

Nutrients of Concern

Nitrogen & Phosphorus



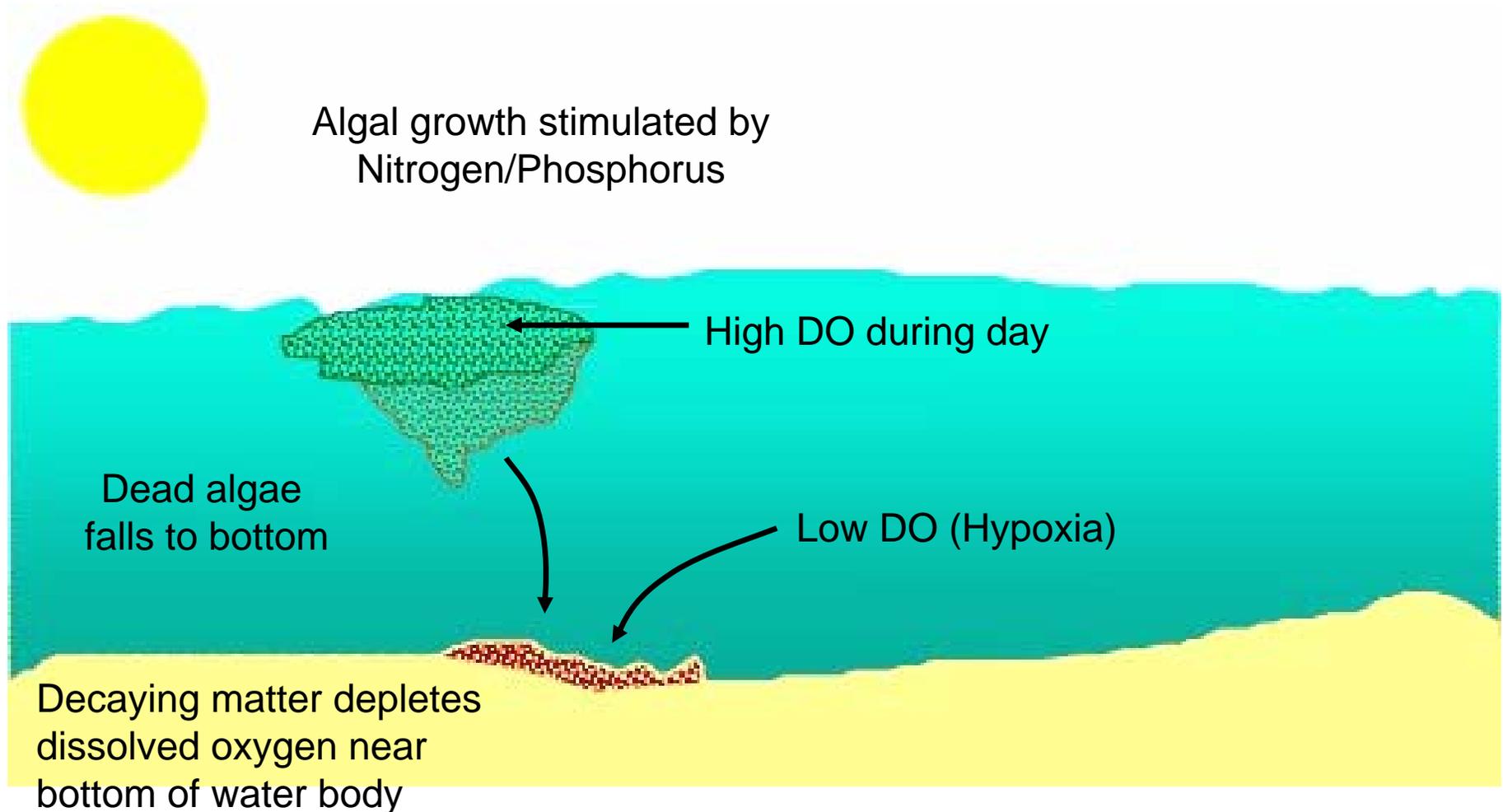


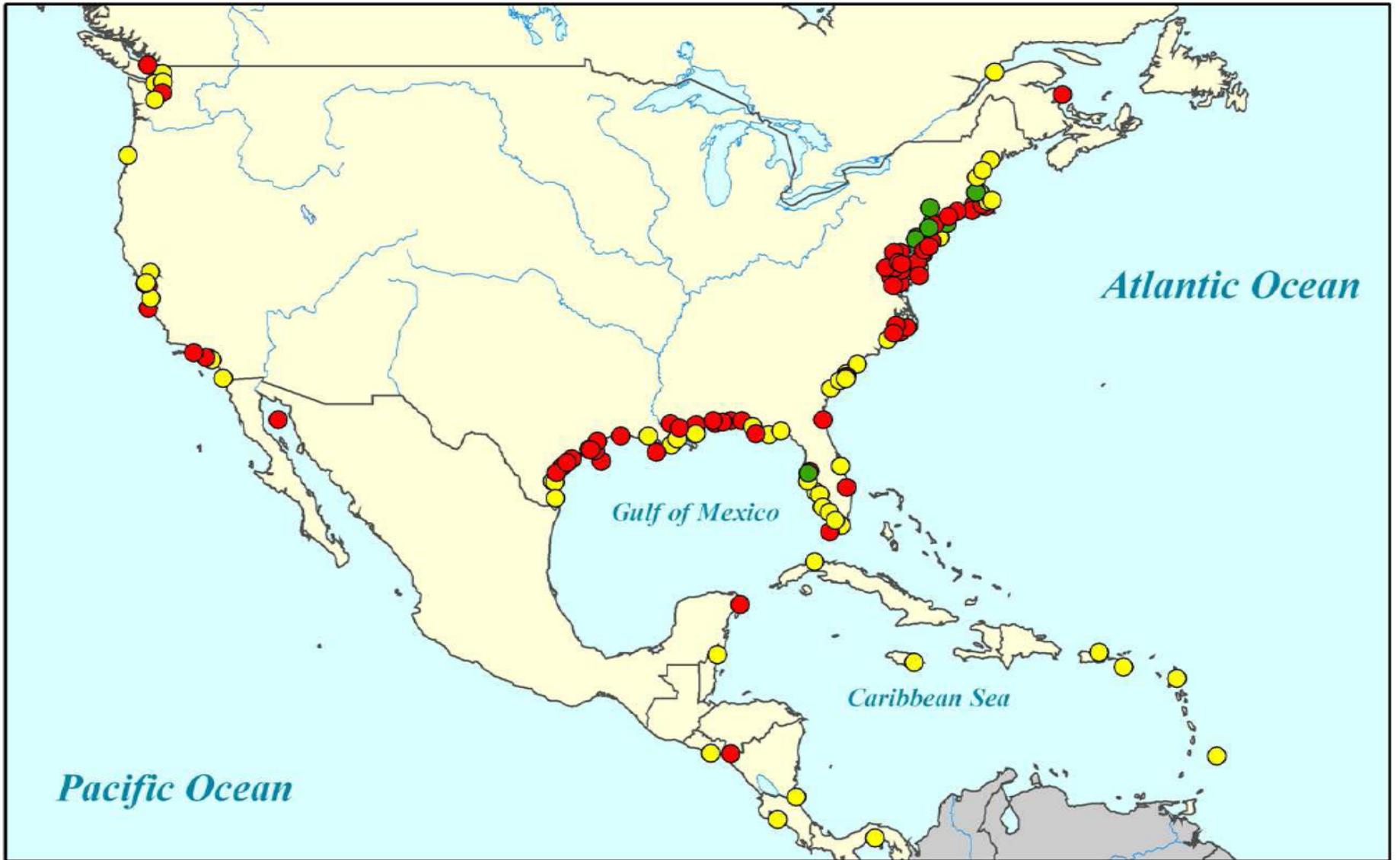
Green Lawns - OK!

Green Lakes – NO WAY!



Impacts of Decaying Plant and Algal Matter on Dissolved Oxygen





Eutrophic and Hypoxic Areas

- Areas of Concern
- Documented Hypoxic Areas
- Systems in Recovery

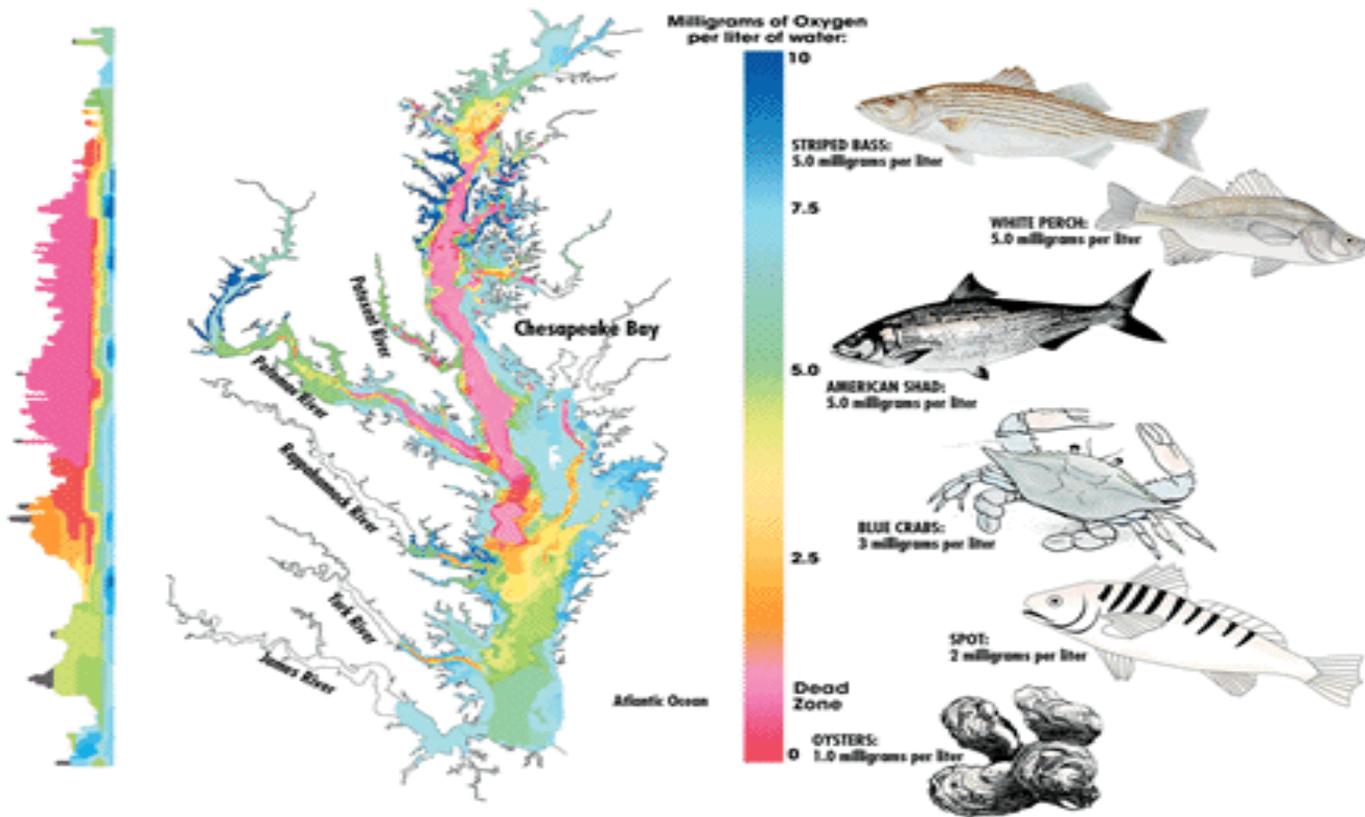


Coastal Eutrophic and Hypoxic Areas of North America and the Caribbean

Data compiled from various sources by R. Diaz, M. Selman and Z. Sugg.

The Price: Chesapeake Bay

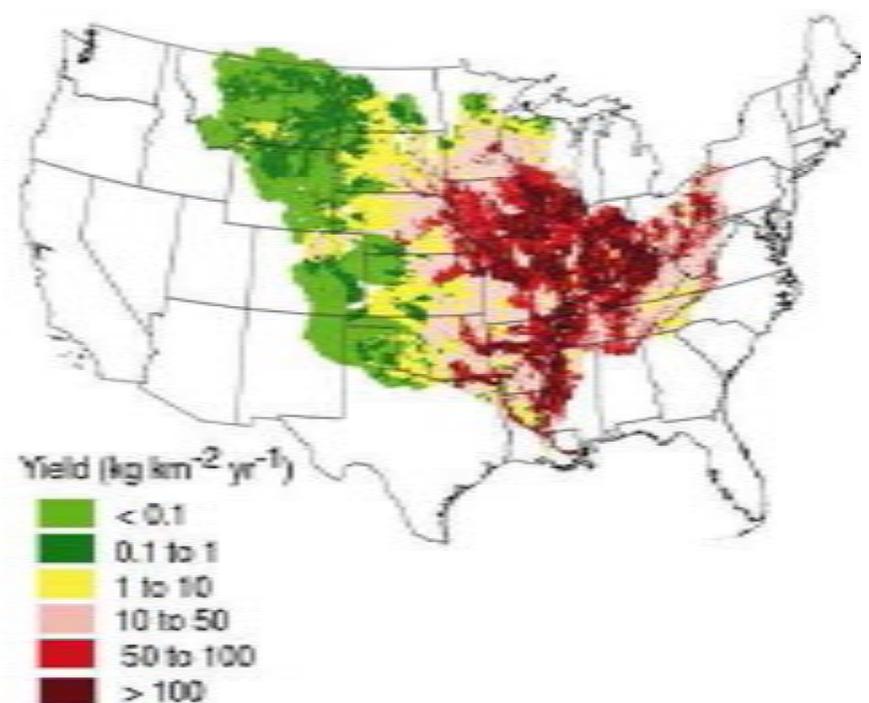
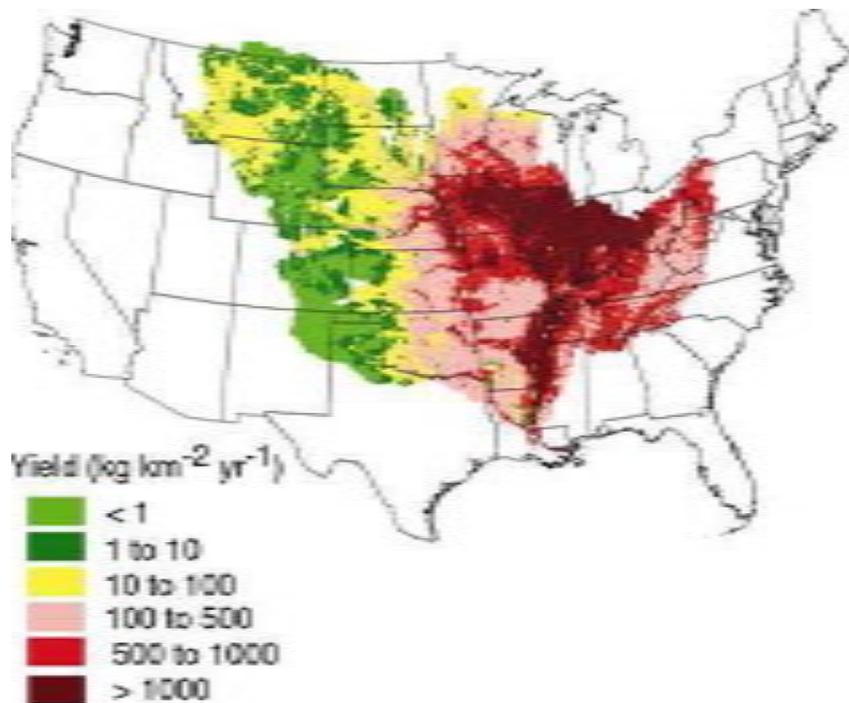
The “Dead Zone”



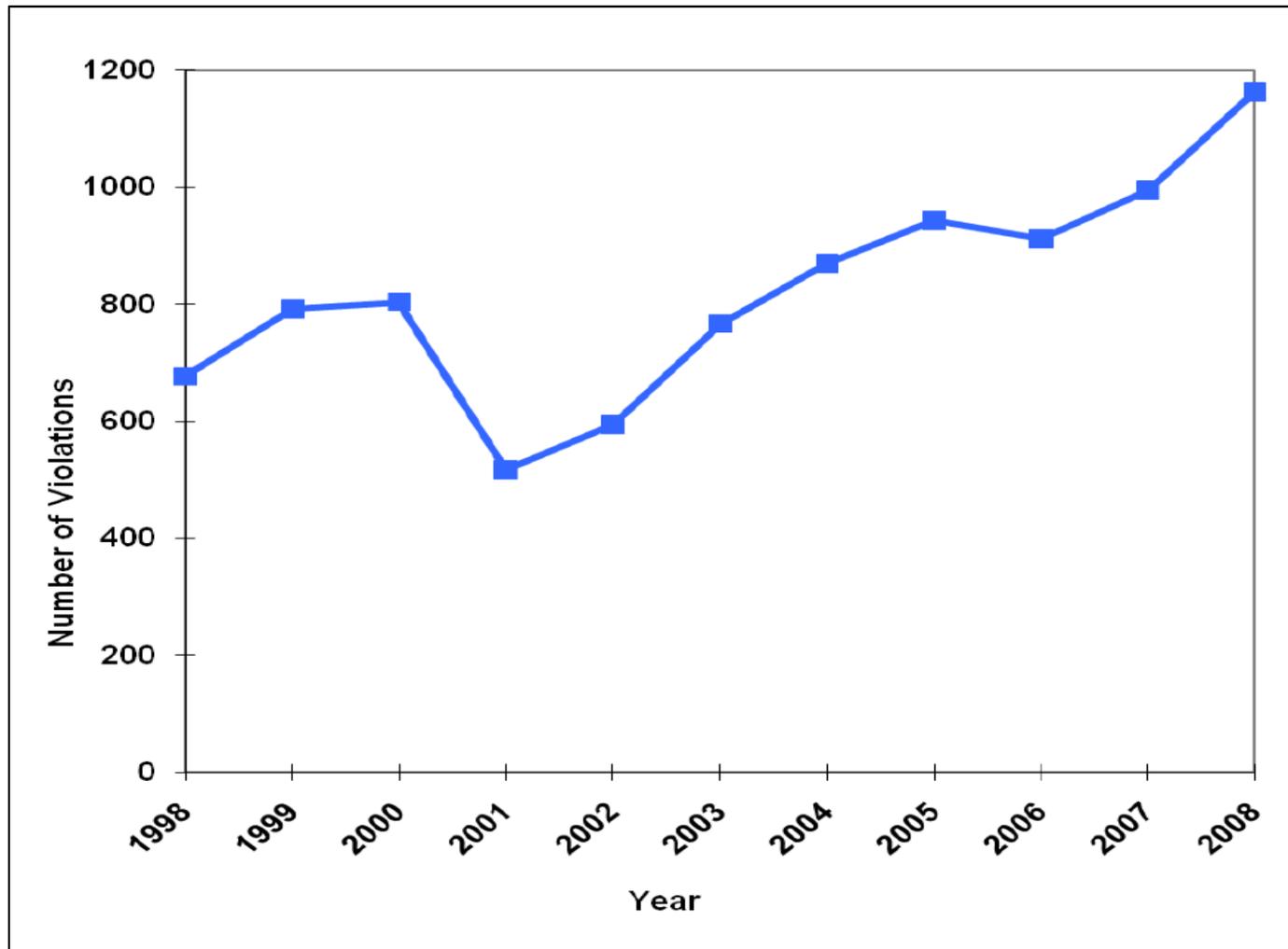
Nutrient Delivery to Gulf of Mexico

Total Nitrogen

Total Phosphorus



Annual Nitrate Violations in Community Water Systems



Nutrient Pollution Impacts

- Drinking Water
 - Disinfectant by-products
 - Harmful algal blooms and increased treatment costs
 - Nitrate violations have doubled in the last 7 years
- 14,000 nutrient-related impairment listings in 49 states
- River and Streams
 - Over 47% of streams have medium to high levels of phosphorus and over 53% have medium to high levels of nitrogen
- Lakes and Reservoirs
 - 2.5 million acres impaired
- Coastal and Estuarine
 - 168 hypoxic zones in U.S. waters
 - 78% of assessed continental U.S. Coastal area with eutrophication symptoms

POTWs

- 16,500 POTWs nationwide
- 34 billion gallons per day
- Major (urban) sources of nutrient pollution
- 65% of point source nutrient pollution is from POTWs
- <10% have P limits; 4% have limits for N
- Total discharge is expected to grow

Beijing Olympic Venue



Adopt China's Approach



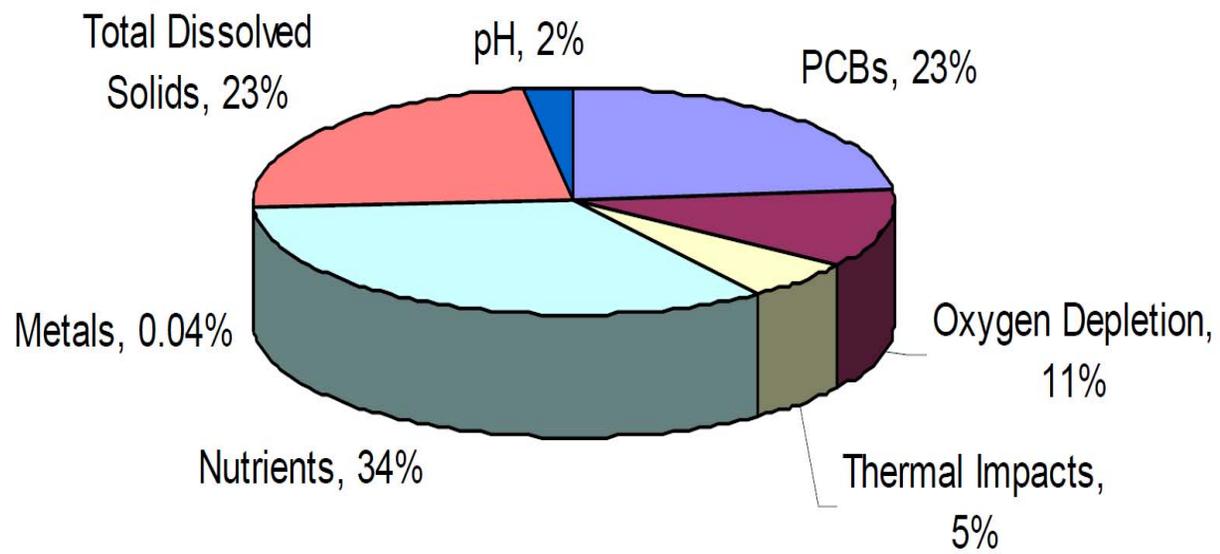


Figure 3-5 Causes for Lake (acres) Impairments

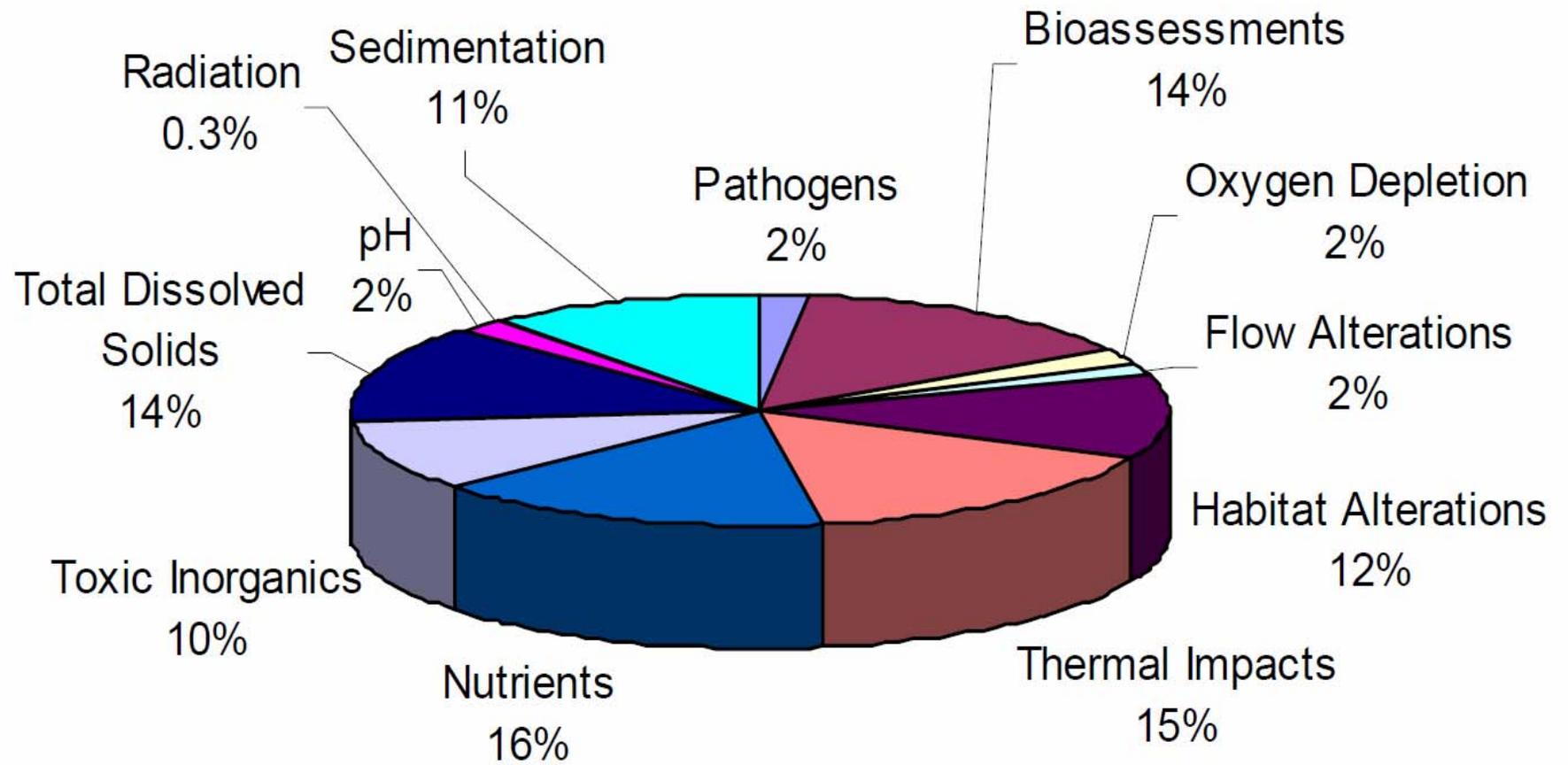
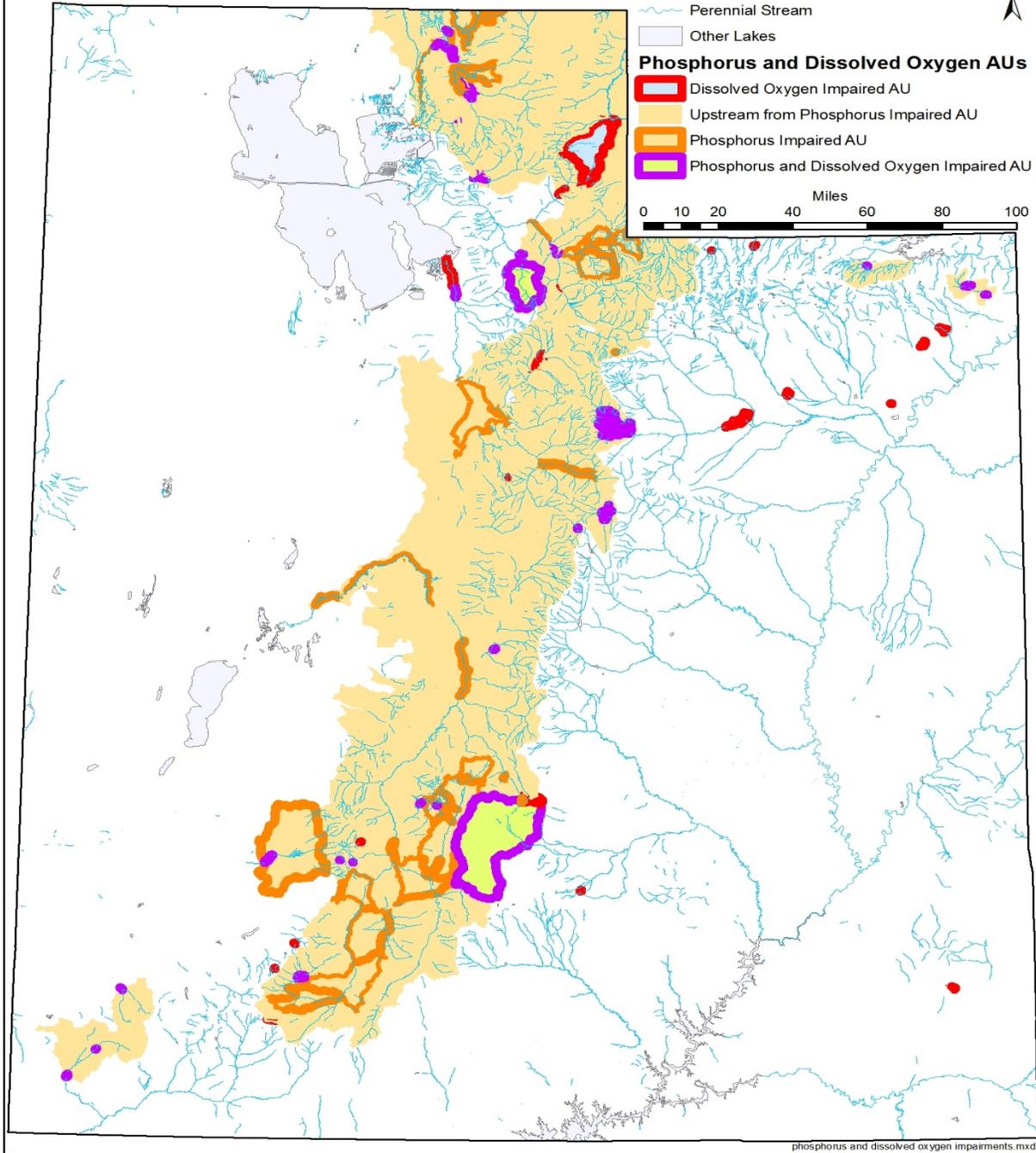


Figure 3-3 Causes for Stream (miles) Impairments

Phosphorus and Dissolved Oxygen Impairments



Spatial extent of nutrient-related surface water impairments

Currently addressed with phased TMDLs

TMDLs

- 164 performed or are being performed
- 35 (21%) of the waters are “listed” due to phosphorus problems

East Canyon Creek



Utah Lakes and Reservoirs

- 97% of our lakes and reservoirs are assessed
- 48 of 132 priority lakes and reservoirs (36%) are not meeting their beneficial uses; all but 5 are “listed” due to nutrient pollution
- Matt Warner Reservoir – 2004

18 cattle died due to ingesting blue-green algae



Recent Developments

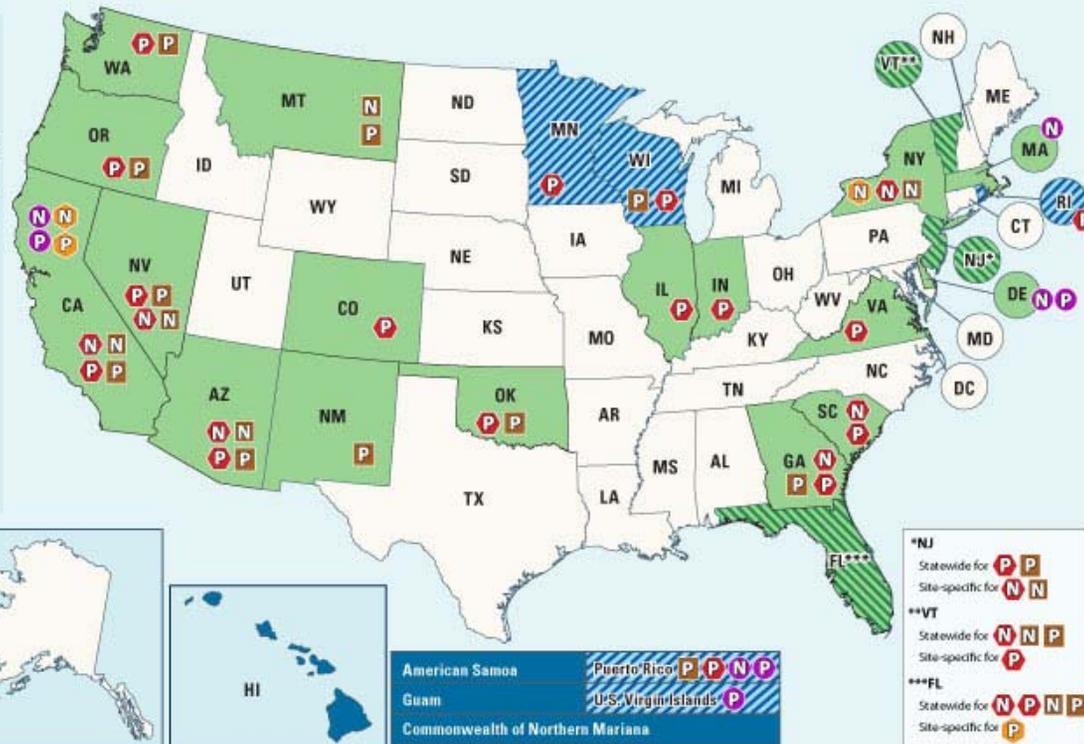
- November 2007: NRDC Petition to EPA for the revising the definition of “secondary treatment” to include nutrients; 0.3 mg/l P; 3.0 mg/l N
- July 2008: EPA sued to develop numeric nutrient standards due to the failure of narrative standards
- August 2009 OIG Report: *“EPA Needs to Accelerate Adoption of Numeric Nutrient Water Quality Standards”*
- August 2009: EPA publishes “An Urgent Call to Action” to address nutrient pollution
- November 2009: Environmental Advocates issue notice of intent to sue EPA to develop numeric nutrient standards in Wisconsin
- February 2010: EPA proposes numeric nutrient standards for Florida waters

Recent Developments

- EPA Administrator Jackson identifies addressing nutrients as a 2010 EPA priority
- Cardin Bill: Provides authority on the Chesapeake Bay for 402 permits to be issued to “any discharge from a pollution source” that alters the chemical, physical or biological integrity of jurisdictional waters
- March 2010: EPA Region I rejects Maine’s nutrient criteria stating that the state didn’t provide adequate numeric means to achieve its narrative criteria for addressing nutrient pollution.
- January 2011: EPA Region 5 informs Illinois that the states evaluation of NPDES permits for 20 POTWs did not properly evaluate control technologies to address nutrients which was contrary to the state’s criteria.
- March 2011: EPA Acting Administrator for Water issues memo on EPA’s framework for working with states to address nutrient pollution.

Progress Toward Clean Water Act Adopted Numeric Nutrient Criteria

- Legend**
- Nutrient (N & P) criteria for all waters
 - Statewide nutrient criteria for at least one class of waterbodies
 - Statewide and site-specific nutrient criteria for different nutrient parameters
 - Some site-specific nutrient criteria
 - No nutrient criteria
 - N N for rivers/streams
 - P P for rivers/streams
 - N N for lakes/reservoirs
 - P P for lakes/reservoirs
 - N N for wetlands
 - P P for wetlands
 - N N for estuaries
 - P P for estuaries



- *NJ**
Statewide for P P
Site-specific for N N
- **VT**
Statewide for N N P
Site-specific for P
- ***FL**
Statewide for N P N P
Site-specific for P

Where is Utah Currently At?

- Numeric Standards: To achieve the “fishable and swimmable” goals of the Clean Water Act.
- Narrative Standard: It’s unlawful to discharge any waste that produces undesirable conditions
- Pollution Indicator (for 3A and 3B waters):
 - ❑ Lakes/reservoirs – 0.025 mg/l P
 - ❑ Streams – 0.05 mg/l P; 4 mg/l Nitrate





DWQ Nutrient Cost Impacts Study

If national or state-wide effluent discharge standards are required...

- *What are the treatment technical challenges?*
- *What are the economic ramifications?*
- *What are the environmental impacts?*

Results Statewide of the Study

Four Effluent Scenarios 30 Mechanical Plants		
Costs	Total Phosphorus	Total Phosphorus
	1.0 ppm	0.1 ppm
Capital	\$23.7 M	<u>\$818.1 M</u>
O&M	\$4.5 M / year	\$4.8 M
Rate	\$ 1.19 / month	\$ 11.08 / month

Results Statewide of the Study

Four Effluent Scenarios 30 Mechanical Plants		
Costs	Total Phosphorus / Total Nitrogen	Total Phosphorus / Total Nitrogen
	1.0 / 20 ppm	0.1 / 10 ppm
Capital	\$139.7 M	<u>\$1,040.1 M</u>
O&M	\$4.7 M / year	\$5.0 M
Rate	\$ 2.99 / month	\$ 13.58 / month

Phase II of the Nutrient Study: Ecological and Recreational Benefits

- Quantify the cost of excess nutrients, in recreation activities:
 - Fishing, Boating, Swimming, Duck hunting, Tourism
- Quantify the cost of excess nutrients in treating our drinking water
- Quantify the effect of excess nutrients on livability, property values, social well-being