

Policy Questions and Indicators for the Water Pilot

September 12, 2008

U.S. Environmental Protection Agency



EPA's Report on the Environment 2008



National Policy Questions

- Policy Questions need to address the cumulative effect of environmental laws and to drive effective management decisions
- EPA's mission is to protect human health and the environment. Meeting this mission requires EPA to understand and track trends in
 - The condition of the Nation's air, water, and land; and
 - Associated trends in human health and ecological systems.
- Indicators and information that are relevant and scientifically sound provide critical input for decisions allows EPA and the public to assess whether the Agency is succeeding in its mission.

Using Data to Protect and Restore Human and Ecological Health

- Track status and trends of water, air and land resources
- Analyze the effectiveness of environmental programs and adjust actions accordingly
- Develop human and ecological health thresholds and criteria
- Protect public health
 - Fish consumption advisories
 - Air Quality Index
- Respond to emergencies and conduct clean-up activities
 - National Coastal Assessment data provided baseline information for evaluating the impacts of Katrina near New Orleans

What are the trends in.....and their effects on human health and ecological systems?

- Outdoor Air
- Indoor Air
- Fresh Surface Water
- Ground Water
- Wetlands
- Coastal Water
- Drinking Water
- Fish and Shellfish
- Recreational Water
- Land Cover
- Land Use
- Wastes
- Chemicals used on the land
- Contaminated land

EPA's Strategic Plan & Performance Report



- EPA Strategic Plan
- EPA Annual Performance Report
- EPA's Report on the Environment



Estuaries



Lakes



Wetlands



Streams



Rivers

National Aquatic Resource Surveys

Combination of Monitoring Tools Support Management Needs

Targeted monitoring	<ul style="list-style-type: none">➤ Assess WQS attainment for specific segments➤ Measure localized water quality trends➤ Identify sources of pollutants to specific waters➤ Support development of local management measures (TMDL, NPDES permits, NPS BMPs, WQS)
Probabilistic sample Survey	<ul style="list-style-type: none">➤ Describe proportion of all waters supporting CWA goals, with documented confidence➤ Measure broad-scale water quality trends and CWA program effectiveness➤ Support development of new WQS➤ Prioritize targeted monitoring
Modeling and landscape analysis	<ul style="list-style-type: none">➤ Support development of local management measures (TMDL, NPDES permits, NPS BMPs, WQS)➤ Predict where water quality is likely impaired➤ Predict water quality trends➤ Prioritize targeted monitoring

Remaining Gaps – Is Water Quality Getting Better or Worse?

- Critiques¹ of state and EPA monitoring and reporting on water quality
 - Data and assessment methods not comparable
 - Design not representative of waters of the US
 - Investment in monitoring is key to ensure accountability for water resource protection and restoration
- EPA and states implemented new approach to address data needs at the national scale
 - Statistically representative survey design
 - Nationally consistent methods and core indicators

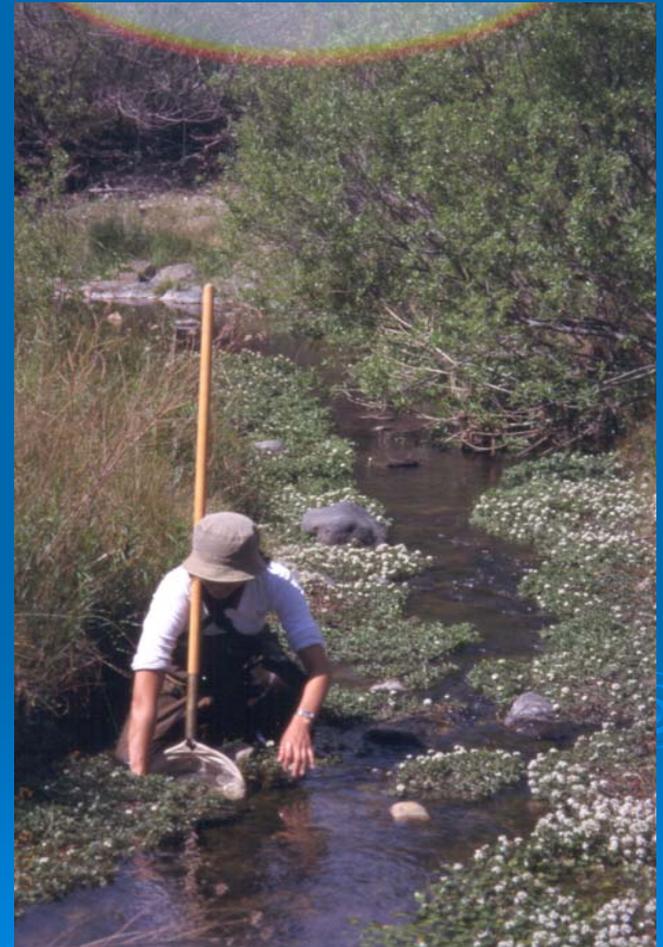
¹ GAO, NRC, NAPA, Heinz Center

National Water Policy Questions – EPA Perspectives

- Do the Nation's waters provide for the protection and propagation of fish, shellfish, and wildlife and for recreation in and on the water (CWA Section 101 goal)?
- What are the priority stressors threatening achievement of this goal?
 - Nutrients
 - Toxics
 - Flow
 - Habitat
 - Invasive species

Implementation by EPA, States and Tribes

- EPA/State meetings and workgroups on design, methods, data analysis
- Randomized site selection based on peer reviewed method
- Standardized field and lab protocols implemented by states, tribes and contract crews
- National QA program, training and data management
- National indicator development applying peer reviewed analyses



Other Federal Collaborators

- U.S. Geological Survey
 - Site reconnaissance; Sample collection and processing; Data analysis and interpretation; Feedback, refinement, and future direction
- U.S. Fish and Wildlife Service
 - Design requirements; Core indicators; Data analysis and interpretation
- U.S. Forest Service
 - Site reconnaissance; Data analysis and interpretation; Feedback, refinement, and future direction
- National Oceanographic and Atmospheric Administration
 - Standardized protocols; Training; Site reconnaissance; Sample collection and processing (including expansion to additional coastal resources); Data analysis and interpretation; Feedback, refinement, and future direction
- National Park Service
 - Identification of reference sites

National Surveys Designed to Answer Key Policy Questions

- What is the condition of aquatic resources nationally and regionally and how is it changing over time? For example:
 - Wetland acres in good, fair, poor condition based on interpretation of biological assemblages
 - Estuarine area supporting recreational goals based on fish tissue or pathogen indicators?
- What extent of waters are affected by key stressors, are we making progress or losing ground? For example:
 - Stream miles with elevated nutrient levels or what is the % in different nutrient concentration ranges?
 - Lakes with pathogen levels that may pose concerns for recreational use?

National Aquatic Resource Survey Indicators

➤ Ecological Indicators

- Multi-metric Index of Biological Condition
- Observed to Expected Taxa Loss Models
- Macroinvertebrates, fish, zooplankton and other biological assemblages

➤ Human Health Indicators

- Pathogen indicators like enterococcus (recreation)
- Fish Tissue contamination

➤ Stressor Indicators

- Nutrients, excess sedimentation, habitat, salinity, acidification, landscape, etc

➤ Supplemental indicators

- Emerging contaminants/pharmaceuticals
- Pesticides
- Mercury

Indicator Selection Goals and Criteria

- Selected to represent three major resource conditions:
 - Ecological condition
 - Human health/recreation
 - Water quality, physical/chemical stressors
- Applicable across a broad geographic range and stressor gradient
- Interpretable for that water resource type
- Standardized methods
 - All trained field crews must be able to implement methods within one day for the majority of sites.

National Aquatic Resource Survey Schedule

	2006	2007	2008	2009	2010	2011	2012
Lakes	Design	Field	Lab,data	Report	Research	Design	Field
Rivers	Research	Design	Field	Field Lab, data	Lab,data	Report	Research/ Design
Streams	Report	Research	Field	Field Lab, data	Lab,data	Report	Research/ Design
Coastal			Research	Design	Field	Lab,data	Report
Wetlands	Research	Research	Research	Research	Design	Field	Lab,data

Data Analysis and Interpretation Options

- Descriptive statistics on condition at ecoregion II, EPA region, national scale
 - Basic analysis of data sets designed to describe populations
 - Describe central tendency (mean, median) and variation
 - Cumulative distribution function
- Interpretation of indicator in context of least-disturbed reference condition as threshold or benchmark for evaluation

National Coastal Condition Report

Overall National Coastal Condition



Overall West



Overall Great Lakes



Overall Northeast



Overall Southeast



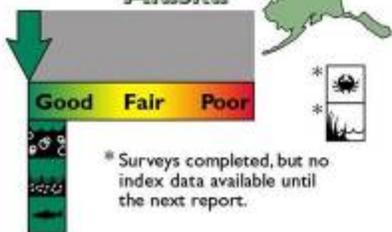
Overall Gulf



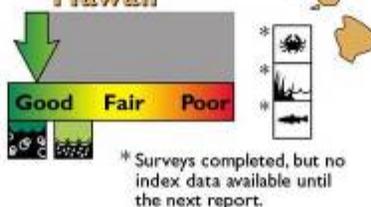
Ecological Health

- Water Quality Index
- Sediment Quality Index
- Benthic Index
- Coastal Habitat Index
- Fish Tissue Index

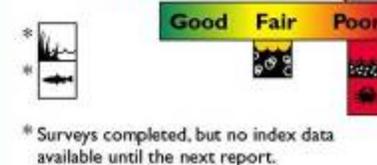
Overall Alaska



Overall Hawaii



Overall Puerto Rico



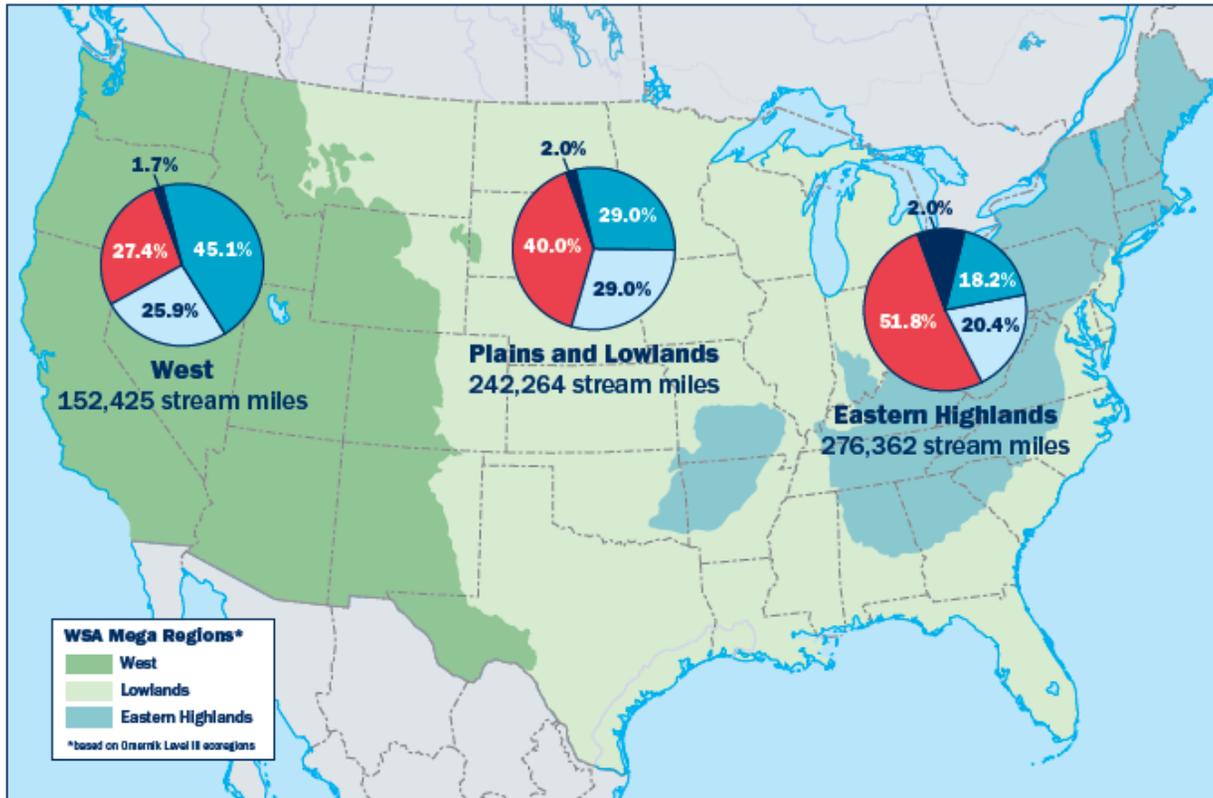
All coastal States and Puerto Rico participated in monitoring

Data support status and trends at regional, State and local scales

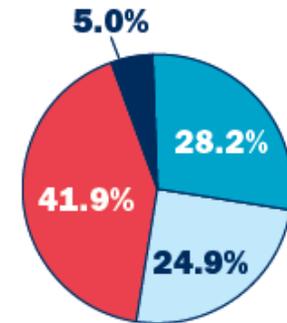
Strong support among states to continue partnership with EPA, NOAA, others

Built State capacity to assess coastal waters

Wadeable Streams Assessment Condition of the Resource



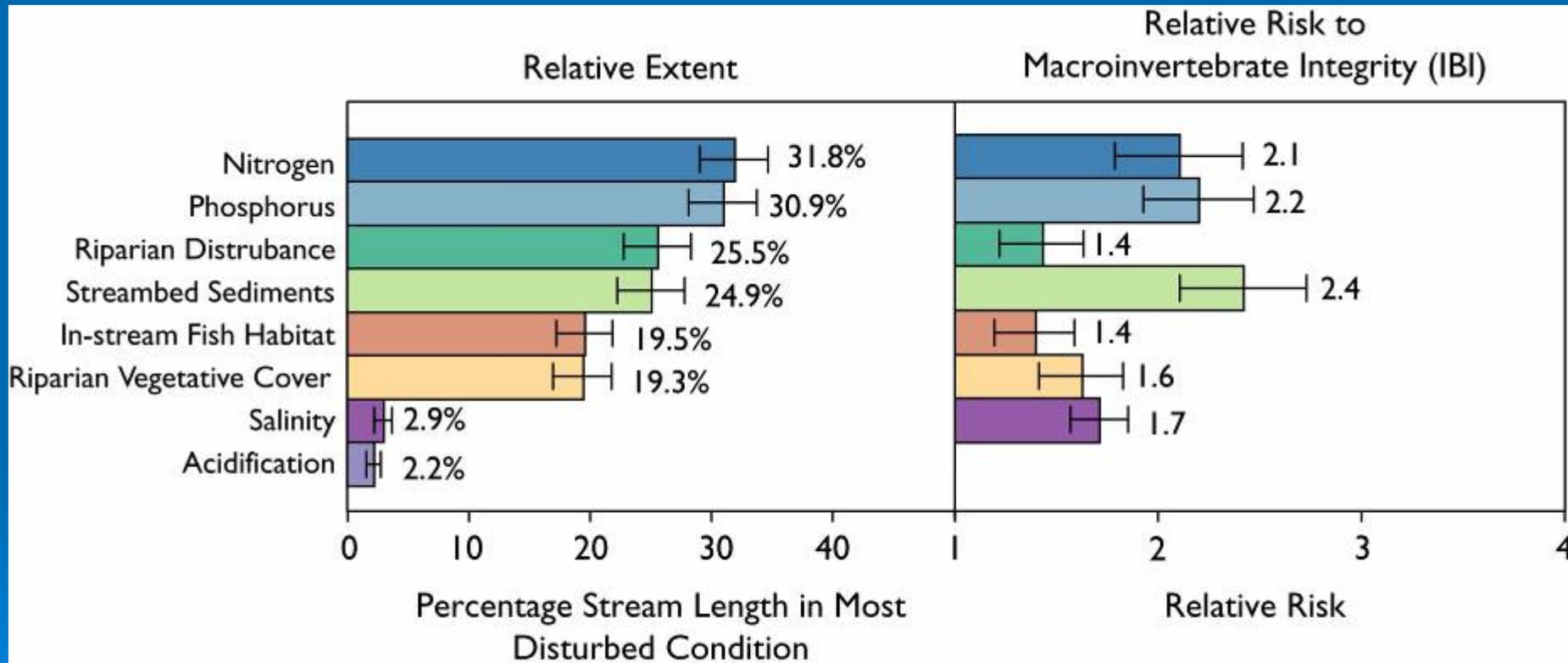
National Summary



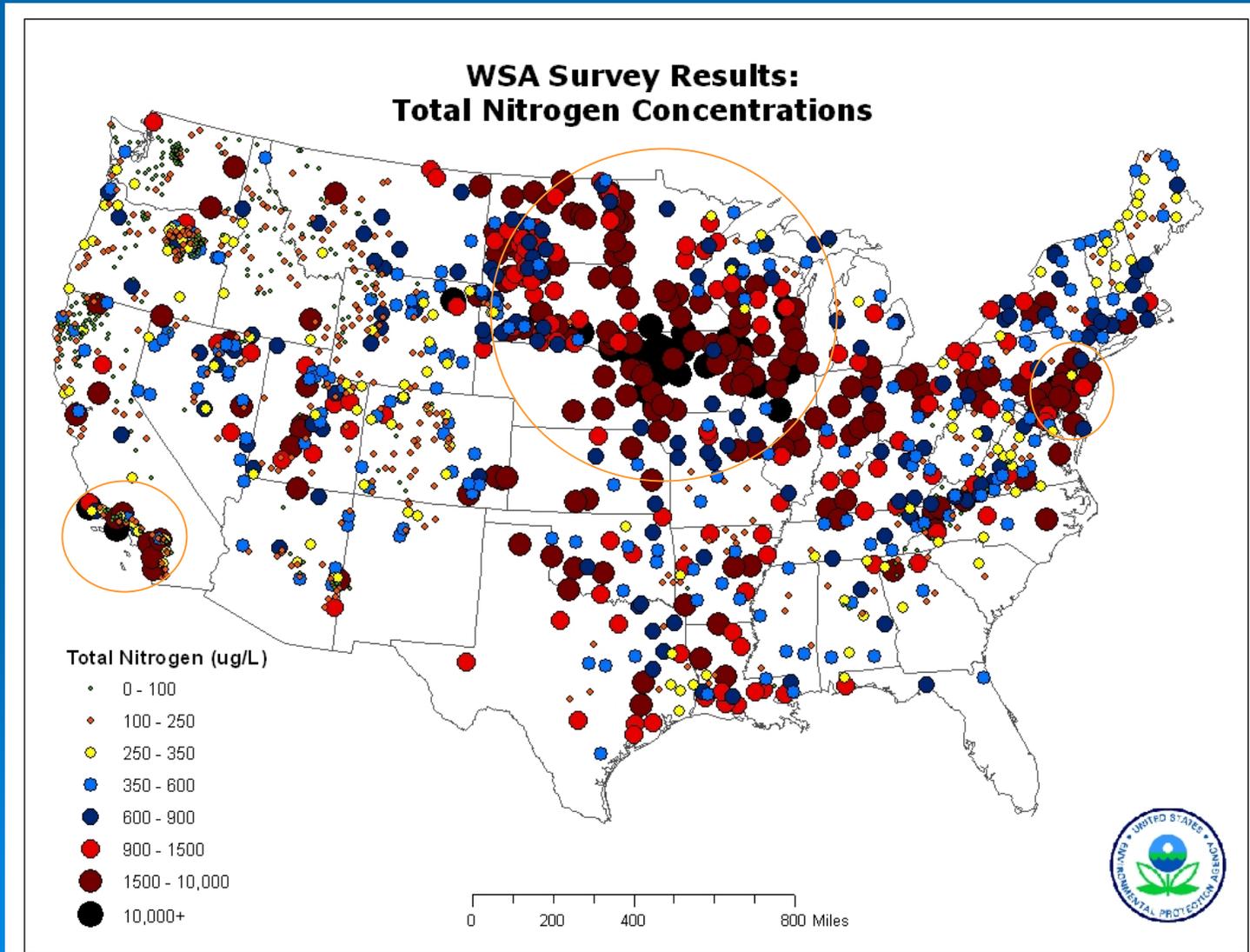
Biological Condition of Wadeable Streams



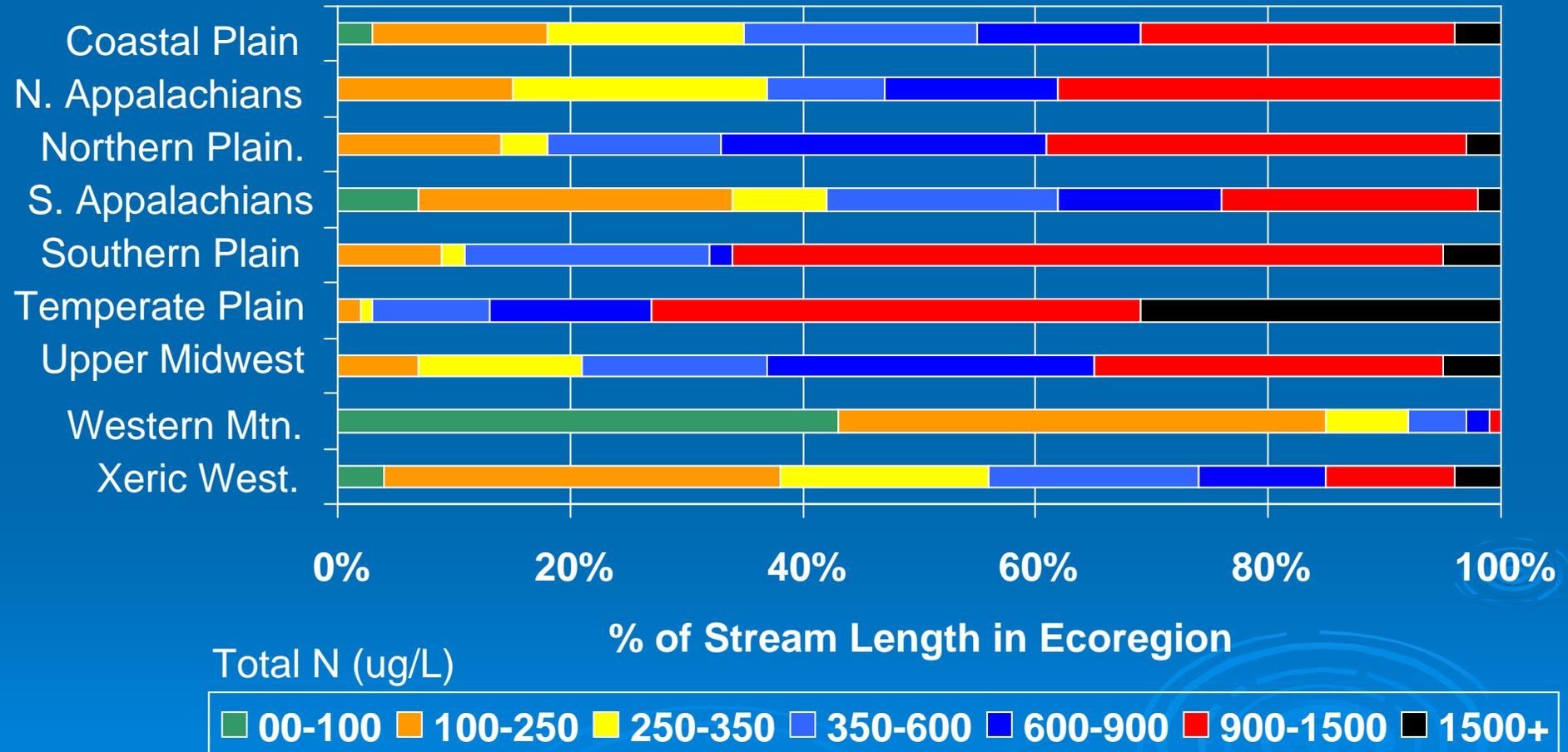
Extent of Stressors and their Relative Risk to Condition



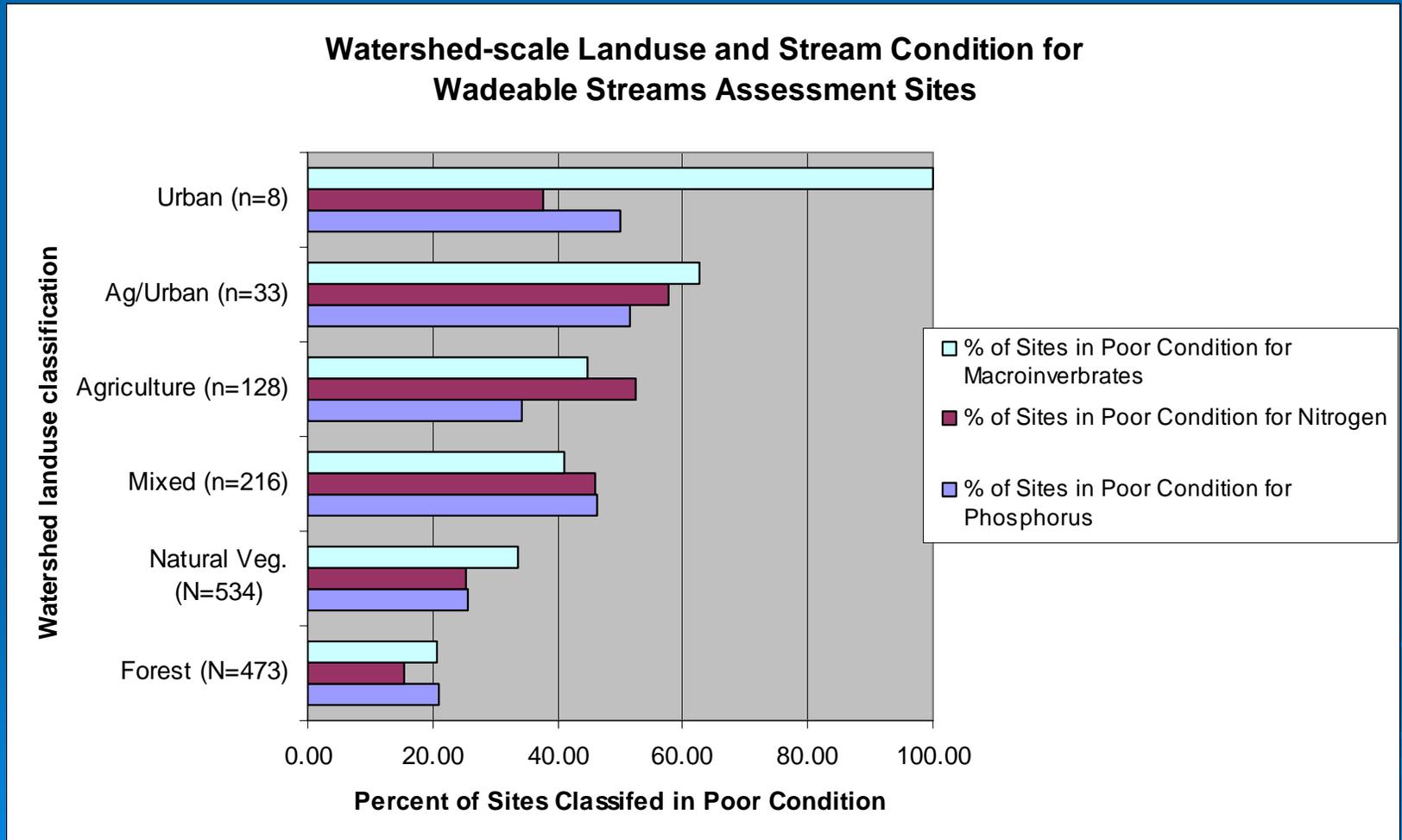
Highest Concentrations of Nitrogen are Geographically Focused



Percent of Stream Miles in Each Concentration Range



Analyzing Land Use and Water Quality Results

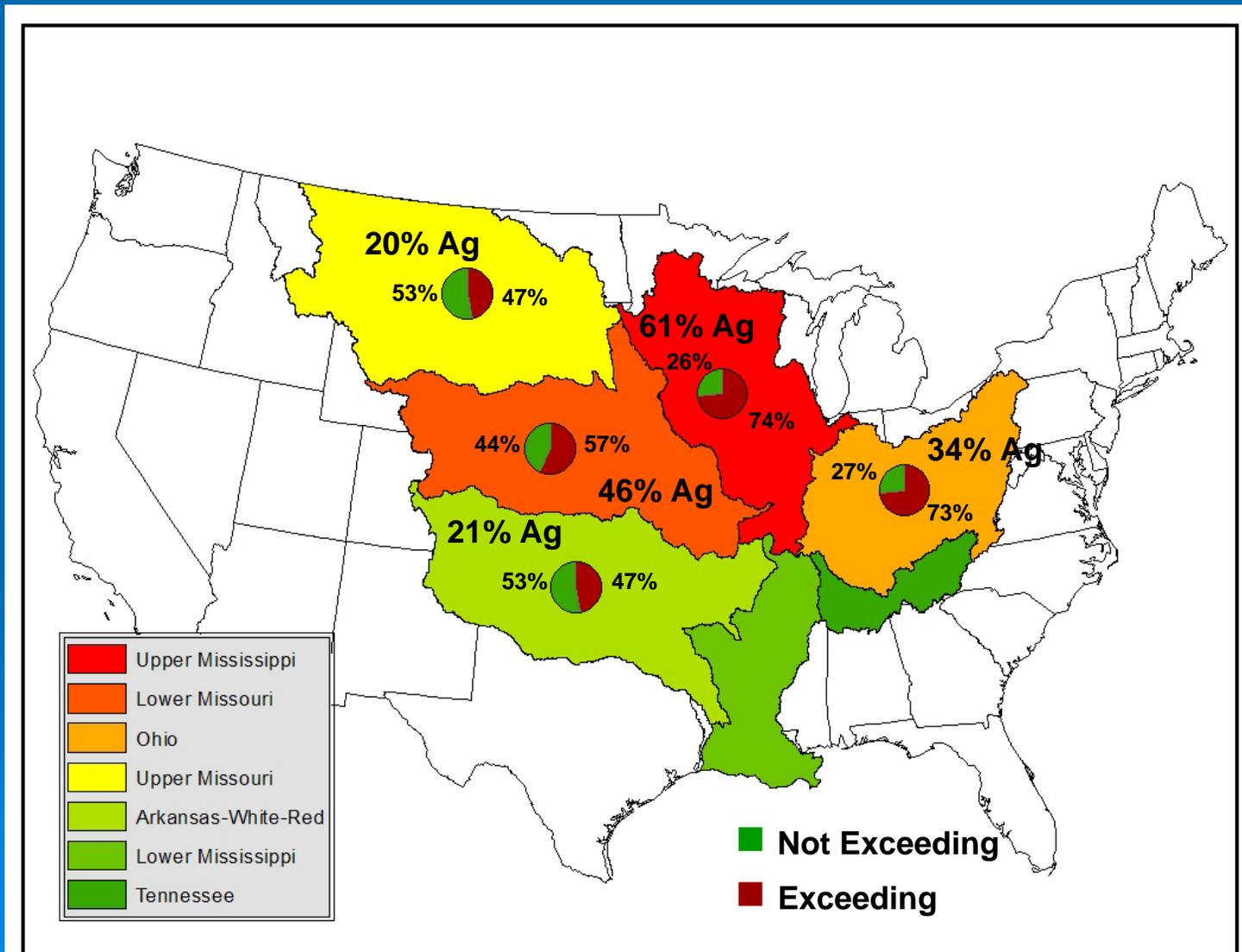


Based on data from the Wadeable Streams Assessment

Geospatial Scales of the Surveys

- Current sample size allows reporting at various scales
 - National scale*
 - Regional scale
 - Some states with sufficient sample size
- Ability to reclassify and re-analyze the data for different spatial scales (waters on Forest Service Land, Park Service, Prairie Pothole Region, Mississippi River Basin)
- Improving ability to disaggregate by land use (urban, ag, forest, etc.)

Percentage of Stream Miles Exceeding WSA Region Nitrogen Thresholds



Benefits of Collaboration on National Surveys

- Explore method comparability to expand data interoperability
- Expand key stressors covered in survey implementation based on other monitoring activities and reports
- Increase analysis effectiveness of water quality management efforts in protecting and restoring waters
- Provide publicly accessible nationally consistent dataset
- Expand data as states and others expand implementation of statistical surveys with scalable and consistent indicators