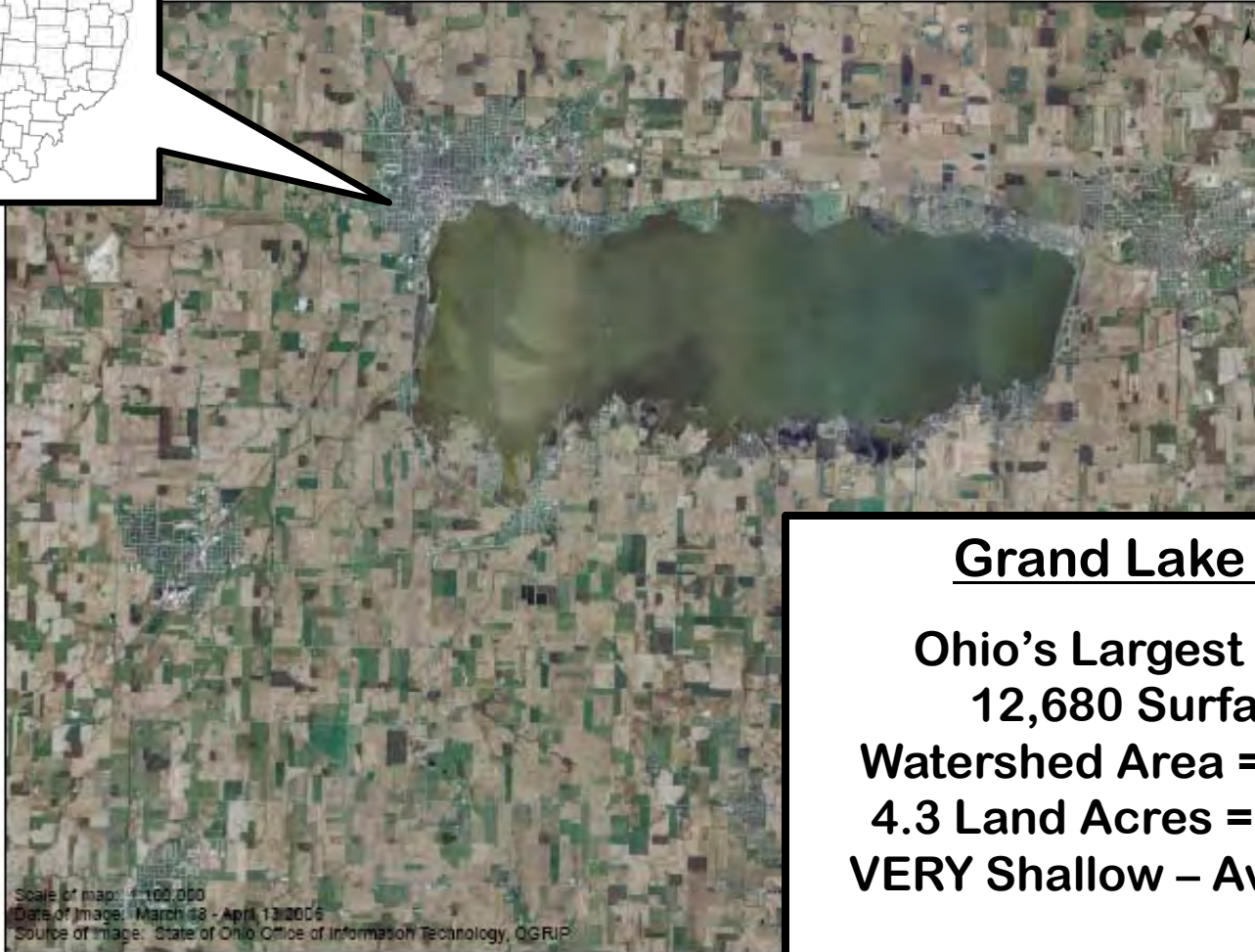


Implementing Grand Lake St. Marys Nutrient TMDL



Tom Davenport, USEPA
Russ Gibson, Ohio EPA
Trinka Mount, Ohio EPA

Grand Lake St. Marys



Scale of map: 1:100,000
Date of Image: March 28 - April 13, 2006
Source of Image: State of Ohio, Office of Information Technology, QGRIP

Grand Lake St Marys

Ohio's Largest Inland Lake
12,680 Surface Acres
Watershed Area = 54,000 acres
4.3 Land Acres = 1 Water Acre
VERY Shallow – Average 5-7 feet

Land Use in the watershed

Cropland	73%
Developed	14%
Pasture	9%
Forest	3%
Wetlands	<1%

Population

Mercer County:	40,666
Auglaize County:	46,576

Importance of Grand Lake to the Community

Public drinking water supply

Lake-based recreation and tourism accounts for up to \$150 million annually.

Grand Lake State Park enjoyed by more than 700,000 visitors each year.

Extensive lakeshore residential development.

A focal point for many community festivals and events each year.



**Grand Lake St. Marys
June, 2010**





We have a Problem!



Algae – it's more than just ugly!

Environmental Impacts

- Horrible Odor
- Waterfowl and Pet Deaths
- Severe Dissolved Oxygen Swings & Fish Kills

Public Health Impacts

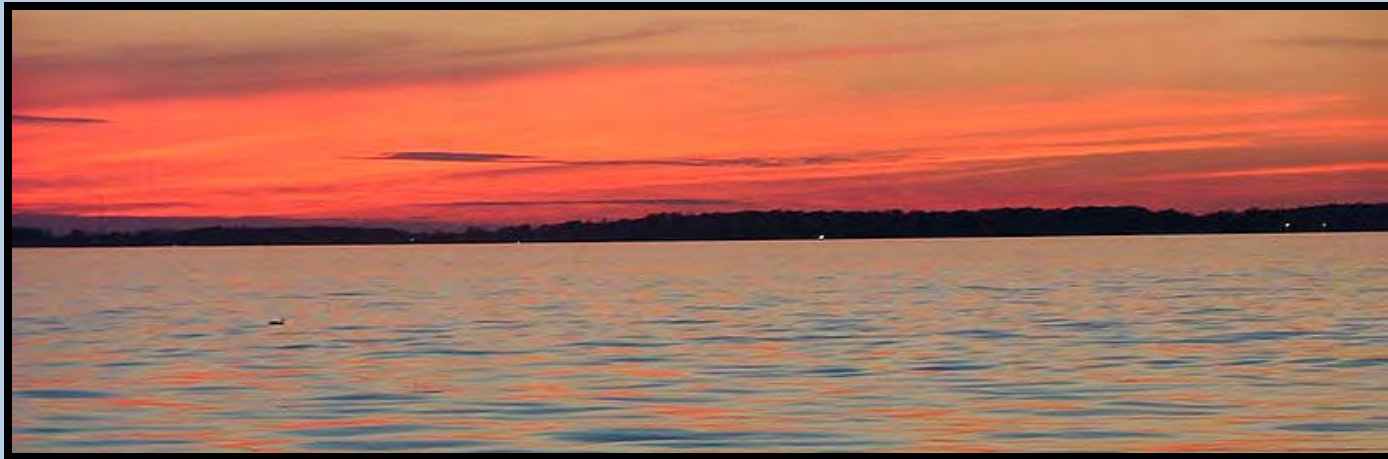
- 23 Suspected Illnesses
- Recreation and Boating Advisory
- Fish Consumption Advisory

Economic Impacts

- \$150 Million Tourism Industry Decimated
- Regatta Cancelled = @\$600,000 Lost
- Park Revenues down >\$250,000/yr
- 5 Lakeside Businesses Closed

Urgency Prompts New Approach

Extreme impacts to the community require us to first focus on what is needed to fix the lake NOW!!!



- **Reduce harmful algae blooms**
- **Insure safe water-based recreation**
- **Protect public drinking water supply**
- **Reduce external and internal nutrient loads**



Considerations

- Algae blooms are fueled by internal nutrient cycling as well as external loads.
- In-lake management effectiveness is directly affected by watershed nutrient loads.
- Substantial watershed based nutrient reduction actions will likely require several years.

Institutional Challenges

- **Multiple existing plans with impractical timeframes**

TMDL, 9-element plan, ODNR plan, Governor's plan, Local plan

- **Segmented state leadership, authority and missions**

ODNR – Ohio EPA – Agriculture–Health

- **Staggered agency engagement**

Start & stop syndrome –Tell us what's going on!!!

- **Incomplete data due to USDA 1619 concerns**

- **Unwillingness to “own the load”**

Farm lobby and the realities of drainage



Moving forward in Challenging Circumstances

Established federal, state & local team

Technical assistance through US EPA-R5

Identified REALISTIC Load Reduction Goals

Internal+ External = Total Goal

We know that ...

- 1. INTERNAL** P-loads need to be reduced from 200µg/L to between 25-50µg/L.
- 2. EXTERNAL** P-loads need to be reduced by 80% and this will take some time.
- 3. TRIBUTARY** treatment of nutrients will be necessary to reduce loads entering the lake.

Grand Lake St. Marys

Recommended Lake Management Actions

Aluminum sulphate treatment

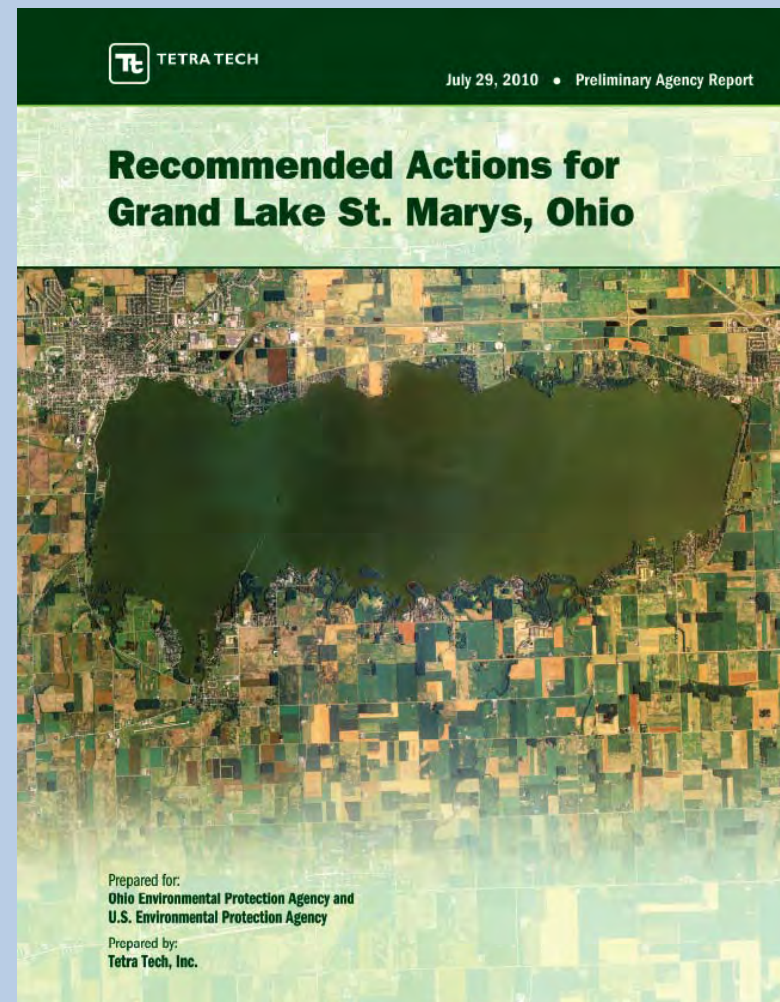
Strategic dredging

Wetland treatment trains

Site specific aeration

Lake shoreline stabilization

Agricultural BMPs



GRAND LAKE ST. MARY'S

Recommended Actions & Timeline

Year 1 Actions

Alum
Demonstration
Project

Install 3 Sediment
Collectors

Strategic
Aeration

Accelerate Land
Treatment
Implementation

Year 2 & 3 Actions

Install 2 Wetland
Treatment Trains

Whole Lake Alum
Treatment*

Strategic Aeration

Install 3 Sediment
Collectors

Continue Land
Treatment Effort

Year 4 - 5 Actions

2 additional
Wetland
Treatment Trains

Continue Land
Treatment Effort

Lake Shoreline
Stabilization
BMPs

Alum Treatment Demonstration Project for Grand Lake St. Marys

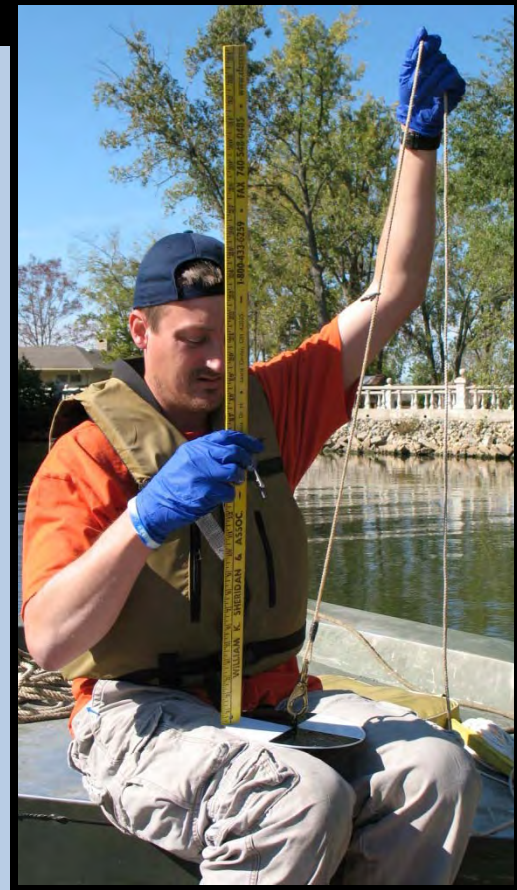


What are the goals for this demonstration project?

To reduce GLSM internal phosphorus levels by 60-85%.

To sustain P-reductions through the first phase of degradation.

To refine dosing requirements for a potential whole-lake_t treatment.



Initial Results

(48 hours after treatment)

Harmon Channel – Total Phosphorus reduced 92%
Otterbein Channel– Total Phosphorus reduced 42%
West Bank Marina—Total Phosphorus reduced 89%



Final Results

(6 weeks after treatment)

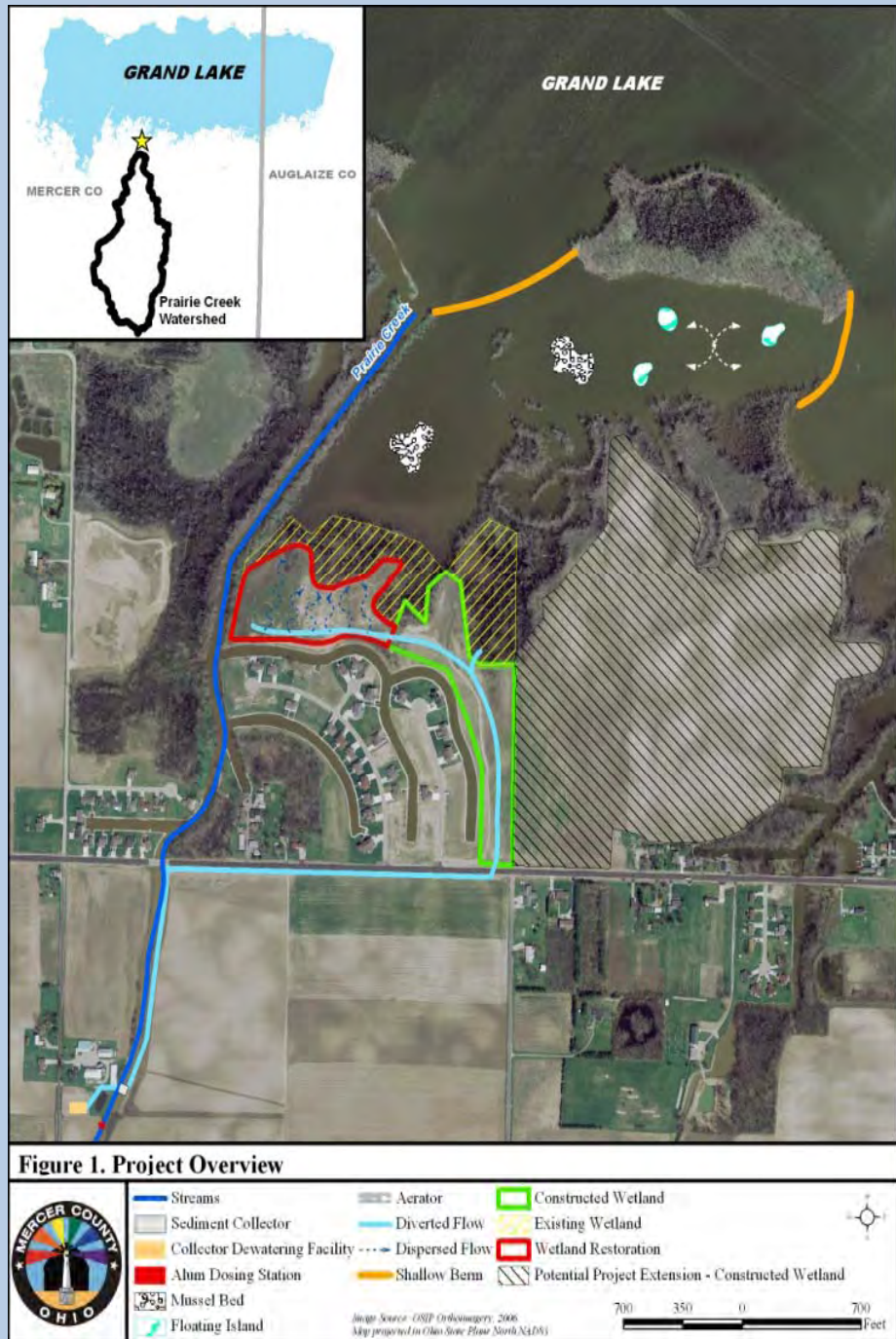
Harmon Channel – Total Phosphorus reduced 52%
Otterbein Channel– Total Phosphorus reduced 57%
West Bank Marina—No sustained P reduction



Other than alum ... what's going on in GLSM?

LOTS!!!

Project	Status
GLSM Alum Demonstration Project	Completed
NRCS -EPA Conservation Planning	Underway
ODNR Distressed Watershed Rule	Passed
Mercer County SWIF Grant-Airy gator	Completed
Mercer County Treatment Train	Underway
Mercer SWCD HSTS & Ag BMP's	Underway
St. Marys Twp. Sediment Collector	Completed
Lakefront Homeowners Workshop	Scheduled
Ohio Lake Mgmt. Society Conference	Scheduled



Tributary Treatment Trains

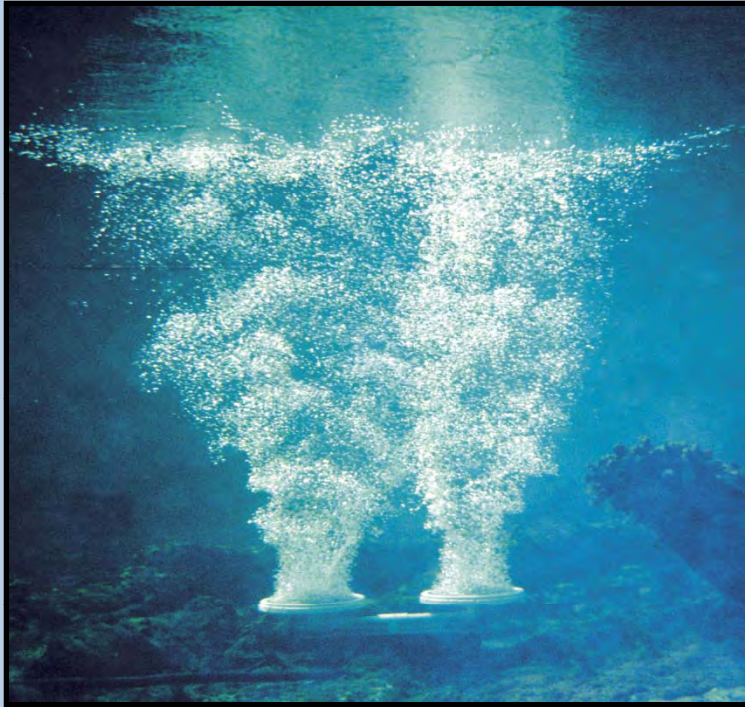
- A variation of this plan will be installed at the mouths of each of the six south shore tributary streams.
- During high flows, runoff will be diverted through wetland areas prior to discharging into GLSM.
- Strategic dredging will occur in areas where sediment deposition are highest.
- Sediment collectors may operate in conjunction with in-stream alum dosing units upstream from wetland treatment areas.

Treatment Train Deployment

Installation of Treatment Train Systems at the mouths of each of the tributaries is expected to reduce sediment loads by approximately 32% and phosphorus loads by as much as 10%.



Grand Lake St. Mary's—Restoration Plan Lakefront Landowners Strategies



Lakefront homeowners are being encouraged to use **ZERO P fertilizers**. Workshops are planned to help with this effort.

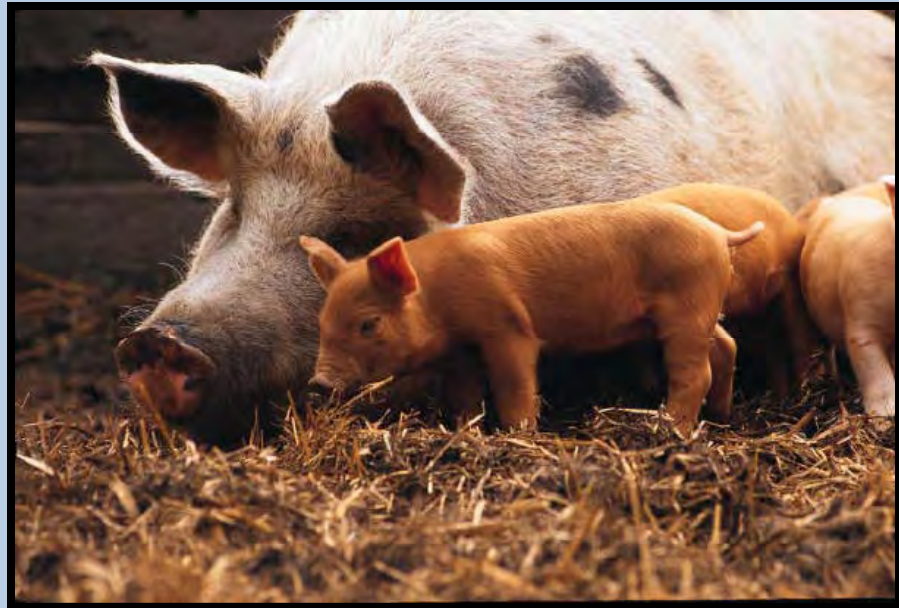
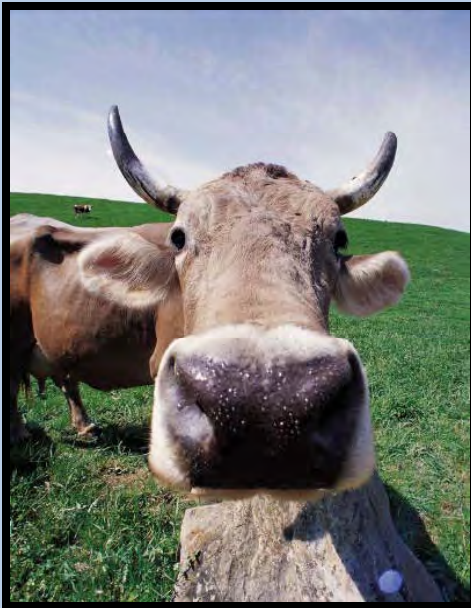


Strategically placed aerators in private channels will reduce odors and fish kills.

Small floating wetland kits (right) may help take up nutrients in channels.



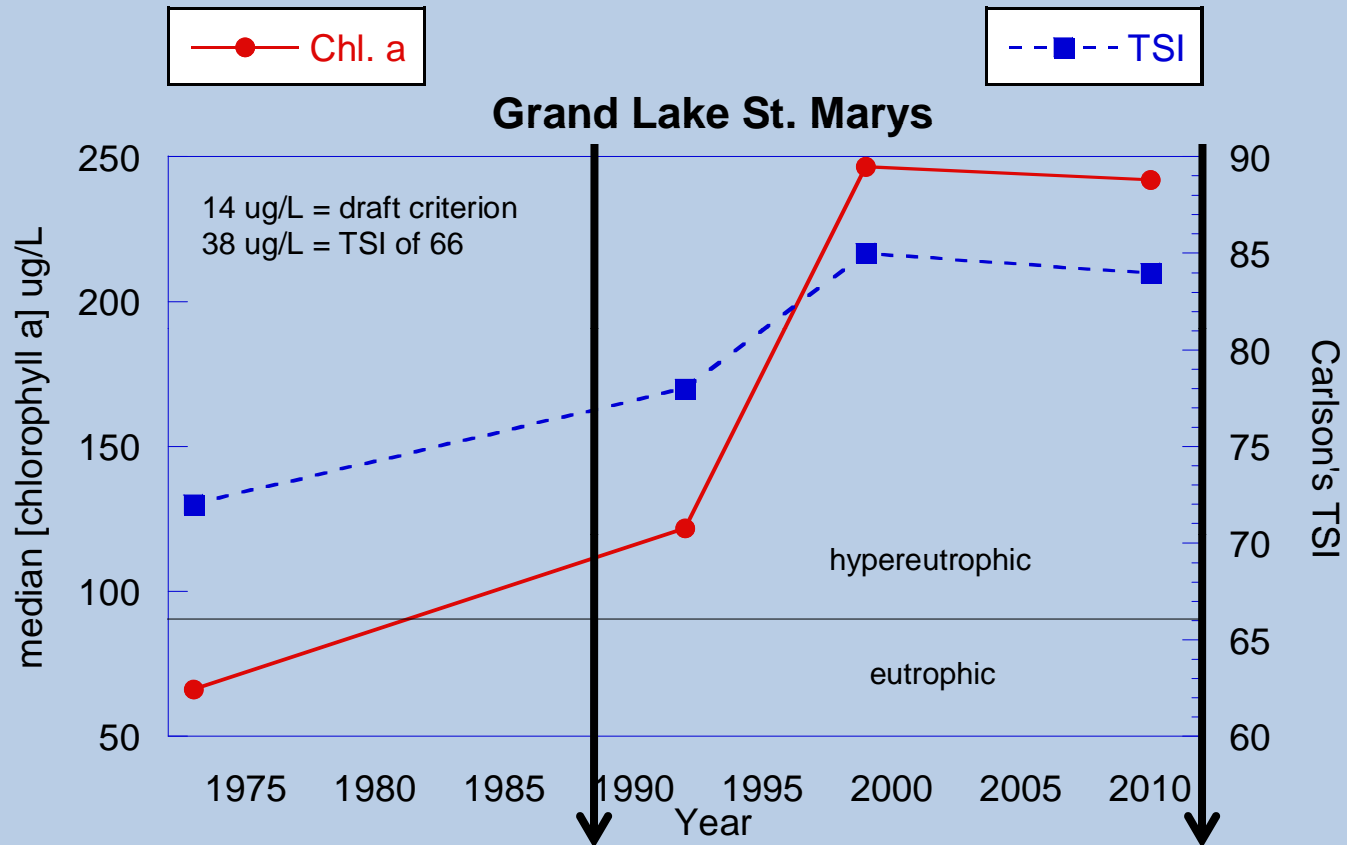
The Gorilla in the room



“Grand Lake water quality problems related to nutrients appear better resolved through reduction of nutrient loads and control of agricultural and livestock waste sources”

**Louisville District Corps of Engineers
August, 1981**

Historical levels of chlorophyll-a and trophic state index



1987 GLSM Livestock Population
 45,000 cows
 123,000 hogs
 3.9 million chickens

2007 GLSM Livestock Population
 79,000 cows
 273,000 hogs
 9.3 million chickens

Specific efforts to reduce agricultural nutrients

“Distressed Watershed” Rule

Prohibition of Winter Manure Application

Nutrient Management Planning

Mandatory Soil Testing

Community Anaerobic Digester (proposed)

Refining the P-Index (proposed)

Continued expansion of special EQIP

Ongoing Challenges

- **Future funding**
- **Agency action & coordination**
- **Community pressure**
- **Timing of in-lake measures**
- **Owning the load issues**
- **Local economic impacts**



Questions?

