
  - Mississippi River - Pools 3 + 4
  - Lake Superior - South Shore

# PBDEs

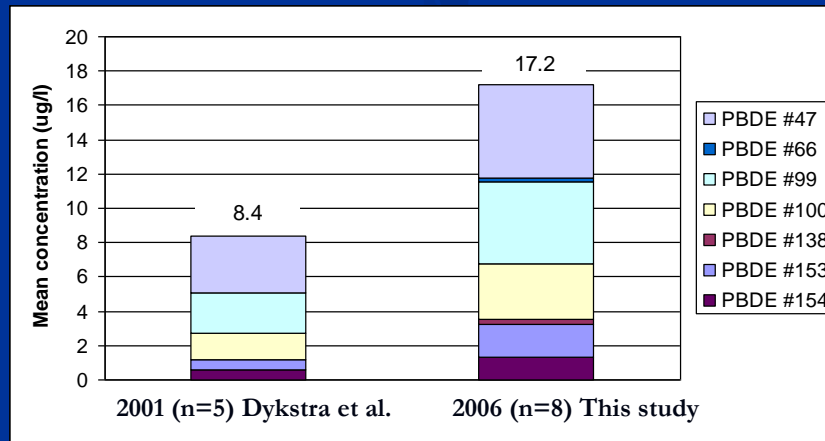
## Persistent & Cumulative



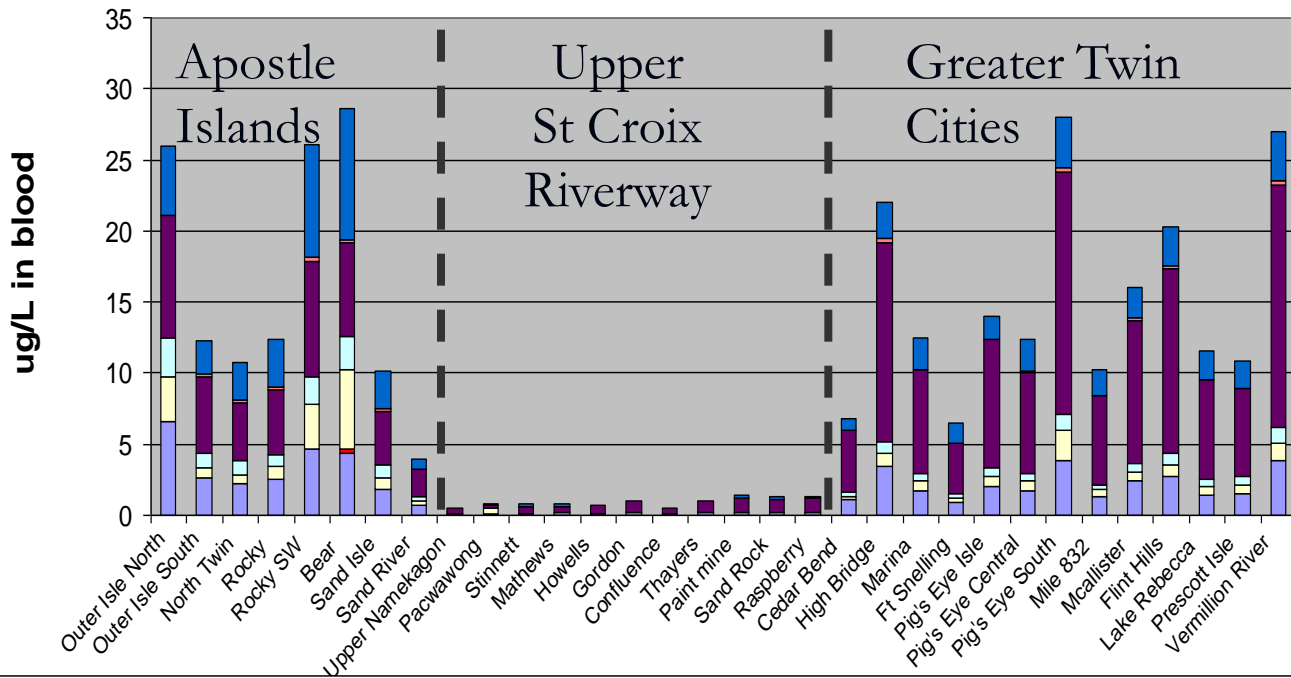
Common Flame Retardant



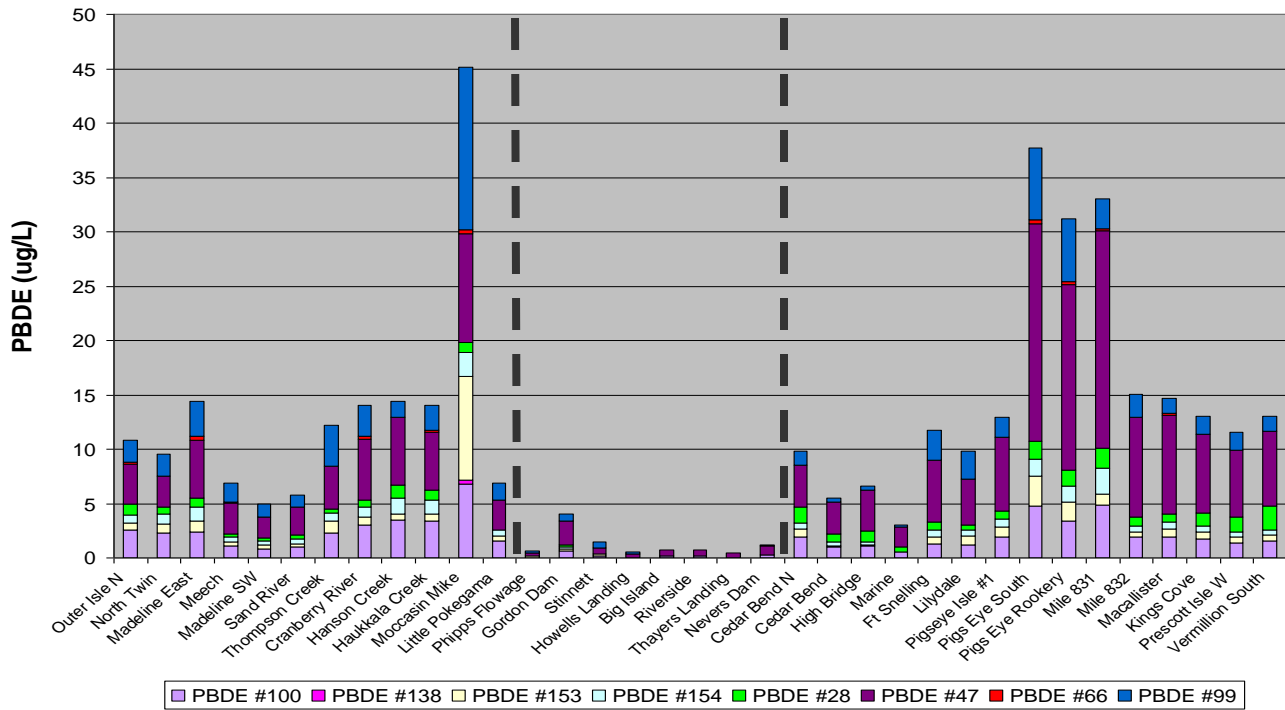
Bald Eagle Blood Samples



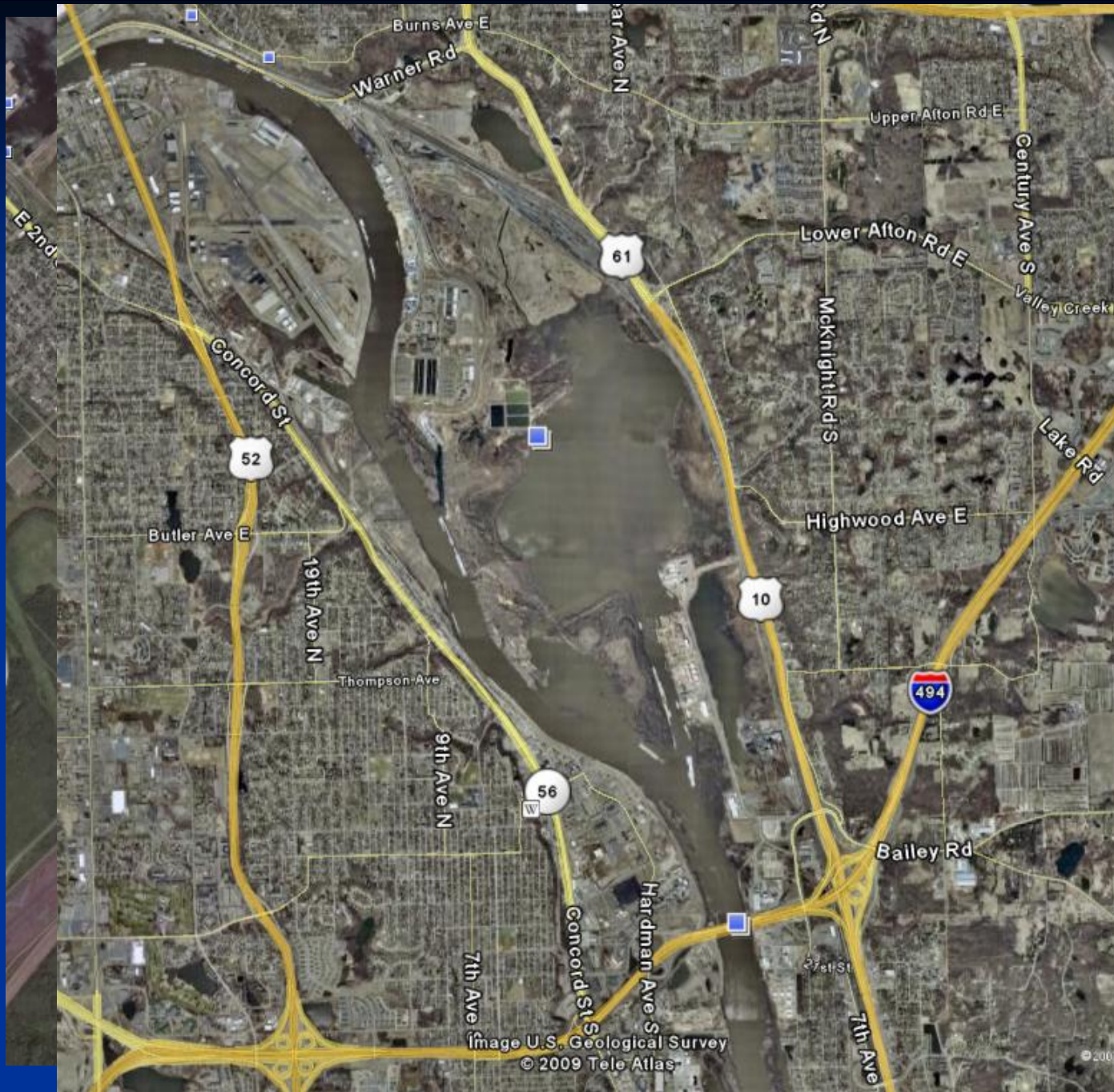
2006



2007







# Availability of products

## National Park Service Inventory & Monitoring Program

National Park Service  
U.S. Department of the Interior



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- I & M
- NPS.gov

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## Great Lakes Network

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### Great Lakes Network Inventory and Monitoring Program

Parks in this Network

Please select a park

The Great Lakes Inventory and Monitoring Network is one of 32 similar networks

## In-depth Information:

Factsheets:	Please select a factsheet: <input type="button" value="v"/>
Executive Summaries:	Please select a summary: <input type="button" value="v"/>
Annual Reports:	Please select a report by year: <input type="button" value="v"/>
Handling Summaries:	Please select a summary by year: <input type="button" value="v"/>
Monitoring Protocols:	GLKN eagle contaminant monitoring protocol - [630 KB PDF]
	GLKN fish & dragonfly contaminant monitoring protocol (draft) - [870 KB PDF]
Related Documents:	Emerging Contaminants in Great Lakes Bald Eagles (Poster) - [220 KB PDF]
Contacts:	Eagles: Bill Route, bill_route@nps.gov
	Fish & Dragonflies: Jim Wiener, University of Wisconsin - La Crosse

<http://science.nature.nps.gov/im/units/glkn/>

network coordinator  
Bill Route  
(715) 682-0631 ext.21

# Conclusions & Opportunities

- Levels vary between years
- Hot spots in each study area
  - PFCs along the Mississippi
  - DDT/DDE at Apostle Islands
  - Mercury on upper St Croix
- Mercury has decreased (recent increase in fish)
- Decline in PFOS in St Croix & Mississippi
- PFOS did not decline in Apostle Islands
- PFOS & PFDS = 60% & 30% of PFCs
- PBDEs doubled at Apostles from 2001 to 2006
- Opportunities for public education
  - High visibility (front page news)

# Acknowledgments

- National Park Service I&M Program
- Wisconsin Department of Natural Resources
- Audubon Minnesota
- Minnesota Pollution Control Agency
- Donald Weesner Foundation
- St. Croix National Scenic Riverway
- Mississippi National River & Recreation Area
- Apostle Islands National Lakeshore

