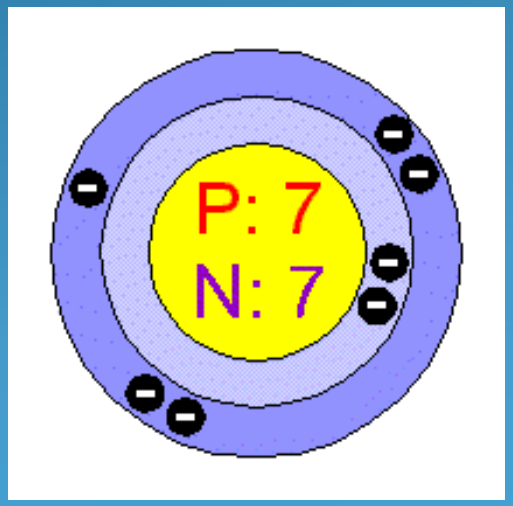
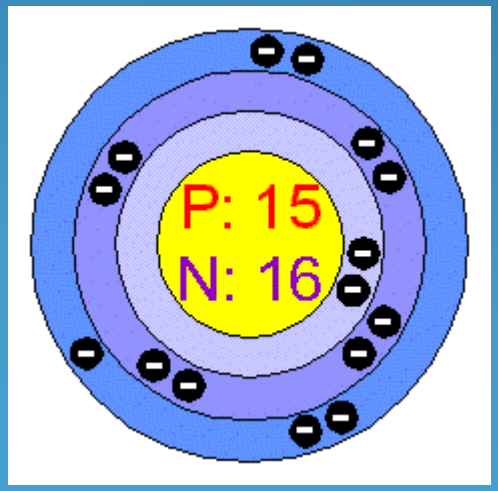
Nitrogen and Phosphorus Concentrations and Loads in the Great Miami River Basin, Ohio

Nitrogen

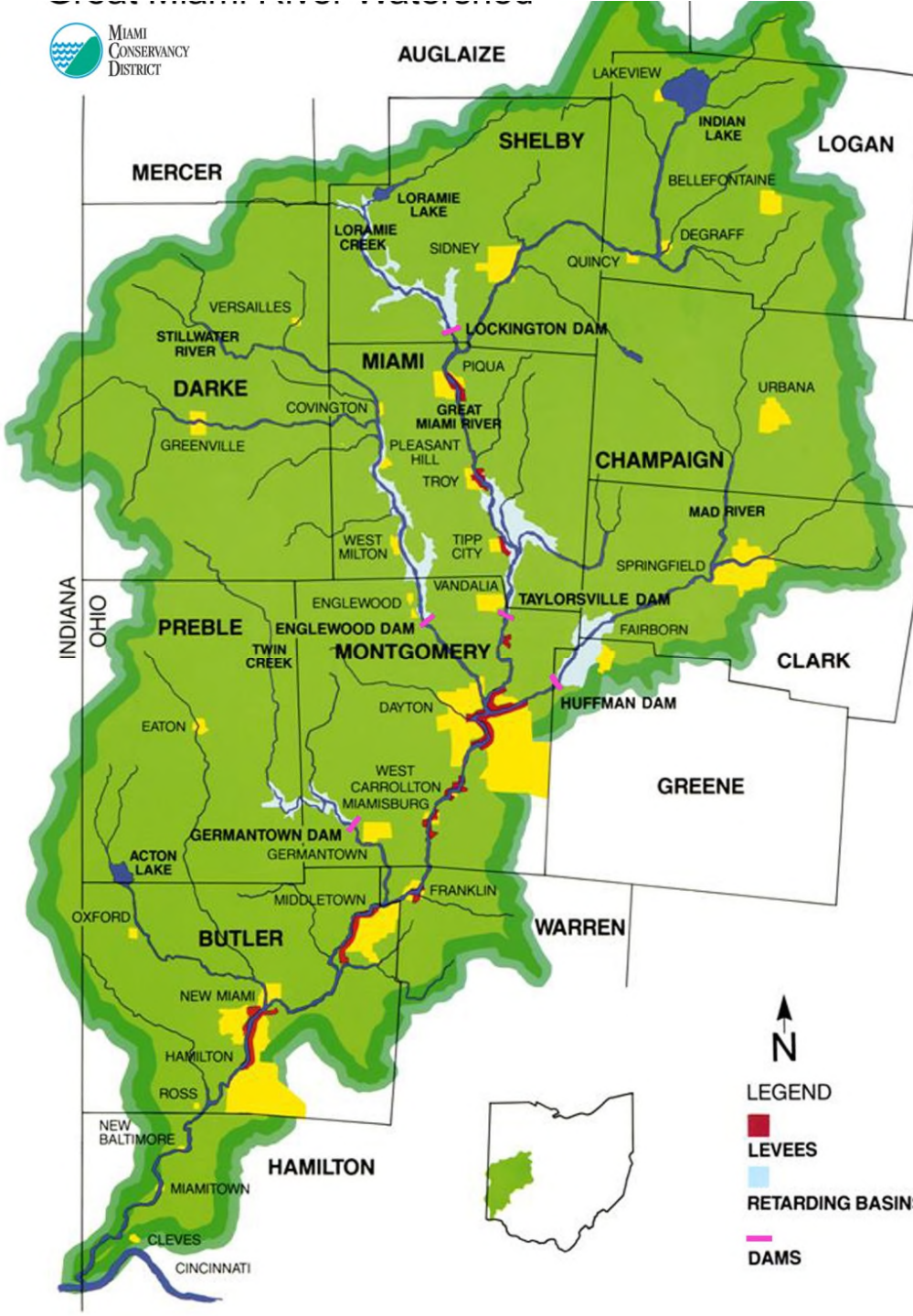


Phosphorus



Ohio's Great Miami River Watershed

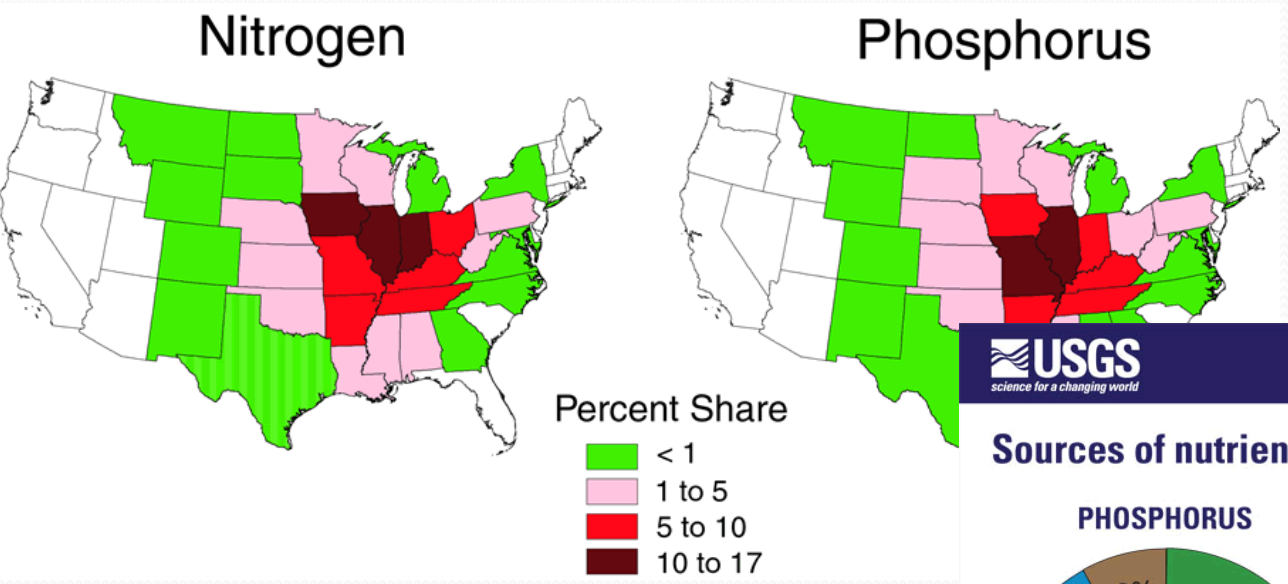
- 4,000 mi² / 15 counties
- Dayton is largest city
- Major tributaries:
  - Great Miami River
  - Stillwater River
  - Mad River
  - Wolf and Twin Creeks
- 1.5 million residents

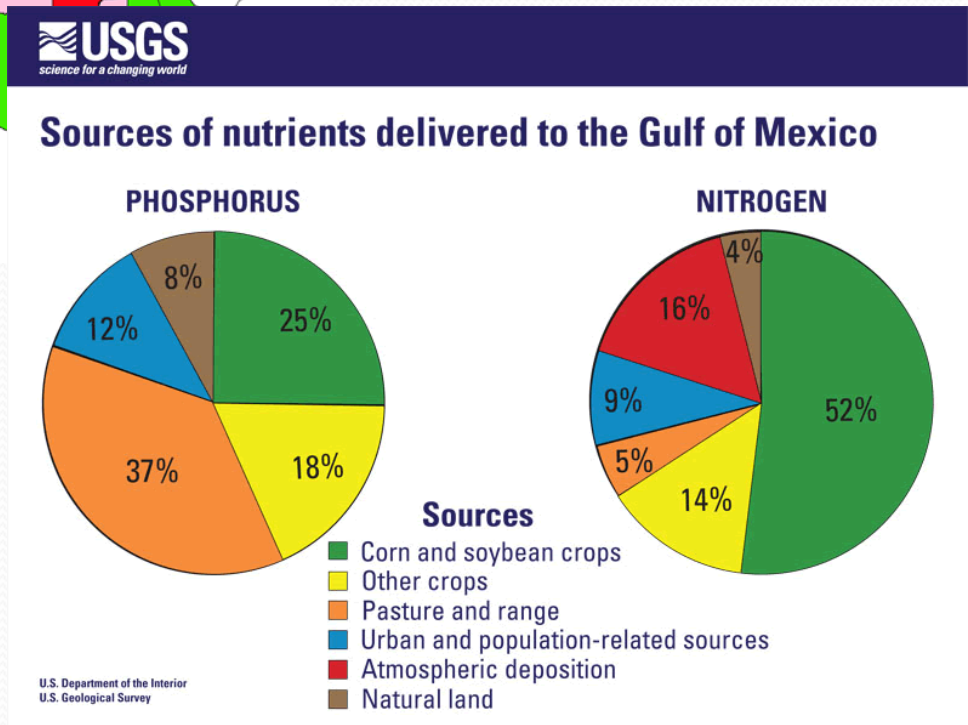


Are we meeting water quality goals?

- Of our monitored streams:
  - ✓ Yes = +/- 60%
  - ✓ Almost = +/- 20%
  - ✓ No = +/- 20%
- Nutrients, Sediment, hydromodification

Ohio among “dirty” eight





From: water.usgs.gov/nawqa/sparrow/gulf_findings/primary_sources.ht

USGS rankings

For 818 subwatersheds (HUC8s) of the Gulf of Mexico

Watershed	Total Nitrogen	Total Phosphorus
Upper Great Miami	27th	289th
Lower Great Miami	31st	58th

From:
Supplement to Robertson et. al., 2009
Journal of the American Water Resources Association

USGS
science for a changing world

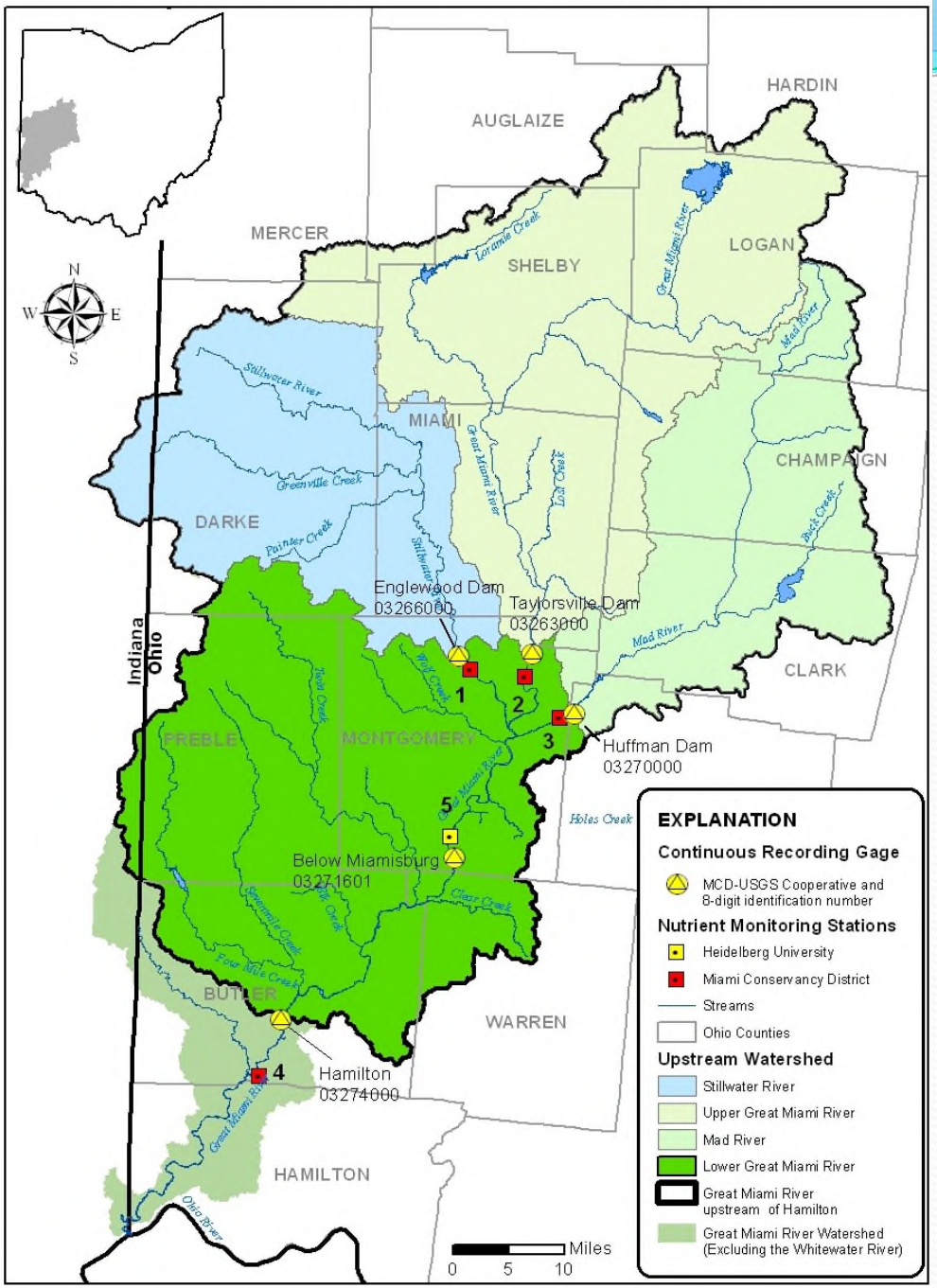
Source of Nutrients in Natural Waters

Trading Program overview

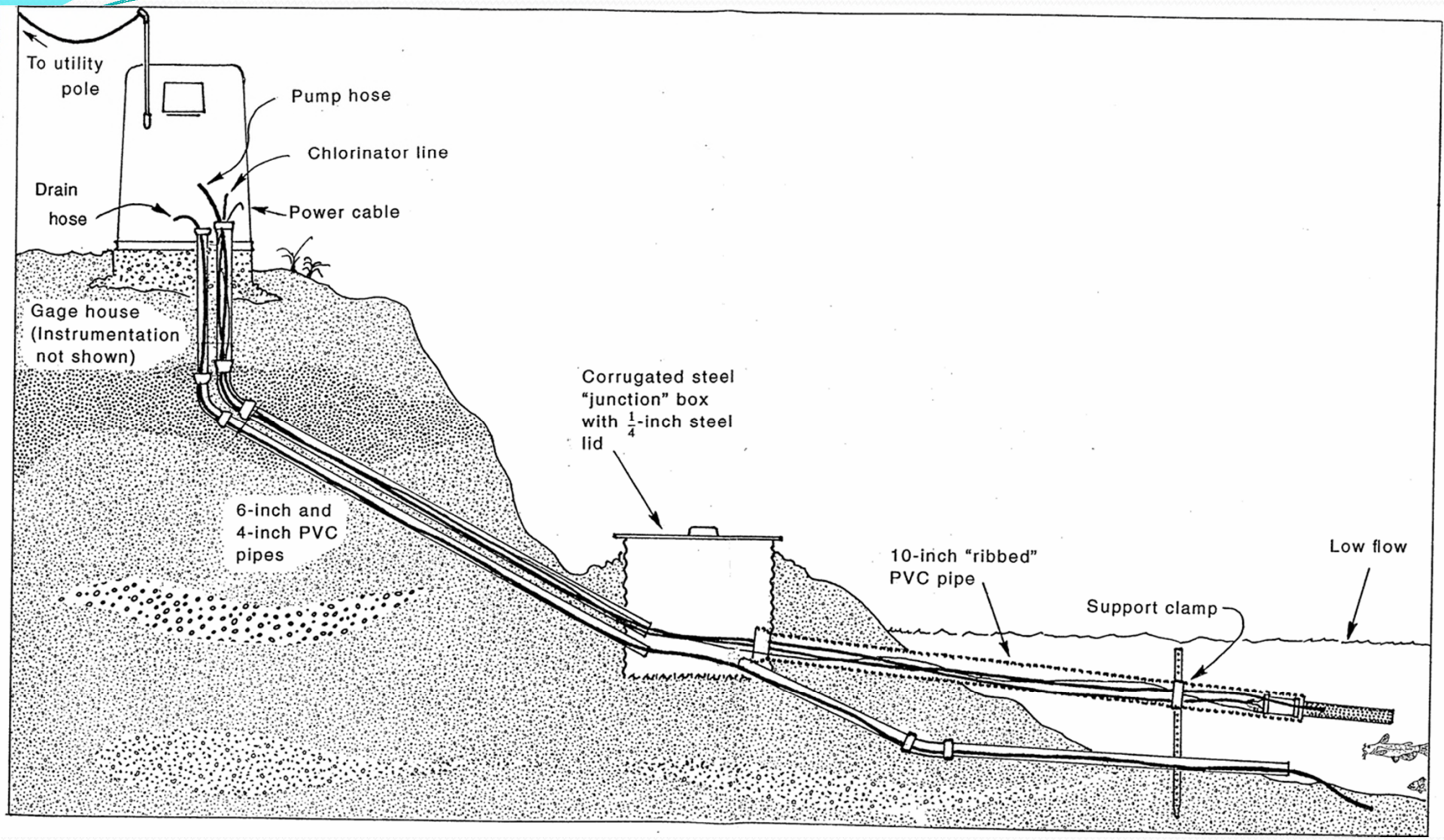
County SWCDs

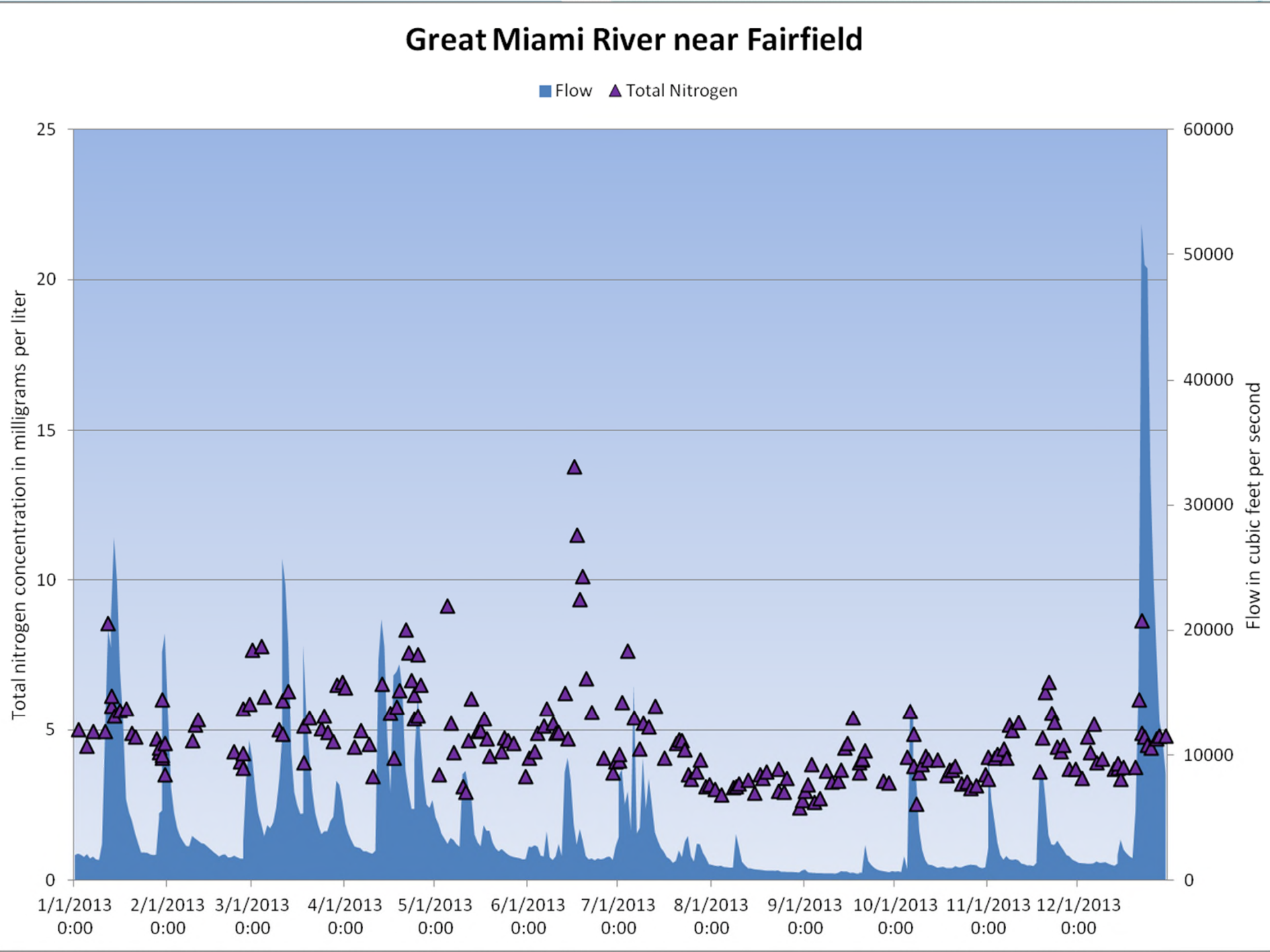
Miami Conservancy District

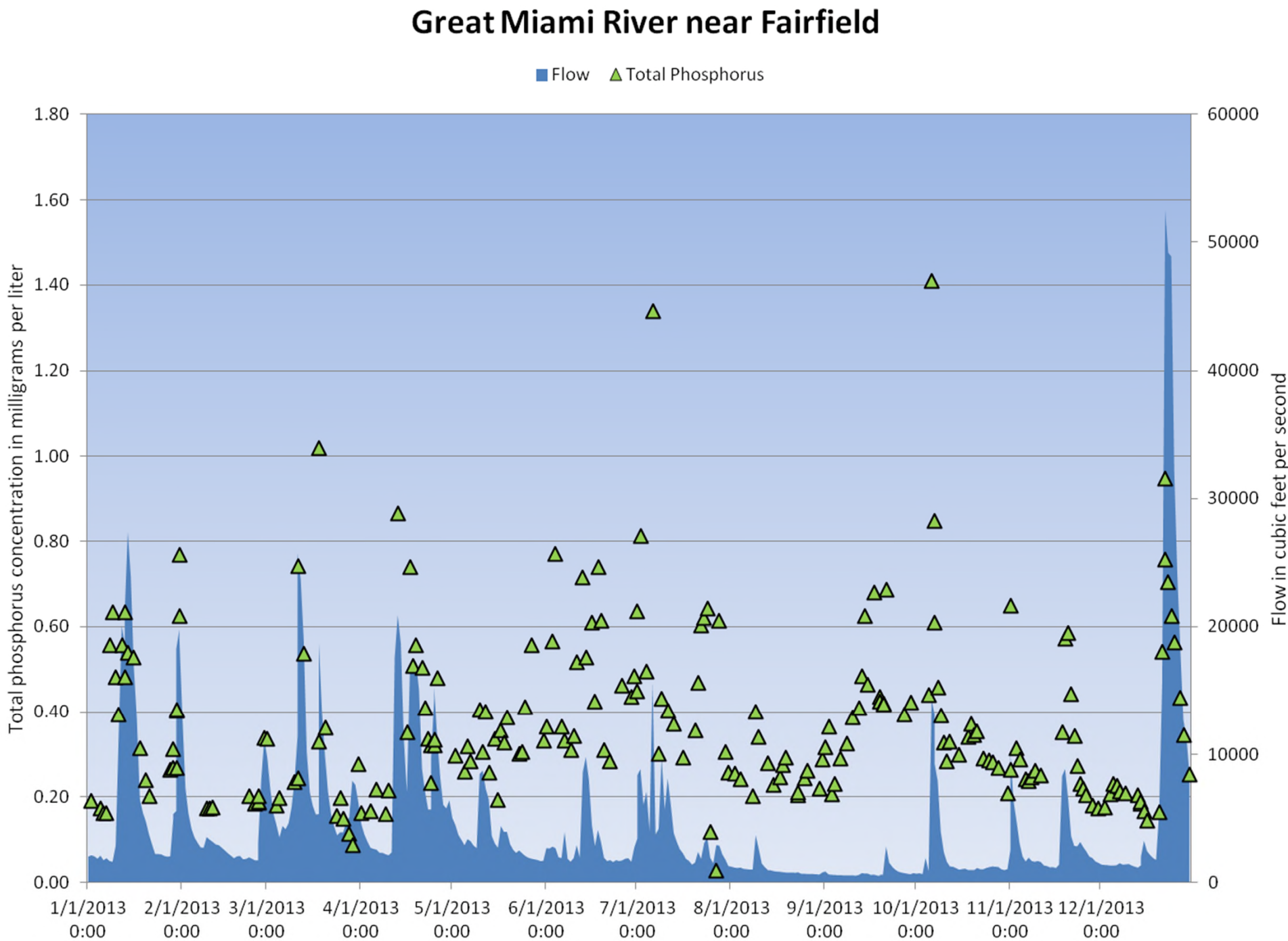
Locations of Nutrient Monitoring Stations

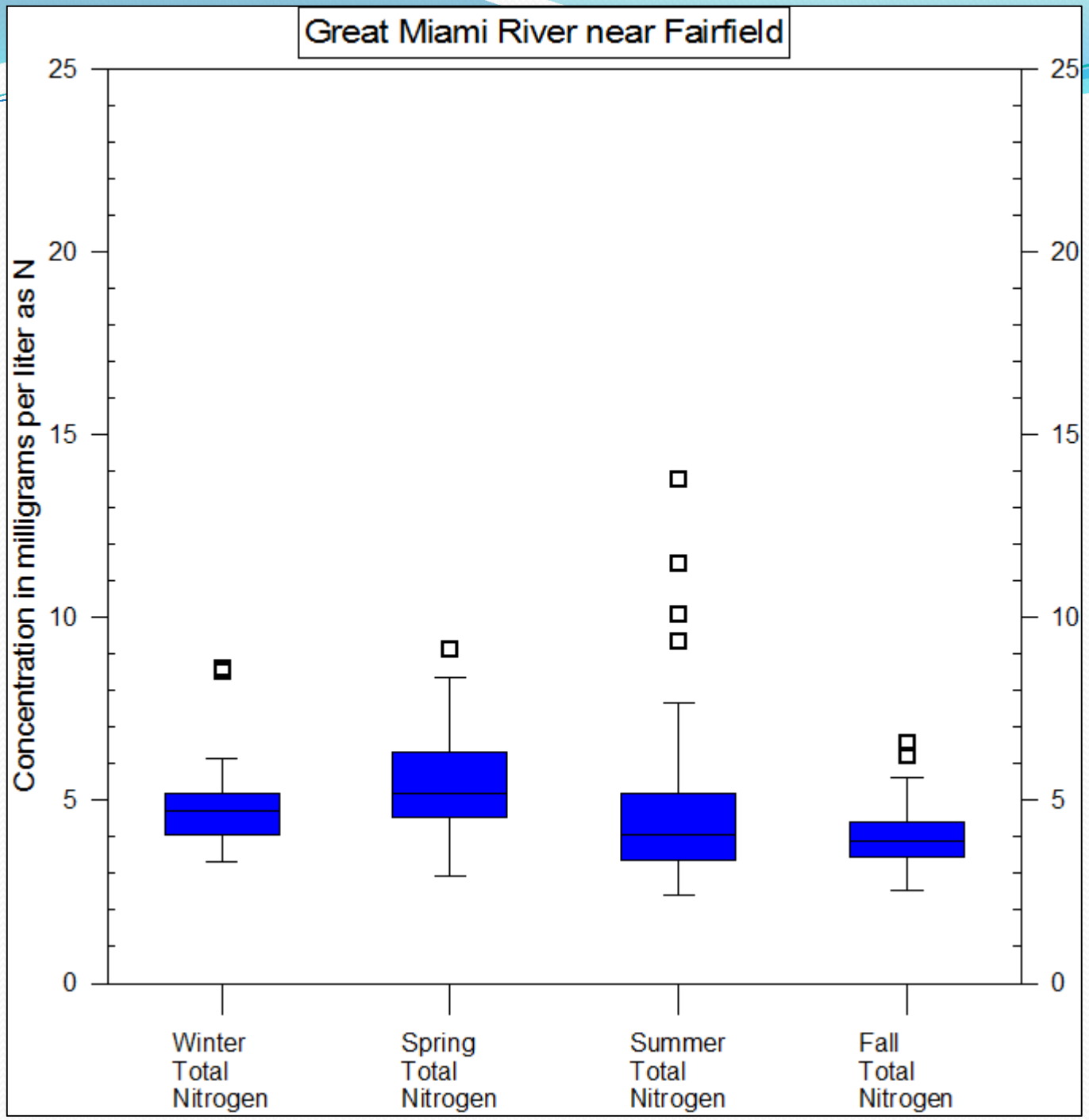


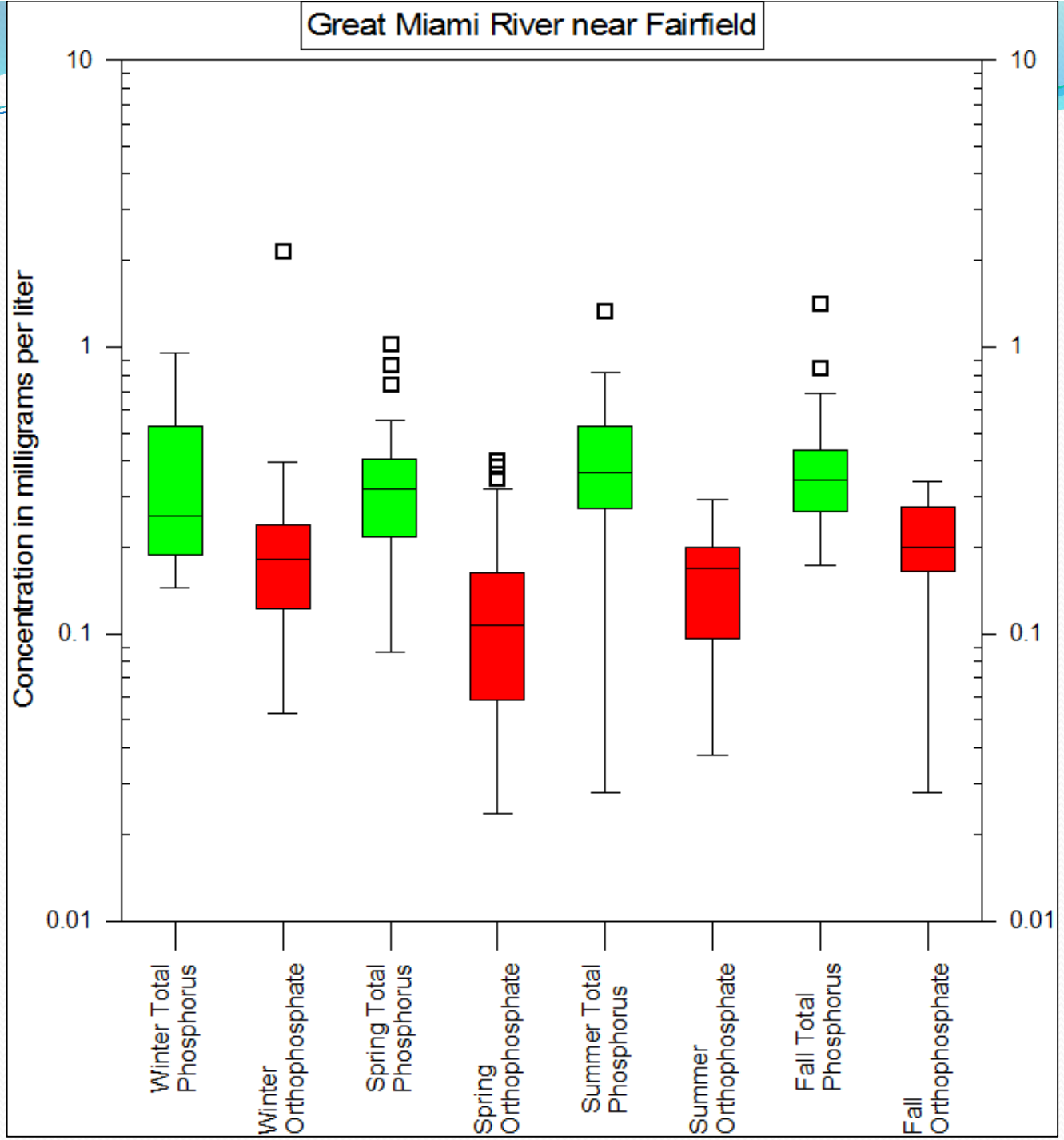
6600 V2
Multiparameter Water Quality Sonde
ISCO
6712


To utility pole
Pump hose
Chlorinator line
Drain hose
Power cable
Gage house (Instrumentation not shown)
Corrugated steel "junction" box with 1/4-inch steel lid
6-inch and 4-inch PVC pipes
10-inch "ribbed" PVC pipe
Support clamp
Low flow

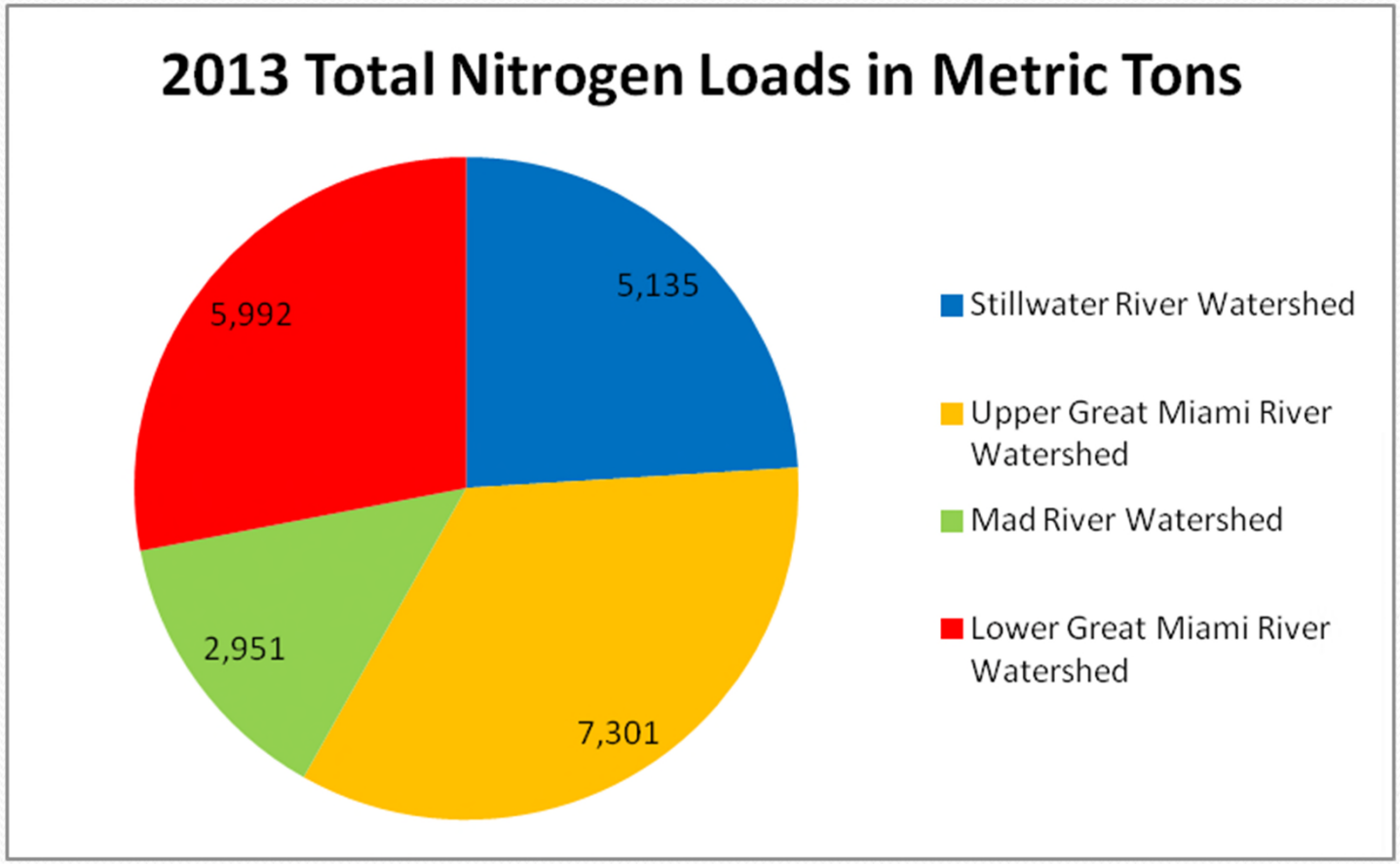

Great Miami River near Fairfield
Flow
Total Nitrogen
Total nitrogen concentration in milligrams per liter
Flow in cubic feet per second
25
20
15
10
5
0
60000
50000
40000
30000
20000
10000
0
1/1/2013 0:00
2/1/2013 0:00
3/1/2013 0:00
4/1/2013 0:00
5/1/2013 0:00
6/1/2013 0:00
7/1/2013 0:00
8/1/2013 0:00
9/1/2013 0:00
10/1/2013 0:00
11/1/2013 0:00
12/1/2013 0:00


Great Miami River near Fairfield
Flow
Total Phosphorus
Total phosphorus concentration in milligrams per liter
Flow in cubic feet per second
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
60000
50000
40000
30000
20000
10000
0
1/1/2013 0:00
2/1/2013 0:00
3/1/2013 0:00
4/1/2013 0:00
5/1/2013 0:00
6/1/2013 0:00
7/1/2013 0:00
8/1/2013 0:00
9/1/2013 0:00
10/1/2013 0:00
11/1/2013 0:00
12/1/2013 0:00

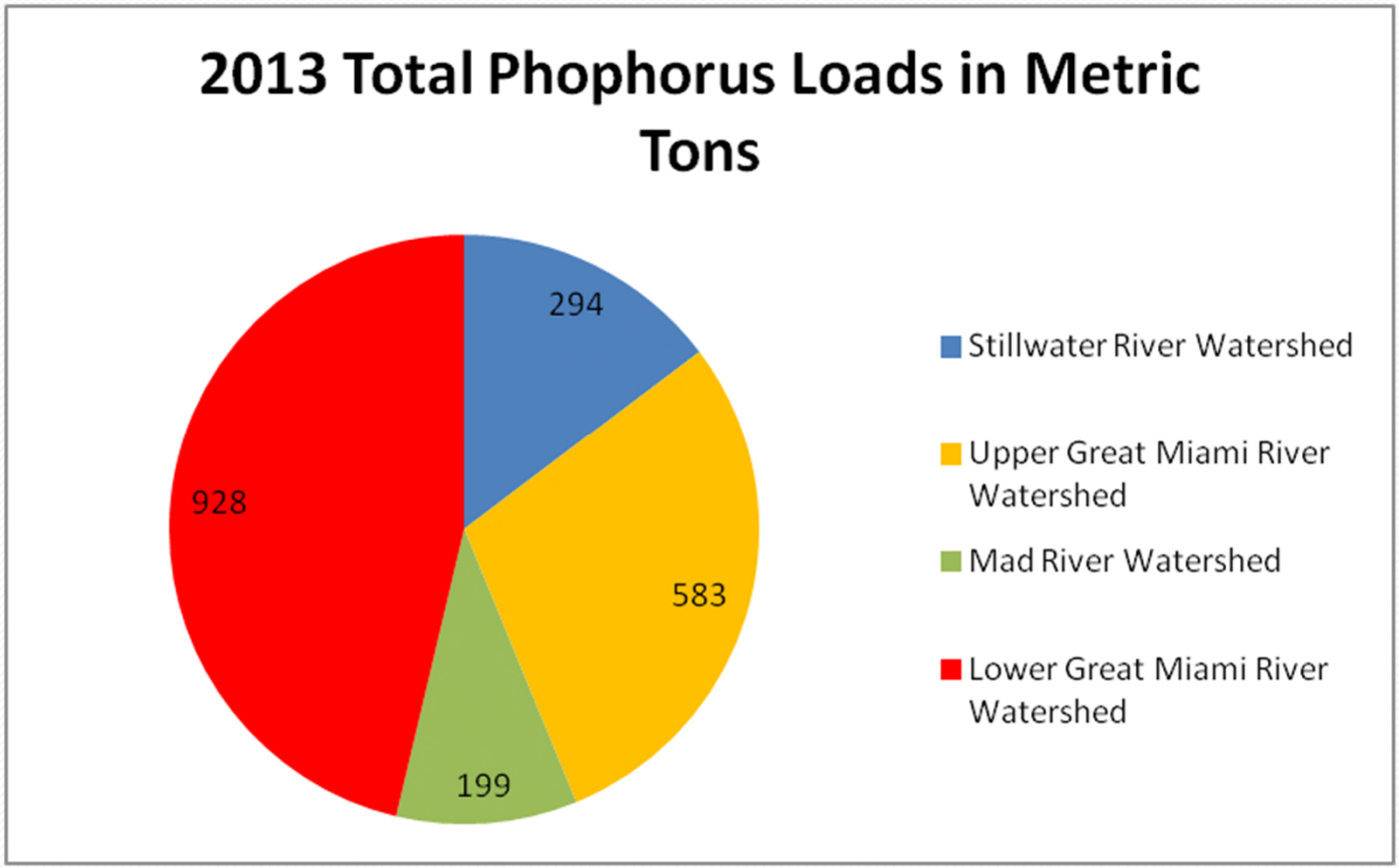

Great Miami River near Fairfield
Concentration in milligrams per liter as N
25
20
15
10
5
0
Winter Total Nitrogen
Spring Total Nitrogen
Summer Total Nitrogen
Fall Total Nitrogen

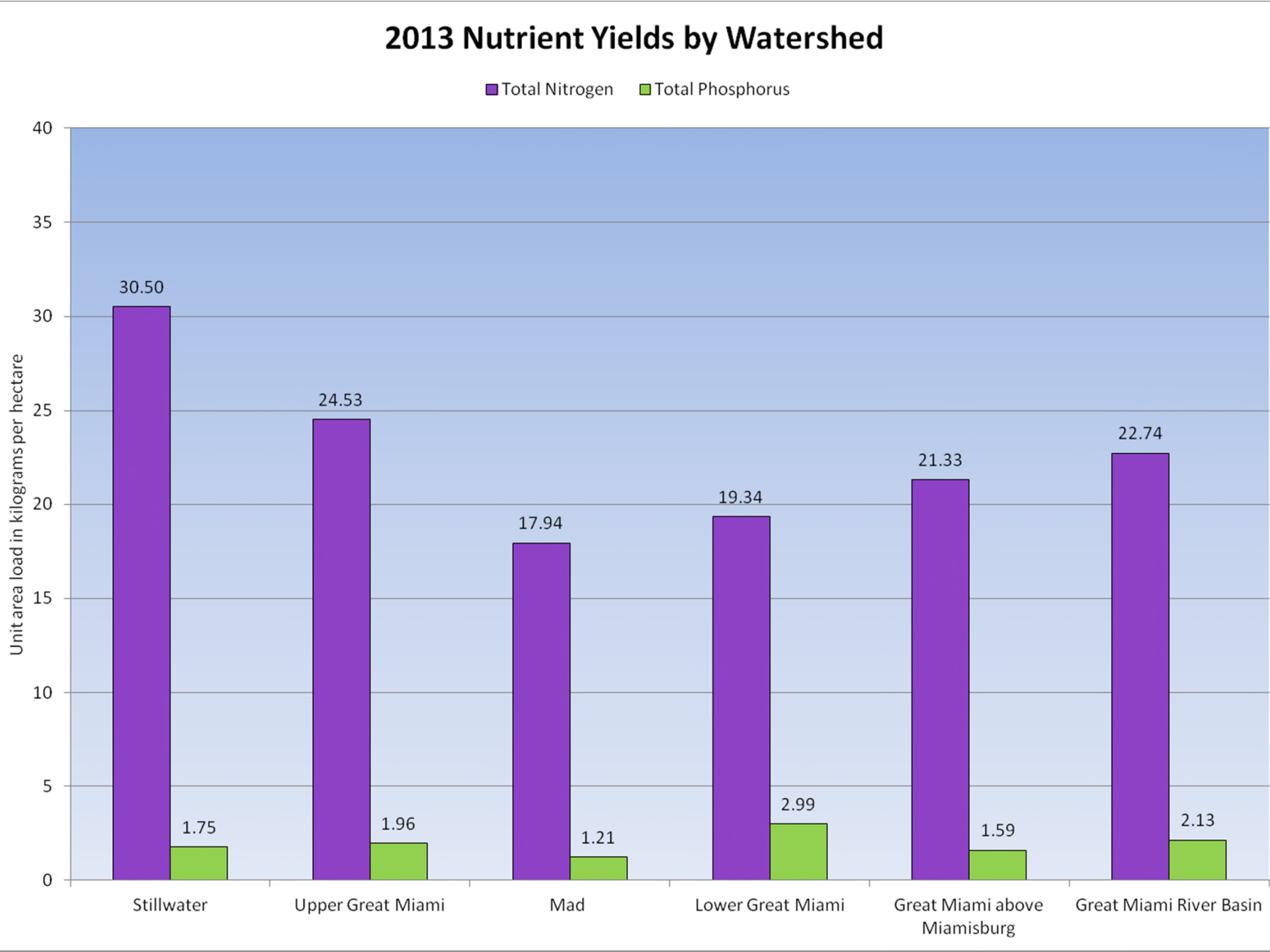

Great Miami River near Fairfield
Concentration in milligrams per liter
10
1
0.1
0.01
Winter Total Phosphorus
Winter Orthophosphate
Spring Total Phosphorus
Spring Orthophosphate
Summer Total Phosphorus
Summer Orthophosphate
Fall Total Phosphorus
Fall Orthophosphate

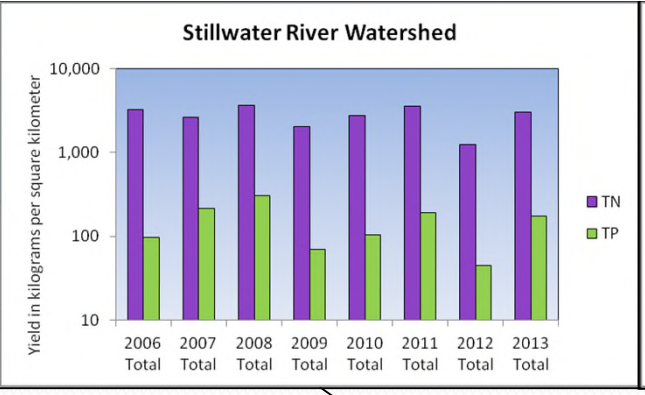
Load Comparisons

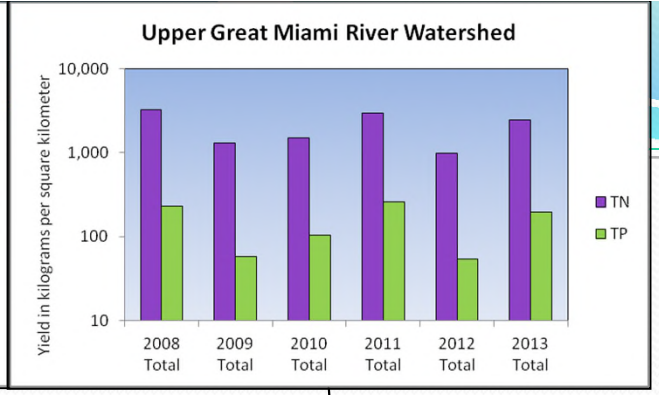


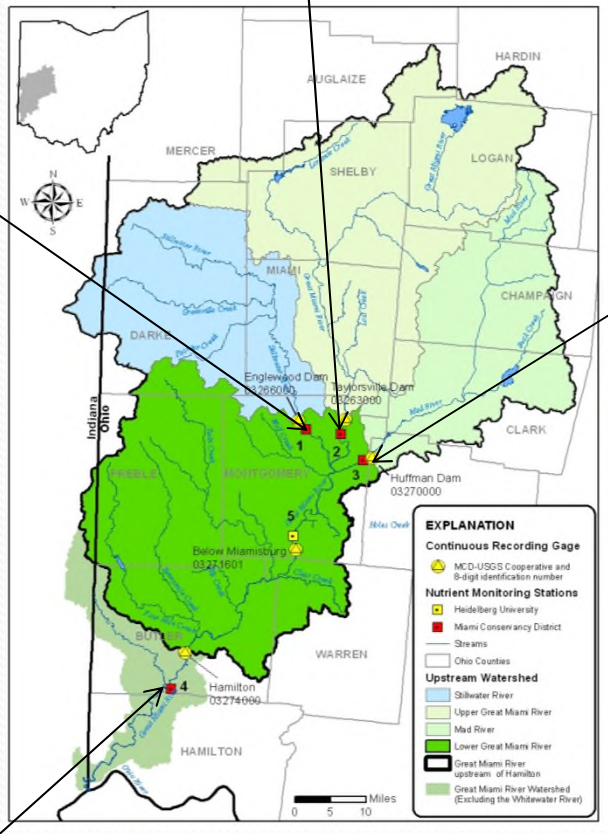
Load Comparisons

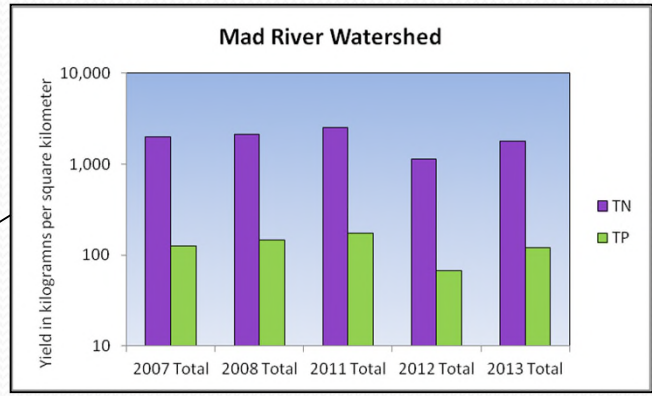


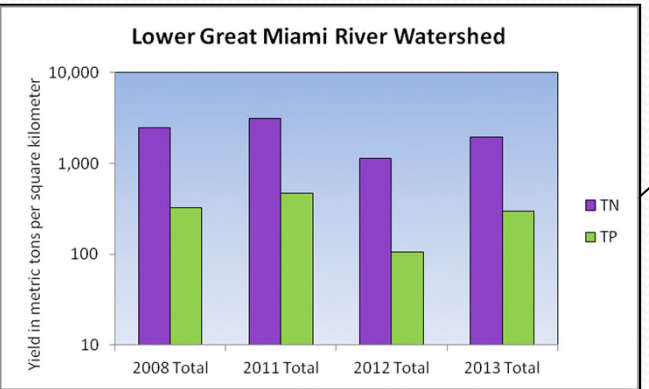

2013 Nutrient Yields by Watershed
Total Nitrogen
Total Phosphorus
Unit area load in kilograms per hectare
40
35
30
25
20
15
10
5
0
30.50
1.75
24.53
1.96
17.94
1.21
19.34
2.99
21.33
1.59
22.74
2.13
Stillwater
Upper Great Miami
Mad
Lower Great Miami
Great Miami above Miamisburg
Great Miami River Basin


Stillwater River Watershed
Yield in kilograms per square kilometer
10,000
1,000
100
10
2006 Total
2007 Total
2008 Total
2009 Total
2010 Total
2011 Total
2012 Total
2013 Total
TN
TP


Upper Great Miami River Watershed
Yield in kilograms per square kilometer
10,000
1,000
100
10
2008 Total
2009 Total
2010 Total
2011 Total
2012 Total
2013 Total
TN
TP


AUGLAIZE
HARDIN
MERCER
SHELBY
LOGAN
MIAMI
CHAMPAIGN
DARKE
CLARK
PREBLE
MONTGOMERY
BUTLER
WARREN
HAMILTON
Indiana
Ohio
Englewood Dam
03260000
Taylorsville Dam
03263000
Huffman Dam
03270000
Below Miamisburg
03271601
Hamilton
03274000
1
2
3
4
5
EXPLANATION
Continuous Recording Gage
MCD-USGS Cooperative and 8-digit identification number
Nutrient Monitoring Stations
Heidelberg University
Miami Conservancy District
Streams
Ohio Counties
Upstream Watershed
Stillwater River
Upper Great Miami River
Mad River
Lower Great Miami River
Great Miami River upstream of Hamilton
Great Miami River Watershed (Excluding the Whitewater River)
Miles
0 5 10


Mad River Watershed
Yield in kilogramns per square kilometer
10,000
1,000
100
10
2007 Total
2008 Total
2011 Total
2012 Total
2013 Total
TN
TP


Lower Great Miami River Watershed
Yield in metric tons per square kilometer
10,000
1,000
100
10
2008 Total
2011 Total
2012 Total
2013 Total
TN
TP

Questions ?

MIAMI CONSERVANCY DISTRICT