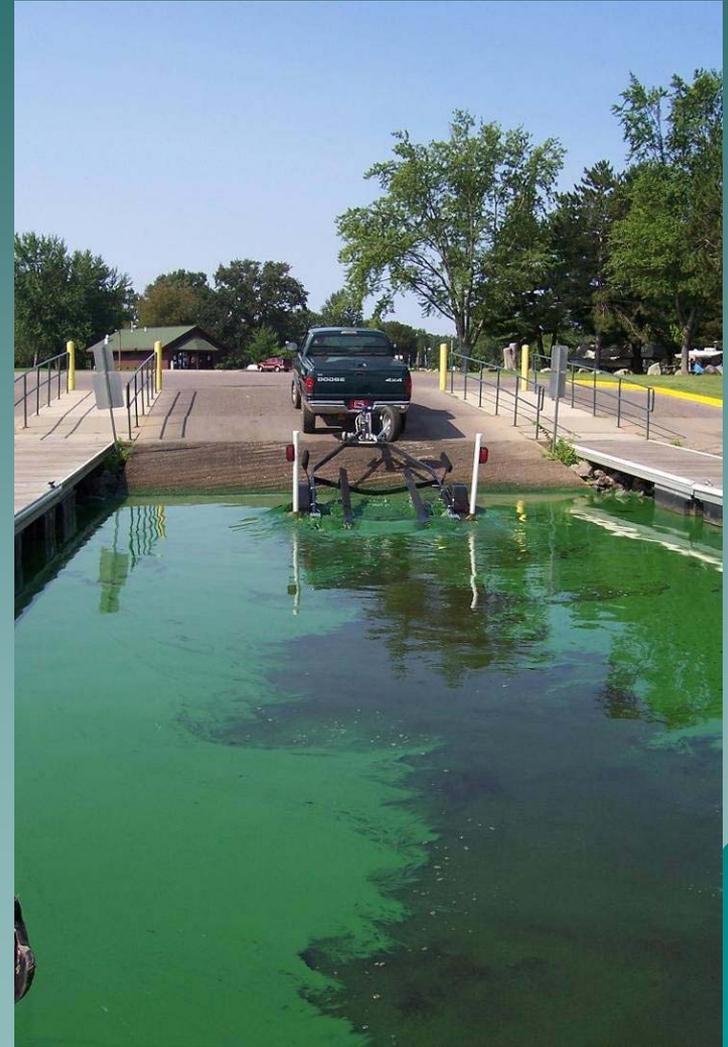


Wisconsin River TMDL Water Quality Study

- ◆ What is a TMDL?
- ◆ Study area
- ◆ Sampling strategy
- ◆ Timeline

What is a TMDL?

- ◆ TMDL = Total Maximum Daily Load
- ◆ A TMDL is the amount of a pollutant a stream, river or lake can receive before exceeding water quality standards.



What is a TMDL?

$$\text{TMDL} = \text{LA} + \text{WLA} + \text{MOS}$$

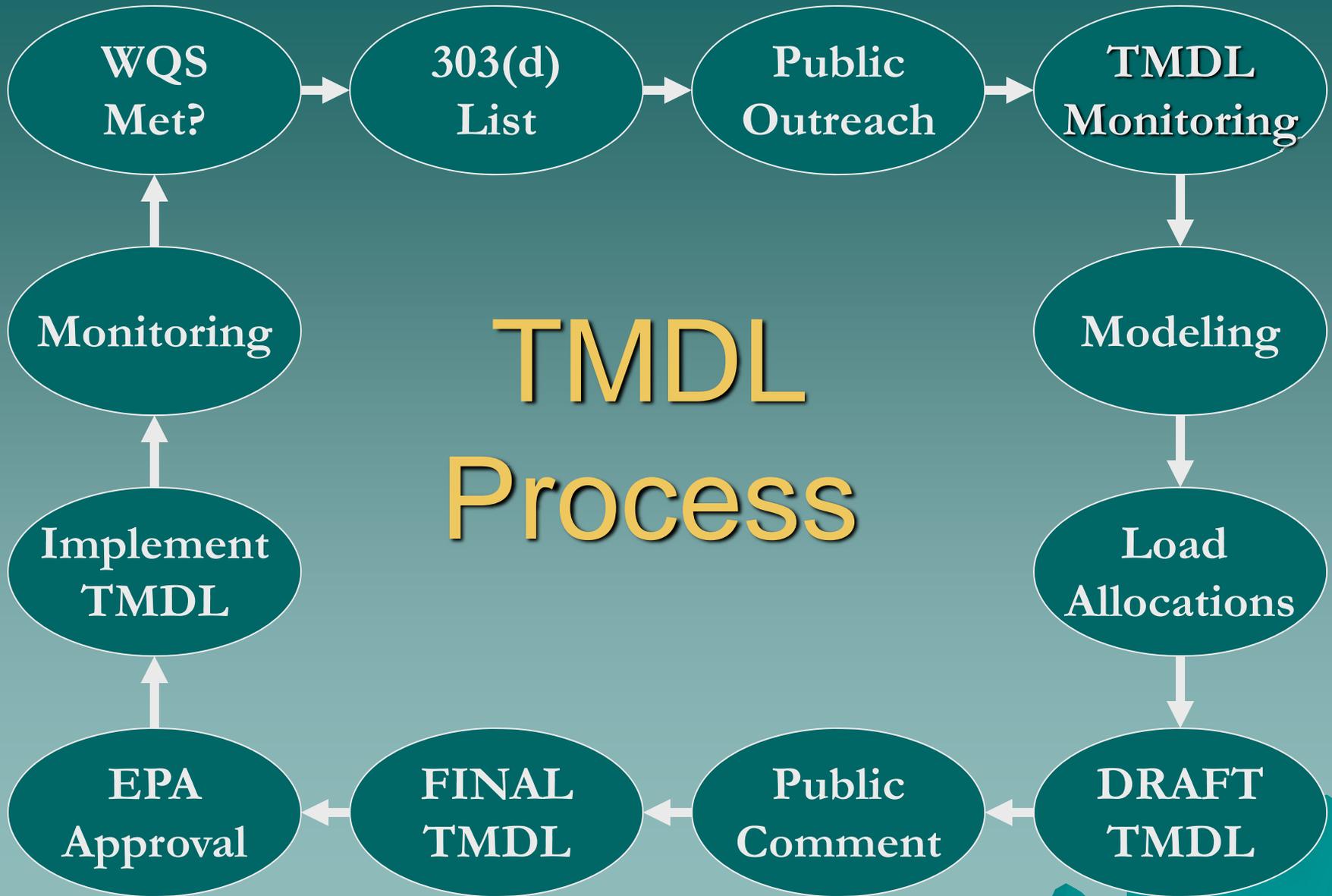
LA = Load Allocation
(Nonpoint Sources)

WLA = Wasteload
Allocation (Point Sources)

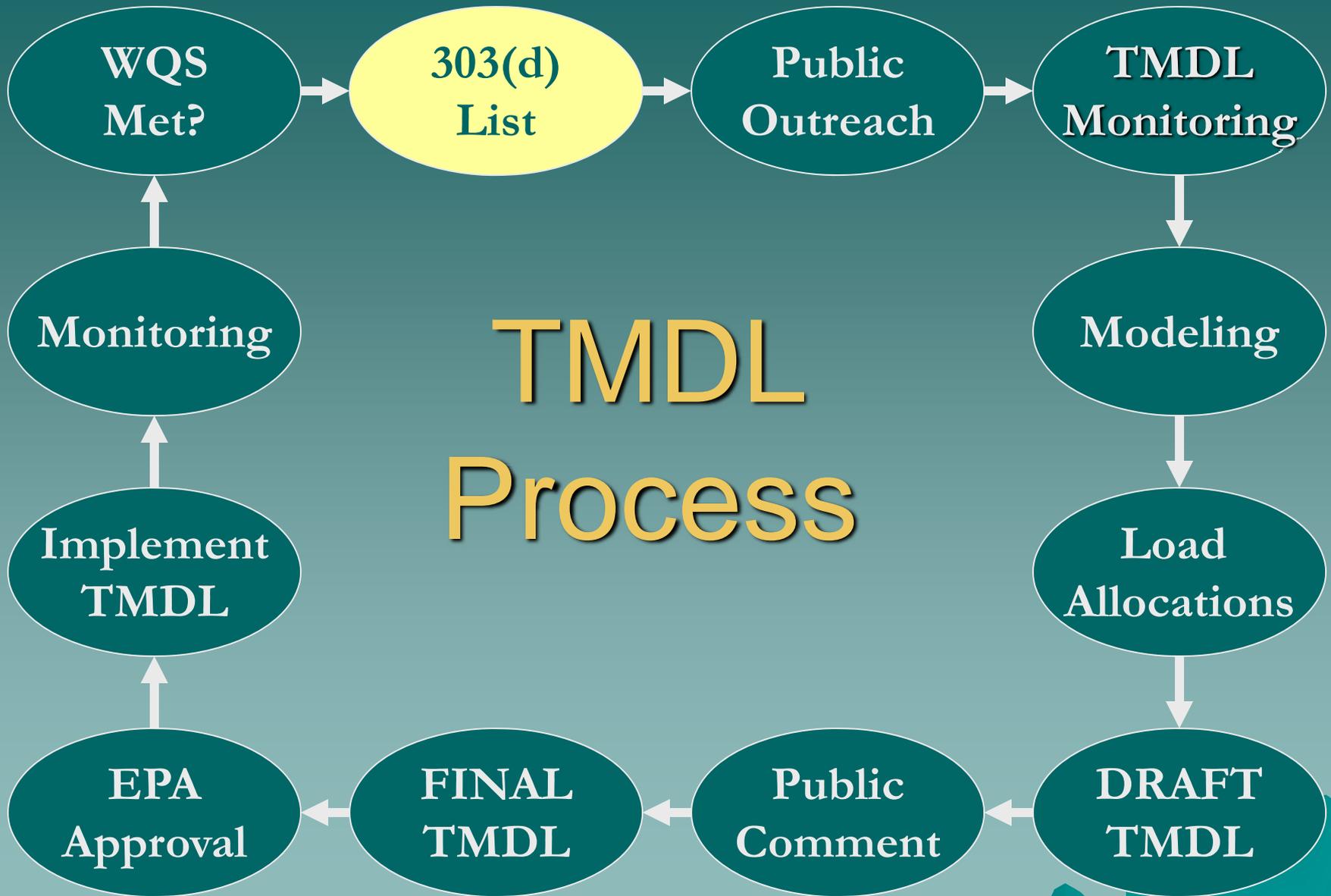
MOS = Margin of Safety



TMDL Process



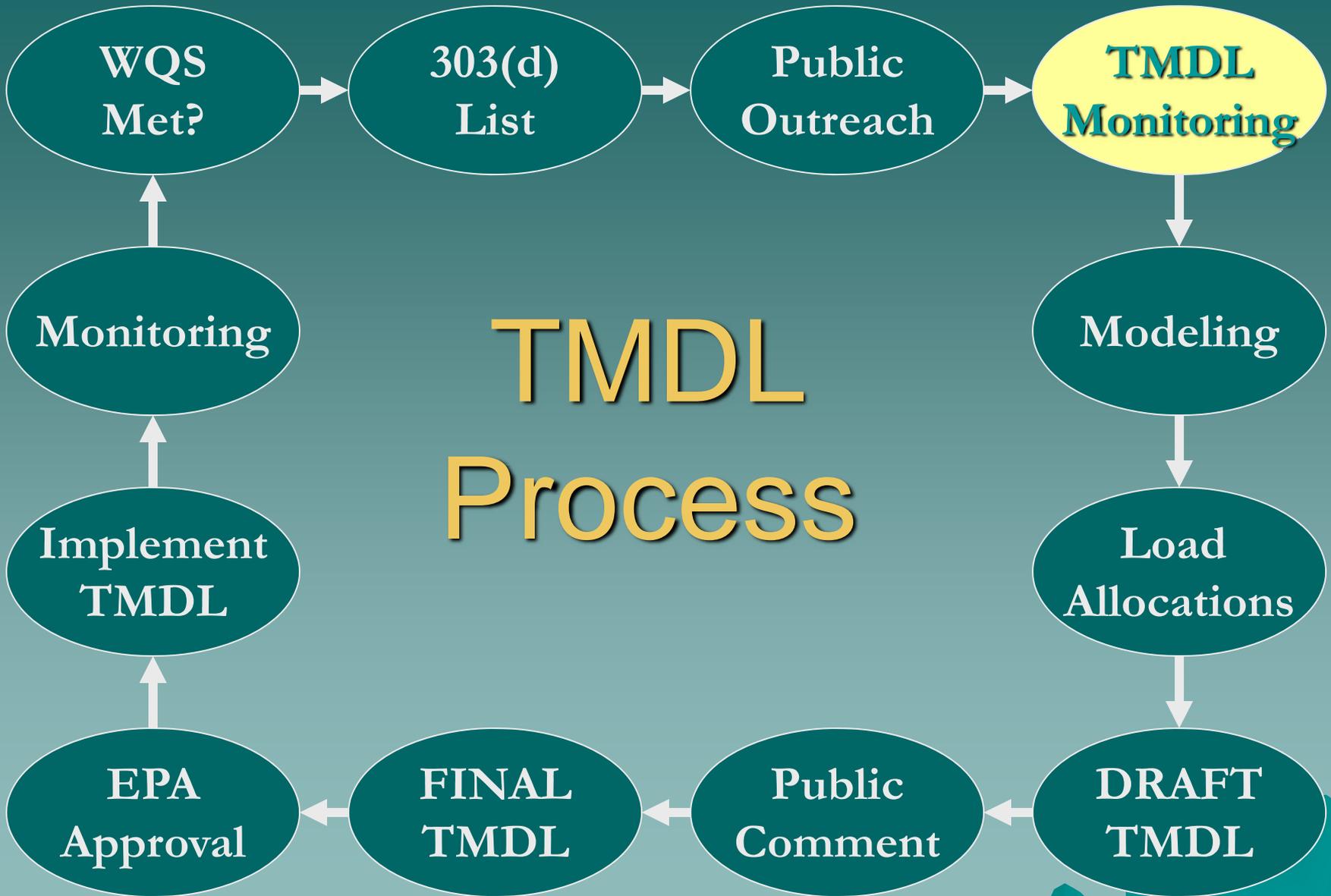
TMDL Process



Wisconsin River Basin Impaired Water (303d) Listings

Waterbody	Impairment	Pollutant
Big Eau Pleine Flowage	Low DO, Eutrophication	Phosphorus
Mill Creek	Low DO	Phosphorus
Petenwell Flowage	Low DO, Eutrophication	Phosphorus
Lake Dexter	Eutrophication	Phosphorus
Castle Rock Flowage	Low DO, Eutrophication	Phosphorus
Lake Wisconsin	Low DO, Eutrophication	Phosphorus

TMDL Process



Wisconsin River TMDL Water Quality Study

Objectives:

- Collect water quality information from major tributary inflows, Wisconsin River main stem and major impoundments.
- Measure background, point and nonpoint source loads to the Wisconsin River from Tomahawk to the Prairie du Sac dam.
- Develop watershed and reservoir/river models to forecast water quality responses to loading reduction scenarios.
- Develop technically sound TMDLs for the major Wisconsin River reservoirs.

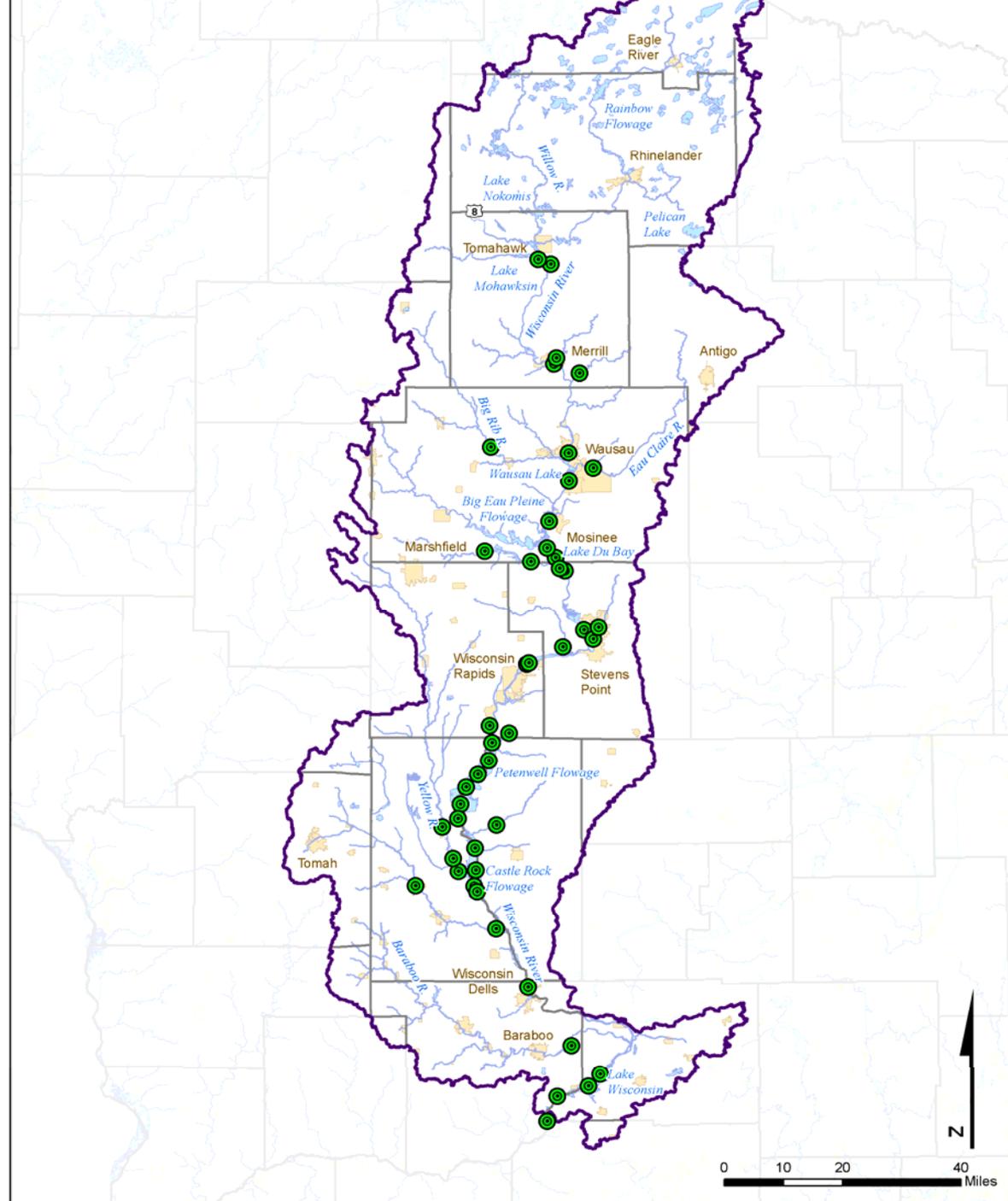
Wisconsin River TMDL Water Quality Monitoring Strategy

- ◆ Sample Wisconsin River, major tributaries and reservoirs for three years beginning in November 2009.
- ◆ Collect semi-monthly samples from river and stream sites year round.
- ◆ Collect semi-monthly samples from reservoirs during April-September (growing season).
- ◆ Begin model development after first 2 years of monitoring.

Wisconsin River TMDL

Water Quality Monitoring Stations

13 Wis. River sites
16 Tributary sites
19 Reservoir sites



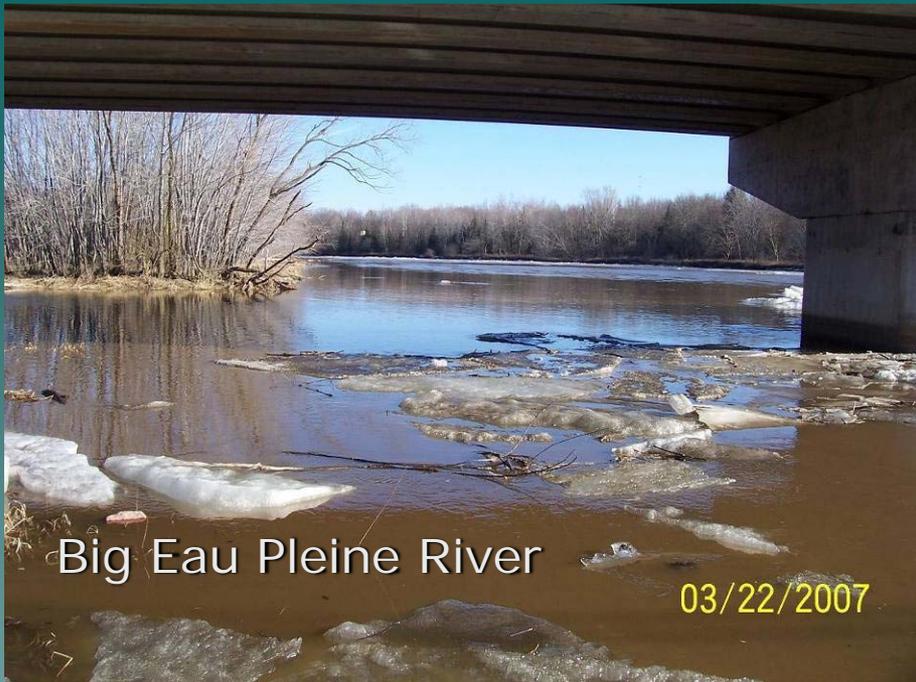
Wisconsin River Sites

- ◆ Below Tomahawk dam
- ◆ Below Merrill dam
- ◆ Below Brokaw
- ◆ Below Lake Wausau
- ◆ Below Mosinee dam
- ◆ Below DuBay dam
- ◆ Below Stevens Point dam
- ◆ Below Biron Flowage
- ◆ Below Nekoosa
- ◆ Below Petenwell dam
- ◆ Below Castle Rock dam
- ◆ Wisconsin Dells
- ◆ Below Lake Wisconsin

Wisconsin River Tributary Sites

- ◆ Prairie River
- ◆ Spirit River
- ◆ Pine River
- ◆ Eau Claire River
- ◆ Plover River
- ◆ Rib River
- ◆ Big Eau Pleine River
- ◆ Little Eau Pleine R.
- ◆ Mill Creek
- ◆ Tenmile Creek
- ◆ Yellow River
- ◆ Big Roche Cri Creek
- ◆ Lemonwier River
- ◆ Baraboo River





Big Eau Pleine River

03/22/2007



Freeman Creek

03/22/2007



Fenwood Creek

03/22/2007

Tributary Loading



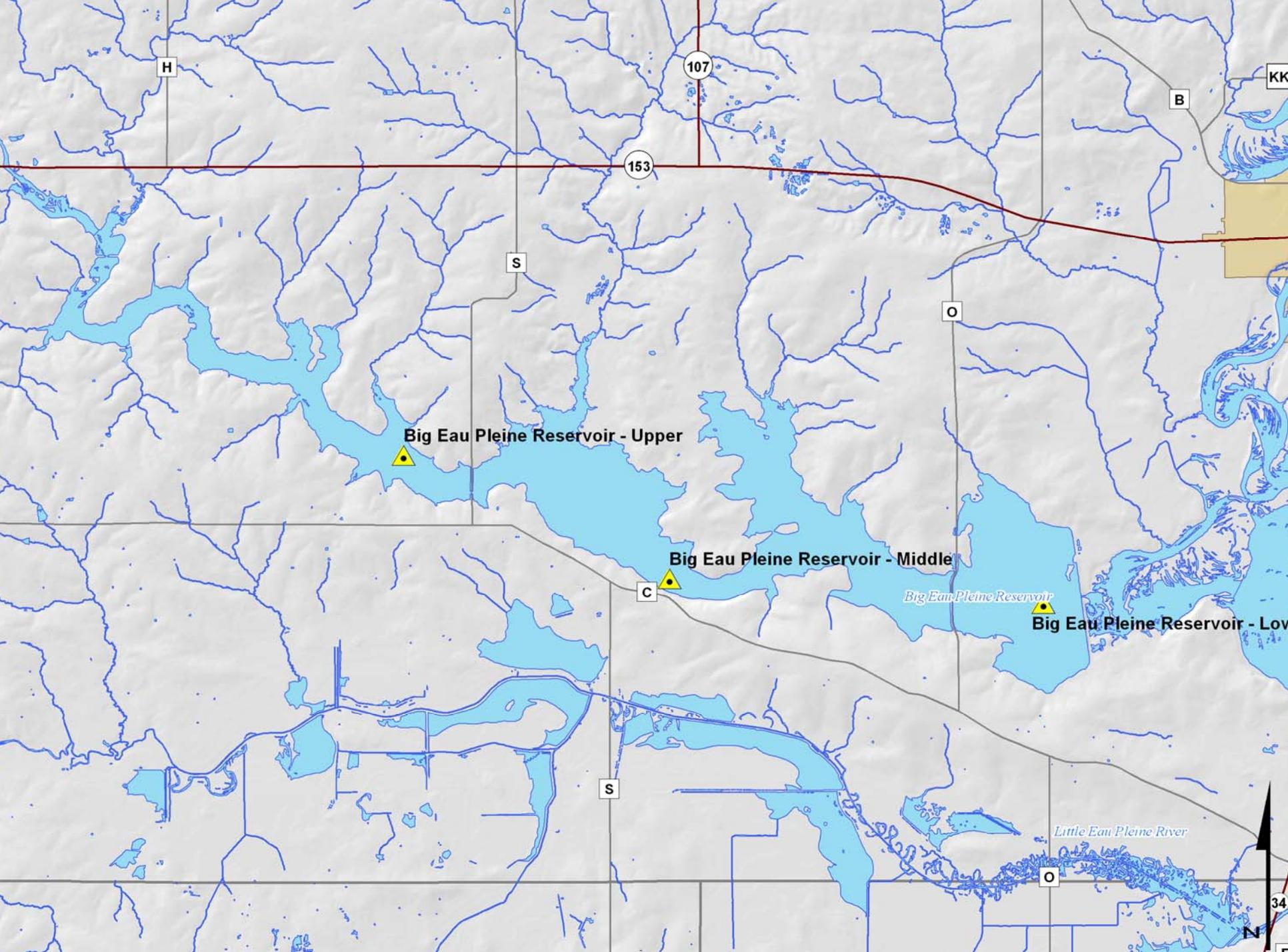
Primary Water Chemistry Parameters for Wisconsin River and tributary sites:

- ◆ Total Kjeldahl-N
- ◆ Nitrate-N
- ◆ Ammonia-N
- ◆ Soluble P
- ◆ Total P
- ◆ Total suspended solids

Reservoirs will be sampled bi-weekly from
May thru October at multiple
sites and depths

Reservoir sites:

- ◆ Big Eau Pleine Reservoir (3 sites/3 depths)
- ◆ Lake DuBay (3 sites/2 depths)
- ◆ Petenwell Flowage (5 sites/1-3 depths)
- ◆ Castle Rock Flowage (5 sites/1-3 depths)
- ◆ Lake Wisconsin (3 sites/ 2 depths)



H

107

B

KK

153

S

O

Big Eau Pleine Reservoir - Upper

Big Eau Pleine Reservoir - Middle

Big Eau Pleine Reservoir

Big Eau Pleine Reservoir - Lower

C

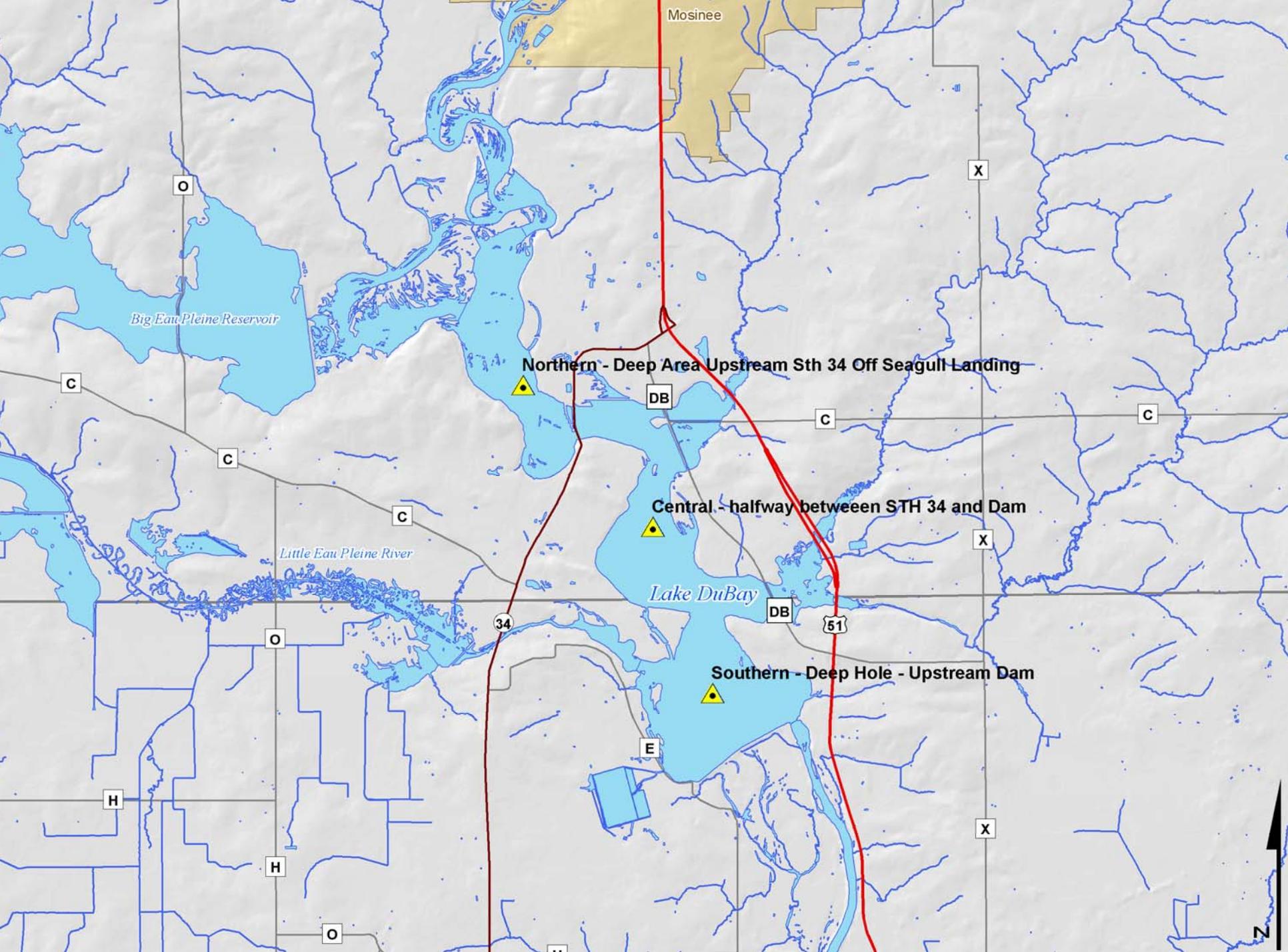
S

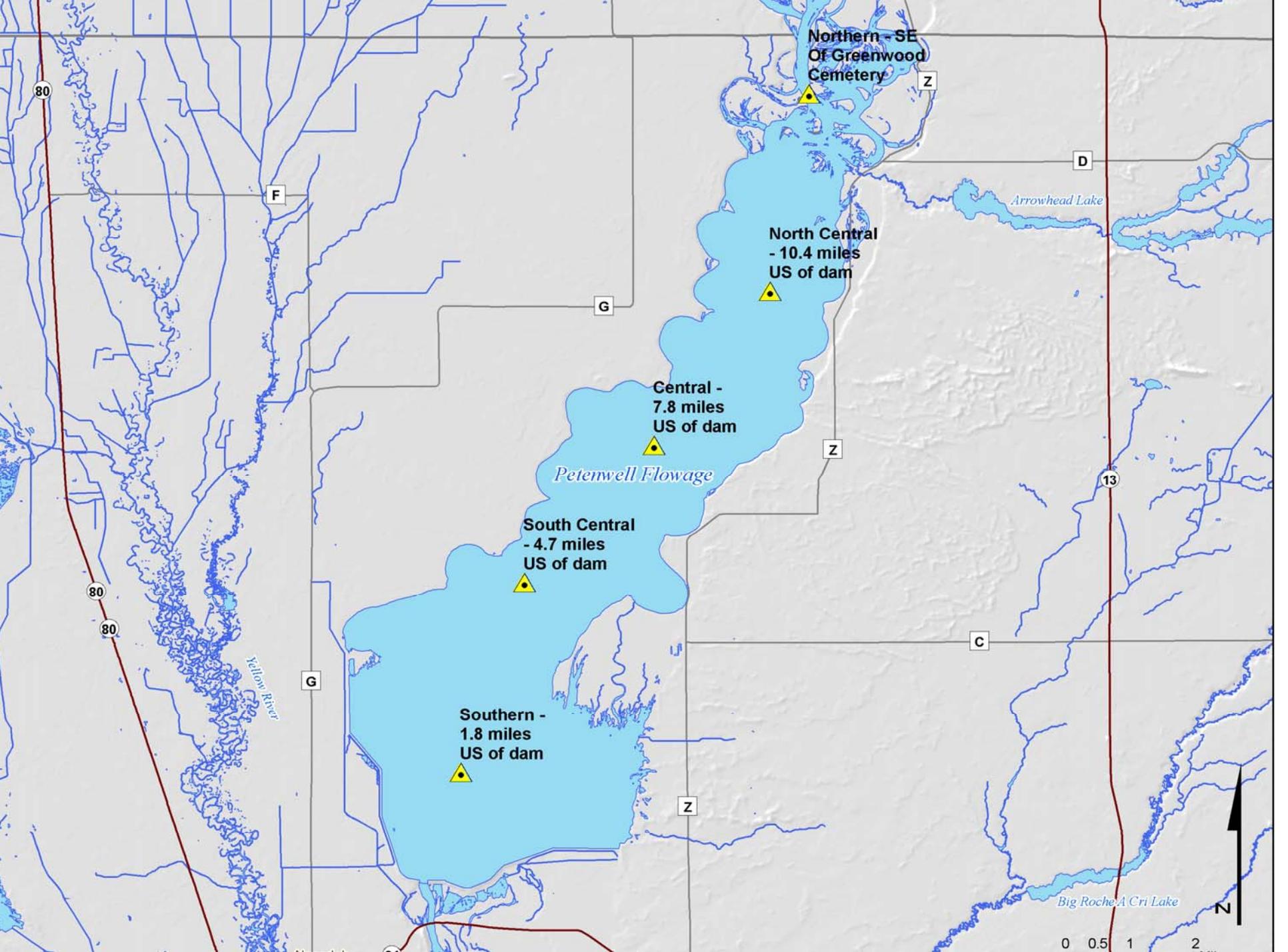
Little Eau Pleine River

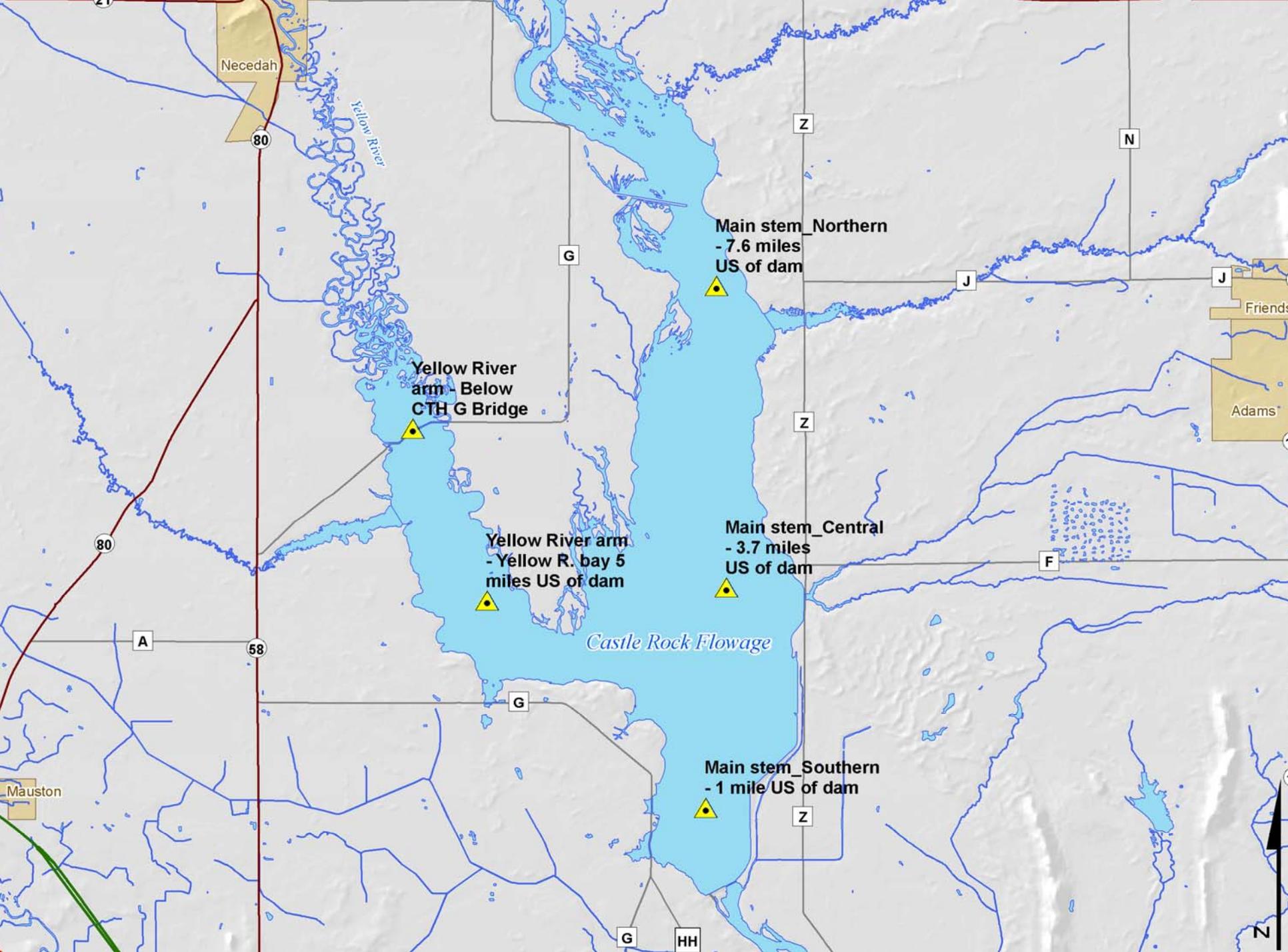
O

34

N







Necedah

Yellow River

80

Z

N

Main stem_Northern
- 7.6 miles
US of dam

G

J

J

Friends

Adams

Yellow River
arm - Below
CTH G Bridge

Z

Yellow River arm
- Yellow R. bay 5
miles US of dam

Main stem_Central
- 3.7 miles
US of dam

F

Castle Rock Flowage

A

58

G

Main stem_Southern
- 1 mile US of dam

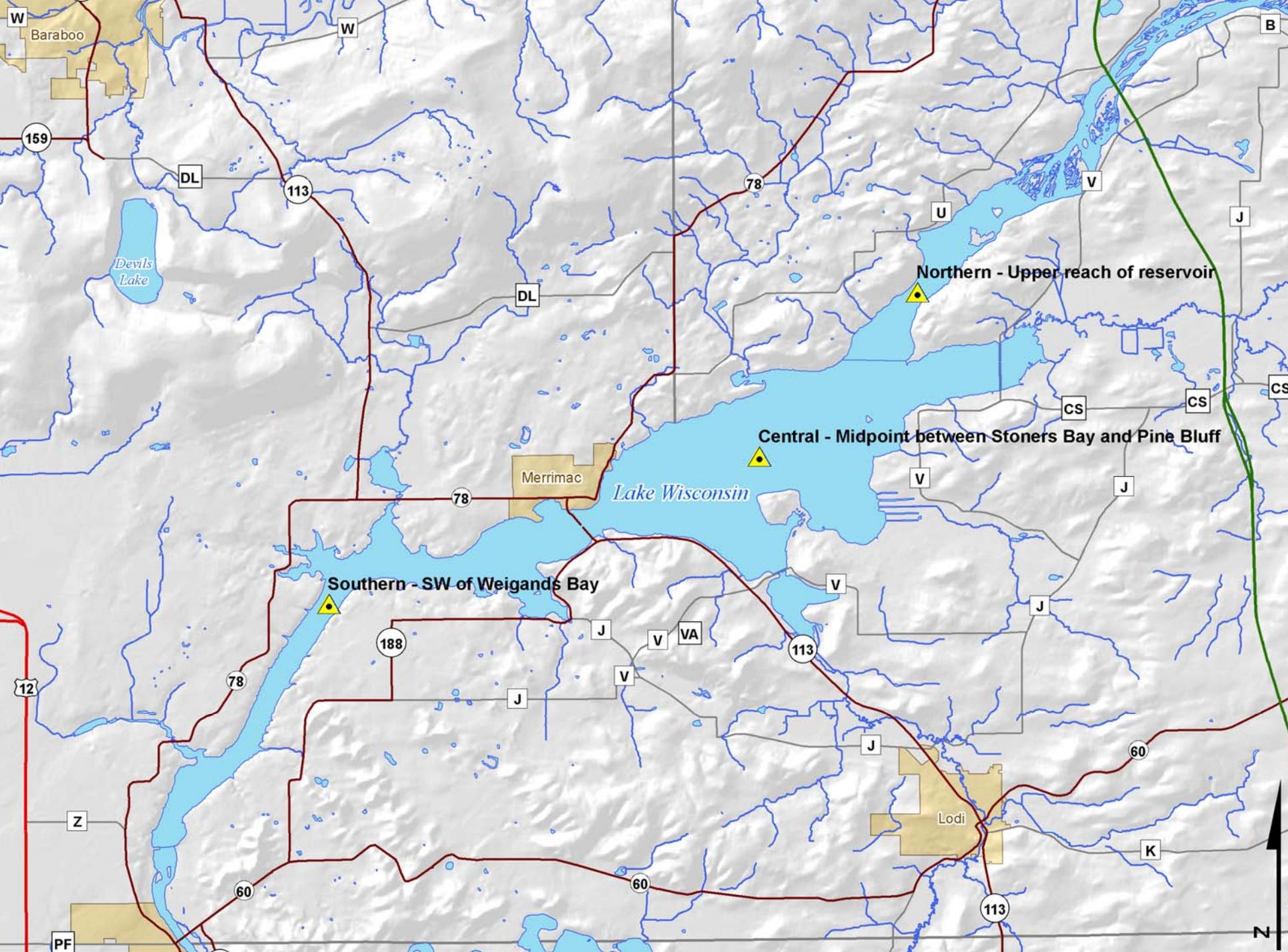
Z

Mauston

G

HH

Z



Primary Water Chemistry Parameters for Reservoir Sites:

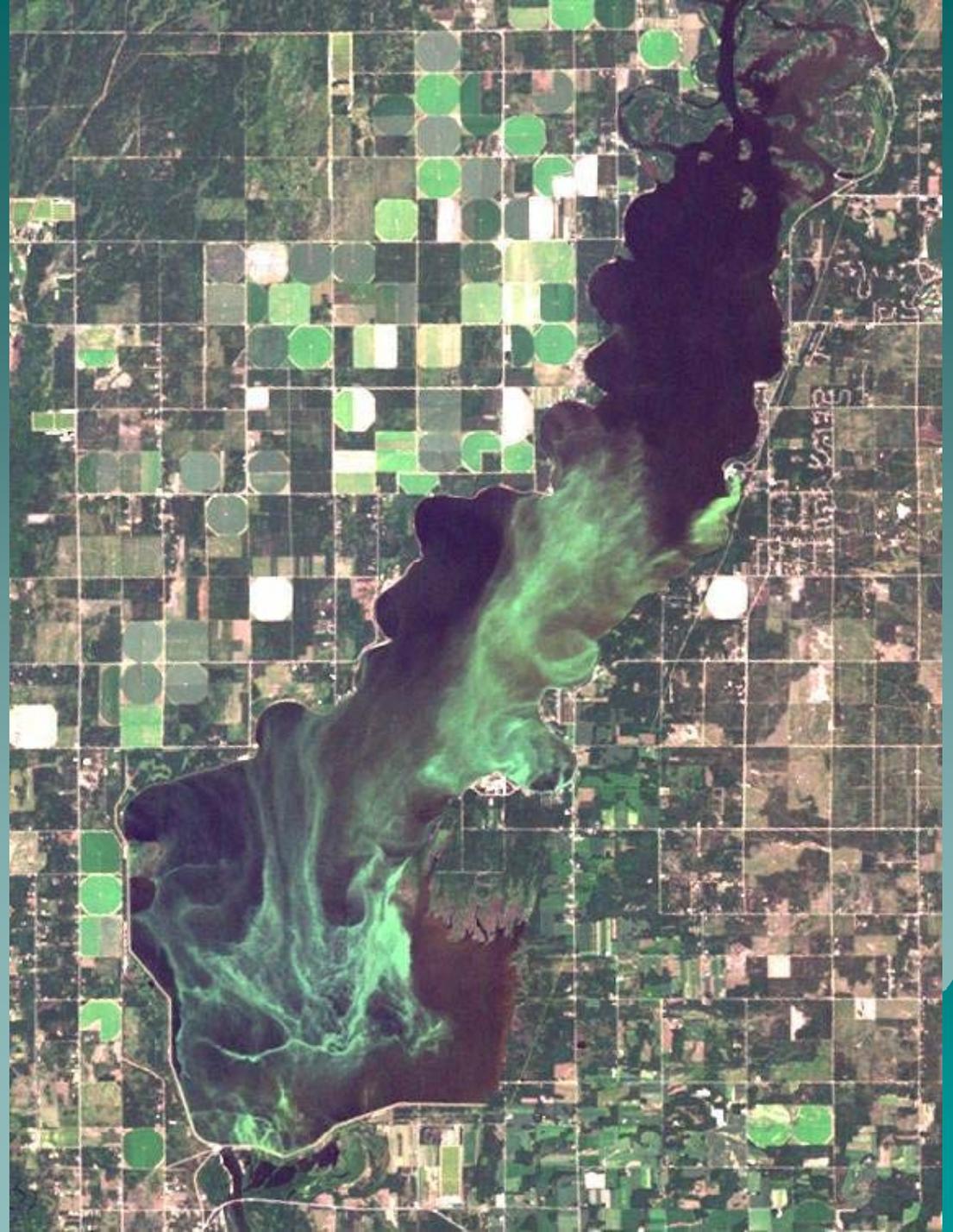
- ◆ Total Kjeldahl-N
- ◆ Nitrate-N
- ◆ Ammonia-N
- ◆ Soluble P
- ◆ Total P
- ◆ Total suspended solids
- ◆ Chlorophyll a

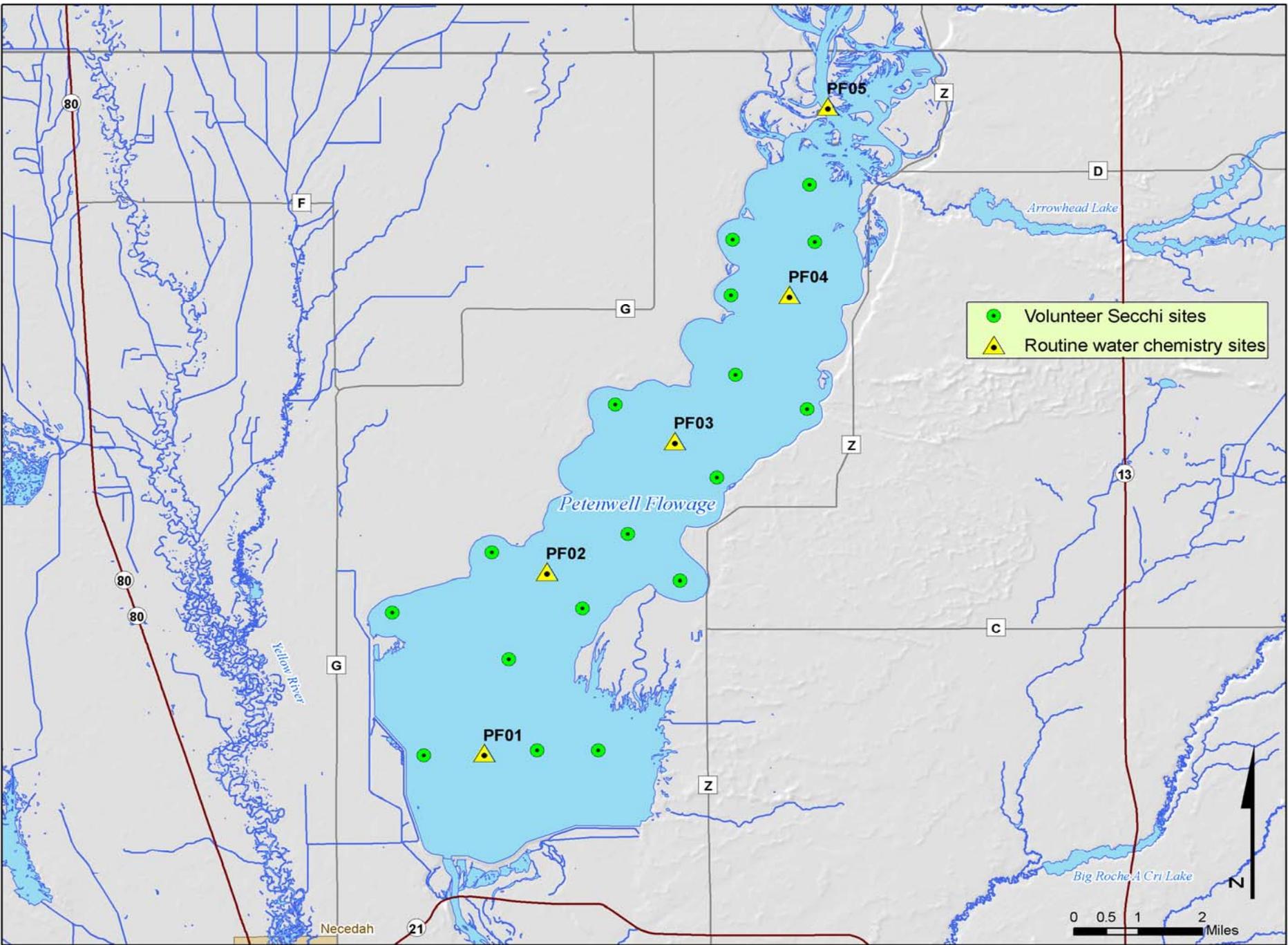
Additional Data Collection

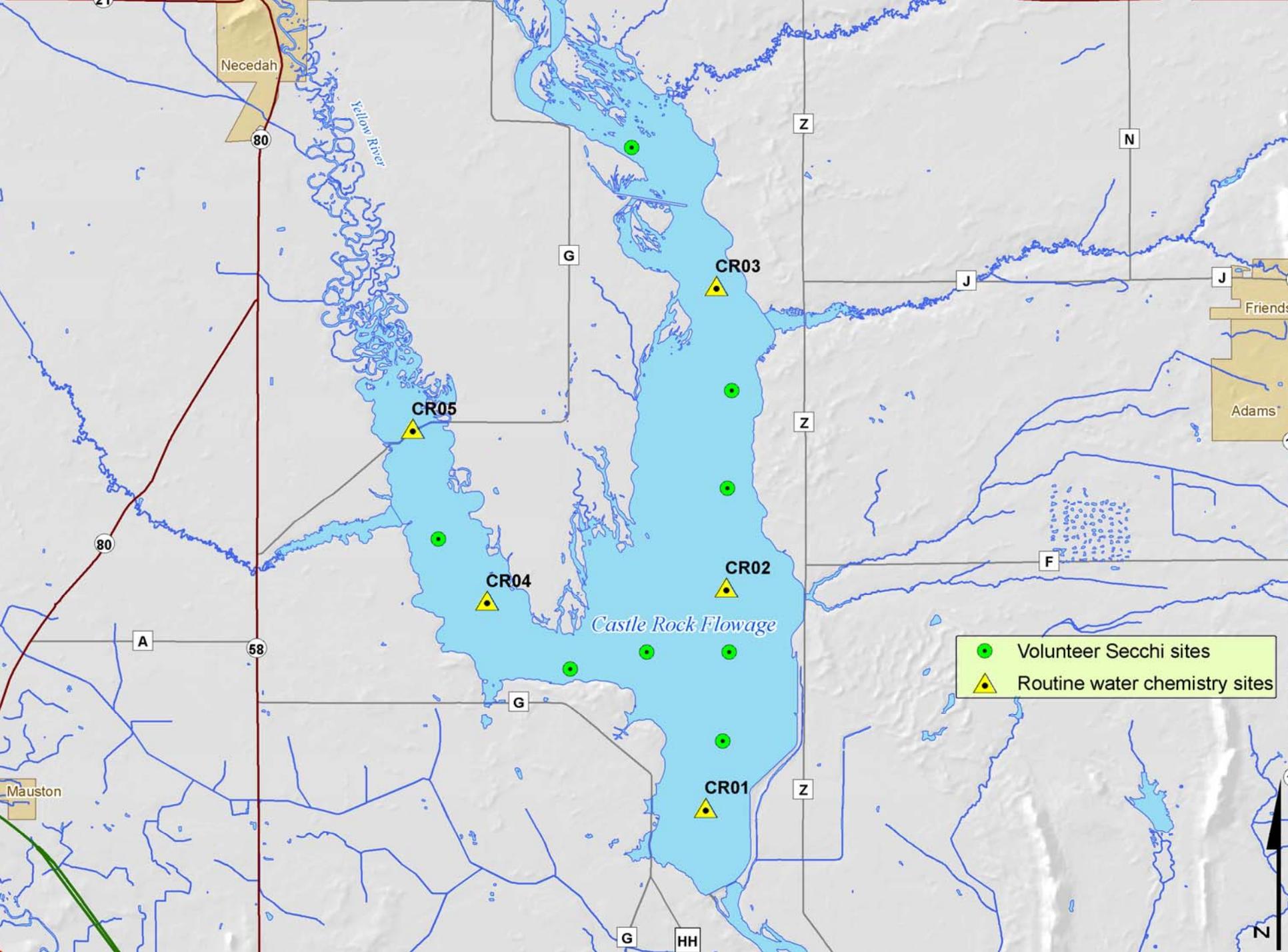
- ◆ Wastewater discharge monitoring (WPDES permits)
- ◆ Continuous streamflow measurement (USGS)
- ◆ Internal P loading (sediment P release studies)
- ◆ Land use inventories (soil P, crop rotations, GIS layers)
- ◆ Petenwell/Castle Rock algae sampling

Petenwell Flowage

Algae Bloom Variability







Necedah

Yellow River

80

G

Z

N

J

J

Friends

Adams

CR05

CR03

Z

F

80

CR04

CR02

G

Castle Rock Flowage

A

58

- Volunteer Secchi sites
- ▲ Routine water chemistry sites

Mauston

CR01

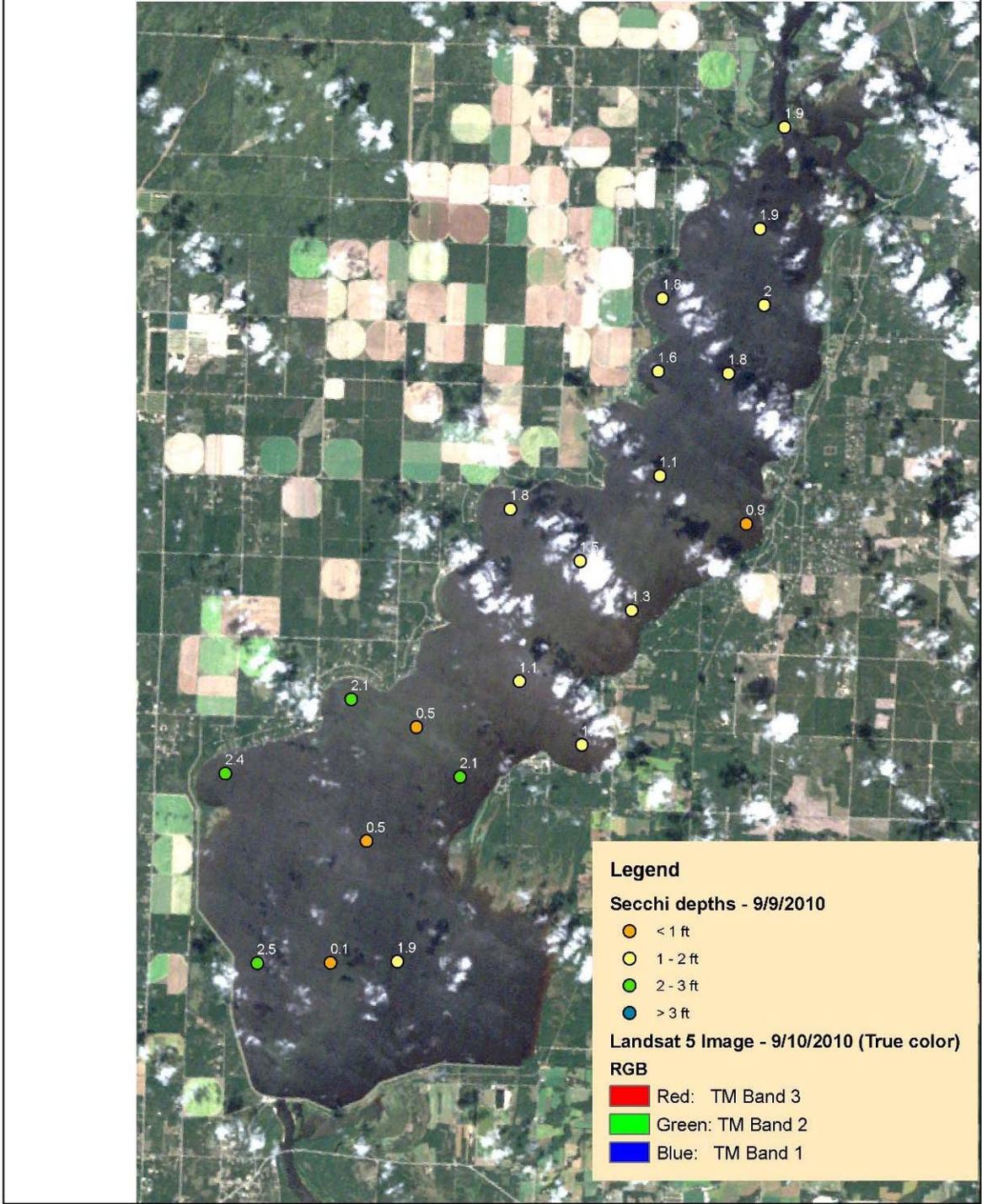
Z

G

HH

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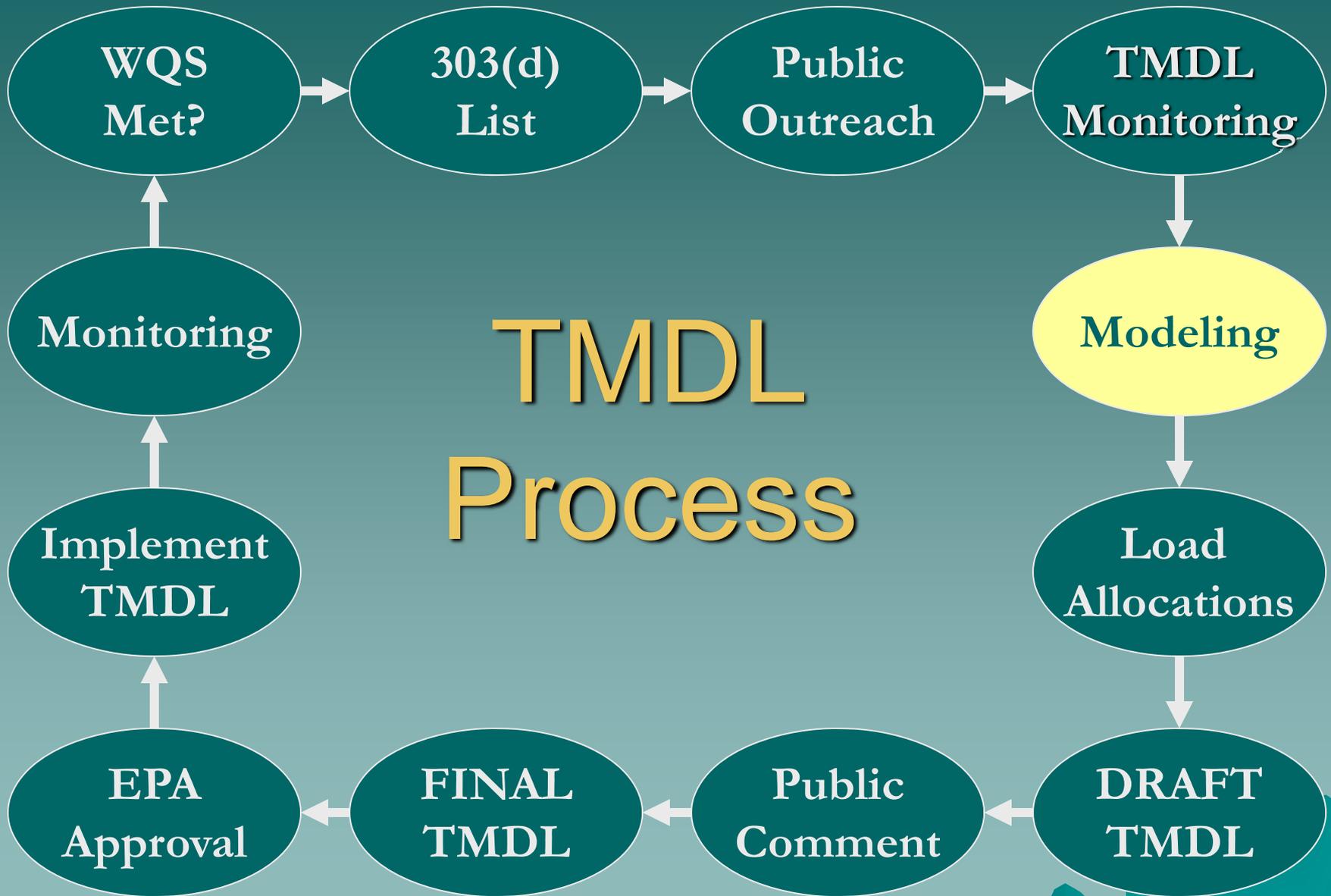
Secchi Depths and Landsat Imagery



Other Related Projects

- ◆ Mill Creek SWAT modeling (UWSP)
- ◆ Big Eau Pleine Watershed monitoring (incl. WVIC)
- ◆ Gap analysis (EPA funded)
- ◆ USCOE sediment sampling and temperature profiles
- ◆ Socio-economic study (?)
- ◆ Agricultural land use inventory

TMDL Process

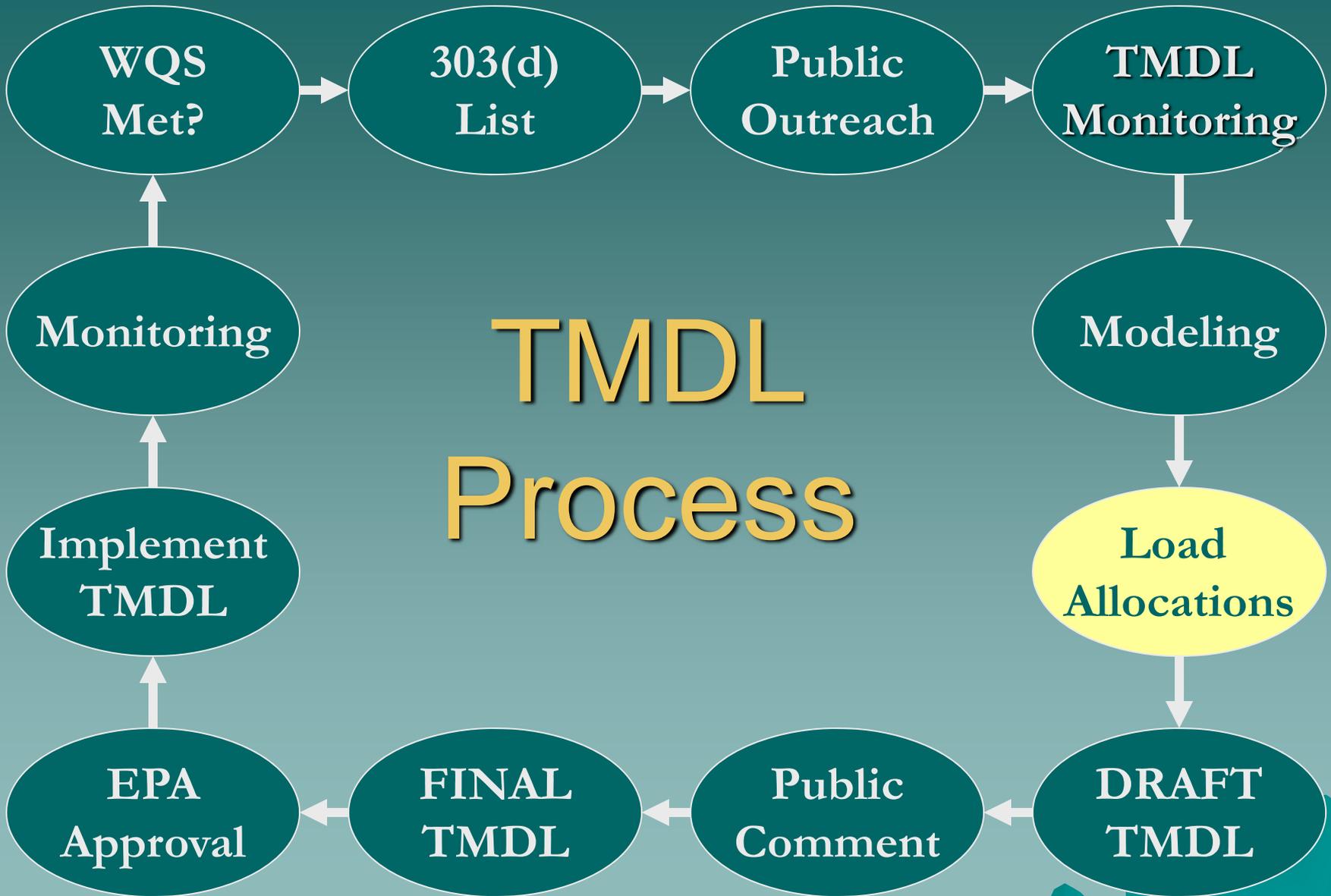


Modeling

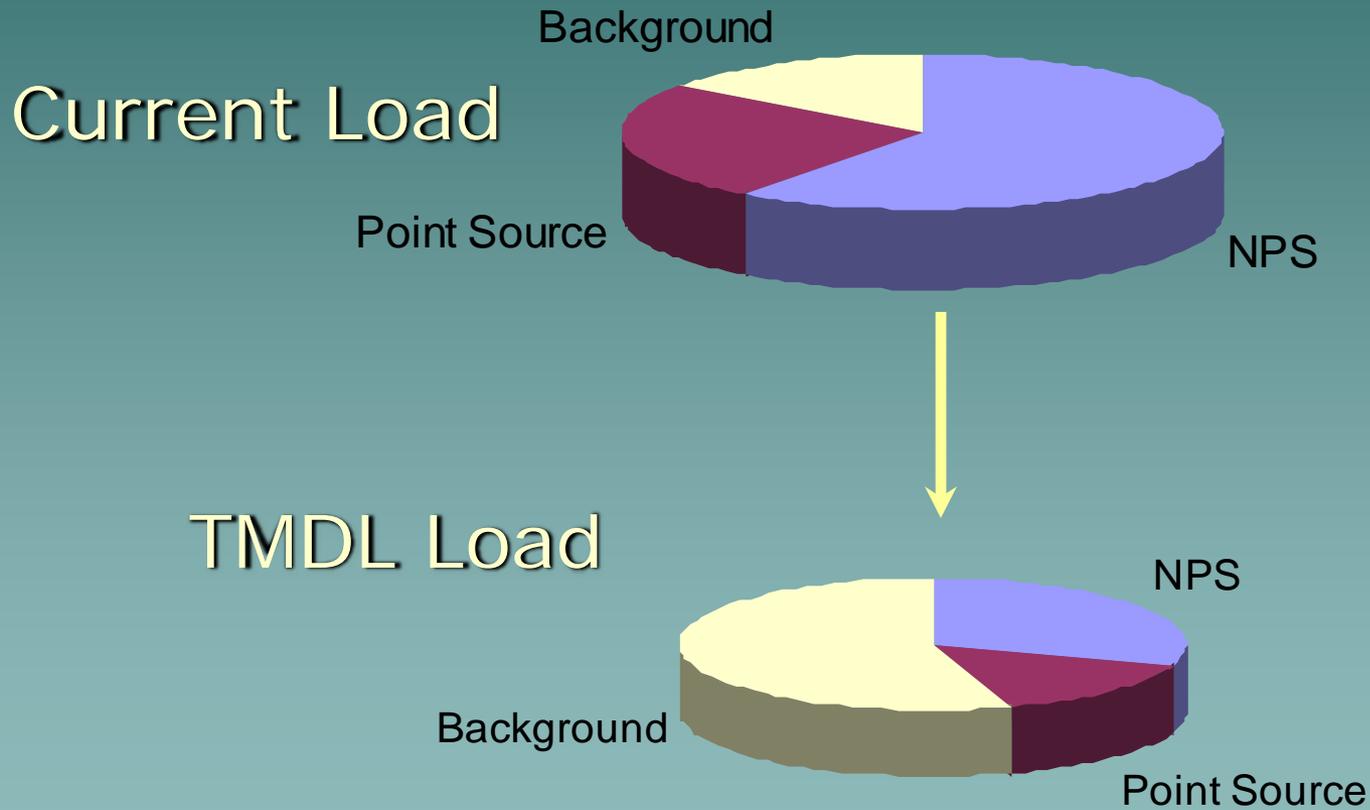
After two years of monitoring:

- ◆ Reservoir model (BATHTUB)
- ◆ River and reservoir model (CE-QUAL-W2)
- ◆ Land use model (SWAT)
- ◆ Field scale model (Wis. P Index)

TMDL Process



TMDL Load Allocation



"From Lac Vieux Desert to Prairie du Chien, this great Wisconsin River must become a model of cleanliness"

George C. Becker

Questions?

