Wisconsin River/Reservoir/Tributaries Water Quality Monitoring Update

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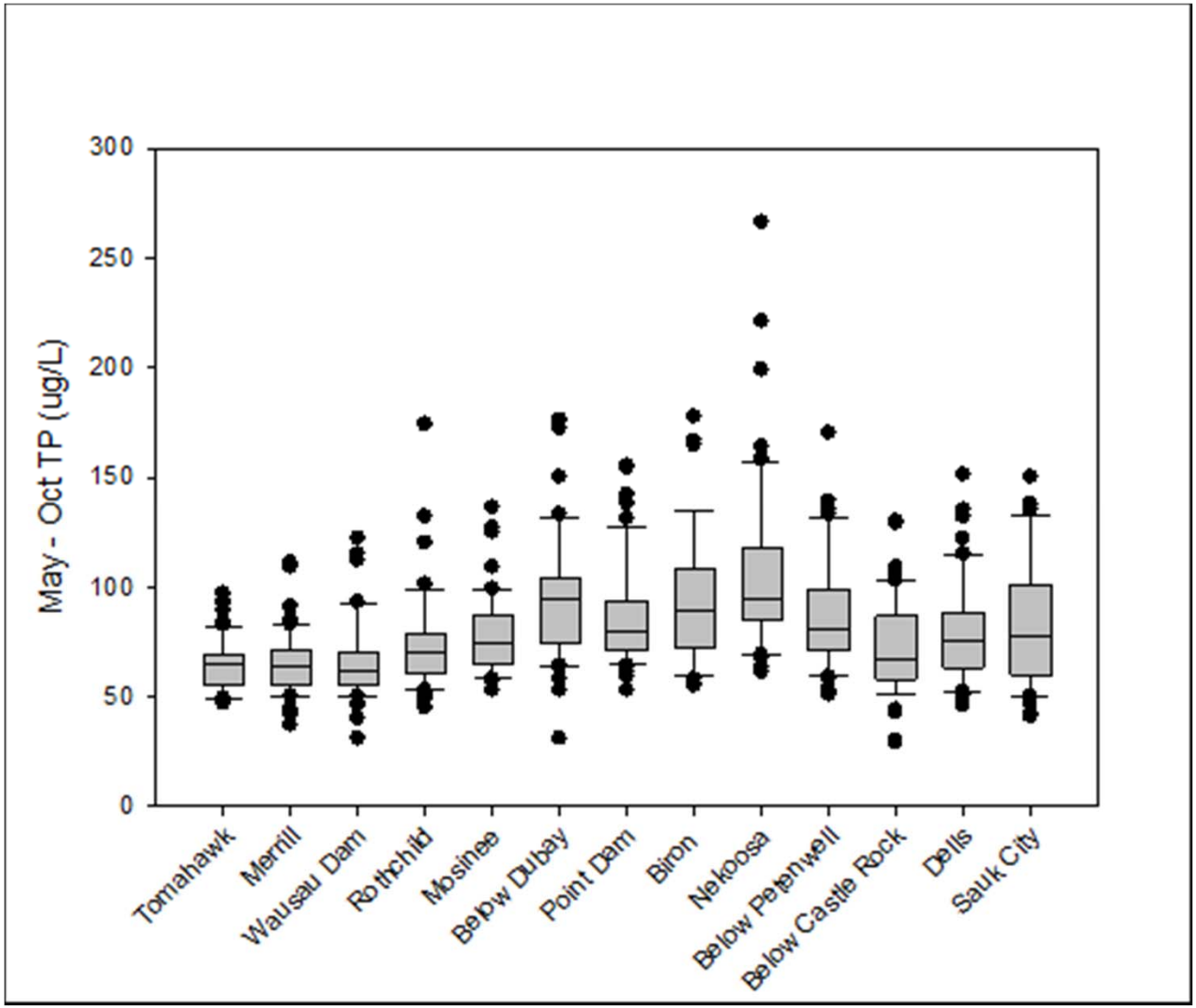
So here we are again…

- Outline
  - Refresher on P criteria
  - TMDL specific monitoring results
    - Tributary data
    - Mainstem data
    - Reservoir data
  - Other data
    - Status monitoring
    - Trend monitoring

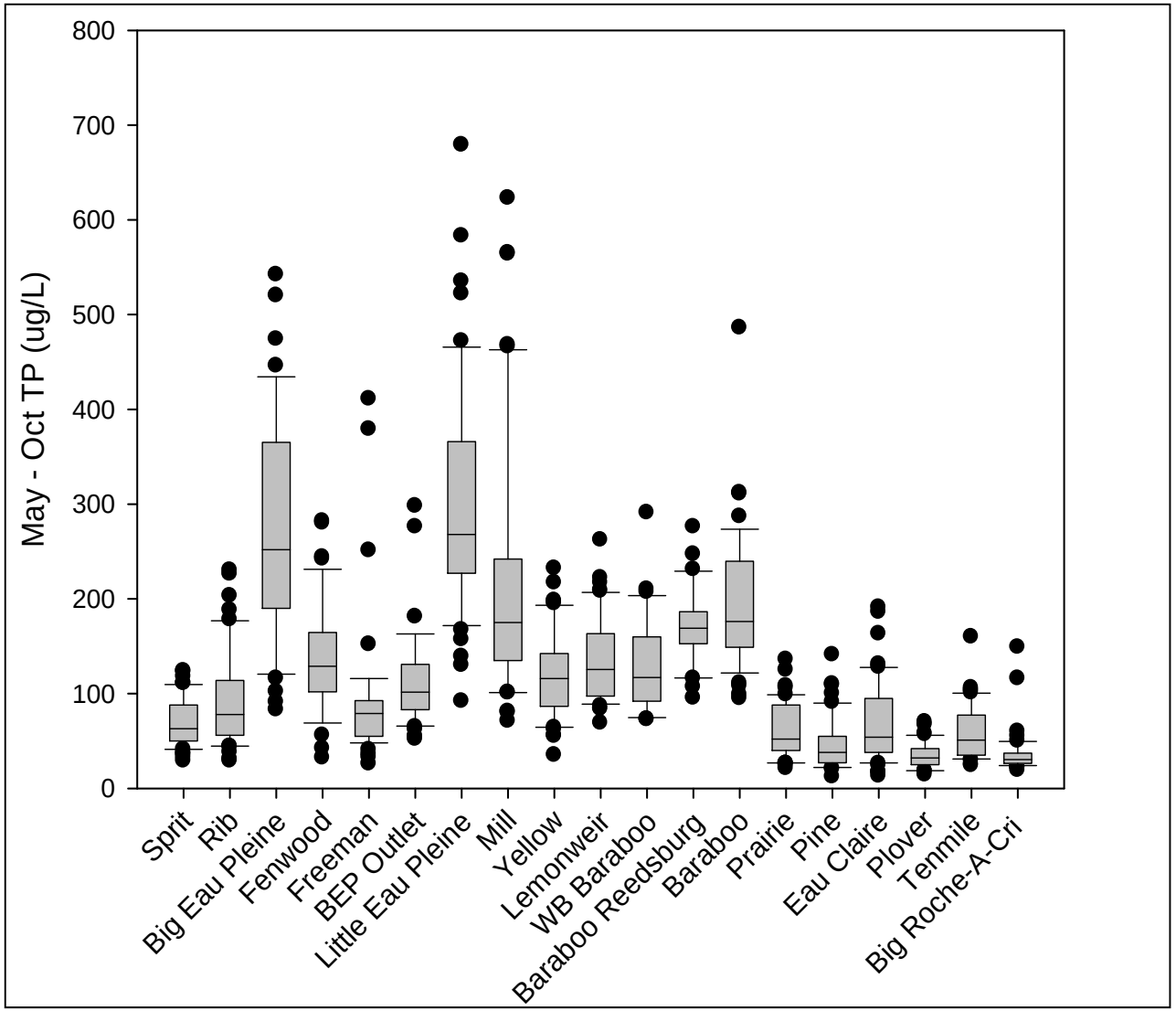
Phosphorus Criteria Refresher

- Contained in s. NR 102.06 WI Admin. Code
- Rivers and Streams
  - Named rivers – 100 μg/L
    - Wisconsin River downstream of Rhinelander
    - Lemonweir River downstream of New Lisbon
    - Baraboo River downstream of La Valle
  - Other rivers in this study - 75 μg/L
- Lakes and Reservoirs
  - Two Story Fisheries -15 μg/L
    - Big Fork Lake, Minocqua Lake
  - Stratified Seepage Lakes 20 μg/L
    - May not be examining any of these in this study
  - Stratified Drainage Lakes and Reservoirs - 30 μg/L
    - Planting Ground Lake, Big Eau Pleine
  - Mixed Lakes and Reservoirs - 40 μg/L
    - Lac Vieux Desert, Petenwell

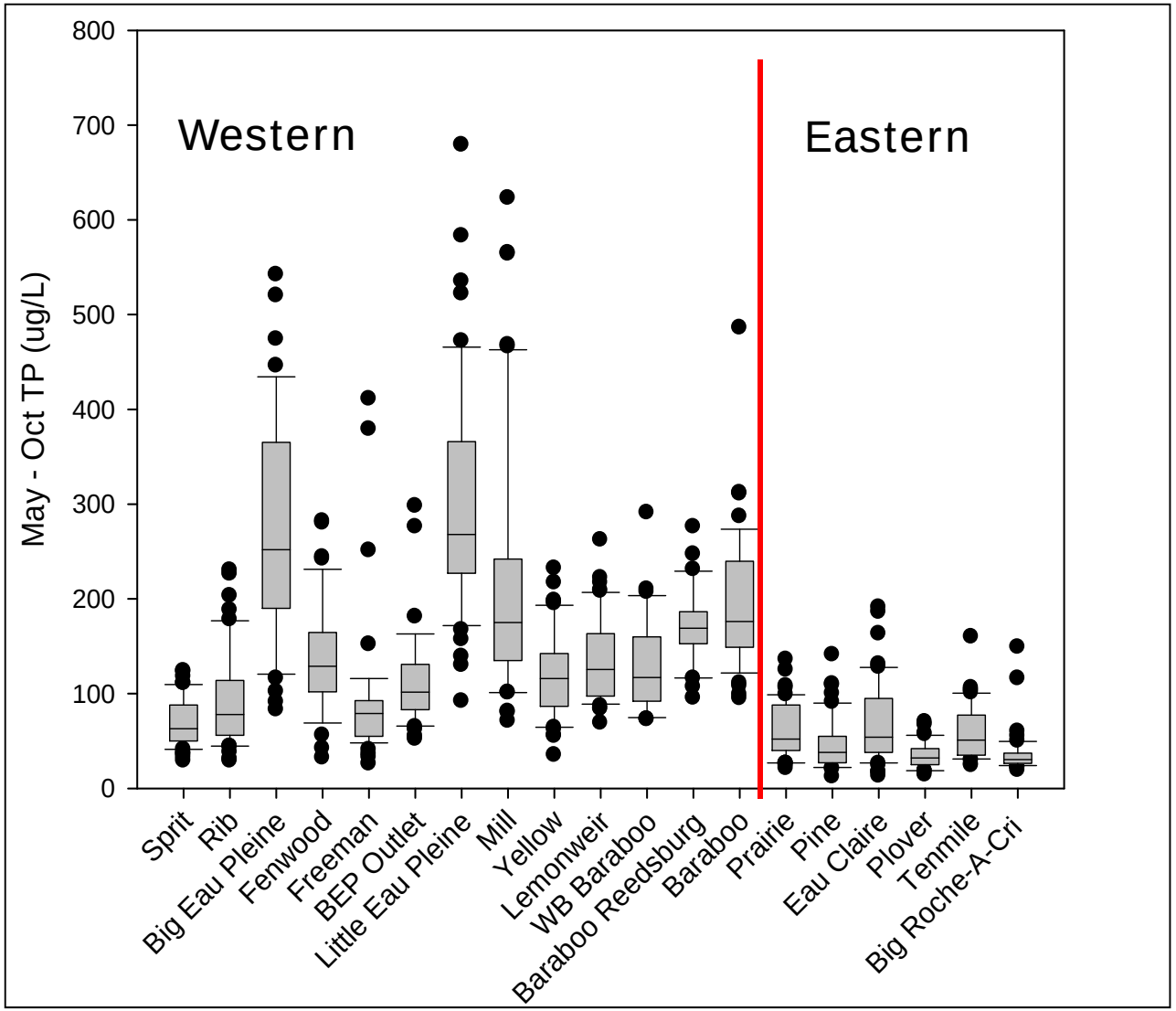
Wisconsin River Mainstem: May-Oct Medians(2009-2013)

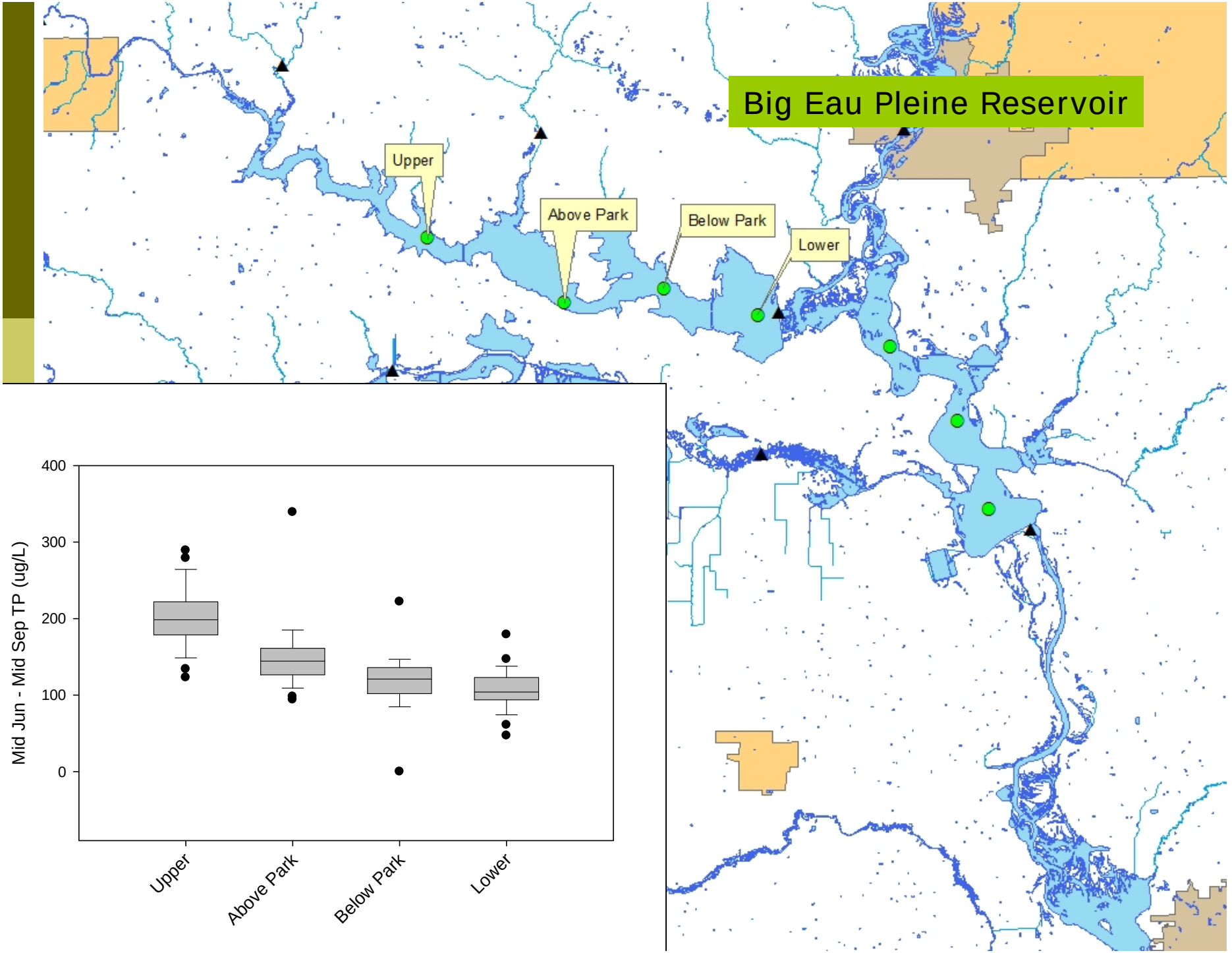


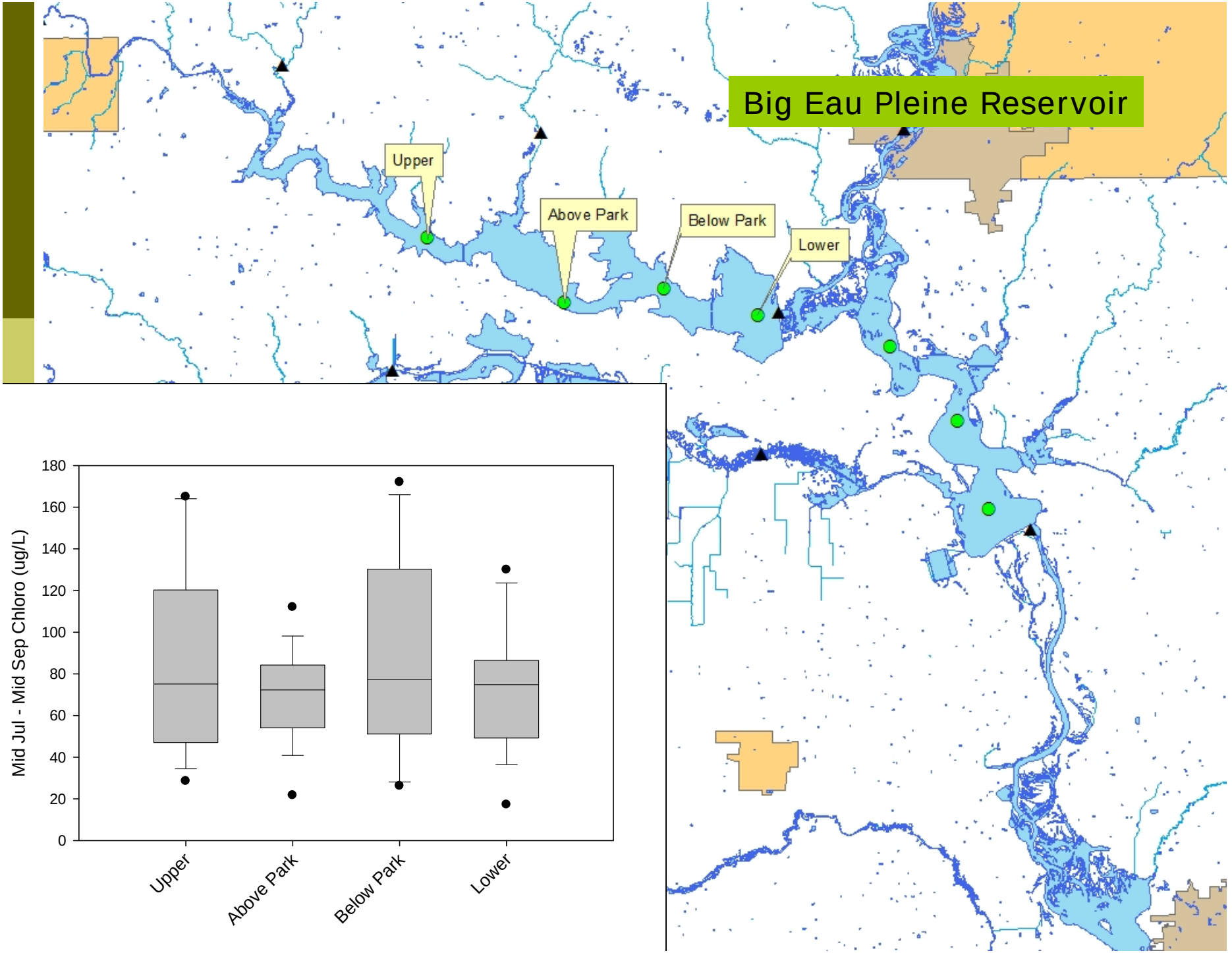
Wisconsin River Tributaries: May-Oct Medians (2009-2013)

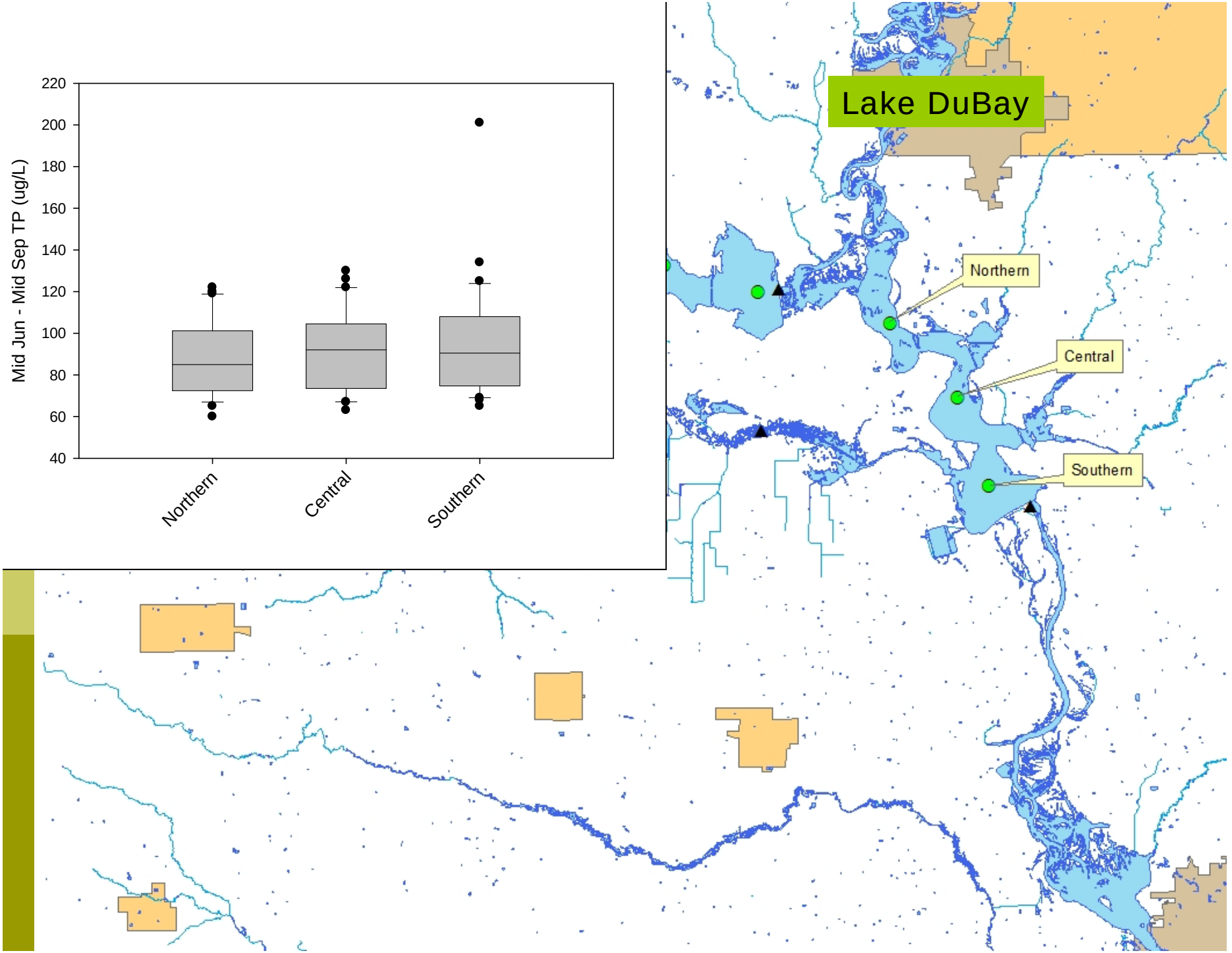


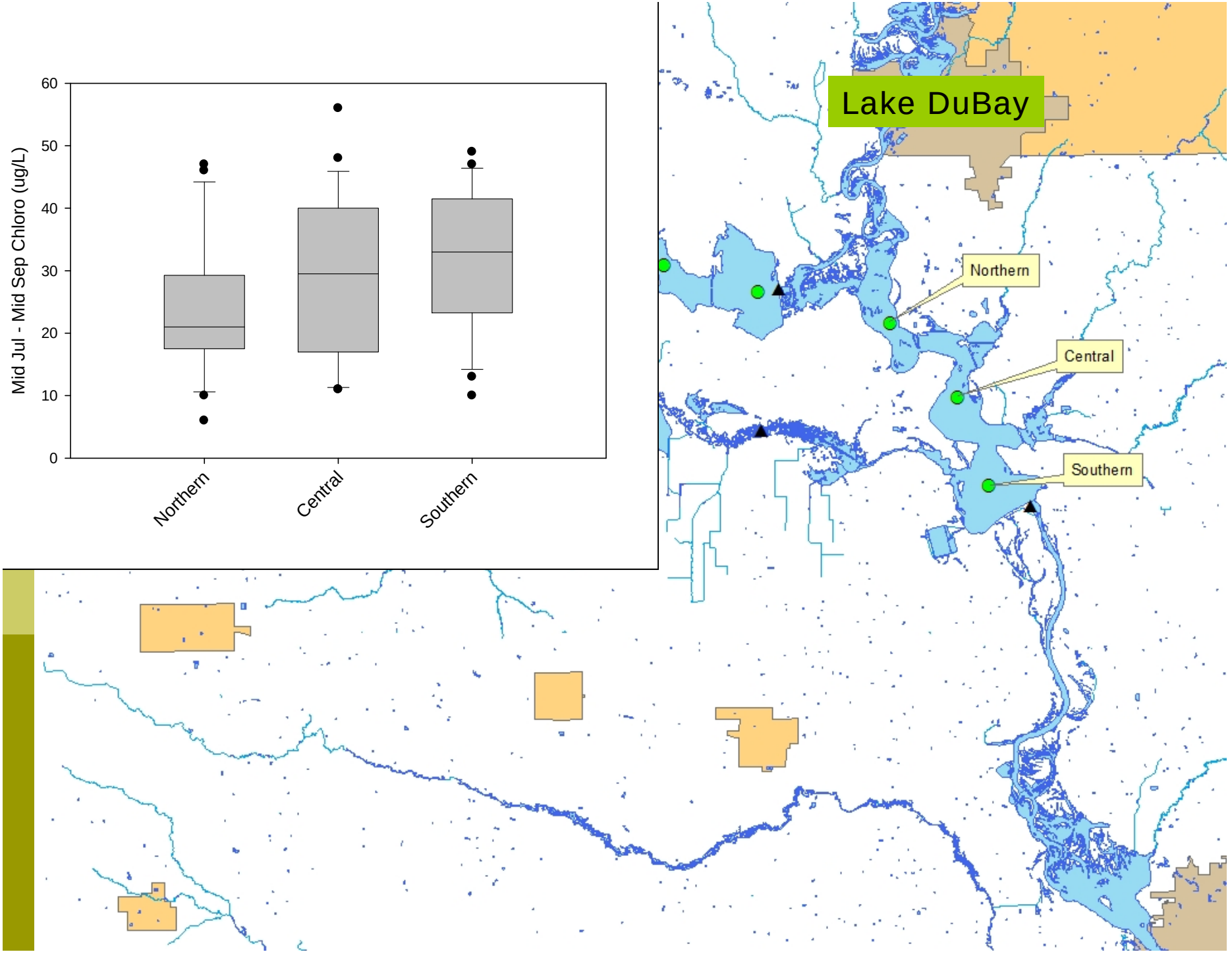
Wisconsin River Tributaries: May-Oct Medians (2009-2013)

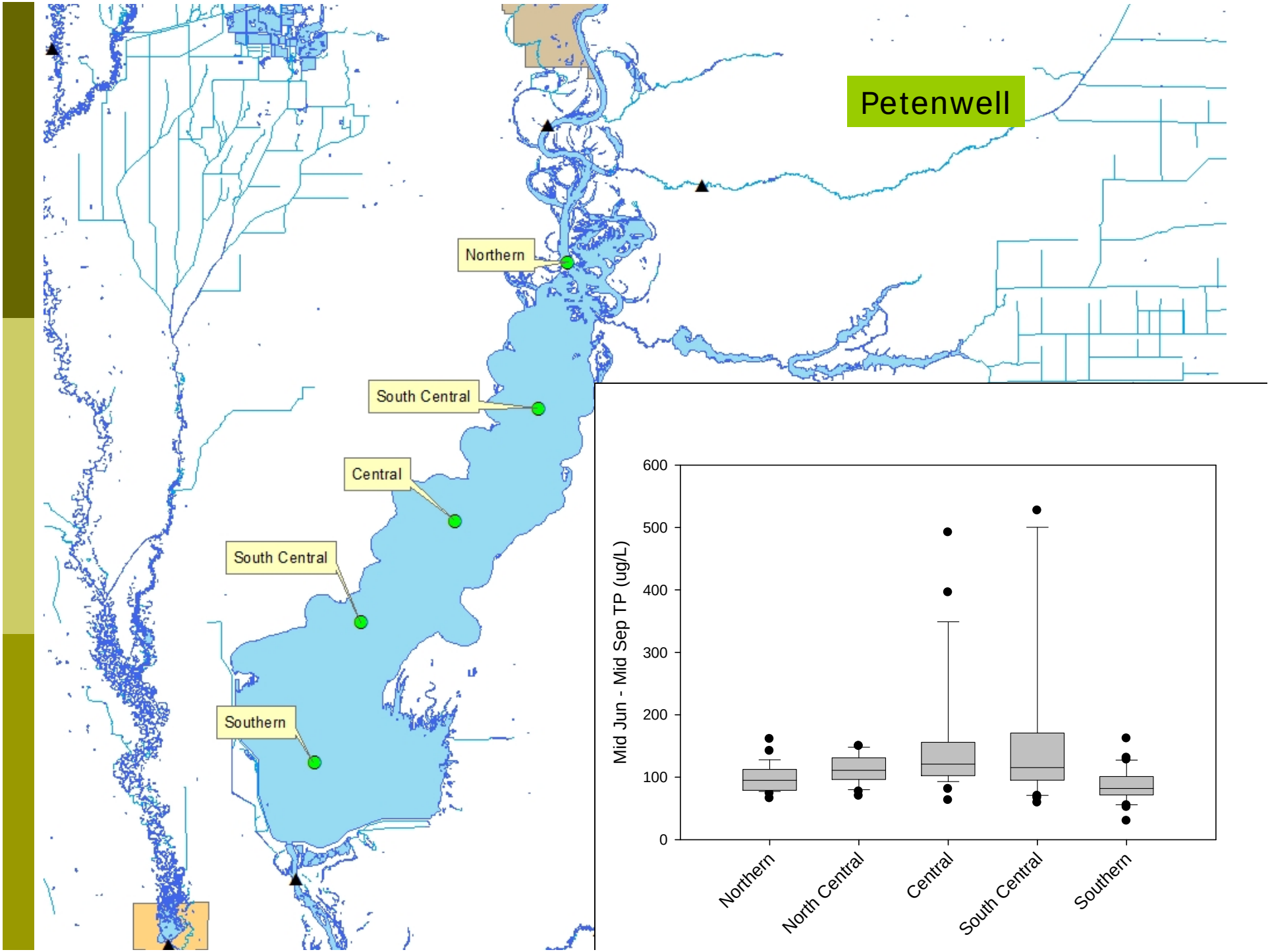


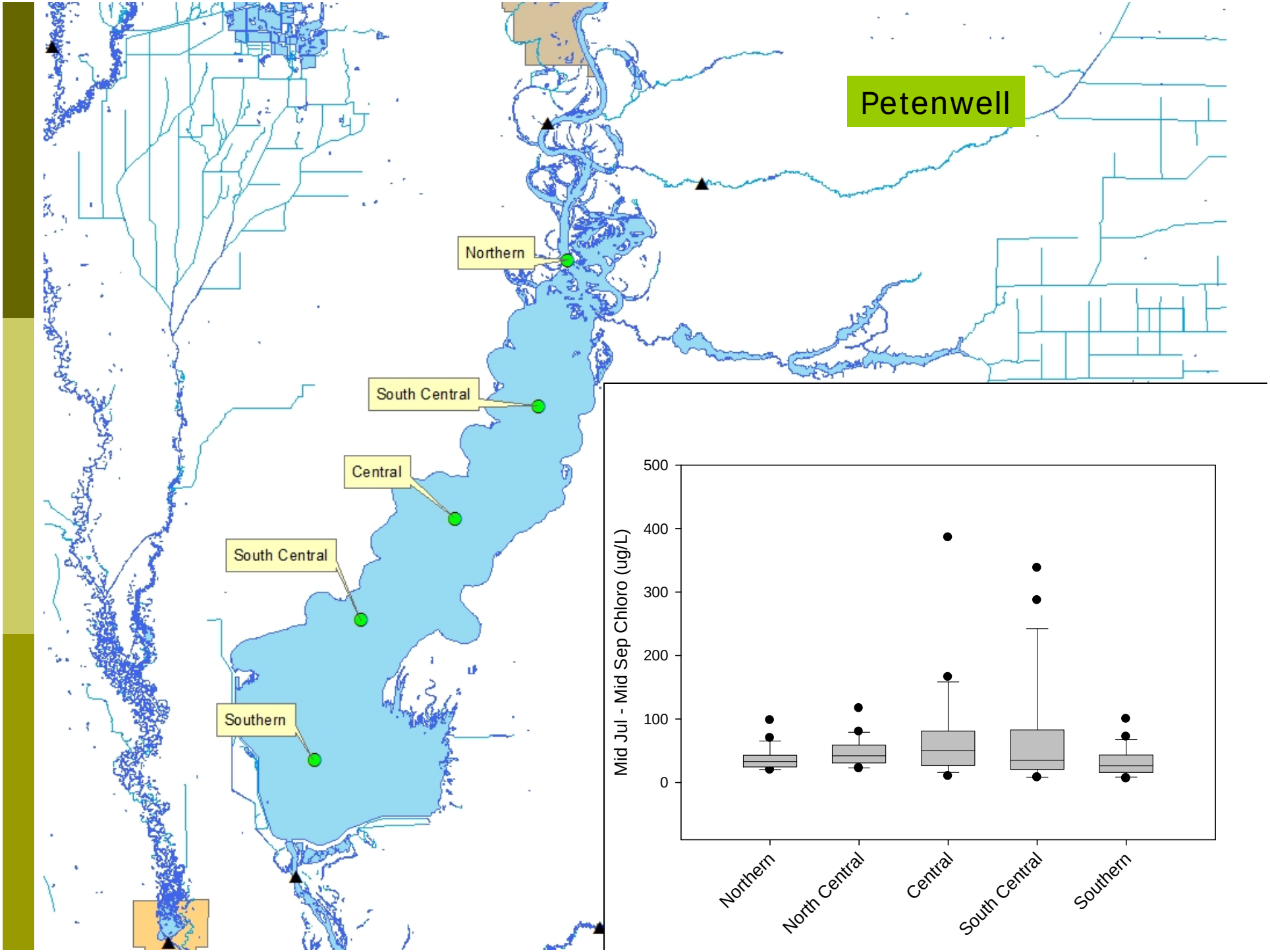

Big Eau Pleine Reservoir
Upper
Above Park
Below Park
Lower
Mid Jun - Mid Sep TP (ug/L)
400
300
200
100
0
Upper
Above Park
Below Park
Lower

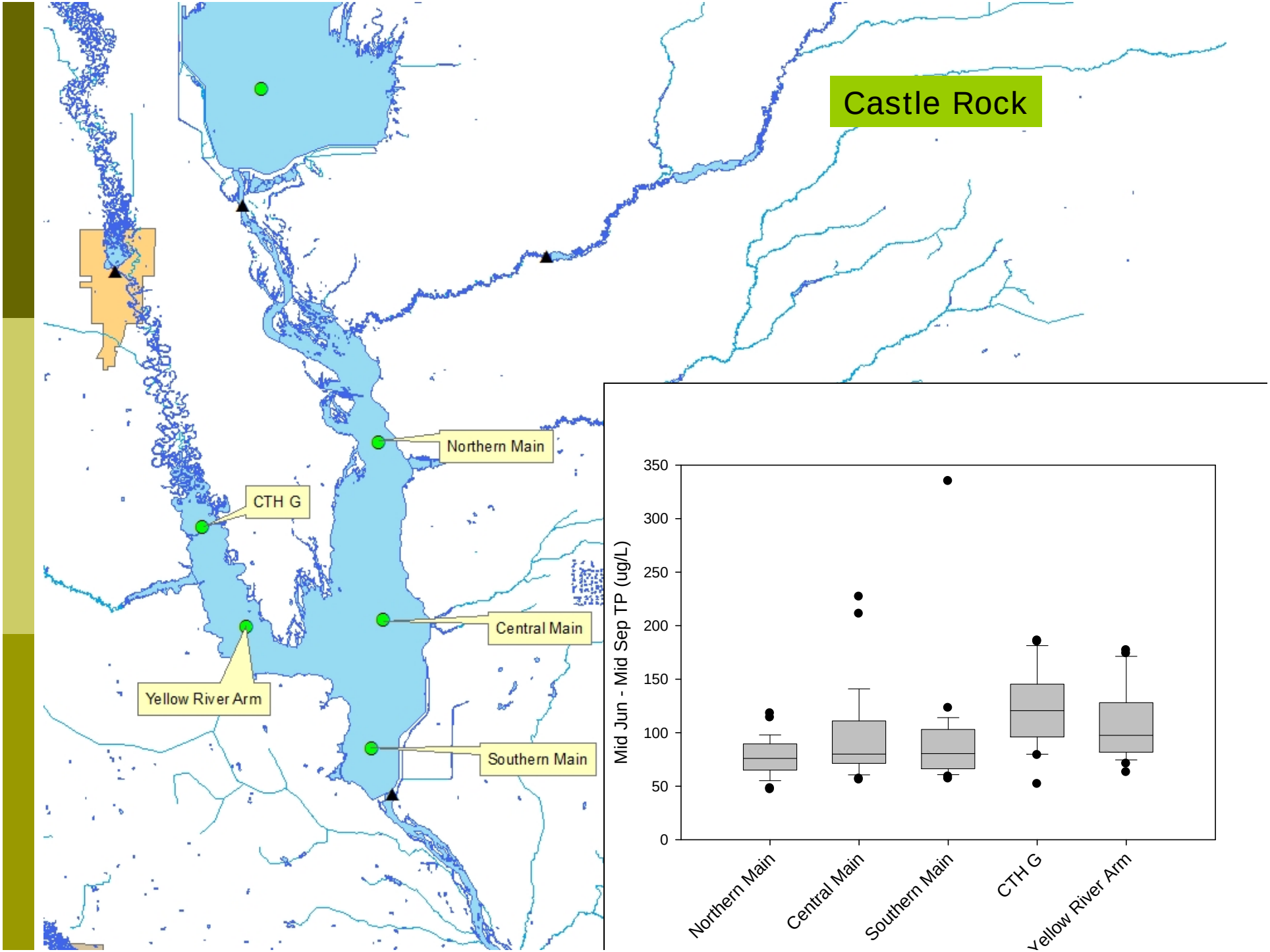

Big Eau Pleine Reservoir
Upper
Above Park
Below Park
Lower
Mid Jul - Mid Sep Chloro (ug/L)
0
20
40
60
80
100
120
140
160
180
Upper
Above Park
Below Park
Lower

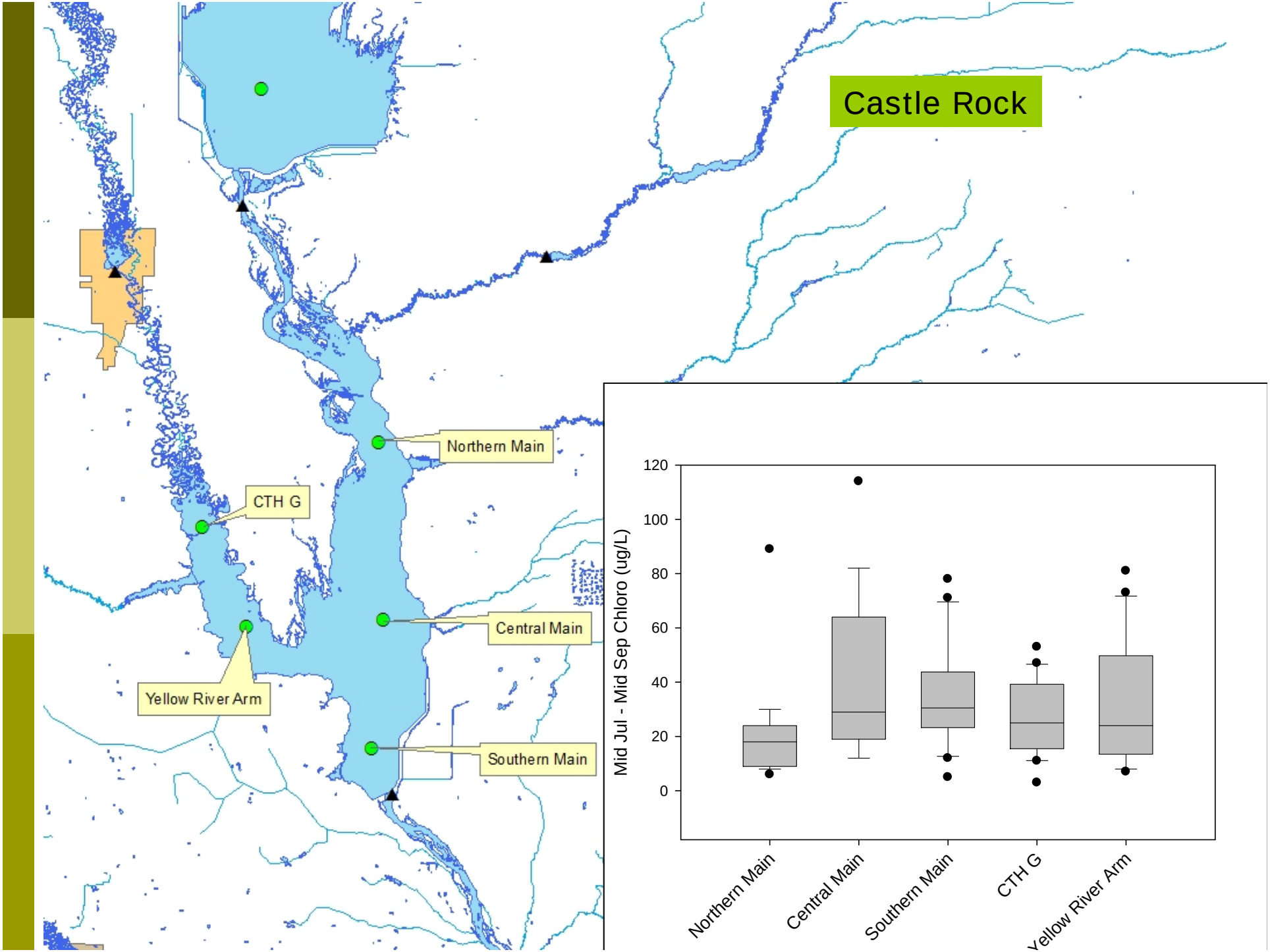

Lake DuBay
Northern
Central
Southern
Mid Jun - Mid Sep TP (ug/L)
220
200
180
160
140
120
100
80
60
40
Northern
Central
Southern

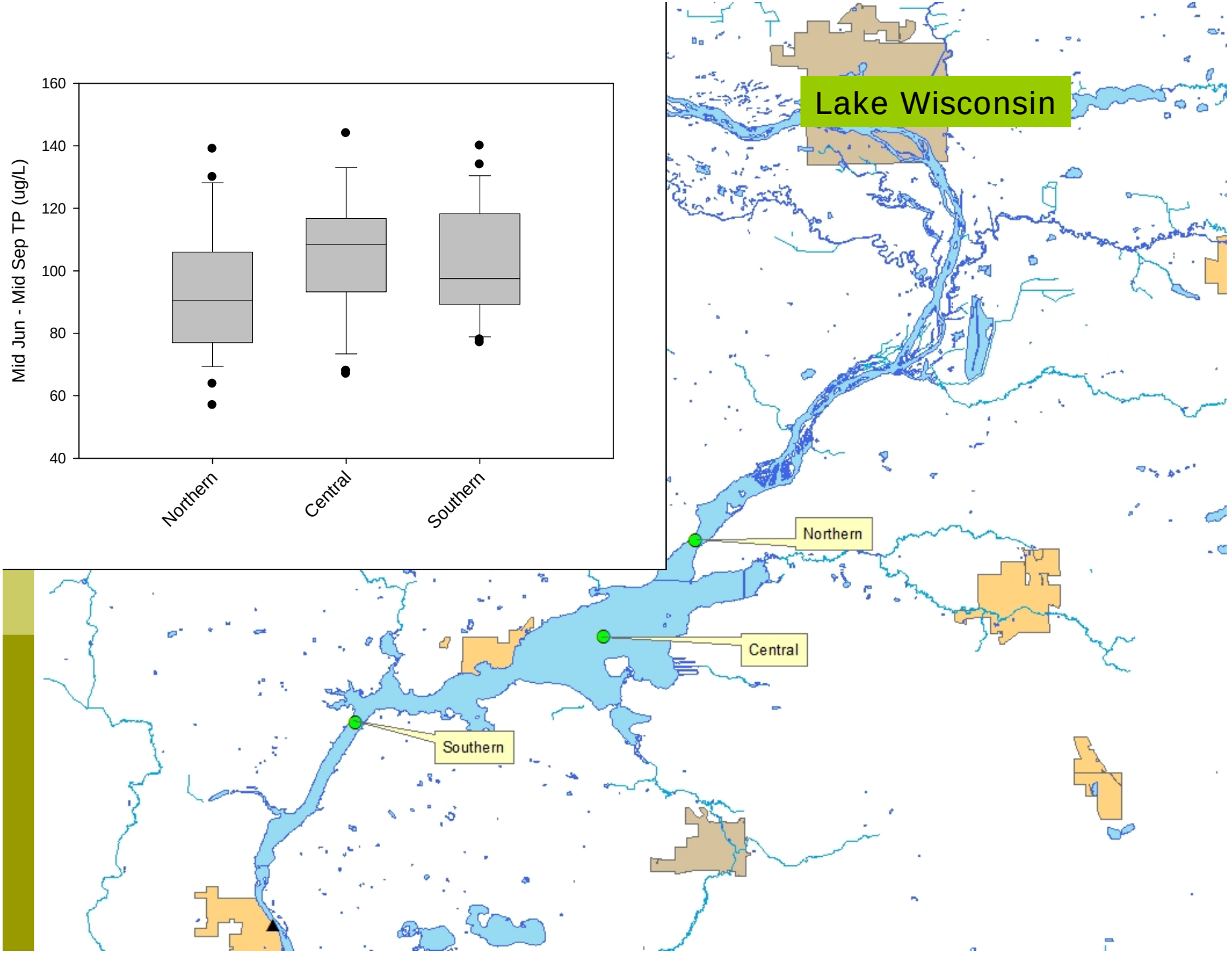

Lake DuBay
Northern
Central
Southern
Mid Jul - Mid Sep Chloro (ug/L)
60
50
40
30
20
10
0
Northern
Central
Southern

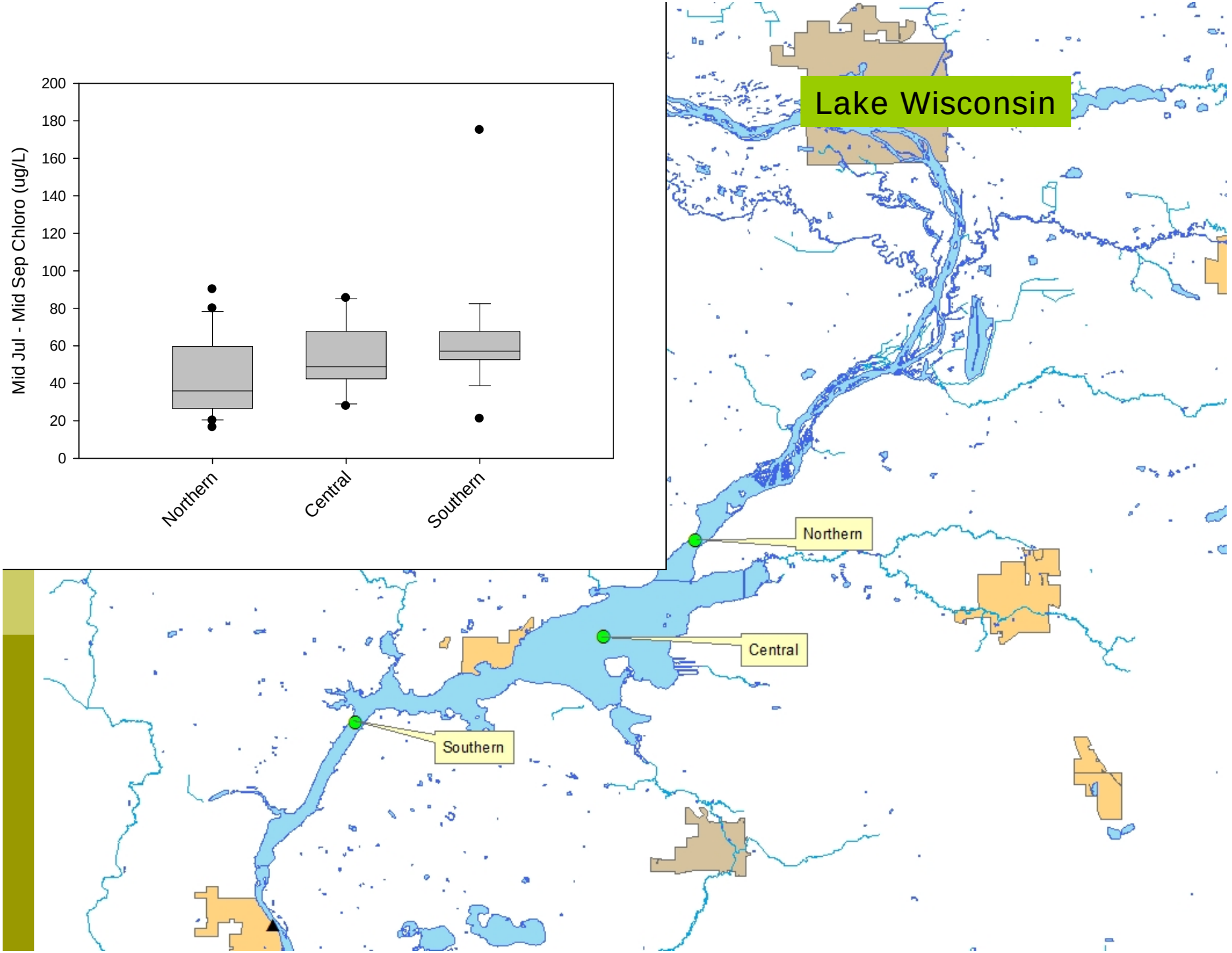

Petenwell
Northern
South Central
Central
South Central
Southern
Mid Jun - Mid Sep TP (ug/L)
600
500
400
300
200
100
0
Northern
North Central
Central
South Central
Southern


Petenwell
Northern
South Central
Central
South Central
Southern
Mid Jul - Mid Sep Chloro (ug/L)
500
400
300
200
100
0
Northern
North Central
Central
South Central
Southern


Castle Rock
Northern Main
CTH G
Central Main
Yellow River Arm
Southern Main
Mid Jun - Mid Sep TP (ug/L)
350
300
250
200
150
100
50
0
Northern Main
Central Main
Southern Main
CTH G
Yellow River Arm


Castle Rock
Northern Main
CTH G
Central Main
Yellow River Arm
Southern Main
Mid Jul - Mid Sep Chloro (ug/L)
120
100
80
60
40
20
0
Northern Main
Central Main
Southern Main
CTH G
Yellow River Arm


Lake Wisconsin
Mid Jun - Mid Sep TP (ug/L)
160
140
120
100
80
60
40
Northern
Central
Southern
Northern
Central
Southern


Lake Wisconsin
Mid Jul - Mid Sep Chloro (ug/L)
200
180
160
140
120
100
80
60
40
20
0
Northern
Central
Southern
Northern
Central
Southern

So what else you got?

- TMDL development monitoring only one part
- Assessment monitoring
  - Define current conditions
- Trend monitoring
  - Learn how are things changing over time

Assessment monitoring example

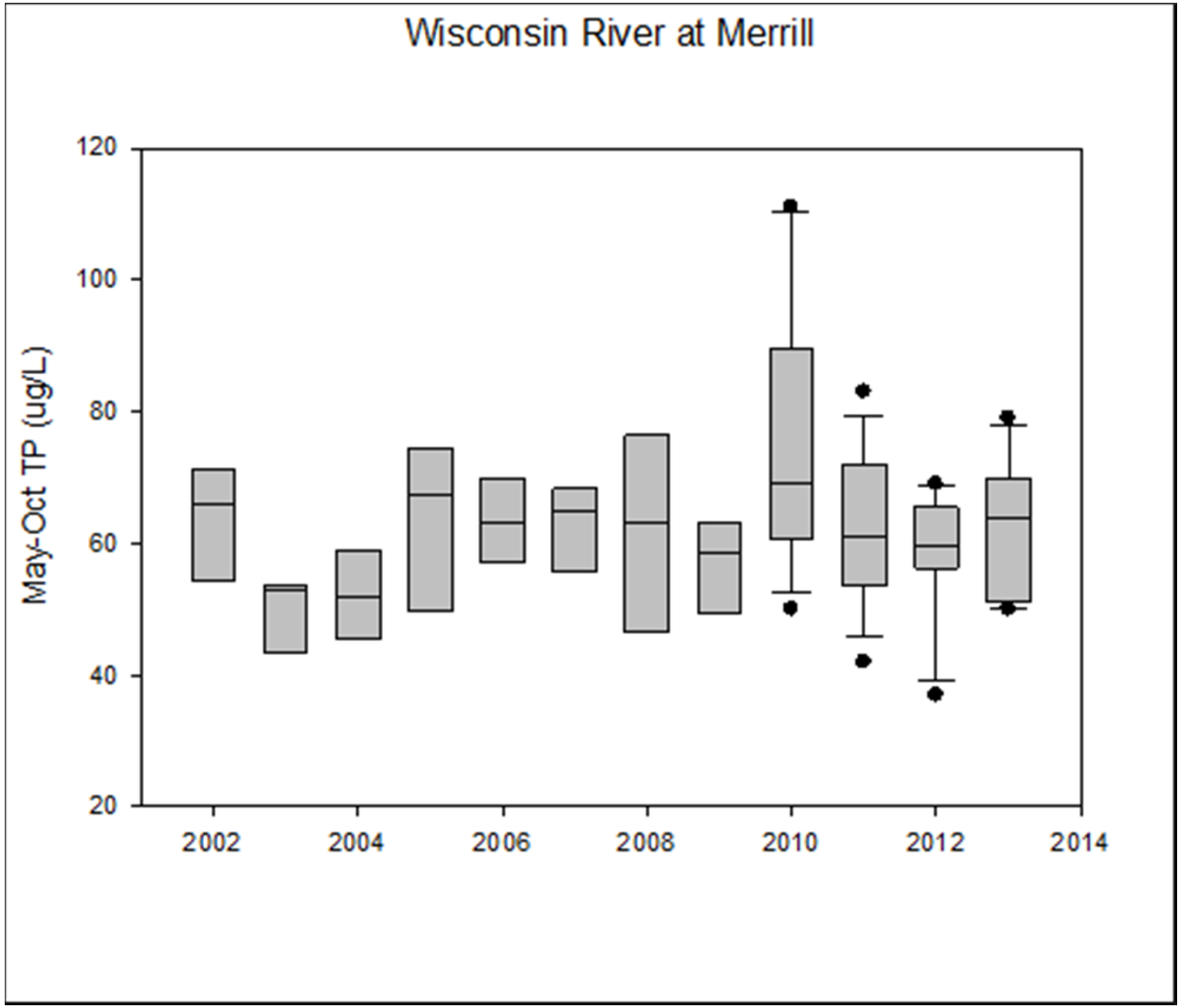
- WVIC Trophic Monitoring
  - 3 years of summer water chemistry (2010-2012)
  - 38 different lakes
  - 43 sites
- Quick Results:
  - 20 Two story fisheries
    - 12* not meeting 15 μg/L TP criteria
  - 6 deep lakes/reservoirs
    - 1 not meeting TP 30 μg/L criteria
  - 12 shallow lakes/reservoirs
    - 1 not meeting 40 μg/L TP criteria

*Unofficial count

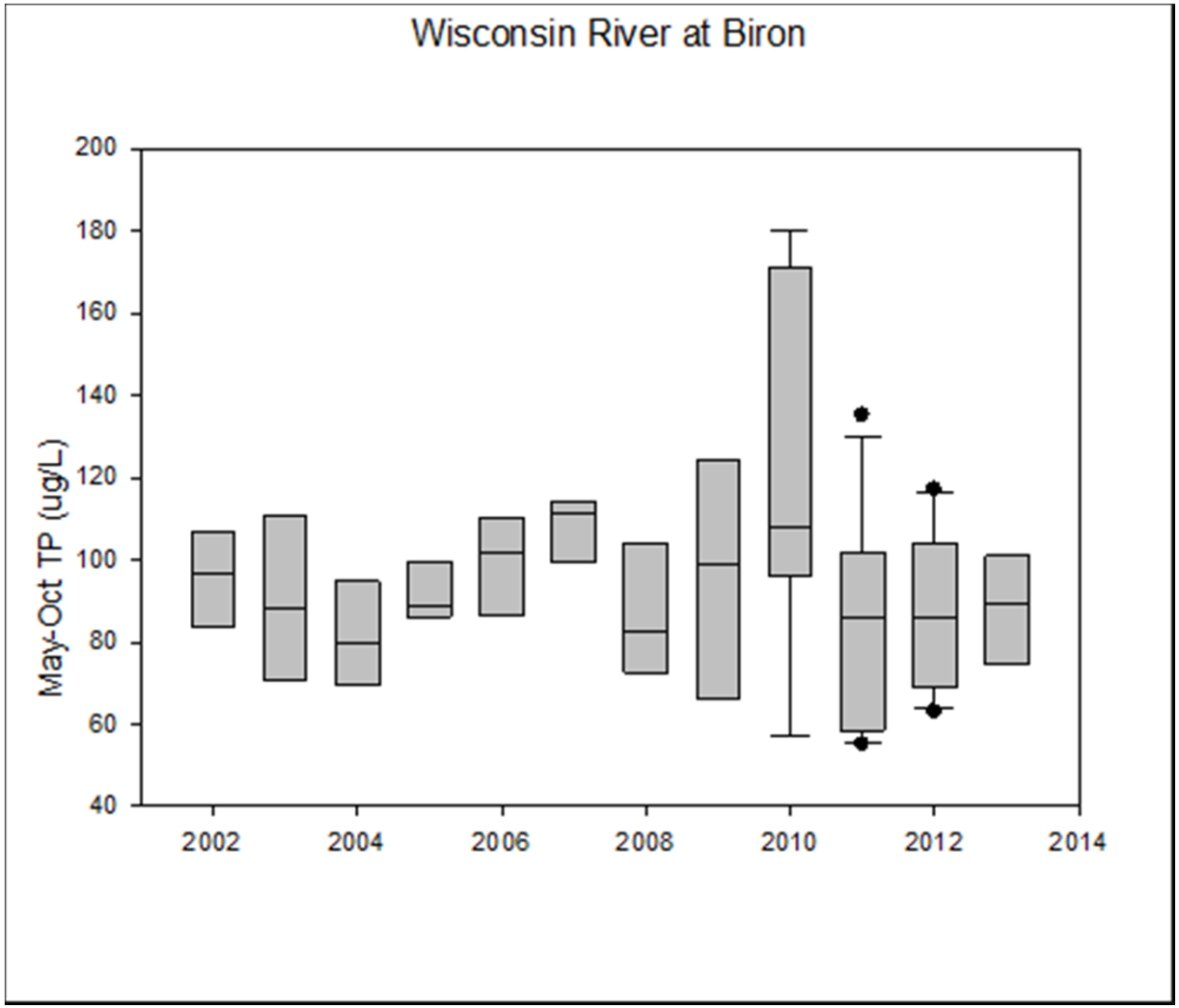
Assessment monitoring example

- 98 stream sites monitored for TP in 2012
  - 17 stream segments exceeded the total phosphorus criteria (75 μg/L)
  - 31 sites identified for further phosphorus and biological monitoring in 2013

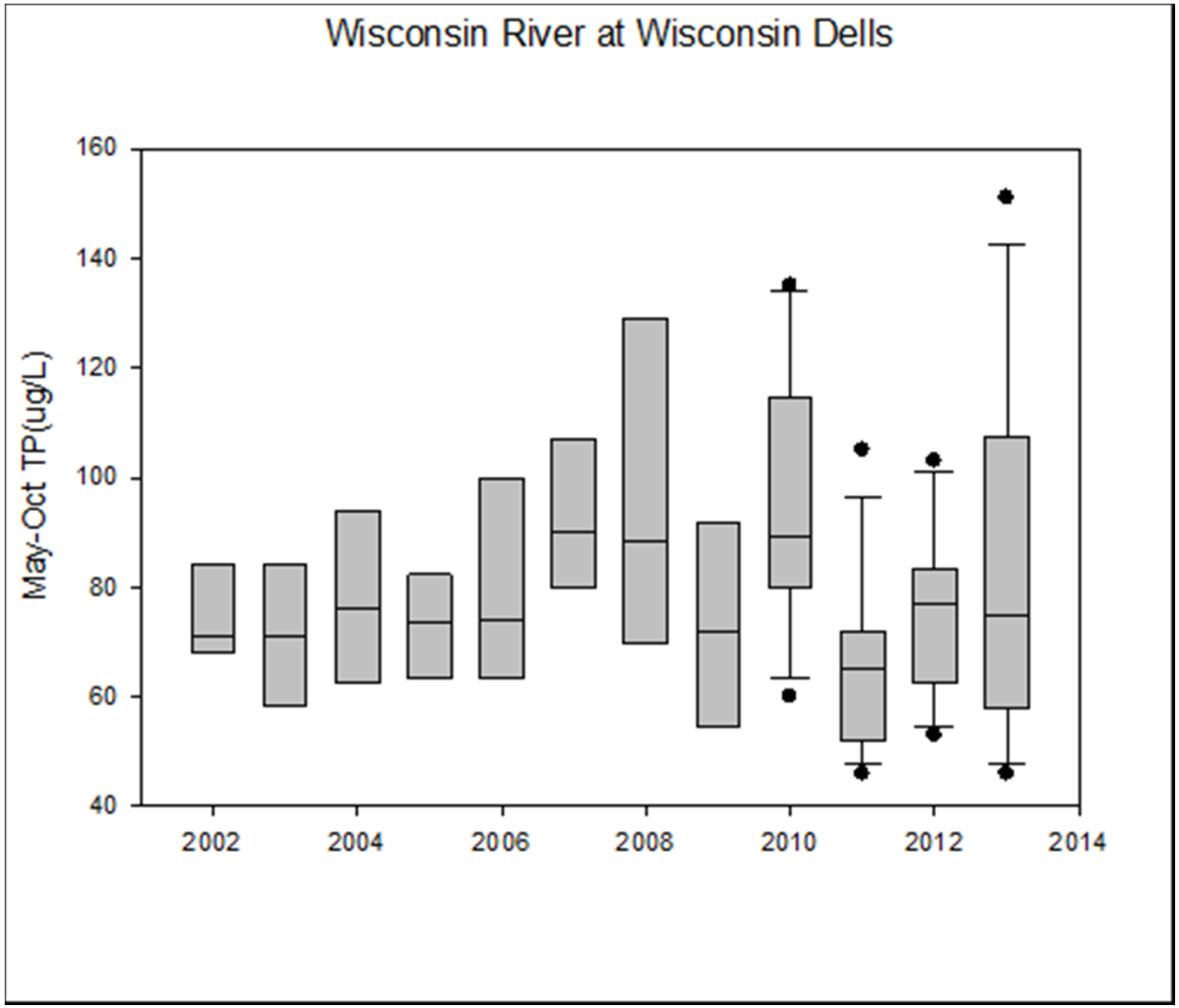
Trend monitoring



Trend monitoring

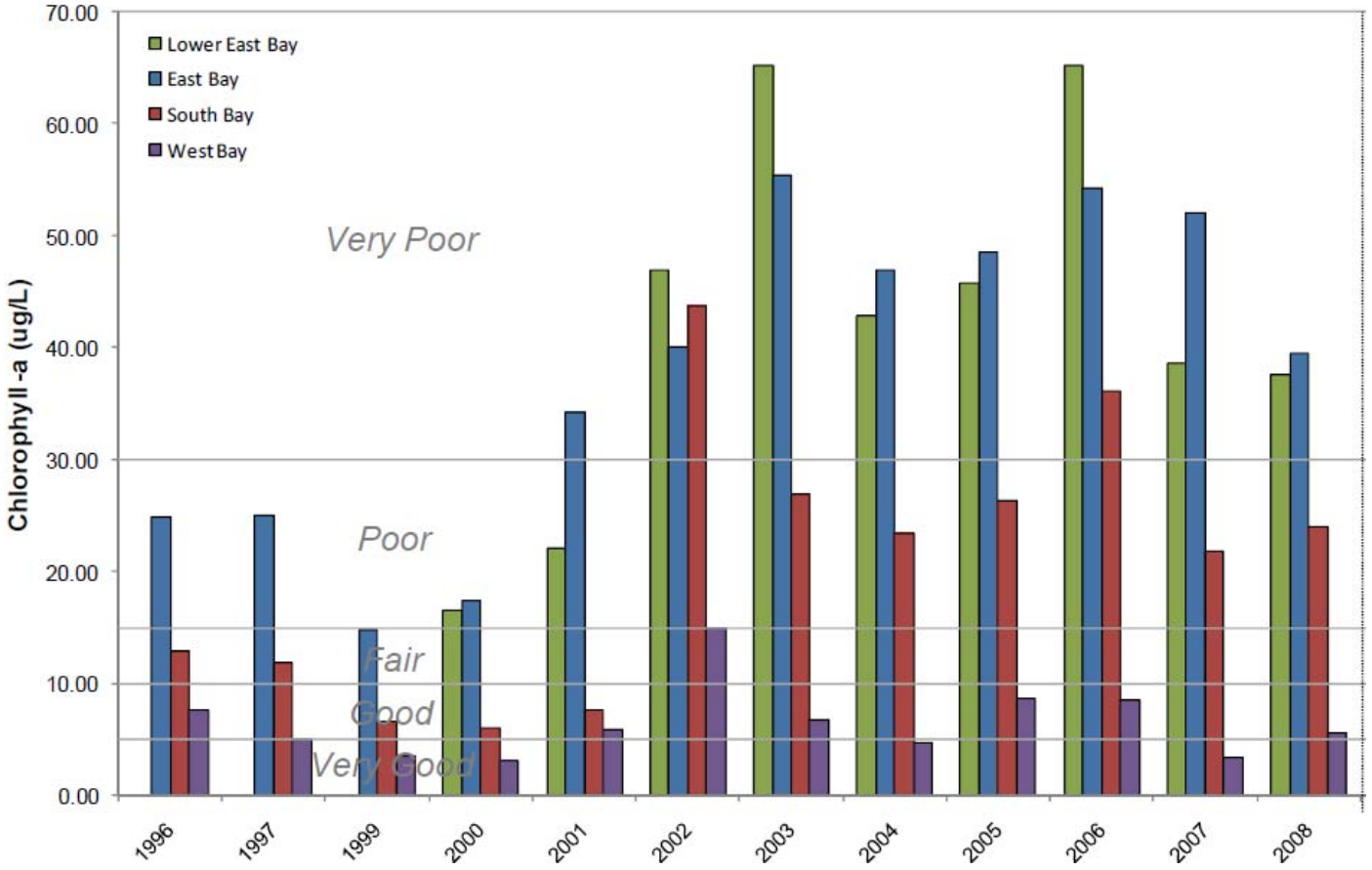


Trend monitoring



Trend monitoring

Little Saint Germain Lake Chlorophyll-a*



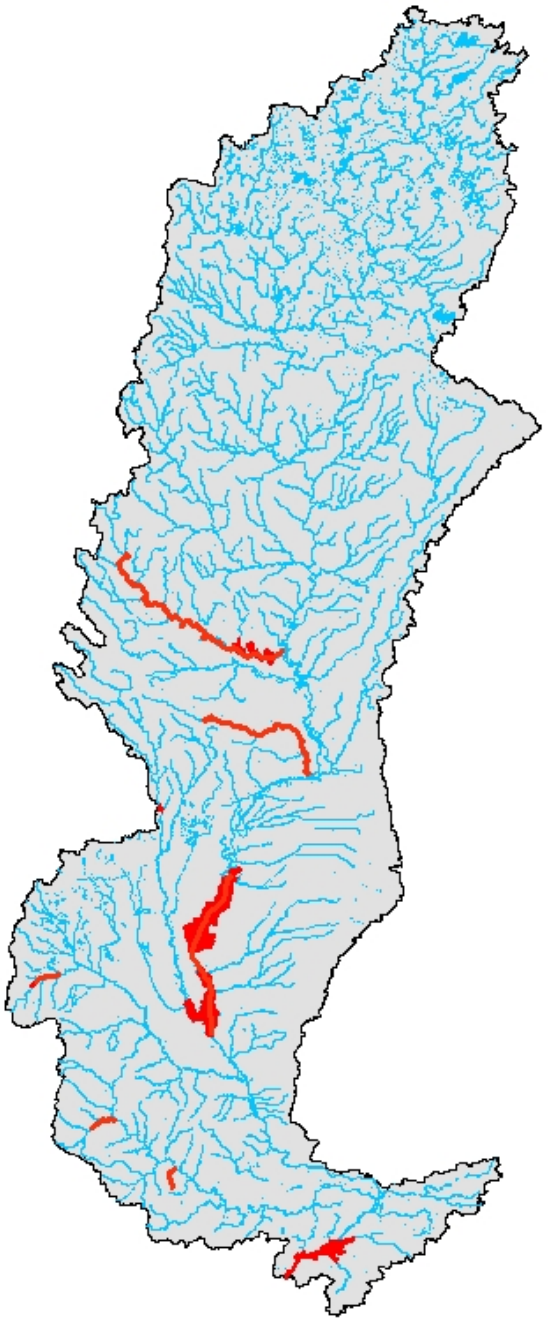
*Little Saint Germain Lake Management Plan 2010

So what do we do with the data?

- Fulfill local needs and guide local management actions and objectives
  - Lake Management Plans
  - Priority Watershed Plans
- Satisfy statewide needs and guide management actions and objectives
  - Statewide Nutrient Reduction Strategy
  - Development of State Water Quality Criteria
- Satisfy reporting needs of EPA/Congress
  - Integrated reporting (i.e. 305(b) report to congress, 303(d) list of impaired waters)

So what about that 303(d) list thing?

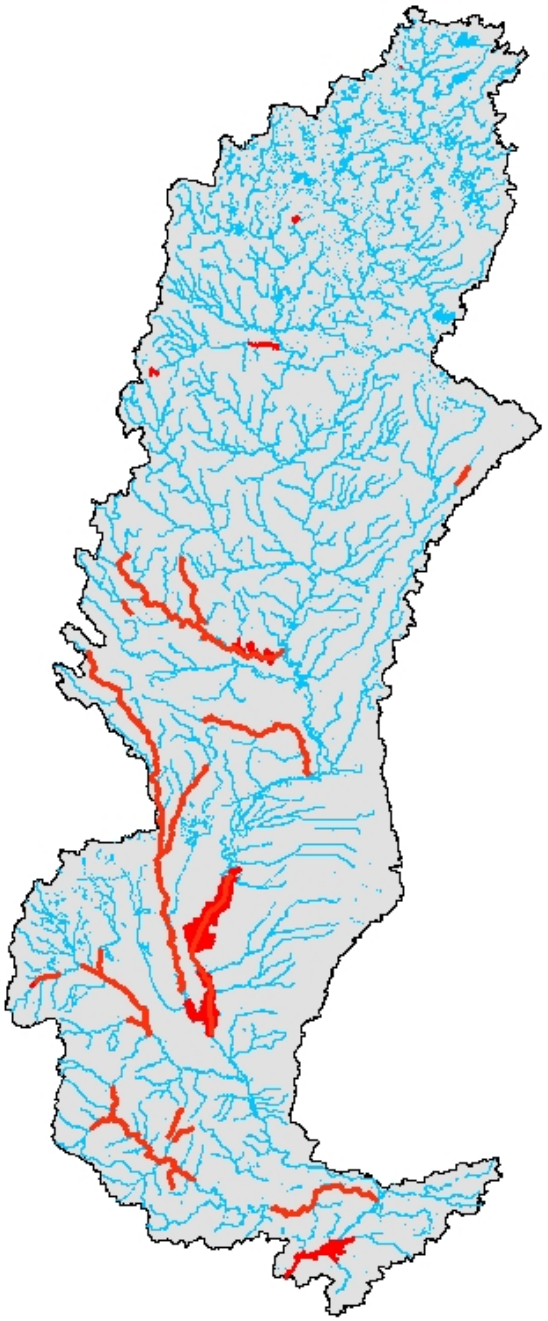
- Management tool for tracking water quality status
  - Cleanup plans are tracked
  - Delisted water bodies are often restoration success stories
- DNR does not use the list as a measure of water quality trends
  - Changes can be driven by updated water quality standards, assessment methods and monitoring strategies



2010 Final
303(d) List
of Phosphorus
Impaired Waters

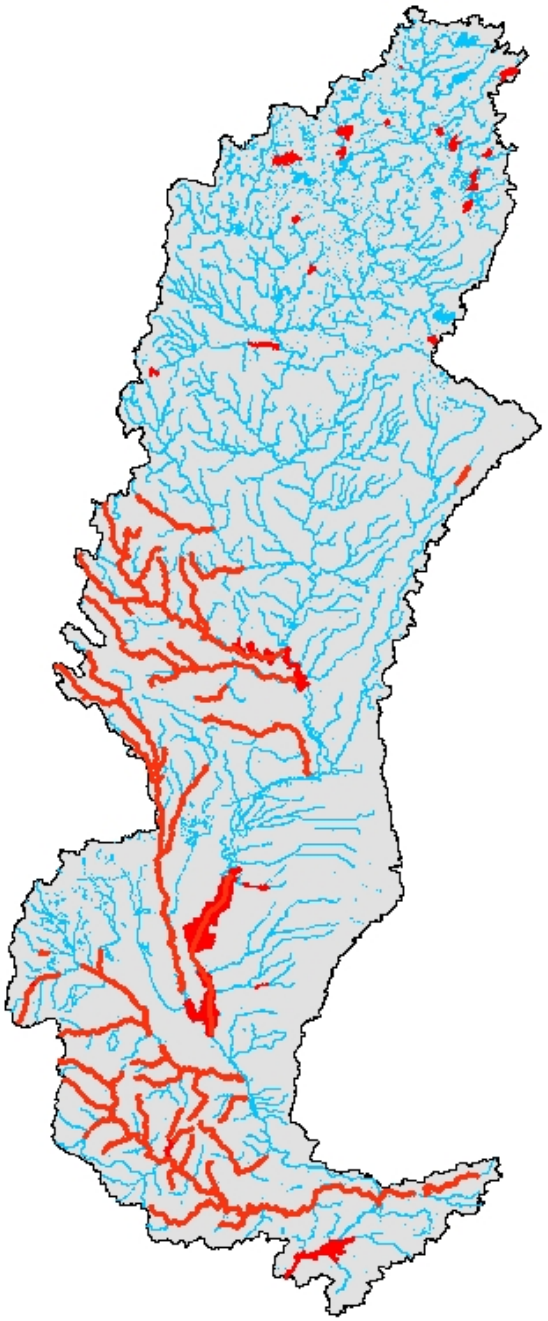
What it looked like
when we started
the TMDL project

No numeric
phosphorus criteria!



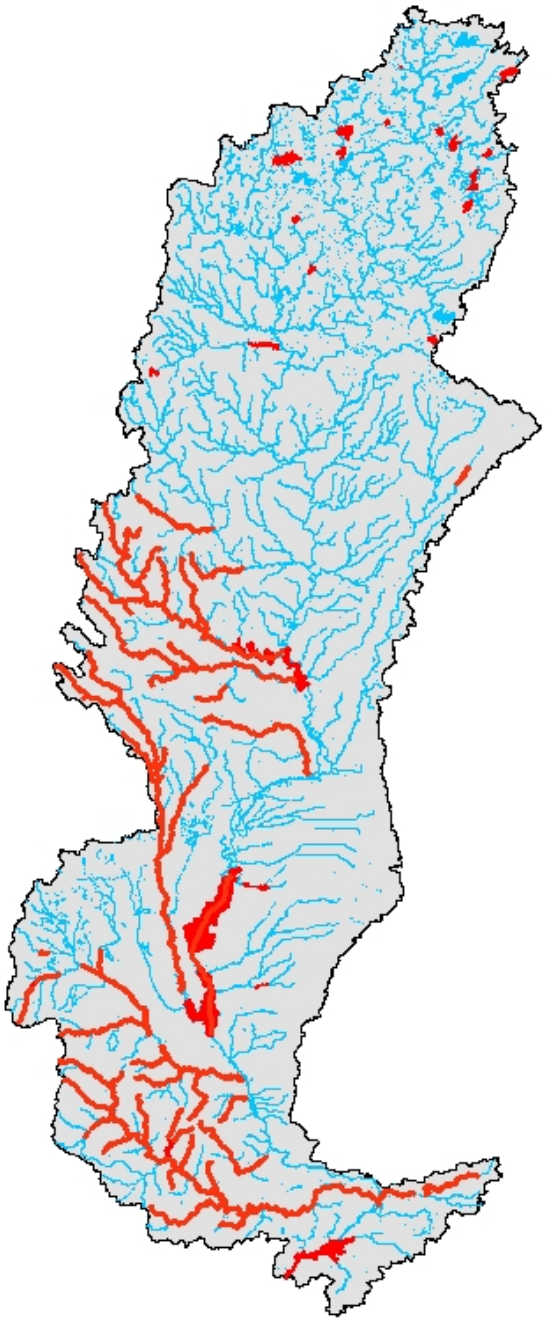
2012 Draft* 303(d) List of Phosphorus Impaired Waters

*Awaiting USEPA approval



2014 DRAFT* 303(d) List of Phosphorus Impaired Waters

*Public Comment Period open until Thursday, March 6, 2014



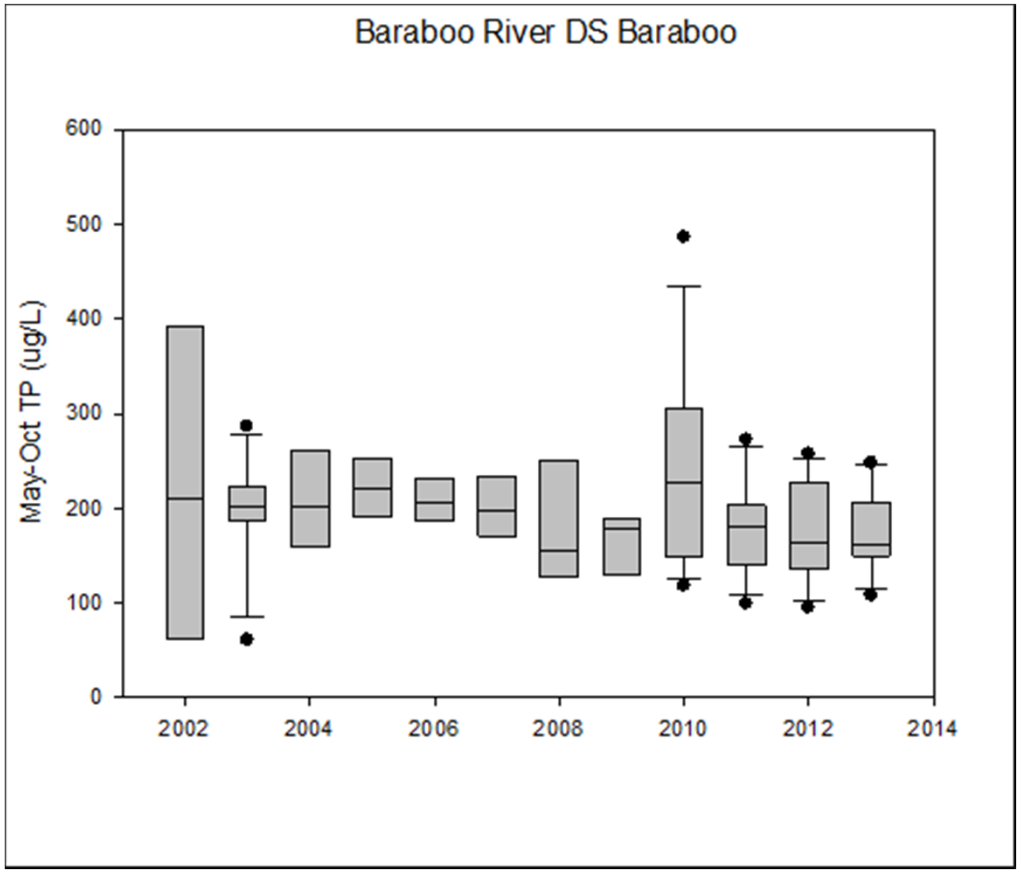
2014 DRAFT 303(d) List of Phosphorus Impaired Waters

Likely more by 2016

*Public Comment Period open until Thursday, March 6, 2014

In conclusion

- Wisconsin River phosphorus concentrations generally increase north to south
  - Some reservoirs significant sinks (Big Eau Pleine, Petenwell), others aren't (DuBay, Lake Wisconsin)
- Western tributaries exhibit much higher phosphorus concentrations (and unit area loads) than eastern tributaries
  - Function of land use and soil type
- Large reservoirs generally exhibit poor water quality (chlorophyll > 25 µg/L)
  - Algae blooms are variable in time and space
- TMDL monitoring period bracketed a wide environmental conditions to allow for robust model development
- TMDL monitoring focused on middle and lower parts of the basin where obvious nutrient issues exist, recent assessments indicate the potential of subtle, but real nutrient issues in the upper parts of the basin.

Questions?

Trend Monitoring