State Development and Implementation of Nutrient Standards:
Putting Florida into the National Context of the Nutrients Challenge

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U.S. EPA Office of Water
3rd Water Institute Symposium
University of Florida
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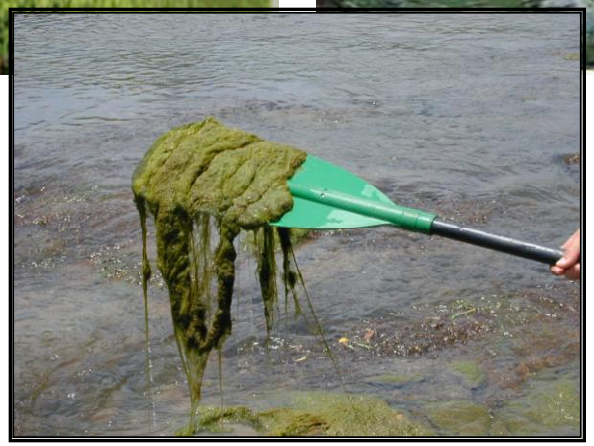
http://www.epa.gov/nutrientpollution

Outline

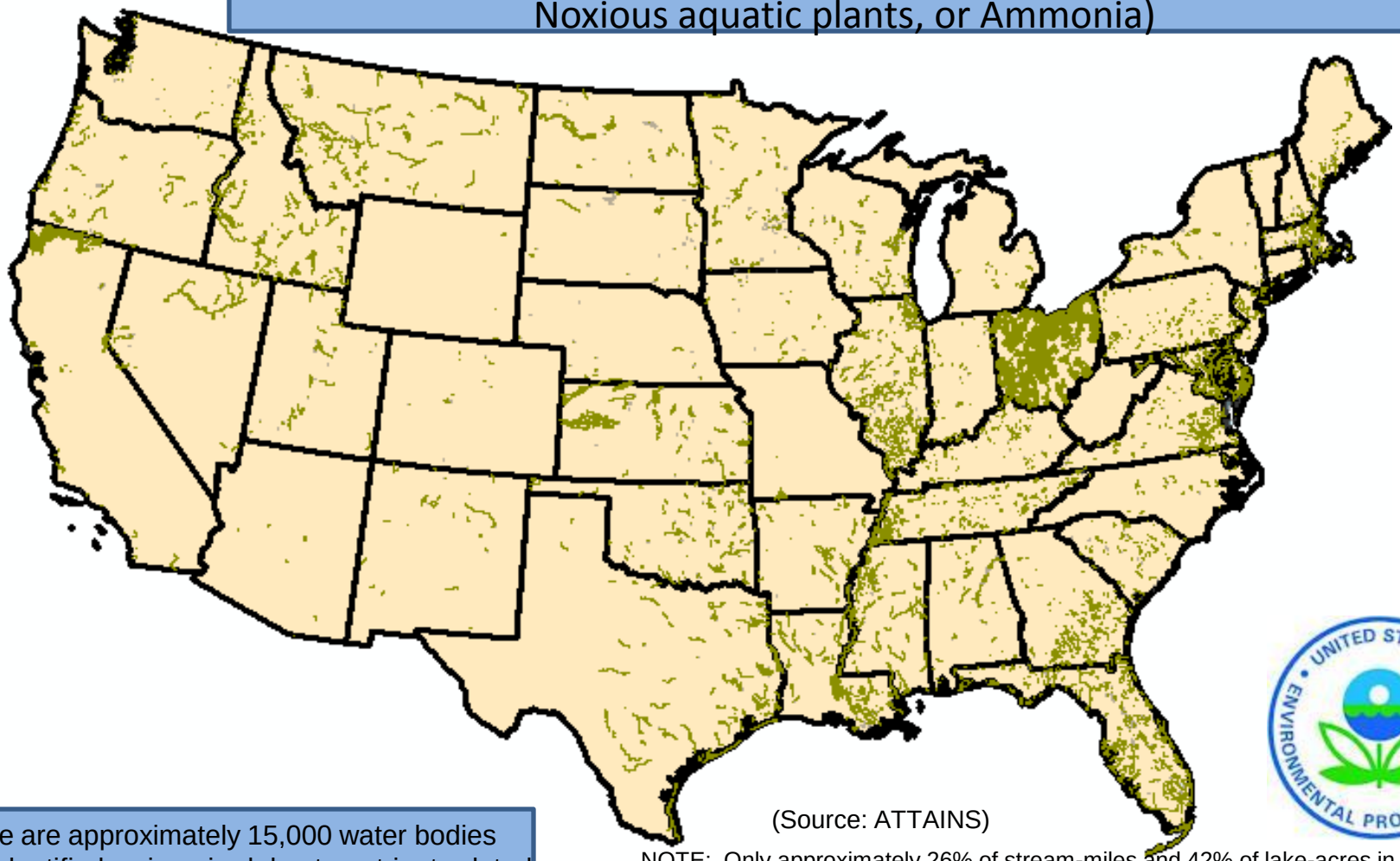
- National scope of nutrient pollution
- Public health, economic, and aquatic impacts
- Sources of nutrients
- Nutrient framework
  - The need for a framework
  - Guiding principles
  - Elements of the framework
- Nutrient criteria
  - Technical assistance
  - Working with states
  - Other tools and considerations
- Looking Ahead – Key Priorities

The Problem

Nutrient pollution is a MAJOR national challenge to sustainable water resources



Waters Indentified as Impaired for Nutrient-related Causes (those with Parent Pollutants in the following categories: Nutrients, Algal growth, Organic enrichment/oxygen depletion, Noxious aquatic plants, or Ammonia)



(Source: ATTAINS)

There are approximately 15,000 water bodies identified as impaired due to nutrient-related causes, or roughly 21% of all impairments

NOTE: Only approximately 26% of stream-miles and 42% of lake-acres in the US have been assessed in order to determine compliance with applicable water quality standards. In addition, the geospatial information necessary for mapping is available for only approximately 70% of the known nutrient-related impairments. Thus, the image shown does not identify all waters that have nutrient-related problems.

Microcystis bloom - August 2003

Toledo Water Intake

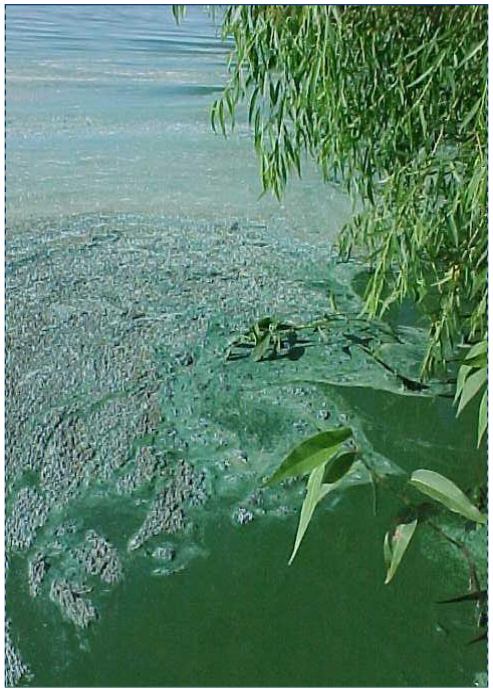
Impacts on Downstream Waters

Microcystis **Bloom – Goodby's Creek at the St. Johns River, Jacksonville, FL (09/14/05)**

Health Advisory listed by the FL Department of Health as a result of algal blooms and fish kill in the St. Johns River, Jacksonville, FL - June 15, 2010

Degraded Streams – Examples

Impaired Reservoirs – Examples

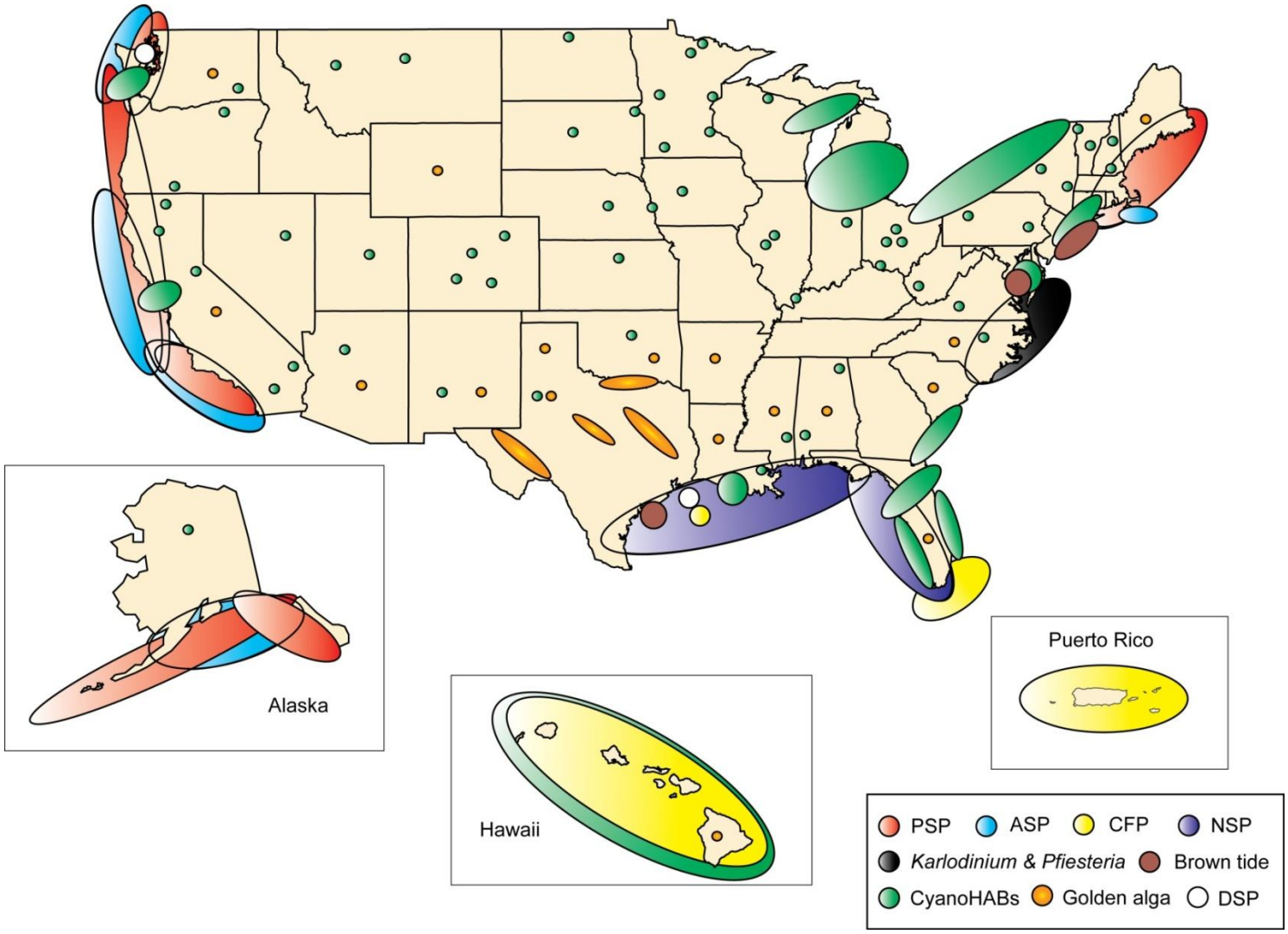


Grand Lake St. Mary's – Ohio 2010

National Scope of Nutrient Problem

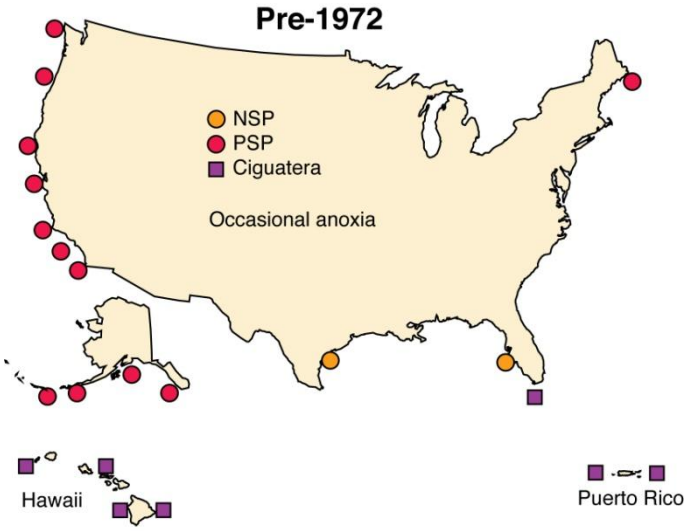
- **Rivers and streams (from national surveys)**
  - Over 47% of streams have medium to high levels of phosphorus
  - Over 53% of streams have medium to high levels of nitrogen
- **Lakes and reservoirs**
  - 5 million acres identified as impaired
- **Coastal and estuarine**
  - 300 hypoxic zones in U.S. waters and not just on the coast
  - 78% of assessed continental U.S. coastal areas exhibit eutrophication symptoms

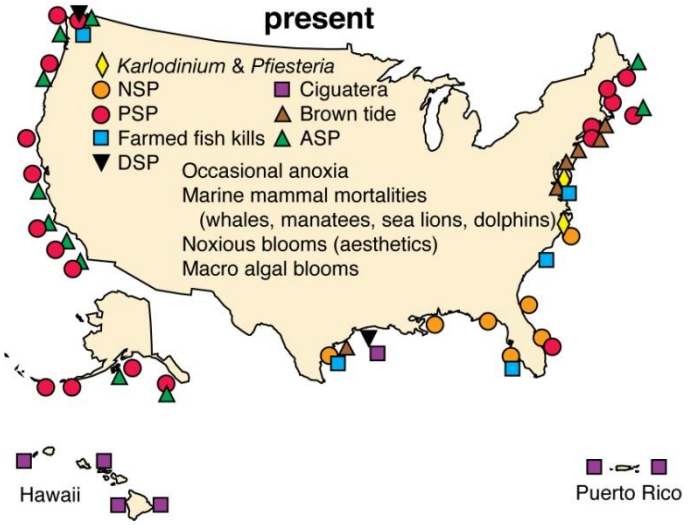
Harmful Algal Bloom (HABs) Occurrences in the United States



(Woods Hole Oceanographic Institution, 2011)

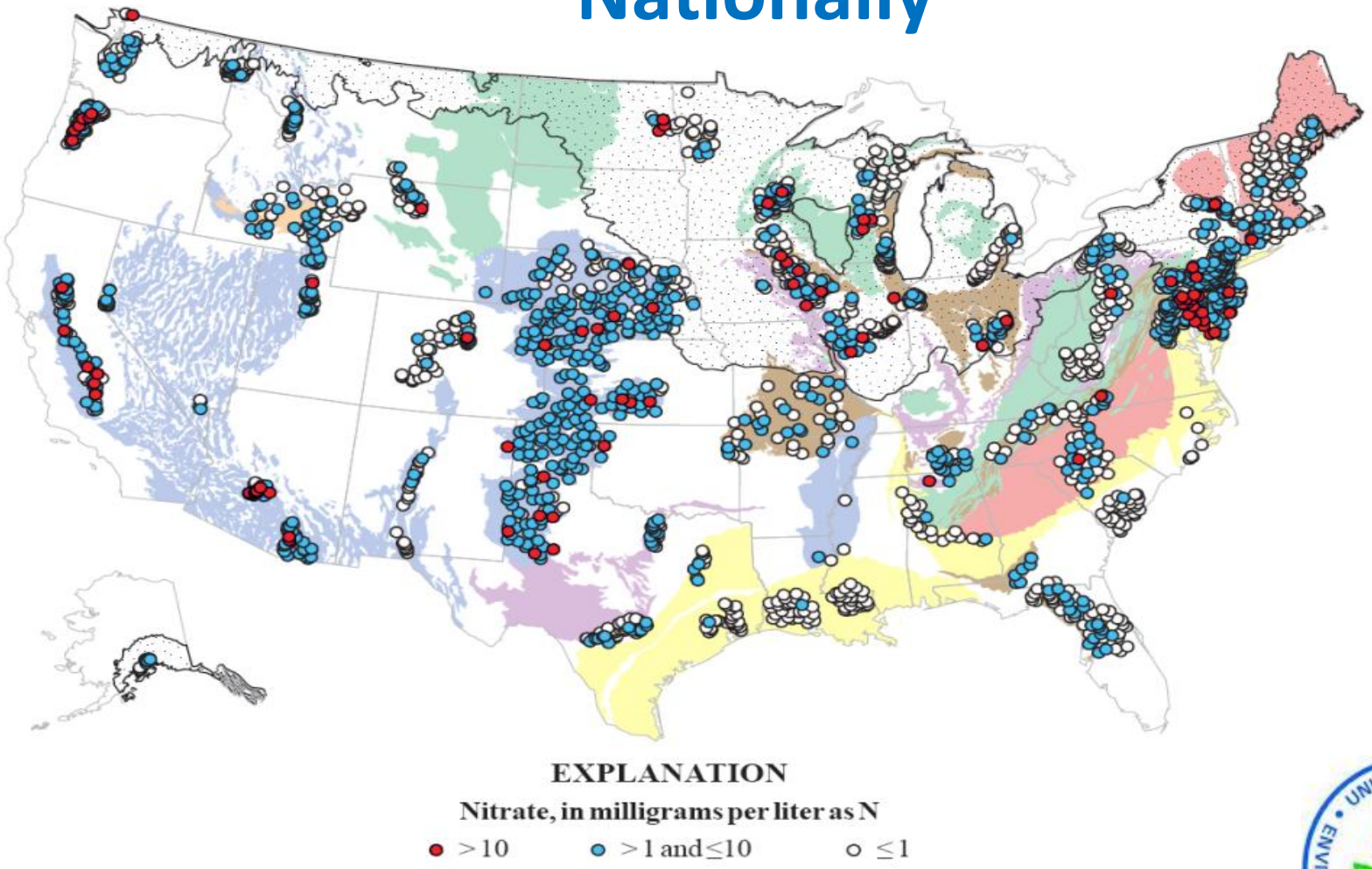
Harmful Algal Bloom (HABs) Occurrences Over Time





(Woods Hole Oceanographic Institution, 2011)

Occurrence of Nitrates in Wells Nationally

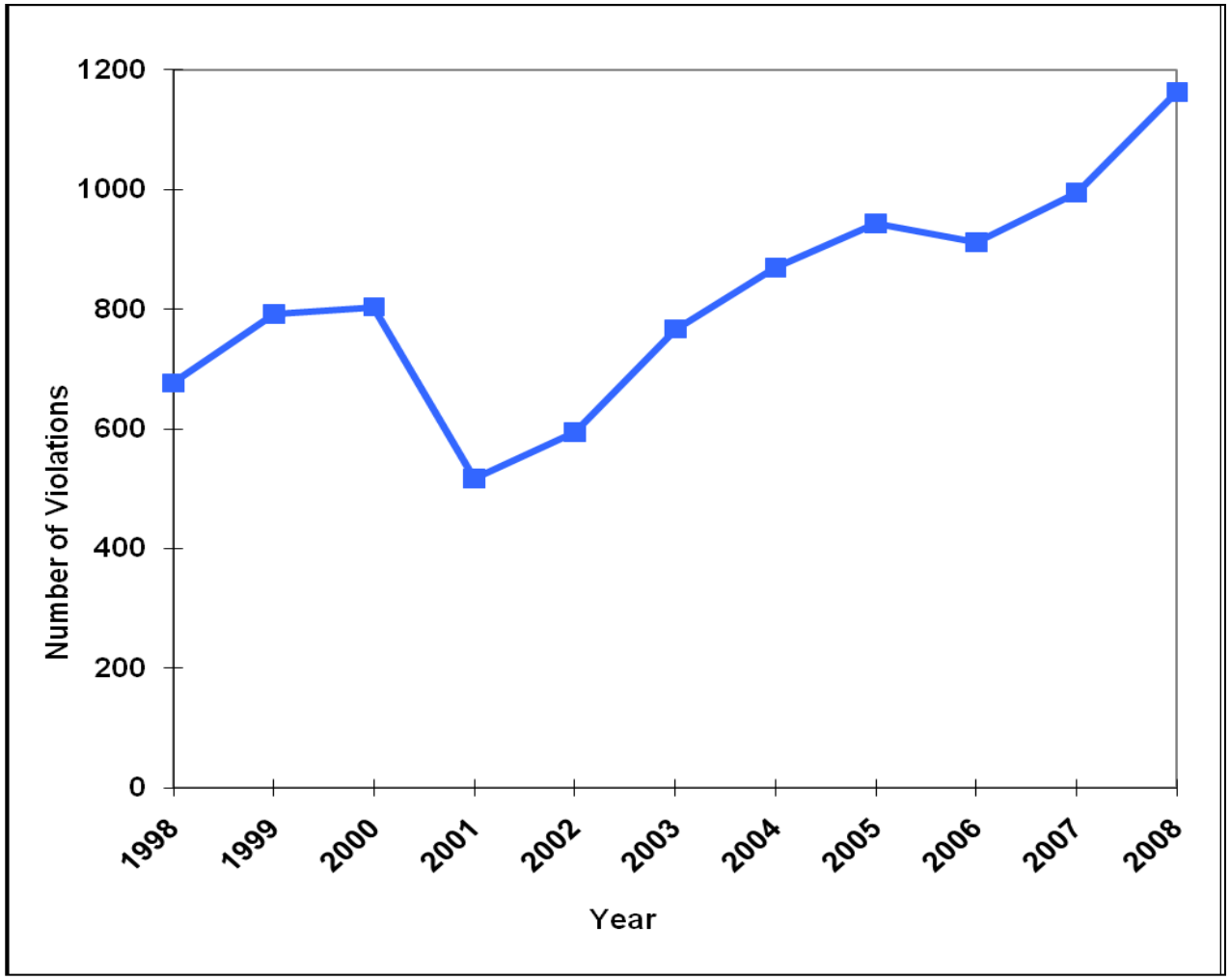


(MCL of 10 mg/l exceeded as N in 4.4 percent of the wells)

2010 USGS Report
Nutrients in Streams & Groundwater

- Analysis of occurrence data from 1992 to 2004
- Nitrogen concentrations generally highest in agricultural streams in Northeast, Midwest, & Northwest
- Despite substantial federal, state and local efforts, limited national progress during this period
- Nitrate concentrations likely to increase in drinking water aquifers over next decade as nitrogen moves downward into the groundwater system.

Community Water System (CWS) Drinking Water Nitrate Violations



Rate of nitrate violations in community water systems doubled over 7 years

The Problem

Nutrient pollution

Nitrogen (N) and Phosphorus (P)

Eutrophication

Harmful algal blooms and associated algal toxins
Dissolved oxygen impairments
Fish kills
Taste and odor issues
Disinfection byproducts

Impacts

Public Health
Drinking water
Recreational use
Shellfish contamination

Socioeconomic

Ecosystem

Public Health Impacts

- Algal toxins pose risks for swimmers and shellfish consumers
- Nitrates in drinking water wells—particularly private wells---pose acute risks to infants and young children

Economic Impacts

- **Grand Lake St. Mary's, OH**
  - As of October 2010, the public water supply had incurred $12,388,700 (estimated) to treat nutrient-polluted water. $3,381,200 of that was total O&M. Amount does not include alum, lime, and sludge costs.
  - Before 2009, tourism and recreation in the area accounted for as much as $150 million in annual economic activity.
  - Three years of algal blooms and public health advisories have drastically impacted water-based recreation.
    - Several marinas, boat dealers and small businesses have closed.
    - Other small businesses around the lake have lost ~ $35 to $45 million in revenues.
    - Park revenue is down ~$250,000.
- **Chesapeake Bay**
  - Between 1998-2006, the decline of crabs meant a cumulative loss of ~$640 million to MD and VA restaurants, crab processors, wholesalers, grocers and watermen.

Aquatic Life Impacts

- **Low dissolved oxygen levels (hypoxia)**
  - Algae, fed by N&P, use DO as they respire and when they decompose
  - When DO levels in the water get low enough, aquatic life, particularly immobile species like oysters and mussels, become stressed or die, resulting in significant impacts on marine food webs and the economy
- **Fish kills**
  - Have been noted on all U.S. coasts and in many inland waters
  - Frequency and magnitude have increased as nutrient pollution has worsened both hypoxia and harmful algal blooms (HABs)
- **Dead zones**
  - Often used in reference to the absence of life (other than bacteria) when habitats have no oxygen
  - Most dramatic U.S. example is off the coast of Louisiana & Texas
    - Second largest eutrophication-related hypoxic zone in the world
    - Associated with the nutrient pollutant load discharged by the Mississippi and Atchafalaya Rivers

What are the N & P sources?

- **Municipal Wastewater Treatment**
  - Among most heavily regulated sectors in US
  - Treat >18 million tons of human waste annually
  - >16,500 municipal treatment system permits
  - ~7% have numeric limits for N or P
  - 18% monitor for these pollutants
- **Atmospheric Nitrogen Deposition**
  - Regulations in place, more underway
  - These sources can be significant
  - In the Chesapeake Bay and Mississippi River watersheds, Atmospheric N accounts for 21% of the source contributions

What are the N & P sources?

- **Urban Stormwater**
  - 80% of U.S. population lives on 10% of land
  - Urban populations are impacting coastal areas
  - 50% of existing urban landscape will be redeveloped by 2030
  - Additional 30% of currently undeveloped land likely to be developed
- **Agricultural Livestock**
  - $130 billion industry , >1 billion tons of manure annually
  - Substantial production is largely unregulated by CAFO Rule
- **Agricultural Row Crops**
  - $120 billion industry, in many areas a significant source of N&P
  - Agricultural storm water runoff and irrigation return flows exempt from Clean Water Act, variable controls at state level

The Need for a Nitrogen and Phosphorus Pollution Reduction Framework

- Current efforts to address N and P pollution hard-fought but collectively inadequate at state and national level
- Serious problem that is getting worse
  - Potential to become one of the costliest and most challenging environmental problems
- Growing population = more N and P pollution from urban stormwater, municipal and industrial wastewater discharges, air deposition, agriculture
- To protect public health and the environment, need to reduce N and P loadings ***now*** -- while states continue to develop numeric nutrient criteria and standards
  - Since 1998, the EPA has encouraged states to develop numeric nutrient criteria to gauge N and P pollution and develop and implement appropriate solutions

The Need for a Nitrogen and Phosphorus Pollution Reduction Framework (2)

- **IG Numeric Nutrient Standards Report**
  - The EPA's 1998 to 2008 strategy and plan "has been ineffective"
  - In the 11 years since 1998 "half the states still have no numeric criteria"
  - The EPA has "not held States accountable"
  - No assurance that "states will develop standards that provide adequate protection of downstream waters"
  - "Until recently, EPA has not used its Clean Water Act authority to promulgate Water Quality Standards for States".
- **State-EPA Nutrient Innovations Task Group Report**
  - Knowledge, collaboration, and incentives will fail absent joint accountability
  - Current CWA tools underutilized or rarely utilized
  - Need profound change in how we share accountability between sources, within watersheds, and across State lines
- **Growing Stakeholder Pressure for EPA Action**
  - Louisiana- stakeholder demands for listing subset of Louisiana coastal waters for dissolved oxygen
  - Wisconsin, Kansas – stakeholder demands for EPA establishment of N & P N & P numeric Water Quality Standards
  - Mississippi River Basin – petition for the EPA to develop N & P numeric water quality standards for entire country, alternatively for MARB states, or at minimum 10 stem States

EPA's March 2011 Framework: Guiding Principles

- **Results, results, results**: build from existing state work, but accelerate progress and demonstrate clear results

- Encourage a collaborative approach between federal partners, states, and stakeholders

- States need flexibility to achieve near-term reductions in N and P pollution while they make progress on their long-term strategies

EPA's March 2011 Framework Elements: Assessment and Prioritization

- **Prioritize watersheds on a statewide basis for nutrient loading reductions**
  - Estimate N & P loadings delivered to waters in all major watersheds across the state at HUC8 scale or smaller
  - Identify watersheds that account for substantial portion of urban and/or agricultural
  - Identify targeted/priority HUC12 or similar watersheds for targeted N & P load reduction activities, considering receiving water problems, public and private drinking water supply impacts, nutrient loadings, opportunity to address high risk nutrient problems, or other related factors
- **Set watershed load reduction goals based upon best available information**
  - Set numeric goals for loading reductions for each targeted/ priority HUC12 that will collectively reduce the majority of N & P loads from identified HUC8 watersheds

Framework Elements: Identify and Implement Metrics, Measures, and Practices to Reduce Loads

- **Ensure effectiveness of point source permits in targeted/ priority sub-watersheds**
  - Municipal and Industrial Wastewater Treatment Facilities
  - Concentrated Animal Feeding Operations (CAFOs) that discharge
  - Urban Stormwater
- **Agricultural areas**
  - Partner w/ Federal & State Agricultural partners, Non-Governmental Organizations, Landowners
  - Consider innovative approaches (e.g., stewardship initiatives, markets)
  - Accelerate adoption of the most effective conservation practices where they are most needed

Framework Elements: Identify and Implement Metrics, Measures, and Practices to Reduce Loads

- **Reduce stormwater runoff and septic system impacts**
  - Use state, county and local government tools in communities not covered by the MS4 program to address runoff
  - Including Low Impact Development/Green Infrastructure approaches
  - Address septic systems
    - consider limits on phosphorus

Framework Elements: Accountability and Transparency

- **Accountability and verification measures**
  - Identify which tools will be used within targeted/priority sub-watersheds to assure reductions will occur
  - Verify that load reduction practices are in place
  - Assess/demonstrate progress in implementing and maintaining management activities and achieving load reductions goals

- **Annual public reporting of implementation activities and biannual reporting of load reductions and environmental impacts associated with each management activity in targeted watersheds**
  - Establish process to annually report for each watershed
  - Share annual report publically on the state's website with request for comments and feedback for an adaptive management approach

Framework Elements: Numeric Criteria

Goal

For states to develop numeric water quality standards on a reasonable schedule while making progress on reducing loads in the near-term

Develop work plan and phased schedule for developing numeric criteria for classes of waters (lakes/reservoirs, rivers/streams, and estuaries)

- Should contain interim milestones, e.g., data collection, data analysis, criteria proposal, and criteria adoption consistent with the Clean Water Act
- Reasonable timetable: complete numeric N & P criteria for at least one class of waters in accordance with a robust, state-specific workplan and phased schedule

Why Numeric Nutrient Criteria?

Numeric nutrient criteria provide quantitative and measureable goals

- **Advantages of numeric criteria**
  - Easier to accurately implement for:
    - Monitoring, assessment, and listing (impaired waters list)
    - Water quality-based pollutant limits (NPDES permits)
    - Remediation (TMDLs, nutrient budgets and allocations)
  - Better tracking of progress towards controlling N and P
  - More transparent to the public
  - Protective and preventative; easier than translating narratives when implementing controls before problems occur

EPA Assistance to States to Develop and Implement Numeric Nutrient Criteria

EPA Technical Assistance: Guidance Documents and Collaborations

- Waterbody-specific guidance documents for developing numeric nutrient criteria (NNC)
- Technical support document on use of stressor-response approaches
- Providing technical support through N-STEPS (Nutrient Scientific, Technical Exchange, Partnership and Support)
- Strengthening and communicating science that supports NNC development to state water quality agencies and the public
- Consulting with the EPA's Science Advisory Board regarding scientific methods to develop NNC
- Engaging with state coalition efforts to advance NNC development
- Providing data on the magnitude and potential sources of N&P pollution and resultant water quality problems via the nitrogen and phosphorus data access tool (NPDAT)

Assisting states to develop workable and protective numeric nutrient criteria

- **Maine**:
  - The EPA is helping to clarify and strengthen Maine's draft nutrient water quality standards.
  - Maine proposal combines total phosphorus and a suite of seven response indicators while maintaining consistency with the Clean Water Act and the EPA's policy on independent applicability.
  - Increases Maine's certainty that waters that exceed the nutrient criteria are truly impaired and requires water quality-based permit limits for total phosphorus at protective levels.
- **Ohio**:
  - The EPA is similarly working with Ohio to explore its innovative approach to include biological response indicators in nutrient criteria for streams.
  - This approach is a multi-metric scoring system, called the Trophic Index Criterion, that aggregates results from individual evaluations of primary productivity, bic[illegible] and in-stream nutrient concentrations.
  - The proposal integrates "stressors" (i.e., nitrogen and phosphorus) that cause stream degradation and "responses" (e.g., impacts to organisms that inhabit the stream).

Assisting states to develop workable and protective numeric nutrient criteria

- **Wisconsin**:
  - The EPA worked with Wisconsin's Department of Natural Resources on developing phosphorus criteria for lakes, reservoirs, streams, rivers, and Great Lakes.
  - This effort culminated with the Wisconsin legislature's adoption of numeric phosphorus criteria and corresponding provisions for developing and implementing Wisconsin Pollutant Discharge Elimination System (WPDES) permit provisions.
  - The EPA approved the numeric phosphorus criteria in December 2010 and has been working with the state to strengthen the accompanying permitting rule.
- **Montana:**
  - The EPA worked with Montana's Department of Environmental Quality to explore the role of variances when implementation of numeric nutrient criteria would result in substantial and widespread economic impacts.

Assisting states to develop workable and protective numeric nutrient criteria

Florida:

- The EPA has been working with the state for years to develop numeric nutrient water quality standards for Florida's estuaries, coastal waters, lakes and streams and flowing waters.
- The standards will set numeric limits, or criteria, on the amount of nutrient pollution allowed in Florida's waters.
- These criteria will improve water quality and protect public health, aquatic life and the long-term recreational uses of Florida's waters.
- EPA supports Florida's effort to develop numeric nutrient criteria.
- The ideal outcome is for the State of Florida to develop and implement its own rules to control the nutrient pollution problems in the state.
- Both EPA and the state either have or are in the process of developing rules, both of which largely rely on the same underlying data and are similar in many respects.
- EPA is providing as much consideration and flexibility as possible to enable the state to complete its rulemaking process and submit its nutrient water quality standards to the EPA for review.
- The EPA is required to promulgate nutrient criteria in order to meet the terms of a consent decree.

Looking Ahead – Key Priorities

- Broader EPA–USDA coordination
- Continued commitment to science
- Working with more and more states in development and implementation of nitrogen and phosphorus pollution reduction frameworks that address all sources of nutrient pollution
- Assistance with development of states' numeric nutrient standards
- Broader and more effective outreach to stakeholders

For More Information:

www.epa.gov/nutrientpollution

The slides below were kept for the reviewers of this presentation in case some of them could be reused.

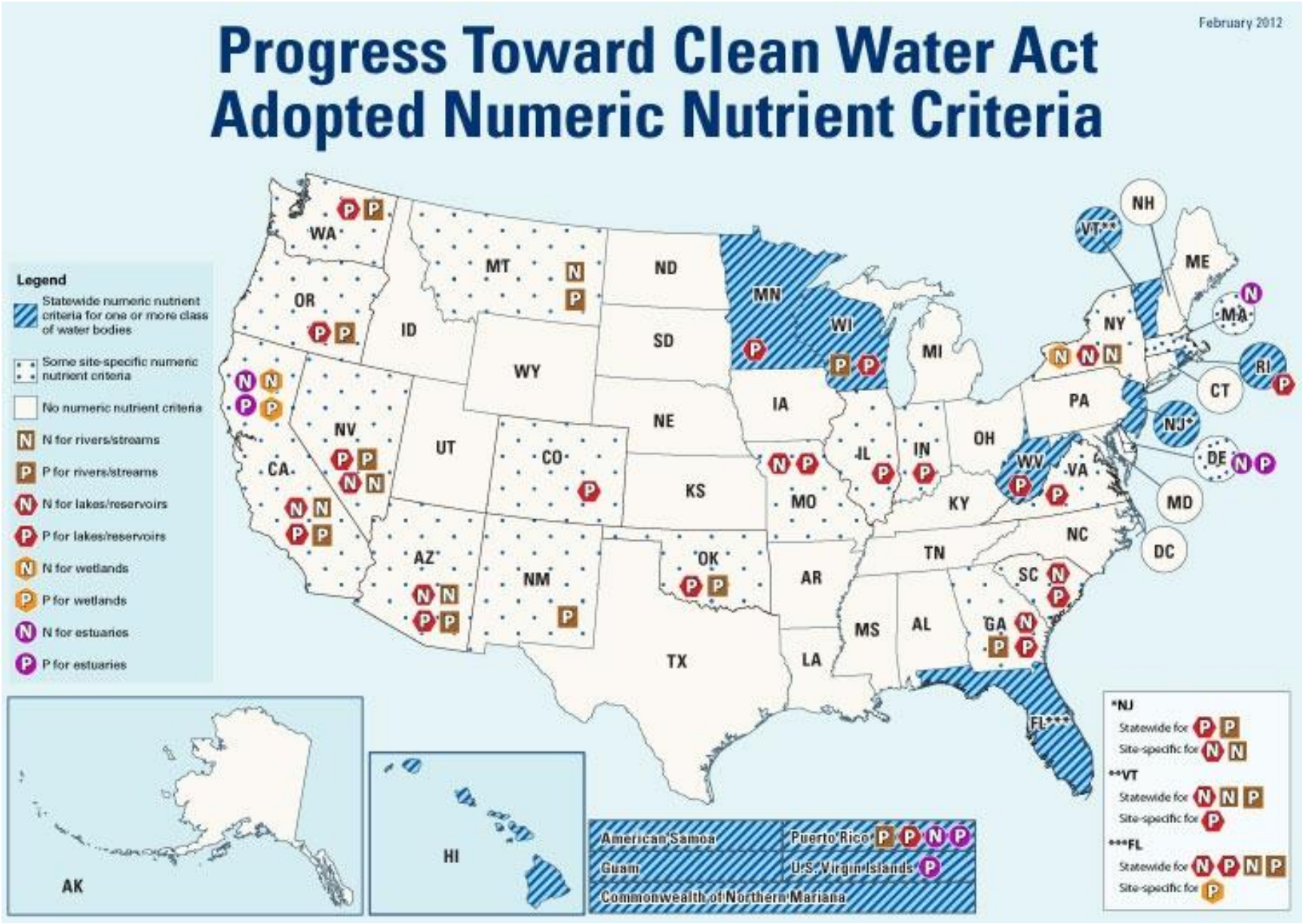
They should be deleted before sending this presentation for management review and to Ellen.

Litigation, Petitions, and Environmental Reports

- **NRDC Secondary Treatment Petition – Nov. 2007**
- **Mississippi River Watershed Petition – July 2008**
  - **EPA Numeric Standards for MN, WI, IL, IA, MO, AR, KY, TN, MS, LA**
  - **Sierra Club Petition in Support – 40,000 Signatures**
- **Florida Wildlife Federation's Lawsuit - July 2008**
- **PA TMDL Nutrients Litigation – Summer 2009**
- **EPA I.G. Numeric Nutrient Standards Report - August 2009**
- **Wisconsin Notice of Intent to Sue – November 2009**
- **Kansas Notice of Intent to Sue – Spring 2010**
- **Missouri Notice of Intent to Sue – Summer 2010**
- **LA NOI to Force Listing of Coastal Waters – Spring 2011**

NITG Call to Action

- All Major Sources of Nutrients Must be Held Accountable for Their Contributions to the Problem.
- Combating the Challenge of Nutrient Pollution Will Require a Profound Change in How We Share Accountability Between Sources, Within Watersheds, and Across State Lines
- National Leadership is Vital to Supporting and Requiring a More Consistent and Full Utilization of Existing Tools From State to State and Source to Source


February 2012
Progress Toward Clean Water Act
Adopted Numeric Nutrient Criteria
Legend
Statewide numeric nutrient criteria for one or more class of water bodies
Some site-specific numeric nutrient criteria
No numeric nutrient criteria
N for rivers/streams
P for rivers/streams
N for lakes/reservoirs
P for lakes/reservoirs
N for wetlands
P for wetlands
N for estuaries
P for estuaries
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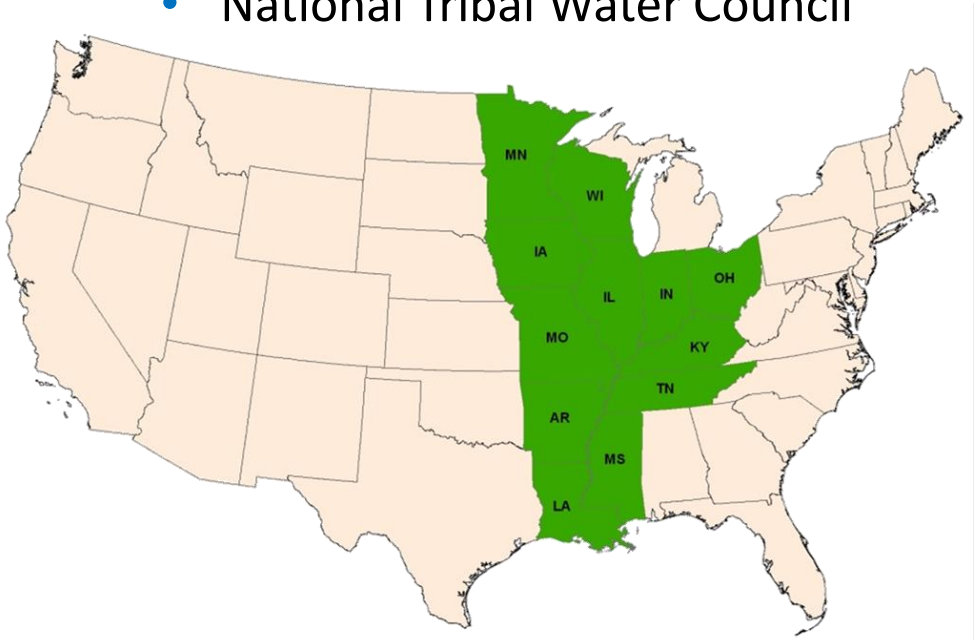
Gulf Hypoxia Task Force Membership

5 Federal Agencies and Tribes:

- US Army Corps of Engineers
- US Environmental Protection Agency
- US Department of Agriculture
- US Geological Survey
- National Oceanic and Atmospheric Administration
- National Tribal Water Council

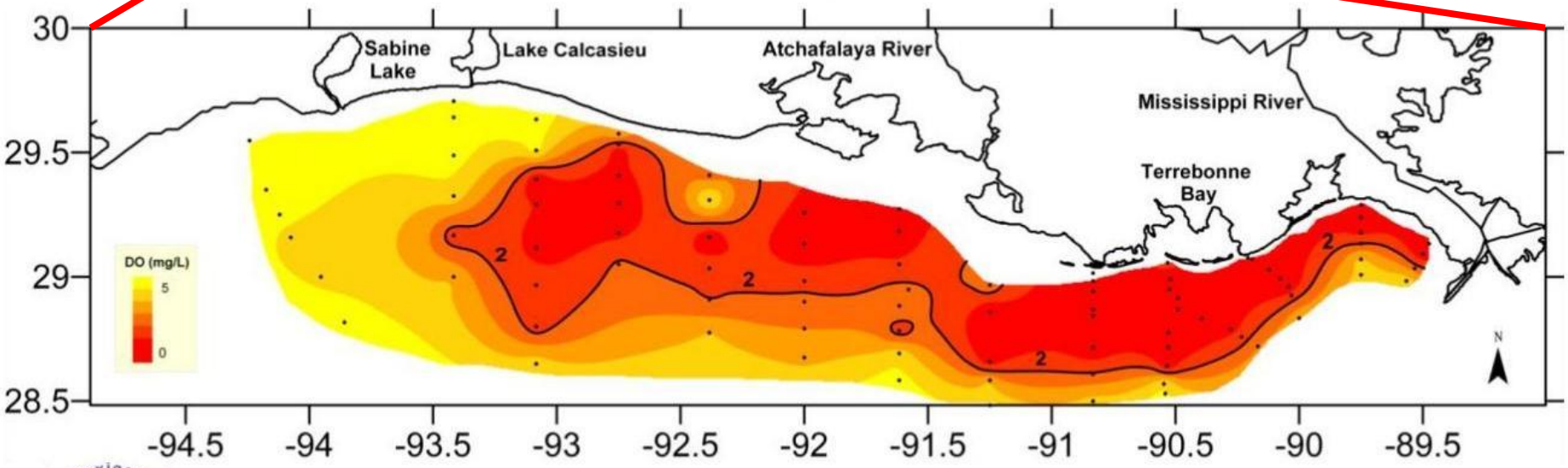
12 State Agencies:

- Arkansas
- Missouri
- Iowa
- Tennessee
- Minnesota
- Indiana
- Ohio
- Louisiana
- Illinois
- Mississippi
- Kentucky
- Wisconsin



Reduce Nutrients Impacting Hypoxic Zone

Bottom-Water Dissolved O_2 (July 24 – 30, 2011)

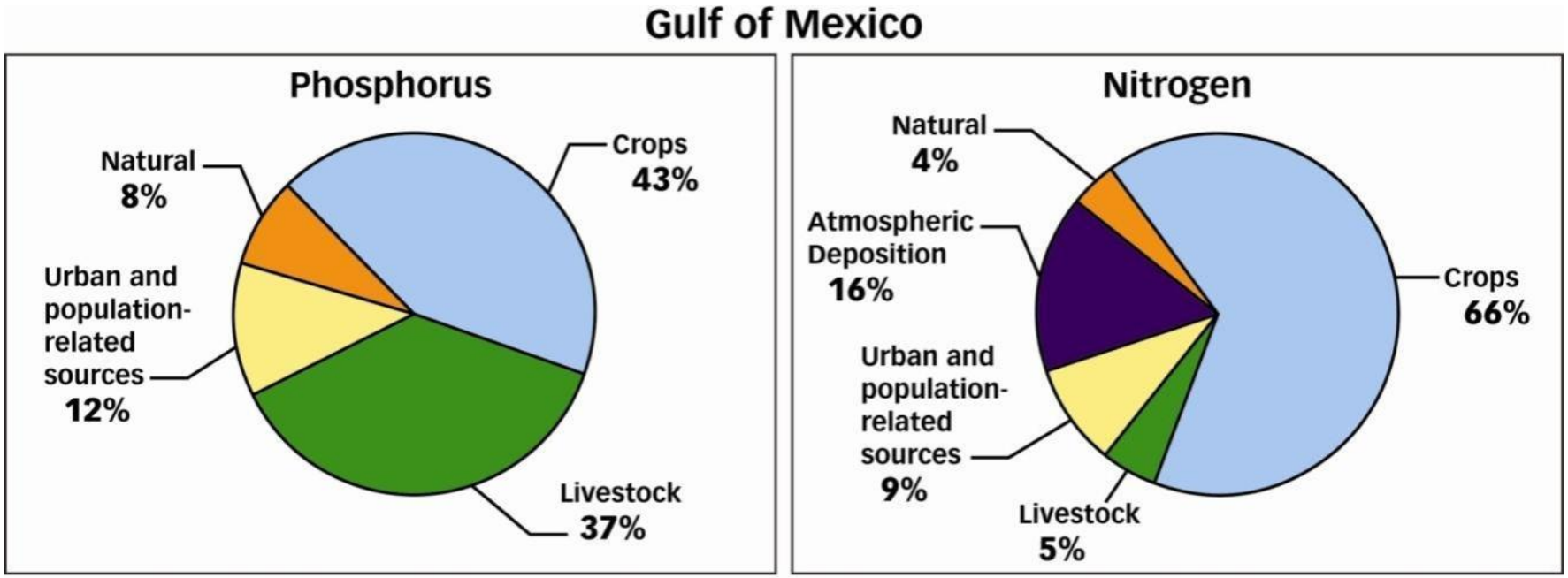


Source: N. N. Rabalais (Louisiana Universities Marine Consortium) and R. E. Turner (Louisiana State University)

Funded by: NOAA, Center for Sponsored Coastal Ocean Research

Achieving the 5,000 km^2 goal: Need to Reduce Loads from Upstream Ag

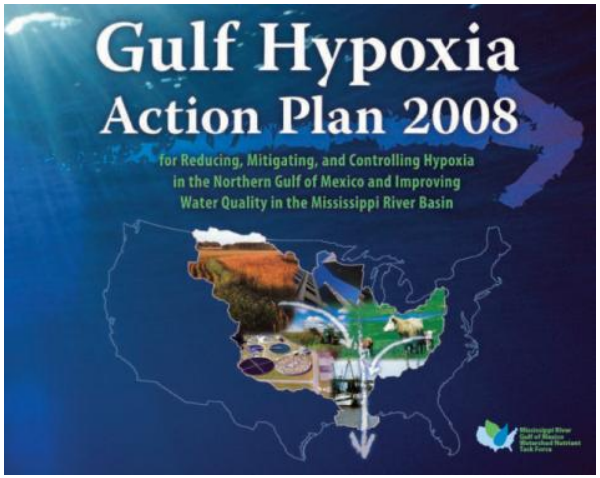
- Gulf hypoxic zone is "fed" by excess N & P from the Mississippi/Atchafalaya River Basin (MARB)
  - Drains 31 states, or ~41% of contiguous U.S.
  - Multiple, diffuse non-point sources



USGS, 2008

2008 Gulf Hypoxia *Action Plan:* Nutrient Strategies and Increased Accountability

- 2008 *Gulf Hypoxia Action Plan*
  - Product of a four-year reassessment and consideration of emerging science



- Actions to achieve goals include:
  - Develop/implement state-wide nutrient reduction strategies with complementary federal strategies
  - Track interim progress on reducing N & P pollution to increase accountability
  - Continues Task Force commitment to pursue a voluntary and adaptive management approach

2008 Gulf Hypoxia *Action Plan:* Progress on Nutrient Strategy Development

- MS has "led" the way, having completed strategy development and moved to the implementation stage.
- The other HTF states are at various stages of the development process:
  - Some states have put pen to paper: LA, IN, OH, KY
  - Some states holding stakeholder meetings: IA, IL, MO, TN
  - Lack of funding is delaying and challenging efforts by states to complete Strategies on time
  - Still need buy-in from all key parties within states, and long term monitoring

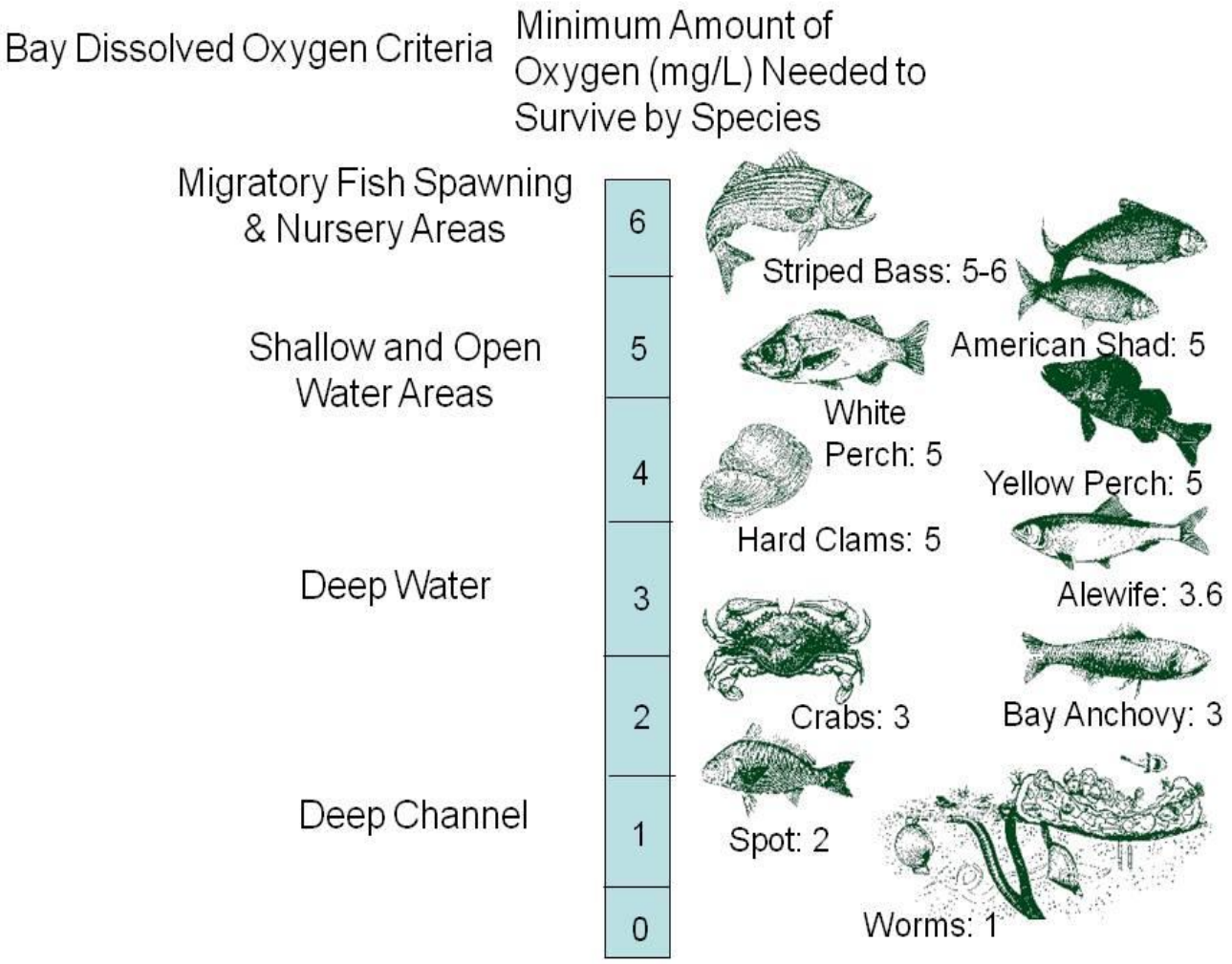
Recent Hypoxia Task Force Actions Supporting Nutrient Reductions and State Strategies

- Task Force-wide efforts:
  - 2010 Nutrient Strategy Work Group Report (Sept 2010)
  - EPA Nutrient Framework (March 2011)
  - All states working on state nutrient strategies (Aug 2011)
  - USDA Mississippi River Basin Healthy Watersheds Initiative (MRBI)

Some Very Important Points Regarding the Chesapeake Bay TMDL

- ***TMDL Endpoint was Temporally and Spatially defined DISSOLVED OXYGEN CRITERION***
- ***The strategy to achieve these TMDL endpoints centered on reducing Nitrogen and Phosphorus from all sources in the watershed***
- ***The strategy also relies on an adaptive management approach***
- ***EPA ready to "Backstop" states if needed***

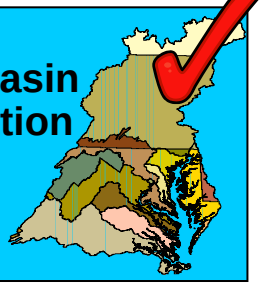
DO (mg/L) Concentrations Required by Chesapeake Bay Key Species



Bay TMDL and WIP Schedule: 2009-2017

Oct 2009

Major basin jurisdiction loading targets

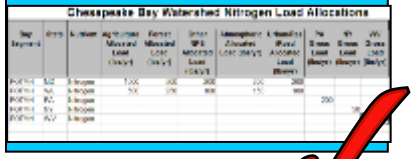


November-December 2009

Bay TMDL Public Meetings

Phase 1 Watershed Implementation Plans: November 2009 – Sept.1 2010

Local Program Capacity/Gap Evaluation



July 1 and August 13 Allocations

Draft TMDL

Sept. 24, 2010

(45 days)

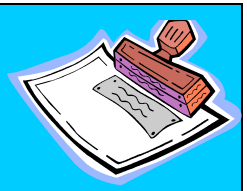
Public Review And Comment

Nov 29, 2010

Final WIPs

December 2010

Final TMDL Established



Phase 2 Watershed Implementation Plans: Jun/Nov 2011

Divide Target Loads among Watersheds, Counties, Sources

Starting 2011

2-year milestones, reporting, modeling, monitoring

2017 60% of Practices in Place - Phase III WIPs to meet 2025 Goal

CBTMDL Modeling Approach

Applying the Adaptive Management Approach