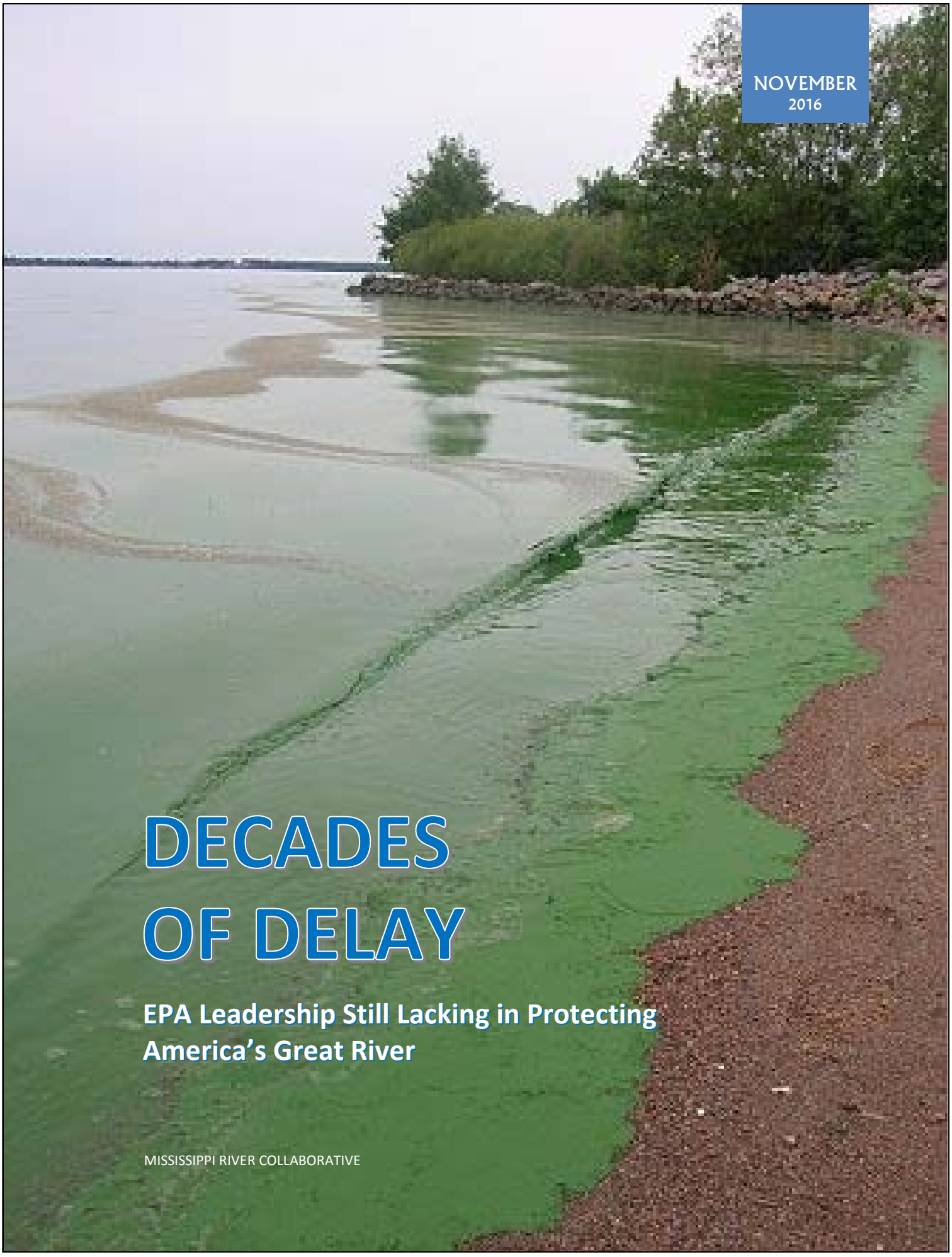

NOVEMBER
2016

DECADES OF DELAY

EPA Leadership Still Lacking in Protecting America's Great River

MISSISSIPPI RIVER COLLABORATIVE

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November 2016

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MRC is a partnership of environmental organizations and legal centers from states bordering the Mississippi River as well as regional and national groups working on issues affecting the Mississippi River and its tributaries. The Collaborative harnesses the resources and expertise of its diverse organizations to reduce pollution entering the Mississippi River as well as the Gulf of Mexico.

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Above: Mississippi River at Itasca, MN; Credit: Mark Evans; Source: Wikimedia Commons

Cover Photo: Wisconsin River; Source: Midwest Environmental Advocates

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EXECUTIVE SUMMARY

Nitrogen and phosphorus pollution poses an increasingly serious threat to the nation's fresh and salt water resources, with potentially dire consequences for human and natural communities throughout the Mississippi River Basin. Excess nutrients can lead to harmful algal blooms that are toxic to humans, pets, and wildlife. Toxic algae can taint drinking water supplies, threatening human health and increasing water treatment costs, and can poison swimmers. Algal blooms can also deplete the water of the oxygen needed by fish and other water species. Nutrient pollution from the Mississippi River Basin states causes the Gulf of Mexico Dead Zone (Dead Zone), a huge area where nutrient-fueled algal blooms annually deplete coastal waters of life-giving oxygen.

EPA recognized the problem of nutrient pollution in the mid-1990s, but failed to take steps necessary to reduce the amount of nutrients in the water. It hoped for voluntary action on the part of the states, and issued guidance, convened meetings, and otherwise provided encouragement, but the states were reluctant to act.

Frustrated by the lack of action and progress, the Mississippi River Collaborative (MRC) petitioned U.S. EPA In 2008 to develop enforceable limits on nitrogen and phosphorus pollution and to prepare a Total Maximum Daily Load (TMDL), or cleanup plan, for the Mississippi River and the Gulf of Mexico. EPA denied the petition, and instead issued a 2011 memorandum stating its preference for working with the states. MRC sued EPA and won a partial victory in the trial court, despite facing opposition from many states, commodity crop trade associations, and other agricultural interests in addition to EPA. EPA appealed and continues in court to oppose it having to take regulatory action, while maintaining its position that change will come from the states if it continues to provide encouragement.

MRC examined state administrative regulations and practices in the 10 states along the main-stem of the Mississippi River in order to measure what, if any, progress has been made under the Gulf Hypoxia Action Plan and EPA's state partnership framework of 2011. The results of that assessment are dismal.

To date, no state has EPA-approved numeric nitrogen criteria, and only two of the 10 have EPA-approved phosphorus criteria. Less than 2% of rivers and streams in the 10 states have current assessments for phosphorus-caused impairments, and five of the 10 states do not assess the impact of phosphorus on their lakes at all. Not one of the states assesses its lakes for nitrogen-caused impairments. Even when states prepare, and EPA approves, TMDL cleanup plans, less than five percent of the plans requiring reasonable assurances that the planned nutrient

reductions will occur provide this element. In six states, no plans had those kinds of reasonable assurances. More than 90% of TMDL cleanup plans fail to require monitoring to determine whether water quality has improved and a similar percentage contain no provisions for re-examining the plans to determine if adaptations are needed. Most state-issued pollution discharge permits (62%) fail to impose phosphorus limits or nutrient monitoring requirements on dischargers. In Louisiana and Iowa, over 90% of permits lack such controls.

After nearly 20 years of largely voluntary efforts, nutrient pollution remains a serious problem throughout the Mississippi River Basin. Waters throughout the Basin suffer noxious, smelly algal blooms, fish kills, and serious health threats, and the Dead Zone has not been reduced.

This report demonstrates the continuing failure of EPA's voluntary approach and the continuing and growing threats of unregulated nitrogen and phosphorus pollution. EPA has the power and the duty to act to require reasonable, common-sense regulations to address the growing scourge of nutrient pollution, and it should do so. Once again, MRC calls upon EPA to remedy this state of affairs, specifically recommending that EPA:

- Develop numeric phosphorus criteria for each of the eight states that have yet to adopt them, and numeric nitrogen criteria for all 10 states.

- Require states to assess their waters for nitrogen and phosphorus pollution and to prioritize TMDL development and implementation planning accordingly.

- Increase oversight of the state NPDES programs to ensure that both narrative and numeric nutrient criteria are implemented through limits in permits, including the use of Water Quality Based Effluent Limits (WQBELs) where appropriate.

- Disapprove TMDLs that lacking reasonable assurance that nonpoint source reductions are likely to occur and lack monitoring and timelines to ensure that planned reductions actually take place. Further, EPA needs to provide oversight to ensure consistency among EPA Regions in TMDL review and approval (especially in Regions 4 and 6.)

- Ensure that states' Nutrient Reduction Strategies contain implementation plans detailing point and nonpoint source reductions needed, responsible parties, funding mechanisms, milestones, measurement metrics, and reasonable timelines.

- Require states under Section 319 of the Clean Water Act to identify programs and practices for controlling nonpoint sources of pollution to the maximum extent possible.

PART 1: EPA AND NUTRIENT POLLUTION IN THE MISSISSIPPI RIVER STATES

Nutrient Pollution Threatens Nation's Waters

Nutrient pollution is a very serious and dramatically escalating problem for the nation's salt and fresh water systems. While EPA has repeatedly acknowledged this to be true[1]-- again most recently in its "Renewed Call to Action"[2]— the agency's response has been underwhelming and largely ineffective.

Nutrients – primarily nitrogen and phosphorus – are essential for plant and animal life. However, an overabundance of these chemicals is harmful to both fresh and marine water systems.

Nutrient pollution has serious negative impacts for human and natural communities throughout the Mississippi River watershed. As algae replicate rapidly in nutrient-rich waters, blooms are formed that block vital sunlight from reaching beneficial underwater plants that provide food and a place to live for fish and aquatic animals. As the algal blooms die and decompose, they also rob the water of oxygen needed by fish and other species. Decomposing algae can create hypoxic or dead zones where oxygen levels are too low to sustain life. As the Mississippi River makes its way to the Gulf of Mexico, it picks up and carries a heavy load of nutrients from bordering states, delivering it to the Gulf of Mexico and creating one of the largest dead zones in the world.[3] In 2015, the Dead Zone measured 6,474 mi^2, the size of Connecticut and Rhode Island combined.[4]

An over-abundance of nutrients can also cause cyanobacterial blooms, which can produce toxins that poison recreational waters and drinking water supplies. In the summer of 2015, the Ohio River, a major tributary of the Mississippi River, suffered a toxic bloom spanning 650 miles.[5] In 2014, Toledo's water supply was contaminated by cyanotoxins, forcing the city to

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[1] United States Environmental Protection Agency, *Clean Water Action Plan, Restoring and Protecting America's Waters* (1998) at 7-9 (Clean Water Action Plan), nepis.epa.gov. Available at http://bit.ly/2d4VKya; Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, *Action Plan for Reducing Mitigating and Controlling Hypoxia is the Northern Gulf of Mexico* (January 2001) at 7 ("2001 Action Plan"). Available at https://www.epa.gov/sites/production/files/2015-03/documents/2001_04_04_msbasin_actionplan2001.pdf; U.S.EPA, Science Advisory Board, *Hypoxia in the Northern Gulf of Mexico*, (2008) at 10. Available at https://yosemite.epa.gov/sab/sabproduct.nsf/C3D2F27094E03F90852573B800601D93/$File/EPA-SAB-08-003complete.unsigned.pdf; Nancy K. Stoner, Acting Assistant Administrator, EPA to Regional Administrators, Regions 1-10, *Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions* at 6 (March 16, 2011) ("2011 Framework").

[2] Joel Beauvais, Deputy Assistant Administrator, EPA to State Environmental Commissioners and State Water Directors, *Renewed Call to Action to Reduce Nutrient Pollution and Support for Incremental Actions to Protect Water Quality and Public Health* (September 22, 2016) ("Renewed Call to Action").

[3] "2015 Gulf of Mexico Dead Zone above average," Noaanews.noaa.gov (August 4, 2015). Available at http://www.noaanews.noaa.gov/stories2015/080415-gulf-of-mexico-dead-zone-above-average.html

[4] *Id.*

[5] "Drinking Water Source Protection Update," Ohio Environmental Protection Agency (December 2015). Available at http://www.epa.ohio.gov/Portals/28/documents/swap/2015_SWAP_Newsletter.pdf

issue a "do not drink" order for more than 500,000 residents.[6] In Des Moines, Iowa, high levels of nitrogen pollution in the Raccoon River, the city's drinking water source, have forced the Des Moines Water Works to spend millions in additional treatment and infrastructure costs to make the water safe for drinking.[7]

Despite these very real and dangerous threats, U.S. EPA leadership and action on this issue has been underwhelming and largely ineffective.

EPA Repeatedly Fails to Take Decisive Action

In the mid-1990s, EPA began to convene parties to discuss the problems of nutrient pollution and the Dead Zone. In 1995, the agency held its first conference on the issue. During this time, EPA promised to educate Mississippi River Basin states about the effects of their actions on the Dead Zone and promised "on the ground" Nutrient Reduction Strategies by 1997.[8] These on-the-ground strategies never materialized. Instead, in 1997, EPA convened the first meeting of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force (Hypoxia Task Force.) For two years, the Hypoxia Task Force studied the science of hypoxia and nutrient pollution and developed a strategy, but it contained no action items or goals for reducing nutrient loads.[9] It wasn't until a legislative mandate[10] was developed that the Hypoxia Task Force got to work on an action plan.

Released in 2001, the Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico (Action Plan) called for a reduction in the size of the Dead Zone to less than 5,000 mi^2 by 2015, yet it contained no real nutrient reduction actions or mandates. Instead, it called for more committees, further study of the problem, and continued use of existing government programs.[11] By 2007 it was clear that the activities called for in the Action Plan had not resulted in a reduction of the Gulf hypoxic zone.[12] The Hypoxia Task Force itself acknowledged this failure in 2008.[13]

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[6] "'Do not drink, do not boil' water: Crisis closes out second day with little information," wtol.com (August 3, 2014) Available at http://www.wtol.com/story/26178506/do-not-drink-do-not-boil-water-advisory-issued-for-issued-for-lucas-county-surrounding-area

[7] "Des Moines Water Works' nitrate removal facility sets record number of days in operation in a single year," dmww.com (May 28, 2015). Available at http://www.dmww.com/about-us/news-releases/nitrate-removal-facility-sets-record-number-of-days-in-operation-in-a-single-year.aspx

[8] Final Meeting Summary for the First Meeting of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force 6 (December 4, 1997). Available at https://www.epa.gov/sites/production/files/2015-08/documents/2008_12_4_msbasin_meetings_summary_01.pdf

[9] Final Meeting Summary for the Third Meeting of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force 4-5 (September 24, 1998).

[10] The Harmful Algal Bloom and Hypoxia Research and Control Act of 1998 (HABHRCA), Pub. L No. 105-383, was enacted on November 13, 1998. See 16 U.S.C. § 1451.

[11] 2001 Action Plan.

[12] National Research Council Committee on the Mississippi River and the Clean Water Act, *Mississippi River Water Quality and the Clean Water Act: Progress, Challenges, and Opportunities*, 44-45, 74 (2008). Available at https://www.mcknight.org/system/asset/document/118/pdf-4-mb.pdf

[13] *Ibid.*

In addition to setting up the Hypoxia Task Force, EPA developed the Clean Water Action Plan (CWAP) in 1998 to, in part, identify actions to address nitrogen and phosphorus pollution.[14] In the CWAP, EPA promised to develop nutrient criteria for water body types and ecoregions by 2000, and to promulgate nutrient water quality standards for those states that failed to do so within three years of EPA's issued criteria. Although EPA did issue eco-regional criteria, it never promulgated standards for the states as promised. EPA made the same promise regarding state standards in its 1998 National Strategy on the Development of Regional Nutrient Criteria. EPA called upon the states to adopt numeric criteria by the end of 2003 and declared it would promulgate such standards for states that did not adopt by the end of 2004.[15] None of the Mississippi River states had numeric nitrogen or phosphorus criteria by the end of 2004, and EPA has never taken any action to promulgate such standards for any state in the MRB.

EPA's refusal to take decisive action on nutrient pollution continued with its denial of a 2003 petition asking EPA to promulgate numeric nutrient criteria for the Missouri and Mississippi Rivers and a 2007 petition requesting EPA impose technological based limits on nitrogen and phosphorus discharges from publicly owned treatment works (POTWs.)

In 2008, both the National Research Council (NRC) and the Science Advisory Board (SAB) concluded that more aggressive action was needed to reduce nutrient pollution in the Mississippi River. The SAB called upon EPA to take a "more aggressive role…to [maintain] and [improve] water quality in the Mississippi River and the northern Gulf of Mexico" by preparing a TMDL for the River and the Gulf and by adopting numeric criteria for the River's terminus.[16] The NRC in turn concluded that "[n]utrients should be reduced as soon as possible before the system reaches a point where even larger reductions are required to reduce the area of hypoxia."[17]

At this time, MRC filed another petition with U.S. EPA (MRC 2008 Petition) asking the Agency to promulgate numeric nitrogen and phosphorus criteria for the Mississippi River states and to prepare a TMDL for the Mississippi River and the Gulf of Mexico.

In 2009, a joint EPA-state task group issued "An Urgent Call to Action." The final section of the report emphasized the importance of making all contributors responsible for pollution:

> All major sources of nutrients must be held accountable…There is a growing reluctance and resistance on the part of highly regulated entities and downstream users to pay for increasingly expensive loading reductions…when

[14] United States Environmental Protection Agency, *Clean Water Action Plan: Restoring and Protecting America's Waters* (1998). Available at http://bit.ly/2d4VKya
[15] 63 Fed. Reg. 34648-49.
[16] NRC Report, at 126.
[17] U.S.EPA, Science Advisory Board, *Hypoxia in the Northern Gulf of Mexico* (2008). Available at https://yosemite.epa.gov/sab/sabproduct.nsf/C3D2F27094E03F90852573B800601D93/$File/EPA-SAB-08-003complete.unsigned.pdf

> upstream sources are not held responsible for their own nutrient contributions…[18]

The task group also found that a national framework was required because no single state had an incentive to impose more stringent nutrient regulations. Without a national framework, sources of pollution would simply move to another state that enjoyed a laxer regulatory climate.[19]

Again, EPA failed to follow through with decisive action on a national regulatory framework. Instead, in March 2011, Acting Assistant Administrator Nancy K. Stoner issued a memorandum entitled *Working in Partnership with the States to Address Nitrogen and Phosphorus Pollution through the Use of a Framework for State Nutrient Reductions* (Framework) that included eight recommended elements for state management of nitrogen and phosphorus pollution. One of those elements addressed promulgation of numeric nutrient criteria. EPA encouraged states to "step forward" with their own nutrient regulations, noting that "[a] reasonable timetable would include developing numeric N and P criteria for at least one class of waters within the state (e.g., lakes and reservoirs, or rivers and streams) within 3-5 years."[20]

In the same year, EPA denied the MRC 2008 Petition, three years after it was filed and only after being threatened with legal action for unreasonable delay. While EPA acknowledged that the Dead Zone and upstream nitrogen and phosphorus pollution were issues of "serious concern" that were a "high priority for EPA's water programs,"[21] it did not find that numeric criteria were necessary. Instead, EPA stated that it preferred to work with the states and encourage them to voluntarily develop criteria, rather than promulgating criteria that, it stated, would be "highly resource and time intensive."[22]

EPA Joins Opponents of Water Quality Standards

In 2012, MRC members sued EPA under the Administrative Procedure Act, alleging that EPA's denial of the MRC 2008 Petition (1) failed to provide a basis for denial that was grounded in the statute, instead relying on its own preference for voluntary compliance and (2) arbitrarily and capriciously ignored the administrative record evidence that numeric nutrient criteria were necessary, failing either to make a positive or negative necessity determination under CWA § 303(c)(4)(B).[23]

EPA, along with dozens of states, commodity crop trade groups, and other agricultural interests, vigorously fought the suit. The trial court partially ruled in MRC members' favor,

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[18] State-EPA Nutrient Innovations Task Group, *An Urgent Call to Action: Report of the State-EPA Nutrient Innovations Task Group* (Aug. 2009). Available at https://www.epa.gov/sites/production/files/documents/nitgreport.pdf

[19] *Id.* at 33.

[20] Framework.

[21] Letter from Michael Shapiro, Deputy Assistant Administrator of EPA to Kevin Reuther, Legal Director of MCEA, at 2 (July 29, 2011).

[22] *Id.* at 4.

[23] Complaint, *Gulf Restoration Network* et al., *v. McCarthy*, No. 2:12-cv 00677, at ¶ 4 (filed Mar. 13, 2012).

finding that "EPA could not simply decline to make a necessity determination in response to Plaintiffs' petition for rulemaking."[24]

Rather than comply, EPA appealed. In a mixed decision, the appeals court vacated the trial court's order, holding that "EPA may decline to make a necessity determination if it provides an adequate explanation, grounded in the statute, for why it has elected not to do so."[25] The appellate court sent the case back to the trial court to determine whether EPA had provided an adequate explanation.

The parties are awaiting a decision from the trial court as of October 2016.

EPA Moves the Goal Posts

Eighteen years of forming task forces, encouraging voluntary pollution reduction measures, and sponsoring scientific studies have not resulted in EPA meeting its own goals of reducing nutrient pollution and the size of the Dead Zone. As noted above, the Dead Zone continues to persist and grow, a 650-mile cyanobacteria bloom lasted for weeks in the Ohio River in 2015, and major U.S. cities (Toledo and Des Moines) have had to take emergency steps to supply their residents with safe drinking water. Water quality in the Mississippi River and tributaries continues to deteriorate, and the impacts of the nutrient pollution problems are no longer limited to the recreational and aesthetic, but are now threatening drinking water supplies for hundreds of thousands of Mississippi River Basin residents. Rather than act decisively to address these growing problems, the Hypoxia Task Force simply extended the target date for achieving reductions in the size of the Dead Zone.

In the 2008 Action Plan, the goal of the Hypoxia Task Force was the following:

> [S]trive to reduce…the five-year running average areal extent of the Gulf of Mexico hypoxic zone ***to less than 5,000 square kilometers by the year 2015*** through implementation of specific, practical, and cost-effective voluntary actions…[26] (*Emphasis added*.)

When 2015 arrived, and after seven years of "specific, practical and cost-effective voluntary actions," the Hypoxia Task Force introduced its new goal:

> We strive to reduce the five-year running average areal extent of the Gulf of Mexico hypoxic zone *to less than 5,000 square kilometers* ***by the year 2035.***[27] (*Emphasis added.*)

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[24] *Gulf Restoration Network v. McCarthy*, No. 2:12-cv 00677, 2013 WL 5328547, at *6-8 (E.D. La. Sep. 20, 2013).
[25] *Gulf Restoration Network v. McCarthy*, 783 F.3d 227, 243 (5th Cir. 2015).
[26] *Id.* 2008 Action Plan, at 9 (2008). In fairness, the 2008 Action Plan contained this caveat: "The 5,000 km^2 target remains a reasonable endpoint for continued use in an adaptive management context; however, it may no longer be possible to achieve this goal by 2015…"
[27] Hypoxia Task Force, *New Goal Framework* at 1 (Dec. 2014).

The Hypoxia Task Force assigned itself the same goal it had failed to reach by 2015 and simply allowed twenty extra years to achieve it. Even if the 2035 goal is achieved, the Dead Zone will still be nearly the size of Delaware.

EPA Issues "Renewed" Call to Action but Requires Nothing New

On September 22, 2016, EPA issued a memorandum to state environmental commissioners and water directors entitled "Renewed Call to Action to Reduce Nutrient Pollution and Support for incremental Actions to Protect Water Quality and Public Health." In it, the agency identifies nutrient pollution as "one of the greatest challenges to our Nation's water quality," and "a growing threat to public health and local economies." Although EPA calls upon states (and the agricultural sector in particular) to "intensify their efforts" to reduce the impacts of nutrient pollution, gone is the urgent call to action of 2009, replaced in 2016 by agency support for "incremental actions." The Renewed Call to Action amounts to nothing new in terms of required actions by the states. In fact, the renewed call seems to backtrack on important elements of the 2011 Framework. For instance, the Framework's call for the establishment of work plans and phased schedules for nitrogen and phosphorus criteria development is replaced by an EPA promise to simply "advocate the benefits" of adopting such criteria.

Today in the States: Findings of a Comprehensive Assessment

Eighteen years after EPA called for states to develop their own nutrient criteria, most have not. MRC's comprehensive review of nutrient control programs in the 10 states bordering the Mississippi River shows that these states have very few regulatory mechanisms for reducing nutrient pollution. (See Part 2 for details on the findings listed below.)

- Only two of the 10 states have EPA-approved **numeric** criteria for phosphorus, and none have EPA-approved nitrogen criteria.
- In all 10 states combined, just 1.6% of rivers and streams are assessed to determine whether they are impaired by phosphorus. Of that small number of assessed miles, 78% *are* impaired. No state assesses rivers and streams for nitrogen; only a few conduct limited assessments for nitrates in drinking water.
- In aggregate, the 10 states have assessed just 26% of lakes for phosphorus and algae, but such assessments are only conducted in the upper Mississippi River states. No assessments have been conducted in Kentucky, Tennessee, Mississippi, Arkansas, or Louisiana.
- Merely 5% of the TMDLs prepared by states for nutrient-impaired water bodies receiving both point and nonpoint sources of nutrient pollution contained reasonable assurances that nonpoint source reductions will occur.
- Fully 92% of the nutrient TMDLs prepared by the states and approved by EPA do not track or verify nonpoint source compliance, and 90% do not include a provision for reexamining TMDLs to see whether nutrient reductions have occurred or whether revisions to the TMDLs are necessary.
- Not one of the states uses its narrative standard to derive effluent limits for nitrogen/nitrate in National Pollutant Discharge Elimination System (NPDES) permits.

- More than 60% of NPDES-permitted facilities in the states neither monitor nor have any limit on phosphorus discharges. In some states, the percentage is much higher; over 90% of Louisiana's and Iowa's phosphorus-discharging NPDES facilities have no limits or monitoring, and over 80% of Missouri's facilities are similarly unregulated for phosphorus.

A review of state Nutrient Reduction Strategies developed in response to EPA's 2011 Framework shows that not one state fully incorporated all recommended elements. While eight out of 10 states finalized a Nutrient Reduction Strategy, these plans do not contain the "minimum building blocks" necessary for the reduction of nutrient pollution.[28]

- Although the Framework called on states to adopt numeric nitrogen and phosphorus criteria for at least one type of water body by 2016, only two states did so.
- No state provided resources for implementation or enforceability of its Nutrient Reduction Strategy.
- No state has adopted its Nutrient Reduction Strategy as a statute or as regulations. The Strategies remain guidelines.
- Some states actually backtracked, abandoning plans for numeric nutrient criteria in favor of the unenforceable guidelines laid out in the Framework.

Recommendations to EPA

It is apparent that no matter how much encouragement and support EPA offers the states, they lack the will to develop numeric nutrient criteria on their own and to implement those criteria through assessment, permitting, TMDLs, and enforceable standards. Now, more than ever, it is essential for EPA to take a leadership role in driving progress toward clear, enforceable criteria that will result in measurable reductions in nutrient pollution and in the size of the Dead Zone.

Specifically, the MRC recommends that EPA:

1. Develop numeric phosphorus criteria for each of the eight states that have yet to adopt them, and numeric nitrogen criteria for all 10 states.

2. Require states to assess their waters for nitrogen and phosphorus pollution and to prioritize TMDL development and implementation planning accordingly.

3. Increase oversight of the state NPDES programs to ensure that both narrative and numeric nutrient criteria are implemented through limits in permits, including the use of Water Quality Based Effluent Limits (WQBELs) where appropriate by doing the following:

    a. Requiring states to include nutrient monitoring conditions for facilities discharging nitrogen and/or phosphorus,

[28] 2011 Framework, at 2.

b. Requiring states to track and report numeric nutrient effluent limits by type (WQBEL, TBEL, or other), nutrient monitoring data, and nutrient loading,

c. Preparing guidance for deriving WQBELs from narrative and numeric nutrient/eutrophication standards,

d. Objecting under 40 CFR 123.44 to all draft state permits that fail to limit discharges of pollutants that may cause or contribute to violations of state numeric or narrative water quality standards, and

e. Withdrawing state NPDES program approval under 40 CFR 123.63 when, as in the case of numerous Mississippi River states, the state program has repeatedly issued permits that do not comply with the law.

4. Require states to complete TMDLs with reasonable assurance that nonpoint source reductions are likely to occur and with monitoring and timelines that ensure that planned reductions actually take place. Provide oversight to ensure consistency among EPA Regions in TMDL review and approval (especially in Regions 4 and 6).

5. Ensure that states' Nutrient Reduction Strategies contain implementation plans detailing point and nonpoint source reductions needed, responsible parties, funding mechanisms, milestones, measurement metrics, and reasonable timelines.

6. Require states under Section 319 of the Clean Water Act to identify programs and practices for controlling nonpoint sources of pollution to the maximum extent possible.

PART 2: STATE NUTRIENT CONTROL PROGRAMS

Purpose and Methods Used

In order to examine state progress toward the reduction of nitrogen and phosphorus in state waters, MRC examined nutrient control program components for each of the 10 states bordering the Mississippi River. These elements include: numeric nutrient criteria development; water quality assessment and 303(d) listing for nutrient parameters; nutrient controls in NPDES permits; TMDLs for nutrient-impaired waters; and state Nutrient Reduction Strategies.

The method for examining progress on the development of numeric nutrient criteria was fairly straightforward. MRC looked at the statutes and regulations currently in force in each of the states, as well as documents generated by the state administrative rulemaking bodies to determine what work is underway and the status of any proposed criteria.

To determine the level of waterbody assessment undertaken by each state, MRC first looked at the 305(b) integrated reports, and then sought additional data from the state agencies in an attempt to obtain information about specific parameters. Impairment statistics were universally available, but because some states compile data on a use-specific basis, and each use may involve many chemical parameters, MRC was unable to include data for each parameter from each state.

For data about the inclusion of nutrients in the states' NPDES permitting programs, MRC first looked at the data contained in EPA's ICIS database, and then sought additional data from state agencies. MRC reviewers obtained lists of facilities discharging phosphorus, and determined whether any WQBELs for phosphorus or other phosphorus limits were used and whether the facility was required to monitor for phosphorus.

MRC reviewed all EPA-approved TMDLs in each of the states for eight parameters, including nutrients, phosphorus, algae, nitrogen, nitrates, eutrophication, sediment, and biochemical oxygen demand where it appeared that impairment might be driven by nutrients. TMDLs for impairments caused by ammonia were not included.

Finally, MRC looked at each state's Nutrient Reduction Strategy documents to determine whether the states have complied with the components of EPA's 2011 State Framework for Managing Nitrogen and Phosphorus. These documents were readily obtainable from the states.

Numeric Nutrient Criteria Development

Introduction

This section reviews progress by the 10 states in developing and adopting numeric criteria for phosphorus and nitrogen.

Background

As detailed above, EPA has called upon states to adopt numeric nutrient criteria since 2003. Most recently, the Framework memo issued by Acting Assistant Administrator Nancy K. Stoner in 2011 encouraged states to "step forward" to develop "numeric N and P criteria for at least one class of waters within the state (e.g., lakes and reservoirs, or rivers and streams) within 3-5 years."

Detailed Findings

This report categorizes state progress on N and P criteria development as follows: criteria adopted, draft criteria, some effort toward development, no recent progress/stalled, and moving backwards. (See Table 1 for a chart of current state progress.)

Criteria Adopted

Minnesota and Wisconsin are the only states with statewide criteria for phosphorus for one class of waters, with each having adopted criteria for both lakes/reservoirs and streams/rivers. No state has adopted numeric criteria for nitrogen.

Draft Criteria Published

Minnesota published draft numeric criteria for nitrate for protection of aquatic life in 2010, and is awaiting the results of EPA-led testing of additional taxa groups before adjusting and finalizing the criteria.

Current Efforts toward Development

Illinois and Mississippi have each made progress in planning and development of criteria; Illinois has convened a science advisory panel to explore phosphorus criteria, and Mississippi is planning to release N and P criteria for lakes over 100 acres in size (excluding two regions of the state).

Table 1. 10-State Progress of Statewide Numeric Nutrient Criteria Development

PHOSPHORUS CRITERIA STATUS				
Backward	**Stalled**	**Planning/Development**	**Proposed**	**EPA Approved**
Iowa	Arkansas	Illinois		Minnesota
Louisiana	Kentucky	Mississippi*		Wisconsin
	Missouri			
	Tennessee			
NITROGEN CRITERIA STATUS				
Backward	**Stalled**	**Planning/Development**	**Proposed**	**EPA Approved**
Iowa	Arkansas	Illinois	Minnesota (streams)	
Louisiana	Kentucky	Mississippi*		
	Missouri			
	Tennessee			
	Wisconsin			

Key
Moving backward
No recent progress; stalled
Some effort toward development
Draft criteria
Criteria adopted

**Mississippi is developing criteria for lakes over 100 acres in specified regions of the state.*

No Recent Progress/Stalled

Four states appear to have stalled criteria development (Arkansas, Kentucky, Missouri, and Tennessee) for both N and P; and Wisconsin has made no recent progress on N criteria.

Moving Backwards

Iowa and Louisiana have moved backward in criteria development efforts. Iowa abandoned earlier efforts to adopt lake phosphorus criteria shortly after release of the Framework, later declaring nutrient criteria to be "not necessary."[29] Louisiana missed all dates provided in its

[29] Iowa Environmental Protection Commission, *Denial of Petition for Rulemaking* at p. 4. (Oct. 14, 2013)

2006 criteria development plan, has proposed no new dates or planning efforts, and has instead weakened its dissolved oxygen criterion (with EPA's approval).

Recommendation

- EPA must develop numeric phosphorus criteria for each of the eight states that have yet to adopt them, and numeric nitrogen criteria for all 10 states.

Water Quality Assessment and 303(D) Listing

Introduction

This section discusses findings of a review of state water quality assessment programs for nutrients and nutrient-caused impacts. The purpose of the review was to uncover the extent to which the 10 states are assessing their waters for nutrient-related impairments, as well as the extent of knowledge in the 10 states about nutrient impacts to water quality. Reviewers collected data from 305(b) reports and state agencies regarding assessment for phosphorus (eutrophication, algae) dissolved oxygen, and nitrogen (nitrate) for both streams and lakes (reservoirs, ponds).

Background

Water quality monitoring and assessment is fundamental to implementation of the Clean Water Act. It drives impaired waters listing, NPDES permit effluent limits, TMDLs, and anti-degradation efforts. Without adequate monitoring and assessment, it is impossible to determine whether goals for local waters or the Gulf are being met.

Section 305(b) of the Clean Water Act requires each state to prepare a report (called a 305(b) report) on the current statewide status of water quality every two years.[30] These 305(b) reports identify the water quality status of all waterbodies in the state for which sufficient credible data is available. The 303(d) list is a subset of the waterbodies evaluated in the 305(b) report that identifies waterbodies for which there is evidence that water quality is impaired (not meeting state water quality standards.)[31] In 2002, EPA asked states to merge their 305(b) and 303(d) reports into a single integrated report. The EPA compiles the information from the states' integrated reports and prepares a summary for the U.S. Congress on the status of the nation's waters (called the National Water Quality Inventory Report to Congress.)

For this audit, MRC members first examined state integrated reports and then sought additional data from state agencies to tease out the extent of assessment for nutrient parameters. This effort was complicated by the fact that states report whether a particular designated use (e.g., aquatic life use) is supported, and the use may encompass many chemical parameters without teasing out parameter-specific causation. Some state agency personnel were able to provide parameter-specific data on miles or acres assessed, supporting (recreation and aquatic life), and for which there was insufficient data, while others were not. Where this information is not tracked by the state, the spreadsheet cell (see Table 2) is left blank. Each state must report impaired waters along with the cause of impairment in its integrated report, so impairment statistics were universally available.

[30] 33 U.S.C. §1315.
[31] 33 U.S.C. §1313.

Overall Observations

All states report a lack of assessment for one or more parameters and classes of waters due to the absence of numeric criteria. No states are applying their narrative standards in their water quality assessment programs, including those with draft numeric standards (Minnesota) or numeric translators of narratives (Tennessee).

Although all states have numeric criteria for dissolved oxygen (DO) in streams, very few waters are assessed for this parameter. The reasons for this are beyond the scope of this inquiry, but authors note that the assessment methodologies of some states require a large amount of monitoring data and/or concomitant biological impairment to determine DO impairment.

Table 2. Water Quality Assessments in the 10 States

MISSISSIPPI RIVER	River/Stream	River/Stream	River/Stream	Lake/Res./Pond	Lake/Res./Pond	Lake/Res./Pond
MAIN-STEM STATES	(miles)	(miles)	(miles)	(acres)	(acres)	(acres)
Nutrient Assessments	P	Nitrate DW	DO	P	N	DO
Supporting	3,137	2,601	17,056	1,257,684	98,823	241,273
Threatened Waters			139	148		
Insufficient Info to Assess	1,939	6,049	23,296	1,604,040	127,137	8,960
Impaired Waters	11,366	2,963	16,225	1,242,736	34,876	137,808
Waters Fully Assessed	14,503	5,564	33,420	2,500,568	133,699	379,081
Total Waters	900,576	900,576	900,576	9,507,407	9,507,407	9,507,407
Percent of Waters Assessed	**1.6**	**0.6**	**3.7**	**26.3**	**1.4**	**4.0**

Detailed Findings

Stream/River Assessment

Phosphorus/Eutrophication

Wisconsin is the only state among the 10 that is conducting stream assessments for phosphorus; possibly because it has had numeric criteria since late 2010. In the 10 states, just **1.6%** of stream miles are reported as assessed for phosphorus/eutrophication. All states except Minnesota, Iowa and Mississippi report stream miles with designated uses impaired by phosphorus; these impairments total 11,366 miles of 14,503 miles reported as assessed (**78%**).

Dissolved Oxygen (DO)

There is a very low level of assessment in the 10 states for DO (**3.7%**)**;** notable because every state has a water quality standard (criterion) for this parameter, and for states lacking numeric phosphorus criteria (all except Minnesota and Wisconsin), DO is the only nutrient-related standard for streams supporting recreation and aquatic life. (Most states have a small class of drinking water streams for nitrate.) Comparison cannot be made between miles supporting versus impaired, because four states do not track miles supporting (IA, IL, KY, TN). All states

report stream DO impairments; these total 16,225 miles (**49%** of the stream miles reported as assessed for this parameter).

Nitrogen/Nitrate
Not one of the 10 states is assessing streams for Total Nitrogen/nitrate for aquatic life or recreational use support. Most do very limited nitrate sampling for drinking water use support for waters classified as public water supply.

Lake/Reservoir Assessment

Phosphorus/Eutrophication
Assessment of lakes for phosphorus and algae is far more widely conducted than any other waterbody type/nutrient parameter combination. Still, just over one-quarter of lake acres are assessed in the 10 states (**26%**). All states except Kentucky and Mississippi report lake/reservoir acres impaired by phosphorus; these total 1,242,736 (**49.7%** of the 2,500,568 acres assessed.) There is a striking upper state/lower state split on lake/reservoir assessment: **all** of the lake/reservoir assessments were conducted by MN, WI, IA, IL, and MO. **None** were conducted by KY, TN, AR, MS, or LA.

Dissolved Oxygen (DO)
Only three states assess lakes/reservoir acres for DO (IA, IL, and LA). IA and IL report low impairment levels (2% and 9% of acres assessed respectively) while LA reports 82% of assessed acres as impaired.

Nitrogen/Nitrate
As with streams, states are not assessing lakes and reservoirs for Total Nitrogen/nitrate for aquatic life or recreational use support; only three (IA, IL, and MO) are looking at nitrate in lakes (again, largely for drinking water use support.)

Recommendation

- EPA should require the states to assess their waters for nitrogen and phosphorus pollution and to prioritize TMDL development and implementation planning accordingly.

NPDES Permits

Introduction

This section reviews National Pollutant Discharge Elimination System (NPDES) permits for facilities discharging phosphorus to surface waters in the 10 states in order to assess the extent to which state programs control phosphorus releases with WQBELs or other limits (e.g., technology- or policy-based limits not calculated to achieve water quality standards) and impose phosphorus discharge monitoring requirements.

Background

NPDES permitting is the primary tool established by the Clean Water Act to restrict pollution discharges into surface waters. Authority to operate a NPDES program has been delegated by EPA to each of the 10 states under review here. Federal regulations govern most aspects of NPDES permit content and process, and are thereby uniform across the nation. States may impose additional requirements, but must, at a minimum, adhere to federal requirements. Key federal regulations important in controlling nutrient pollution include the following:

- A prohibition on issuing a NPDES permit "[W]hen the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States;"[32]
- A requirement that each NPDES permit must contain conditions necessary to achieve water quality standards for any pollutant that "may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, *including State narrative criteria* for water quality"[33] (emphasis added). Such limits are called water quality based effluent limits, or WQBELs; and
- A requirement that facilities monitor the pollutants limited in NPDES permits.[34]

For this audit, reviewers first examined NPDES permit data contained in EPA's ICIS database, and then sought additional data from state agencies to compile the following information: a comprehensive listing of facilities discharging phosphorus to surface waters; any WQBELs for phosphorus in the respective permits; other phosphorus effluent limits; and whether the facility was required to monitor its effluent for phosphorus.[35] Reviewers identified and obtained data on 7,965 NPDES permitted facilities discharging (or likely to be discharging) phosphorus to surface waters.[36]

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[32] 40 C.F.R. §122.4(d).
[33] 40 C.F.R. §122.44(d).
[34] 40 C.F.R. §122.44(i).
[35] Nine state agencies cooperated and supplied data and databases to the best of their abilities; the Mississippi Department of Environmental Quality refused to provide data and denied an open records request, forcing the state reviewer to locate and review individual permit files.
[36] Where states did not provide this information, reviewers made the following assumptions: 1) all POTWs with surface water discharges discharge phosphorus, 2) effluent from other facilities required to monitor phosphorus contains phosphorus; and 3) a few industries selected by Standard Industrial Code discharge phosphorus. Data

The authors understand that results found using this method do not represent the entire universe of NPDES permits in the 10 states due to discrepancies and gaps in state data reporting. Instead, the findings indicate cumulative trends and underscore the need for improved recordkeeping to ascertain and quantify progress in controlling nutrient pollution via NPDES permits. That said, the findings are as robust as possible and are based exclusively on state-provided data. The authors believe these findings provide valuable metrics not included in the *Report on Point Source Progress in Hypoxia Task Force States*[37] because they include both major and minor facilities as well as appropriate industrials and because they include specific information on WQBELs.

Overall Observations

No state uses its narrative standard to derive effluent limits for nitrogen/nitrate in NPDES permits. Similarly, no state lacking numeric criteria is deriving phosphorus limits from its narrative. Less than three percent of the nearly 8,000 facilities discharging phosphorus have a water quality-based limit for that pollutant.

Nearly 62% of NPDES-permitted facilities in the states, a hefty majority, neither monitor for nor have any limit on phosphorus discharges into receiving waters. In some states, the percentage is much higher. Over 90% of Louisiana's and Iowa's phosphorus-discharging NPDES facilities have no limits or monitoring.

Detailed Findings

As noted, not one of the 10 states is utilizing its narrative standard to derive effluent limits for nitrogen/nitrate. Similarly, none of the eight states lacking numeric criteria for phosphorus (all except Minnesota and Wisconsin) is using its narratives to derive phosphorus limits. Three states have not imposed a WQBEL in any permit (IA, IL, and TN). Missouri and Kentucky have derived just one WQBEL each and Louisiana just three. Overall, only 2.8% (222) of the 7,965 phosphorus dischargers identified have WQBELs for that parameter. Just 12.8% (or 1,019) of facilities have another type of phosphorus limit (technology or policy based). Another 22.7% of the facilities monitor phosphorus discharge but do not have limits. Fully 61.7% of permitted facilities neither monitor nor have any limit on phosphorus discharges.

Minnesota stands out with 15.3% of its 899 permitted facilities subject to a WQBEL and 27.7% subject to another type of nutrient limit. Wisconsin has also made progress toward incorporating WQBELs for phosphorus. While the data provided by the state show that only a small percentage of permits have WQBELs that are currently effective, a majority of permittees

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were not filtered geographically, and as such, data from Minnesota, Wisconsin, and Illinois contain dischargers that do not discharge to the Gulf of Mexico, but instead to the Great Lakes watershed.

[37] Hypoxia Task Force, *Report on Point Source Progress in Hypoxia Task Force States*, February 2016. Available at https://www.epa.gov/ms-htf/report-point-source-progress-hypoxia-task-force-states.

have been issued WQBELs that will become effective over the next several years as their compliance schedules expire.

Conversely, over 90% of Louisiana's and Iowa's phosphorus-discharging NPDES facilities have no limits or monitoring requirements. Missouri runs close behind with nearly 83% of its facilities (1,790) completely unregulated for phosphorus discharges.

Recommendations

EPA should do the following:

- Increase oversight of the state NPDES programs to ensure that nutrient criteria, narrative and numeric, are implemented through limits in permits, including the use of WQBELs where appropriate;
- Object to state issued permits that fail to comply with federal regulations and, as expected by the CWA, take over permitting where states have demonstrated that they will not follow federal requirements;
- Require states to include nutrient monitoring conditions for facilities discharging them;
- Require states to track and report numeric nutrient effluent limits by type (WQBEL, TBEL, or other), nutrient monitoring data, and nutrient loading; and
- Prepare guidance for deriving WQBELs from narrative and numeric nutrient/eutrophication standards.

Table 3. Facilities with Phosphorus Discharges

State	Total Facilities	WQBEL	Other Limits	Monitoring Only	No Limits or Monitoring
Minnesota	899	138	249	399	113
Wisconsin	754	32	286	167	269
Iowa	1,328	0	2	127	1,199
Illinois	739	0	132	188	419
Missouri	2,162	1	148	223	1,790
Kentucky	902	1	84	290	527
Tennessee	275	0	54	103	118
Arkansas	175	34	21	114	6
Mississippi	210	13	42	155	0
Louisiana	521	3	1	41	476
Totals	7,965	222	1,019	1,807	4,917
Percentages		2.8%	12.8%	22.7%	61.7%

Total Maximum Daily Loads (TMDLs)

Introduction

This section discusses findings from an intensive review of the 374 EPA-approved TMDL reports that address nutrient impairments in the 10 states. The purposes of this review are to assess the extent of nutrient TMDL coverage and the inclusion of reasonable assurances for nonpoint source reductions, mechanisms to track nonpoint source implementation, TMDL review triggers, and follow-up water quality monitoring in these TMDLs.

Background

The Clean Water Act requires states to prepare "pollution budgets" known as TMDLs for waters on the states' 303(d) lists of impaired waters.[38] TMDLs calculate the total pollutant loadings a water body or stream segment can receive from all watershed sources and still meet water quality standards, establish a pollutant reduction target, and allocate the necessary reductions among contributing sources. These sources are characterized as point sources and nonpoint sources. Point sources receive a wasteload allocation (WLA) which is implemented through a NPDES permit. Nonpoint sources receive a load allocation (LA), generally implemented by a variety of federal, state and local actions that may be voluntary or regulatory. When a TMDL allocates loads among both nonpoint and point sources, the state must provide "reasonable assurances that nonpoint source reduction will in fact be achieved. Where there are not reasonable assurances, under the CWA, the entire load reduction must be assigned to point sources."[39]

Overall Observations

Most of the 10 states lack numeric criteria for phosphorus and all lack criteria for nitrogen except for nitrate criteria applicable to drinking water uses. As such, the states generally do not assess and list waters as impaired by excess phosphorus and nitrogen, but may find these nutrients to be the cause of the impairment. All approved TMDLs were reviewed for phosphorus, nitrate, "nutrients," low dissolved oxygen, biochemical oxygen demand, algae, organic enrichment and sediment (turbidity, total suspended solids) where driven wholly or largely by nutrients.

[38] 33 U.S.C. §1313(d)(1)(C)

[39] EPA Office of Water, *Guidance for Water Quality-based Decisions: The TMDL Process*, April 1991, p.15. Available at http://www.regulations.gov/docket?D=EPA-HQ-OW-2007-0784.

Table 4. 10-State TMDLs and Presence/Absence of Key Elements

	Total # of Nutrient TMDLs	WLA/LA Split		Reasonable Assurance		% of TMDLS with WLA/LA Split w/ Reasonable Assurance
		N	Y	N	Y	
MN	78	28	50	47	3	6%
WI	15	4	11	13	2	18%
IA	61	44	17	13	4	24%
IL	51	39	12	12	0	0%
MO	18	4	14	14	0	0%
KY	6	5	1	1	0	0%
AR	21	13	8	7	1	13%
TN	5	1	4	4	0	0%
MS	64	21	43	43	0	0%
LA	55	12	43	43	0	0%
Totals	**374**	**171**	**203**	**193**	**10**	**5%**

	NPS Implementation Tracking		% of TMDLs with LAs that track NPS implementation	Revision/Review Trigger		WQ Monitoring	
	N	Y		N	Y	N	Y
MN	30	20	40%	57	21	22	56
WI	11	4	27%	13	2	12	3
IA	59	0	0%	54	7	8	53
IL	51	0	0%	51	0	51	0
MO	12	1	8%	18	0	8	10
KY	1	0	0%	6	0	6	0
AR	13	0	0%	21	0	19	2
TN	4	0	0%	5	0	5	0
MS	64	0	0%	64	0	28	36
LA	55	0	0%	47	8	54	1
Totals	**300**	**25**	**8%**	**336**	**38**	**213**	**161**

Region5
Region7
Region4
Region6

Detailed Findings

Oversight

Two lower Basin states—Tennessee and Louisiana—had multiple approved TMDLs listed as "Stage 1" or "Phase I" dating back as early as 2005 and 2010, respectively. It is unclear why these TMDLs have not been finalized in Tennessee. In Louisiana, Phase I TMDLs were drafted in order to delay full implementation until dissolved oxygen standards in those watersheds are reexamined.

Two EPA Region 4 states—Kentucky and Tennessee— have written very few nutrient TMDLs (6 and 5 respectively). Further, these states appear to have stopped preparing TMDLs altogether, with no TMDLs from Kentucky in 16 years, and none from Tennessee in 6 years. An unequal effort among states and across EPA regions in producing and finalizing TMDL documents prevents a broad-scale, shared effort to tackle nutrient impairments.

Reasonable Assurance

Among the 374 TMDLs, 203 (54%) had both a wasteload allocation for point sources and a load allocation for nonpoint sources. Reviewers examined these 203 TMDLs for the presence of reasonable assurance as required by EPA,[40] and found adequate assurances in just 10 TMDLs (5%) from four states (MN, WI, IA and AR). The six remaining states had not written a single TMDL with adequate reasonable assurance (IL, MO, KY, TN, MS and LA). Reviewers considered reasonable assurance provisions inadequate if missing entirely or if the section merely listed USDA agricultural best management practices and noted programs providing subsidies for BMP implementation.

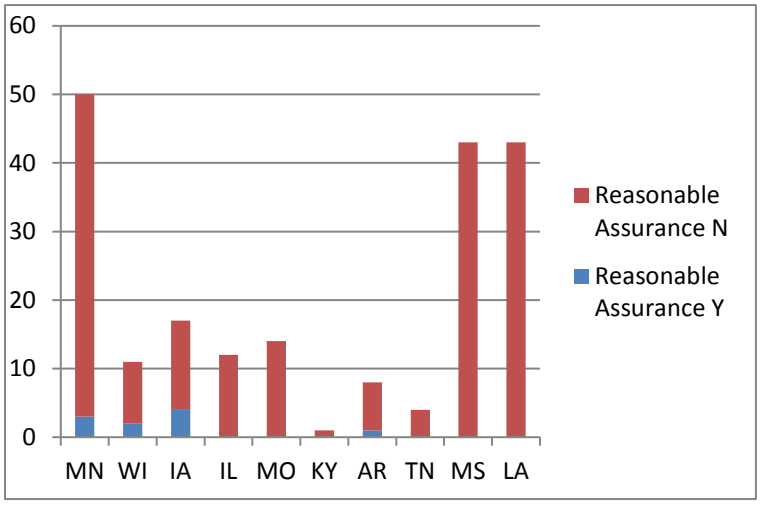


Figure 1. TMDLs with Reasonable Assurance Component

[40] Reviewers compared TMDLs and any available implementation plans with EPA's four-part test found in *Reasonable Assurance for Sources for Which an NPDES Permit is Not Required,* Federal Register, Volume 65, No. 135, Thursday, July 13, 2000, Rules and Regulations, pages 43599-43600. This test states that the control actions or management measures must be 1) specific to the pollutant and waterbody for which the TMDL is being established; 2) implemented as expeditiously as practicable; 3) accomplished through a reliable delivery system; and 4) supported by adequate funding.

Tracking Nonpoint Source Implementation

Plans to track implementation of recommended nutrient reduction practices for nonpoint sources (NPS) in TMDL documents are also overwhelmingly lacking in all 10 states. Just 8% of the 326 TMDLs (or TMDL implementation plans) with a load allocation for NPS contained a mechanism by which implementation would be tracked or verified. Seven of the 10 states have no TMDLs with NPS implementation tracking (including all five lower Basin states). Minnesota and Wisconsin have the highest rates of TMDLs with NPS implementation tracking at 40% and 27% respectively.

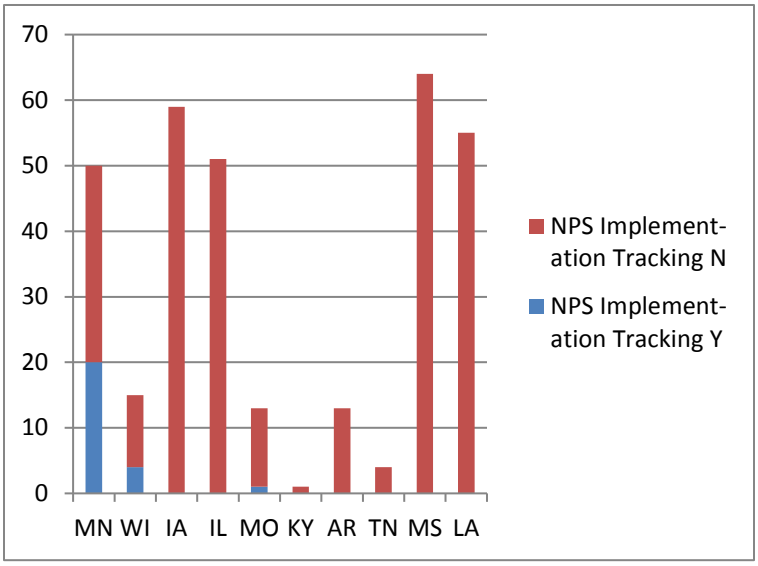


Figure 2. TMDLs with Nonpoint Source Implementation Tracking

The widespread failure to provide reasonable assurances that NPS reductions will occur or mechanisms to verify whether, or the extent to which, they have occurred means that the accuracy of wasteload allocations cannot be determined, and that EPA has no means by which to ensure that implementation of the TMDL achieves water quality standards. EPA's guidance clearly calls for such an evaluation plan for nonpoint sources where regulatory programs do not exist, stating that a state needs to "… evaluate BMP implementation, maintenance, and overall effectiveness to ensure that load allocations are achieved."[41]

[41] EPA, *Guidance for Water Quality-based Decisions: The TMDL Process*, April 1991.

TMDL Review or Revision Triggers

Quality controls for TMDLs in the form of triggers for future review or revision are broadly neglected, with only 10% of the documents containing a timeline for review or other such provisions. This is particularly problematic given the overwhelming lack of reasonable assurance, and overwhelming lack of tracking NPS reductions. These three oversight failures render it impossible for EPA to determine whether there is any progress in meeting water quality standards from TMDL implementation.

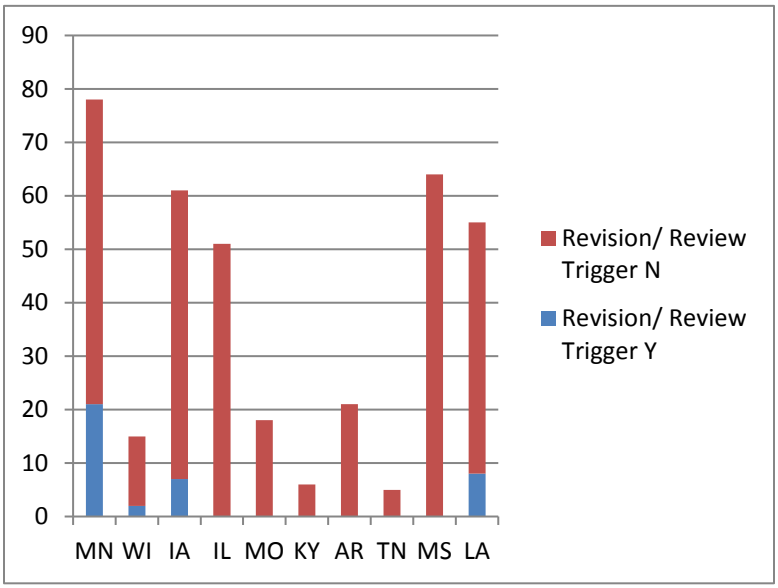


Figure 3. TMDLs with Review or Revision Triggers

Water Quality Monitoring

Just 43% of TMDLs and/or TMDL implementation plans include a plan for follow-up water quality monitoring to check on restoration progress in the impaired waterbody. Three states (IL, KY, and TN) have not included such a plan in any TMDL, while IA and MN include monitoring plans in 89% and 72% of TMDLs, respectively. States often address monitoring with boilerplate language that defers follow up monitoring to its 5-10 year general basin monitoring cycle and make it clear that monitoring is contingent on funding. As such, it is unclear that follow-up monitoring actually occurs with the specificity needed to gauge TMDL progress.

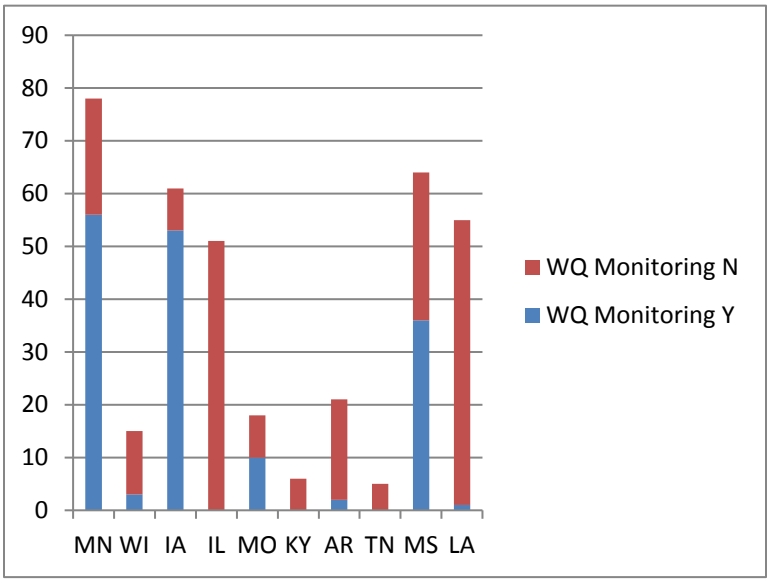


Figure 4. TMDLs or Plans with Water Quality Monitoring Component

TMDLs apply modeled reductions to fit nutrient inputs to a maximum load so that the capacity of an impaired stream to safely assimilate the pollutants is not overloaded. Such modeling is pointless if not subject to future monitoring to check whether the recommended reductions are working. More than half of TMDLs in the 10 states fail to

impose future monitoring, making it impossible to objectively determine whether a TMDL has been effective in reducing nutrients.

Recommendations

EPA needs to step up its oversight to ensure that states complete TMDLs with reasonable assurances that nonpoint sources reductions are likely to occur and with the monitoring and timelines to ensure that planned reductions actually take place. Conversely, EPA should discontinue its practice of approving TMDLs lacking these fundamentals. Additional EPA HQ oversight is needed to ensure consistency among EPA Regions in TMDL review and approval (especially in Regions 4 and 6.) EPA should object to NPDES permits that assume that nonpoint loadings will be reduced unless it is clear from an implementation plan that the nonpoint reductions will actually occur.

Nutrient Reduction Strategies

Introduction

This section of the audit looks at progress made by the 10 states in the development and implementation of Nutrient Reduction Strategies (Strategies). It has been five years since states began drafting these Strategies, and while progress varies by state, it is evident not one of the states has fulfilled the intent set forth in EPA's 2011 Framework for Managing Nitrogen and Phosphorus Pollution. Nor has any state reported any measurable pollution reductions through Strategy implementation.

Background

In March 2011, EPA's Acting Administrator of the Office of Water, Nancy K. Stoner, issued a memo to EPA regional administrators that acknowledged the serious problems caused by nitrogen and phosphorus pollution, but once again passed off management of the problem to the states. While asserting it needed to provide flexibility to the states in finding solutions, the Framework memo set forth a framework comprised of eight "key elements that state programs should incorporate to maximize progress" calling them "minimum building blocks [that] are necessary for effective programs to manage nitrogen and phosphorus pollution."

Overall Observations

Five years have passed since EPA invited states to develop these collaborative, voluntary Strategies. At this point, it is unknown whether the Strategies have facilitated nutrient loading reductions because they lack nutrient loss reduction reporting requirements and implementation accountability measures. To date, none of the states has reported reductions in nutrient loadings due to Strategy implementation. No state has adopted more than two of the eight EPA-recommended elements for managing nitrogen and phosphorus pollution. Because most Strategies lack timelines for achieving reductions, it is unknown what reductions each state was to have even accomplished at this point. Overall, it appears these Strategies are not sufficient to address the extent of nutrient pollution.

Detailed Findings

As shown in Table 5 below, two EPA Region 4 states, Kentucky and Tennessee, have not finalized their Strategies (and their drafts have not been updated in over a year). Just four states have provided overall nutrient reductions goals and only two of these have a timeframe by which to achieve the reductions. None of the 10 states has provided dedicated or regular funding to implement its Strategy.

Table 5. Status of State Nutrient Reduction Strategies

State	NRS Complete	Overall reduction goals	Timeframe to achieve goal	Dedicated implementation funding
Arkansas	X			
Illinois	X	X	X	
Iowa	X	X		
Kentucky				
Louisiana	X			
Minnesota	X	X	X	
Mississippi	X			
Missouri	X			
Tennessee				
Wisconsin	X	X		

There were eight recommended elements in EPA's 2011 Framework for Strategy development (see Fig. 5). Table 6 shows the presence or absence of the eight recommended elements in the Strategies by state.

MEETING THE ELEMENTS

1. Watersheds on a HUC-12 or similar scale were identified to implement targeted N & P load reduction activities.
2. Numeric goals were established for loading reductions for each targeted/priority sub-watershed.
3. The strategy contains plans to develop effective point source permits for Wastewater Treatment Facilities that contribute to significant measurable nutrient loadings, all CAFOs that discharge or propose to discharge, and urban stormwater sources that discharge into nutrient impaired waters.
4. Watershed plans have been developed that target the most effective practices where they are needed most.
5. The Strategy identified how the State will assure nutrient reductions from developed communities not covered by the MS4 program.
6. The Strategy established baseline of existing nutrient loads and current BMP implementation in each targeted/priority sub-watershed, plans for conducting ongoing sampling and provides a description and confirmation of the degree of additional BMP implementation and maintenance activities.
7. A process was established to annually report for each targeted/priority sub-watershed.
8. Developed numeric nutrient criteria for at least one class of waters within 3-5 years.

Figure 5. List of Eight Recommended Elements in EPA's 2011 Framework Memo

Table 6. Presence or Absence of Eight Recommended Elements in State Nutrient Reduction Strategies

Element	MN	WI	IA	IL	MO	KY	TN	AR	LA	MS
1. Watershed prioritization statewide HUC-12 N&P (1.C.)		X	X	X					X	
2. Watershed load reduction goals HUC-12 N&P										
3. Effective NPDES permits (WWTPs, CAFOs, stormwater)										
4. Targeted agricultural practices					X					X
5. Assured septic and non-MS4 areas					X					
6. Accountability and verification										
7. Annual public reporting			X	X					X	
8a. Numeric criteria development (P)	X	X								
8b. Numeric criteria development (N)										

The Framework element of developing effective NPDES permits for wastewater treatment plants, Concentrated Animal Feeding Operations (CAFOs), and urban stormwater was ignored by all 10 states.[42] Only four states (MN, WI, IA, and IL) included reduction goals in their Strategies, but not one of these states included watershed-specific reduction goals as recommended in EPA's Framework. Moreover, none of these four Strategies includes an implementation plan for achieving the stated reduction goals.

The Framework reaffirmed that numeric nutrient criteria are "ultimately necessary for effective state programs" and expected states to "develop statewide numeric N and P criteria for at least one class of waters within 3-5 years." After five years, however, only two states have adopted numeric criteria for P for at least one waterbody type (Minnesota and Wisconsin). Only four of the states (Illinois, Louisiana, Wisconsin, and Iowa) prioritized watersheds with the greatest need in order to begin implementation. Even if all of the Strategies contained complete implementation plans, none are legally enforceable and all lack funding. Not a single Strategy included milestones for evaluation or accountability for implementation. Two of the states (Illinois and Minnesota) did develop timelines, but these are meaningless without goals or a plan for completion.

Only three of the states (Iowa, Illinois and Louisiana) even addressed annual reporting in their Strategies. Lacking reporting requirements or implementation accountability, none of the states

[42] Tennessee's draft Strategy includes a plan to address NPDES permits for wastewater treatment plants, but is silent on the other categories, and Arkansas's Strategy only applies to NPDES permits in the designated Nutrient Surplus Area.

have yet described a reduction in nutrient loading or reported on the progress of their Strategies.

In some instances, it appears that states have actually backtracked on nutrient reduction efforts after going through the Strategy development process. Iowa's Strategy notes that nutrient pollution will be addressed through the Strategy itself rather than numeric criteria development, and Tennessee (the state with the fewest nutrient TMDLs) said it will focus on implementing its Strategy rather than developing new nutrient TMDLs. It appears the Strategies may actually be supplanting enforceable measures to reduce nitrogen and phosphorus pollution.

Recommendations

EPA can no longer rely on voluntary state efforts to make progress on nutrient pollution. In order to improve water quality, EPA must ensure that states include each of the Framework's recommended elements along with adequate provisions for enforceability and accountability in their Strategies. To address nonpoint source pollution, EPA should require states to identify programs and practices for controlling these sources to the maximum extent possible under Section 319 of the Clean Water Act. States must step forward with adequate funding and adopt effective laws and rules to implement their plans. The Framework stated that "EPA will support states that follow the framework but, at the same time, will retain all its authorities under the Clean Water Act" to ensure compliance. It is time for EPA to use its CWA authority to hold states accountable for implementing effective nutrient reduction strategies.

PART 3: NUTRIENT CONTROL PROGRAM STATUS BY STATE

Introduction

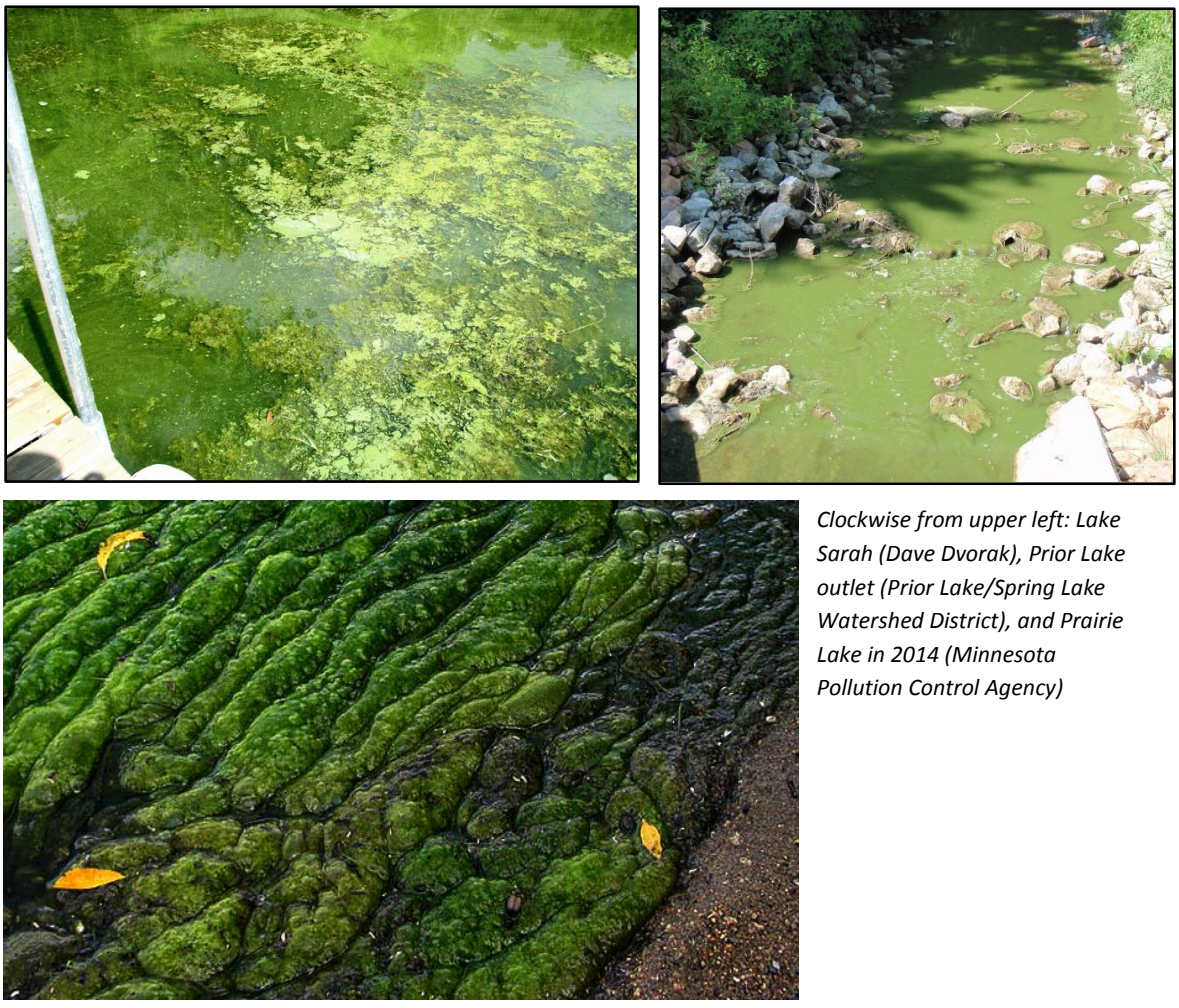
Part 3 summarizes nutrient pollution problems and state control programs for each of the 10 states bordering the Mississippi River. Summaries were written by MRC state partners, and each reviews the respective state's criteria development efforts, water quality assessment and impaired waters listing for nutrient parameters, implementation of nutrient controls through NPDES permits and TMDLs, and concludes with the status and content of Nutrient Reduction Strategies developed in response to EPA's Framework. Summaries are presented from upstream to downstream.

Minnesota

Overview

Excess nutrients are profoundly affecting Minnesota's freshwater resources. Lake eutrophication is the leading cause of impairments added to Minnesota's 2014 303(d) list, with 573 lakes on the state's total inventory of impairments.[43] An additional 127 stream segments are listed as impaired by low dissolved oxygen.[44]

Each summer, Minnesota's lakes suffer severe algae blooms, rendering them unfit for recreation. It is not uncommon for theses blooms to become toxic, resulting in one or more dog deaths each year.



Clockwise from upper left: Lake Sarah (Dave Dvorak), Prior Lake outlet (Prior Lake/Spring Lake Watershed District), and Prairie Lake in 2014 (Minnesota Pollution Control Agency)

[43] *2014 Proposed Impaired Waters List*. Available at https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list.
[44] *Id.*

Large picture water quality trends are mixed, with phosphorus declining in several basins, but nitrate levels on the rise, with mixed trends for biochemical oxygen demand.[45]

Nitrate pollution is ubiquitous throughout Minnesota's agricultural watersheds, with 41 percent of rivers and streams showing levels above 5 mg/L.[46] Nitrate contamination has forced 56 public water suppliers to upgrade infrastructure and find new supplies, and has contaminated an estimated 4,800 private wells to levels in excess of the safe drinking water standard.[47]

Summary of Minnesota Nutrient Control Program

Minnesota has adopted numeric nutrient criteria for phosphorus and chlorophyll-*a* for rivers and lakes. The state conducts relatively few assessments to determine whether waters are meeting these standards. Although the majority of NPDES-permitted facilities that discharge phosphorus are monitoring for that parameter, few have WQBELs. Nutrient-related TMDLs often assign the vast majority of needed load reductions to agricultural nonpoint sources, with little or no "reasonable assurance" that the reductions will occur, and the state does not follow-up on implementation of these load allocations. To date, no nutrient impaired waterway in Minnesota has been delisted due to nonpoint source implementation.

Numeric Nutrient Criteria Adoption

The Minnesota Pollution Control Agency (MPCA) adopted numeric lake and reservoir eutrophication criteria, by ecoregion, for phosphorus, chlorophyll-*a,* and Secchi depth (transparency) in 2007. EPA approved these standards in March 2008.

The MPCA adopted numeric river and stream eutrophication criteria, also by ecoregion, for total phosphorus, chlorophyll-*a*, biochemical oxygen demand, dissolved oxygen flux, and periphyton in 2014. EPA approved these standards in January 2015.

The MPCA does not intend to develop criteria for total nitrogen, as its data evaluation does not show a need for them. Instead, the agency has prepared draft statewide aquatic life criteria for nitrate, available in a technical support document dated November 2010.[48] The MPCA has long awaited the results from additional toxicity testing being conducted by EPA Region 5 before finalizing and adopting the draft criteria. The additional tests have been planned for several years, but did not actually begin until April 2016.[49] As a result, MPCA has missed announced

[45] *Water Quality Trends for Minnesota Rivers and Streams at Milestone Sites*, Minnesota Pollution Control Agency, June 2014, at 15-18. Available at https://www.pca.state.mn.us/sites/default/files/wq-s1-71.pdf
[46] *Nitrogen in Minnesota Surface Waters*, Minnesota Pollution Control Agency, June 2013, p.2. Available at https://www.pca.state.mn.us/sites/default/files/wq-s6-26a.pdf.
[47] *Estimating the external costs of nitrogen fertilizer in Minnesota*, Bonnie Keeler and Jesse Gourevitch, University of Minnesota Institute on the Environment, December 2014.
[48] *Aquatic Life Water Quality Standards Technical Support Document for Nitrate*, Minnesota Pollution Control Agency, 2010. Available at https://www.pca.state.mn.us/sites/default/files/wq-s6-13.pdf.
[49] Personal communication with Candice Bauer, USEPA Region 5, March 29, 2016.

start dates (most recently Fall 2015) to commence finalization of this rule, and has not announced a future start date.

Water Quality Assessment and 303(d) Listing for Nutrients

Minnesota has fully assessed comparatively few of its stream miles and lake acres for nutrient parameters. About 31 percent of lake acres have been fully assessed for phosphorus (eutrophication). Of those fully assessed, 42 percent are impaired. Only 3.3 percent of the state's stream miles are fully assessed for low dissolved oxygen, of which 58 percent are impaired.

Minnesota has just begun to assess rivers and streams for compliance with its numeric eutrophication standards, and expects to list impairments for these parameters in its 2016 303(d) list. Generally, these assessments look at phosphorus and chlorophyll-*a* only, and the state is requiring many samples across two summer growing seasons for both parameters to determine a waterway's status. A review of MPCA's draft assessments to date shows that these data requirements are very seldom met, even where the state has conducted its "intensive" 10-year assessment cycle.

Minnesota assesses streams designated as Class 1 (drinking water use) for nitrate pursuant to its standard of 10 mg/L for these waters. Just a tiny percentage of steam miles (one-tenth of 1 percent) have been assessed for nitrate—all of which were impaired. The MPCA does not assess streams for aquatic life use support for nitrate, despite its longstanding narrative standard and draft numeric cold-water and warm-water criteria.

NPDES Permits

Minnesota has made progress in implementing phosphorus controls in NPDES permits. The state has imposed phosphorus monitoring conditions in most (88%) of the NPDES permits for facilities that discharge this pollutant (all POTWs and some categories of industrials). Among all phosphorus dischargers, just over 43% have a phosphorus limit of any type (whether based on technology, water quality, or state policy).

Only 15% of permits for facilities discharging phosphorus have WQBELs controlling that parameter, and these limits apply to only an estimated 2% of the total design flow of aggregated phosphorus dischargers.

The Minnesota Center for Environmental Advocacy conducted an intensive review of discharge monitoring reports for dischargers to the Lake Pepin watershed. Lake Pepin is a natural impoundment on the Mississippi River that captures most of the phosphorus discharged in the state to the Mississippi Basin. This analysis revealed that authorized (permitted) phosphorus loads are triple the amount actually discharged. It appears that the state will need to impose more stringent permit limits to meet numeric nutrient criteria, particularly in light of TMDL implementation concerns discussed below.

Nutrient TMDLs

The MPCA has prepared, and EPA has approved, 78 TMDLs for Minnesota waters impaired by excess nutrients (phosphorus), low dissolved oxygen, and/or excess turbidity (driven at least in part by excess nutrients). Of these, nearly two-thirds (50) contain both a wasteload allocation (WLA) for point sources, and a load allocation (LA) for nonpoint sources. A close review of these documents shows that 94% (47) of these TMDLs with both a WLA and a LA lack adequate reasonable assurances that the necessary nonpoint source reductions will actually occur.[50] The majority of these "split" TMDLs that lack reasonable assurance require substantial load reductions from agricultural sources.

There is little evidence that needed agricultural reductions will be tracked, as all 30 TMDLs requiring substantial reductions from this sector lack any mechanism for or discussion of nonpoint source implementation tracking.

Nearly 75% of the nutrient TMDLs lack a trigger or plan for review and evaluation of the TMDL for efficacy in addressing the impairment, while just under 30% lack a follow-up water quality monitoring plan.

Minnesota's Nutrient Reduction Strategy

The state adopted its Nutrient Reduction Strategy (Strategy) in September 2014. The Strategy contains overall reduction goals for phosphorus and nitrogen in each of three major drainage basins: the Mississippi River, Lake Winnepeg, and Lake Superior. For the Mississippi River, Minnesota adopted the 45% reductions in both phosphorus and nitrogen export from the state from the 2008 Gulf Hypoxia Action Plan. The phosphorus goal is to be met in 2025, while the nitrogen goal has a 20% reduction milestone in that year, with ultimate achievement in 2040.

While these are laudable targets, to date Minnesota's Strategy lacks a plan to actually achieve these reductions, a mechanism by which to measure, track and report progress, prioritized reduction targets at the HUC-8 or HUC-12 levels, and public progress reporting.

A key challenge is that, while publicly-subsidized agricultural BMPs are credited for progress from the baseline, practices that are removed are not deducted. For example, over 857,000 acres of lands in the Conservation Reserve Program (CRP) have been removed since 2007.[51] Agricultural draintile—the state's largest source of nitrate delivery to surface waters[52]—is being

[50] Reviewers compared TMDLs and any available implementation plans with EPA's four-part test found in *Reasonable Assurance for Sources for Which an NPDES Permit is Not Required,* Federal Register, Volume 65, No. 135, Thursday, July 13, 2000, Rules and Regulations, pages 43599-43600. This test states that the control actions or management measures must be: 1) specific to the pollutant and waterbody for which the TMDL is being established; 2) implemented as expeditiously as practicable; 3) accomplished through a reliable delivery system; and 4) supported by adequate funding.

[51] United States Department of Agriculture, Farm Service Agency, http://www.fsa.usda.gov/programs-and-services/conservation-programs/reports-and-statistics/conservation-reserve-program-statistics/index

[52] *Nitrogen in Minnesota Surface Waters*, Minnesota Pollution Control Agency, June 2013, p. 9.

added at the rate of 100 million feet per year.[53] Such an accounting system is tantamount to balancing a checkbook by counting only deposits and ignoring withdrawals. This baseline adjustment failure is fatal to any verification of and reporting on progress under Minnesota's Strategy.

[53] Lowell Busman and Gary Sands, *Agricultural Drainage Publication Series: Issues and Answers*, University of Minnesota Extension, 2012, last visited May 18, 2016. Available at http://www.extension.umn.edu/agriculture/water/agricultural-drainage-publication-series/

Wisconsin

Overview

Every summer, Wisconsin communities and tourism-related businesses cope with the detrimental effects of nutrient pollution, including foul, smelly water, nuisance algae blooms, fish kills, and health threats, such as toxic algae and contaminated drinking water. The recurring algae blooms limit recreational opportunities on Wisconsin's waters, negatively affect property values, and hurt a wide-range of business owners who rely on clean, healthy water for their livelihoods. While Wisconsin has taken steps to decrease nutrient pollution entering its waters, there is much work to be done to understand the full scope of and address the problem.

Midwest Environmental Advocates

Close to 40% of the waters on Wisconsin's 2014 303(d) list are impaired by excessive phosphorus pollution—and that percentage is growing.[54] Excessive phosphorus is the leading cause of impairment on newly listed water bodies throughout Wisconsin.[55] An additional 129 phosphorus impairments are proposed to be added to the 2016 303(d) list (61% of new listings.)[56] An additional 65 waters are being added as a result of "use impairment" from poor biological conditions.[57] Use impairment is a catch-all category that includes multiple causes of impairment; a primary one being severe or toxic algal blooms caused by excessive phosphorus and nitrogen concentrations.[58]

Data collected over more than three decades at long-term river monitoring sites show nitrogen concentrations increasing throughout the state, with more significant increases occurring in the

[54] WDNR, *Draft Impaired Waters List*.
[55] 2016 Impaired Waters List Update Fact Sheet, Wisconsin DNR Bureau of Water Quality, Revised Oct 20, 2015
[56] *Id*. In part, the increase in phosphorus impairments can be attributed to the state's increased efforts over the last several years to perform assessments on waterbodies that had not been previously assessed. The increased number of impairments does not necessarily indicate that specific waterbodies are declining in water quality.
[57] *Id*.
[58] *Wisconsin's Draft 2016 Impaired Waters List: Public Informational Webinar*, Slide 10, Aaron Larson, DNR Water Evaluation Section, Nov. 3, 2015.

southern half of the state.[59] Between 1977 and 2010, 35 of the 38 long-term river monitoring sites found increased concentrations of nitrogen in rivers. Several sites recorded nitrogen concentrations in 2010 that were almost twice as high as the levels recorded in 1997. For example, the monitoring site in the Pecatonica River recorded nitrogen concentrations of over 6 mg/l in 2010, whereas the 1997 levels were below 3 mg/l.[60]

There is little information available about nitrogen levels in Wisconsin surface waters beyond the data collected at long-term monitoring sites, There is, however, much more information about nitrogen and nitrate pollution in groundwater. Elevated nitrate concentrations, often exceeding enforcement levels, have been found in municipal drinking water and well water throughout the state.[61] A recent investigation by the Wisconsin Center for Investigative Journalism revealed that "nitrate is at unsafe levels in an estimated 94,000 Wisconsin households."[62] Further, "[o]ne in five wells in heavily agricultural areas is now too polluted with nitrate for safe drinking."[63] In a report to the Wisconsin Legislature, the Wisconsin Groundwater Coordinating Council concluded that "Nitrate that approaches or exceeds unsafe levels in drinking water is one of the top drinking water contaminants in Wisconsin, posing an acute risk to infants and women who are pregnant... and a chronic risk of serious disease in adults."[64]

Summary of Wisconsin Nutrient Control Program

Wisconsin has made progress in its efforts to address nutrient pollution, particularly with respect to phosphorus. Those efforts, however, do not match the scale of the water quality problems caused by nutrient pollution. While the state has adopted numeric phosphorus criteria, the standards have been under attack as long as they have been in effect. Efforts to develop and adopt numeric nitrogen criteria have stalled. Wisconsin has increased its assessment of waterbodies for phosphorus impairments, but the state is not undertaking similar efforts for nitrogen. Some wastewater discharge permits now include water-quality based effluent limits and monitoring requirements for phosphorus, but WDNR grants permittees excessively long compliance schedules, and again, does not include similar requirements for nitrogen. Wisconsin's TMDLs lack "reasonable assurances" that agricultural pollution reductions will be achieved and plans for monitoring water quality and reviewing progress. The state's Nutrient Reduction Strategy (Strategy) fails to set out any real plan for achieving the massive pollution reductions it promises.

[59] See *Wisconsin Nutrient Reduction Strategy*, Executive Summary - 7
[60] *Id.*
[61] *Id*.
[62] Kate Golden, *Nitrate in water widespread, current rules no match for it* (Nov. 15, 2015). Available at http://wisconsinwatch.org/2015/11/nitrate-in-water-widespread-current-rules-no-match-for-it/
[63] *Id*.
[64] *Id*.

Numeric Nutrient Criteria Adoption

In 2010, Wisconsin became one of the first states to adopt statewide numeric water quality standards for phosphorus. Since the criteria were adopted, however, the state has made several attempts to either eliminate or delay their implementation. For example, Governor Walker's 2011-2013 budget proposal included a provision that would have eliminated the criteria and replaced them with standards that are "no more stringent than neighboring states."[65] That provision was later removed, in part due to concerns that it would violate EPA regulations. Most recently, WDNR has been working towards implementation of a multi-discharger variance that would delay compliance with the phosphorus criteria.[66] Under the proposed variance, any point source that qualifies for the variance will not have to comply with its phosphorus WQBEL for up to four permit terms (20+ years).[67] During that time, the permittee would be subject to an interim limit and would be required to make payments to counties that would be put towards reducing nonpoint source pollution.[68] DNR recently estimated that over 60% of the permittees would be eligible for the variance as it is currently written.[69]

Wisconsin's efforts to develop numeric criteria for nitrogen have stalled despite significant support from the public and within the WDNR.[70] In 2010, WDNR indicated that it planned to adopt numeric nitrogen criteria by 2013. In subsequent years, WDNR moved forward with planning for criteria development and collected necessary information and data.[71] The next step is for WDNR to analyze the data and determine whether to "[propose] criteria or [pursue] the option of showing that nitrogen criteria are not needed."[72] WDNR proposed to complete the needed analysis by July 2014, but has yet to do so. Based on conversations with WDNR

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[65] Ron Seely, *Lake protections take big hit in Walker's budget, critics say* (Mar. 7, 2011). Available at http://host.madison.com/wsj/news/local/environment/lake-protections-take-big-hit-in-walker-s-budget-critics/article_dc7e06ae-479e-11e0-ae5b-001cc4c002e0.html

[66] WDNR, *Statewide Phosphorus Multi-Discharger Variance* Website. Available at http://dnr.wi.gov/topic/surfacewater/ phosphorus/statewidevariance.html.

[67] *See* Wis. Stat. § 283.16.

[68] *Id*.

[69] Oral testimony of Amanda Minks, WDNR Water Resources Management Specialist, during public hearing on Jan. 19, 2016.

[70] WDNR and EPA staff and the State's Tribes ranked the development of numeric criteria for nitrogen as the state's second highest priority during the most recent Triennial Standards Review. *Wisconsin Triennial Standards Review* at p. 14.The public ranked as the 5th highest priority. *Id*. at p. 19. Despite these high rankings, WDNR did not identify the development of nitrogen criteria as a priority for 2015-2017. *See id*. at 20.

[71] *Wisconsin's Nutrient Reduction Strategy* at 88-89. http://dnr.wi.gov/topic/SurfaceWater/nutrient/combined_draft.pdf

[72] *Id*. at 89.

staff, there is no plan for completion of that analysis. Instead, WDNR expects to release two reports discussing problems the agency has encountered with reviewing and understanding the collected data.[73]

Midwest Environmental Advocates

It is not clear when or if Wisconsin will move forward with development of nitrogen criteria. However, the state's Strategy does give a clear signal that the State does not intend to adopt new criteria in the near future. Specifically, WDNR has stated that it expects to be able to meet state water quality goals and Gulf of Mexico hypoxia nutrient reduction goals without "new regulations for either point sources or nonpoint sources."[74]

Water Quality Assessment and 303(d) Listing for Nutrients

Since adopting numeric phosphorus criteria, Wisconsin has increased efforts to assess the state's waterbodies for phosphorus impairments. Nonetheless, WDNR has assessed less than half of the total acres of lakes, reservoirs and ponds in Wisconsin; and just 10% of total miles of rivers and streams. Among waters assessed for phosphorus, WDNR is finding high rates of impairment. Over 60% of the river and stream miles and 70% of the lake and reservoir acres assessed contain phosphorus at levels that exceed the water quality standard.

WDNR does not assess waters for nitrogen. According to WDNR staff, "Wisconsin does not have surface water quality standards or assessment methods for nitrogen; therefore no assessments have been conducted for this parameter."[75]

NPDES Permits

When it adopted the numeric phosphorus criteria, Wisconsin also adopted rules for implementing the criteria in wastewater discharge permits. Although many point sources face stringent limits under the new rules,[76] WDNR's implementation rules establish several mechanisms that provide permittees with "flexibility" in meeting them. These include compliance schedules of up to 7 to 9 years and a "watershed adaptive management option" that allows permittees 20 years to meet water quality standards in conjunction with other

[73] B. Weigel, WDNR Water Evaluation Section Chief, personal communication, Jan. 18, 2016.
[74] Wisconsin's Nutrient Reduction Strategy at p. ES-1.
[75] A. Larson, WDNR Impaired Waters Coordinator, personal communication, Aug. 7, 2015.
[76] WDNR conducted a statewide analysis to determine how many facilities may be subject to water quality based effluent limits under the new criteria. The agency found that of the 754 permittees that discharge to surface waters, 592 would likely need phosphorus WQBELs incorporated into their permits.

watershed sources.[77] As mentioned above, the state is also seeking EPA approval for a multi-discharger variance that could further delay compliance with the more stringent limits.

While the rules for implementing the criteria in permits were adopted over 5 years ago, less than 5% of the 754 permits for facilities that discharge phosphorus have a water-quality based effluent limit for phosphorus currently in effect. An additional 286 facility permits contain WQBELs to be effective following 7-9 year compliance schedules.[78] More than a third of the permits do not contain either an effluent limit or monitoring requirements.[79]

In part, WDNR has been slow to incorporate needed effluent limits into permits due to a backlog in reissuing the permits.[80] However, WDNR has also been implementing the rules in a way that unnecessarily and illegally delays compliance with water quality standards. For example, WDNR routinely fails to justify the length of permit compliance schedules in accordance with the factors outlined in state and federal law. Instead, WDNR appears to base the length of the compliance schedule entirely on the stringency of the final limit.

WDNR does not include nitrogen effluent limits or discharge monitoring requirements in permits. The state lacks procedures for translating narrative water quality standards into water quality based effluent limits for nitrogen.

Nutrient TMDLs

WDNR has developed 15 TMDLs addressing phosphorus impairments. There are no TMDLs to address nitrogen impairments because the state does not assess waters for nitrogen and therefore has not identified any waterbodies as nitrogen-impaired.

All 15 of the phosphorus TMDLs have load allocations that call for a reduction of nonpoint source pollution. However, only 2 of the TMDLs have reasonable assurances that nonpoint source load allocations will be achieved and water quality standards will be attained. Most TMDLs contain boilerplate language that simply references existing requirements in state regulations and describes federal and state funding programs that provide money to agricultural operators to help offset the costs of implementing best management practices (BMPs). The TMDLs do not discuss whether the mandatory or voluntary reductions anticipated will be sufficient to meet the load allocations. Moreover, there is no discussion of the likelihood of implementation of any BMPs, or a specific plan for implementation. Thirteen of the 15 phosphorus TMDLs do not contain triggers for reviewing progress made towards meeting the TMDL requirements, and 12 of the 15 TMDLs do not specify how, or even if, nonpoint source

[77] Wis. Admin. Code §§ NR 217.17 and 18.

[78] The data provided by WDNR did not indicate whether the effluent limits for specific permittees were water quality-based or technology-based effluent limits. A number or assumptions had to be made about the data in order to arrive at the numbers mentioned in this paragraph. Those assumptions are explained in Part 2: NPDES Permits

[79] See Part 2: NPDES Permits

[80] Over 20% of individual WPDES permits are currently expired and have not been reissued. *Current WPDES Wastewater Permit Holders*, DNR, http://dnr.wi.gov/topic/Wastewater/PermitLists.html (last visited Jun. 28, 2016).

projects will be tracked. The lack of targeted implementation plans, tracking requirements and procedures for reviewing progress do not provide reasonable assurances that the TMDL goals will be met and make it unlikely that the TMDLs will result in significant water quality improvements.

Thirteen of the 15 TMDLs also lack a specific water quality monitoring plan. While almost all TMDLs indicate that water quality monitoring will be done, the plans themselves are void of detail and do not provide specific assurances that the monitoring will occur. Several TMDLs acknowledge that there may not be funding to do water quality monitoring in the future or state merely that there is an "intention" to do the identified monitoring.

Wisconsin's Nutrient Reduction Strategy

Wisconsin finalized its Strategy in November 2013. The Strategy contains overall reduction goals for phosphorus and nitrogen in the Mississippi River and Lake Michigan Basins. For the Mississippi River, Wisconsin adopted the 45% reductions in both phosphorus and nitrogen export from the state from the 2008 Gulf Hypoxia Action Plan claim that Wisconsin can achieve these goals without "new regulations for either point sources or nonpoint sources."[81] However, the Strategy lacks any real plan to actually achieve these reductions. There are no mechanisms by which to measure, track and report progress; no specific load reduction goals; and no provisions for annual public reporting of implementation actions or biannual reporting of load reductions. Moreover, the Strategy does not specify a date by which it expects to achieve the needed 45% reductions.

Perhaps most problematic, the Strategy relies on unrealistic estimates of future pollutant reductions to demonstrate that the state will achieve the 45% reduction goals. For example, the NRS estimates that nonpoint source contribution of phosphorus to the Mississippi River Basin will be reduced by a whopping 40% from baseline (1995) conditions under existing state and federal programs.[82] These programs include Wisconsin's agricultural performance standards, BMPs used to meet them, and a listing of cost-share programs. However, most programs are voluntary, and agricultural operators are only required to comply with the performance standards when they accept cost-share funding, participate in programs such as the Wisconsin Farmland Preservation Tax Credit, or in some cases, receive state or local permits related to livestock siting and manure handling.

The state performance standards were adopted in 2002, yet the available data from between 1995 and 2013 show that Wisconsin has experienced a "degree of backsliding" over that time.[83] This backsliding results in part from lands being taken out of the Conservation Reserve Program,[84] and limited effectiveness of the state's performance standards due to "insufficient staff levels, inadequate time and resources at both the state and county levels, and the lack of

[81] *Wisconsin's Nutrient Reduction Strategy* at p. ES-1
[82] *Id.* at 33.
[83] *Id*.
[84] *Id.*

cost share dollars."[85] A state review of nutrient management planning shows widespread non-compliance with this state performance standard, with less than half of the crop land in 62 of 72 counties in Wisconsin covered by a nutrient management plan, and, in 26 of those counties, less than 10% of the crop land covered under a plan.[86] In short, available data simply do not support the Strategy's reliance on estimates of massive future agricultural load reductions under the status quo.

[85] WDNR, *Wisconsin's Nonpoint Source Program Management Plan- FFY 2016-2020*, at 11, (Sep. 18, 2015).
[86] *Id*.

Iowa

Overview

The environmental and public health impacts to Iowa lakes, rivers and streams from excessive nitrogen and phosphorus pollution threaten the safety of Iowa's drinking water and recreational waters. All trends in Iowa point to increasing levels of nitrogen and phosphorus pollution with no plans to implement Clean Water Act regulatory requirements to set limits on these pollutants. Instead, Iowa's primary approach to nutrient pollution control relies on a patchwork of voluntary and non-regulatory measures rather than explicit water quality goals.

The Des Moines Waterworks (DMWW) is struggling with historic levels of nitrate in their intake waters from the Des Moines and Raccoon Rivers. This nitrate pollution is threatening the health of nearly 500,000 Iowans (about one third of the state) and costing millions of dollars to treat. The Des Moines Waterworks was forced to run its nitrate removal system for 177 days in 2015 (the previous record was 108 days).[87] The system costs $7,000 a day to operate.[88] Costs to ratepayers could increase significantly if DMWW has to implement new denitrification technology to provide safe drinking water at an anticipated capital cost of $76-183 million.[89] As Bill Stowe, the manager of the DMWW explains, Des Moines has seen "the worst spikes of nitrate concentrations" since Iowa's voluntary Nutrient Reduction Strategy (Strategy) was announced in 2012.[90] As a result, the DMWW has been forced to file a lawsuit against upstream sources of nitrate in an effort to protect the public's health and welfare.[91]

Algae blooms discourage recreation at the popular Big Creek State Park Lake Beach, northwest of Des Moines, the site of a number of microcystin advisories since 2006. (Iowa Environmental Council)

[87] Press Release, Des Moines Waterworks, January 4, 2016. Available at http://www.dmww.com/about-us/news-releases/des-moines-water-works-2015-denitrification-record.aspx.

[88] Complaint at ¶95, Board of Water Works Trustees of the City of Des Moines Iowa v. Sac County Board of Supervisors (N.D. Iowa 2015)(No. 5:15-cv-04020).

[89] *Press Release, Des Moines Water Works, July 27, 2015*. Available at http://www.dmww.com/about-us/news-releases/des-moines-water-works-ratepayers-face-over-1-5-million-for-2014-and-2015-denitrification-operationa.aspx.

[90] Q & A with Bill Stowe, Published in Successful Farming, December 7, 2015. Available at http://www.agriculture.com/crops/fertilizers/technology/qa-bill-stowe-ceo-general-mager-of-des_175-ar51492

[91] See Complaint, Board of Water Works Trustees of the City of Des Moines Iowa v. Sac County Board of Supervisors. See also Eller, Donnelle, *Des Moines water quality suit slated for trial in 2016*, Des Moines Register, July 15, 2015. Available at http://www.desmoinesregister.com/story/money/agriculture/2015/07/15/des-moines-

Des Moines is not the only community in Iowa battling the problem of drinking water contaminated by harmful levels of nitrate pollution. According to a Des Moines Register article, the public drinking water from wells or surface water for about 260 cities and towns in Iowa — or 30% of the municipal water systems in the state — are "highly susceptible" to nitrate levels in their water supplies exceeding the federal standard for safe drinking water. As noted in the article, this problem affects Iowa's largest cities (Des Moines, Cedar Rapids, Cedar Falls, Waterloo) and also many of its smallest towns.[92]

A sign warns visitors to avoid the water at Rock Creek Lake Beach in central Iowa, the site of a number of microcystin advisories since 2006. (Iowa Environmental Council)

There are also growing public health concerns related to recreational contact with polluted waters. Iowa is seeing increased problems with microcystin toxins produced by cyanobacteria blooms that form in lakes and rivers with too much phosphorus. In 2015, weekly monitoring for microcystin at 39 state park beaches resulted in a significant increase in health warnings. The previous record for microcystin health warnings was in 2013, with 24 weekly warning signs posted at 10 of Iowa's 39 state park beaches. In 2015, Iowa had 34 warnings at 15 state beaches, including 6 that had *never* had a warning for microcystin before 2015.

While more common in lakes, unsafe levels of microcystin toxins were also documented in 2015 in the Mississippi River at the drinking water intakes for the cities of Davenport, IA and Moline, IL.[93] The cities were fortunate that their filter systems were able to remove the toxins to safe levels in the finished drinking water, but it was a close call. In response, additional plans and new resources were put in place so these communities can better track microcystin toxins in their intake water and avoid a catastrophic situation like the severe algae blooms in Lake Erie that made the City of Toledo's drinking water unsafe.

The overall impairment trend for nutrient pollution in lakes is getting worse, not better. Iowa's 2012 Integrated Report identifies a total of 120 nutrient-related impairments to Iowa lakes and reservoirs; Impairments in these same categories jumped to 130 in the 2014 Integrated Report.[94]

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water-works-lawsuit-buena-vista-calhoun-sac-counties-water-quality/30191169/?from=global&sessionKey=&autologin=

[92] Eller, Donnelle, *30% of water systems susceptible to nitrate pollution, data show*, Des Moines Sunday Register, July 5, 2015, at 1A.

[93] Meeting minutes for Upper Mississippi River Basin Association Water Quality Task Force, Sept. 29-30, 2015. Available at http://www.umrba.org/meetings/wqtf-summaries/wqtf9-15.pdf, p. 5.

[94] See *Fact Sheet for the final 2012 list of impaired waters*. Available at http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Water-Monitoring/Impaired-Waters/Previous-303-d-Listings, p. 7; See *Summary for the*

In addition to the local health and environmental impacts, Iowa's nutrient pollution is also a major contributor to the Dead Zone. According to the U.S. Geological Survey, Iowa contributes 11.3% of total nitrogen and 9.8% of total phosphorus flux to the Gulf of Mexico, making it the second and third leading state, respectively, contributing to the Dead Zone.[95]

Summary of Iowa Nutrient Control Program

Iowa has not established statewide numeric nutrient criteria for any waterbody type, and has no plans to do so. The state is well aware of the programmatic inadequacies resulting from its failure to adopt numeric nutrient criteria, stating "Because Iowa does not yet have numeric criteria for nutrients or sediment/siltation, identification of such impairments is relatively rare. Eventual adoption of numeric criteria for nutrients, chlorophyll, and/or turbidity will likely result in a substantial ***increase*** in the number of waterbodies on Iowa's future lists of impaired waters." (Emphasis in original)[96]

In the meantime, Iowa has assessed less than one-third of its lake acres for nutrient impacts utilizing a trophic state index to interpret its narrative standard, and lacks any process for assessing nutrient impacts to streams. Iowa has explicitly rejected use of its narrative water quality standards to derive phosphorus effluent limits in NPDES permits, and has only two NPDES permits in the entire state with phosphorus effluent limits based on TMDLs. While the vast majority of nutrient impairments to waters in Iowa are caused by agricultural nonpoint sources, Iowa has no system for tracking nonpoint source implementation needed to restore impaired waters.

Numeric Nutrient Criteria Adoption

Iowa's nutrient pollution problems are significant and are getting worse and in many cases are approaching crisis levels. Despite the urgency of this problem, Iowa has abandoned work on development of numeric water quality criteria to set limits on nutrient pollution.

Iowa's 2006 criteria development plan stated that numeric criteria for lakes would be adopted in 2007, with stream criteria being developed the following year.[97] In 2016, according to U.S. EPA's tracking website, Iowa has made no progress towards the development of numeric criteria and has failed to provide any milestones for future state progress.[98] The current Iowa Department of Natural Resources (IDNR) Work Plan Summary for the 2015-2017 triennial review (Work Plan) does not make any reference to the development of numeric nutrient criteria as either an existing or planned effort. Instead, the current Work Plan states that it has

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final 2014 list of impaired waters and Integrated Report. Available at http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Water-Monitoring/Impaired-Waters, p. 5.

[95] See table at http://water.usgs.gov/nawqa/sparrow/gulf_findings/index.html.

[96] *Summary for the final 2014 list of impaired waters and Integrated Report.* Available at http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Water-Monitoring/Impaired-Waters, p 1-2.

[97] *Iowa's Plan for Adoption of Nutrient Water Quality Standards 3rd Draft –2/3/06*, Iowa Department of Natural Resources, p. 12.

[98] *See* https://www.epa.gov/nutrient-policy-data/state-development-numeric-criteria-nitrogen-and-phosphorus-pollution

been determined that nutrients will be addressed through the state's Strategy. "Nutrients, General" and "Nutrients, Lake" are listed as "de-selected" priority items in the current Work Plan.[99]

In denying a citizen petition in October 2013 to establish numeric phosphorus and chlorophyll-*a* criteria to protect recreational uses at Iowa lakes—an effort the state abandoned three years earlier in mid-2011[100] following release of EPA's 2011 Framework—the Iowa Environmental Protection Commission concluded that numeric criteria are "not necessary," declaring that Iowa's Strategy represents the State's "primary effort" to reduce statewide nutrient-related impacts.[101] The Iowa Strategy, however, states that development of numeric nutrient criteria "may not be the best approach" and provides no timelines or milestones for next steps on water-quality based criteria.[102]

In summary, since EPA issued its 2011 Framework memo, *Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions*, Iowa has backed off on development of numeric water quality criteria for nutrients.

Water Quality Assessment and 303(d) Listing for Nutrient Impairments

Iowa does not assess surface waters for aquatic life or recreational impacts from nitrogen or nitrate, but does assess nitrate levels relative to its drinking water standard of 10 mg/L. The state reports that 49 stream miles (23% of miles assessed) are impaired for drinking water use, but has assessed only 0.3% of its stream miles for this parameter. The state does not assess for phosphorus impacts to streams at all. Iowa reports 124 miles as impaired by low dissolved oxygen, but does not report miles supporting or miles assessed for this parameter. The state sets its bar for data indicating dissolved oxygen impairment very high, requiring continuous monitoring over at least one four-week (28-day) period during mid to late summer (e.g., July and August) in each of two different years within a five-year period. The state's methodology also requires a large amount of impact for an impairment finding, with criteria being exceeded for 16 or 24 hours

Algal scum makes boating unpleasant at Center Lake, in north Iowa's Great Lakes region, where summer tourism contributes significantly to the local economy. (Iowa Environmental Council)

[99] DNR, *Triennial Work Plan 2015-2017* (May 27, 2015). Available at http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Water-Quality-Standards, p. 6, 21
[100] *Id.*, p. 6
[101] Iowa Environmental Protection Commission, *Denial of Petition for Rulemaking* at p. 4. (Oct. 14, 2013)
[102] Iowa Nutrient Reduction Strategy, Section 1.2. Available at http://www.nutrientstrategy.iastate.edu/, p. 7

in a 24-hour period "significantly greater than 10% of the days monitored".[103]

IDNR was unable to provide data regarding the number of stream miles fully assessed using this methodology. Iowa DNR tracks where data for dissolved oxygen suggest impairment of aquatic life uses but does not track where dissolved oxygen has been monitored but no impairment was indicated. [104]

Nitrogen and phosphorus pollution can cause excessive algal growth, turbidity and/or low dissolved oxygen that can lead to eutrophication in lakes. Lacking numeric criteria for nitrogen and phosphorus, Iowa uses a trophic state index based on water clarity and algal growth (measured by chlorophyll-*a)* to determine use support of its narrative water quality standard identifying "esthetically objectionable conditions" for recreation or "acutely toxic conditions" for aquatic life. Based on this assessment, nutrient pollution is the leading cause of impairments in Iowa's lakes, where the state reports that it has assessed 31.5% of its lake acres for eutrophication, finding 27% of these to be impaired.

NPDES Permits

IDNR has flatly rejected adherence to federal regulations[105] requiring use of its narrative water quality standards to derive phosphorus effluent limits in NPDES permits, stating "The traditional approach of first adopting numeric criteria or a narrative translator, calculating a wasteload allocation, determining water quality-based permit limits and issuing a permit with a schedule that would require compliance within a specified time was considered and rejected in favor of the proposed approach…"[106] IDNR's approach, outlined in its Strategy, is to require major sources to submit a feasibility study for technology-based removal of phosphorus within two years of permit issuance or renewal.[107]

Remarkably, Iowa currently has just two permits in the entire state with phosphorus limits, or just 0.15% of the 1,328 permitted facilities discharging phosphorus. Neither of these is a water quality based effluent limit. Less than 10% of these facilities are required to monitor phosphorus discharges.

Setting aside Iowa's impermissible failure to follow EPA's regulations, IDNR is not fully or consistently implementing its substitute approach. The INRS states that when wastewater capacity increases are planned "the evaluation of nutrient removal feasibility will be conducted as part of the construction permitting process through current antidegradation rules and

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[103] Iowa DNR, *Methodology for Iowa's 2014 Water Quality Assessment, Listing, and Reporting Pursuant to Sections 305(b) and 303(d) of the Federal Clean Water Act*, July 2015, p. 145-147.
[104] Electronic correspondence from John Olson, IDNR, to Clare Kernek, IEC, on 11/9/15.
[105] 40 C.F.R. §122.44(d); §122.4.
[106]Iowa DNR, *Draft Iowa Nutrient Reduction Strategy Response to Comments*, November 19, 2012, p.14. http://www.nutrientstrategy.iastate.edu/public
[107] Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources, Iowa State University College of Agriculture and Life Sciences ,Iowa Nutrient Reduction Strategy, Section 3, *Point Source Nutrient Reduction Technology Assessment and Implementation Plan.* Available at http://www.nutrientstrategy.iastate.edu/public,. p. 6.

procedures," and that "[n]utrient removal will be encouraged anytime construction is proposed,"[108] but this has not been the case. For example, when the City of Clarion was seeking a new construction permit for the expansion of its wastewater treatment plant, a nutrient removal alternative was not considered in the City's draft antidegradation alternatives analysis, and Iowa DNR did not encourage it to do so.[109] Although Clarion did include a nutrient removal alternative in its final alternatives analysis (in response to comments from the Iowa Environmental Council), Iowa DNR approved the Clarion expansion project without requiring consideration of the environmental benefits of nutrient removal. Iowa DNR's failure to implement the INRS in this case was especially troubling due to the fact that Clarion's facility is subject to the TMDL plan addressing the nitrate impairment of the Des Moines River, yet was authorized to increase its loading of nitrate pollution through the permitted expansion.[110]

Nutrient TMDLs

Iowa DNR has prepared and EPA has approved 61 TMDL plans for Iowa waters impaired by nutrients, nitrate, algae, turbidity, organic enrichment, noxious aquatic plants, and/or low dissolved oxygen caused at least in part by excess nitrogen and/or phosphorus.[111] The vast majority of the nutrient pollution contributing to these impairments is coming from nonpoint sources, mostly related to agricultural runoff. Among the 17 TMDLs that include both a wasteload allocation (WLA) for point sources and a load allocation (LA) for nonpoint sources, 76% lack adequate reasonable assurance that the nonpoint source reductions will actually occur and 65% set the WLA at the existing point source load, requiring all reductions to come from the nonpoint sources. Despite this, none of the TMDLs includes a system to track agricultural nonpoint source implementation.

While 87% of the Iowa TMDLs have ongoing water monitoring that is adequate to track progress, 88% lack a trigger or plan for review and evaluation of the TMDL progress to determine if changes are needed.

Iowa's Nutrient Reduction Strategy

The Iowa Nutrient Reduction Strategy (INRS) has set a 45% overall nutrient load reduction goal, but lacks a feasible plan for reaching these ambitious goals.

The INRS documents the significant extent of the agricultural nonpoint source problem, details promising conservation practices, and provides possible scenarios for achieving the agricultural reductions. However, it lacks specific timelines, benchmarks and resources to implement these scenarios. It also lacks important accountability mechanisms such as monitoring to measure

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[108] *Id.*, p. 6

[109] See City of Clarion, *Draft Antidegradation Alternative Analysis, Wastewater Treatment Facility Improvements Project*, September 2014. Clarion added a nutrient removal alternative to its final antidegradation alternatives Analysis in response to IEC's comment letter of August 20, 2014, but eliminated that option based on higher costs without considering environmental benefits of nutrient removal.

[110] See October 9, 2014 letter from IDNR approving Clarion's Antidegradation Alternatives Analysis.

[111] Iowa's EPA approved TMDL plans. Available at http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Watershed-Improvement/Water-Improvement-Plans/Public-Meetings-Plans

progress at the small watershed scale to set the stage for adaptive management. The INRS identifies nine HUC8 watersheds as initial priority focus areas, but does not set any reduction goals or timelines specific to the priority watersheds.[112] While all of Iowa's NRS HUC 12 priority watersheds are working with farmers and landowners to implement the targeted agricultural practices determined to be most effective in reducing nitrogen and phosphorus that are recommended in the Iowa NRS, not all priority watersheds have watershed plans that are targeting these practices to critical areas of the watershed where they are needed most.

Currently, progress on the INRS is being measured based on four main indicators: *Inputs*, including money spent for programs to deliver practices identified in the INRS by state, federal and private partners; *Human*, including partner organizations and farmer knowledge and attitudes; *Land*, including the number and acreage of conservation practices installed, and; *Water*, including calculated load reductions and measured loads in priority watersheds, based primarily on modeling of estimated nutrient reductions.[113] There has been conflicting information as to whether the Iowa Nutrient Research Center, which is responsible for tallying progress on INRS goals, is tracking "net" conservation acreage, considering practices lost, as well as new acreage signed up in conservation programs.

According to the INRS' science assessment, the costs of reaching just the nonpoint reduction targets are significant, ranging from initial financial investments of $1.2 to $4 billion over 20 years, plus annual investments of $756 million to $1.2 billion.[114] Yet thus far, Iowa has not identified funding sources that would come close to what is needed for implementation, nor does it have a plan for raising such funds. Annual appropriations from the state committed to the INRS have been inconsistent, starting at $10 million for fiscal year 2013, dropping to $3.9 million in Year 2, dropping again to $1.765 million in Year 3, and then increasing to $12.155 million in Year 4 and $10.925 million in Year 5.[115]

[112] Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources, Iowa State University College of Agriculture and Life Sciences, *Iowa Nutrient Reduction Strategy,* Updated Sept. 2014.
[113] Iowa Water Resources Coordinating Council/Watershed Planning Advisory Council. 2015. NRS Reporting Template. http://www.nutrientstrategy.iastate.edu/sites/default/files/documents/IndividualNRSReports2015.pdf
[114]Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources, Iowa State University College of Agriculture and Life Sciences. *Iowa Nutrient Reduction Strategy,* updated Sept. 2014. Section 2.1, Executive Summary- Iowa Science Assessment of Nonpoint Source Practices. Available at http://www.nutrientstrategy.iastate.edu/documents, Table 5, p. 9.
[115]Legislative Services Agency. June 2016. Fiscal Topics: Budget Unit: Water Quality Initiative. Available at https://www.legis.iowa.gov/docs/publications/FT/26088.pdf.

Illinois

Overview

Excessive nitrogen and phosphorus continue to pose serious threats to Illinois waters, interfering with the public's use and enjoyment and threatening the health of people and aquatic life. Lakes in particular have been devastated by phosphorus pollution.

Phosphorus and algae are the leading causes of impairment of the aesthetic use in Illinois lakes. In 2016, 91% of assessed lake acres were impaired by excess phosphorus and 45% by aquatic algae and aquatic plants.[116] Many of Illinois' inland lakes are disgusting in the summertime.

Left: Candlewick Lake, Right: Westlake (Prairie Rivers Network)

In the 2012 drought, Illinois saw alarming spikes in microcystin values in several of its lakes, including microcystin values in the thousands of parts per billion (µg/L), with a high of 31,500 µg/L, a definite public health concern. The World Health Organization guidance for probability of health effects during recreational exposure identify a high probability of acute health effects at microcystin values of 20 µg/L and greater and a very high probably of acute effects when levels are ≥ 20,000 µg/L. [117]

In 2013, of the approximately 110 lakes monitored, 52 (nearly 50%) were found to have microcystin levels in excess of 20µg/L, with 2 lakes over the 20,000 µg/L threshold. Accurate

[116] http://www.epa.illinois.gov/Assets/iepa/water-quality/watershed-management/tmdls/2016/303-d-list/iwq-report-surface-water.pdf

[117] Ingrid Chorus and Jamie Bartram, eds. (1999), Toxic cyanobacteria in water, A guide to their public health consequences, monitoring and management, UNESCO, WHO and UNEP by E&FN Spon. http://www.who.int/water_sanitation_health/resourcesquality/toxcyanchap5.pdf

information on beach closures due to harmful algal blooms is unavailable, as there is no Illinois agency tracking such closures. In the Mississippi River, unsafe levels of microcystins were found in the drinking water intake for the city of Moline.

In addition to the local health and environmental impacts, Illinois' nutrient pollution is also a major contributor to Gulf Hypoxia. According to USGS, Illinois contributes more total nitrogen and total phosphorus to the Gulf of Mexico than any other state.[118]

Lake Le Aqua Na

Summary of Illinois Nutrient Control Program

Despite these real and persistent problems that threaten human health and limit the use and enjoyment of waterways, the state lacks rigorous programs for addressing the scourge of nutrient pollution. An examination of the state's nutrient control program and the Illinois Nutrient Loss Reduction Strategy (Strategy) reveals various shortcomings.

Numeric Nutrient Criteria Adoption

Illinois' nutrient control program fails to adequately assess and limit nutrient pollution. One obvious shortfall is the absence of phosphorus and nitrogen water quality standards to protect aquatic life. More than fifteen years ago, Illinois started work on the development of phosphorus water quality standards. But early on, the agency insisted that it could find no statistically significant relationship between phosphorus and adverse impacts on aquatic organisms in Illinois streams. The agency maintained this position over the years[119] despite the plethora of applicable science in the region[120] and despite EPA Region 5's finding in 2013 that it is possible to detect statistically significant biological responses of aquatic organisms to total phosphorus pollution in Illinois streams.[121] Illinois has made several aborted attempts to limit phosphorus discharges in other ways such as a technology-based limit for phosphorus, an amended narrative standard, and a low phosphorus water quality standard for select streams. Now the state has convened a science advisory panel to begin again the exploration of numeric

[118] See table at http://water.usgs.gov/nawqa/sparrow/gulf_findings/index.html.
[119] Illinois Nutrient Loss Reduction Strategy, pp 8-2 to 8-3.
[120] Dale M. Robertson, David J. Graczyk, Paul J. Garrison, Lizhu Wang, Gina LaLiberte, and Roger Bannerman (2006). "Nutrient Concentrations and Their Relations to the Biotic Integrity of Wadeable Streams in Wisconsin". USGS Professional Paper 1722; Miltner, Robert J. (2010). "A Method and Rationale for Deriving Nutrient Criteria for Small Rivers and Streams in Ohio" Environmental Management.
[121] Letter of Linda Holst Water Quality Branch; Elizabeth Behl, Office of Science & Technology; and Ted Angradi, National Health & Environmental Effects Research Lab United States Environmental Protection Agency Region 5 to Kim Knowles, Prairie Rivers Network.

phosphorus standard development. There is real concern that this process will be dragged out. Illinois has never made an effort to develop water quality standards for total nitrogen.

Water Quality Assessment and 303(d) Listing for Nutrients

Equally disturbing is the lack of assessment of the true scope of the nutrient pollution problem. The full impact of nutrients on Illinois lakes, for instance, is unknown because less than half of them are assessed for use attainment. Similarly, less than 10% of the stream miles in the state were assessed for attainment of the aesthetic use in 2015. Despite the abundant evidence of high riverine phosphorus loads in the state, in 2012, Illinois ceased identifying phosphorus as a cause of impairment of aquatic life in Illinois streams, in lakes less than 20 acres, or in Lake Michigan, because there is no numeric phosphorus standard for aquatic life for these water bodies.[122] Another assessment failure is the state's lack of consideration of the impact of total nitrogen on aquatic life and aesthetic uses in both streams and lakes.

NPDES Permits

While Illinois has made some progress on limiting phosphorus discharges from point sources, in 2015, just 18% of all facilities discharging phosphorus were subject to a phosphorus limit, and only 25% of all facilities discharging P were required to monitor P and N. Of the P limits imposed, none were calculated to protect water quality standards and are in fact too high to prevent harm to aquatic life and aesthetic uses. Despite being told by EPA in 2011 to perform reasonable potential analyses on nutrient discharges and to set effluent limits that comply with the narrative standard,[123] Illinois has refused to develop such water quality based effluent limits, leaving many waters unprotected.

Nutrient TMDLs

Illinois has 12 nutrient related (phosphorus, dissolved oxygen, nitrate) TMDLs with both wasteload and load allocations. Not one of these TMDLs provides reasonable assurance that the nonpoint source reductions will in fact occur. Not one contains a roadmap to nonpoint source reductions. There are no schedules, milestones or processes for assessing nonpoint source progress. Nor do the TMDLs contain any plans to tie water quality monitoring to practice implementation. Instead, the TMDLs are a description and recitation of best management practices (BMP) that *could* be implemented, a general discussion of the range of costs associated with various BMPs and general descriptions of programs where funding might be available.

Illinois' Nutrient Reduction Strategy

The Illinois' Nutrient Loss Reduction Strategy (INLRS) lacks a feasible implementation plan for achieving reductions. It is estimated that Illinois exports 527 million pounds of nitrate nitrogen

[122] See Illinois Integrated Water Quality Report and Section 303(d) list 2012, volume 1, p. 9. http://www.epa.state.il.us/water/tmdl/303-appendix/2012/iwq-report-surface-water.pdf

[123] Letter of Tinka G. Hyde, Director, Water Division United States Environmental Protection Agency Region 5 to Marcia Willhite, Chief, Bureau of Water, Illinois Environmental Protection Agency, January 21, 2011.

and 34 million pounds of total phosphorus from the state each year. The INLRS identifies a goal of reducing Nitrate N by 15% and Total P by 25% by the year 2025. The Strategy also includes a 45% reduction "target" (not a goal), but no date for reaching the target is provided. There are no shorter term interim milestones. Attainment of the 2025 goals will require reduction in nitrogen losses by 237 million pounds and phosphorus losses by 15.3 million pounds each year—huge reductions requiring rigorous planning, verification, and accountability structures. None of these are included in the state's Strategy.

Although the state has a plan that is expected to reduce total phosphorus loadings from point sources by 8.55 million pounds/year over the next 10 to 15 years using NPDES permit limits, there is no plan for achieving the remaining 6.75 million pounds of the phosphorus goal, nor is there a clear plan for reducing nitrogen exports by 237.2 million pounds/year.

While a great majority of the state's total nitrogen exports (82%) come from agricultural lands, the INLRS contains no feasible plan for achieving such huge reductions. Instead, the Strategy relies on existing voluntary programs like 319 watershed planning, outreach and education, and other small-scale initiatives. This approach has been unsuccessful in the past, and sufficient funds are not identified (or available) for implementation. The estimated costs of implementing best management practices to achieve nitrogen and phosphorus loss reduction goals of 45% range from $438 million to $878 million/year. At this time, the only funding sources identified are Natural Resource Conservation Service Farm Bill program funding, 319 awards, Nutrient Research and Education Council (NREC) Illinois Department of Agriculture cost share programs, and State Revolving Loan Funds. Even making very generous assumptions regarding the money and nutrient reduction targeting available from these sources, together they total less than $90 million/year, a very serious shortfall.

Missouri

Overview

Nutrients are harming Missouri waters. The state has nearly 45,000 acres of lakes impaired for aquatic life and recreational uses by algal growth. Eight hundred and eighty seven (887) miles of streams are impaired by low dissolved oxygen. This is no wonder because Missouri is woefully behind in implementation of the Clean Water Act. The state has an abundance of water with at least 183,000 miles of streams, 1 million acres of wetlands, and 4,000 lakes covering over 900,000 acres, but water quality protections apply only to "classified" waters. This approach has left 35 % of Missouri's streams, 21% of it lakes, and 97% of its wetlands unprotected and unassessed. As such, the real picture of impairment is likely much worse than the snapshot provided below.

In some cases, such as McDaniel Lake, Fellows Lake and Spring Fork Lake, excessive algal

Left: Keifer Creek, Right: Table Rock Lake (Missouri Coalition for the Environment)

growth has resulted in taste and odor problems that affect drinking water. Nutrients have caused fish kills at large impoundments such as Table Rock Lake in Missouri. According to the Missouri Department of Conservation (MDC), in 2015, MDC investigated 57 fish kills and water pollution incidents accounting for a loss exceeding $57,000 in the value of animals killed. Thirty two (32) of these fish kills were caused by non-regulated pollution sources, including row crop agriculture. The Bootheel region in Missouri is particularly susceptible to fish kills from nutrient pollution due to the highly altered landscape for row crop agriculture.

Summary of Missouri Nutrient Control Programs

Despite over a decade of collecting and analyzing data, holding stakeholder meetings and developing multiple drafts of regulations, Missouri does not have numeric nutrient criteria for the majority of its lakes and all of its streams. This failure broadly impacts the ability to protect water quality. Without criteria, Missouri has only narrative criteria to protect against nutrient related problems. Assessments are only made against narrative criteria. Permits do not include

nutrient effluent limits unless a facility is found culpable for narrative criteria violations through the TMDL process. Thus, the lack of nutrient criteria results in a complete breakdown in Missouri's ability to assess water quality and prevent water quality problems and protect its waters.

Numeric Nutrient Criteria Adoption

Missouri lacks numeric nutrient criteria for all classes of waters but 25 lakes. Although the state adopted criteria for total phosphorus (TP), total nitrogen (TN), and chlorophyll-*a* for lakes and reservoirs, with the exception of the site-specific criteria for the 25 lakes, these criteria were disapproved by EPA in 2011. While Missouri's EPA-approved 2014 Nutrient Loss Reduction Strategy (NLRS) presents a timeline for development of nutrient criteria for lakes and reservoirs, rivers, stream, and wetlands, progress to date has been extremely slow. Missouri's workgroup on criteria development has stopped meeting. Because the state has taken no action since EPA's disapproval in 2011, the Missouri Coalition for the Environment sent a notice of intent (NOI) to sue to force EPA to promulgate nutrient criteria for Missouri. A lawsuit was filed on February 24, 2016.

Missouri is also lacking numeric criteria to protect designated uses for other nutrient-related parameters, such as total suspended solids (TSS), periphyton, and microcystins or cyanobacteria. Missouri is not adequately assessing the extent of its nutrient pollution problem.

Water Quality Assessment and 303(d) Listing for Nutrients

In 2014, Missouri reported assessing just under 30% of its lake acres for impairments to aquatic life due to phosphorus and algae. The state has assessed only 5.5% of its river and stream miles for dissolved oxygen. Missouri does not assess its streams and rivers for the impacts of phosphorus or nitrogen on aquatic life. Just 18% of the lakes and 40% of stream miles designated as drinking water supplies were assessed in 2014. Because Missouri does not have numeric nutrient criteria for phosphorus, nitrogen or chlorophyll-a, the state does not assess waters for these pollutants. Instead, it relies on narrative criteria to assess for impairments to drinking water, aquatic life and recreational uses. This results in water quality problems which are only assessed once the state receives complaints. Rather than sampling against numeric nutrient criteria, the state responds to complaints regarding algae, taste, odor or fish kills – all narrative conditions. The state then assesses the water body. The conditions complained of may then be causally linked to pollutants such as nitrogen, phosphorus or excess chlorophyll. Ultimately, the waterbody may be placed on the 303(d) list for a nutrient related problem such as excess nutrients or low dissolved oxygen.

NPDES Permits

Missouri has approximately 2,162 NPDES permitted facilities that are discharging TN and TP. Of these facilities, just 7% (149) have a TN or a TP limit, none of which are water quality based limits. Just 10% of these facilities are required to monitor for TN and TP. The state recently imposed TN and TP monitoring on facilities with design capacity of 100,000 gallons per day or more, effective upon permit renewal, but the great majority of Missouri's NPDES permitted

facilities (approximately 79%) have design flows below the 100,000 gallon per day threshold, leaving most without any nutrient monitoring requirements.

Nutrient TMDLs

Missouri has completed 18 nutrient related TMDLs that have been approved by EPA. While 15 of these have a waste load allocation/load allocation split between point and nonpoint sources, not one contains reasonable assurance that nonpoint source reductions will be achieved. The TMDLs contain lists of best management practices that might be implemented, but only one has schedules or tracking mechanisms for implementation. In addition, not one of the TMDLs includes a triggering event (e.g., a specified date, new water quality standards) requiring review and assessment of progress, and water quality monitoring requirements are not uniform. In fact, eight of the 18 TMDLs have no requirement that a water quality monitoring plan be developed and implemented to measure efficacy of TMDL activities.

Missouri's Nutrient Reduction Strategy

The Missouri Nutrient Loss Reduction Strategy (NLRS) was adopted in 2014. The NLRS includes multiple strategies for reducing nutrient pollution that might be implemented, yet sets no specific target reductions. According to the Strategy, nutrient reduction targets for point sources will be established in years 1, 2 and 3 following adoption, yet no point source targets have been set to date. Although the Strategy identifies several priority watersheds, without target reductions prioritization has little to no meaning.

At this time, the Strategy amounts to nothing more than a list of activities and practices that *could* be undertaken by both point and nonpoint sources. Again, no targets or goals have been set. For example, manure management is an agricultural best management practice that the state anticipates might be implemented. While the NLRS describes how manure may be managed to reduce nutrient runoff, no specific goals either statewide or watershed-based are established. The same situation applies to all of the other voluntary measures described in the NLRS.

Kentucky

Overview

Kentucky stream impairments from nutrient pollution have been on the rise since 2006 when the state first began monitoring streams for nitrogen and phosphorus. That year, 787 miles were listed as impaired by nutrient/eutrophication biological indicators and 101 miles by total phosphorus. By 2012, those numbers had jumped to 1,677 miles impaired by eutrophication biological indicators, 185 miles by P and 54 miles of streams were listed as impaired by nitrogen.[124]

The state and the Army Corps of Engineers began testing for cyanobacteria in 2013, and found multiple reservoirs with cyanobacteria levels well in excess of the 100,000 cells per milliliter threshold for moderate risk to human health set by the World Health Organization (WHO) (http://www.who.int/water_sanitation_health/bathing/srwe1/en/). The Corps has long managed these reservoirs for flood control but they are also significant recreational resources for Kentuckians. The WHO threshold was again exceeded in many of the same reservoirs in the summers of 2014 and 2015. Unfortunately, the state insists that these occurrences do not constitute a trend, and that the reservoirs fully support recreational uses.

The Ohio River had the most extensive outbreak of cyanobacteria ever recorded in the summer of 2015. Beginning in August in Wheeling, WV, the Ohio River algae bloom spread down past Louisville by mid-September, covering over 500 miles. The bloom led to many river events being delayed or canceled and recreational and drinking water advisories. Excessive nutrients in the Ohio River played a central role.

In addition to the local health and environmental threats, Kentucky's nutrient pollution is also a major contributor to Gulf of Mexico hypoxia. According to USGS, Kentucky contributes 6.1% of Total Nitrogen and 9.0% of Total Phosphorus flux to the Gulf of Mexico, making it the sixth and fifth leading state, respectively.[125]

Harmful Algae Bloom on Ohio River in 2015; Location: Newport KY, across from Cincinnati (Kentucky Waterways Alliance)

[124] https://ofmpub.epa.gov/waters10/attains_state.control?p_state=KY

[125] See table at http://water.usgs.gov/nawqa/sparrow/gulf_findings/index.html.

Summary of Kentucky Nutrient Control Program

Kentucky's efforts to control nutrient pollution have fallen short. The state has been engaged in numeric criteria development for over a decade and has yet to propose new water quality standards. State water quality assessments confirm expanding nutrient impairments, which have not subsequently been dealt with through Clean Water Act programs, such as better effluent limits in NPDES permits or through the proposal of nutrient-related TMDLs. Finally, the state has failed to follow-through with the EPA's request to develop a full Nutrient Reduction Strategy.

Numeric Nutrient Criteria Adoption

Kentucky has repeatedly delayed the proposal of numeric criteria for any category of waters. Although the state initially proposed to prepare numeric criteria in its 2007 triennial review,[126] it has pushed back this goal, first to 2011, then 2014, and now to the last day of 2018.[127] Recent indications are the state only intends to propose numeric criteria for lakes in the 2018 Triennial, and not for any set of streams.

Water Quality Assessment and 303(d) Listing for Nutrients

Kentucky has fully assessed only 11 % of its stream miles for aquatic life use support, finding impacts of nutrient eutrophication responsible for impairment of 2,606 miles (25% of those assessed), and 330 stream miles as impaired by low dissolved oxygen. The state did not provide data on how many lake/reservoir acres it has assessed, but reports that over 8,000 acres are impaired by nutrient eutrophication and over 4,700 acres are impaired by low dissolved oxygen. Of note is that in evaluating use support, Kentucky allows biological data to supersede chemical data, such that waters impaired by a chemical parameter may be listed as fully supporting if biological data are supporting. Kentucky does not assess ambient water quality for nitrate; rather it assesses compliance with its drinking water use by measuring finished drinking water.[128]

NPDES Permits

Kentucky has approximately 902 NPDES-permitted facilities that discharge phosphorus. Of these, just one has a WQBEL, and just 84 (9%) have a TBEL. Another 32% of facilities are only required to monitor for this parameter. The majority of facilities (58%) have neither effluent limits nor monitoring requirements for phosphorus discharges.

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[126] Kentucky Department for Environmental Protection, *Nutrient Criteria Development Plan for the Commonwealth of Kentucky*, August 2007, p. 11.

[127] According to Kentucky's 2012 update to USEPA, December 31, 2018 is the state's current goal for adopting numeric N and P criteria for lakes/reservoirs and wadeable streams. It has not provided any dates for criteria adoption for non-wadeable streams/rivers. https://www.epa.gov/nutrient-policy-data/state-development-numeric-criteria-nitrogen-and-phosphorus-pollution, accessed June 8, 2016.

[128] Kentucky Department for Environmental Protection, *Consolidated Assessment and Listing Methodology: Surface Water Quality Assessment in Kentucky, The Integrated Report*, p. 57.

Nutrient TMDLs

Kentucky has prepared, and EPA has approved, just 6 nutrient-related TMDLs, all written prior to 2001. Despite the nutrient impairments discussed above, Kentucky has not drafted a TMDL in the past 16 years for nutrient impairment. None of these existing TMDLs contain nonpoint source implementation plans or tracking mechanisms, and water quality progress has not been documented.

Kentucky's Nutrient Reduction Strategy

The State has yet to complete a Nutrient Reduction Strategy. The state's 2014 draft Strategy lacks all of the elements specified in EPA's 2011 Framework:

Estimated N and P loads for all state watersheds at the HUC-8 level;

- Identification of major watersheds contributing substantial (e.g., 80 percent) of N and P loads to state and multi-jurisdictional waters;
- Targeting of priority watersheds at the HUC-12 scale;
- Load reduction goals;
- Methods to assure effective point source permits;
- Accountability and verification measures including the following:
    - Identification of where and how each tool will be used in priority watershed;
    - Verification that practices are in place;
    - Establishment of baselines; and
    - Provisions for ongoing, regular, seasonal measurements of N and P loads leaving each watershed;
- Provisions for annual public reporting of implementation actions or biannual reporting of load reductions; and
- A detailed work plan and schedule for development of numeric N and P criteria for at least one class of waters.

Tennessee

Overview

Nitrogen and phosphorus pollution remain a problem in Tennessee's waters, and it is a problem that is getting worse. Of the waters assessed for the relevant parameters, 3,375 stream miles and 15,692 acres of lake in Tennessee are impaired due to nutrients.[129] In 2004 fewer than 2,000 miles of stream were nutrient impaired. This is an increase of almost 70% in 10 years. Of the currently impaired stream miles, 207 are impaired as a result of nutrient/eutrophication biological indicators, 2,539 for total phosphorus, and 1,663 for nitrate/nitrite.[130]

Environmental scientist Barry Sulkin investigates an algae-rich stream resulting from development in middle Tennessee (Tennessee Clean Water Network)

Within Tennessee's Mississippi River Basin watersheds, where much of the agriculture is based, 42% of stream miles and 99% of lake acres that were assessed were found to be impaired by nutrients. Tennessee is also a major contributor to Gulf of Mexico hypoxia, delivering 5.5% of the total nitrogen flux and 5.3% of the total phosphorus flux.[131] Tennessee ranks ninth among the 33 states contributing to the Dead Zone.

Summary of Tennessee Nutrient Control Program

Tennessee is failing to take the necessary steps to control for nutrient pollution. Negating its original timeline and the Nutrient Reduction Strategy memo, the state is significantly behind on its numeric criteria development. In addition, it is unclear to what degree Tennessee is assessing its waters for nutrient pollution. NPDES permits are not sufficiently controlling for nutrient pollution as not a single permit contains a water quality based effluent limit derived from Tennessee's numeric nutrient translator. The state has developed just five nutrient-related TMDLs and has not implemented the resulting wasteload allocations in NPDES permits. Tennessee's Strategy is incomplete and lacks many elements specified in EPA's Framework

[129] TDEC, Planning and Standards Sections. *2012 303(d) List of Impaired Waters*. January 2014. https://www.tn.gov/assets/entities/environment/attachments/2012-final-303d-list.pdf

[130] TDEC, Division of Water Resources. *2014 305(b) Report, The Status of Water Quality in Tennessee.* December 2014. http://www.tn.gov/assets/entities/environment/attachments/water-quality_2014-305b-final.pdf

[131] Alexander, R. B., R. A. Smith, G. E. Schwarz, E. W. Boyer, J. V. Nolan, and J. W. Brakebill. 2008. Differences in Phosphorus and Nitrogen Delivery to the Gulf of Mexico from the Mississippi River Basin. Journal of the Environmental Science Technology, 2008, 42(3).

memo. Despite this, the state said it will focus on implementing the NRS rather than developing nutrient TMDLs.[132]

Numeric Nutrient Criteria Adoption

Tennessee has not adopted statewide numeric nutrient criteria for any waterbody type, and has not provided EPA with any dates by which it intends do the work necessary to develop such criteria. In 2001, the state finalized its "nutrient translator," which is "guidance for interpretation of nutrient data based on regional reference data."[133] While this document does include numeric interpretations of the narrative standard for total phosphorus and nitrate/nitrite, the state does not use these numbers alone to determine designated use support or impairment, or to develop effluent limits in NPDES permits, or as water quality targets for TMDLs.

Tennessee is significantly behind its original timeline for numeric criteria development for phosphorus and nitrogen. In 2004 the state proposed to have final nitrogen and phosphorus criteria by 2012. Instead, in 2012 that deadline was extended to 2021, and the state intends to extend the deadline yet again.[134] The state has delayed all of its plan components. Reference site monitoring should have been finalized in 1999, but was still not completed in 2014 as projected. Headwater monitoring should have been completed in 2014, but as of January 2016, the state was still "working on refining headwater stream biocriteria."[135]

Water Quality Assessment and 303(d) Listing for Nutrients

According to the state's most recent 305(b) report, Tennessee has assessed approximately half of its stream miles and 99% of its lake acres for designated uses.[136] How many of these assessments considered impacts from nutrients is unknown, however as the state does not maintain a list of total water bodies assessed for use impairment due to

Algae-covered pond in East Tennessee (Tennessee Clean Water Network)

[132] J. Dodd, in-person meeting, September 20, 2013.
[133] Denton, Gregory M., Arnwine, Debbie H., and Wang, Sherry H. *Development of Regionally-Based Interpretations of Tennessee's Narrative Nutrient Criterion.* Nutrient Translator, Page 55. August 2001.
[134] G. Denton, personal communication, May 25, 2016.
[135] D. Arnwine, personal communication, January 11, 2016.
[136] TDEC, Division of Water Resources. *2014 305(b) Report, The Status of Water Quality in Tennessee,* December 2014.

nutrients.[137] TDEC requires impairment of biologic indices as well as exceedance of its numeric nutrient translator for a finding of impairment.

The state reports 15,700 lake acres as impaired by nutrients (not differentiated by N and P). Regarding stream miles, 2,746 miles are listed as impaired by phosphorus/eutrophication and 1,663 by nitrate exceeding the drinking water standard. An additional 1,862 miles are impaired by low dissolved oxygen.

NPDES Permits

Tennessee has improved its effluent monitoring requirements in NPDES permits, with 54% of facilities that discharge TP currently being required to monitor for it. Just 19% of phosphorus dischargers have effluent limits for this parameter, and none of these limits are water quality based. The state has never imposed a nutrient WQBEL in a permit and has never used the translator tool to establish numeric effluent limits.

Rather than using the narrative translator developed in 2001 to develop WQBELs, the state is applying categorical limits based on the quantity of nutrients discharged (low, medium or high). The state has not demonstrated that these categorical limits, which greatly exceed the translator, comply with federal law prohibiting permits that allow a facility to cause or contribute to exceedances of water quality standards.[138] The state is inconsistent in applying these categorical limits, and when it does, allows facilities two to three NPDES permit cycles to achieve compliance without the necessary demonstration that extended compliance schedules are necessary.

With regard to municipal runoff, the state does not impose wasteload allocations developed in nutrient TMDLs on MS4 dischargers.

[137] G. Denton, personal correspondence, May 4, 2015 and September 22, 2015.
[138] 40 CFR §§122.4 and 122.44.

Nutrient TMDLs

Tennessee has developed just five nutrient-related TMDLs, none over the past 6 years. These TMDLs address just 426 of the 3,375 nutrient impaired stream miles in the state (12.6%). Three of the 5 TMDLs do not address the full impaired reach, as the state completed only "Stage 1" TMDLs focused on the headwater/wadeable portion of the impaired watershed, and ignoring any downstream reaches with wastewater treatment plant discharges. As a result, Tennessee has never developed a wasteload allocation for these facilities.

Algae bloom on spring fed pond downstream of dairy CAFO (Tennessee Clean Water Network)

In addition, during development of the Strategy, the Tennessee Clean Water Network was told by the Tennessee Department of Environment and Conservation (TDEC) that the Strategy would likely replace development of TMDLs. TCWN informed EPA Region 4 about this comment during an October 2014 meeting in Atlanta. EPA said it could not compel the state to develop TMDLs.[139]

Tennessee's Nutrient Reduction Strategy

Tennessee's Strategy is still in draft form and has not been updated in a year. The Strategy focuses primarily on limiting nutrient loads through categorical NPDES limits discussed above, but fails to provide any new strategy for agricultural or urban sources. Instead, for the agricultural sector, the Strategy simply reiterates existing voluntary approaches without any plan for how BMP implementation will be achieved, particularly on the grand scale needed to address this problem. For nonpoint sources, the Strategy instead relies on existing NRCS programs. The Strategy also fails to contain any new or effective plans for reducing urban sources. For instance, there are no additional MS4 NPDES requirements. Despite these serious shortcomings, the state asserts it will achieve a 40% reduction in agricultural source loading and a 50% reduction in urban storm water runoff.

The Strategy also lacks the following elements:

- Goals or target reductions;
- Prioritization of watersheds by degree of loading;
- A timeline for any of the proposed activities;
- Provision for additional monitoring;
- Additional resources or a plan for obtaining those needed;
- Promulgation of statewide criteria for N and P for one class of waterbodies.

[139] A. Feingold, in-person meeting, October 27, 2014.

Arkansas

Overview

Excessive nutrients are harming Arkansas waters. Citizens are experiencing negative impacts on their drinking water and ability to recreate in lakes. Beaver Lake, which provides drinking water for about 420,000 people, experiences taste and odor problems from algae for six to eight weeks each fall.[140] Numerous beaches are closed each summer due to elevated blue green algae levels.[141] U.S. Geological Survey modeling ranked two Arkansas watersheds among the highest contributors of nutrients to the Mississippi River and the Gulf of Mexico.[142] The state adds about 7% of the total nitrogen and 10% of the total phosphorus to the Gulf of Mexico.[143]

Summary of Arkansas Nutrient Control Program

Arkansas has not developed numeric nutrient criteria for any class of waters and has failed to receive approval from EPA of the narrative criteria for nutrients.[144] The narrative standard used to assess waters sets a very high allowance of nutrient pollution to determine impairment. This threshold causes a domino effect in the state's nutrient control program resulting in few impairment listings, few TMDLs, and few limits in NPDES permits. Arkansas's Nutrient Reduction Strategy (Strategy) recognizes the threats of excessive nutrients and the challenges to reduce nutrient loading but fails to propose a plan that can be implemented, monitored and verified for success. The lack of adequate nutrient criteria and a viable Strategy results in Arkansas's waters not being protected from nutrient related problems.

Beaver Lake (Arkansas Public Policy Panel)

[140] http://www.arkansasonline.com/news/2013/feb/23/beaver-lake-algae-test-limits-would-be-st-20130223/

[141] http://www.swl.usace.army.mil/Media/NewsReleases/tabid/7165/Article/486889/corps-continues-beach-closures-on-nimrod-lake.aspx

[142] Robertson, D. M., Schwarz, G. E., Saad, D. A. and Alexander, R. B. (2009), Incorporating Uncertainty Into the Ranking of SPARROW Model Nutrient Yields From Mississippi/Atchafalaya River Basin Watersheds. JAWRA Journal of the American Water Resources Association, 45: 534–549.

[143] Barvenik, S., Chirigotis, A., Engelberg, D., Fuller, L., Hamann, J., Reed, M., 2009. EPA Needs to Accelerate Adoption of Numeric Nutrient Water Quality Standards. Evaluation Report 09-P-0223. Office of Inspector General, U.S. Environmental Protection Agency, Washington, DC.

[144] USEPA Region 6 2010-2012 Draft 303(d) ROD: "Missing or incomplete Assessment Methodology- Nutrient (Reg. 2.509) The state's Assessment Methodology did not include any information about how data are assessed and interpreted to determine attainment of the narrative criteria for Nutrients."

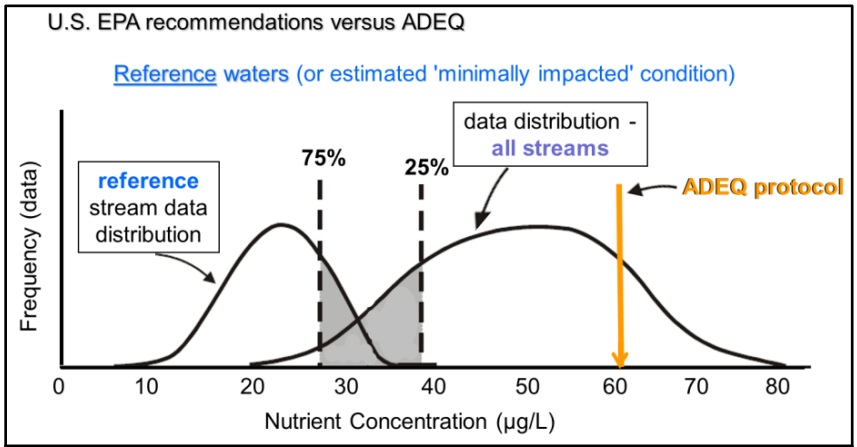
Numeric Nutrient Criteria Adoption

The Arkansas Department of Environmental Quality (ADEQ) has not adopted statewide numeric nutrient criteria for any class of waterbody. ADEQ's 2008 and 2012 nutrient criteria development plans similarly lack dates for criteria development for classes of waterbodies, instead setting out an approach involving data collection and site specific criteria development. Having collected data for close to a decade, ADEQ has promulgated a site specific criterion for just one lake, which is pending EPA approval. ADEQ is developing site specific nutrient criteria for two streams in Extraordinary Resource Watersheds (ERWs) with expected completion in 2016. The agency then plans to begin collecting data on ERWs in other ecoregions. Any criteria developed are not expected to be proposed for adoption before 2020, and once proposed would take another one to two years for approval. Clearly, the site-specific approach favored by ADEQ puts Arkansas on a very slow train, leaving the vast majority of waters unprotected indefinitely.

Water Quality Assessment and 303(d) Listing for Nutrients

Lacking numeric nutrient criteria, Arkansas has developed translators of its narrative standard for the purpose of assessing wadeable streams (only) for use support or impairment. These translators set the bar very high for data requirements, and allow excessive pollution before an impairment determination. The requirements are as follows:

1. The mean total phosphorus or total nitrogen concentration must exceed the 75th percentile of the total phosphorus or total nitrogen data from all wadeable streams and rivers within an ecoregion. This level of exceedance is in sharp contrast to EPA's methods for establishing numeric criteria, which provide for the 75th percentile of clean, reference streams, or the 25th percentile (cleanest quartile) of all streams.[145] (See comparison of ADEQ's protocol versus EPA's recommendations.)



Comparison of ADEQ protocol vs EPA recommendations.

[145] United States Environmental Protection Agency (U.S. EPA) (2000b) Nutrient Criteria Technical Guidance Manual, Rivers and Streams. United States Environmental Protection Agency, Washington, DC. Report EPA-822-B-00-002,

2. Two 72-hour continuous monitoring data sets are required, *both* of which indicate at least *two* of the four water quality translators to be exceeded.
3. One or both biological assemblages are evaluated as impaired.
4. All of the data collection must be within the same calendar year or season.[146]

If these high data requirements and pollution thresholds are not exceeded, ADEQ simply assumes no nutrient-related impairment.

As a result of ADEQ's data requirements and limited monitoring, less than one-tenth of one percent of the state's 88,000 stream and river miles are fully assessed for phosphorus and nitrogen and only 1.3 percent are assessed for dissolved oxygen.[147]

NPDES Permits

Arkansas has 175 NPDES permits for facilities discharging total phosphorus. Among these, just 19% (34 facilities) have a phosphorus WQBEL, another 12% (21 facilities) have a TBEL and 65% (114 facilities) are only required to monitor and report their TP discharge. Six facilities have no limits or monitoring requirements.

Nutrient TMDLs

Just twenty-one nutrient-related TMDLs have been completed by ADEQ and approved by EPA. Eight of these have both a waste load allocation and a load allocation for point and nonpoint sources respectively, but only one provides reasonable assurance that necessary nonpoint source reductions will be achieved. All six of the TMDLs with a load allocation lack implementation timelines or tracking mechanisms for nonpoint source reductions. All twenty-one TMDLs lack any trigger or timeline for review, and 90% lack any follow up water quality monitoring plan.

Arkansas' Nutrient Reduction Strategy

The Arkansas Nutrient Reduction Strategy (Strategy) lacks specific reduction goals for nitrogen and phosphorus losses and contains only the general goals of removing nutrient impairments and delisting of 303(d) waterbodies.

p. 96. Available at https://www.epa.gov/sites/production/files/documents/guidance_rivers.pdf.

[146] ADEQ, Assessment Methodology 2016 for the Preparation of the Integrated Water Quality Monitoring and Assessment Report, p. 46.

[147] https://www.adeq.state.ar.us/water/planning/integrated/303d/pdfs/2014/list-of-impaired-waterbodies.pdf

While the Strategy prioritizes 10 watersheds, reduction goals lack specificity and any timelines for achievement. In fact, the Strategy identifies a reduction goal for just one watershed, the Illinois River, which was set by the Arkansas-Oklahoma Arkansas River Compact Commission at 40% of the baseline nutrient loadings.

Old Town Lake (Arkansas Public Policy Panel)

Interim targets and percent reduction goals are to be evaluated, on a watershed-by-watershed basis, yet there is no clear plan for setting or achieving such goals and targets. The Strategy instead relies on guiding principles (e.g., strengthening existing programs, incorporating adaptive management and flexible strategic planning, and leveraging available financial and technical resources). Missing entirely are clear action items, avenues for accountability, and verification of implementation and efficacy.

To reduce point source nutrient loads, the Strategy again lists general program requirements and enhancements (more water quality monitoring, imposition of NPDES permit limits for major point sources in priority watersheds, improved knowledge of treatment processes, etc.), but fails to identify responsible parties, timelines, funding sources, or evaluation or verification components.

Although the Strategy recognizes that the nonpoint source contribution of nutrient loadings in Arkansas is greater than that of point sources, it fails to propose a plan for achieving nonpoint reductions.

Mississippi

Overview

Nitrogen and phosphorous pollution in Mississippi's rivers, lakes and coastal waters causes serious problems, including drastically low dissolved oxygen levels, threats to drinking water sources, widespread lake eutrophication, and beach closures.

In the Mississippi Delta, the section of the state with the most intensive farming operations, smaller streams with excessive nutrient inputs show dissolved oxygen levels dropping to zero at night due to algal respiration. The Mississippi Department of Environmental Quality (MDEQ) is at such a loss as to how to address persistent nutrient problems that it recently announced a plan to create "agricultural drainage stream" use classifications at the state's next triennial review, thereby weakening water quality standards for these streams. These streams draining the agricultural "delta" section of Mississippi drain into the Yazoo River system, the state's largest contributor to the Mississippi River.

Panther Creek in Madison County is impaired by nutrients and reduced flow. (Mississippi Department of Environmental Quality)

Nutrients are adversely affecting the Ross Barnett Reservoir, a drinking water source for Jackson, MS (population 174,000). In addition, a "red tide" algae bloom in the Gulf of Mexico in December 2015 led to the closing of Mississippi beaches, and the shutdown of oyster harvesting areas in Mississippi and Louisiana.

Summary of Mississippi Nutrient Control Program

Mississippi's nutrient control efforts are modest even when viewed in the most flattering light. The state has not adopted statewide numeric criteria for any waterbody type, and is behind its timeline for establishing criteria for a partial subset of lakes. Mississippi assesses a very low percentage of statewide streams for nutrients in 305(b) reports, and uses a methodology that under-reports nutrient impairments. Only 6% of the state's NPDES permits for phosphorus dischargers have water quality-based effluent limits. TMDLs in Mississippi universally lack reasonable assurance that nonpoint source reductions will occur, triggers for TMDL review and nonpoint source implementation tracking. The Mississippi Nutrient Reduction Strategies (Strategies) lack most elements specified in EPA's 2011 Framework.

Numeric Nutrient Criteria Adoption

Mississippi has not adopted statewide numeric nutrient criteria for any waterbody type. The state plans to propose its first set of numeric criteria for one subclass of waters (lakes larger than 100 acres in portions of the state) in summer 2016, three years later than the date set forth in the state's 2010 Plan for Nutrient Criteria Development.[148] Clearly, Mississippi is well behind the "reasonable timetable" set forth in EPA's March 2011 Framework, which called for development of numeric N *and* P criteria for at least one *entire* class of waters within the state.

NOAA/Wikimedia Commons

Further, the state's prioritization of these lakes is misplaced. Nutrient problems in the Delta's Yazoo River Basin are arguably the most severe among all the state's waterbody types, and indeed Mississippi's Strategy chose Delta lakes and streams as the priority for BMP project development and implementation. Yet the PNCD leaves criteria development for Delta waters last in a rolling schedule of numeric nutrient criteria development. The impaired streams of the Delta region will languish in poor condition for 5-10 more years as the state follows a process that leaves the worst streams for last.

Water Quality Assessment and 303(d) Listing for Nutrients

Mississippi does not consider phosphorus or nitrogen as causes of impairment when assessing streams or lakes for use attainment unless there is concomitant impairment caused by a parameter with a numeric criterion.[149]

According to Mississippi's 2014 305(b) report, the state assessed just under 15% of its total stream miles for dissolved oxygen, finding 7% of those assessed to be impaired.[150] This low incidence of impairment may be due to a flawed assessment methodology that allows use of instantaneous measurements (as opposed to continuous DO monitoring), during daylight hours (after 9 AM), and a finding of no impairment if DO levels meet or exceed 4 mg/L.

Mississippi's 305(b) report does not report any assessment of waters for drinking water supply, and its 2014 CALM report does not specify the parameters used to determine public water supply use support, stating that: "Indicators appropriate for use in drinking water supply use

[148] The draft criteria do not apply to tidally influenced lakes or those in the heavily agricultural Delta region. The draft criteria were developed with EPA oversight, but are not final or approved by EPA at time of writing.
[149] Mississippi Department of Environmental Quality, *Consolidated Assessment and Listing Methodology, 2014 Assessment and Listing Cycle*, p. 4. (Hereafter "CALM Report")
[150] Mississippi Department of Environmental Quality, *State of Mississippi Water Quality Assessment 2014 Section 305(b) Report*, p. 15.

determination include chemical data. Chemical parameters as specifically denoted in the state's WQS document will be utilized for assessment."[151]

NPDES Permits

Mississippi has imposed phosphorus monitoring requirements in all of the 210 NPDES permits analyzed. Among these permits, 74% lack phosphorus limits. Just 6% of the permits contain WQBELs for phosphorus, and another 20% have TBELs.

Note: *Mississippi has a total of 1,150 facilities with NPDES permits. Reviewers sought to review electronic records or summary statistics via a public records request which was denied by MDEQ. The agency allowed access only to paper files.[152] Reviewers searched paper files for 210 of the 249 facilities reported on EPA's database. The remaining 39 permits reviewed had data gaps rendering analysis impossible.*

Nutrient TMDLs

Since 1999, Mississippi has prepared, and EPA approved, sixty four nutrient-related TMDLs for streams. Among these, 43 contain both a wasteload allocation for point sources and a load allocation for nonpoint sources—but *none* of the 43 contain reasonable assurance that the nonpoint source loads will be met. None of the 64 TMDLs contains a trigger or plan for TMDL review or revision, and none contains any mechanism to track nonpoint source implementation efforts. Ongoing water quality monitoring was specified consistently in TMDLs written between 1999 and 2006, but requirements of post-TMDL monitoring are missing from the 39 TMDL reports from 2006-2014.

Mississippi's Nutrient Reduction Strategy

MDEQ has published a series of regional Nutrient Reduction Strategies: Delta (2009), Upland (2011) and Coastal (2001). In 2012, these three were integrated into a state Strategy which serves as Mississippi's Nutrient Reduction Strategy for the purposes of EPA's 2011 Framework.[153]

The Mississippi Strategies amount to detailed regional planning *process* descriptions instead of plans that incorporate the *products* of such planning, such as specific reduction goals, timeframes, baselines, responsible parties or verification mechanisms. While each regional Strategy has yielded one or more waterbody specific implementation plan(s), they do not individually or together fulfill most of the elements for nutrient reduction strategies called for in EPA's Framework.

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[151] CALM Report, p. 6.

[152] H. Wilson, personal communication, August, 2015.

[153] Nancy K. Stoner, Acting Assistant Administrator, USEPA*, Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions*, March 16, 2011.

Mississippi's Strategy lacks the following elements specified in EPA's Framework:

- Estimated N and P loads for all state watersheds at the HUC-8 level;
- Identification of major watersheds contributing substantial (e.g. 80 percent) of N and P loads to state and multi-jurisdictional waters;
- Targeting of priority watersheds at the HUC-12 scale;
- Load reduction goals; and
- Methods to assure effective point source permits.

Accountability and verification measures including the following:

- Identification of where and how each tool will be used in priority watershed;
- Verification that practices are in place;
- Establishment of baselines;
- Provisions for ongoing, regular, seasonal measurements of N and P loads leaving each watershed;
- Provisions for annual public reporting of implementation actions or biannual reporting of load reductions; and
- A detailed workplan and schedule for development of numeric N and P criteria for at least one class of waters.

Louisiana

Overview

Louisiana is at the bottom of the Mississippi/Atchafalaya River watershed and feels the disproportionate impact of the Dead Zone that forms in state and federal waters every year. Impacts of the Dead Zone include the following:

- A decline in brown shrimp harvest;[154]
- The death of blue crabs and other species caught in traps impacted by the Dead Zone;
- Severe reproductive impairment in Gulf species, such as the Atlantic croaker;[155] and
- Less diverse, less abundant benthic communities.[156]

Algae bloom, Umbrella Canal, June 2013. (Louisiana Department of Environmental Quality)

Nitrate not only contributes to harmful algae blooms, fish kills, and the Dead Zone; it can also poison drinking water. According to the EPA, 15% of Louisiana's area has groundwater contaminated with nitrate (over 5 mg/L), the highest percentage among Mississippi River main-stem states.[157]

Louisiana experiences noxious algae blooms throughout the state that are potentially toxic and prevent recreational use and enjoyment of Louisiana waters.

Summary of Louisiana Nutrient Control Program

Despite drafting a large number of TMDLs, a 2006 Numeric Nutrient Criteria Development Plan, and a Nutrient Management Strategy, Louisiana is not implementing an adequate nutrient control program. Despite having a plan for a decade, Louisiana has not proposed any numeric nutrient criteria. This lack of numeric criteria is why they do not assess for nutrient-related impairments. Similarly, Louisiana does not designate numeric nutrient loadings in its TMDLs and

[154] Zimmerman, RJ and Nance, JM. 2000. Effects of hypoxia on the shrimp fishery of Louisiana and Texas, in Coastal Hypoxia: Consequences for Living Resources and Ecosystems, pp. 293-310. Pub. American Geophysical Union
[155] Thomas, P., and M. S. Rahman. 2010. Region-wide impairment of Atlantic croaker testicular development and sperm production in the northern Gulf of Mexico hypoxic dead zone. Marine Environmental Research 69: S59–S62.
[156] Baustian, M. M., J. K. Craig, and N. N. Rabalais. 2009. Effects of summer 2003 hypoxia on macrobenthos and Atlantic croaker foraging selectivity in the northern Gulf of Mexico. Journal of Experimental Marine Biology and Ecology 381: S31–S37
[157] EPA. https://www.epa.gov/nutrient-policy-data/estimated-nitrate-concentrations-groundwater-used-drinking. Accessed May 27, 2016.

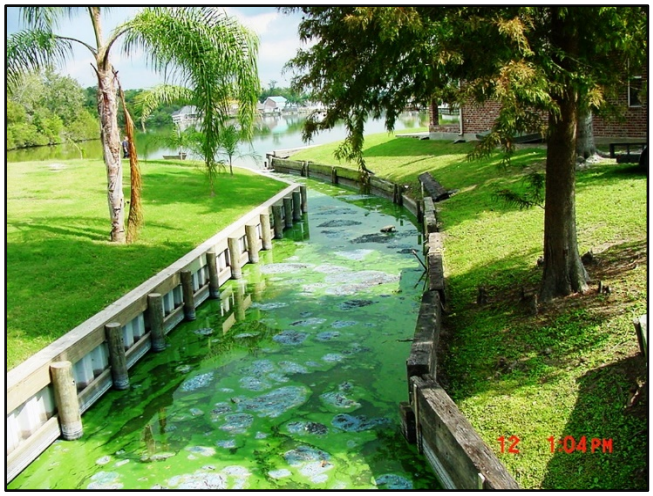
rarely assigns phosphorus limits in LPDES permits, and when required, they are not water quality based effluent limits.

Numeric Nutrient Criteria Development

Louisiana has not adopted statewide numeric nutrient criteria for any waterbody type, and has not provided any dates by which it intends to plan for, collect and analyze data supporting, or propose such criteria. In its 2006 criteria development plan, the state committed to proposing criteria for some water types in 2009, 2010 and 2013, and left other waters with no specified target date. Ten years later, all provided dates have passed with no criteria or new projected dates proposed.

Instead, LDEQ has proposed to weaken dissolved oxygen criteria throughout the state, starting with the Barataria Basin, and now the Eastern Lower Mississippi River Alluvial Plain (ELMRAP). EPA recently approved the ELMRAP dissolved oxygen standards, reducing the minimum standard from 5.0 mg/l to 2.3 mg/l for the majority of the waters bordering Lake Pontchartrain. EPA approved the new criteria despite apparent weaknesses in the proposal, which included the following:

- Use of reference sites dissimilar in geography, size, and salinity to waters being changed;
- Changes applied to waters outside of the Ecoregion;
- LDEQ and independent monitoring data showing many of the waterbodies achieving and exceeding the minimum dissolved oxygen standard of 5.0 mg/l; and
- The changes treating fresh, estuarine, and tidally influenced waters the same.



Lake Verret, June 2013. (Louisiana Department of Environmental Quality)

Although Louisiana has a narrative water quality standard that requires maintenance of naturally occurring N-P ratios and the establishment of nutrient limits using site-specific studies,[158] no N-P ratios have been set for any Louisiana waters and no site specific studies have been conducted to establish numeric limits.

Water Quality Assessment and 303(d) Listing for Nutrients

Low dissolved oxygen, Louisiana's primary indicator for nitrogen and phosphorus impacts, is the state's leading cause of impairment. Louisiana has assessed fewer than 11 % of its stream and

[158] Louisiana Administrative Code at LAC33:IX §1113.B.8.

river miles for dissolved oxygen, finding 58% of those assessed to be impaired. Worse, among the 13% of lake/reservoir acres assessed, over 82% were impaired.

Since EPA added the Gulf nearshore waters to Louisiana's 2008 303(d) list as impaired for low dissolved oxygen, Louisiana has attempted (in 2010, 2012, and 2014) to get those segments removed, despite evidence that low dissolved oxygen associated with the Dead Zone definitively exists in these areas. As of the 2014 list, EPA has required the three segments stay on the list; however in LDEQ's draft 2016 303(d) list, Louisiana claims that one of the three subsegments is now meeting the standard (5.0 mg/l). EPA has not responded to this proposal or public comments.

Louisiana does not generally assess for nitrogen or phosphorus due to the lack of numeric criteria,[159] but does list about 900 stream miles and 12,000 lake acres as impaired for nitrate/nitrite and phosphorus due to 'legacy' listings that were done through a best professional judgment assessment when the state began reporting its impaired waters under Section 303(d). LDEQ has since stopped listing waters for nitrogen and phosphorus due to the above mentioned lack of numeric criteria.[160]

LPDES Permits

Not a single one of the approximately 522 LPDES permits for facilities discharging phosphorus in Louisiana contains a water quality based effluent limit for that parameter. Just 4 permits have another type of phosphorus limit (0.8%), and none have nitrogen limits. Just 41 plants (7.8%) are required to monitor for nitrogen and phosphorus.

Nutrient TMDLs

Louisiana has completed and EPA has approved 55 TMDLs for nutrient-related impairments.[161] None of the 43 TMDLs with both wasteload and load allocations have reasonable assurances that nonpoint source loads will occur. There are no implementation plans for any of the TMDLs. Only one of Louisiana's TMDLs contains a monitoring plan to gauge progress in the affected waterway.

Further, LDEQ makes the assumption that completing oxygen demanding substances TMDLs will control for nutrients.[162] Due to this assumption, no nitrogen or phosphorus loads are

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[159] Personal conversation and email with Louisiana Dept. of Environmental Quality staff, May 25, 2016.

[160] *Id.*

[161] Dissolved Oxygen, Biochemical Oxygen-Demanding Substances, Nutrients, Oxygen Demanding Substances, or Oxygen Demand.

[162] See, e.g. *Final Bayou Lacombe Watershed TMDL, Subsegments 040901 and 040902,* February 2, 2012, stating that "LDEQ's position is that when oxygen-demanding loads from point and nonpoint sources are reduced in order to ensure that the dissolved oxygen criterion is supported, nutrients are also reduced. The implementation of this TMDL through wastewater discharge permits and implementation of best management practices to control and reduce runoff of soil and oxygen demanding pollutants from nonpoint sources in the watershed will also reduce the nutrient loading from those sources."

incorporated into oxygen demand TMDLs. This lack of reduction goals makes implementation of these TMDLs via NPDES permits and nonpoint source programs next to impossible.

Louisiana's Nutrient Reduction Strategy

Regrettably, the *Louisiana Nutrient Management Strategy*[163] does not meet the recommended elements of EPA's State Framework for Managing Nitrogen and Phosphorus Pollution. Shortcomings include the following:

- Failure to set specific pollution reduction goals;
- Failure to identify priority watersheds;
- A lack of measures by which to quantify pollution reductions due to Strategy implementation; and
- Failure to plan for (or even mention) development of numeric nutrient criteria.

[163]http://www.deq.louisiana.gov/portal/DIVISIONS/WaterPermits/WaterQualityStandardsAssessment/NutrientManagementStrategy.aspx