What is a TMDL?

NORTH DAKOTA
DEPARTMENT of HEALTH

Heather Husband
Division of Water Quality

The Path from the Past

-or-

Where did all those crumby acronyms come from?

Cuyahoga River Fire

EPA, CWA, and TMDL

- This event inspired the creation of the Environmental Protection Agency (EPA) and the Clean Water Act (CWA) in 1972
- Pollution from point sources (factories, etc) were greatly reduced
- States developed Water Quality Standards (WQS) which were the foundation of pollution control in the CWA
- Water Quality Standards are based on beneficial uses designated within each state.

EPA, CWA, and TMDL

- States created the 303(d) list which identified waterbodies that were not meeting WQS

And then……

EPA, CWA, and TMDL

Total Maximum Daily Loads (TMDL) - 1992

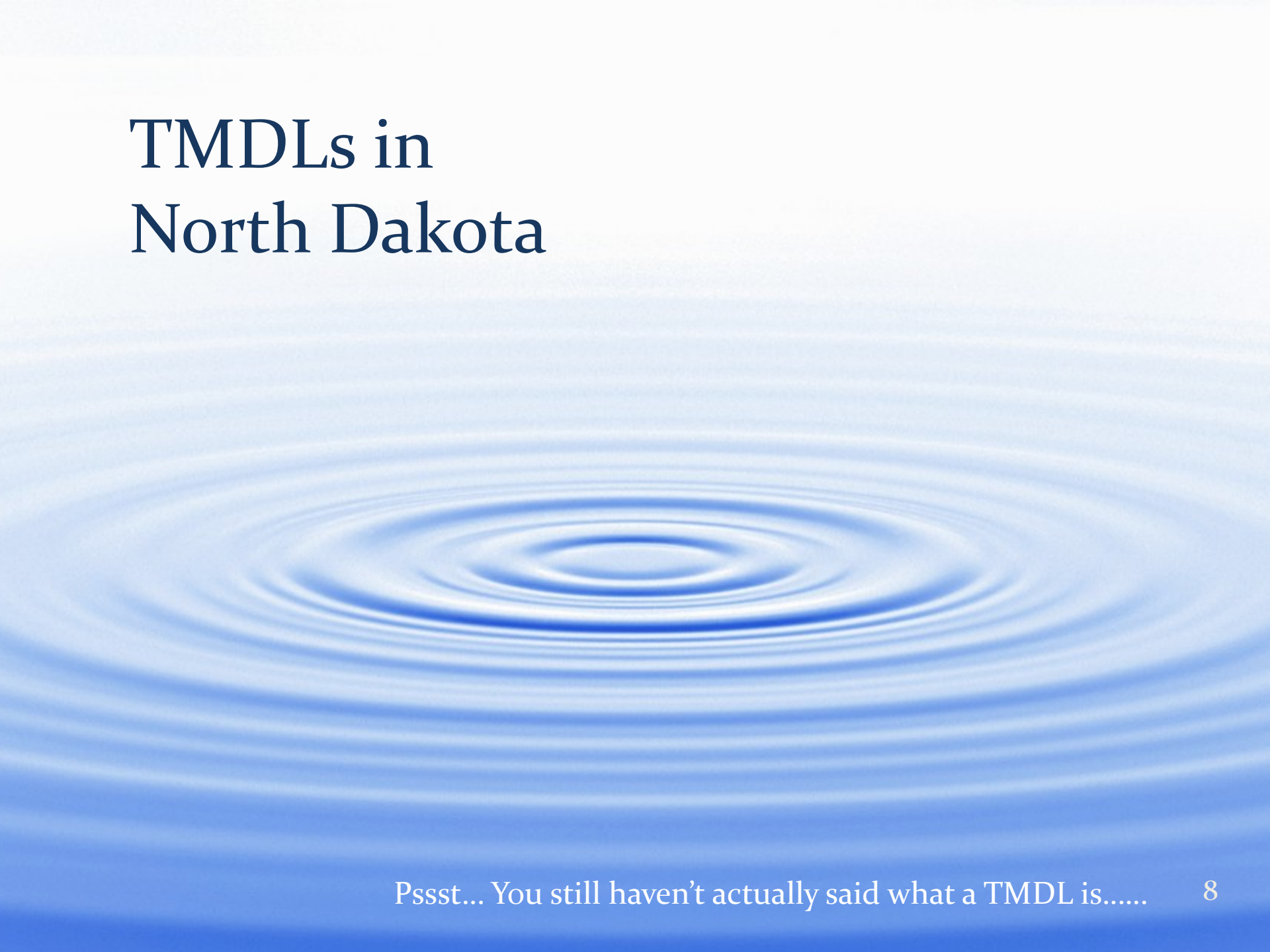
A report required under the CWA that describes the maximum amount (load) of a pollutant a waterbody can receive and maintain all of its designated beneficial uses

EPA, CWA, and TMDL

Beneficial Uses:

- Fishable/Swimmable but also
- Drinking Water
- Agriculture
- Industry

TMDLs in North Dakota



Pssst… You still haven't actually said what a TMDL is……

A TMDL is a tool
for problem identification and prioritization

Parts of a TMDL

Background Information

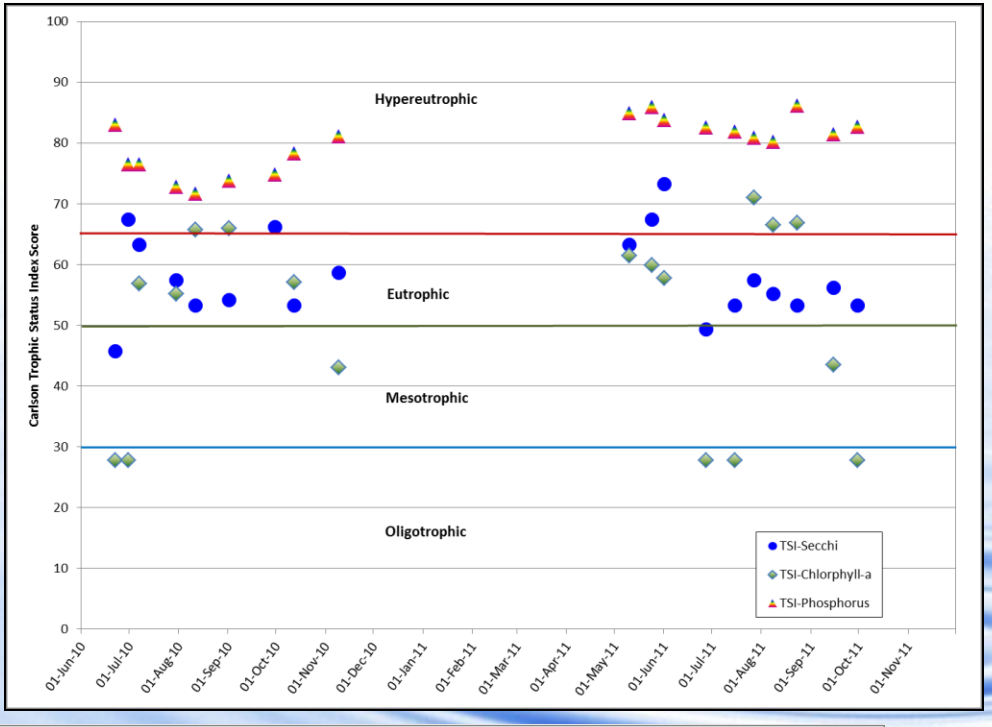
- Watershed Size and Location
- Listing Information
- Climate and Precipitation Data
- Ecoregion Information
- Topography
- Land Use
- Available Data

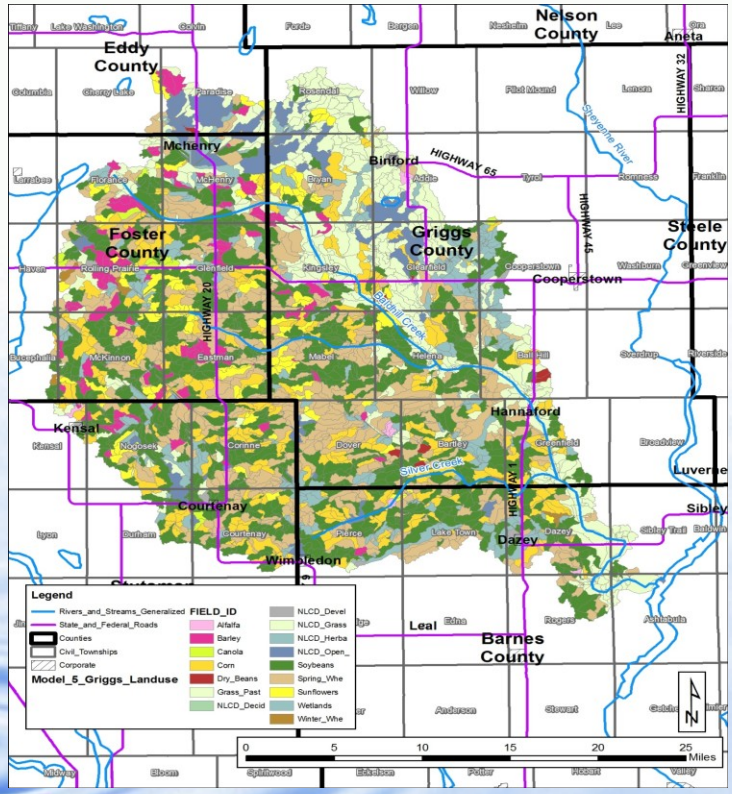
Parts of a TMDL

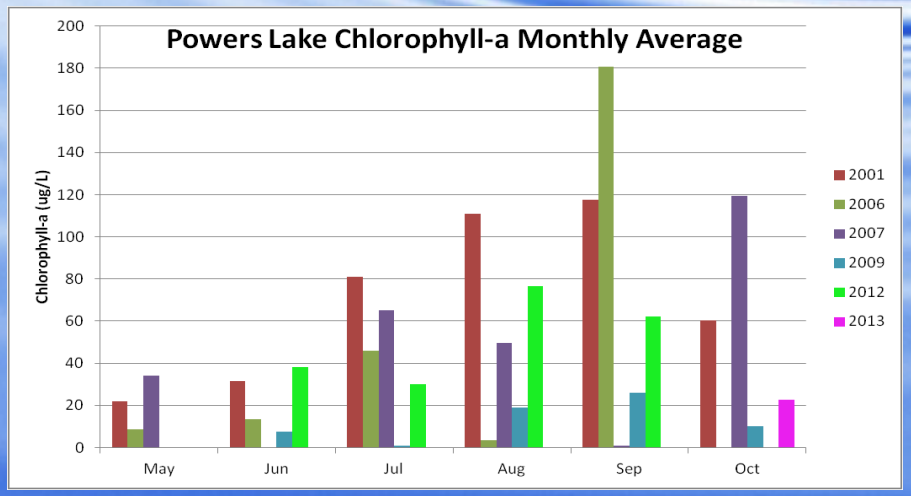
Analysis

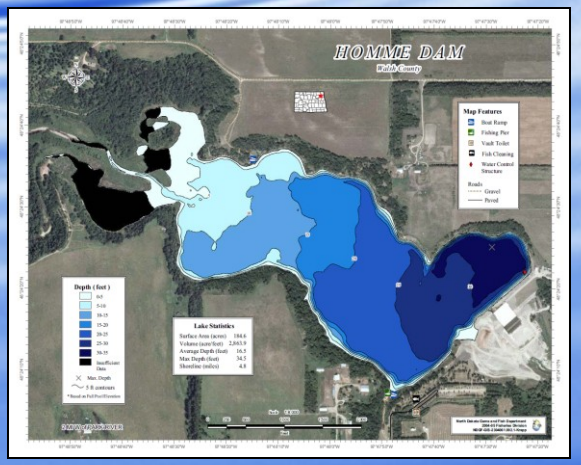
- Maps and Graphs
- Load Duration Curves
- Models
- Rapid Geomorphic Assessments
- Index of Biotic Integrity
- Identification of Critical Areas

Parts of a TMDL

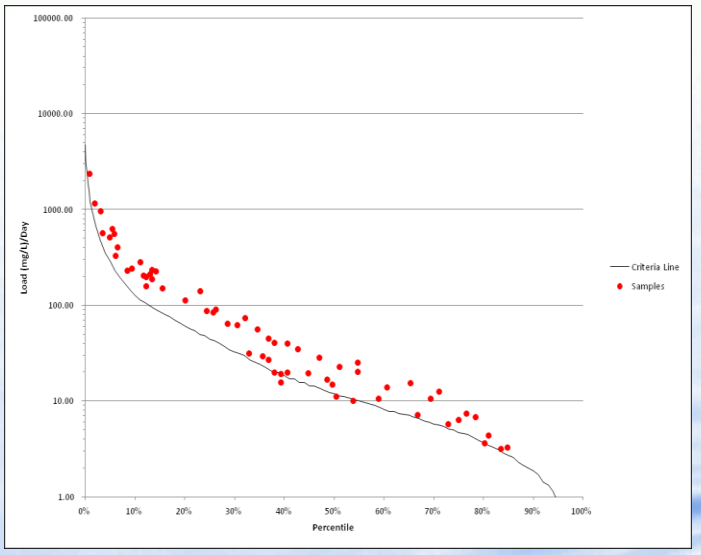


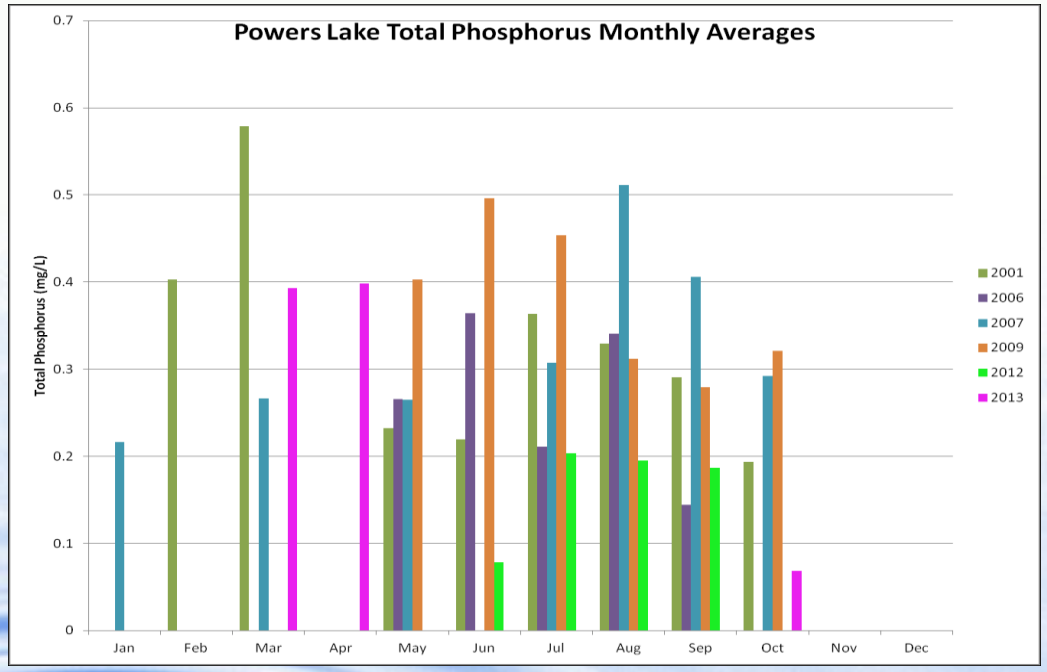


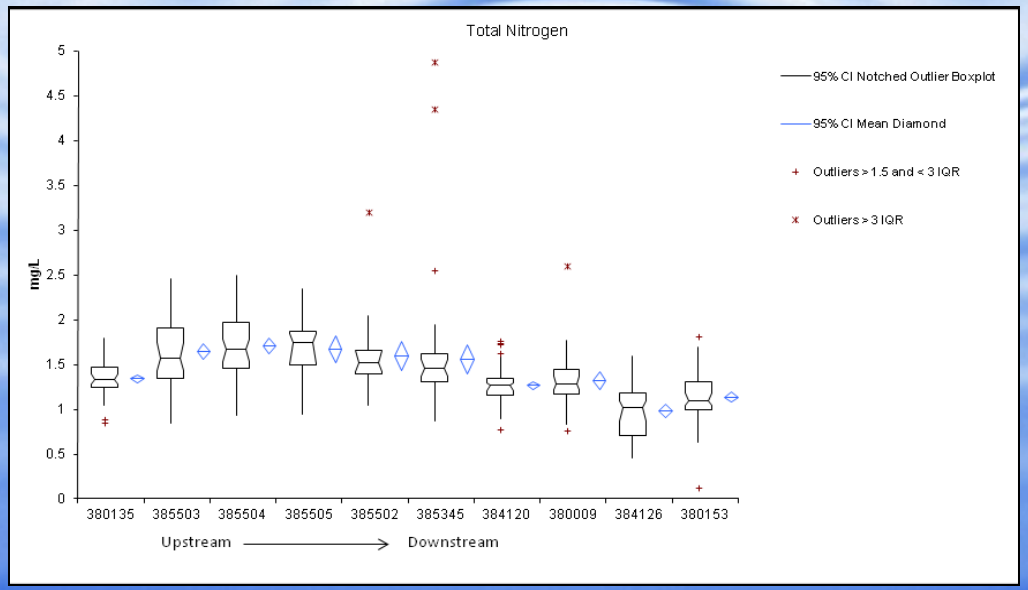




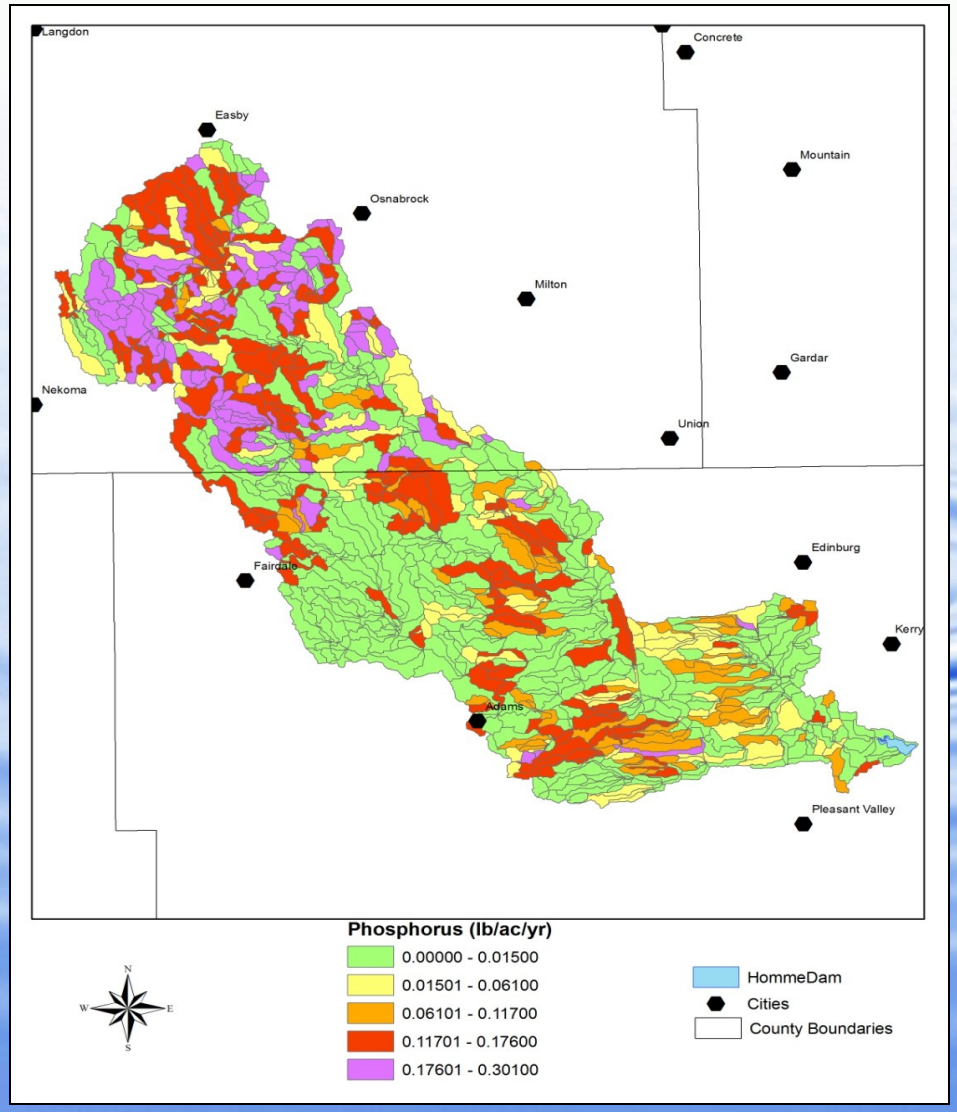
Parts of a TMDL







Parts of a TMDL



AnnAGNPS Identification of Critical Areas for BMP Implementation

Parts of a TMDL

Reductions

- The is the bare bones of the TMDL itself. Creates the target to shoot for.

$$TMDL_{(loading\ capacity)} = WLA + LA + MOS$$

Table 12. Summary of the Total Phosphorus TMDL for Homme Dam (40% reduction needed)

Category	Total Phosphorus (kg/yr)	Explanation
Existing Load	16,660	From observed data
Loading Capacity	9,996	Total TP load from Monte Carlo modeling corresponding to 2010/2011 mean chlorophyll-a concentration of 16.9 µg/L
Wasteload Allocation	0	No point sources
Load Allocation	8,996.4	Entire loading capacity minus MOS is allocated to non-point sources
MOS	999.6	10% of the loading capacity (kg/yr) is reserved as an explicit margin of safety

Parts of a TMDL

Source Identification and Implementation Strategy

We do NOT single out individuals as targets

Ex. Are the high phosphorus levels coming from yard waste (stormwater), livestock runoff, fertilizer runoff, leaking septic systems, in-lake nutrient cycli etc?

Parts of a TMDL

Source Identification and Implementation Strategy

Individuals are NOT identified or targeted

Ex. Are the high phosphorus levels coming from yard waste (stormwater), livestock runoff, fertilizer runoff, leaking septic systems, in-lake nutrient cycling, etc?

Promoting best management practices with focus on source and critical areas(upstream in river, major tributary in lake) within each watershed

Then we use all the pieces together to get that river or lake back on track to meeting water quality standards

Parts of a TMDL

Picking a Target

(tough job with nutrients – see Criteria Workgroup)

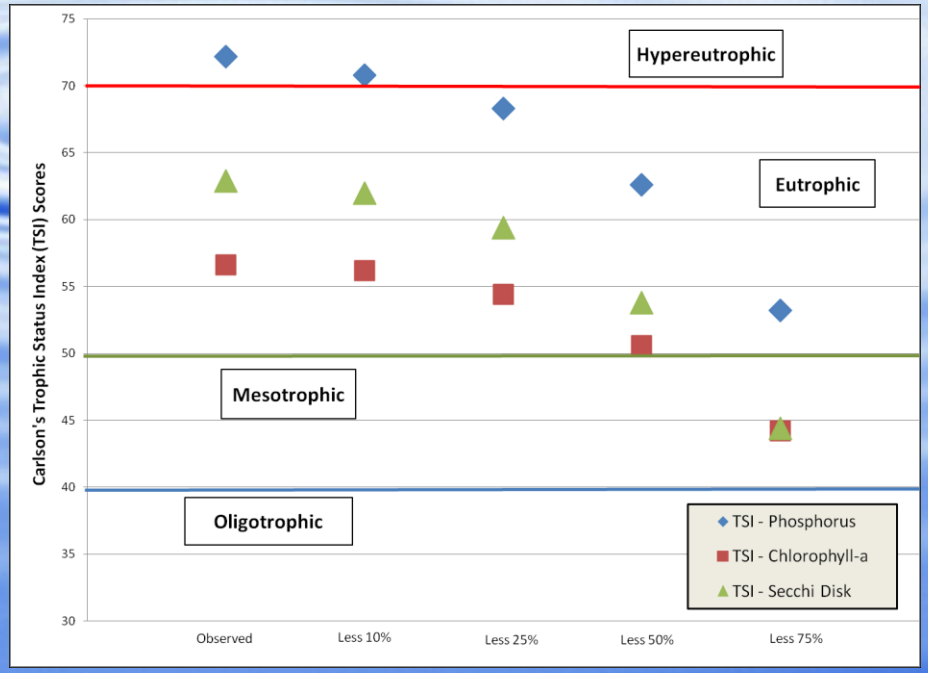
For Lakes:

- Started with **phosphorus** values based on TSI (trophic state index or "How green is the lake?") scores.

- Too many variables depending on region of state, weren't getting results consistent with model.

Variables (just a few):

- Available nitrogen
- Sunlight hours
- Suspended Sediment
- Water Temperature
- Precipitation
- Depth of Lake
- Wind Driven Mixing of Accumulated Nutrients



Parts of a TMDL

Picking a Target

(tough job with nutrients – see Criteria Workgroup)

For Lakes:

- Switched to **chlorophyll-a** values (also related to TSI scores).
- This directly relates to how green the lake is.
- We can then calculate corresponding reductions in nutrients to get us there.
- The current target (nutrient lake TMDLs): an average growing season chlorophyll-a concentration of **20 µg/L** or less to be protective of all lake beneficial uses.

Parts of a TMDL

Picking a Target

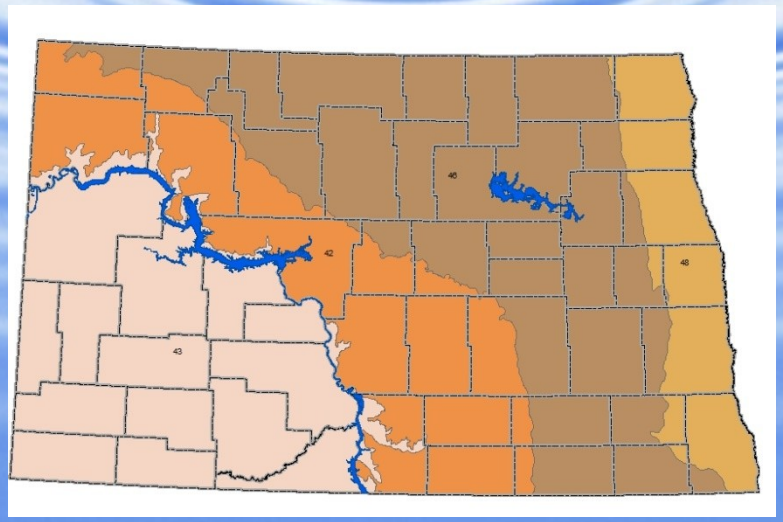
(tough job with nutrients – see Criteria Workgroup)

For Rivers:

- Haven't completed a nutrient TMDL for rivers yet
- Different system
- Upper Sheyenne River Assessment guideline values.

River Nutrient Reference Value

- Based on Ecoregions
  - A NDDoH study (Larson, 2012) looked at perennial, wadeable streams in the Red River Basin
  - For sites that were the "least disturbed" (the bug and fish community was the best, the river channel stability was the best) the average of nutrient concentrations was calculated
  - This value was given for comparison purposes when describing water quality along the Sheyenne River



River Nutrient Reference Value

- Based on Ecoregions
  - A NDDoH study (Larson, 2012) looked at perennial, wadeable streams in the Red River Basin
  - For sites that were the "least disturbed" (the bug and fish community was the best, the river channel stability was the best) the average of nutrient concentrations was calculated
  - This value was given for comparison purposes when describing water quality along the Sheyenne River

Example: For Ecoregion 46, Site 384126

The total nitrogen reference value = 0.581 mg/L

Minimum = 0.46 mg/L

Maximum = 1.60 mg/L

Average = 0.98

The total phosphorus reference value = 0.115 mg/L

Minimum = 0.030 mg/L

Maximum = 0.430 mg/L

Average = 0.160 mg/L

For Prioritization, the NDDoH is not locking the whole state into one mold, and we are not trying to re-write other agencies programs

We are trying to make our NDDoH water quality programs more interactive, efficient, and ultimately more successful

Questions?