

# Introduction to Nutrient Pollution: National Perspective

1

ACWA Nutrients Permitting Workshop

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# The Nutrient Problem

The amount of nutrients entering our waters has dramatically escalated over the past 50 years, and nutrients now pose significant water quality and public health concerns across the United States...

Nitrogen and phosphorus pollution has the potential to become one of the costliest, most difficult environmental problems we face in the 21st century.

*D.F Boesch, 1999*



# Sources of Nutrient Pollution



## Agriculture

Animal manure, excess fertilizer applied to crops and fields, and soil erosion make agriculture one of the largest sources of nitrogen and phosphorus pollution in the country.

## Stormwater

Precipitation runs across hard surfaces - like rooftops, sidewalks and roads - and carries pollutants, including nitrogen and phosphorus, into local waterways.

## Wastewater

Sewer and septic systems treat large quantities of waste, and these systems discharge nitrogen and phosphorus into waterways.

## Fossil Fuels

Electric power generation, industry, transportation and agriculture have increased the amount of nitrogen in the air through use of fossil fuels.

## At Home

Fertilizers, yard and pet waste, and certain soaps and detergents contain nitrogen and phosphorus, and can contribute to nutrient pollution.

# Nutrient Pollution Impacts

*17,000 + waterbodies don't meet state water quality standards because of excess nutrient pollution.*

*EPA has approved over 8,000 TMDLs for nutrient-related pollutants*

## Public Health:

- Nutrients feed harmful algal blooms that release toxins and can impact surface water quality
- Nitrate contaminated drinking water can cause shortness of breath and blue-tinted skin which is sometimes fatal in infants (i.e. blue baby syndrome)

## The Environment:

- Algal bloom toxins are harmful to humans and animals and can lead to beach closures.
- Algal blooms also create aquatic dead zones with little or no oxygen
- Nutrients also contribute to acidification of coastal and marine waters

## The Economy:

- Nuisance algae and odor negatively impacts local tourism, property values
- Increases drinking water treatment costs
- Lost aquatic life impacts local commercial fish and shellfish industries

# National Scope of Nutrient Problem



## Streams

- More than 47% of all streams have medium to high levels of phosphorus
- More than 53% of all streams have medium to high levels of nitrogen



## Lakes

- Approximately 5 million lake acres identifies as threatened or impaired

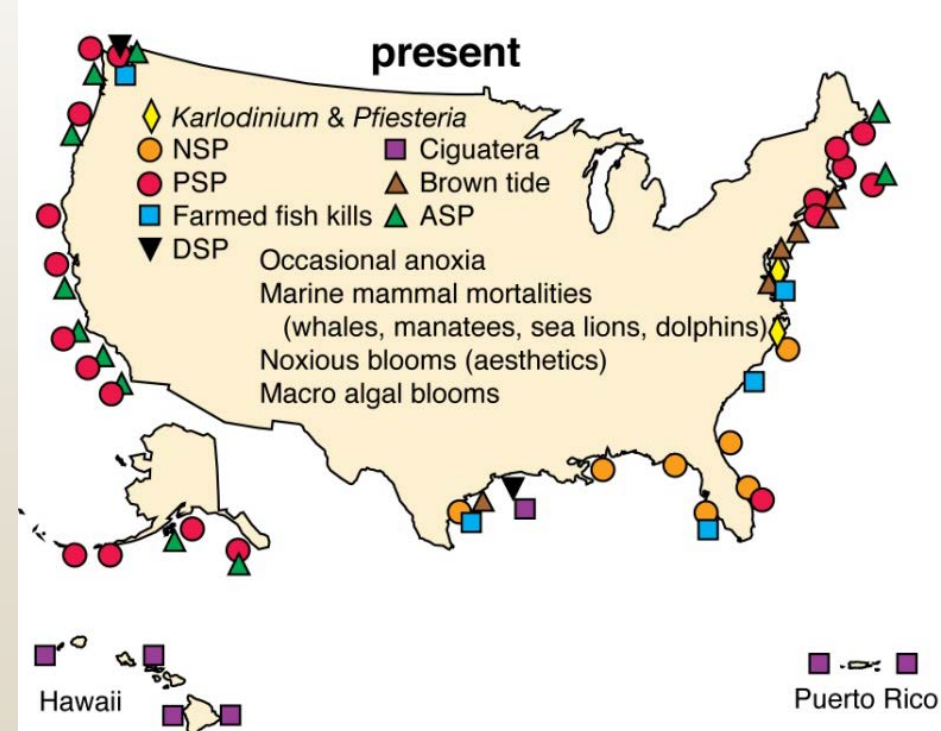
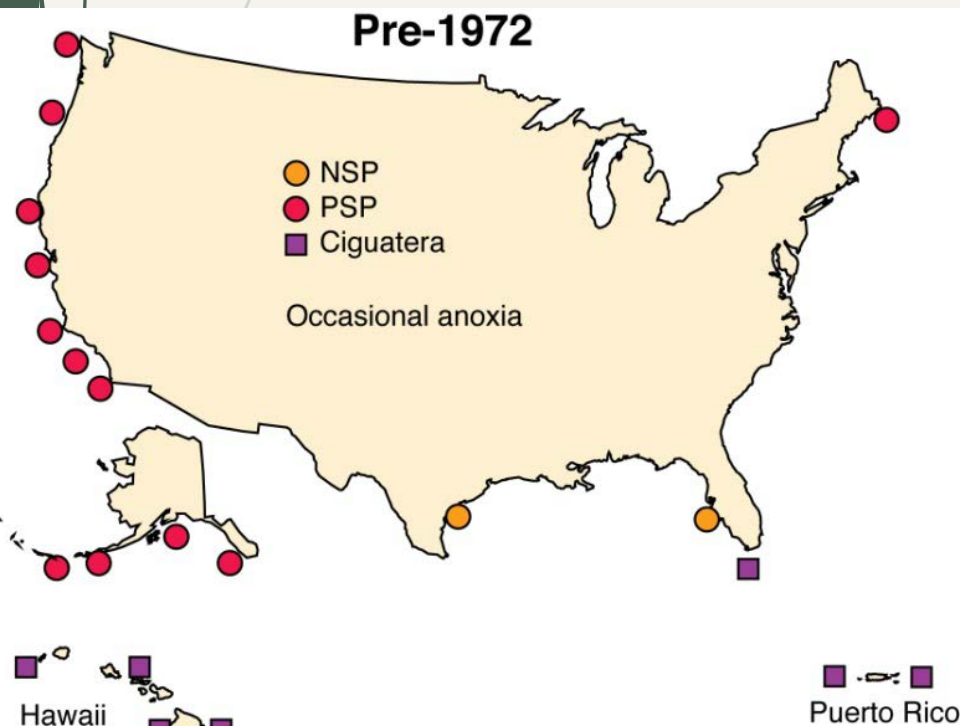


## Coastal waters

- Approx. 78% of assessed coastal areas exhibit signs of eutrophication

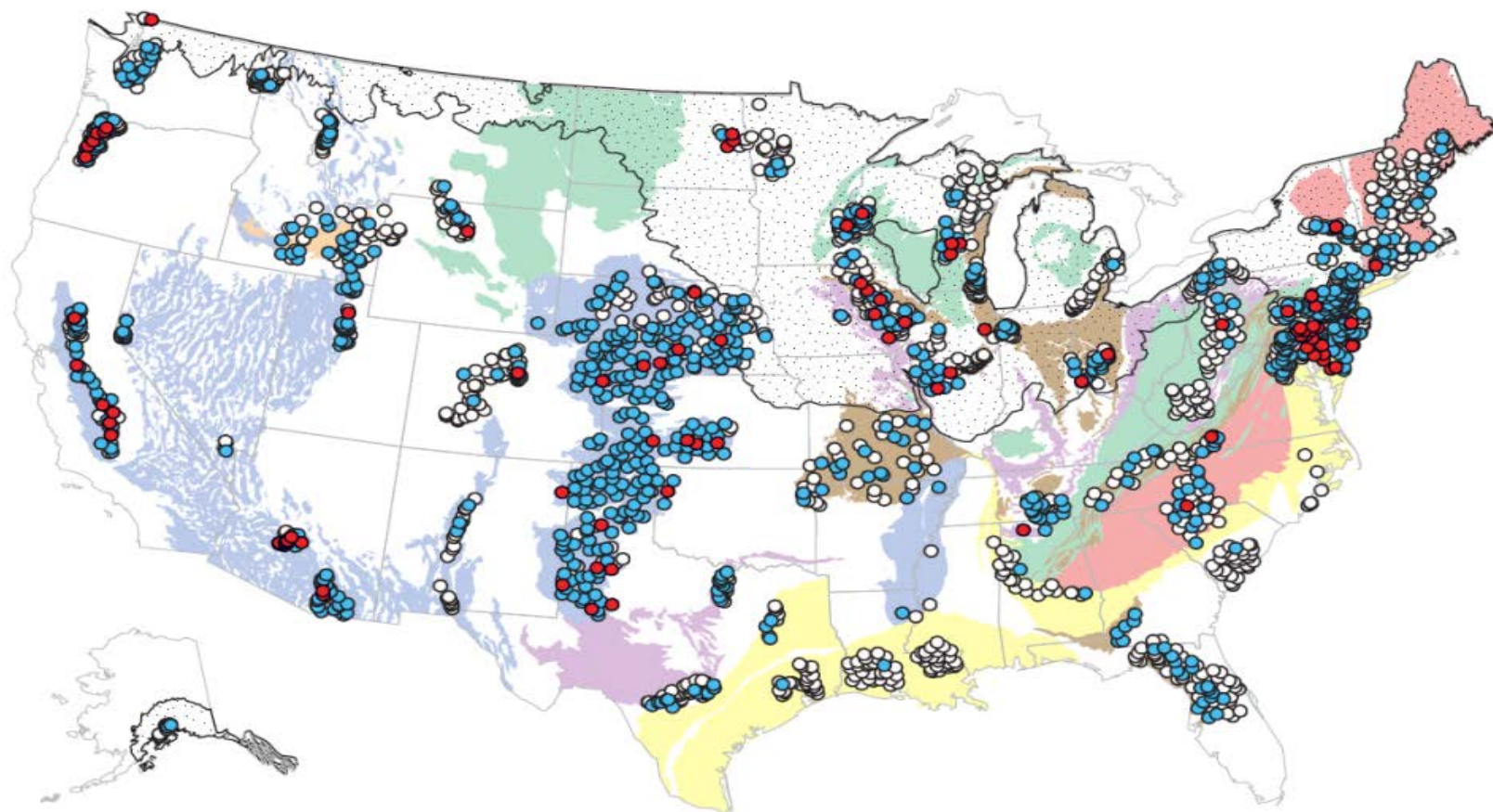
# Harmful Algal Bloom (HABs) Occurrences Over Time

- The occurrence and severity of nuisance algal blooms is on the rise





# Occurrence of Nitrates in Wells Nationally



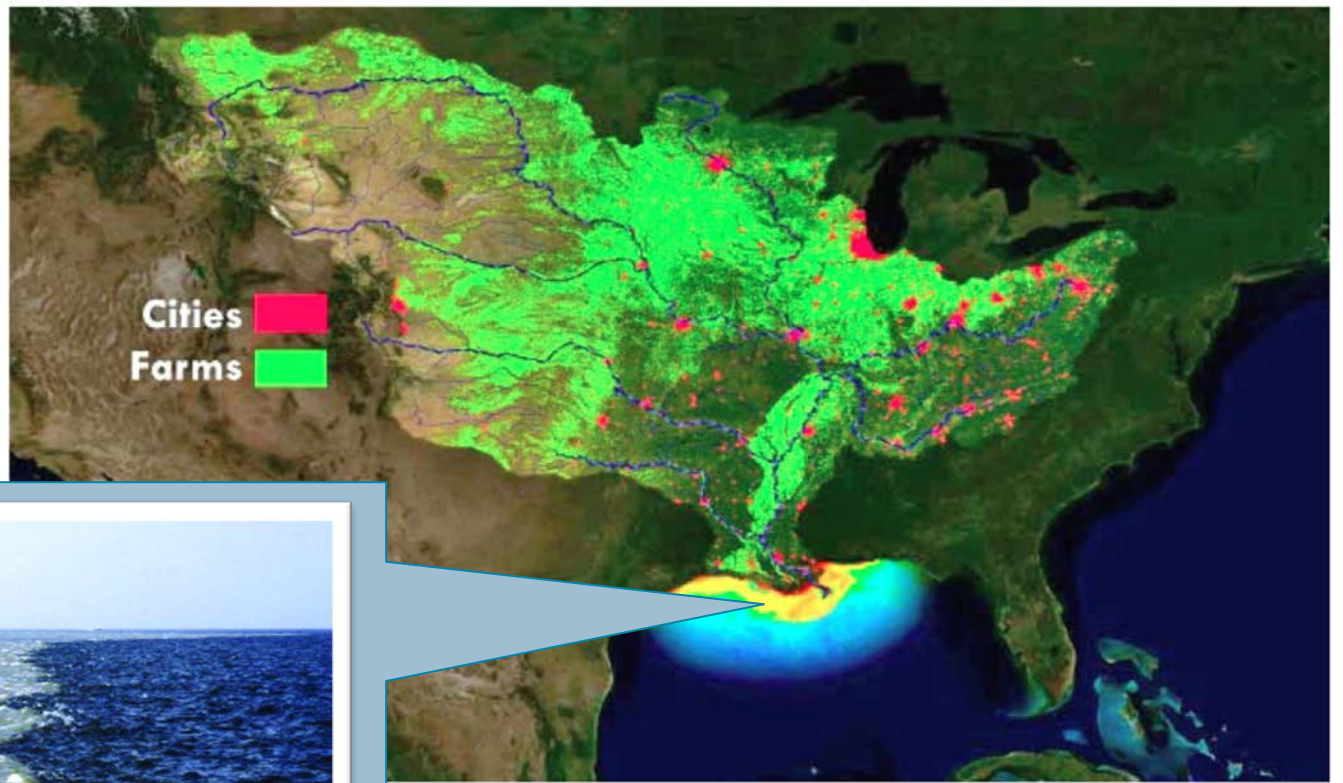
## EXPLANATION

Nitrate, in milligrams per liter as N

● >10    ● >1 and ≤10    ○ ≤1

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

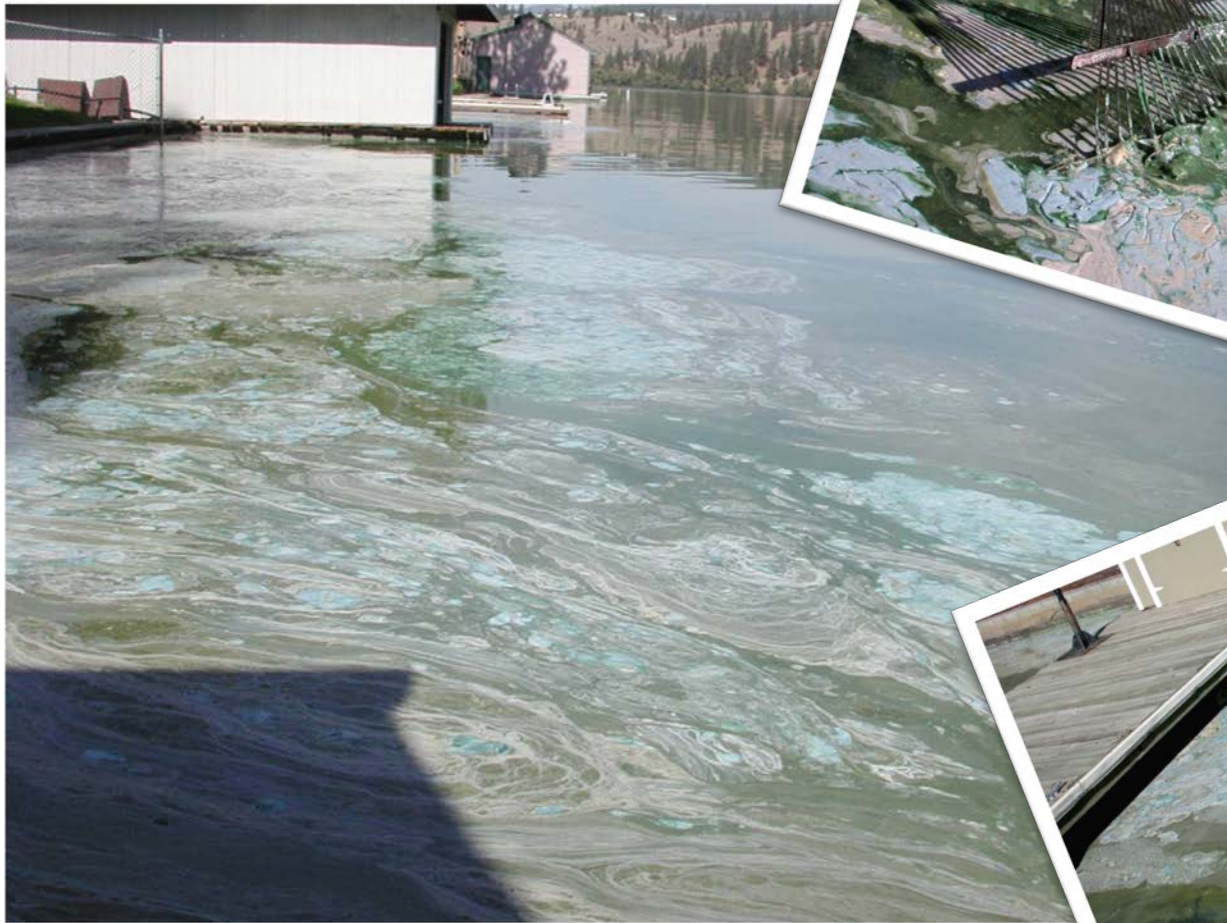
# Gulf of Mexico-Hypoxia





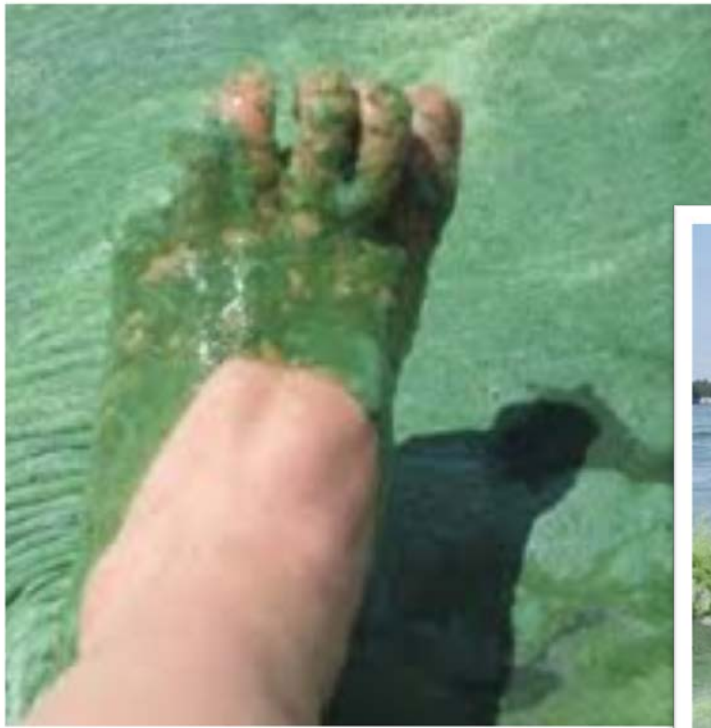
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# Lake Spokane, Washington



10

## Grand Lakes St. Mary, Ohio





# Lake Erie



12

# Chesapeake Bay

Hampton Roads Tunnel in  
Norfolk, Virginia



lower Chesapeake Bay



13



*Trap Pond,  
Delaware*

Klamath  
River,  
California





Mississippi  
Delta Neat  
Philipp,  
Mississippi

Santa Fe  
River,  
Florida





15

# Lake Okeechobee, Florida



Lucie River, Florida

Lake Okeechobee  
watershed

# NPDES Permitting for Nutrients

- Individual WWTF NPDES permits with nutrient limits for one or more nutrients
  - 21% (3,486 of 16,920) of WWTF permits
  - 36% (1,631 of 4,487) of WWTF permits for majors
- Individual WWTF NPDES permits with monitoring requirements for one or more nutrients
  - 48% (5,178 of 16,920) of WWTF permits
  - 74% (2,562 of 4,487) of WWTF permits for majors

*(Data for non-stormwater, Individual municipal permits from ICIS as of October 2017)*





# So What Do We Do?

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The problem is getting worse.

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Increased population and trends in land use

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Our Laws don't exactly fit the problems

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CWA is built around pipes and treatment

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Our treatment technologies are getting better, but not that much better