

National Park Service

Environmental Monitoring & Assessment in the Lake Superior Basin

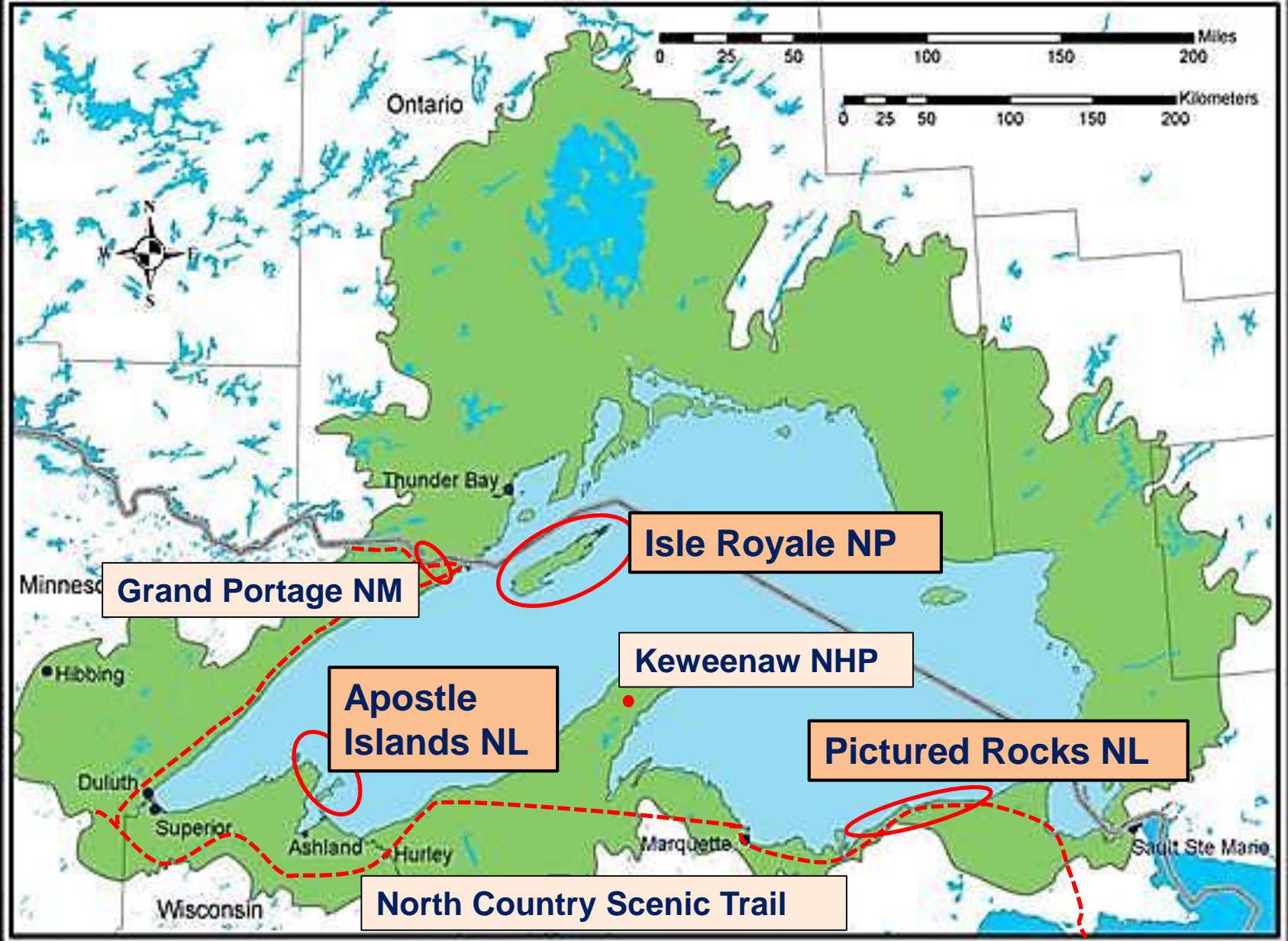
Bill Route and
Brenda Moraska Lafrancois



Main Points

- The National Park Service has significant natural resources in the Lake Superior Basin
- We have expertise in several disciplines and collaborate extensively with partners...
- To investigate a wide variety of resource issues

Lake Superior Drainage Basin



Significance of NPS Areas

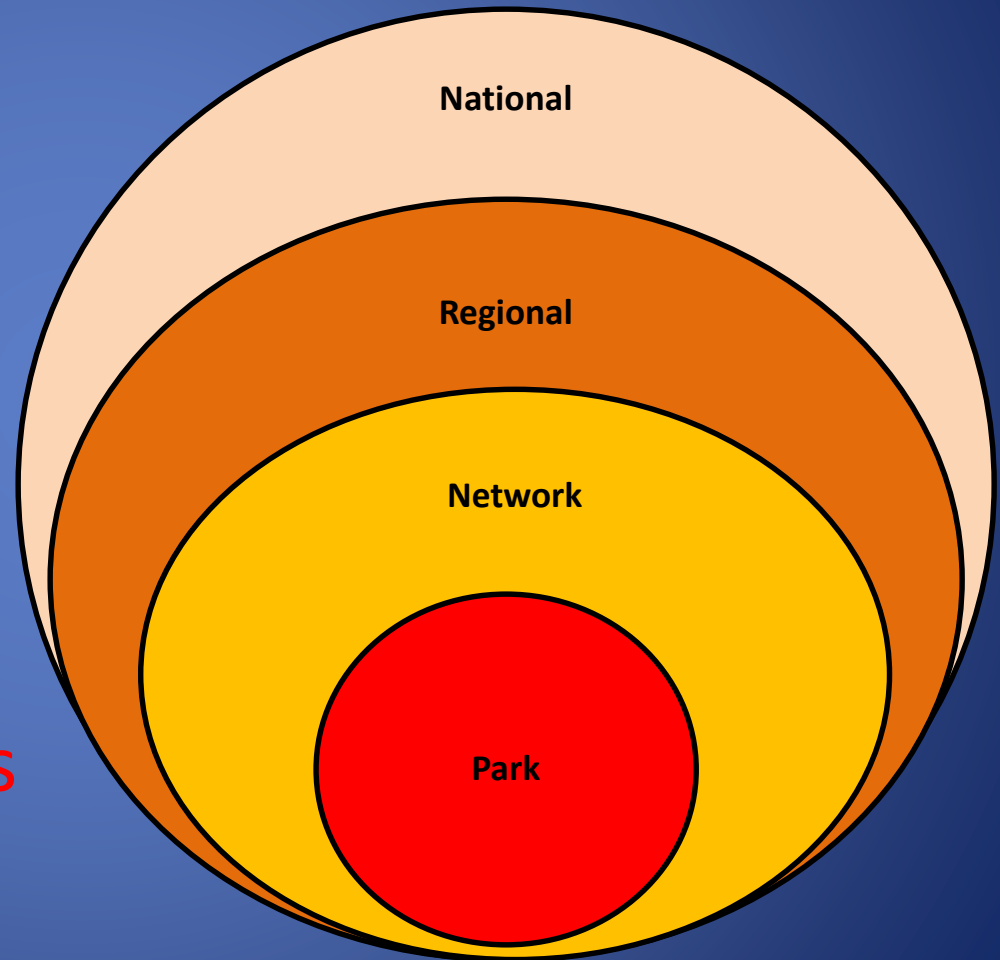
- Only 720,000 acres, but...
 - 850,000 visitors / yr
 - Variety of recreation
 - Fishing & hunting
 - Boating & hiking
 - > \$20M in economic activity annually
- = High public support



Laboratories for science

NPS Science

- Divisions for Air and Water Quality
- Issue driven investigations
- Inventories & long-term monitoring
- Local resource issues



Science at the Park Level

- Issue driven
- Short studies
- Some long-term monitoring
- Many partners
 - Universities
 - USGS / EPA

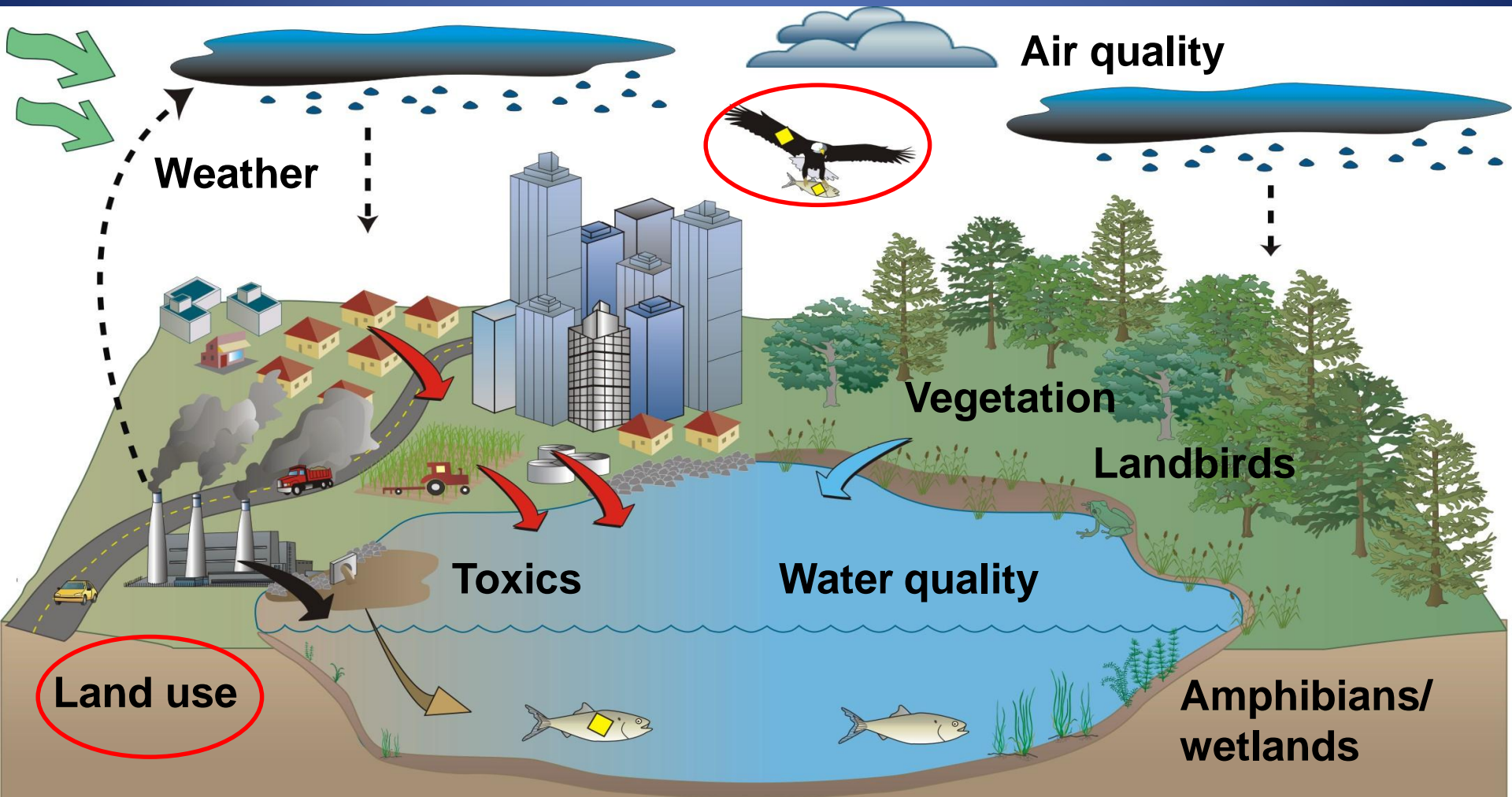


Beechbark Disease, Pictured Rocks

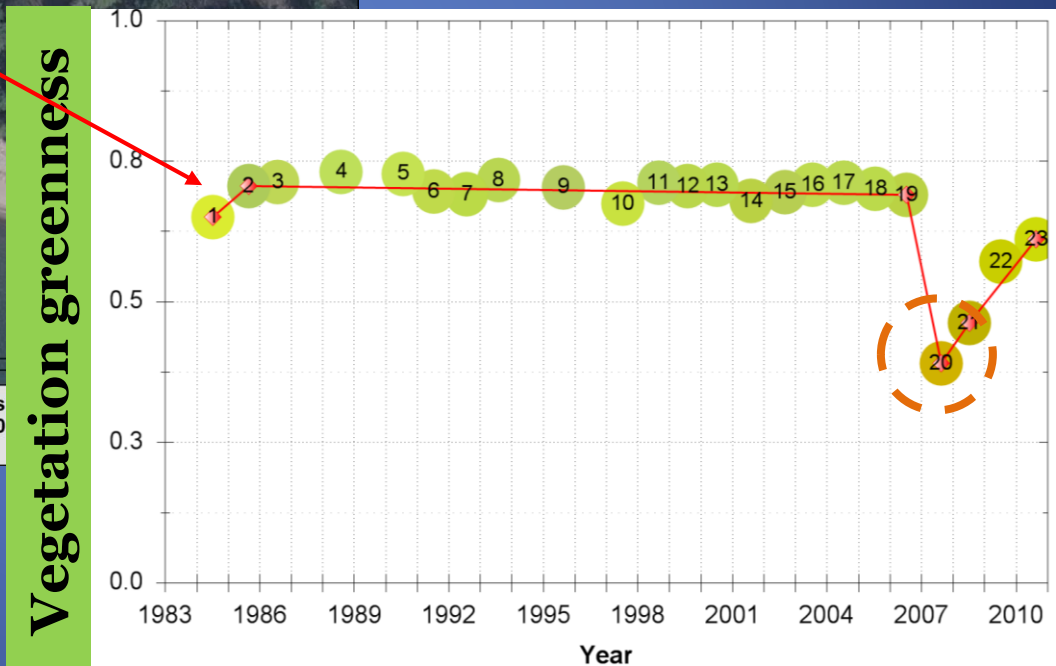
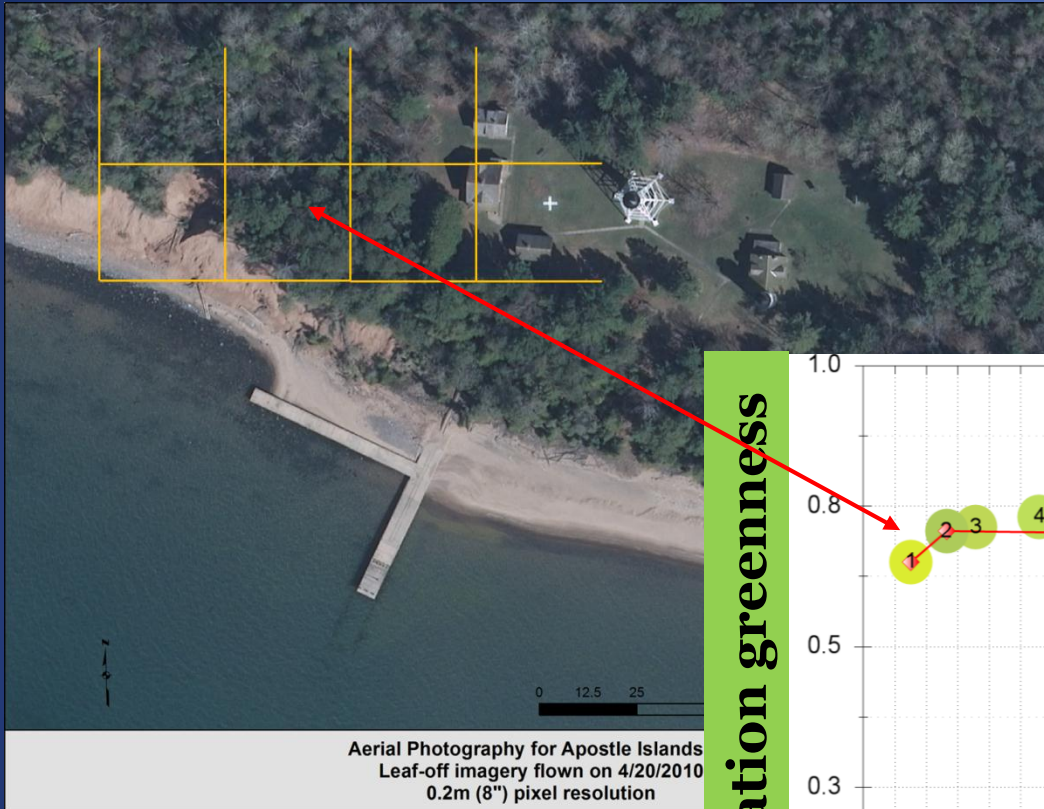
Breeding Bird Surveys

Park	Year Established	No. of Points	Years
Apostle Islands National Lakeshore	1990	106	24
Grand Portage National Monument	1999	38	15
Indiana Dunes National Lakeshore	1993	50	21
Isle Royale National Park	1994	130	20
Mississippi National River and Recreation Area	2007	120	7
Pictured Rocks National Lakeshore	2011	53	3
Sleeping Bear Dunes National Lakeshore	2004	40	10
St. Croix National Scenic Riverway	1982	50	32
Voyageurs National Park	1995	80	19

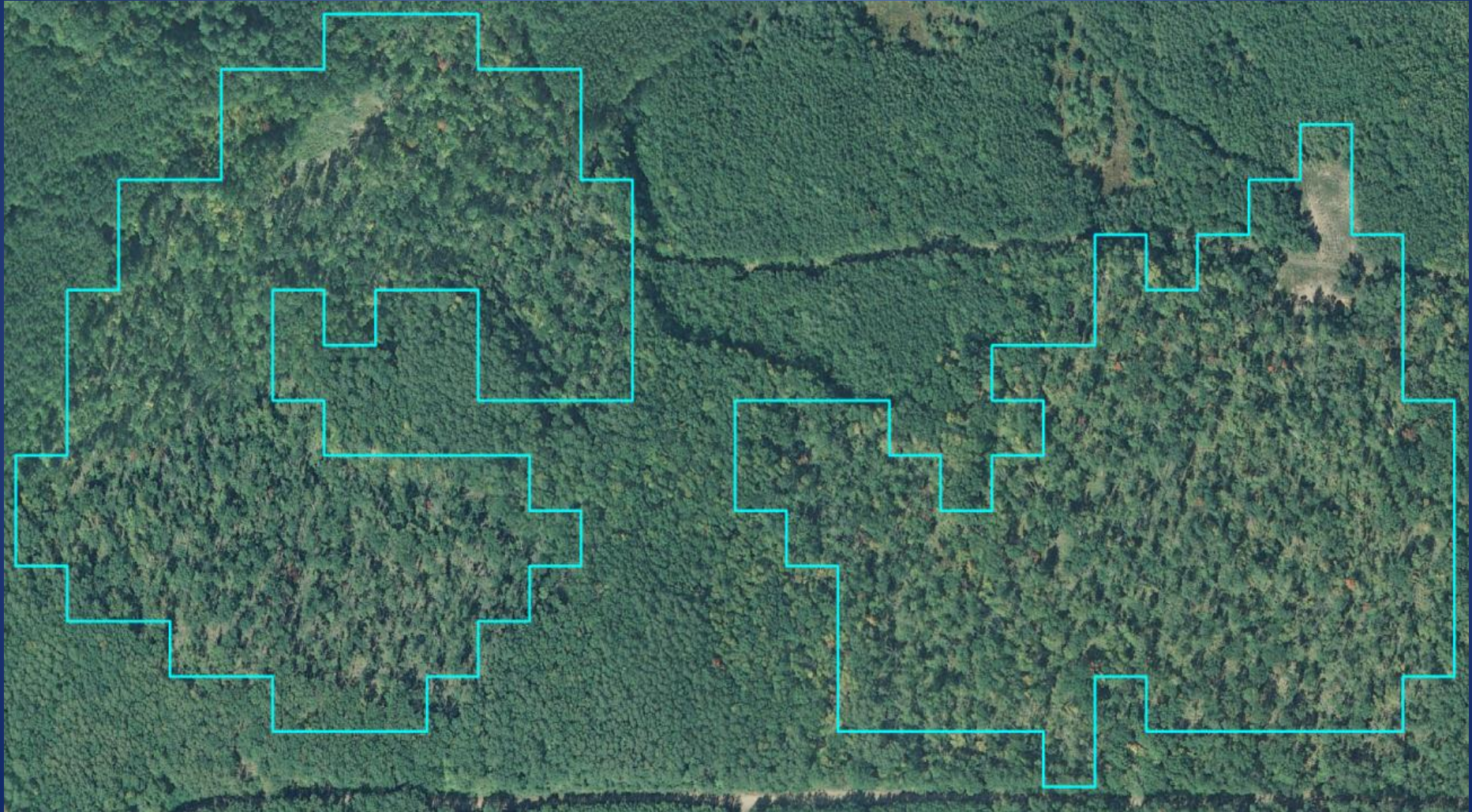
Science at the Network Level



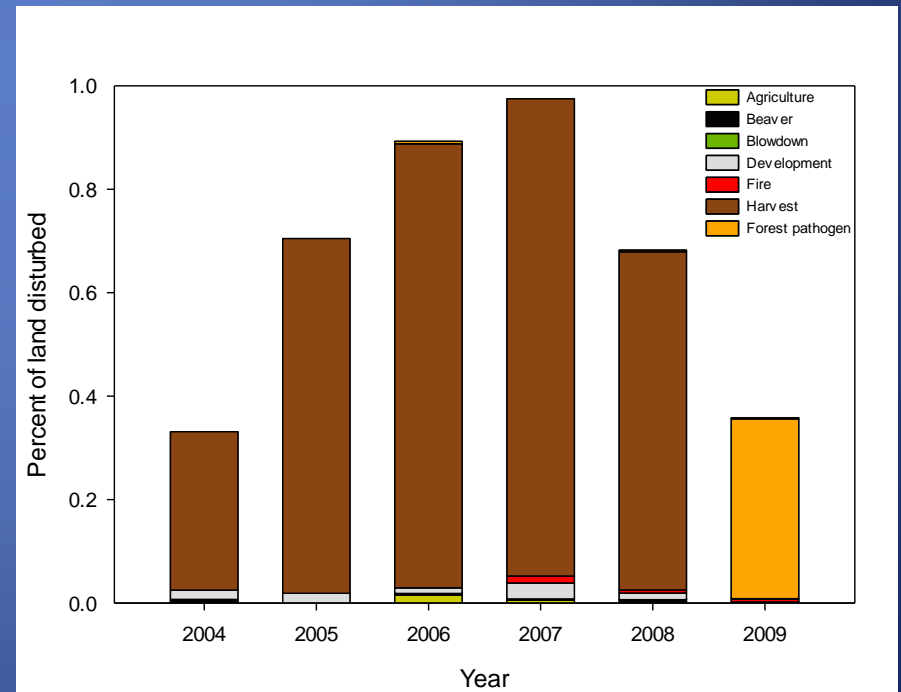
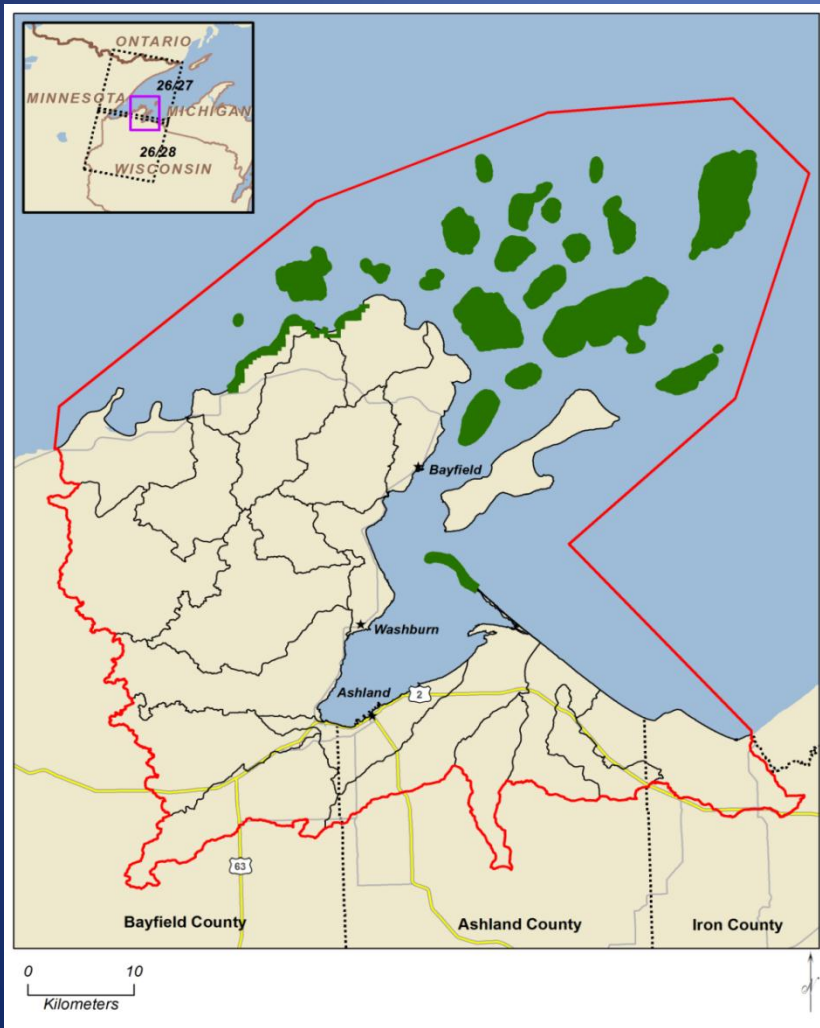
A Pixel Through Time



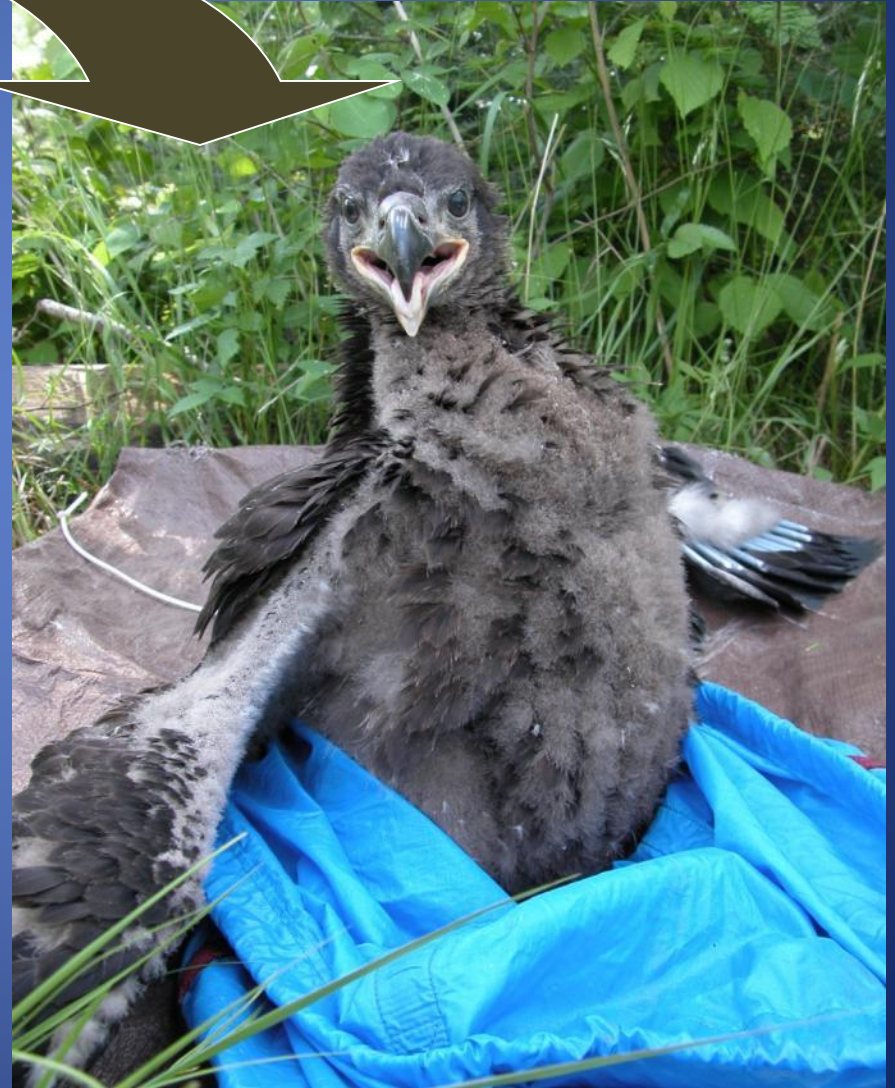
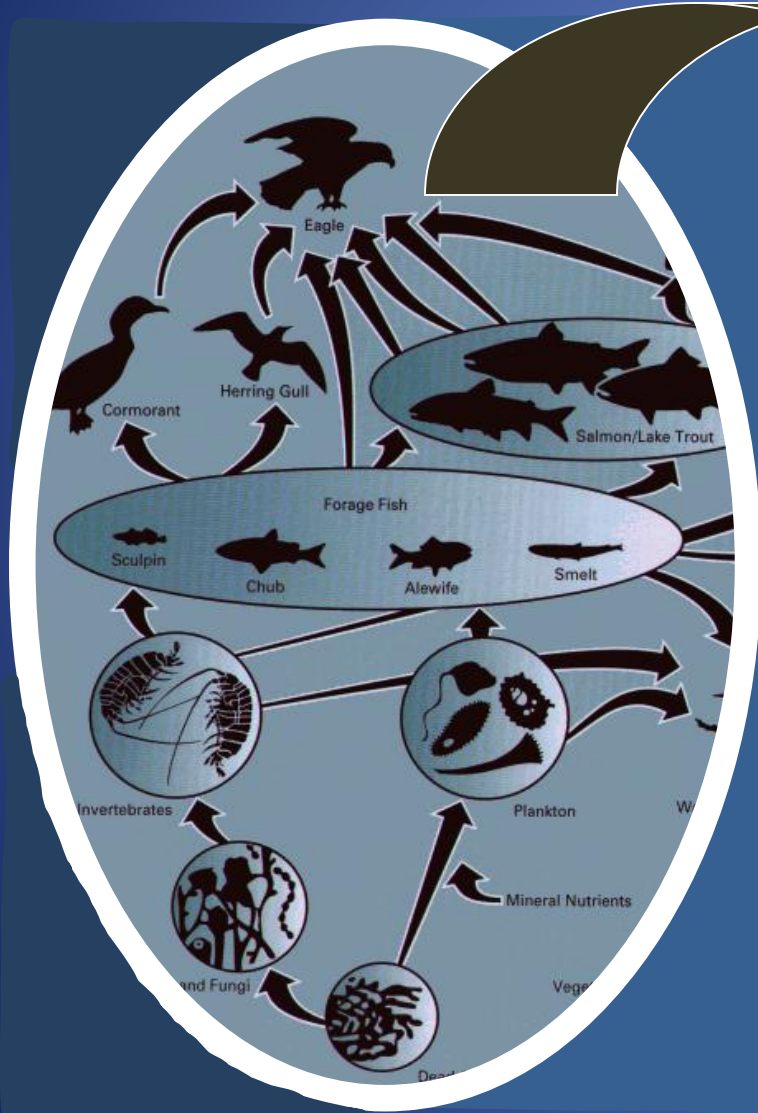
Forest Harvest



Quantifying Disturbance at Landscape Scale



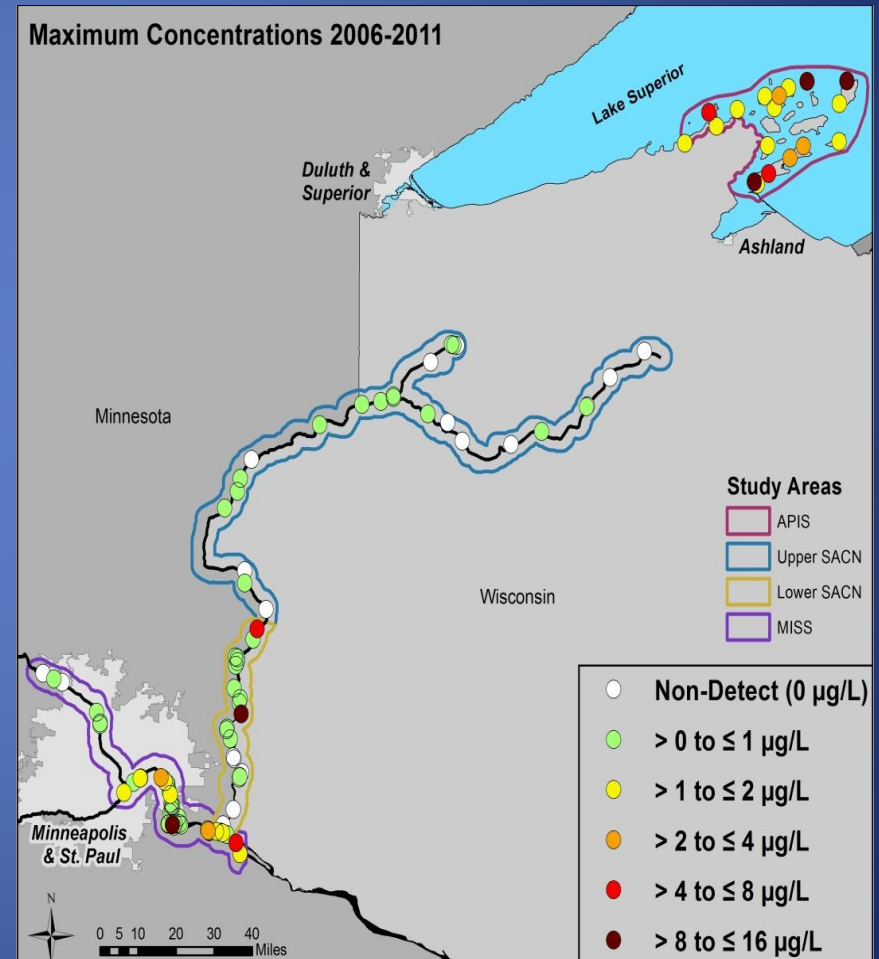
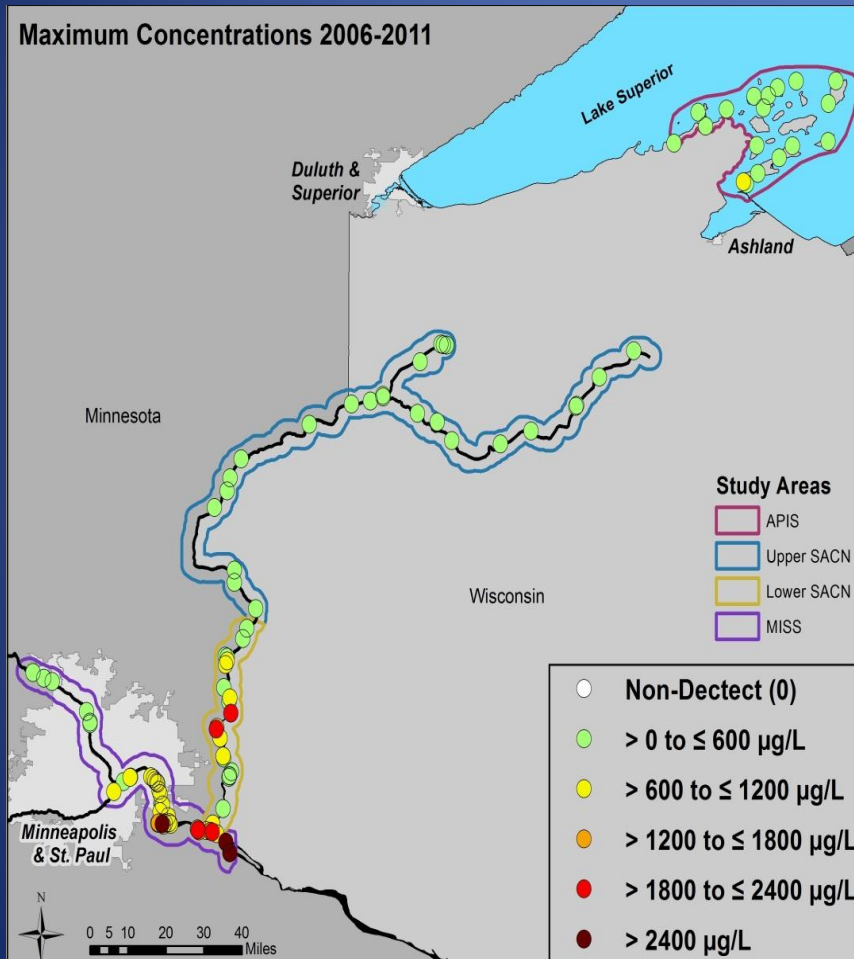
Monitoring Contaminants



Perfluorinated Compounds

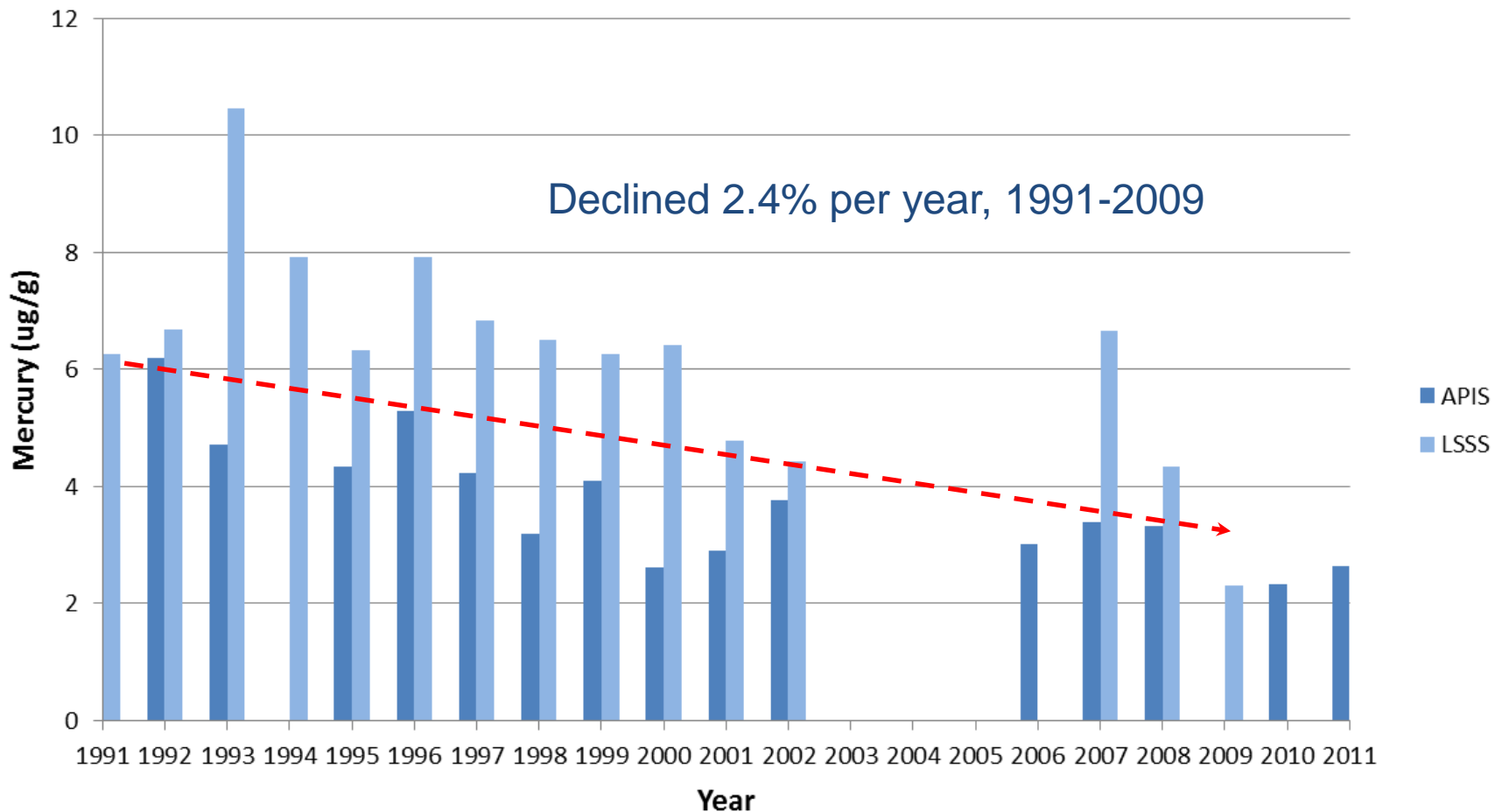
PFOS

PFOA



Mercury Trends

(collaboration with WI DNR)



Collaboration with EPA

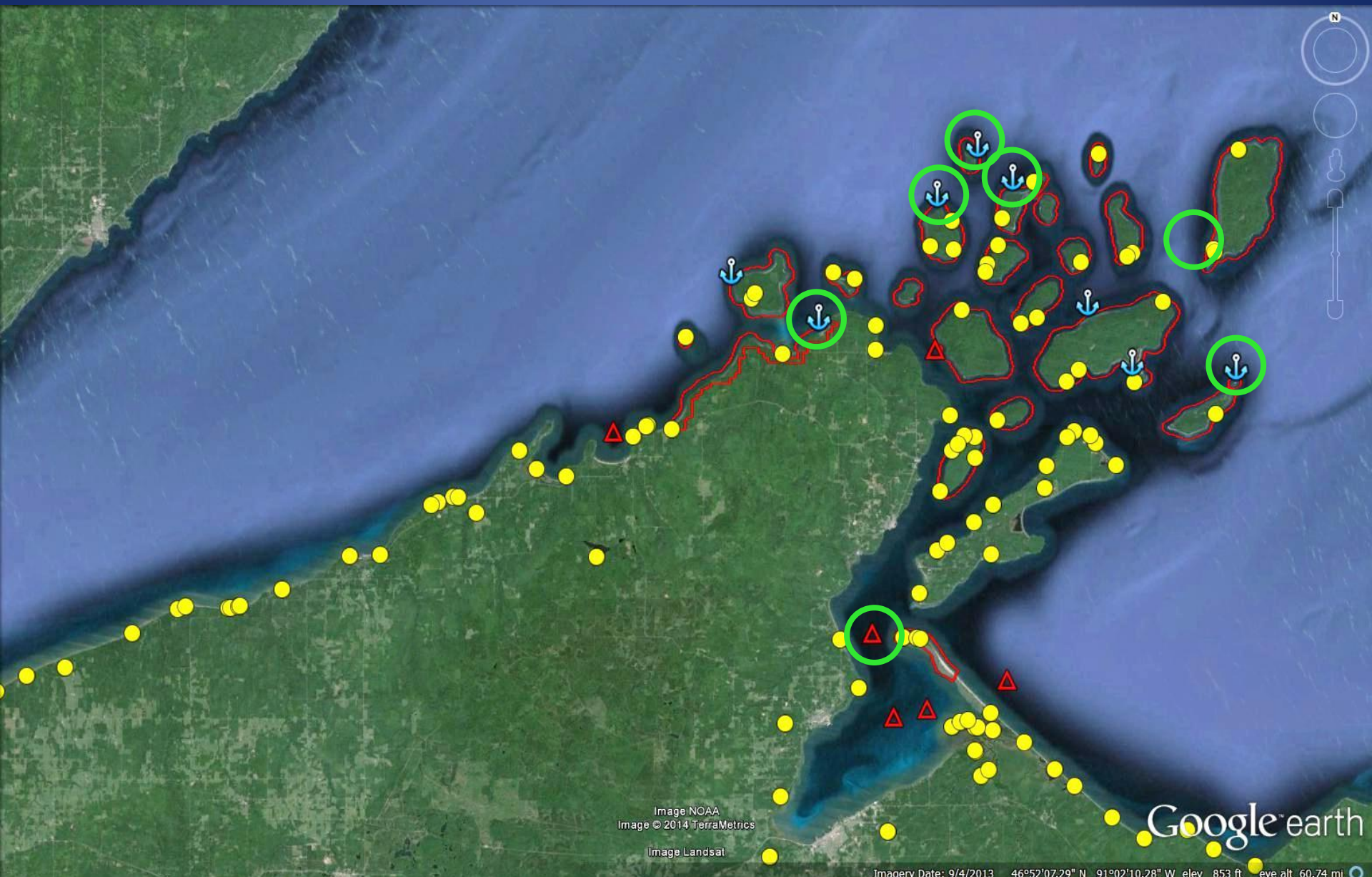


Image NOAA
Image © 2014 TerraMetrics
Image Landsat

Google earth

Imagery Date: 9/4/2013 46°52'07.29" N 91°02'10.28" W elev. 853 ft. sea alt. 60.74 mi

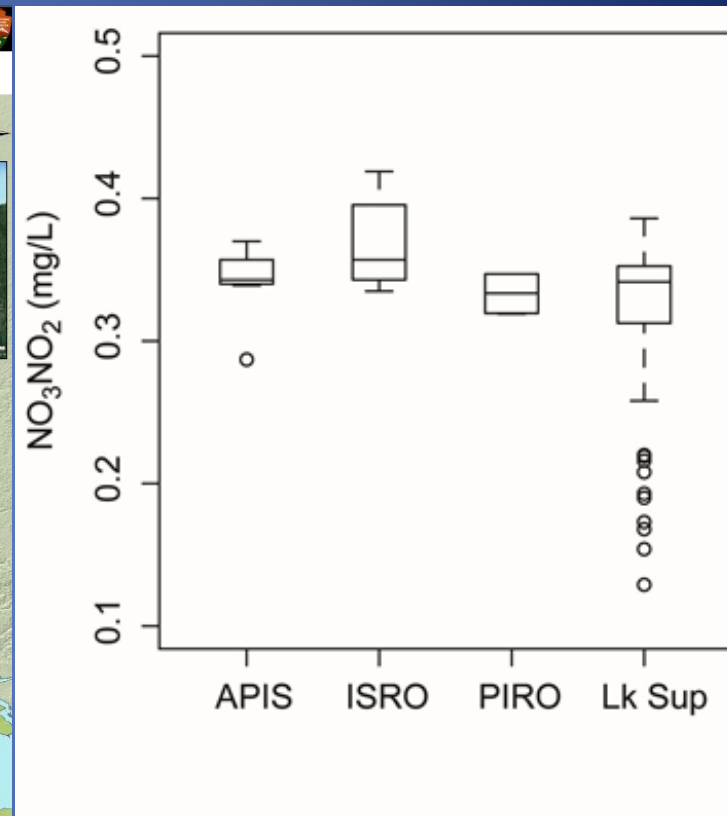
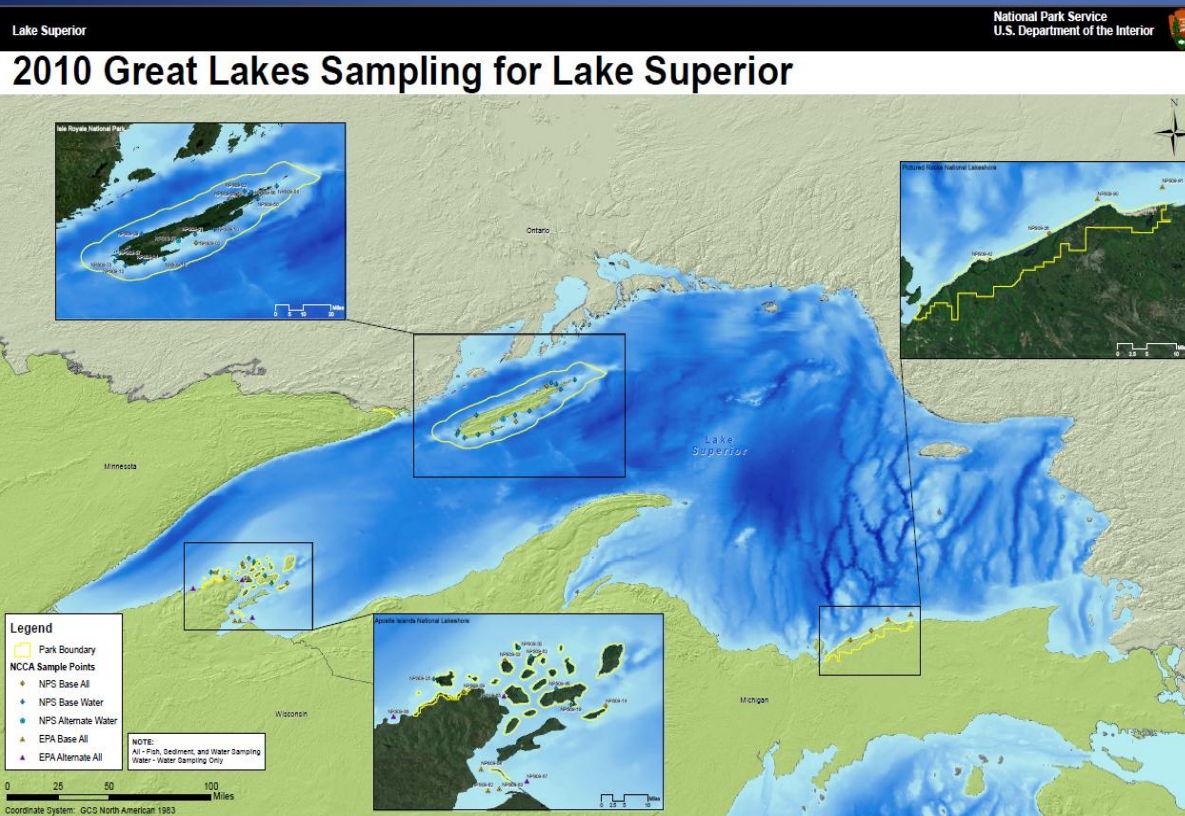
Science at the Regional Level

- Issues of regional scale
- Special initiatives
- Specialized expertise
 - Aquatics
 - Fisheries
 - Wildlife



Assessing Nearshore Habitat

Collaboration with EPA

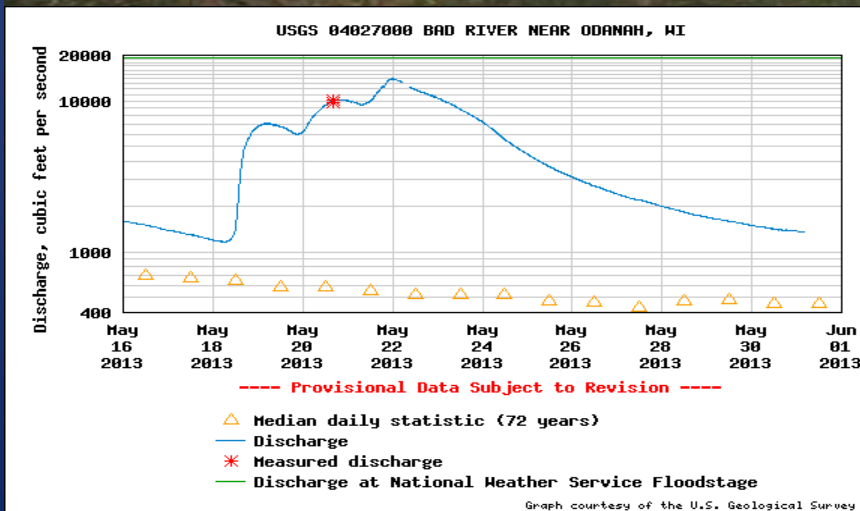


- Partnered with EPA during the 2010 National Coastal Condition Assessment
- → supported ~30 sites within Lake Superior park units
- → broader survey provides context for coastal conditions within NPS units.

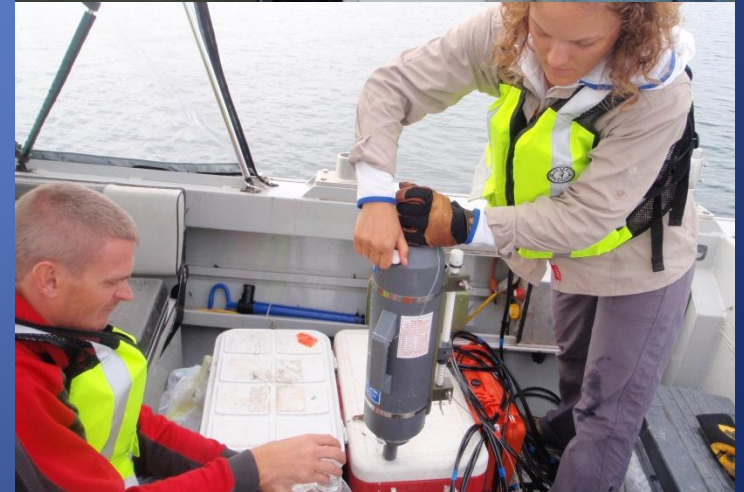
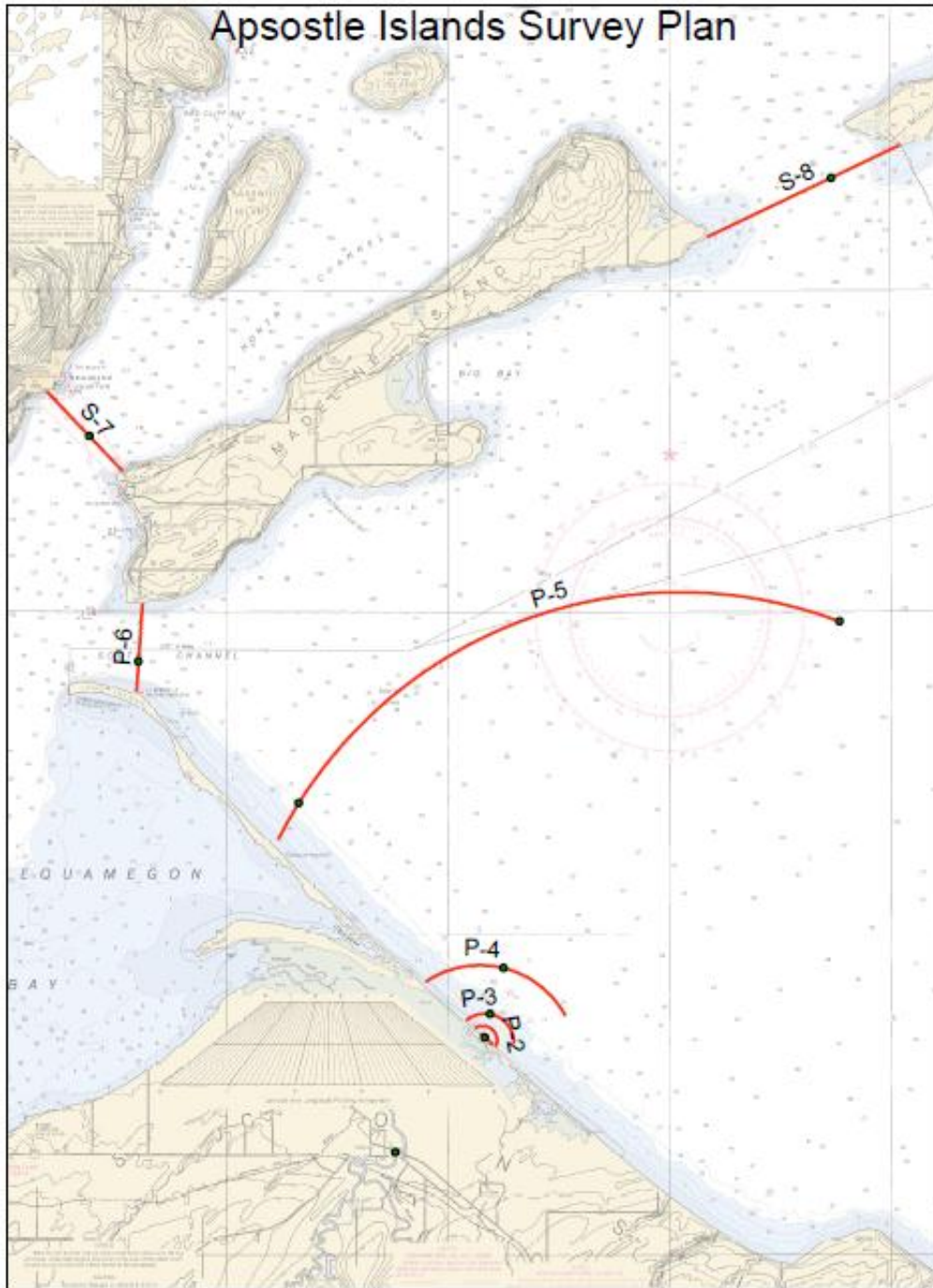
Potential Influence of Mining on the Apostle Islands



- Partners: USGS, Bad River Tribe
- Objectives:
 - Describe mixing patterns
 - Provide baseline data on habitat and benthic conditions
 - Identify monitoring options
- Current work:
 - Reviewing MODIS imagery
 - Setting up continuous monitoring
 - Planning synoptic surveys



Apsostle Islands Survey Plan

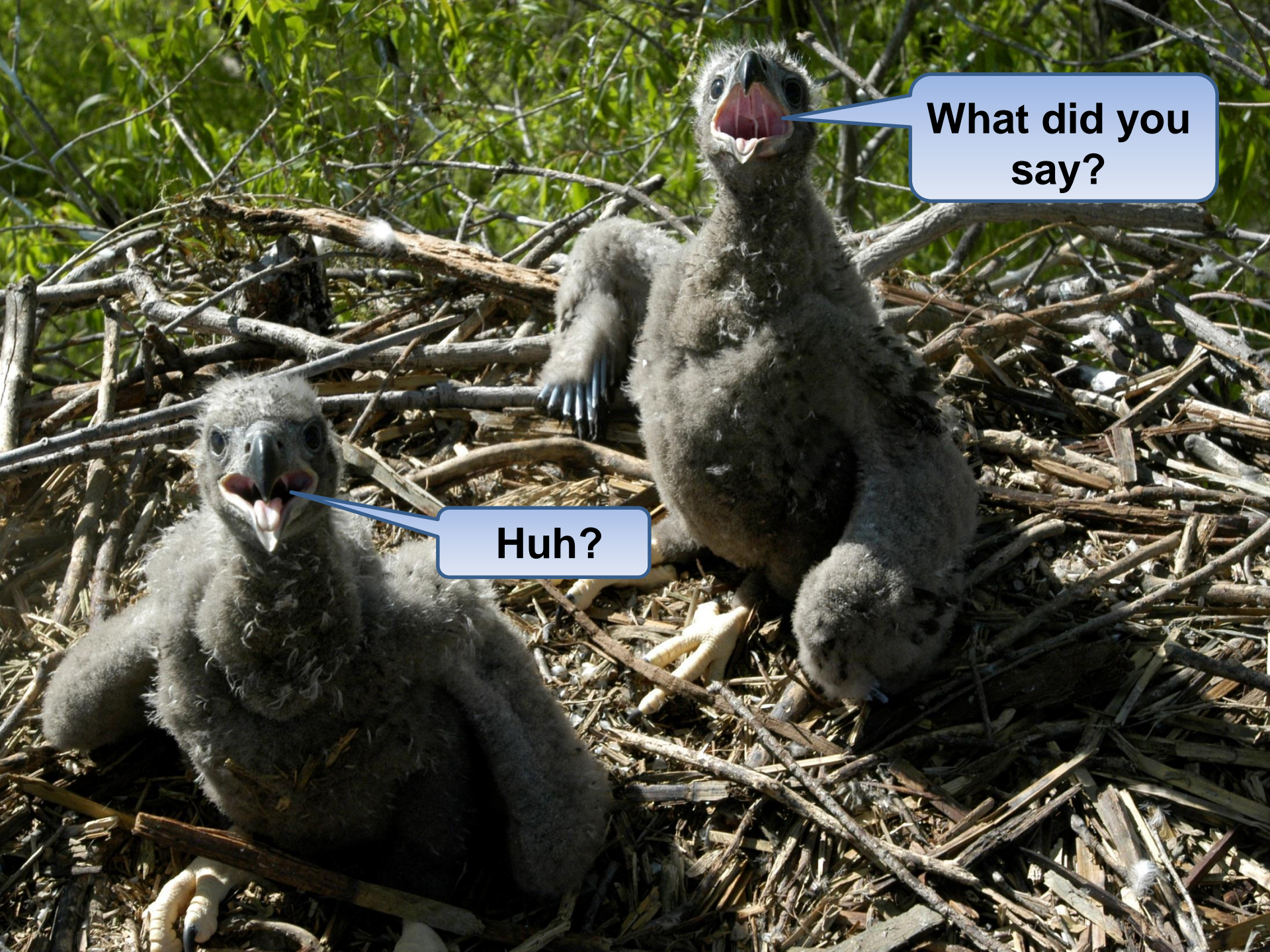


Benthic Mapping

- Bathymetry, Benthic Habitat and Cultural Resources
- Began in 2011 at...
 - Apostle Islands
 - Isle Royale
 - Pictured Rocks



Park	Acres Surveyed		
	2011-13	2014	All Years
Apostle Islands	11374	1695	13069
Isle Royale	14720	6780	21500
Pictured Rocks	3332	2543	5875
All Parks, All Years			40444



What did you say?

Huh?