

National and State River Surveys



David Neils
Chief Aquatic Biologist
NHDES
david.e.neils@des.nh.gov

National Aquatic Resource Surveys

What is NARS?



Coastal

Rivers and Streams

Wetlands

Lakes

- A series of surveys implemented by EPA and state/tribal partners
- Assesses all surface waters within the 48 contiguous states
- Addresses rivers and streams, lakes and reservoirs, wetlands and coastal waters (5 Year cycle)

Purpose of the National Aquatic Resource Surveys

- Assessing biological and recreational condition using indicators of condition and stress
- Documenting associations between indicators of condition and indicators of stress
- Building/enhancing state monitoring and assessment capacity



Coastal



Rivers and Streams



Wetlands



Lakes



National Aquatic Resource Survey Approach

- Randomized design to report on condition of each resource nationally and on a regional basis with documented confidence
- Standard field and lab protocols
- National QA and data management
- Nationally consistent and regionally relevant data interpretation and peer-reviewed reports

National and State Rivers and Streams Assessment Overview

- Nationally: 2,000 -2,400 sample sites on rivers and streams in the continental United States
- State of NH: 26 national sample sites (SS, LS, Rivers), and an additional 30 State sites (SS, LS).
- Includes new wadeable sites, new boatable sites, revisit sites (current year), repeat sites (previous years), reference sites



National Rivers and Streams Assessment

Core Questions

- What is the current condition of the nation's rivers and streams. Reported both Nationally and by Region?
 - Targeted population includes perennial streams through Great Rivers
- Which stressors are contributing to the degradation of the nation's rivers and streams?
- What are the changes in river/stream condition from previous NRSA surveys?



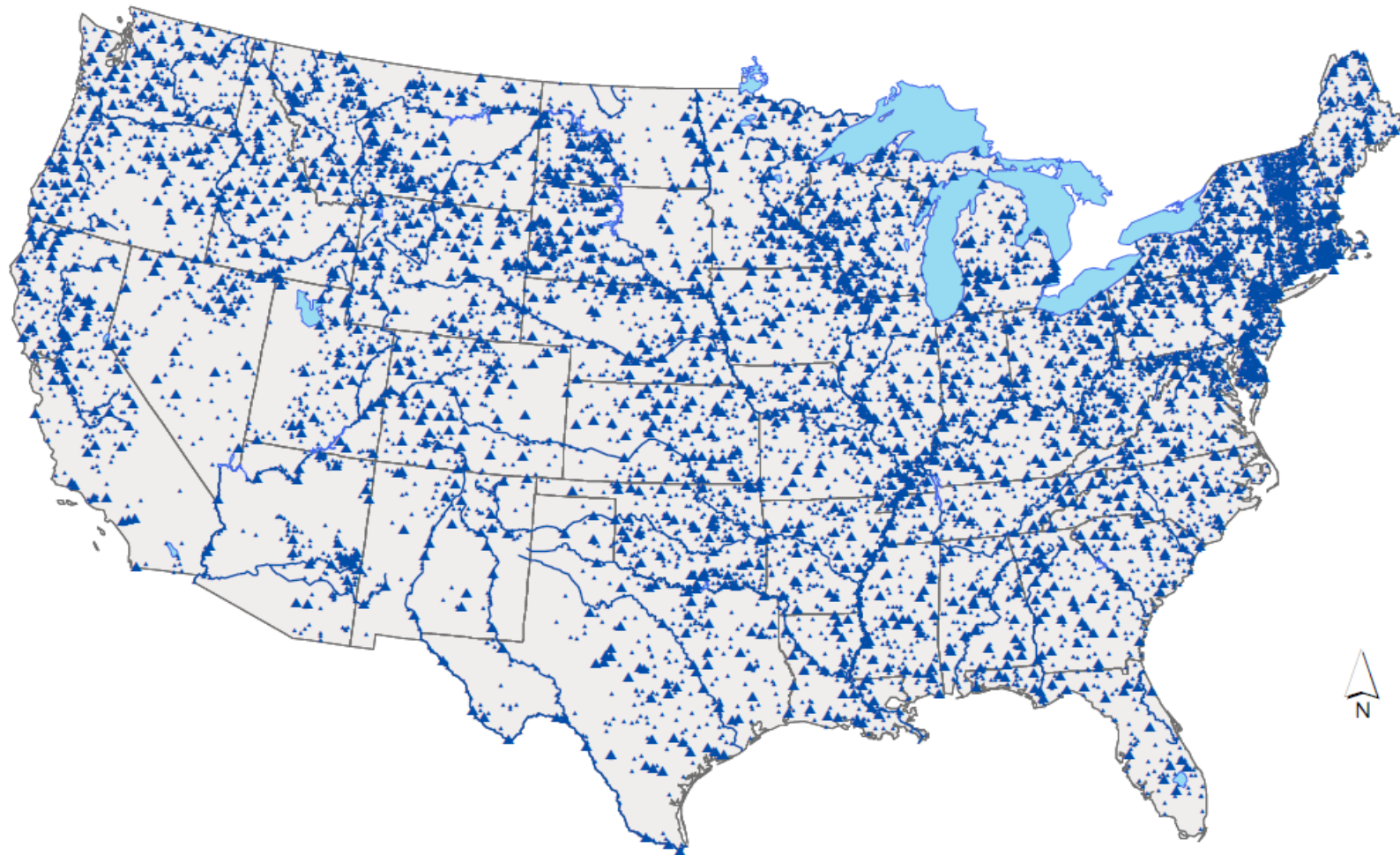
State Rivers and Streams Assessment

Core Questions

- What is the current condition of the state's rivers and streams. Reported for NH only.
 - Targeted population includes wadeable streams only
 - Drainage Areas = 2-85 square miles
- Evaluate changes in river/stream condition from previous NRSA surveys for the following designated uses:
 - Aquatic Life and Swimming (fish, macroinvertebrates, bacteria)



Design Sites for the 2013-2014 National Rivers & Streams Assessment

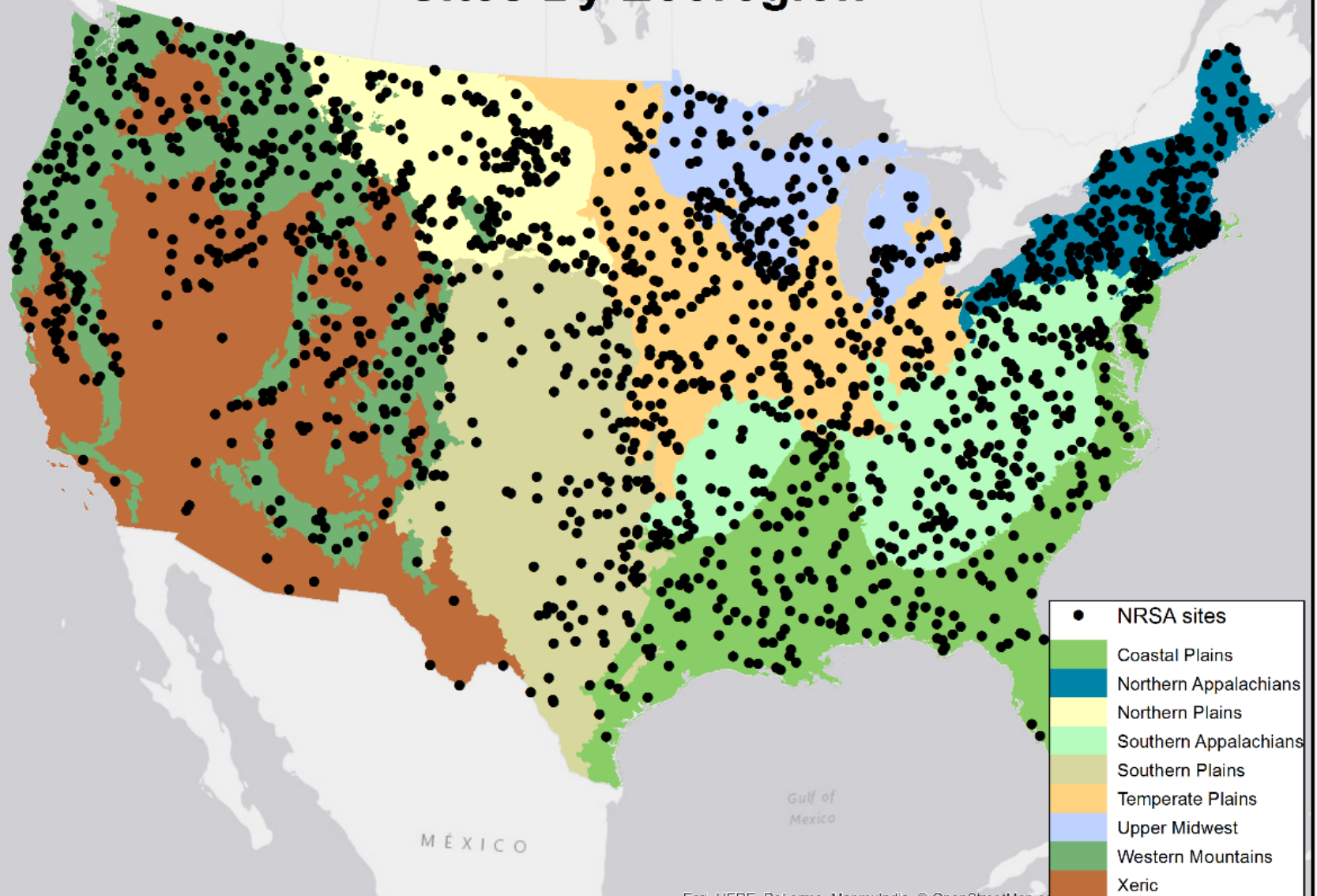


Legend

- ▲ NRSA 2013-14 Base Sites
- ▲ NRSA 2013-14 Oversample Sites

0 250 500 1,000 1,500 2,000 Kilometers

National Rivers and Streams Assessment 2013-2014 Sites By Ecoregion





NH Basins

- Androskoggin
- Saco
- Coastal
- Merrimack
- Middle Connecticut
- Upper Connecticut

Site Type

- NRSA
- SRSA

NRSA and SRSA Sites, 2023-26

- 20 NRSA Sites
 - (+ 4 revisits)
- 30 SRSA Sites
- 2 EPA Assigned Reference Sites

0 10 20 40 Miles

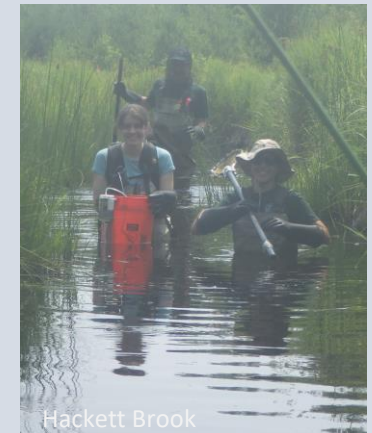
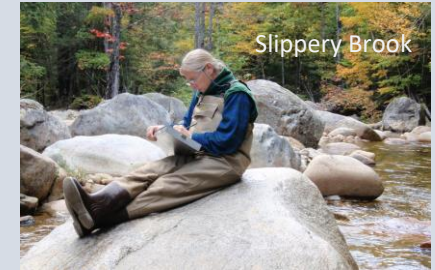
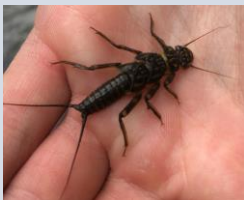
GIS, Esri, DeLorme, Mapbox, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS

What variables will be measured?

Core Indicators:

- In situ temperature, pH, conductivity and dissolved oxygen
- Water Chemistry and Associated Measurements
- Chlorophyll-*a*
- Periphyton*
- Benthic Macroinvertebrates
- Fish Assemblage
- Physical Habitat Assessment

* national only

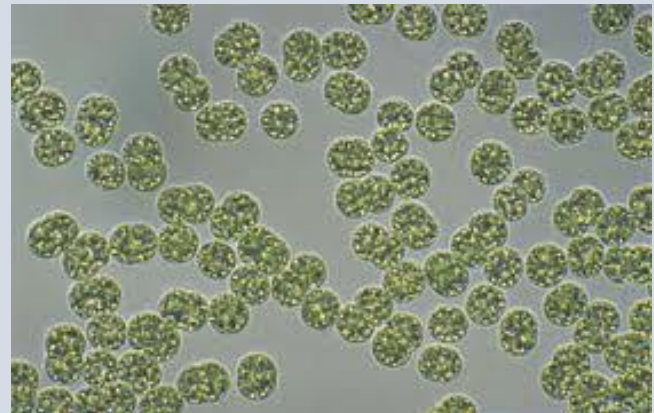


What variables will be measured?

Supplemental Indicators:

- Algal Toxin (Microcystin)*
- Fecal indicator (*Enterococci*/*E. coli*)
- Fish Tissue Plug *

* national only



Survey Indicators and Measures

Surveys assess **biological indicators** such as:

- Benthic macroinvertebrates
- Plants
- Fish community



Surveys assess **public health indicators** such as

- Fish tissue
- Pathogens (e.g., enterococci)
- Microcystin



Surveys measure the occurrence and extent of key **stressors** such as:

- Nutrient enrichment
- Excess sediment
- Physical habitat characteristics (e.g. riparian cover)

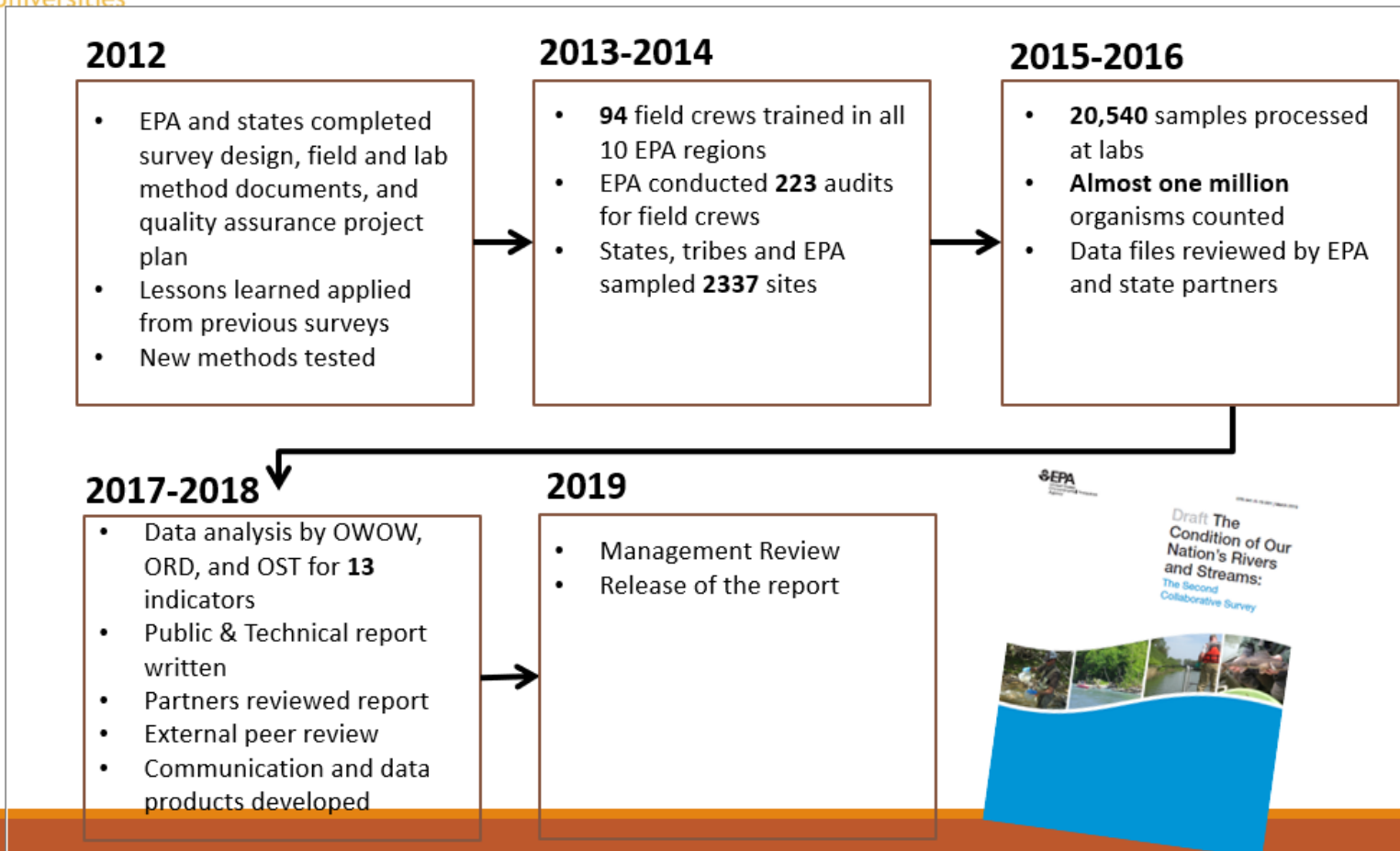
Surveys may include pertinent **research indicators** such as:

- Periphyton
- Contaminants of emerging concern





Rivers and Streams Survey: A Collaboration from Start to Finish



National Conclusions, 2013-14 NRSA

Excess nutrients are widespread and expanding. When nutrients are high, streams are almost twice as likely to have degraded biological communities

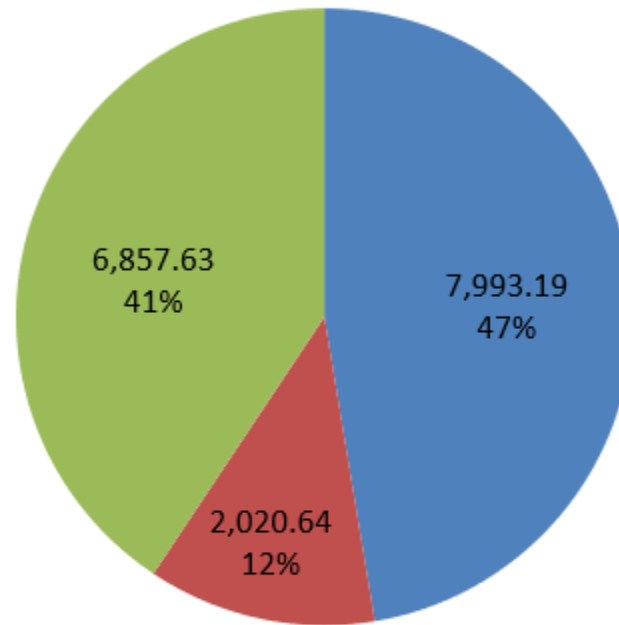
- National efforts to reduce levels of phosphorus and sediments likely to improve the biological condition of many of our nation's waters.
- Everyone plays a role in reducing nutrient pollution – nationally, regionally and locally -- from investing in water and sewer infrastructure to leaving natural vegetation along the water's edge

Recreational risk was low for algal toxins, but ~30% of rivers and streams may pose health risk associated with fecal contamination; fish tissue contaminants are present at varying levels of risk to human health

- Local swimming and fish consumption advisories issued by states, tribes, and watershed organizations should be consulted for additional information on potential human health risks associated with a particular waterbody.

NH State Intensification Sample Frame Population 2013-16

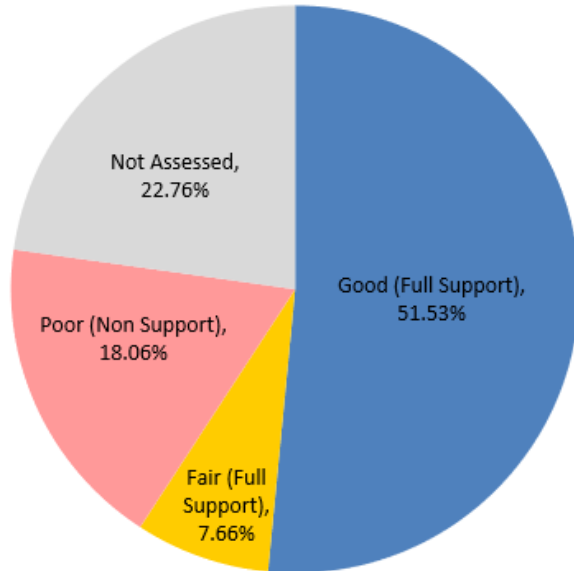
Sample Frame Populations



Sample Frame Category	Miles	Percent
Non-Target	7,993.19	47.38%
Target, Not Assessed	2,020.64	11.98%
Target, Assessed	6,857.63	40.65%
Total	16,871.46	100.00%

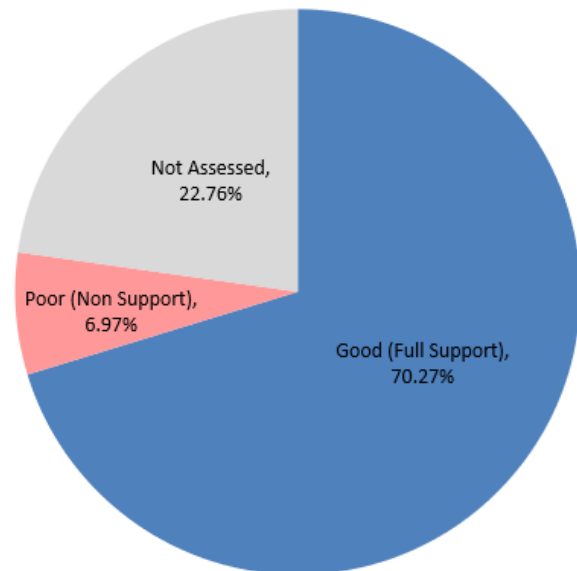
NH Probability Based Stream Assessments 2013-2016

**Aquatic Life Use Condition
Target Population of NH Rivers**



Aquatic Life Use Condition in the Target Population of NH Rivers				
Category	Percent of Resource		Miles of Resource	
	Percent	Error (+/-)	Miles	Error (+/-)
Good (Full Support)	51.5%	11.2%	4,574.60	1113.68
Fair (Full Support)	7.7%	5.6%	679.66	482.40
Poor (Non Support)	18.1%	7.5%	1,603.37	661.44
Not Assessed	22.8%	10.1%	2,020.64	932.42

**Primary Contact Recreation Condition
Target Population of NH Rivers**

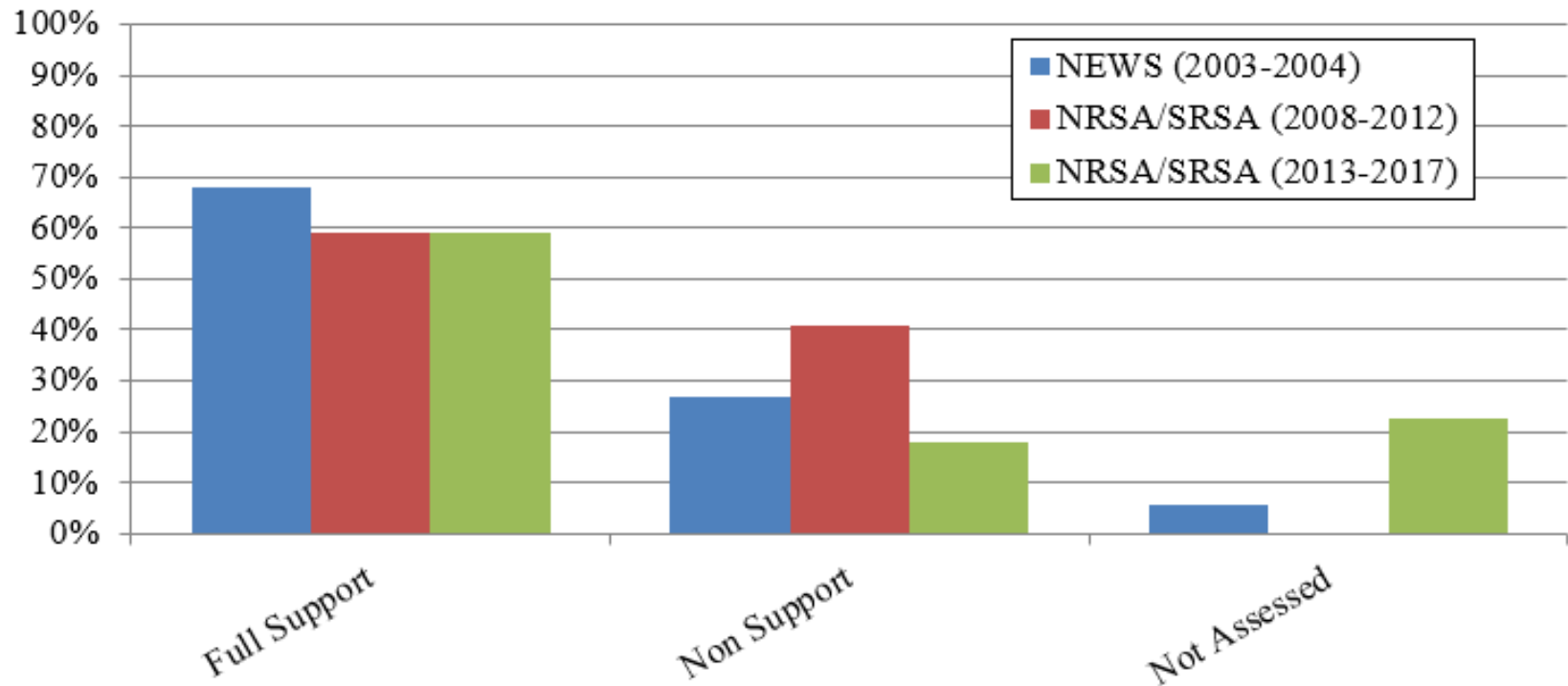


Primary Contact Recreation Condition in the Target Population of NH Rivers				
Category	Percent of Resource		Miles of Resource	
	Percent	Error (+/-)	Miles	Error (+/-)
Good (Full Support)	70.3%	10.9%	6,238.64	1042.07
Poor (Non Support)	7.0%	5.2%	618.99	464.00
Not Assessed	22.8%	10.1%	2,020.64	932.42

Comparison of three aquatic life use probability-based survey assessments (2003-04, 2008-2012 and 2013-2017)

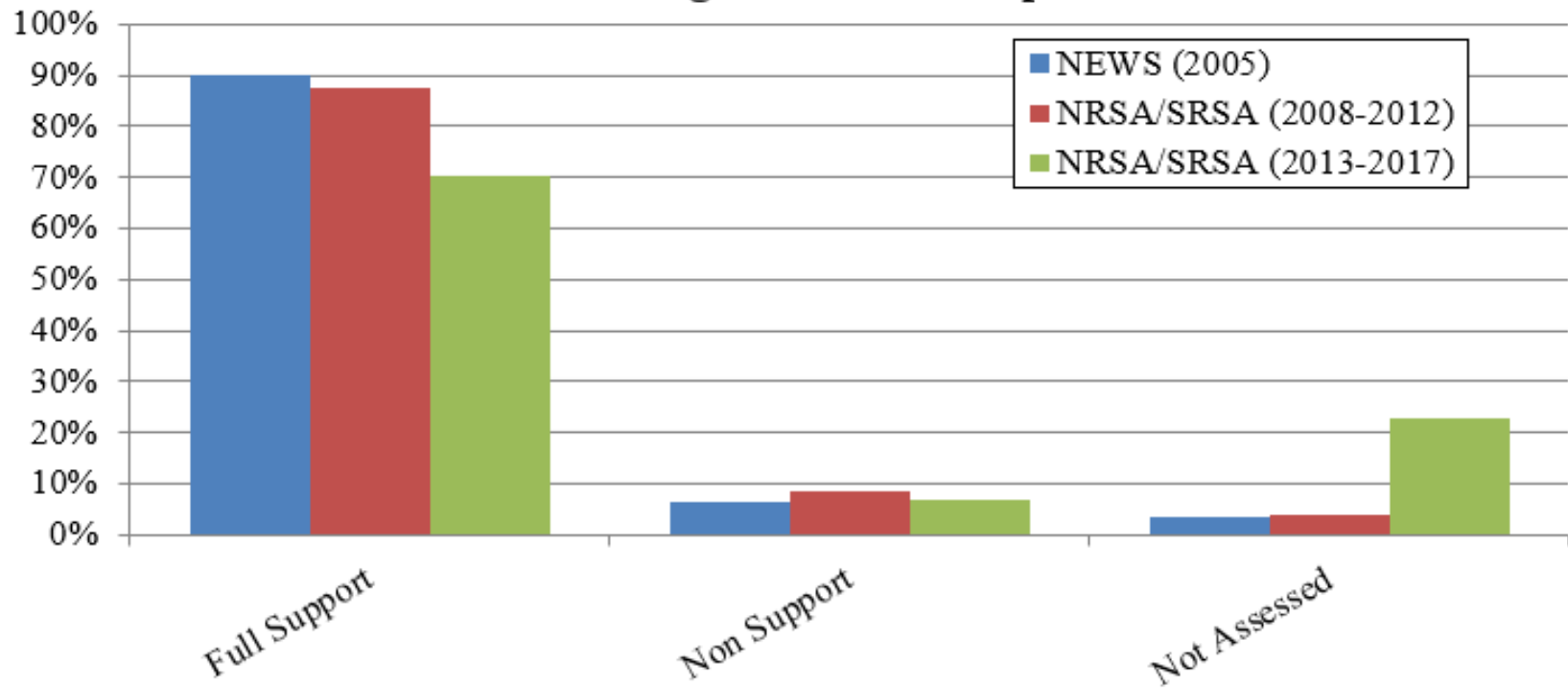
Aquatic Life Use Support

Probability-Based Surveys, 2003-04, 2008-12 and 2013-17
Percent of Target River Mile Population



Comparison of three primary contact recreation probability-based survey assessments (2002-03, 2008-2012 and 2013-2017)

Primary Contact Recreation (i.e. Swimming) Probability-Based Surveys, 2005, 2008-12 and 2013-17 Percent of Target River Mile Population





Questions?



Littlefield Brook, Grantham access location

Many thanks to Richard Mitchell, USEPA for providing NRSA data and overview slides