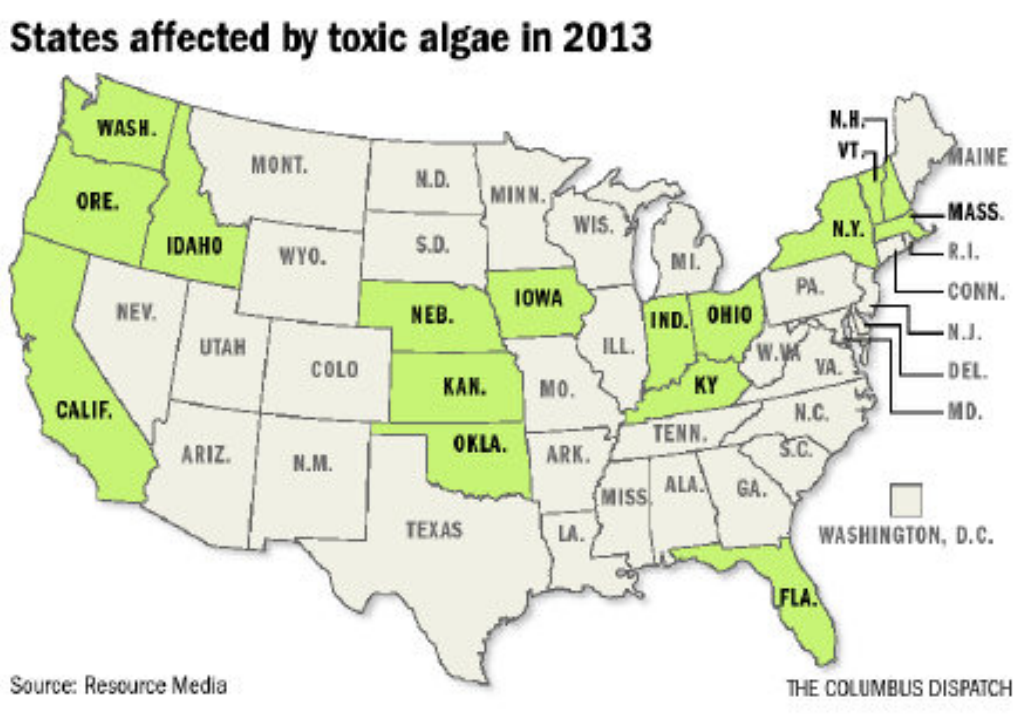
Overview of Nutrient Management Issues and Approaches

Barry Tonning, Tetra Tech

Nutrients: a challenge regionally and nationally

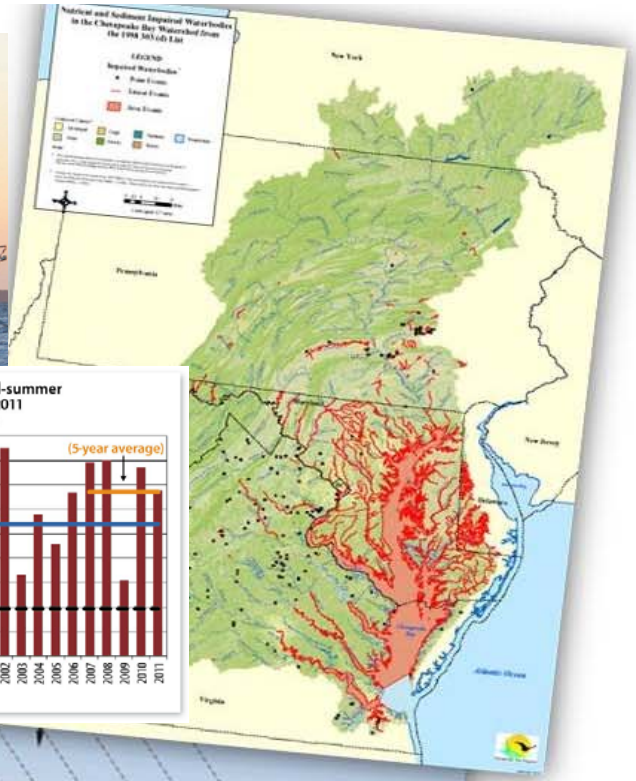
- Nutrient pollution is one of the top causes of water quality impairment
- Linked to over 14,000 water segments listed as impaired
- Over two million acres of lakes and reservoirs across the country are impaired due to excess nutrients
- 78% of assessed continental U.S. coastal areas exhibit symptoms of eutrophication.

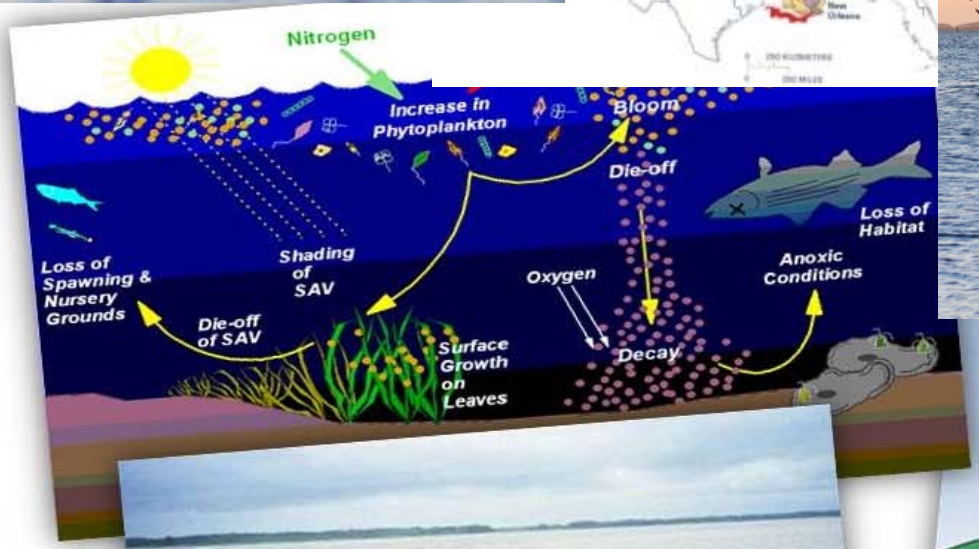


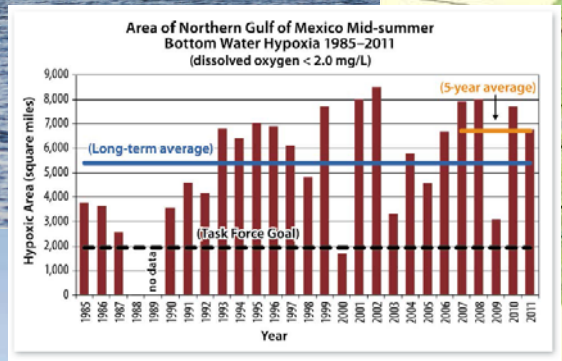
Mississippi River Gulf of Mexico Watershed Nutrient Task Force

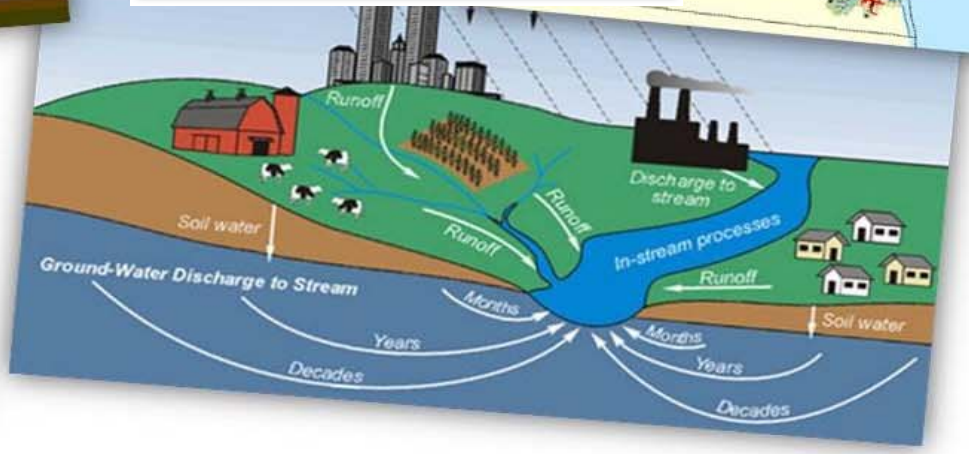
Moving Forward on Gulf Hypoxia

Annual Report 2011

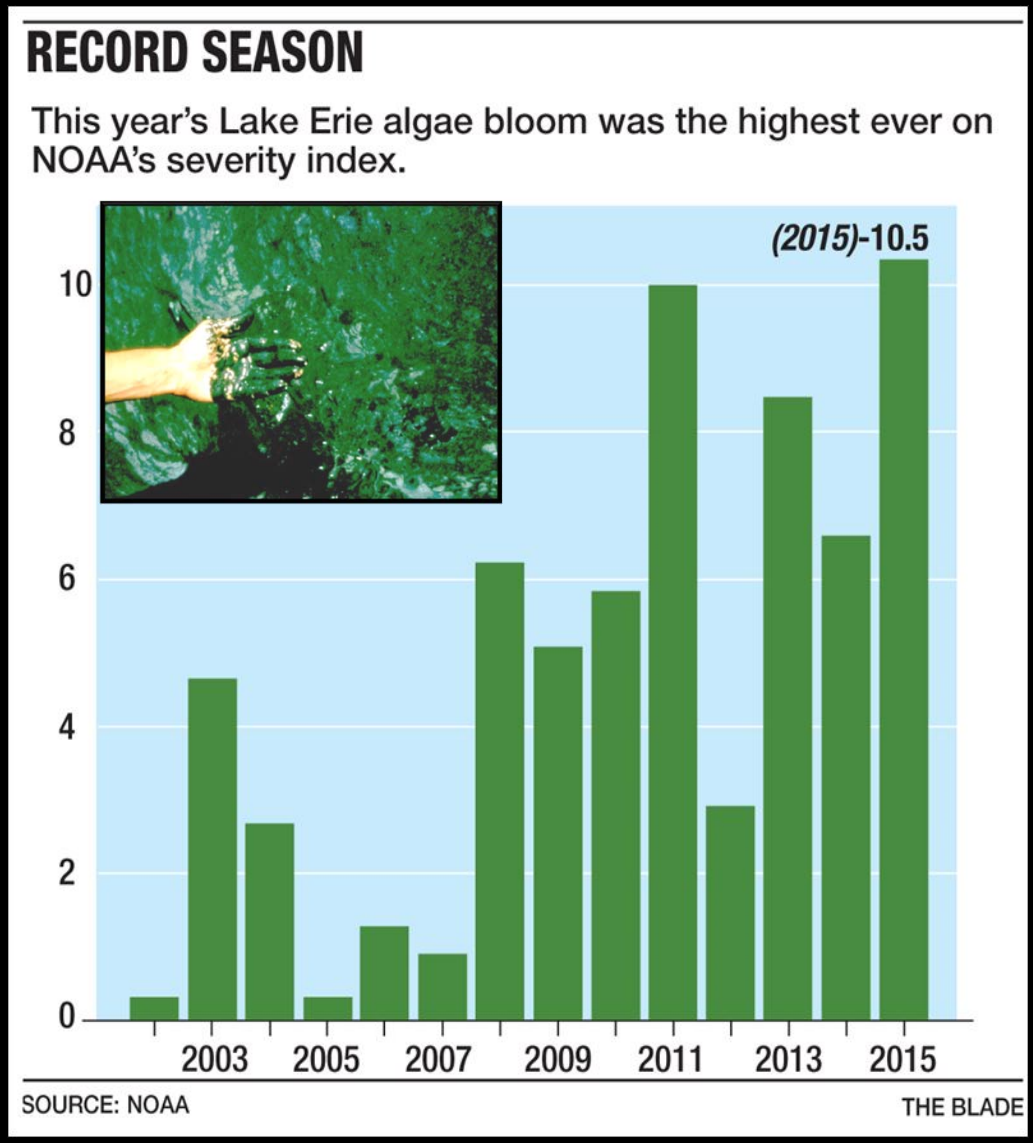








- 1950s – 1960s Cuyahoga River burns in Cleveland
- Getting worse annually to 1970
- Stable 1970-75
- Improving 1975-1995
- 1995+ Getting worse



Lisa Ray
22 hrs

The latest in Florida surfing attire ... seriously ... if you are thinking of coming to Florida to enjoy the beach ... I would reconsider. Unless you like the stench of dead animals and toxic water.

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95 shares 3 comments

Cynthia Sanders Ugh. I think I'll visit NC, instead!
1 · 21 hrs

David Kearns Bro nice hazmat suit. Is it by RipCurl?
18 hrs

Ashley Berke Do you mind if I share this on my Twitter? @causelessharm Let me know if there's an article or anything that accompanies!
18 hrs

Lisa Ray replied · 1 Reply

Lake Name	Lake #	County	Last Updated	Current algae	Health Alert?	E.coli Bacteria
Current Lake(s) on Health Alert						
Pawnee Lake	34a	Lancaster	10/1/15	>35	Yes	4
Pawnee Lake	34b	Lancaster	9/17/15	24.64	Yes	3
Rockford Lake	36	Gage	10/1/15	21.28	Yes	1
Swan Creek Lake # 5A	39	Saline	10/1/15	>35	Yes	3
Willow Creek Lake	45	Pierce	10/1/15	18.42	Yes	210

3 Nebraska Lakes Flagged For Toxic Blue-Green Algae

Recommend 0 Tweet

(AP) _

Officials have issued health alerts for toxic blue-green algae at three lakes in eastern Nebraska.

The state Department of Health and Human Services says water samples at the lakes were above the Nebraska's health alert threshold for a toxin released by certain strains of blue-green algae.

The lakes are Bluestem Lake in Lancaster County, Kirkman's Cove in Richardson County and Willow Creek Lake in Pierce County.

A late August alert for Lake McConaughy near the Nebraska Panhandle has ended.

The alerts will continue at the lakes for at least two more weeks for additional testing.

Third Nebraska lake now on alert for toxic algae

Story Comments Print Font Size:

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POSTED: FRIDAY, SEPTEMBER 18, 2015 12:59 PM

By Jay Withrow / World-Herald staff writer

A health alert was issued Friday over toxic blue-green algae at Swan Creek Lake in Nebraska's Saline County.

The Nebraska Department of Health and Human Services said alerts also continue to be in effect at Pawnee Lake in Lancaster County and Willow Creek Lake in Pierce County. Those alerts were issued last week.

Samples taken earlier this week at the three lakes were above the state's health alert threshold of 20 parts per billion of total microcystin, a toxin released by certain strains of blue-green algae, the health department said.

The alerts will continue at the three lakes for at least two more weeks, officials said, because lakes that are on alerts must record two consecutive weeks of readings below the threshold before an alert is lifted.

Swan Creek Lake #5A is also known as Willard Meyer Recreational Area.

Weekly sampling has been conducted at 50 public lakes in Nebraska since the beginning of May, officials said, with the lakes continuing to be monitored weekly through the end of September.

Toxic algae blooms found in 3 N. Idaho lakes

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Top 10 handguns in the U.S.

By - *Associated Press - Friday, July 10, 2015*

COEUR D'ALENE, Idaho (AP) - State officials issued a health advisory Friday for Hayden Lake in northern Idaho after confirming the presence of a toxic blue-green algae bloom.

The Idaho Department of Environmental Quality tells The Spokesman-Review (http://bit.ly/1LWmU3Y) that sampling found the bloom at the northern end of the lake.

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NO IMPROVEMENT IN HENRYS LAKE'S TOXIC WATER

ST. ANTHONY 0 Updated at 2:39 pm, September 3rd, 2015 By: Bill Schiess, EastidahoNews.com

SHARE THIS STORY

Three weeks after several kinds of blue-green algae were documented on Henrys Lake, the toxicity of the water has not improved.

"We have been taking samples weekly and we have not seen the water quality improve," Troy Saffle, surface water manager at the Idaho Department of Environmental Quality said earlier this week. "We're just learning about the algaes and hope to keep everyone informed so they can make their own decisions about using the lake."

The algae were identified as Microsystis, Anabaena and Aphanizomenon in the first sampling, and another kind, Gloetrichia, was found last week.

IMAGES IN THE NEWS

RELATED STORIES

UPDATE: U.S. CAPITOL AND WHITE HOUSE ON LOCKDOWN AFTER APPARENT SHOTS

Idaho Residents Fear For Pets As Toxic Algae Bloom Grows

By Sara Jerome
@sarmje

Blue-green algae is churning up fear that human and animal life might be at risk this summer after the death of a dog was attributed to toxins in lake water.

In July, "a veterinarian notified health officials of the sudden death of the dog earlier this week, and blue-green algae toxins were initially suspected to be the cause. MCPAWS Regional Animal Shelter in McCall, ID, warned the public on Facebook that the dog might have died from an algae bloom on popular Payette Lake," the *Idaho Statesmen* reported.

But now it appears the algae bloom was not to blame, according to authorities. State regulators "found no evidence of a bloom, or high concentration of the algae, where the dog had been drinking the water — near the boat launch at Ponderosa State Park," the report said.

Stephanie Jenkins, a senior watershed analyst for the Idaho Department of Environmental Quality, investigated the claim.

"The water was very clear. There were no indications of a bloom, but I did take samples," she said. "We should have those back tomorrow. It's very unlikely that we would get a result that would suggest a

Toxic algae prompts warning at Idaho's Lake Lowell

The Associated Press

First Published Oct 03 2015 11:30AM • Last Updated Oct 03 2015 07:50 pm

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Boise, Idaho • Idaho officials have issued a health warning about blue-green algae at Canyon County's Lake Lowell.

The Idaho Department of Environmental Quality said Friday that the algae is harmful to people and animals.

Recommend 253 12

Posted: Jul 23, 2015 3:05 PM EDT
Updated: Jul 23, 2015 4:09 PM EDT

Montana issues warning about toxic algae

By Dennis Bragg CONNECT

HELENA - State officials are warning people to be watchful for toxic blue-green algae, which could start showing up as our hot, dry summer continues.

The blue-green algae has been a problem in a few local lakes before, primarily in the shallow lakes of Northwest Montana. While the Montana Department of Environmental Quality has not reported any specific sightings of the "cyanobacteria", reports of blue green algae have been noted in some Northern Idaho lakes

Blue algae has been a problem for Western Montana in previous year

Lewis and Clark County, Montana

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09 08 2011 19:56 Age: 5 yrs
Category: Environmental Health

Algae Bloom Spotted on Holter Lake; Precautions Advised

The Montana Department of Environmental Quality (DEQ) has notified local health officials of a report of an algae bloom on Holter Lake.

Algae blooms are common in any standing water that's exposed to the sun. Some but not all algae blooms can be toxic and cause illness or even death in warm-blooded animals, including people, waterfowl, livestock, and pets.

"People should avoid water that looks like pea soup, grass clippings, or green latex paint," said Laurel Riek, environmental health specialist with the Lewis and Clark City-County Health Department. "We don't often see toxic effects from these blooms, but they can and do occur."

She noted that algae blooms are a normal summer occurrence in lakes, reservoirs, stock ponds, and roadside ditches and are caused by hot weather.

An algae bloom is a rapid and massive buildup of algae cells that imparts a green color to the water. The algae usually are suspended in a water column or clump together into floating mats. They don't grow from the bottom as do mosses or "water weeds."

Sometimes wind and wave action may concentrate the algae along the shore. It's not usually found in rivers, streams, springs, irrigation canals, or wells.

"There's no way to tell for sure if a particular algae bloom is toxic," Riek said. "Harmless strains of potential toxin-producing algae look the same as deadly strains under a microscope.

Fish taken from waters infested with toxic algae are not likely to cause secondary poisoning if eaten in moderation, although they may taste "weedy," Riek said. Nonetheless, she advised anglers to avoid fish taken from such waters, particularly if they appear sickly or sluggish.

Boiling and conventional water disinfection measures are not effective in removing or deactivating blue-green algae toxins. Water that is free of blue-green algae may not be free of the toxin.

Toxic algae kills 10,000 kokanee in Lake Koocanusa

By VINCE DEVLIN Missoulian · Aug 31, 2013 · 0

LIBBY – At least 10,000 kokanee salmon were killed this week after a strong and fast-moving storm front Sunday churned up the waters of Lake Koocanusa.

The die-off appears to have been triggered by a period of hot, calm weather that allowed the reservoir to stratify, and algae to bloom, according to Montana Fish, Wildlife and Parks.

When the storm front and winds moved through, accompanied by a drop in atmospheric pressure, the algae mixed with deeper layers of water.

FWP fisheries biologist Mike Hensler says the kokanee ingest the algae, which includes some blue-green algae, as they feed.

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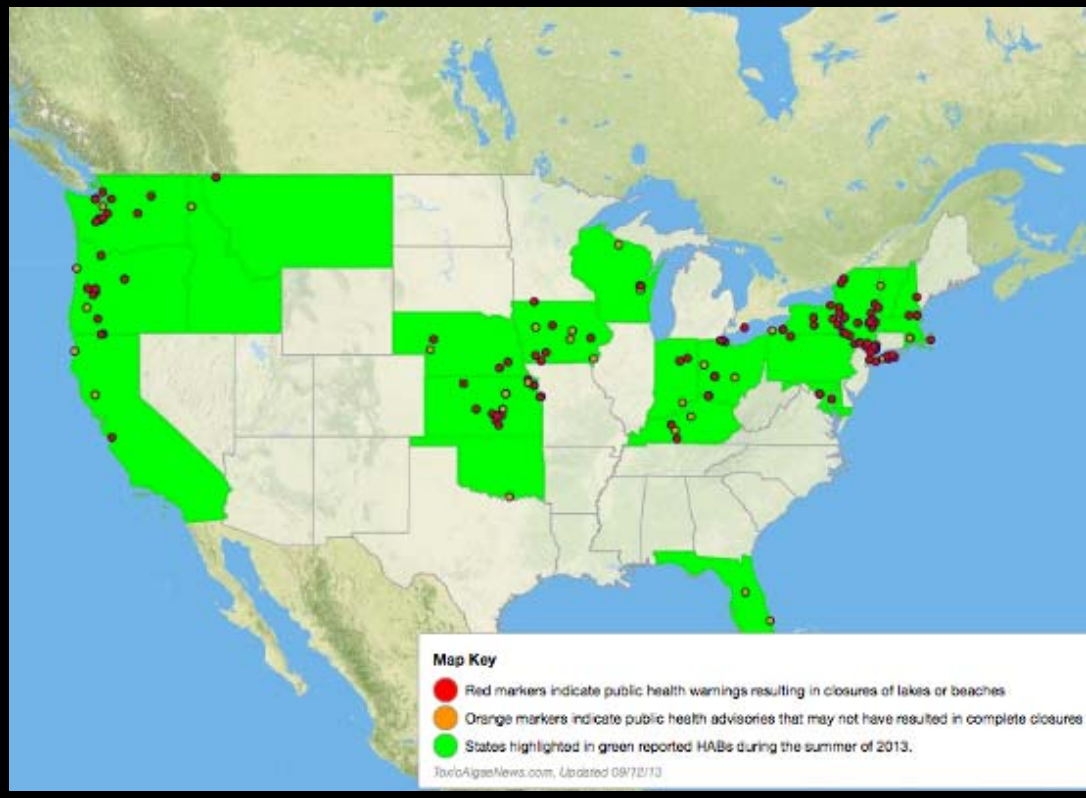
Latest in section

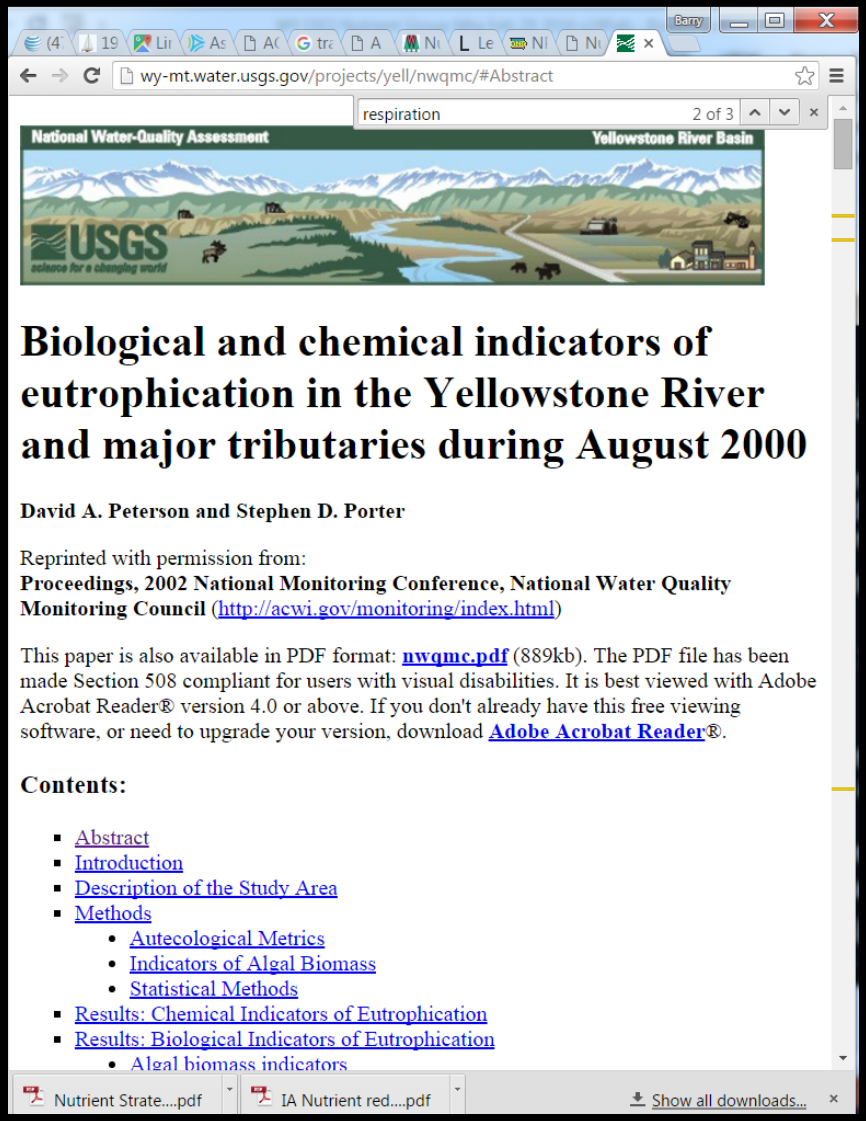
State-Federal Nutrient Innovations Task Group Report (2009)

- Nutrient pollution is nationally significant, expanding, and likely to substantially accelerate
- TMDLs are effective for point sources, but not for nonpoint sources
- Tools such as numeric nutrient criteria, water quality assessments/listings, urban stormwater controls, wastewater treatment plant nutrient limits, and animal feedlot controls are underutilized
- Current regulations address certain sources (e.g. municipal sewage treatment) at the exclusion of others (e.g., agriculture).



States reporting harmful algal blooms in 2013

Are nutrients really a problem in Wyoming?



wy-mt.water.usgs.gov/projects/yell/nwqmc/#Abstract

respiration 2 of 3

National Water-Quality Assessment — Yellowstone River Basin

Biological and chemical indicators of eutrophication in the Yellowstone River and major tributaries during August 2000

David A. Peterson and Stephen D. Porter

Reprinted with permission from:
Proceedings, 2002 National Monitoring Conference, National Water Quality Monitoring Council (http://acwi.gov/monitoring/index.html)

This paper is also available in PDF format: **nwqmc.pdf** (889kb). The PDF file has been made Section 508 compliant for users with visual disabilities. It is best viewed with Adobe Acrobat Reader® version 4.0 or above. If you don't already have this free viewing software, or need to upgrade your version, download **Adobe Acrobat Reader®**.

Contents:

- Abstract
- Introduction
- Description of the Study Area
- Methods
  - Autecological Metrics
  - Indicators of Algal Biomass
  - Statistical Methods
- Results: Chemical Indicators of Eutrophication
- Results: Biological Indicators of Eutrophication
  - Algal biomass indicators

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Algae bloom raises concerns in Fontenelle

JEFF GEARINO Southwest Wyoming bureau Sep 21, 2007 0

GREEN RIVER - Anglers should be OK to catch and eat fish, but waterfowl hunters around Fontenelle Reservoir this weekend might want to watch their dogs carefully, according to wildlife officials.

State and federal officials are closely watching an unusual blue-green algae growth in the small, popular reservoir, located in the corner of Lincoln County about 24 miles southeast of LaBarge.

Officials said some algae species can release toxins that are potentially harmful to humans and animals. The algae can also produce odors and may actually look reddish-brown, as well as bright green or blue-green.

U.S. Bureau of Reclamation officials are recommending people, pets and livestock stay out of the reservoir's water until testing this week determines if the algae is producing harmful toxins.

Latest

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billingsgazette.com/news/state-and-regional/wyoming/algae-bloom-on-bighorn-river-irks-irrigators-anglers/article_13e006be-b6dd-5415-8c63-15ff5771d767.html

Algae bloom on Bighorn River irks irrigators, anglers

By MARTIN KIDSTON mkidston@billingsgazette.com May 25, 2012 2

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9 Remaining

Algae blooms in prize creek

Contributing sources include cow manure, fertilizers, septic systems, study shows.

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POSTED: WEDNESDAY, NOVEMBER 6, 2013 12:15 AM
By Mike Koshmrl | 0 comments

A west bank trout stream heavily flanked by development contains 13 to 180 times more algae than other regional rivers and creeks, a new U.S. Geological Survey study shows.

The 90-page report, released in late October, assesses the water quality and biological

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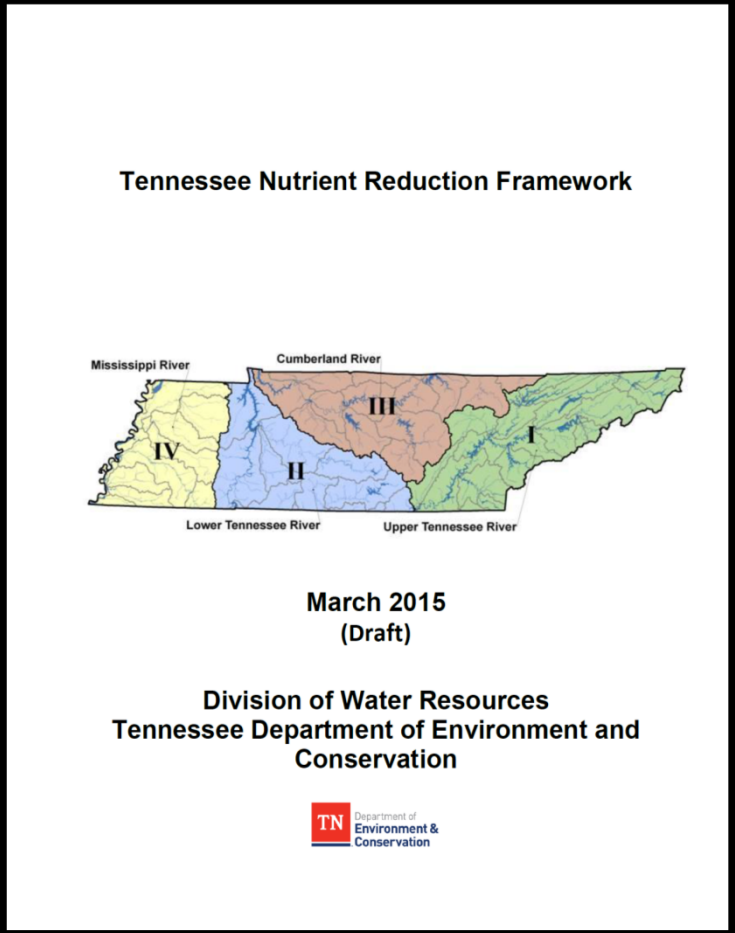
How are states dealing with nutrient challenges?

Example of a typical state approach: Tennessee

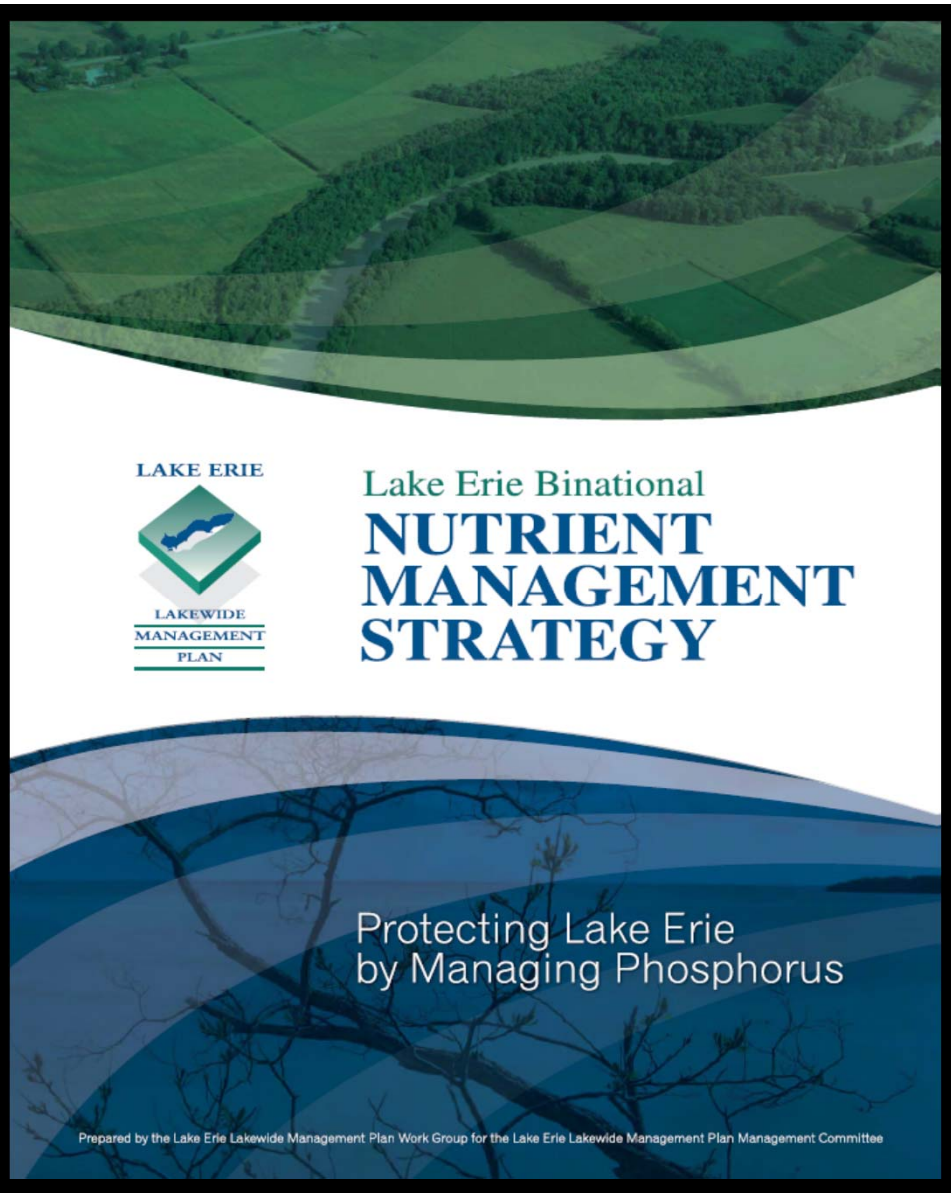
- Prioritize watersheds (or waterbodies)
- Set nutrient load reduction goals
- Ensure effectiveness of point source permits
- Develop implementable plans that maximize the effectiveness of agricultural BMPs
- Encourage nutrient reductions from non-MS4 developed communities
- Establish watershed-based monitoring programs to evaluate effectiveness
- Develop water quality criteria for nutrients
- Documentation and reporting of implementation activities


Tennessee Nutrient Reduction Framework

March 2015
(Draft)

Division of Water Resources
Tennessee Department of Environment and Conservation

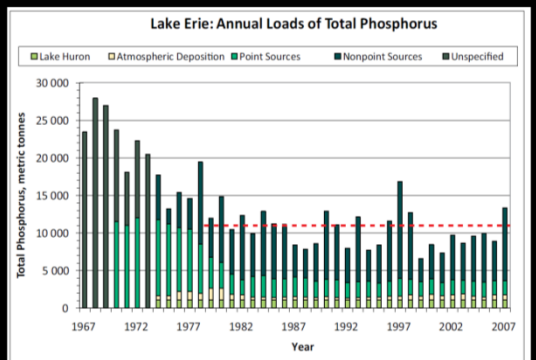
TN Department of Environment & Conservation



Targets for Total Phosphorus Concentrations Lake Erie and Watershed

Habitat Type	Total Phosphorus Concentration (µg/L)
Offshore*	
West Basin	15
Central Basin	10
East Basin	10
Nearshore**	20
Tributaries***	32
Coastal Wetlands	one recording of <30 µg/L/year

* Mean spring total phosphorus concentration
** Mean total phosphorus concentration during ice free period
*** Mean annual total phosphorus concentration



Annual Loads of Total Phosphorus in Lake Erie. The dashed red line represents the phosphorus target for Lake Erie, as set in the 1978 Canada-United States Great Lakes Water Quality Agreement. Graph provided by Agriculture and Agri-Food Canada.

4.0 Nutrient Targets for Lake Erie
4.1 Offshore Nutrient Targets
4.2 Nearshore Nutrient Target
4.3 Tributary Nutrient Target
4.4 Coastal Wetlands Nutrient Target
5.0 Nutrient Management, Research and Monitoring Goals
5.1 Phosphorus Management Goals
5.2 Research Goals
5.3 Monitoring Goals
6.0 Moving Forward and Making a Commitment
6.1 Who Is Involved and What Can Be Done?
6.1.1 Implementing Actions
6.1.2 Research and Monitoring
6.1.3 Collaborating
6.1.4 Public Reporting
6.1.5 Education and Awareness

Report on Point Source Progress in Hypoxia Task Force States

February 2016

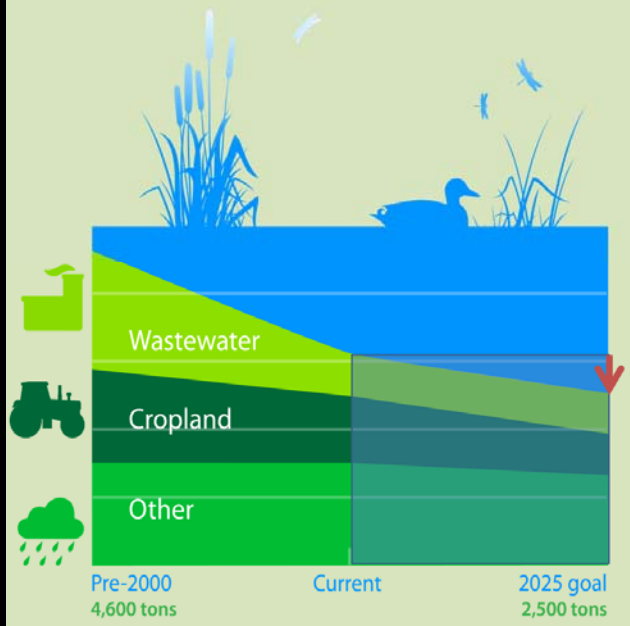
Table 1. Number and percent of major sewage treatment plants with nitrogen (N) and/or phosphorus (P) monitoring requirements for monitoring only purposes or for compliance with an effluent limit.

State	Universe	Monitoring (Both N and P)		Monitoring N		Monitoring P		Total Permits with Nutrient Monitoring (N or P)	
	#	#	%	#	%	#	%	#	%
Arkansas	78	61	**78%**	2	**3%**	8	**10%**	71	**91%**
Illinois	217	151	**70%**	1	**<1%**	13	**6%**	165	**76%**
Indiana	133	14	**11%**	0	**0%**	89	**67%**	103	**77%**
Iowa	100	46	**46%**	0	**0%**	0	**0%**	46	**46%**
Kentucky	88	70	**80%**	1	**1%**	15	**17%**	86	**98%**
Louisiana	105	13	**12%**	0	**0%**	0	**0%**	13	**12%**
Minnesota	75	64	**85%**	0	**0%**	11	**15%**	75	**100%**
Mississippi	65	65	**100%**	0	**0%**	0	**0%**	65	**100%**
Missouri	123	19	**15%**	5	**4%**	5	**4%**	29	**24%**
Ohio	205	205	**100%**	0	**0%**	0	**0%**	205	**100%**
Tennessee	108	87	**81%**	1	**1%**	0	**0%**	88	**81%**
Wisconsin	86	5	**6%**	0	**0%**	81	**94%**	86	**100%**
Federally Issued Permits	27	8	**30%**	1	**4%**	2	**7%**	11	**41%**
All States	1,410	808	**57%**	11	**1%**	224	**16%**	1,043	**74%**

Table 2. Number and percent of major sewage treatment plants with numeric discharge limits for nitrogen (N) and/or phosphorus (P).

State	Universe	Limits (Both N and P)		Limits (N only)		Limits (P only)		Total Permits with Nutrient Limits (N or P)	
	#	#	%	#	%	#	%	#	%
Arkansas	78	7	**9%**	2	**3%**	9	**12%**	18	**23%**
Illinois	217	12	**6%**	1	**<1%**	55	**25%**	68	**31%**
Indiana	133	0	**0%**	0	**0%**	44	**33%**	44	**33%**
Iowa	100	0	**0%**	5	**5%**	0	**0%**	5	**5%**
Kentucky	88	0	**0%**	0	**0%**	24	**27%**	24	**27%**
Louisiana	105	0	**0%**	0	**0%**	0	**0%**	0	**0%**
Minnesota	75	0	**0%**	0	**0%**	53	**71%**	53	**71%**
Mississippi	65	21	**32%**	0	**0%**	0	**0%**	21	**32%**
Missouri	123	0	**0%**	2	**2%**	8	**7%**	10	**8%**
Ohio	205	5	**2%**	0	**0%**	102	**50%**	107	**52%**
Tennessee	108	22	**20%**	1	**1%**	5	**5%**	28	**26%**
Wisconsin	86	0	**0%**	0	**0%**	86	**100%**	86	**100%**
Federally Issued Permits	27	1	**4%**	3	**11%**	1	**4%**	5	**19%**
All States	1,410	68	**5%**	14	**1%**	387	**27%**	469	**33%**

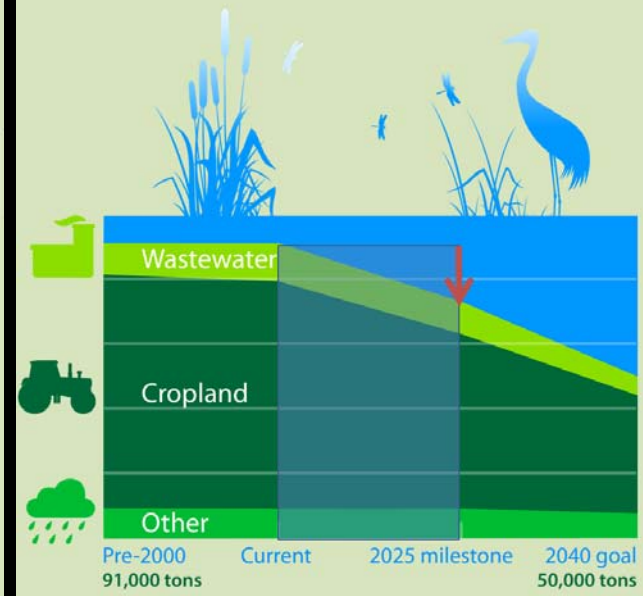
Phosphorus reduction in Mississippi River



Practice	Acres needing new BMPs (millions)
Fertilizer/manure efficiency	2.2
Conservation tillage & erosion control	4.5
Vegetative cover	1.2
Wastewater	Remaining cities
Other sources	Existing programs

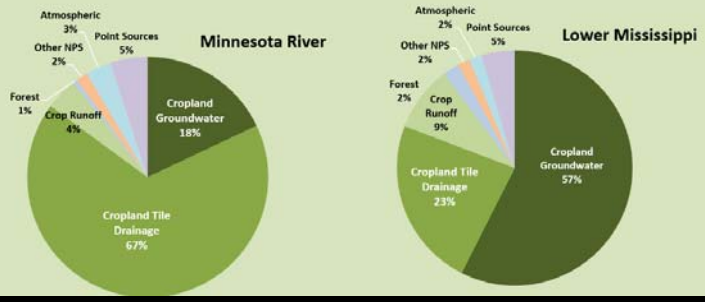
Nitrogen reduction in Mississippi River

20% milestone

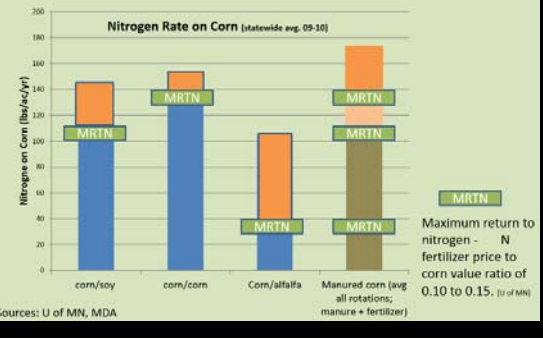


Practice	Acres needing new BMPs (millions)
Fertilizer/manure efficiency	5.2
Vegetative Cover	1.6
Tile drainage water retention & treatment	0.6
Wastewater	*

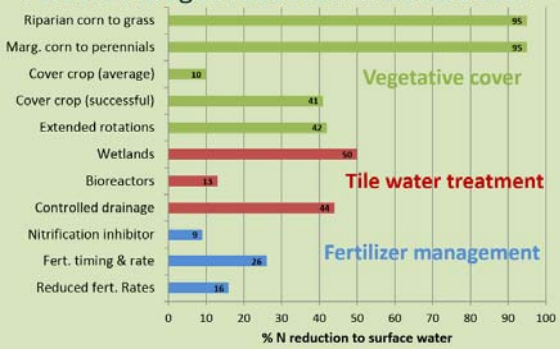
Nitrogen source differences between basins



Baseline survey of N fertilizer rates



Percent nitrogen reduction in treated area



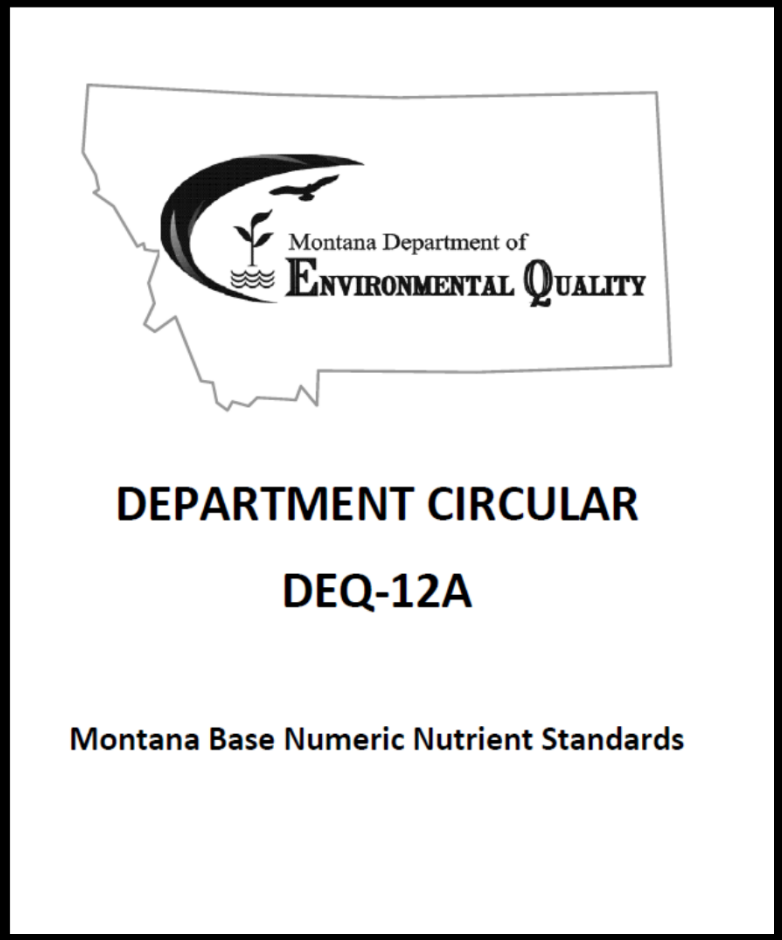
How are neighboring states dealing with this?

Main approaches:

- Numeric criteria and variances
- Criteria upstream of permitted facilities and effluent limits on dischargers to make near-term progress on nutrient reduction
- Nutrient Reduction Strategy

Montana approach to nutrient management

- Numeric nutrient criteria
  - Adopted criteria for wadeable streams and one large river in 2014
  - Montana DEQ and Board of Environmental Review adopted revisions in 2014; approved by US EPA in 2015
- Where necessary, variances based on economic impacts of meeting WQS
  - Recognize limits of technology and economic impacts/limitations for point sources permittees
  - Temporary modifications to a designated use and associated water quality criteria
  - Permit is tied to an interim limit that will be adjusted over time to meet the underlying standard



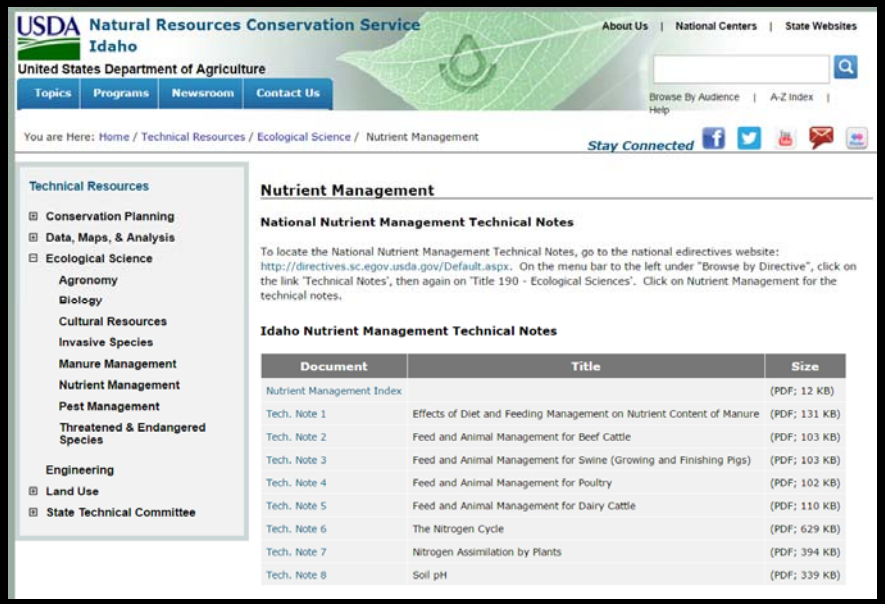
Utah approach

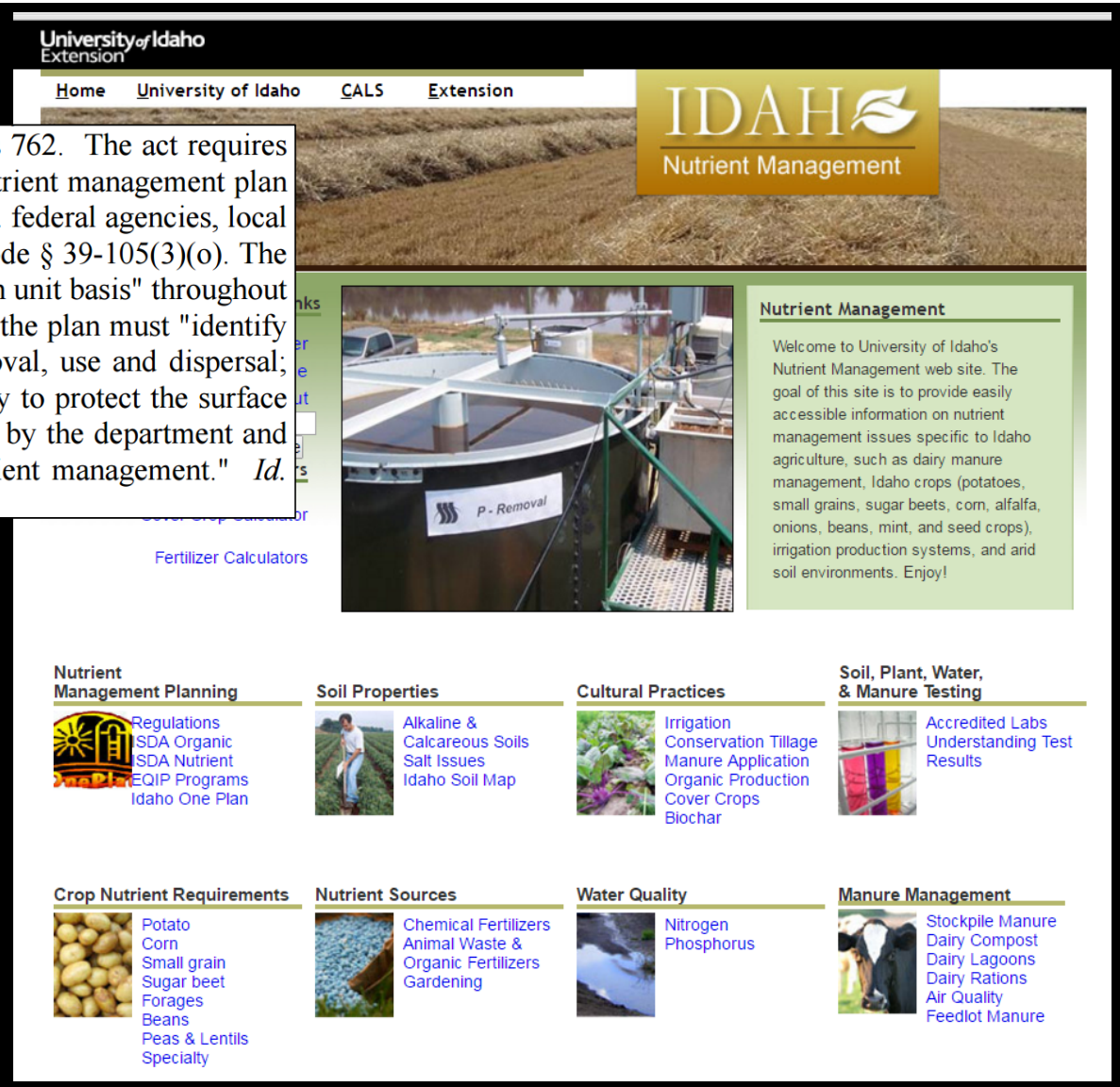
- Developing combined criteria for headwater streams
  - Nutrient response indicators (algal respiration, primary production measures) evaluated with TN & TP data to determine nutrient impairment
- Technology based phosphorus effluent limits (TBPEL) adopted in 2015
  - Non-lagoon treatment works: effluent $\leq$ 1.0 mg/L for TP (annual mean)
  - TBPEL should be achieved by 2020
  - Lagoons: evaluated to determine current annual average TP load based on avg flows & concentrations
  - TP cap of 125% of the current annual average
  - De minimis exceptions to TBPEL and Phos. Load Caps
- Considering adding TN optimization also

Colorado nutrient approach

- Established numeric limitations for dischargers in 2012
- Established monitoring requirements for dischargers in 2013
  - Total phosphorus
  - Total nitrogen
  - Total inorganic nitrogen
  - Sampling monthly at majors and every two months at minors

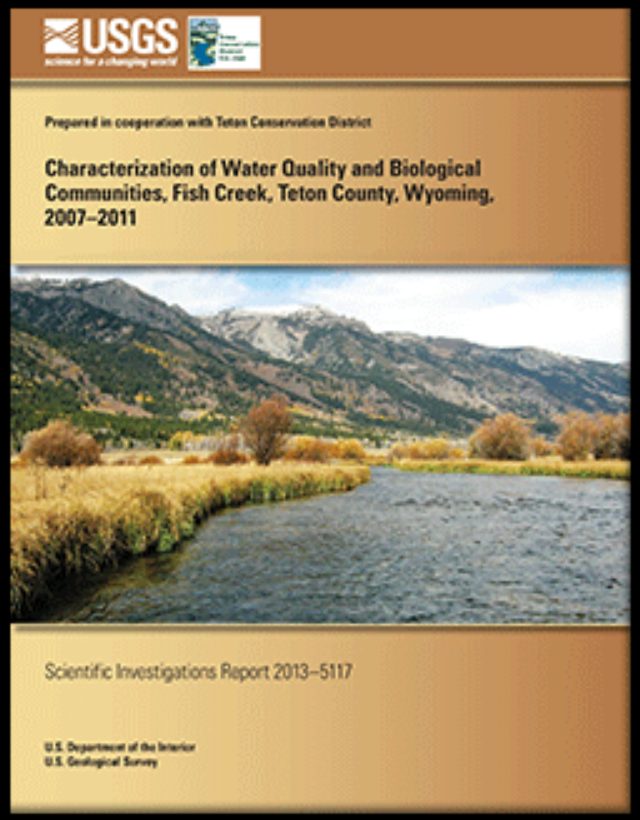
wide consistency in developing the plan. 1989 Idaho Sess. Laws 762. The act requires the department to formulate and adopt a "comprehensive state nutrient management plan for the surface waters of the state of Idaho in consultation with . . . federal agencies, local units of government, and with public involvement." *See* Idaho Code § 39-105(3)(o). The act requires that the plan "shall be developed on a hydrologic basin unit basis" throughout the state "with a lake system emphasis." *Id.* Each component of the plan must "identify nutrient sources [to state waters]; the dynamics of nutrient removal, use and dispersal; and preventative or remedial actions where feasible and necessary to protect the surface waters of the state." *Id.* Once adopted, "[t]he plan shall be used by the department and other appropriate agencies . . . in developing programs for nutrient management." *Id.*





Why do we need a nutrient strategy?

- Long term trends indicate increasing nutrient impacts
- We've seen the effects of waiting too long
- The number of issues and their complexity means that time will be needed to develop workable approaches
- A proactive approach will help to protect Wyoming's waters

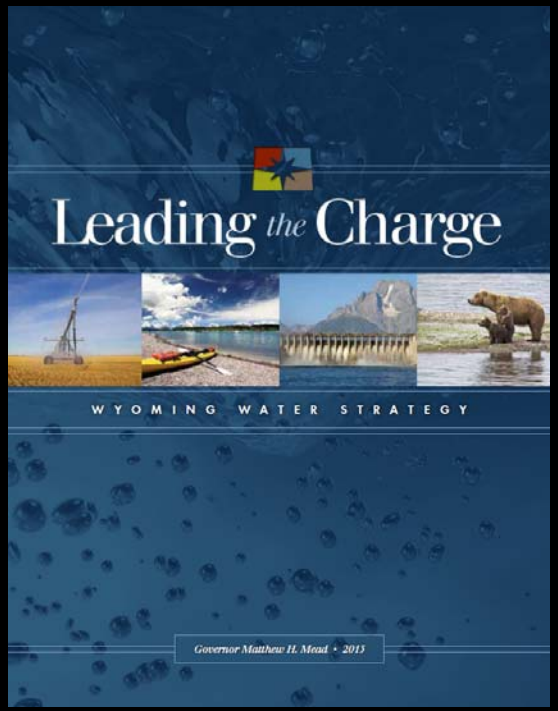


Next: the context for nutrient issues in Wyoming

10:45 am	**Status of Wyoming Numeric Nutrient Criteria**
	Eric Hargett, Watershed Protection Monitoring Program, Wyoming Department of Environmental Quality
11:00 am	**Potential Impacts of Cyanobacteria Blooms on Public Health**
	Tracy Murphy, MD, State Epidemiologist, Wyoming Department of Health
11:20 am	**Potential Impacts of Nutrient Pollution on Drinking Water Supplies**
	Jake Crosby, Environmental Engineer, United States Environmental Protection Agency
11:40 am	**Evaluation of Nutrient Inputs into Fish Creek**
	Cheryl Eddy Miller, Hydrologist, United States Geological Survey

1:00 PM Session:

Developing a Wyoming Nutrient Strategy



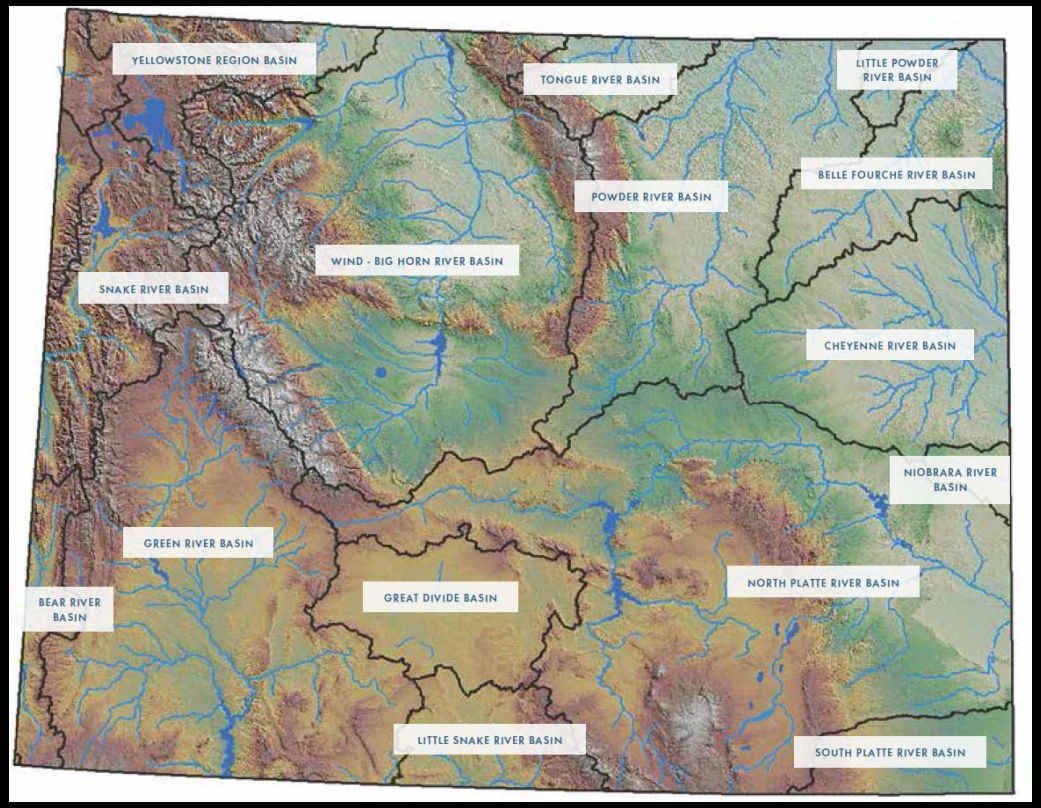
PROTECTION

Conserving water resources goes hand in glove with protecting the quality of those resources. The quality of Wyoming waters gives us clean water to drink, grow crops, water livestock, support wildlife, meet the needs of industries, promote healthy fisheries, and recreate. Protecting these uses protects our way of life.

Wyoming protects water quality through the combined efforts of local, state, and federal entities, along with the help of organizations, industries, and at the most grassroots level, the private landowners and land managers where waters flow.

What is the goal?

Establish a long term **nutrient strategy** that acknowledges Wyoming's unique environmental and social climate, that will show **cost-effective and measurable improvement** in the quality of surface waters in the state

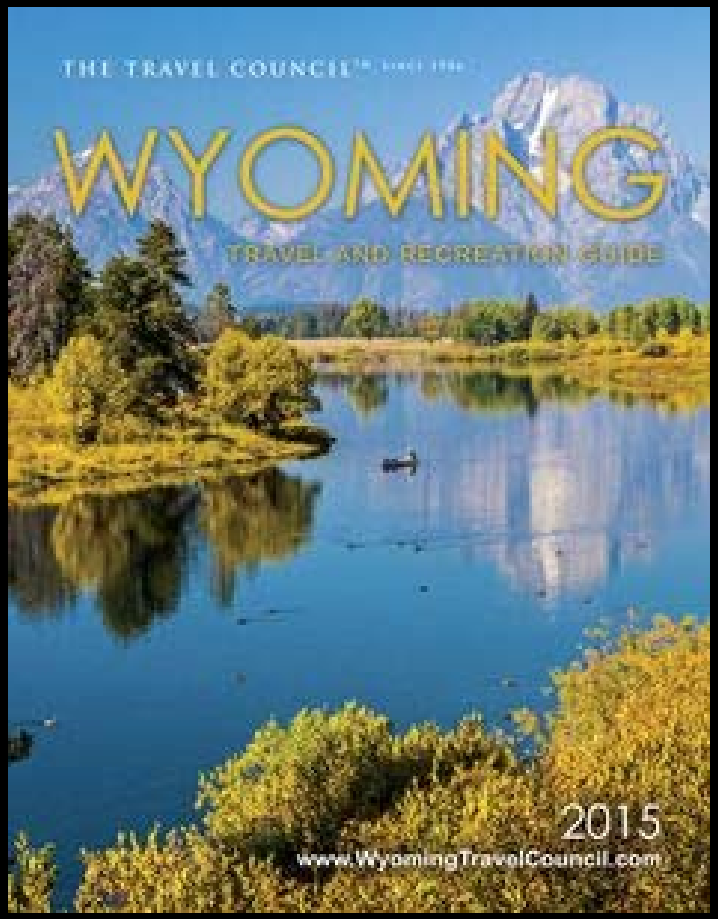


Getting there from here . . .

- Wyoming is working on water quality standards for nutrients in lakes and reservoirs
  - 2013-2014: Focused monitoring on Wyoming Basin lakes
  - 2015: Focused monitoring on Bighorn Basin and Southeast lakes and analysis of Wyoming Basin data
  - 2016: Focused monitoring on Bighorn Basin and Southeast lakes and draft nutrient threshold ranges for Wyoming Basin lakes
- A wide range of programs and activities are underway that focus on point source and nonpoint sources of nutrients
- Groundwork laid towards other nutrient management efforts

Elements of a nutrient strategy

- Address nutrients from point sources
- Address nutrients from nonpoint sources
- Develop water quality criteria for nutrients
- Support outreach and education efforts
- Document our efforts

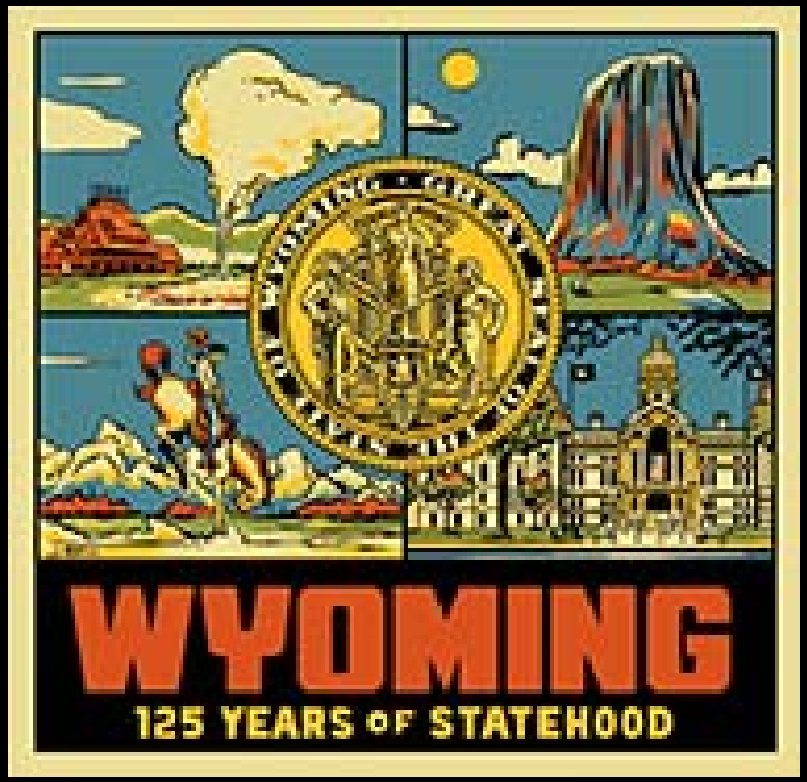


Who will be involved?

- Wyoming Department of Environmental Quality
- Other state agencies
- Local government
- Private sector entities
  - For-profit businesses
    - Agriculture, industries, petroleum, mining, etc.
  - Nonprofits
    - Conservation, environmental, recreation, and other groups
  - Academic institutions/entities

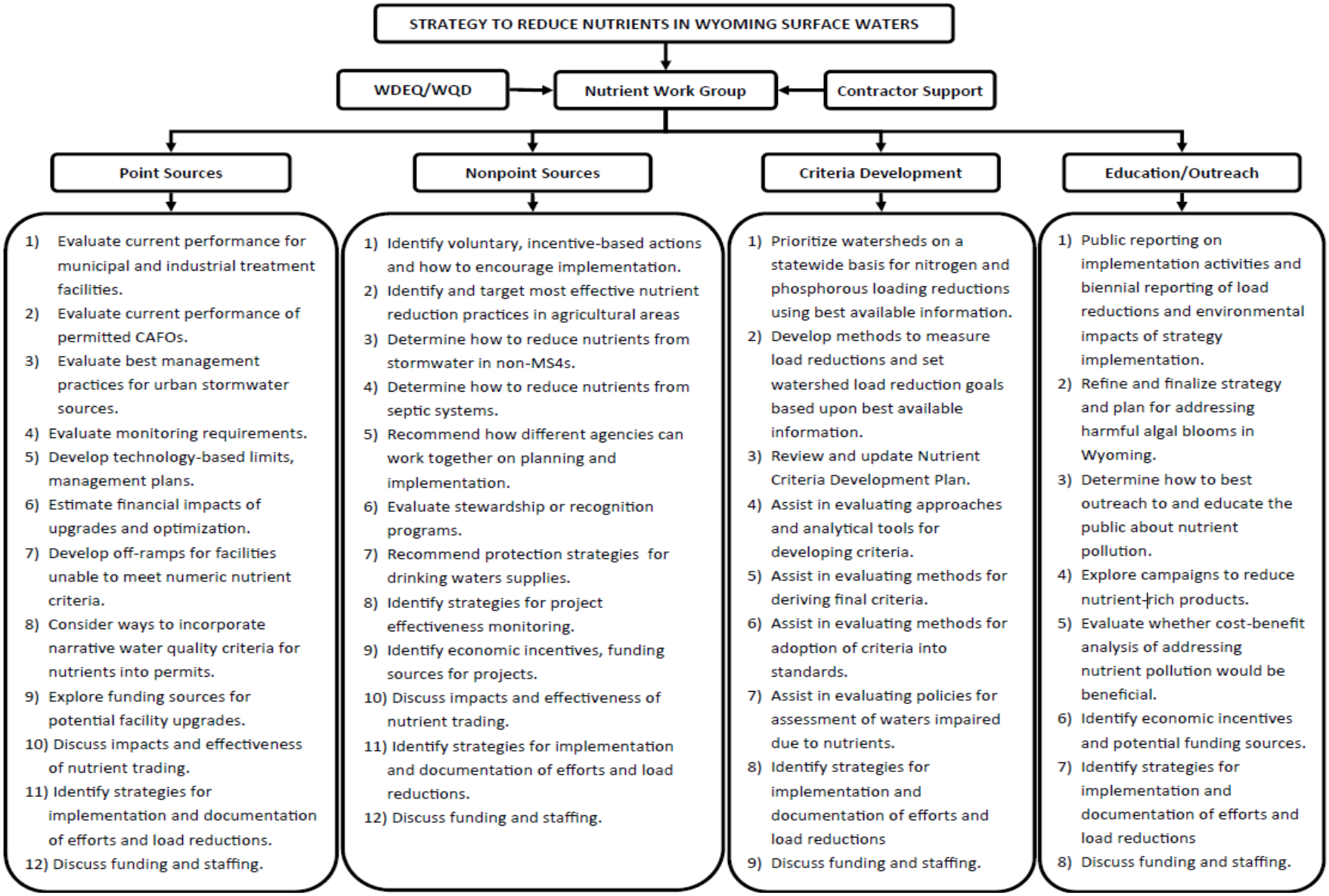
What would a Wyoming approach look like?

- This is the focus of the **workgroup** and the **support groups**
- Typically, states consider:
  - Ecoregion-appropriate and reasonable numeric water quality criteria
  - Aiding wastewater treatment facilities in nutrient treatment optimization
  - Lowering other point source nutrient loads
  - Ratcheting up nonpoint source pollution control activities significantly
  - Approaches for documenting activities, results
  - Other actions?
- Important note: all of this takes time!



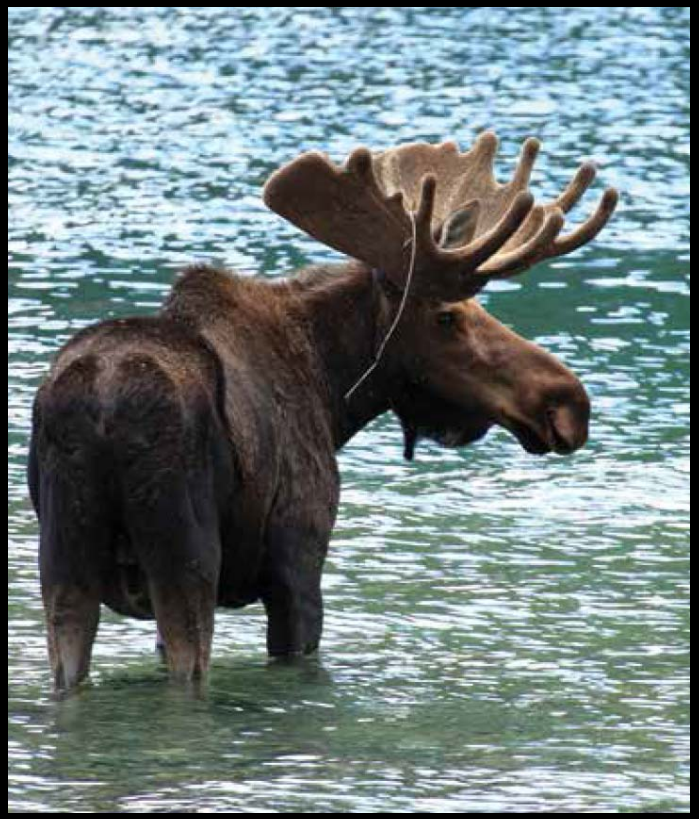
Activities planned for 2016

- Wyoming Nutrient Work Group
  - Recently formed, occasional meetings
  - Stakeholder involvement kickoff meeting (now!)
- Formation of support groups:
  - Point source
  - Nonpoint source
  - Criteria development
  - Education and outreach
- Support group activity
  - Focused on the topics above
  - Self-directed, contractor facilitation
  - Conference calls, email round-robins
  - Nutrient strategy framework development


STRATEGY TO REDUCE NUTRIENTS IN WYOMING SURFACE WATERS
WDEQ/WQD
Nutrient Work Group
Contractor Support
Point Sources
1) Evaluate current performance for municipal and industrial treatment facilities.
2) Evaluate current performance of permitted CAFOs.
3) Evaluate best management practices for urban stormwater sources.
4) Evaluate monitoring requirements.
5) Develop technology-based limits, management plans.
6) Estimate financial impacts of upgrades and optimization.
7) Develop off-ramps for facilities unable to meet numeric nutrient criteria.
8) Consider ways to incorporate narrative water quality criteria for nutrients into permits.
9) Explore funding sources for potential facility upgrades.
10) Discuss impacts and effectiveness of nutrient trading.
11) Identify strategies for implementation and documentation of efforts and load reductions.
12) Discuss funding and staffing.
Nonpoint Sources
1) Identify voluntary, incentive-based actions and how to encourage implementation.
2) Identify and target most effective nutrient reduction practices in agricultural areas
3) Determine how to reduce nutrients from stormwater in non-MS4s.
4) Determine how to reduce nutrients from septic systems.
5) Recommend how different agencies can work together on planning and implementation.
6) Evaluate stewardship or recognition programs.
7) Recommend protection strategies for drinking waters supplies.
8) Identify strategies for project effectiveness monitoring.
9) Identify economic incentives, funding sources for projects.
10) Discuss impacts and effectiveness of nutrient trading.
11) Identify strategies for implementation and documentation of efforts and load reductions.
12) Discuss funding and staffing.
Criteria Development
1) Prioritize watersheds on a statewide basis for nitrogen and phosphorous loading reductions using best available information.
2) Develop methods to measure load reductions and set watershed load reduction goals based upon best available information.
3) Review and update Nutrient Criteria Development Plan.
4) Assist in evaluating approaches and analytical tools for developing criteria.
5) Assist in evaluating methods for deriving final criteria.
6) Assist in evaluating methods for adoption of criteria into standards.
7) Assist in evaluating policies for assessment of waters impaired due to nutrients.
8) Identify strategies for implementation and documentation of efforts and load reductions
9) Discuss funding and staffing.
Education/Outreach
1) Public reporting on implementation activities and biennial reporting of load reductions and environmental impacts of strategy implementation.
2) Refine and finalize strategy and plan for addressing harmful algal blooms in Wyoming.
3) Determine how to best outreach to and educate the public about nutrient pollution.
4) Explore campaigns to reduce nutrient-rich products.
5) Evaluate whether cost-benefit analysis of addressing nutrient pollution would be beneficial.
6) Identify economic incentives and potential funding sources.
7) Identify strategies for implementation and documentation of efforts and load reductions
8) Discuss funding and staffing.

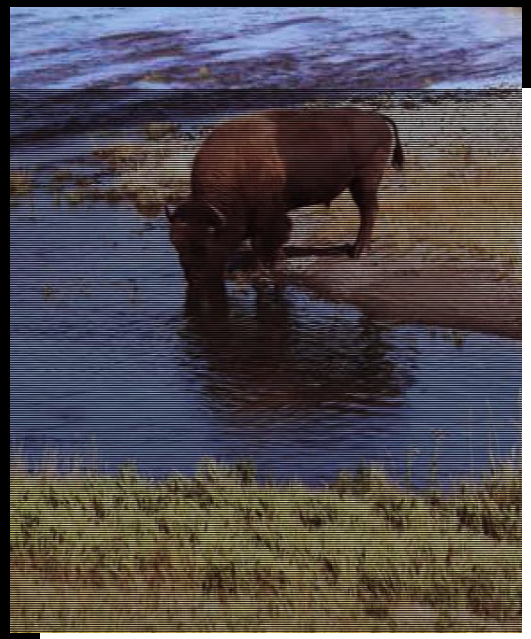
What will the support groups do?

- Develop elements of the nutrient strategy specific to the support groups' area(s) of expertise
  - *Identify several priorities and/or key next steps that will be important for making progress on addressing nutrient pollution in surface waters*



What would your role be?

- Become familiar with state nutrient issues
- Participate in one of the four groups
- Assist the support groups as needed
- Help to generate ideas, strategies
- Be a source of information and data
- Discuss questions & issues with the group



Partners in local government, like Wyoming's Conservation Districts, play important supporting roles in water quality for the state. Districts train to monitor water quality and implement conservation practices that protect and restore waters. They collect credible water quality data, lead watershed planning, and implement projects with landowners. In similar fashion, city, town, and county governments protect drinking water sources, work to prevent pollution from urban areas, and manage sewage through wastewater treatment plants and septic system permits. Nonprofits, federal agencies, community groups, and local citizens also partner on protection and restoration efforts. Conservation and protection in Wyoming are "all hands on deck" efforts.

Discussion

NODULARIA
COELASTRUM
FRAGILARIA
GOMPHOSPHAERIA
MICRACTINIUM
MOUGEOTIA
BOTRYOCOCCUS
EUASTRUM
OOCYSTIS
CYLINDROSPERMUM
PHAGUS
AGTINASTRUM
SCENEDESMUS
GONIUM
STEPHANODISCUS
DESMIDIUM
SPHAEROCYSTIS
ZYGNEMA
EUDORINA
STAURONEIS
PEDIASTRUM

Support Group Sign Ups

Please go to the corner of the room matching your interests.

DEQ staff are there to facilitate the sign-ups.

- Point Source Support Group
- Nonpoint Source Support Group
- Criteria Development Support Group
- Education/Outreach Support Group

Signing up for the support groups

- We need your:
  - Name
  - Organizational affiliation
  - Email address
  - Phone number
  - Preferred support group

Questions for the support group members:

- Can you participate in a 45 to 60 minute call every 4 weeks?
- When is the best day for a conference call?
- What time of day do you prefer?
- Are you OK with an online poll to finalize the best date/time?

Thank You for Your Interest and Participation!

Safe Travels . . .