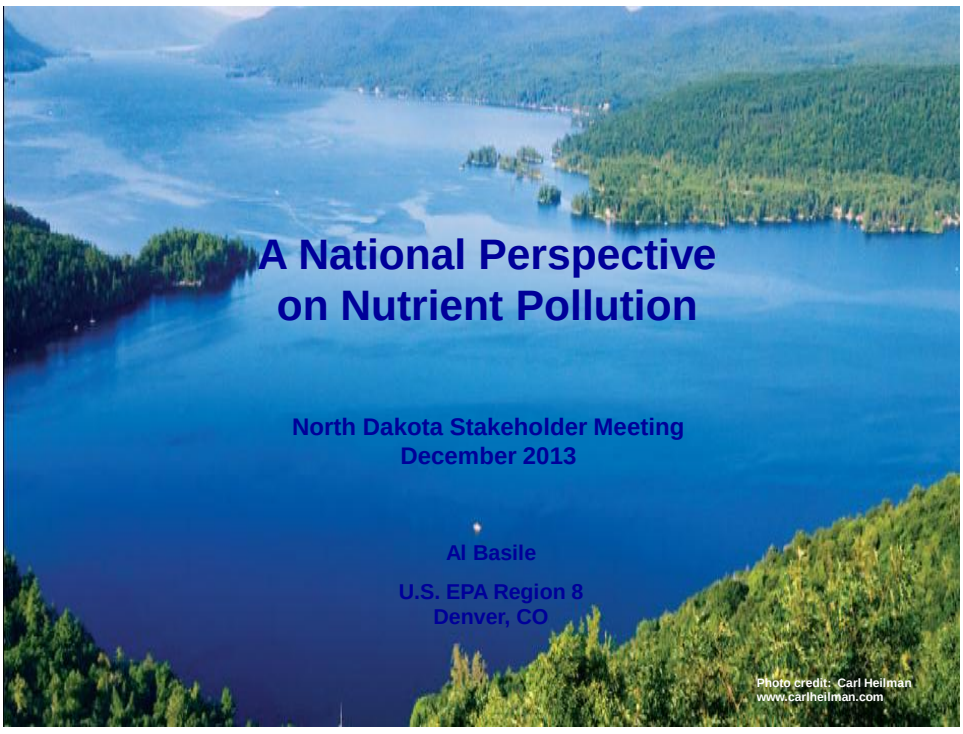
North Dakota's Nutrient Reduction Strategy

Stakeholder Meeting

December 19, 2013

NORTH DAKOTA DEPARTMENT of HEALTH



Nutrient Pollution

- Degrade habitat for fish and wildlife;
- Render water bodies unsafe for swimming and other forms of water recreation;
- Create a public health concern for drinking water supplies;
- Decrease property values, and
- Negatively impact local economies.

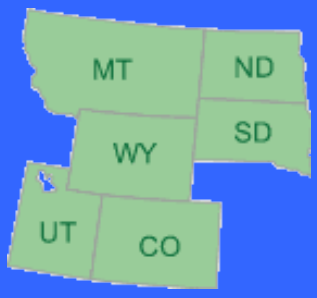
Photo credit: Larry Dupont, VT CAC

Nutrient Pollution
Photo credit: Larry Dupont, VT CAC

Clean Water or Green Water?
EPA
United States Environmental Protection Agency
http://www2.epa.gov/nutrientpollution/protect-your-pooch
Don't Spoil the Fun!
Harmful algal blooms can make dogs very sick. If you think your dog has come in contact with a harmful algal bloom, rinse him or her immediately in fresh water.
Photo courtesy of Janet Neff

National Scope of Nutrient Pollution

- >99,000 river miles threatened or impaired;
- >3 million lake acres threatened/impaired;
- 78% of assessed coastal waters exhibit signs of eutrophication;
- Drinking water violations have increased in recent years because of high levels of nitrate-nitrogen; and
- The occurrence and severity of nuisance algal blooms are on the rise nationwide.

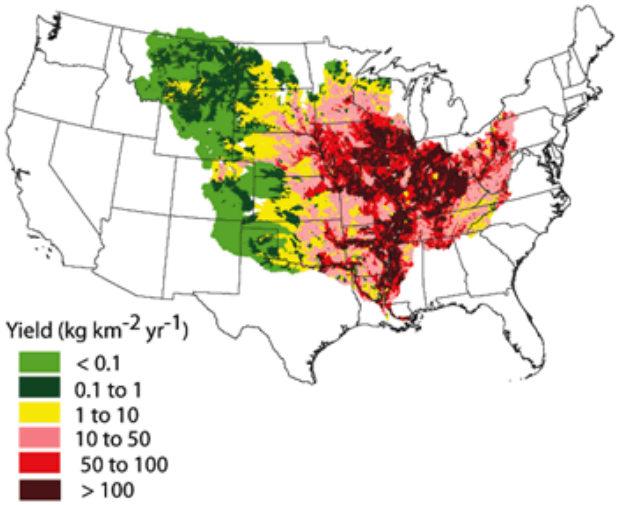


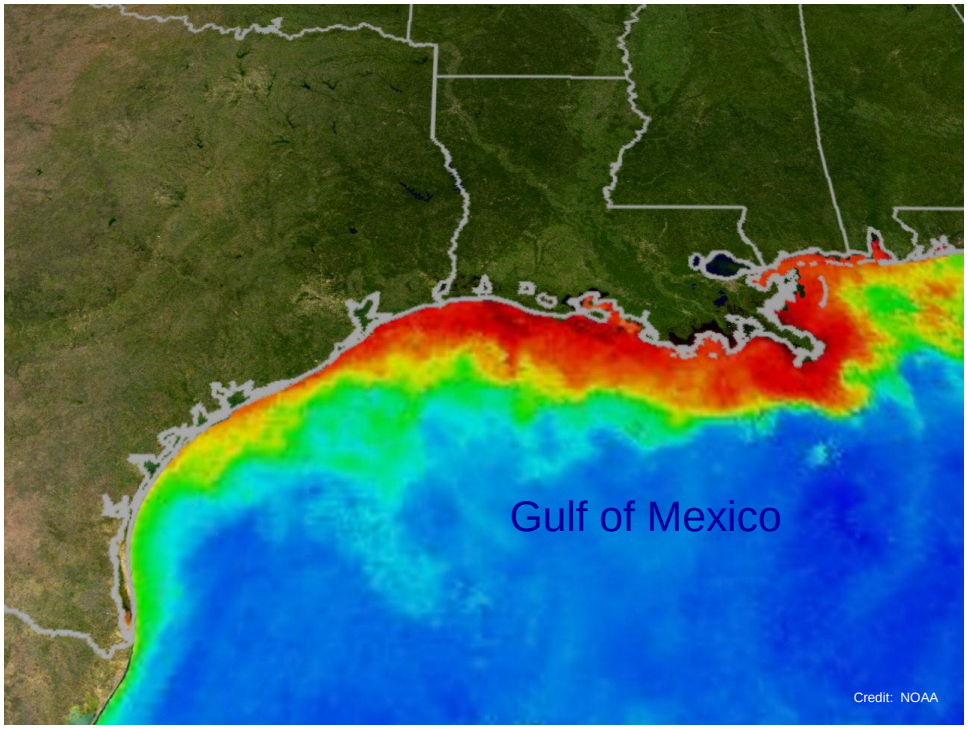
EPA Region 8

Waters Threatened/Impaired by Nutrient Pollution:

>8,000 river miles
>300,000 lake acres

Phosphorus delivered to the Gulf of Mexico





Chesapeake Bay

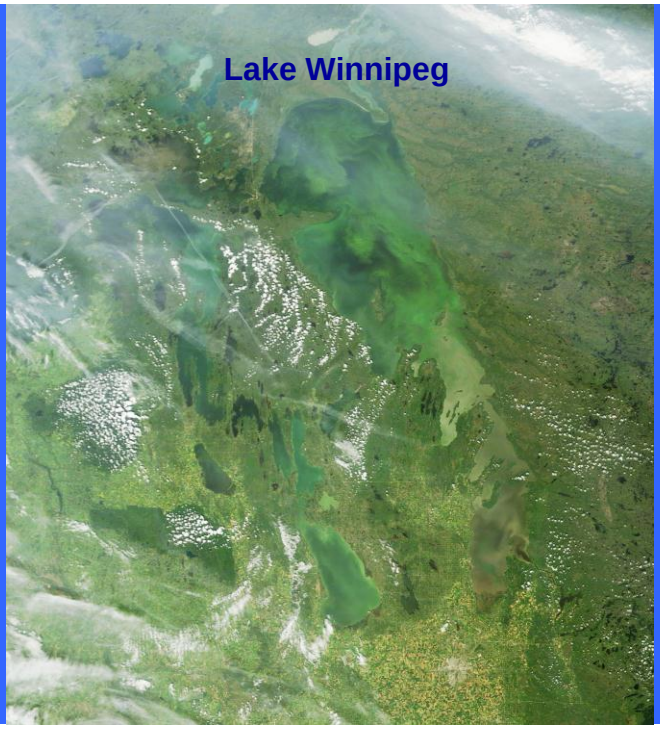
Lake Erie

Lake Erie

Photo credit: Oregon DEQ

Photo credits:
M. Suplee, V. Watson, M. Teply, and H. McKee

Grand Lake St. Mary's
Ohio
Credit: Ohio EPA


Lake Winnipeg

What is EPA doing to help address nutrient pollution?

1. Providing states with technical assistance and other resources to help develop water quality criteria for N and P;
2. Working with states to identify waters impaired by nutrients and developing restoration plans;
3. Awarding grants to states to address pollution from nonpoint sources, such as agriculture and storm water runoff;

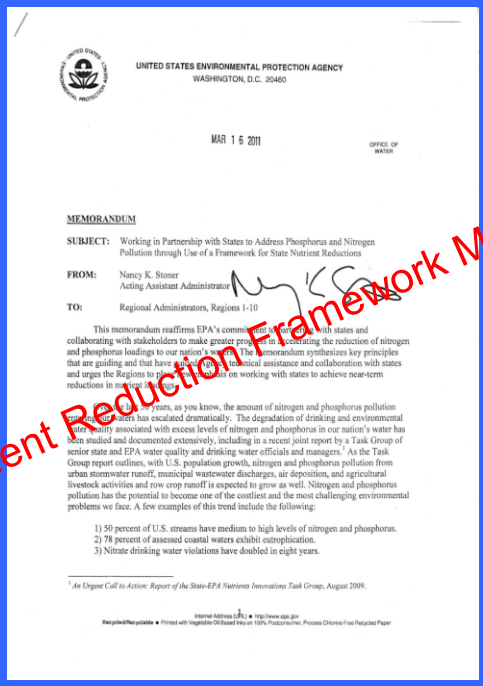
What is EPA doing to help address nutrient pollution?

4. Administering a permit program to reduce the amount of N and P discharged to the environment from point sources;
5. Providing funding for the construction and upgrade of municipal wastewater treatment plants;
6. Working with states to reduce nitrogen oxide emissions from air sources;

What is EPA doing to help address nutrient pollution?

7. Improving collaboration with states, federal partners (e.g., USDA) and other stakeholders; and
8. Increasing efforts to educate the public.

Progress?



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 1 6 2011

OFFICE OF WATER

MEMORANDUM

SUBJECT: Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions

FROM: Nancy K. Stoner
Acting Assistant Administrator

TO: Regional Administrators, Regions 1-10

This memorandum reaffirms EPA's commitment to working with states and collaborating with stakeholders to make greater progress in accelerating the reduction of nitrogen and phosphorus loadings to our nation's waters. The memorandum synthesizes key principles that are guiding and that have guided EPA's technical assistance and collaboration with states and urges the Regions to place a high priority on working with states to achieve near-term reductions in nitrogen and phosphorus.

Over the years, as you know, the amount of nitrogen and phosphorus pollution impacting our waters has escalated dramatically. The degradation of drinking and environmental quality associated with excess levels of nitrogen and phosphorus in our nation's water has been studied and documented extensively, including in a recent joint report by a Task Group of senior state and EPA water quality and drinking water officials and managers.[1] As the Task Group report outlines, with U.S. population growth, nitrogen and phosphorus pollution from urban stormwater runoff, municipal wastewater discharges, air deposition, and agricultural livestock activities and row crop runoff is expected to grow as well. Nitrogen and phosphorus pollution has the potential to become one of the costliest and the most challenging environmental problems we face. A few examples of this trend include the following:

1) 50 percent of U.S. streams have medium to high levels of nitrogen and phosphorus.
2) 78 percent of assessed coastal waters exhibit eutrophication.
3) Nitrate drinking water violations have doubled in eight years.

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Nutrient Reduction Framework Memo

Credit: Ohio EPA

Credit: Dave Halliwell, Maine DEP

Credit: North Dakota Game and Fish

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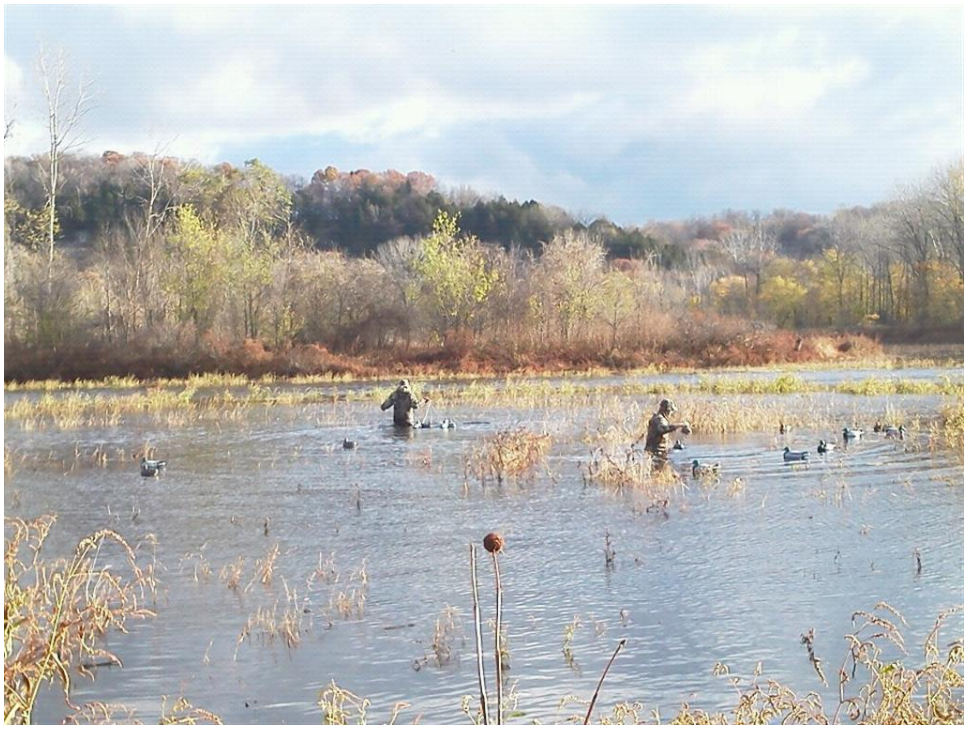


Credit: Bird Hunter magazine

Did you know?
Nutrient pollution is one factor contributing to the increased occurrence of harmful algal blooms. Farmers help mitigate this issue through appropriate fertilizer application and by planting trees and grasses near streams to soak up fertilizer runoff.
Clean Water or Green Water?
Learn more at http://go.usa.gov/bZr5
EPA

Clean Water or Green Water?
http://www2.epa.gov/nutrientpollution/harmful-algal-blooms
EPA
United States Environmental Protection Agency
Don't spoil the fun!
Simple every day activities such as proper fertilizer usage, picking up pet waste, and switching to phosphate-free detergents can help reduce nutrient pollution that may lead to harmful algal blooms.

Nutrient Pollution: A North Dakota and Regional Perspective

Presented to the
North Dakota Nutrient Reduction Strategy Stakeholder Meeting
December 19, 2013

Nutrients

- Nutrients, in appropriate amounts, are essential to the growth and health of aquatic communities
- Excess nutrients, however, can result in:
  - Proliferation of blue-green algae blooms which can cause toxins (cyanotoxicity)
  - Excessive algae and/or plant growth resulting in organic enrichment, low DO and fish kills
  - Excessive algae and plants can cause diurnal low DO or high pH
  - Increased drinking water treatment costs
  - Disinfection by-products concerns
  - Recreation impairments and aesthetics
  - Groundwater contamination (nitrates)

Are nutrients a problem in North Dakota?

- Monitoring and Assessment Programs and Projects Related to Nutrients
- Results for North Dakota Lakes and Reservoirs
- Results for Rivers and Streams

Water Quality Monitoring and Assessment Programs, Projects and Studies

- Ambient Water Quality Monitoring Network for Rivers and Streams
- Biological Monitoring and Assessment Program for Rivers and Streams
  - Ecoregion Reference Station Network
- Lake Water Quality Assessment Program
  - Small lakes and reservoirs monitoring
  - Lake Sakakawea
  - Devils Lake
- Impaired Waterbody Monitoring/TMDL Development Program
- Nonpoint Source Pollution Management Program Monitoring
  - Assessment and Planning
  - Implementation Monitoring

Water Quality Monitoring and Assessment Programs, Projects and Studies

- EPA National Aquatic Resource Survey Collaborations
  - Environmental Monitoring and Assessment Project – Western Pilot Project - 2000
  - National Lakes Assessment – 2007 and 2012
  - National River and Streams Survey -2007/2008
  - National Wetland Condition Assessment – 2011
- Ecological Assessment of Perennial, Wadable Streams in Red River Basin: North Dakota – 2005-2007

Lakes and Reservoirs

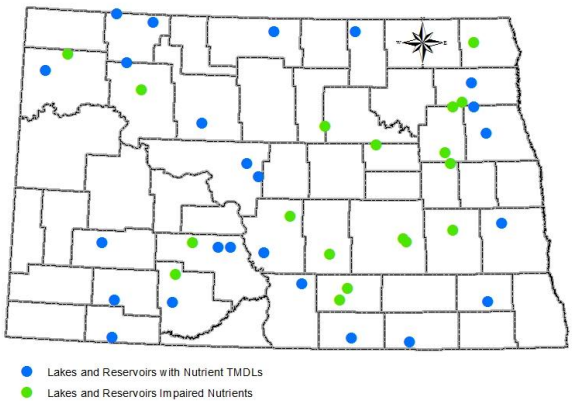
- Lake Water Quality Assessments
- Trophic Status Indicators
  - 20 ug/L chlorophyll-a average concentration
  - Secchi disk transparency
- Low dissolved oxygen concentrations
- Fish kills

Lake Josephine Algal Bloom

Lakes and Reservoirs

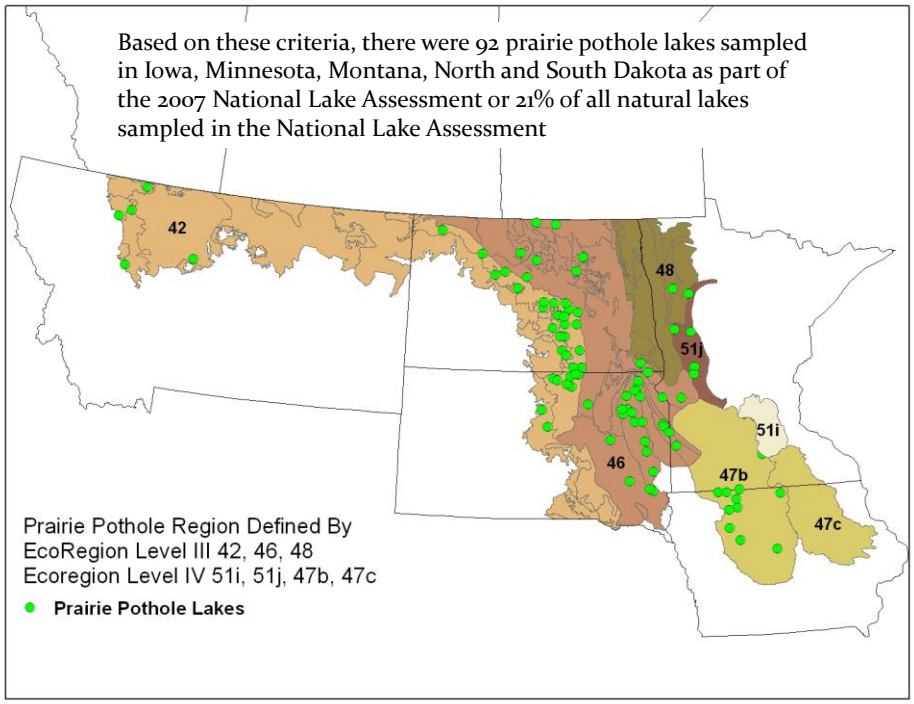
- Currently, 42 lakes and reservoirs assessed as impaired or threatened due to nutrients
  - 24 with a nutrient TMDL written

Lakes and Reservoirs Impaired Based on Nutrients

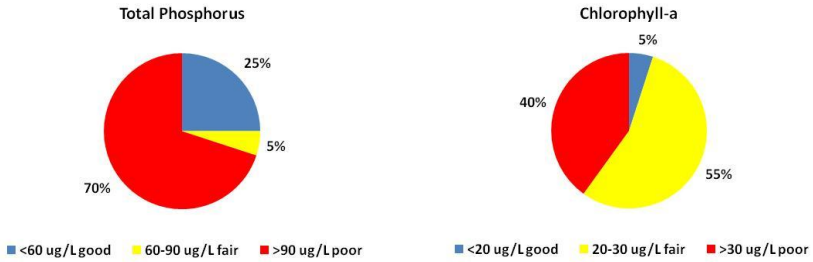


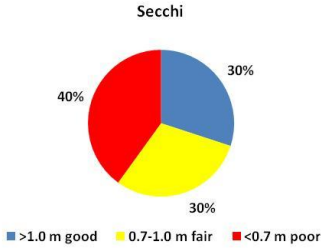
2007 National Lake Survey Results
Prairie Pothole Lake Assessment

A prairie pothole lake is further defined as a natural lake 10 acres or greater in size with a maximum depth of 4.5 m (15 ft.) or less or where 80% or more of the lake is "littoral" (15 feet or less).



PPR lakes trophic status as compared to Minnesota's eutrophication criteria for shallow lakes in the Central Hardwood Forest, Western Corn Belt Plains and Northern Glaciated Plains ecoregions.





MN lake eutrophication standards in Heiskary & Wilson . 2008. LRM 24: 282-297.

North Dakota Rivers and Streams Assessment Results

- Based on biological and chemical monitoring data
- As reported in the 2012 Integrated Report
  - Section 305(b) report
  - Section 303(d) list of impaired waters needing TMDLs
- Currently lack direct indicators of nutrient impairment (i.e., no nutrient criteria)
- 51 river and stream segments (1,400 stream miles) listed for biological impairments, some due to nutrients
- Other indicators related to nutrients

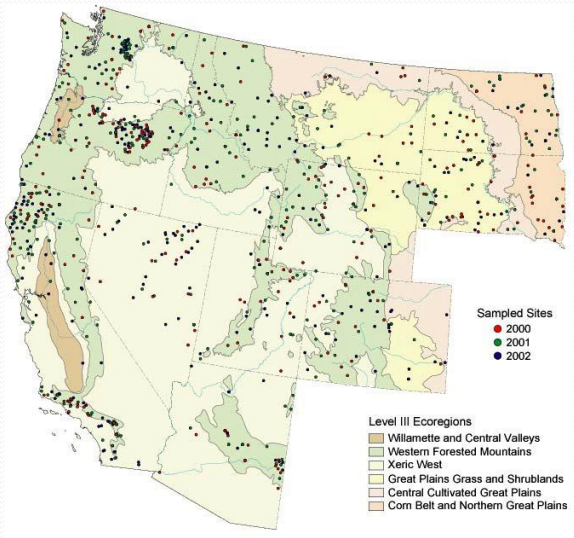
Impairment Summary for Rivers and Streams in North Dakota

Impairment	Miles
Total Fecal Coliform/E. coli	5,667.85
Physical Habitat Alterations	2,422.71
Sedimentation/Siltation	1,783.11
Biological Indicators	1,419.86
Oxygen Depletion	453.67

Probabilistic Survey Results

- Based on randomly selected sites
- Condition class estimates based on "reference sites"
- Provides unbiased estimates of ecological condition and extent of stressor (e.g., nutrients) effects
- EMAP Western Pilot Project Results
- Red River Basin in North Dakota Perennial Streams Assessment

EMAP Western Pilot Project



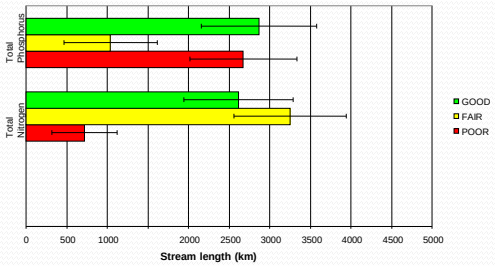
EMAP Western Pilot Project "Reference Site" Based Thresholds for Nutrients

Cultivated Plains Region of ND			
Chemical Stressor	**Poor**	**Fair**	**Good**
Total nitrogen	>2501 ug/L	1525-2501 ug/L	<1525 ug/L
Total phosphorus	>312 ug/L	228-312 ug/L	<228 ug/L

Rangeland Plains Region of ND			
Chemical Stressor	**Poor**	**Fair**	**Good**
Total nitrogen	>1186 ug/L	886-1186 ug/L	<886 ug/L
Total phosphorus	>138 ug/L	70-138 ug/L	<70 ug/L

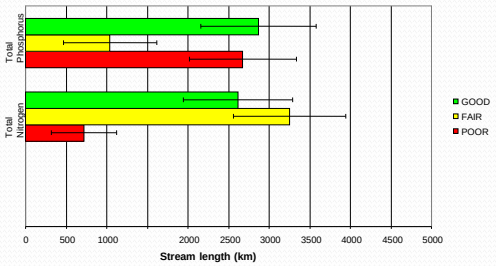
US EPA Western Pilot Project Results for North Dakota

- Phosphorus
  - 43% (2,866 km) in good condition
  - 16% (1,040 km) in fair condition
  - 41% (2,677 km) in poor condition

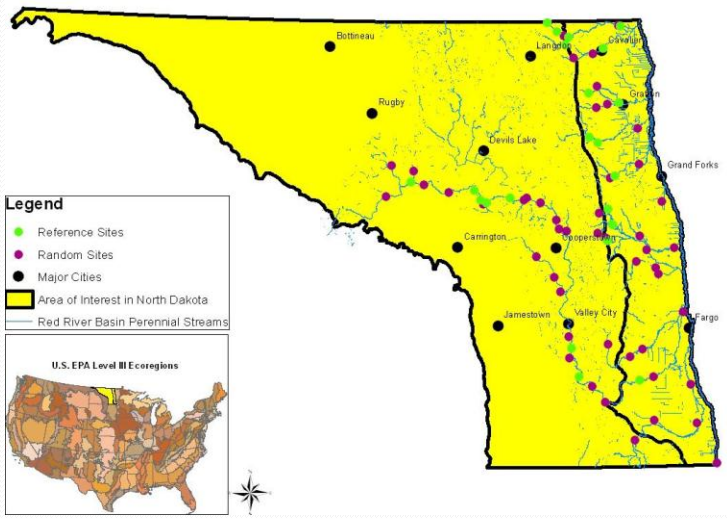


US EPA Western Pilot Project Results for North Dakota

- Nitrogen
  - 89% (5,866 km) in good to fair condition
  - 11% (717 km) in poor condition.



Red River Basin in ND Assessment



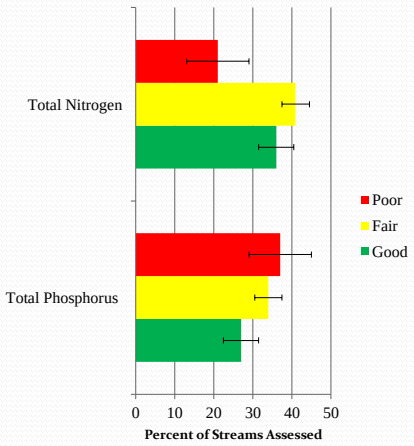
Red River Basin in ND Thresholds for Nutrients

Lake Agassiz Plain Ecoregion			
Chemical Stressor	**Most Disturbed**	**Moderately Disturbed**	**Least Disturbed**
Total Nitrogen	>1230 µg/L	883-1230 µg/L	<883 µg/L
Total Phosphorus	>261 µg/L	148-261 µg/L	<148 µg/L

Northern Glaciated Plains Ecoregion			
Chemical Stressor	**Most Disturbed**	**Moderately Disturbed**	**Least Disturbed**
Total Nitrogen	>1047 µg/L	581-1047 µg/L	<581 µg/L
Total Phosphorus	>215 µg/L	115-215 µg/L	<115 µg/L

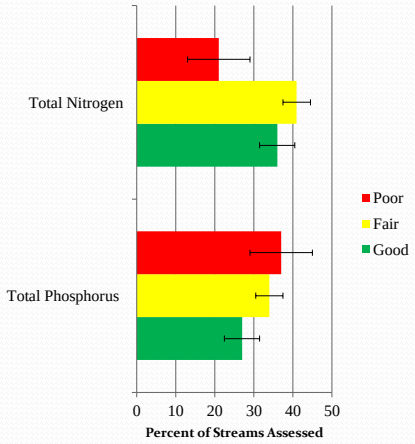
Red River Basin in North Dakota Overall Assessment

- Phosphorus
  - 27% (638mi) in good condition
  - 34% (739 mi) in fair condition
  - 37% (636 mi) in poor condition



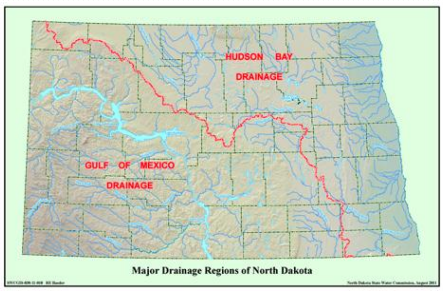
Red River Basin in North Dakota Overall Assessment

- Nitrogen
  - 36% (794) in good condition
  - 41% (813 mi) in fair condition
  - 21% (406 mi) in poor condition

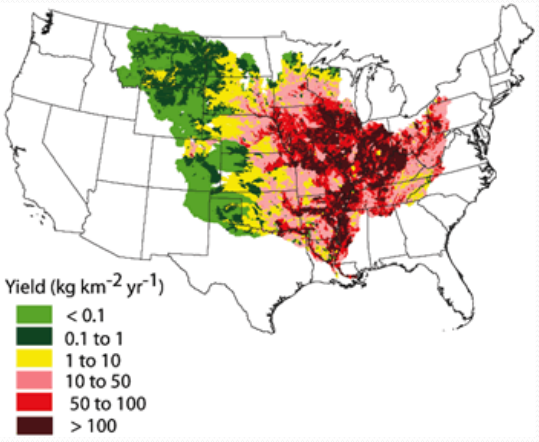


Regional Nutrient Issues

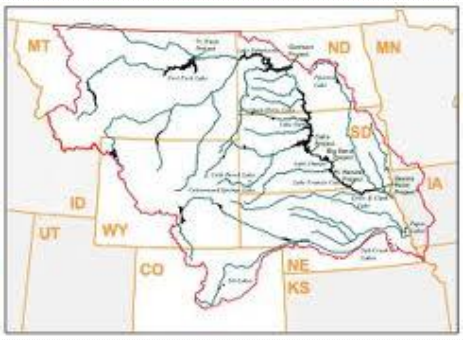
- North Dakota Represented by Two Major River Basins
  - Represent Different Regional, National and International Nutrient Issues



Missouri River Basin



Missouri River Basin/ Lake Sakakawea



Red River Basin/Lake Winnipeg

North Dakota Nutrient Reduction Strategy

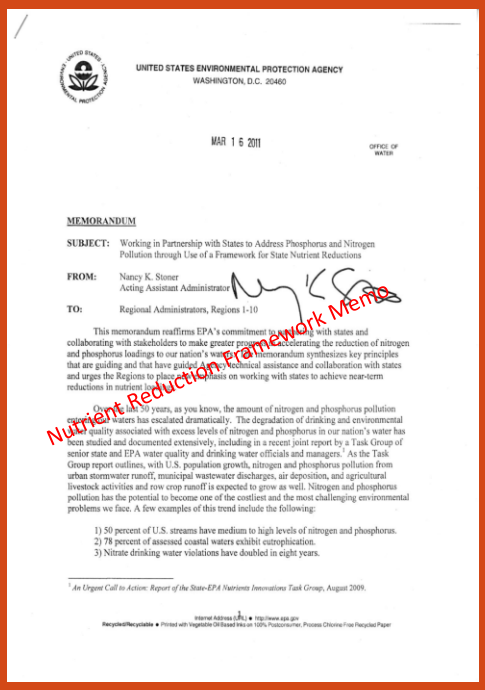
Where have we been, where are we now, and where are we going?

NORTH DAKOTA DEPARTMENT of HEALTH

Where have we been?

- Nutrient criteria development plan – May 2007
- Initial discussions on a state strategy in late 2011
- Based, in part, on Stoner memo (March 16, 2011)
- Formed planning team
- Selected facilitator
- EPA contractor assistance
- Developed Fact Sheet
- 1st Planning Team meeting Nov. 20, 2012

NORTH DAKOTA DEPARTMENT of HEALTH



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MAR 16 2011

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TO: Regional Administrators, Regions 1-10

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Nutrient Reduction Framework Memo

Developing a Framework for State Nutrient Reductions: Guiding Principles

- A "one size fits all" solution is neither desirable nor necessary
- Results, results, results: build from existing state work but find a way to publically demonstrate results
- Encourage a collaborative approach between federal partners, states, and stakeholders
- Flexible approach for states to achieve near-term reductions in N and P pollution while they complete development of their numeric nutrient criteria
  - Since 1998, EPA has encouraged states to develop numeric nutrient criteria

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Nutrient Framework: Recommended Elements

- Prioritize watersheds and set load reduction goals
- Ensure effectiveness of source reduction strategies: point source permits, storm water and septic systems, agricultural areas
- Ensure accountability and report progress to public
- Continue with numeric nutrient criteria development

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Where have we been?

- Nutrient criteria development plan – May 2007
- Initial discussions in late 2011
- Based on Stoner memo
- Formed a planning team
- Selected facilitator
- EPA contractor assistance
- Developed Fact Sheet
- 1st Planning Team meeting Nov. 20, 2012

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Planning Team

Sector	Agency/Organization
Agriculture Sector	ND Stockman's Association
	ND Assoc. of Soil Conservation Districts
	ND Farmers Union
	ND Farm Bureau
Municipalities/Local Government	Public Utilities, City of Bismarck
	ND League of Cities
	ND Association of Counties
	ND Tribes, Standing Rock Sioux Tribe
Industry	Tesoro Refinery/ND Water Pollution Board
	American Crystal Sugar
	ND Lignite Energy Council
	ND Petroleum Council

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Planning Team

Sector	Agency/Organization
Regulatory/Agency	ND Dept of Agriculture
	ND State Water Commission
	ND Game and Fish Dept
	US Fish and Wildlife Service
Environmental	ND Wildlife Federation
	Dakota Resource Council
	Sierra Club-Dakotah Chapter
Exofficio Members	USGS
	NRCS
	US EPA Region 8
	NDSU Extension

NORTH DAKOTA DEPARTMENT of HEALTH

Where have we been?

- Nutrient criteria development plan – May 2007
- Initial discussions in late 2011
- Based on Stoner memo
- Formed planning team
- Selected Jodi Bruns as the facilitator
- EPA HQ contractor assistance (i.e., Tetra Tech)
- Developed Fact Sheet
- Held first Planning Team meeting on Nov. 20, 2012

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1st Planning Team Meeting

- Purpose -
  - Meet and get to know one another.
  - Come to a common understanding of the nutrient management issues facing our state and to identify gaps in our common understanding.
  - Begin to outline the key elements of a state strategy and the process for developing the strategy.

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2nd Planning Team Meeting

- April 11, 2013
- Purpose –
  - Receive an update on other states' progress towards nutrient management strategies.
  - Approve the draft outline of North Dakota's Statewide Nutrient Reduction Strategy
  - Review processes and procedures for prioritizing watersheds/waterbodies for nutrient reduction.
  - Develop technical work groups to forward the development of the statewide strategy.

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Nutrient Reduction Strategy Outline

1. Backgound
   - Scope of the problem
     - What are nutrients and why are they a problem
     - Nationally and internationally
     - State and local
     - Sources and stressors

2. Why a nutrient reduction strategy for ND
   - History with the issue
     - EPA
   - Nutrient strategy development process
   - Other nutrient reduction efforts?
     - MT
     - MN
     - Red River basin
   - Current and past efforts to address nutrient management
     - Lessons learned
     - Practices that worked and didn't work

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Nutrient Reduction Strategy Outline

3. How does a nutrient management strategy relate to other watershed and water quality management programs and activities in the state?
   - Section 319 NPS Management Program
   - Water Quality Monitoring and Assessment
   - Wetland Protection
   - TMDL Program
   - Regulatory programs (e.g., NDPDES, Stormwater, septic systems, AFO/CAFO)
   - Water Quality Standards
   - Basin planning
     - SWC
     - NRCS locally lead process
     - Municipal and county planning and zoning

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Nutrient Reduction Strategy Outline

4. Elements of a state nutrient reduction strategy

- **Priority watersheds**
  - **Prioritization factors**
- **Load and targets**
  - **Nutrient criteria and TMDLs**
- **Source reduction strategies**
  - **NPS (Agriculture, Urban)**
  - **Point sources**
    - **Industrial, Municipal**
    - **Stormwater, Septic systems, AFO/CAFO**
    - **Monitoring**

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Nutrient Reduction Strategy Outline

4. Elements of a state nutrient reduction strategy (con't)

- **Nutrient criteria**
  - **Nutrient criteria development plan**
  - **Narrative**
    - **Targets/criteria developed and expressed through site specific TMDLs or other studies/investigations**
- **Accountability and verification measures**
  - **Monitoring and assessment**
  - **Adaptive management**
- **Reporting**

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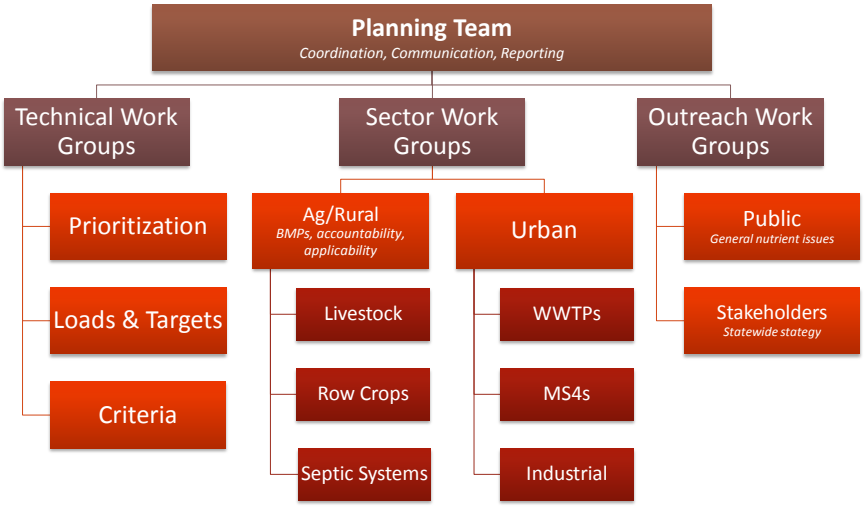
Workgroups



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Where are we now?

- Today's stakeholder meeting
  - – Purpose –
    - Inform stakeholders of efforts to date
    - Seek input from a broad group of stakeholders with an interest and stake in the nutrient problem and reduction strategies in the state
    - Convene workgroups and begin the process of developing the elements of the strategy

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Where are we going?

- Workgroups will continue to meet, as needed, to develop elements of the strategy
  - Deadline is this summer
- Putting it all together
  - Health Dept will be tasked with writing the strategy
  - Integrating the workgroup products into the elements of the strategy
  - Planning team will continue to review and provide input into the strategy development process
  - At least one more stakeholder meeting to review and comment on the strategy
    - Next fall??

NORTH DAKOTA DEPARTMENT of HEALTH

Questions?

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Sector Workgroup Breakout Sessions

- Technical Workgroup: Nutrient Criteria Development, Prioritization, Loads, and Targets
  - Room 431 (upstairs)
- Sector Workgroup: Agriculture and Other Nonpoint Sources
  - Auditorium
- Sector Workgroup: Municipal and Industrial Point Sources
  - Room 436 (upstairs)
- Workgroup on Education and Outreach
  - Room 433 (upstairs)

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