Surveys of the Nation's Waters

EPA and State Collaboration to Assess the Condition of the Nation's Waters

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Overview

- Background on CWA monitoring
  - Why national surveys?
- Schedule
- Surveys by resource
  - National Coastal Assessment
  - Wadeable Streams Assessment
  - National Lakes Survey
  - Large Rivers and Streams
  - National Assessment of Wetland Condition
- National Fish Tissue Survey
- More information

CWA Drivers for Monitoring

- Section 305(b)
  - States must report on condition of <u>all</u> waters
- Section 303(d)
  - States must submit prioritized list of waters that do not meet WQS and need a TMDL
  - Develop TMDL
- Other CWA programs
  - Setting & refining WQS
  - Issuing and ensuring compliance with NPDES permits
  - Managing NPS to meet WQS

305(b) Water Quality Inventory

- Reports on portion of nation's waters
  - 19% of rivers and streams
  - 37% of lakes, ponds and reservoirs
  - 35% of estuaries
- Inconsistencies limit use of information
  - Parameters and methods
  - Extrapolation techniques
  - Design

Critiques of Water Monitoring Programs

- GAO, National Academy of Science, National Academy of Public Administration, and other recent reports find monitoring inadequate
  - States do not have data needed to make decisions
    - Set water quality standards
    - Determine protection and clean up goals
    - Evaluate effectiveness of permits and management measures
  - EPA and States cannot make statistically valid statements about water quality condition in U.S.

EPA Needs Condition Monitoring

- EPA Administrator William Ruckelshaus (early 1980's): *"What do you mean you don't know how many acid lakes there are?"*

- EPA Administrator William Reilly (1989): *"Good News – Based on my years in the environmental movement, I think the Agency does an exemplary job of protecting the nation's public health and quality of the environment. Bad News – I can't prove it."*

Actions to Address the Critiques

- Support collaboration to produce statistically-valid assessment of nation's waters (i.e., National Surveys)
- Expand accessibility and use of data
  - Encourage comparability of methods and reporting
  - Improve communication of water quality results
- Promote Partnerships
  - Collaborate to maximize use of monitoring resources
- Strengthening Monitoring and Assessment
  - Invest in state, interstate and tribal programs
    - Monitoring Initiative funds

Purpose of National Water Resource Surveys

- **Report on the condition of waters of the U.S.**
  - Core indicators with regional supplements
  - Standardized or comparable methods
  - Statistical design for unbiased estimate of condition
  - Involve states in planning and implementation
- **Provide information on key questions:**

  To what extent do waters support healthy ecosystems, recreation?

  Extent of resource affected by key water quality problems/stressors?

  Is water quality improving?

  Are we spending pollution control dollars wisely?

National Water Resource Survey Schedule

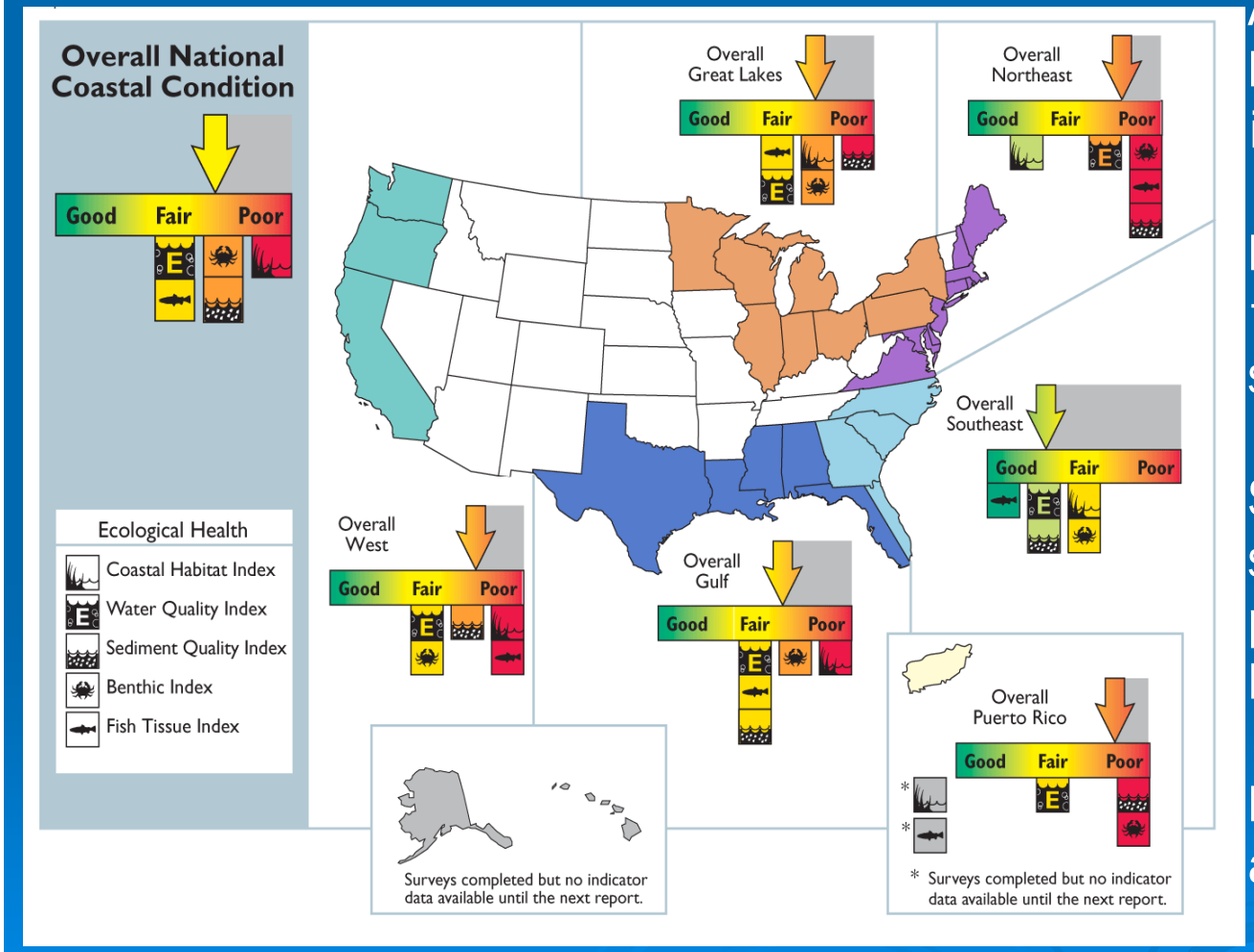
	FY07	FY08	FY09	FY10	FY11	FY12	FY13
Lakes	Field	Lab, data	Report	Research	Design	Field	Lab, data
Rivers	Design	Field	Lab, data	Report*	Research	Design	Field
Streams	Research	Design	Field	Lab, data	Report	Research	Design
Coastal	Report	Research	Design	Field	Lab, data	Report	Research
Wetlands	Research	Research	Research	Design	Field	Lab,data	Report

*The rivers and streams results will be combined into one report issued in 2011, that covers condition of both rivers and streams and changes in stream condition since the baseline report that was finalized in 2006.

National Coastal Assessment

- Multiple agencies and all coastal states + PR
- NCCRI (1990-1996), NCCRII (1997-2000)
- NCCRIII (2001 & 2002 data)
  - Comments closed May 8
  - Report by end of 2007
  - 100% assessment of lower 48 coastal zone
- 5 Indicators of condition
  - Water quality
  - Sediment quality
  - Benthic community condition
  - Coastal habitat loss
  - Fish tissue contaminants

National Coastal Condition Report



All coastal states and Puerto Rico participated in monitoring

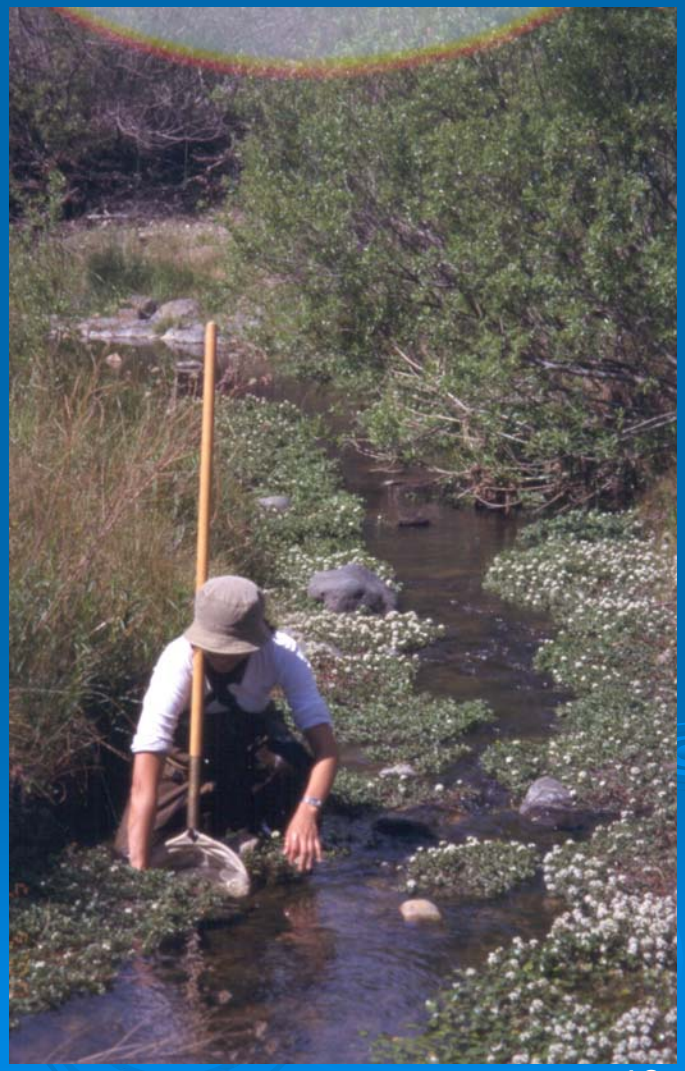
Data support status and trends at regional, state and local scales

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

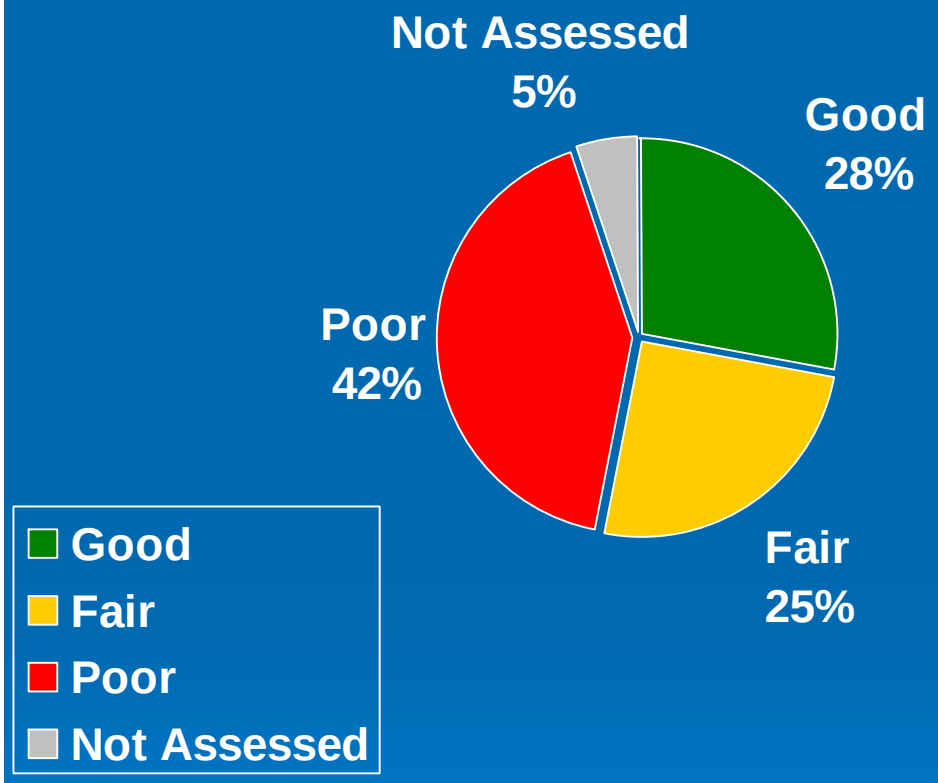
Built state capacity to assess coastal waters

Wadeable Streams Assessment

- Field work – 2004
- Report – December 2006
- Randomized site selection
  - 1,392 sites
- Ecological assessment based on benthic macroinvertebrates
- Quantitative physical habitat characterization
- Water chemistry
- Enhance state/tribal capacity – design, methods, indicators



Wadeable Streams Assessment - Key Findings

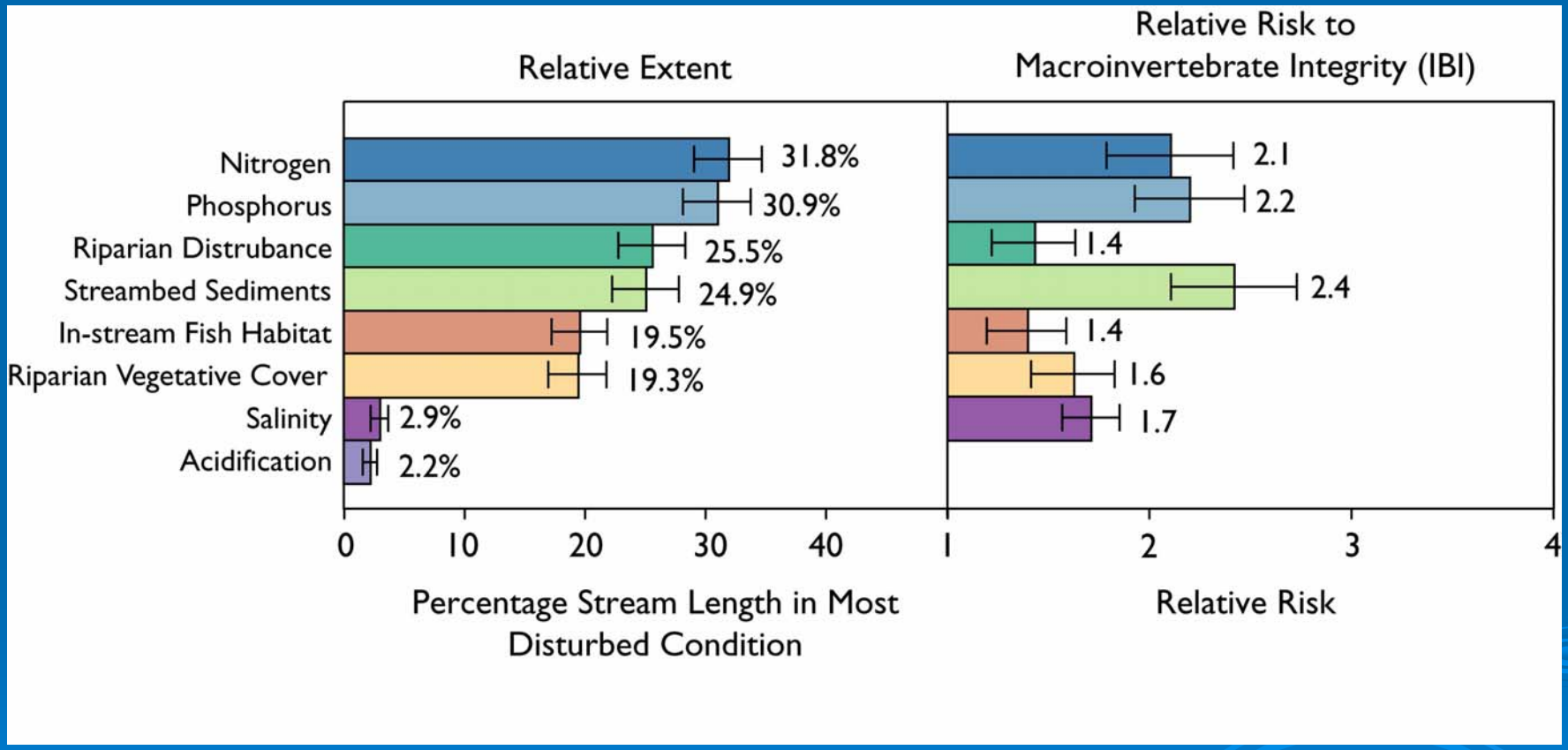


Biological Condition of Streams (Index of Biotic Condition)

Nationally, the WSA found 28% of streams in good condition, compared to least-disturbed reference condition.

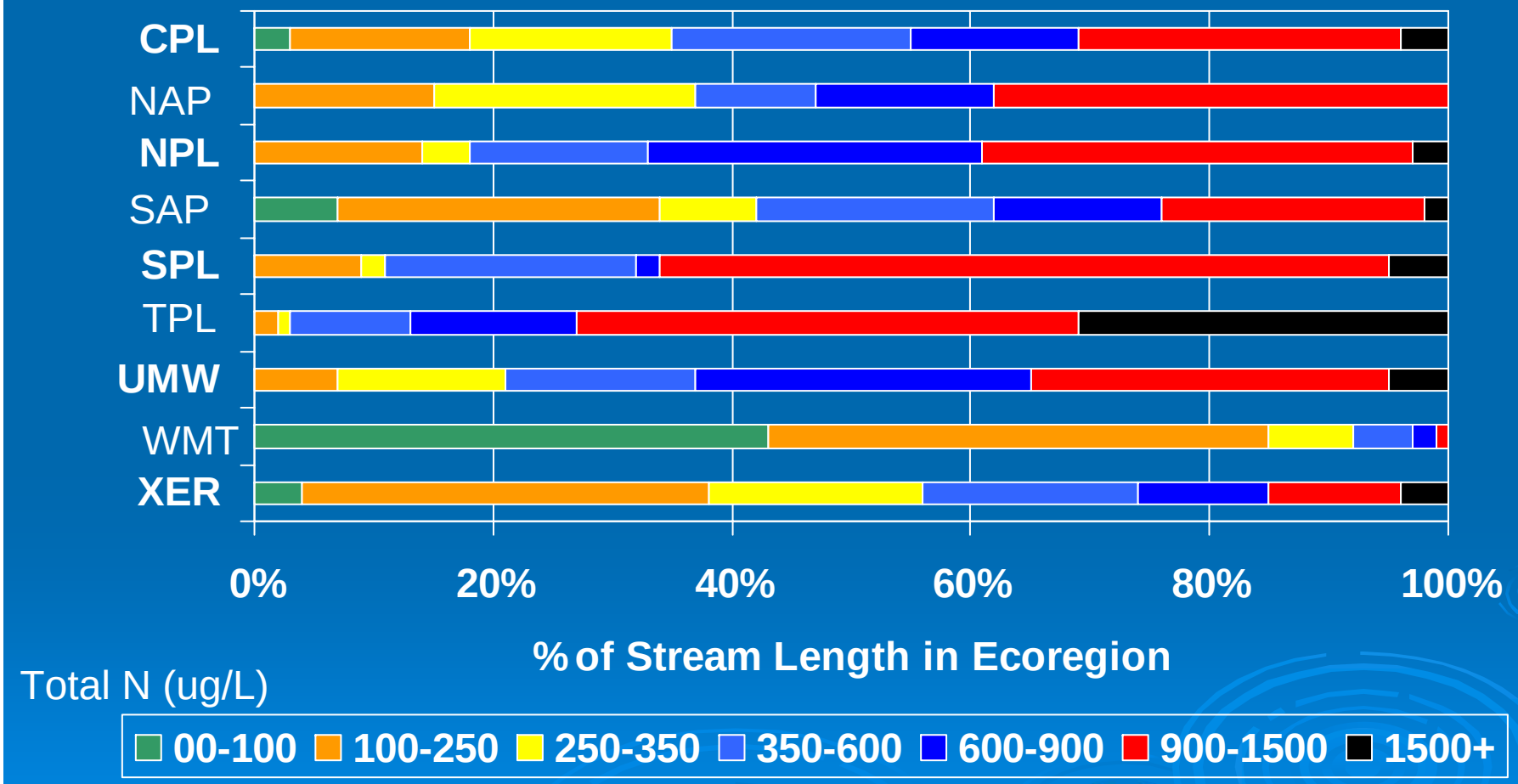
Eastern Highlands:
- 18% good
- 21% fair
- 52% poor
- 9% unassessed

Relative Risk of Stressors to Biological Condition



Eastern Highlands: 42% for nitrogen, 43% for phosphorus

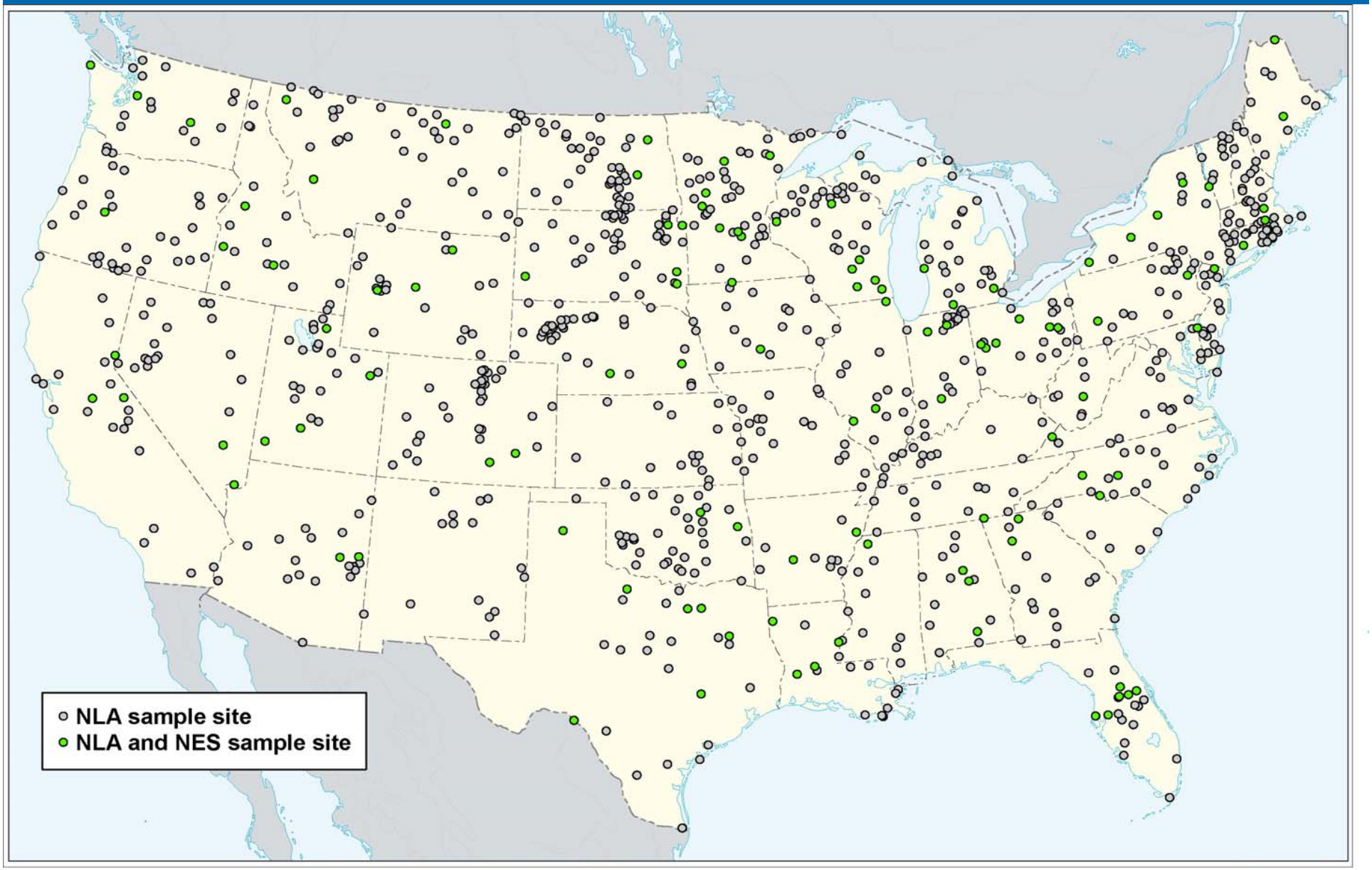
Total Nitrogen Concentration Ranges by Ecological Region



National Lakes Survey

- 909 natural and man-made freshwater lakes, ponds and reservoirs in the conterminous U.S.
  - Greater than 10 acres (4 hectares)
  - Greater than 1 meter deep
  - Greater than 1000 sq meters open water
  - NJ: 8 lakes
  - Include a subset of lakes from 1972 National Eutrophication Study
- Field: 2007
- Report: 2009

Survey of Nation's Lakes

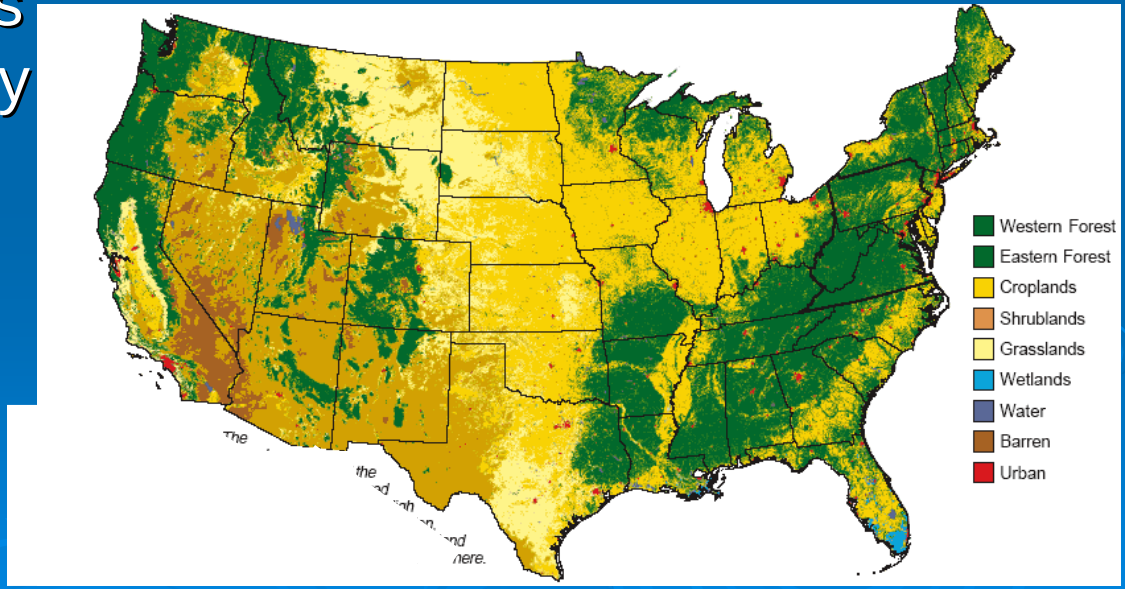


National Lakes Survey
(Recommended Core Indicators)

- Trophic status
  - Water chemistry (nutrients, anions, cations, alkalinity, etc.)
  - Chlorophyll a and other pigments
  - Clarity (secchi disk, turbidity, TSS, color)
- Recreational use
  - Pathogen indicator
  - Algal toxins
- Biological condition
  - Sediment diatoms (surficial and deep slice of sediment core)
  - Phytoplankton
  - Zooplankton
  - Benthos
  - Shoreline habitat
- Other measures
  - Lake area, morphometry
  - Watershed characteristics
  - Mercury in sediment (new)

Survey of Rivers and Streams

- Conduct survey over two years
  - Begin in 2008
  - Combine with next wadeable streams sampling
- Design with options to report by
  - Ecological regions
  - Land use category
    - Agriculture
    - Forest
    - Urban
    - Other
  - Major basins
  - Size class



Target Population

- All NHD+ perennial steams/rivers that are determined to have flowing water during the study index period (n=1800 sites)
  - Excludes tidal rivers up to head of salt
  - Includes Great Rivers
  - Pilot studies in Alaska, Hawaii
- Balance sample size equally across Strahler order to permit estimates by category
  - 1st – 4th order (~900 sites)
    - Balance 1st-2nd, 3rd, and 4th
  - 5th+ order (~900 sites)
    - Balance 5th-6th, 7th, 8th, 9th+
- Resample 450 sites from 2004 wadeable stream assessment to increase power of trend reporting
- Include sufficient sites per state to permit state-level assessment

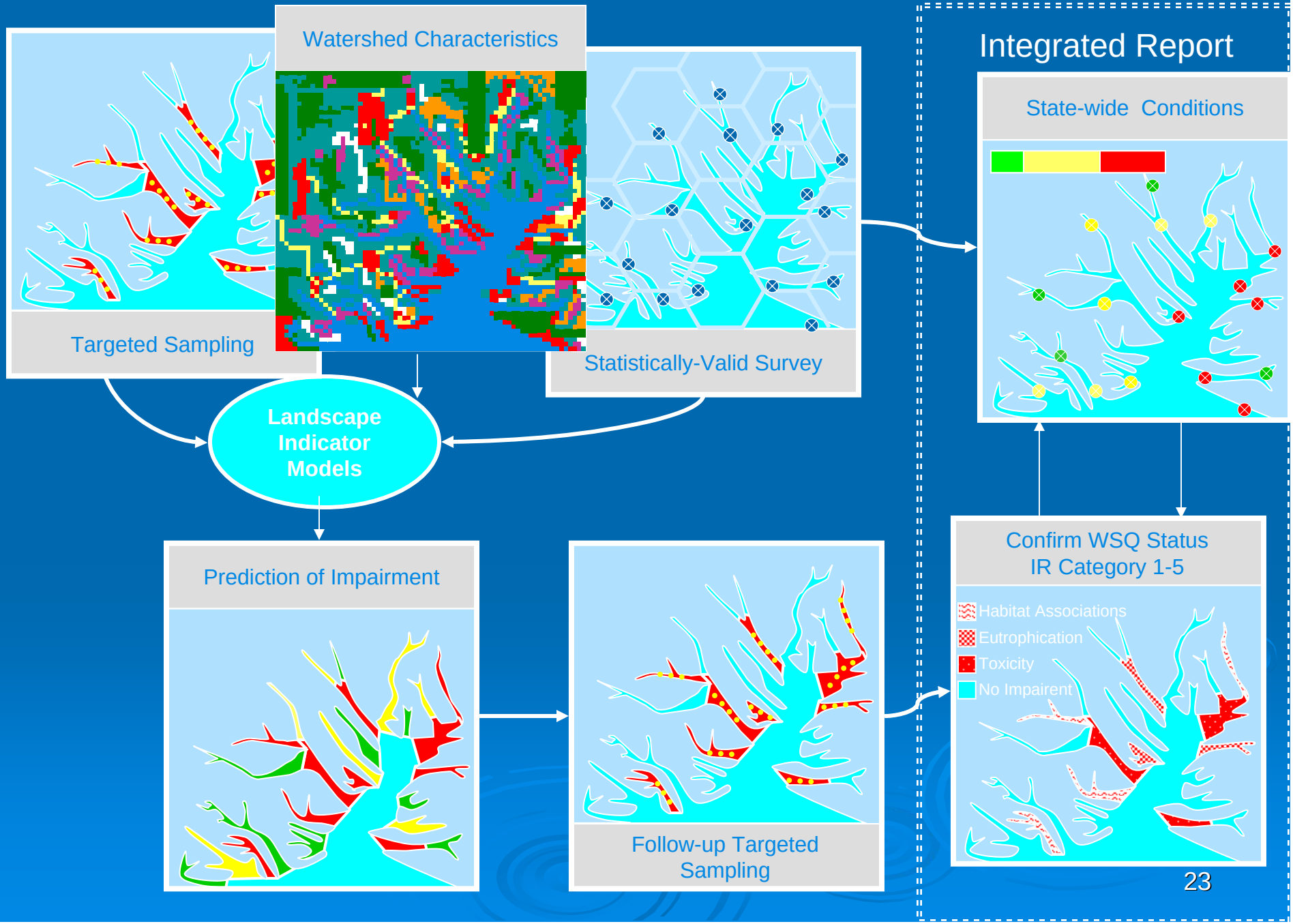
National Rivers Survey
Indicators under Discussion

- Water Chemistry
- Physical Habitat
- Human Health and Recreational Indicator
  - (e.g., Pathogens, Fish Tissue)
- Ecological
  - Algae (Periphyton/Phytoplankton)
  - Benthic Macroinvertebrates
  - Fish

Leverage Surveys to Support Multiple Monitoring Objectives

- Expand to state-scale reports on water quality
  - Assess all waters using statistically-valid surveys
  - Report on status and trends in streams, lakes, rivers, coastal waters, & wetlands
  - Evaluate effectiveness of water resource protection and restoration
- Seek uses of survey data to support water resource protection and restoration
  - Develop water quality standards and criteria
  - Prioritize stressors and follow up analyses
  - Incorporate emerging contaminants into survey implementation
- Integrate data and information to build landscape/predictive tools
  - Prioritize monitoring activities among impaired, high quality and vulnerable waters
  - Set priorities for protection and restoration activities

Streamlined Monitoring – Using the Tools Together



National Assessment of Wetland Condition

- Wetlands not adequately protected through CWA programs
  - Lack of data in 305(b) reports; data on only 4% of Nation's wetlands
  - Some data on quantity, but little on the quality or condition of wetlands
  - Lack of wetland-specific water quality standards

National Assessment of Wetland Condition

- 2011 – field work
- 2 pilot studies
  - Mid-Atlantic states
  - Gulf of Mexico

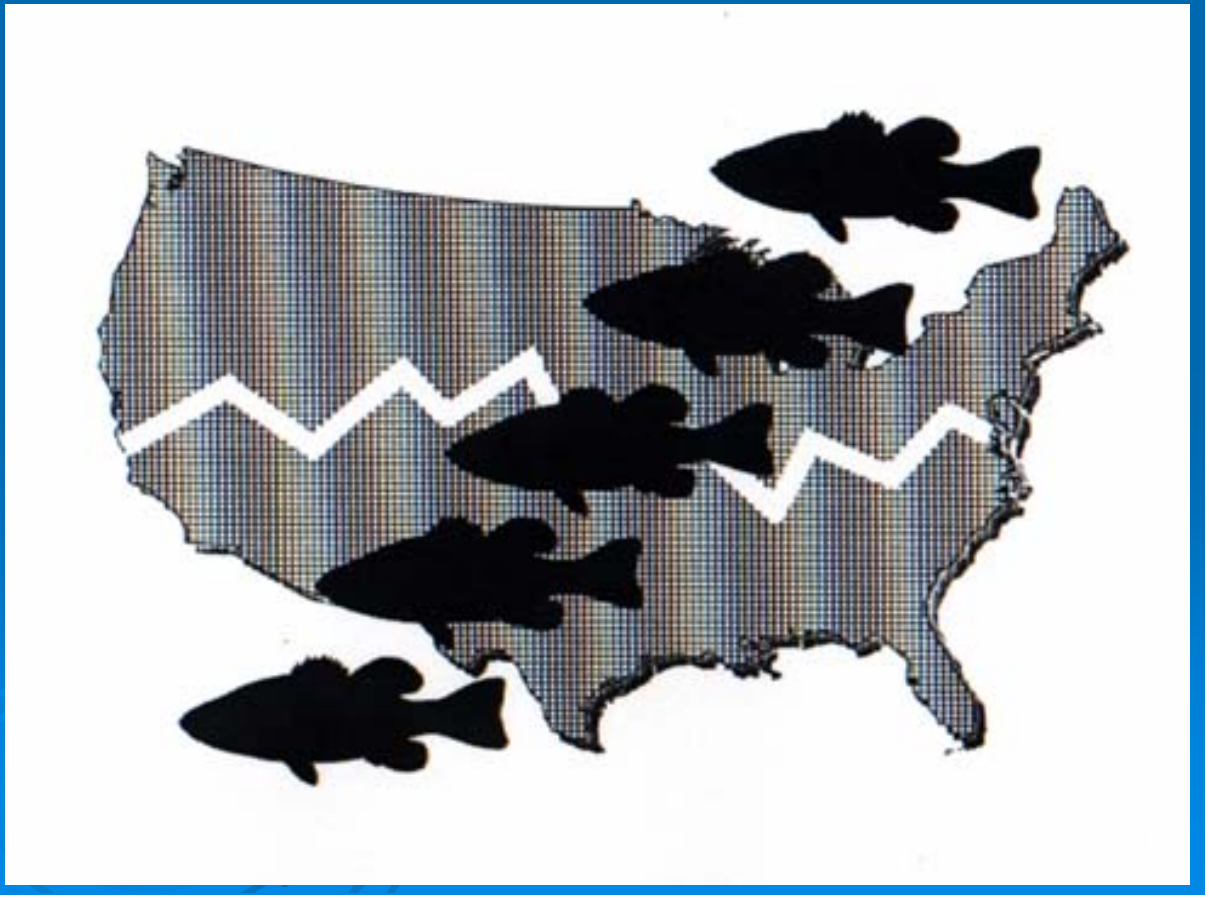
National Study of Chemical Residues in Lake Fish Tissue

500 Lakes and Reservoirs

NJ: 2 lakes

2000-2003: Field work

2007: Final report and data upload

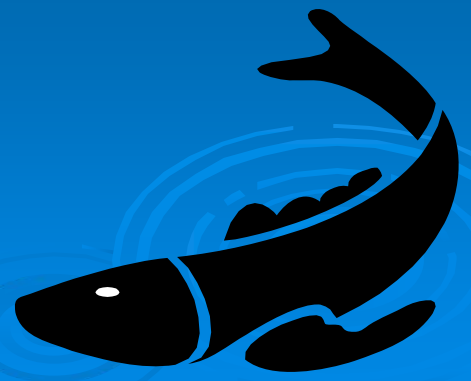


Objective and Design

- *The objective of the National Lake Fish Tissue Study is to estimate the national distribution of the mean levels of selected persistent, bioaccumulative, and toxic chemical residues in fish tissue from lakes and reservoirs in the contiguous United States.*
- Design:
  - 6 size categories of lakes - 1 hectare to 5000 hectares
  - 2 fish composites per site (predator and bottom dweller, with 5 fish in each)

Fish Species

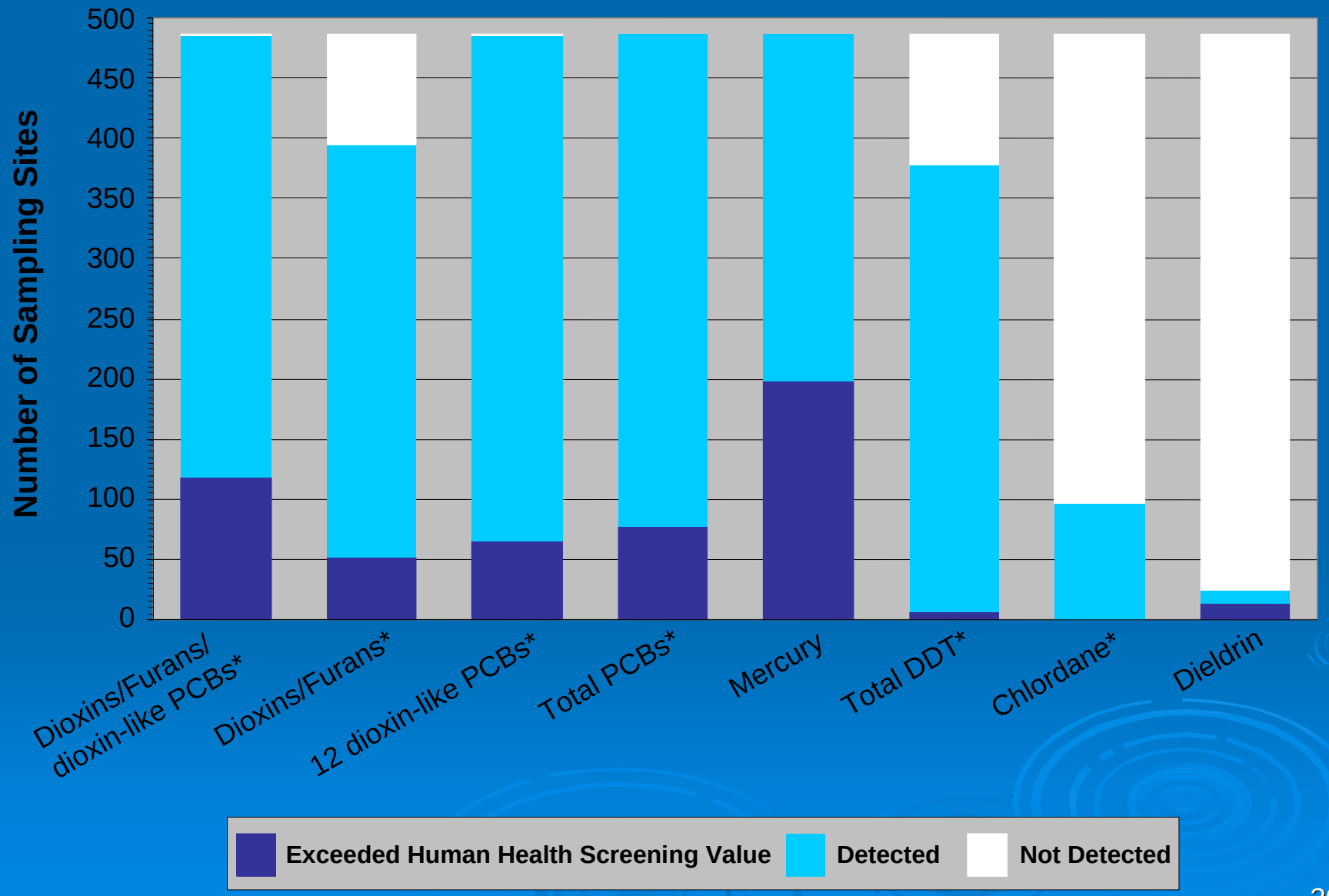
PREDATORS		BOTTOM DWELLERS	
Largemouth bass	50%	Common carp	26%
Walleye	10%	White sucker	20%
Northern pike	7%	Channel catfish	16%



Target Chemicals

- EPA is analyzing the fish tissue for 268 chemicals, including PCB congeners and breakdown products
  - 2 metals (Hg and As [5 forms])
  - 17 dioxins/furans
  - 159 PCB congener measurements
  - 46 pesticides
  - 40 semi-volatile organics (e.g., PAHs)
- EPA added analysis of PBDEs for Year 4 samples only

Preliminary Data Summary for Predators (Fillet Analysis, All Years, Unweighted Data)



*Zero for non-detected analytes; sum of congeners for PCBs

National Water Surveys More Information…

- National Coastal Assessment
  - http://www.epa.gov/owow/oceans/nccr
- Wadeable Streams Assessment
  - www.epa.gov/owow/streamsurvey
- National Lakes Survey
  - http://www.epa.gov/owow/lakes/lakessurvey
- National Rivers and Streams
  - www.epa.gov/owow/riverssurvey
- National Fish Tissue Survey
  - www.epa.gov/waterscience/fishstudy