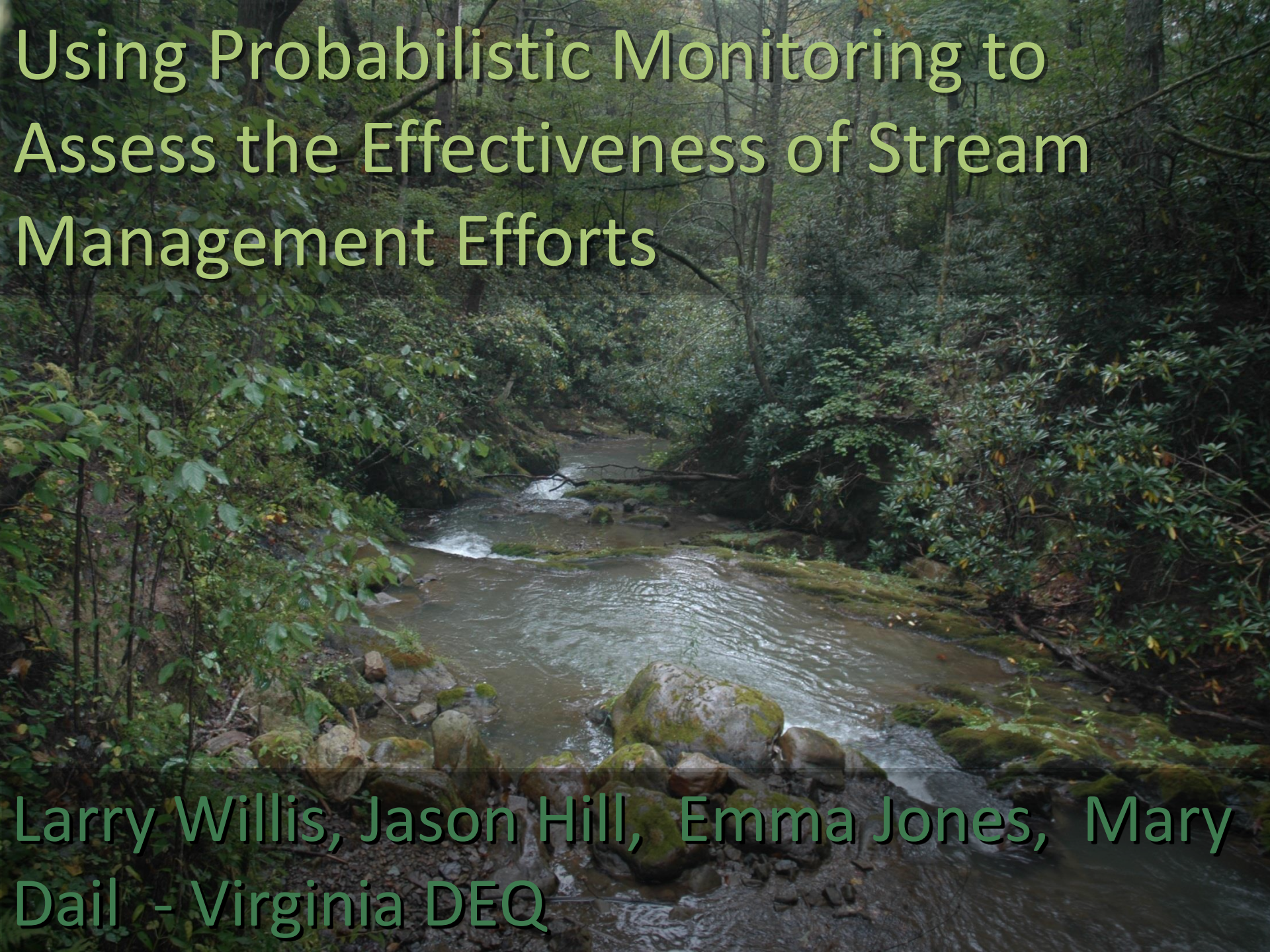
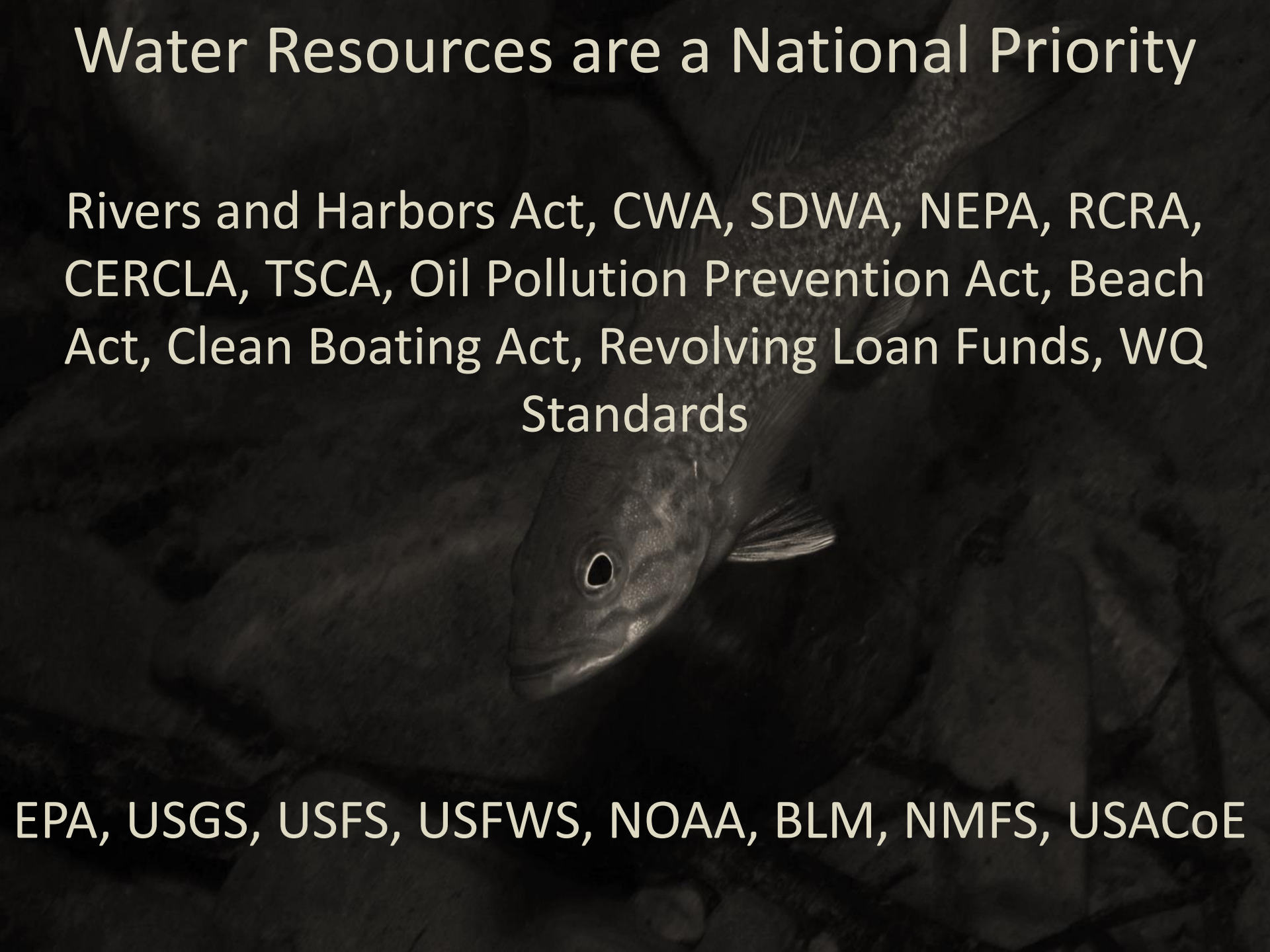
Using Probabilistic Monitoring to Assess the Effectiveness of Stream Management Efforts



Larry Willis, Jason Hill, Emma Jones, Mary Dail - Virginia DEQ

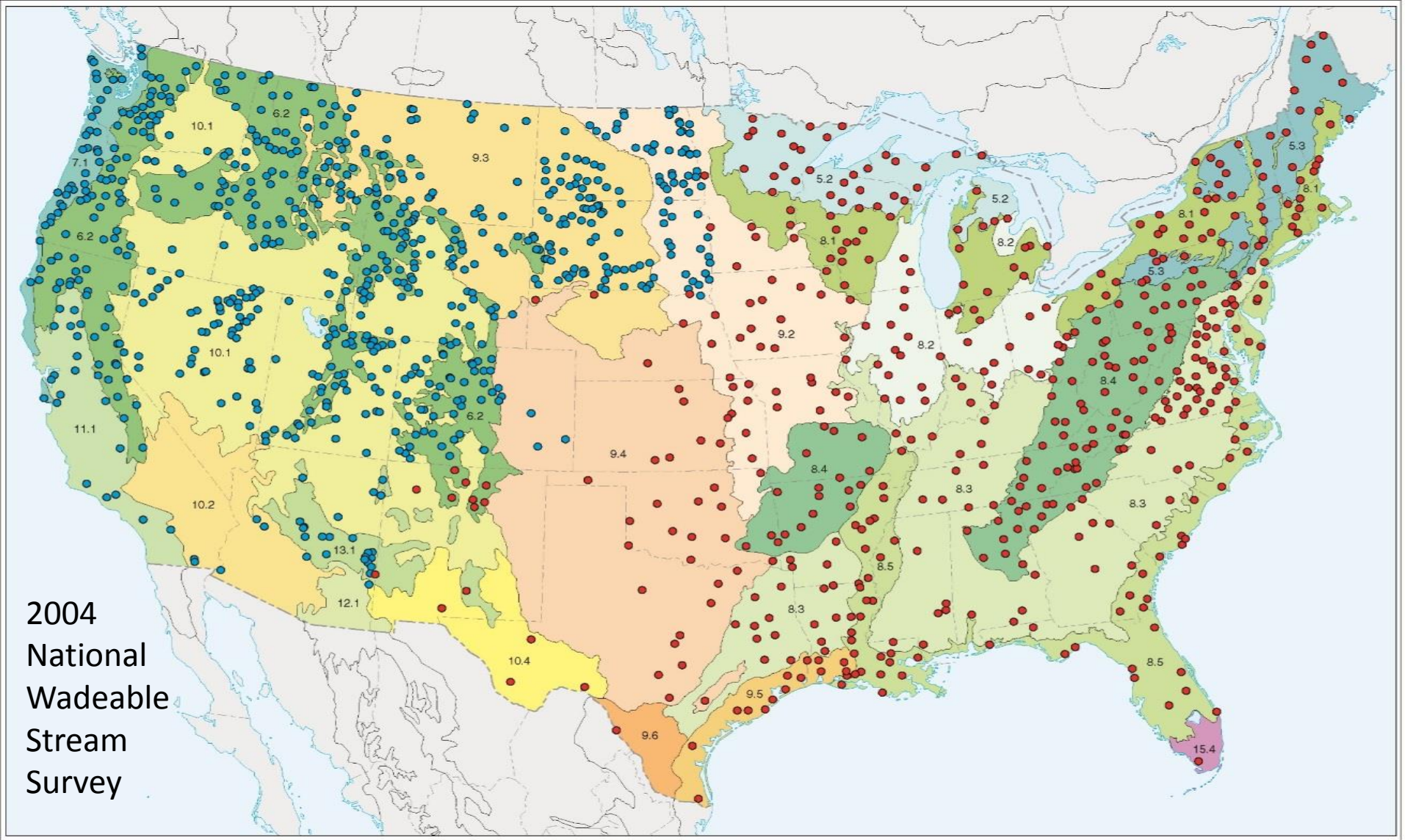
Water Resources are a National Priority

Rivers and Harbors Act, CWA, SDWA, NEPA, RCRA, CERCLA, TSCA, Oil Pollution Prevention Act, Beach Act, Clean Boating Act, Revolving Loan Funds, WQ Standards



EPA, USGS, USFS, USFWS, NOAA, BLM, NMFS, USACoE

EMAP → NARS



Effectiveness of Aquatic Resource Management

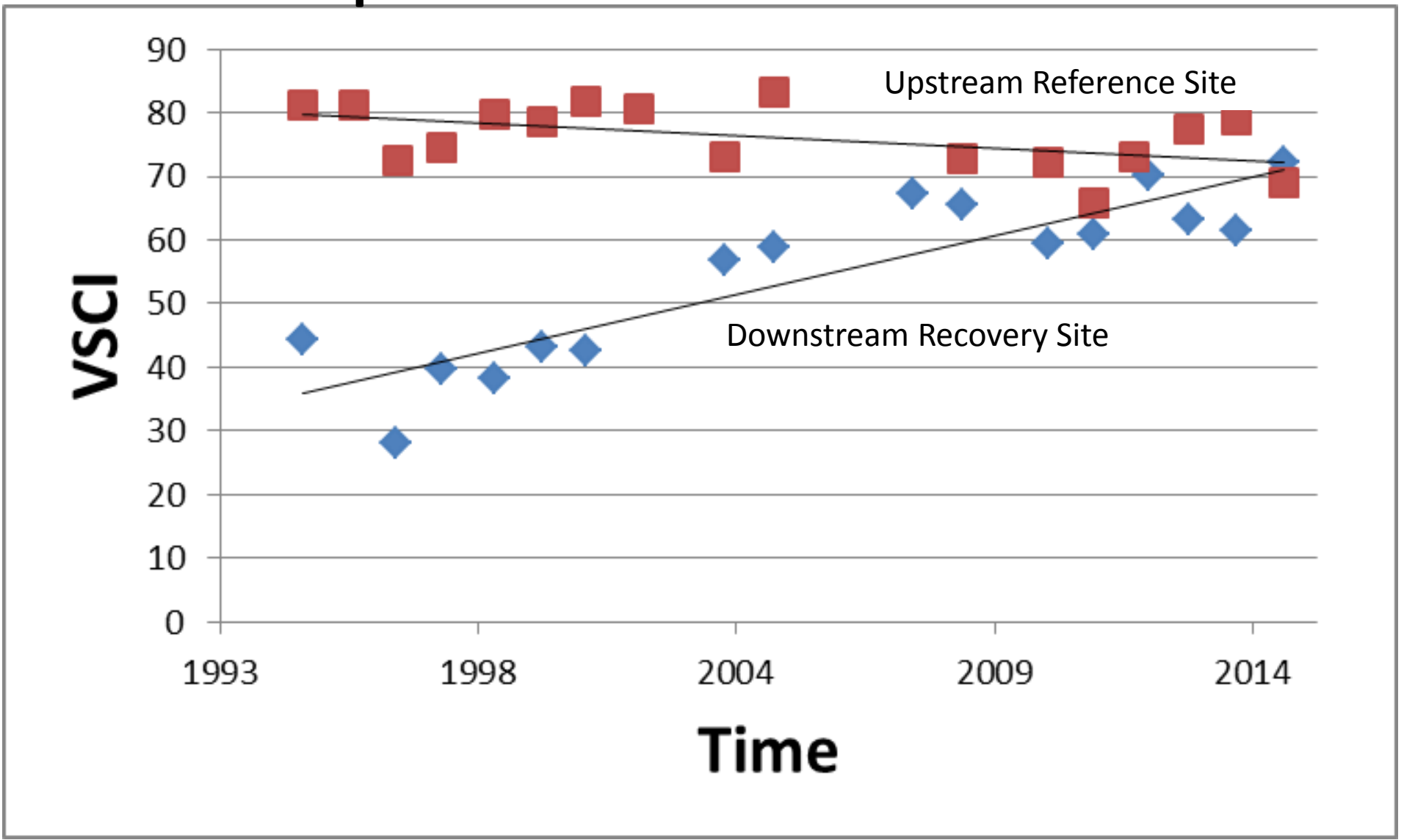
Rock Castle Creek
Patrick Co. VA

Effectiveness of Aquatic Resource Management

Sometimes our management strategies have gone horribly wrong

Lick Run, Roanoke, VA

Jackson River TMDL Implementation Results



Targeted monitoring tells us about a few specific sites but what about everything else?

3.5 million stream miles in the US and 50,000 stream miles in Virginia

Probabilistic Monitoring

A network of randomly chosen stations used to statistically assess statewide water quality conditions.

ProbMon

Virginia's Probabilistic Stream Monitoring Program

Randomly sampling streams since 2001

ProbMon

Virginia's Probabilistic Stream Monitoring Program

Randomly sampling streams since 2001

Virginia DEQ Water Monitoring Programs

- **Ambient Water Quality (Lakes and Streams)**
- **Trend Monitoring**
- **Chesapeake Bay Program**
- **Biological Monitoring Program**
- **Special Studies/TMDL**
- **Pollution Response**
- **Probabilistic Monitoring**

Primary goals of probabilistic monitoring:

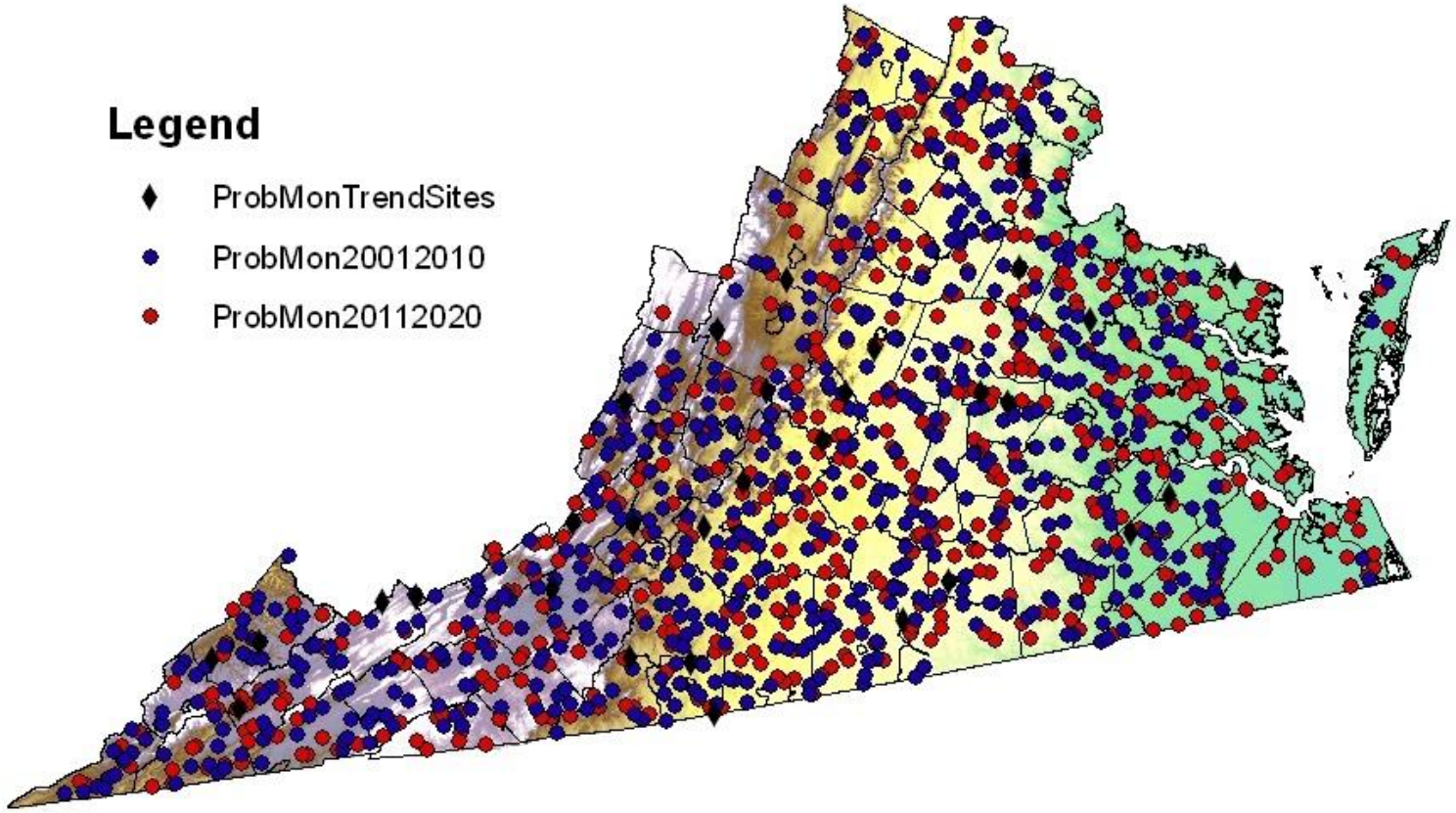
Provide decision makers with good information

What are the problems?

What is the extent of the problems?

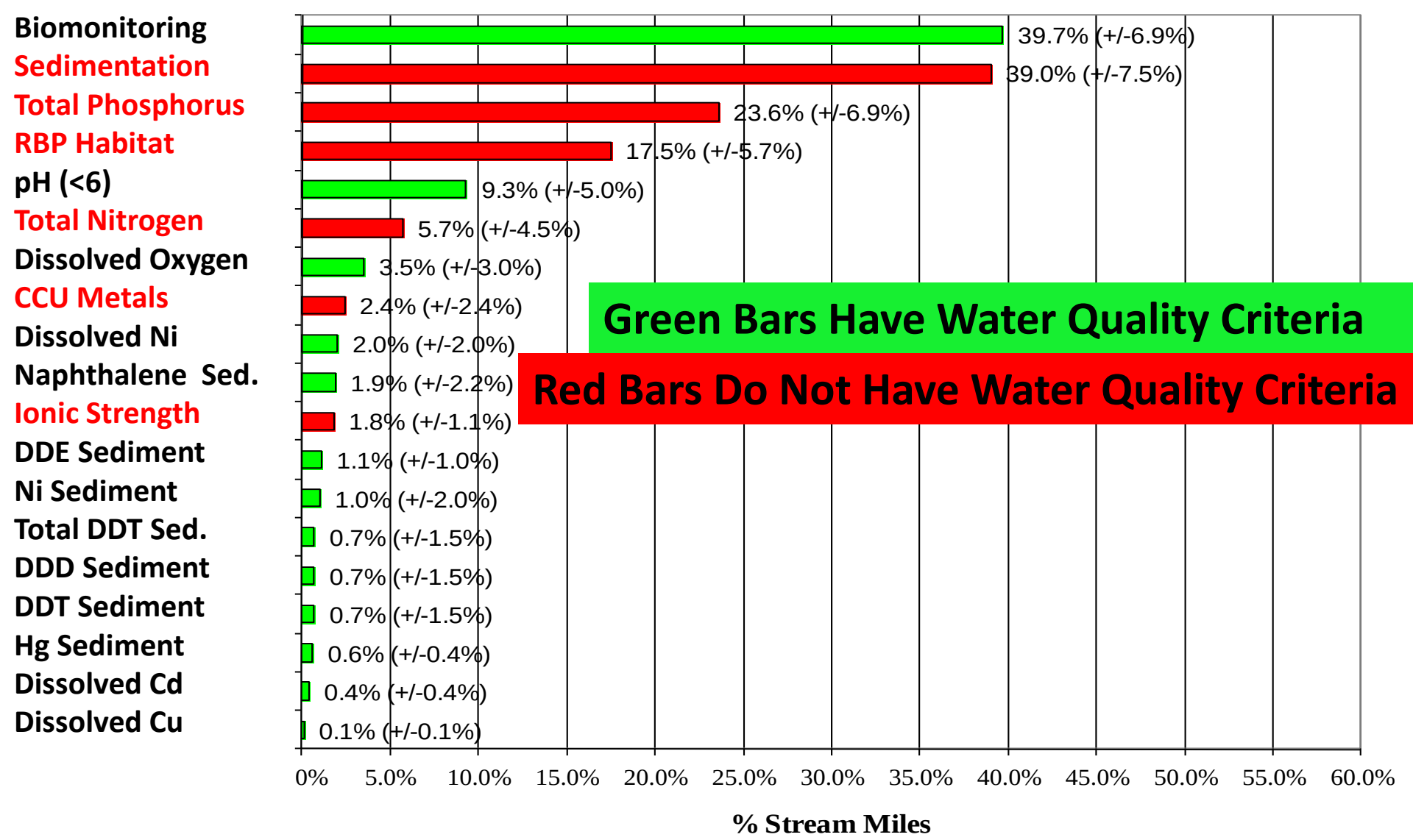
How serious are the problems?

Virginia Probabilistic Monitoring Sites: 2001-2020



Setting a baseline and detecting changes

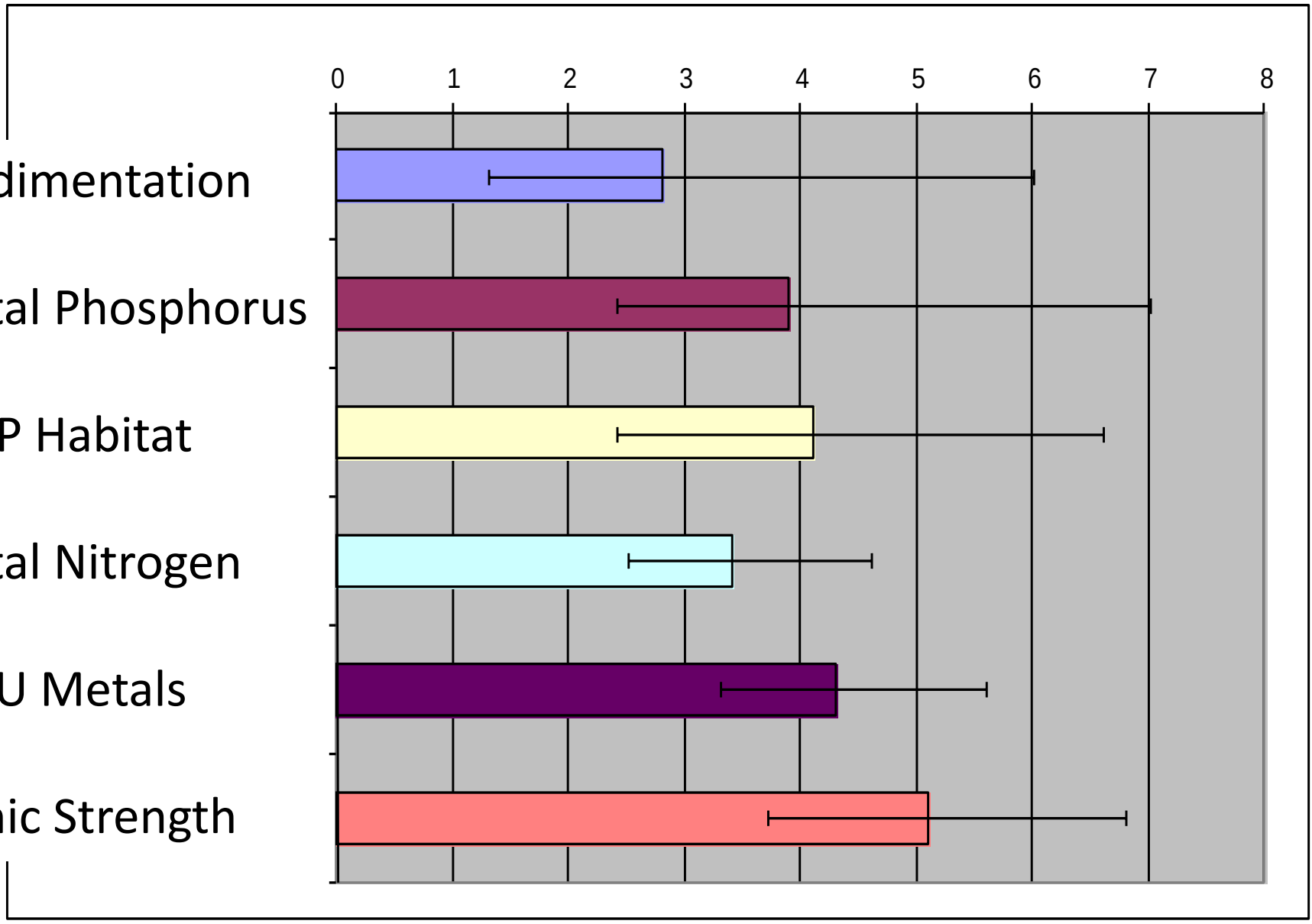

Measuring
Effectiveness
By
Condition

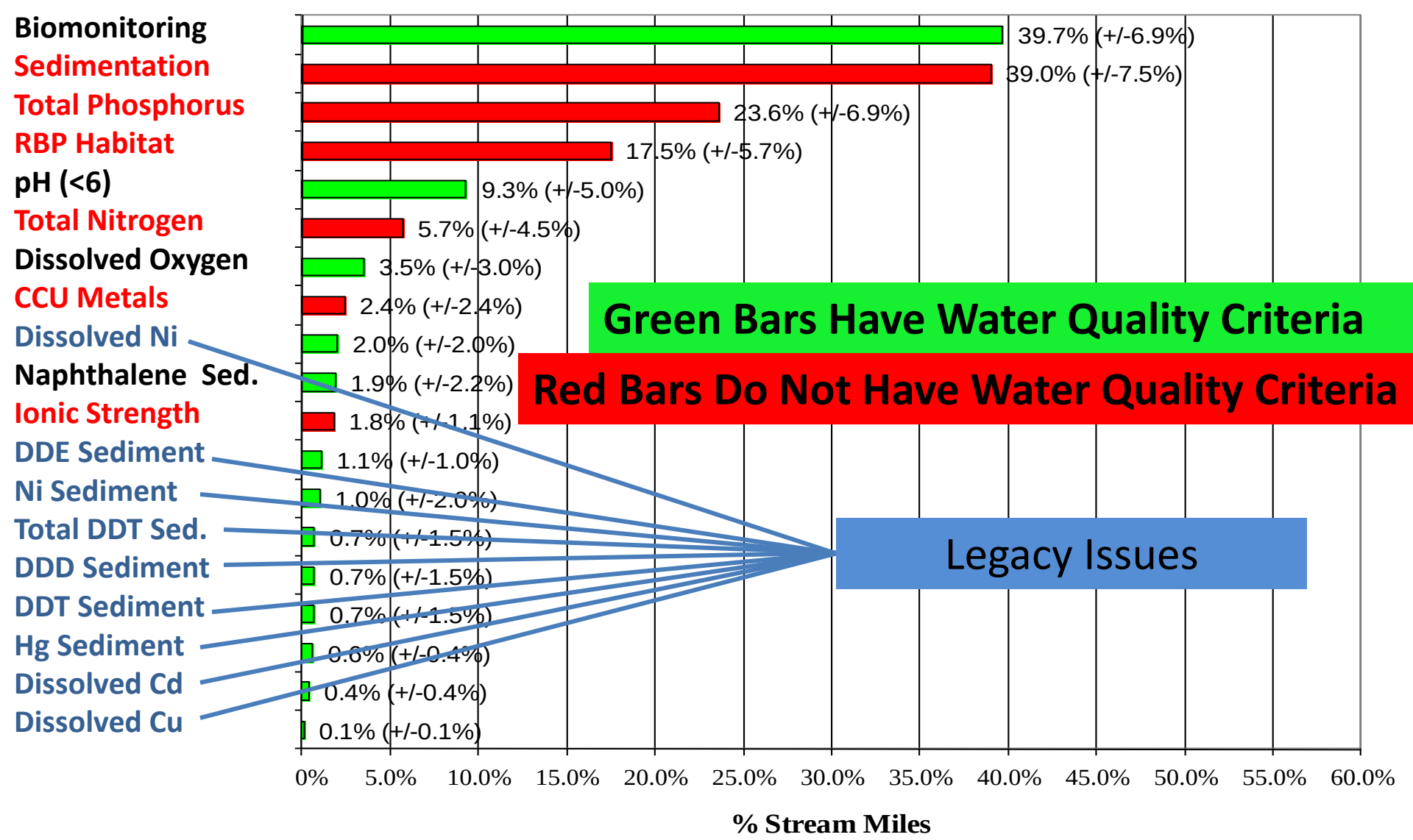


Percent of rivermiles not meeting expectations for the 18 most common stressors in Virginia streams

Virginia 2012 305(b)

Relative Risk





Percent of rivermiles not meeting expectations for the 18 most common stressors in Virginia streams

Virginia 2012 305(b)

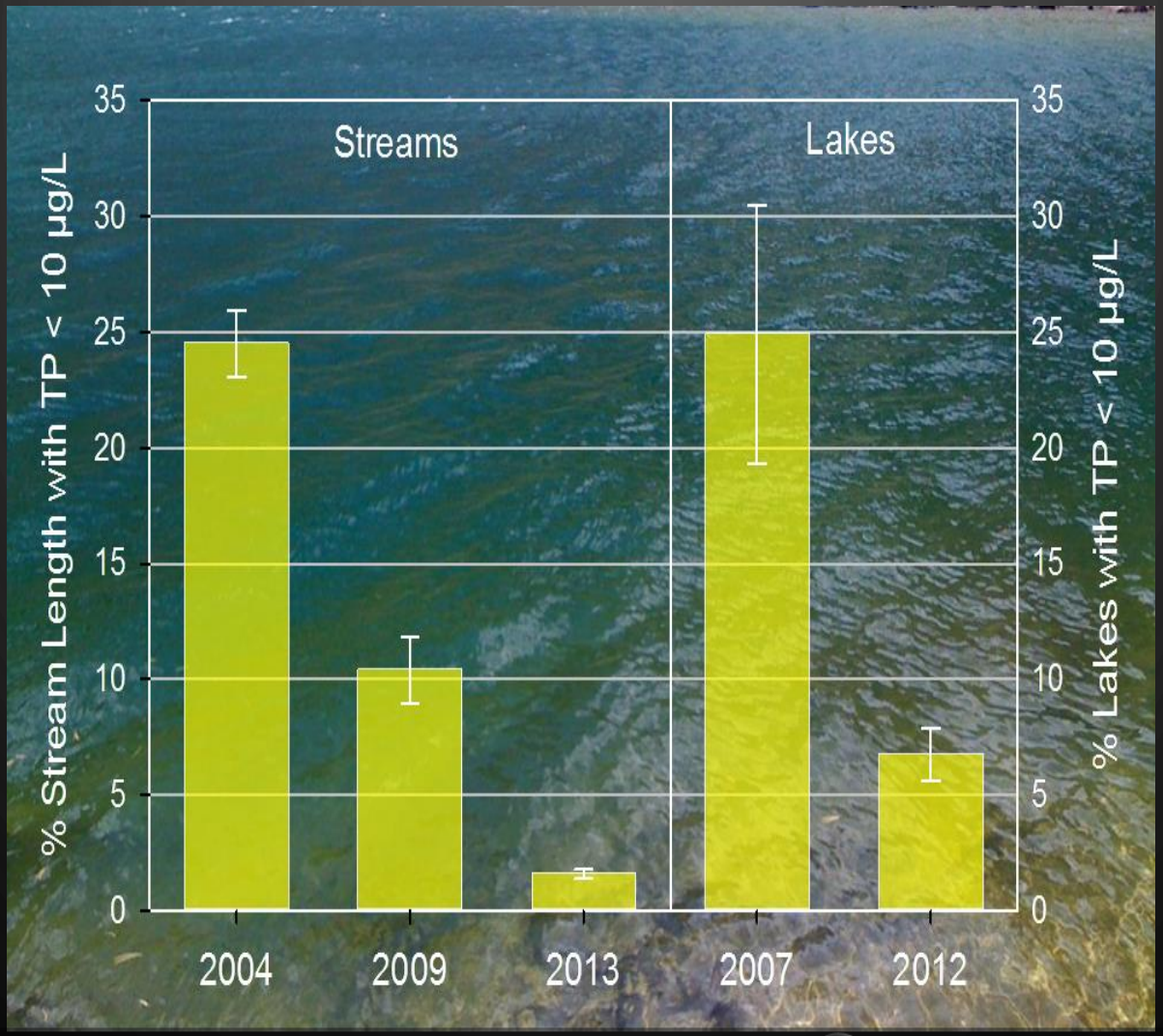

Measuring
Effectiveness
By Changes
in Condition

CONTINENTAL-SCALE INCREASE IN LAKE AND STREAM PHOSPHORUS: ARE OLIGOTROPHIC SYSTEMS DISAPPEARING IN THE U.S.?

JOHN L. STODDARD, JOHN VAN SICKLE, ALAN T. HERLIHY, JANICE BRAHNEY, STEVEN G. PAULSEN, DAVID V. PECK, RICHARD MITCHELL, AMINA POLLARD

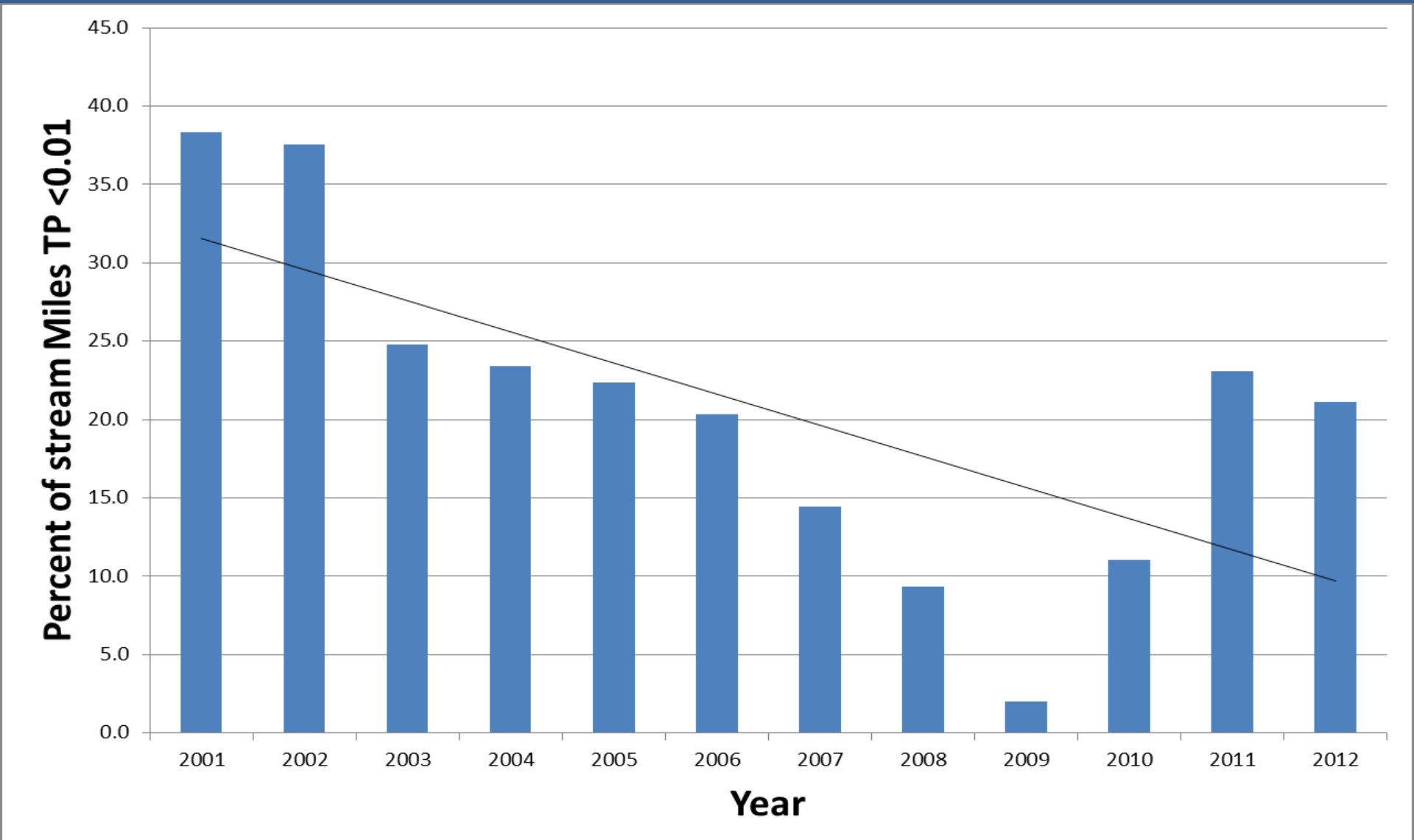
APRIL 19, 2016

OLIGOTROPHIC SYSTEMS – POPULATION ESTIMATES

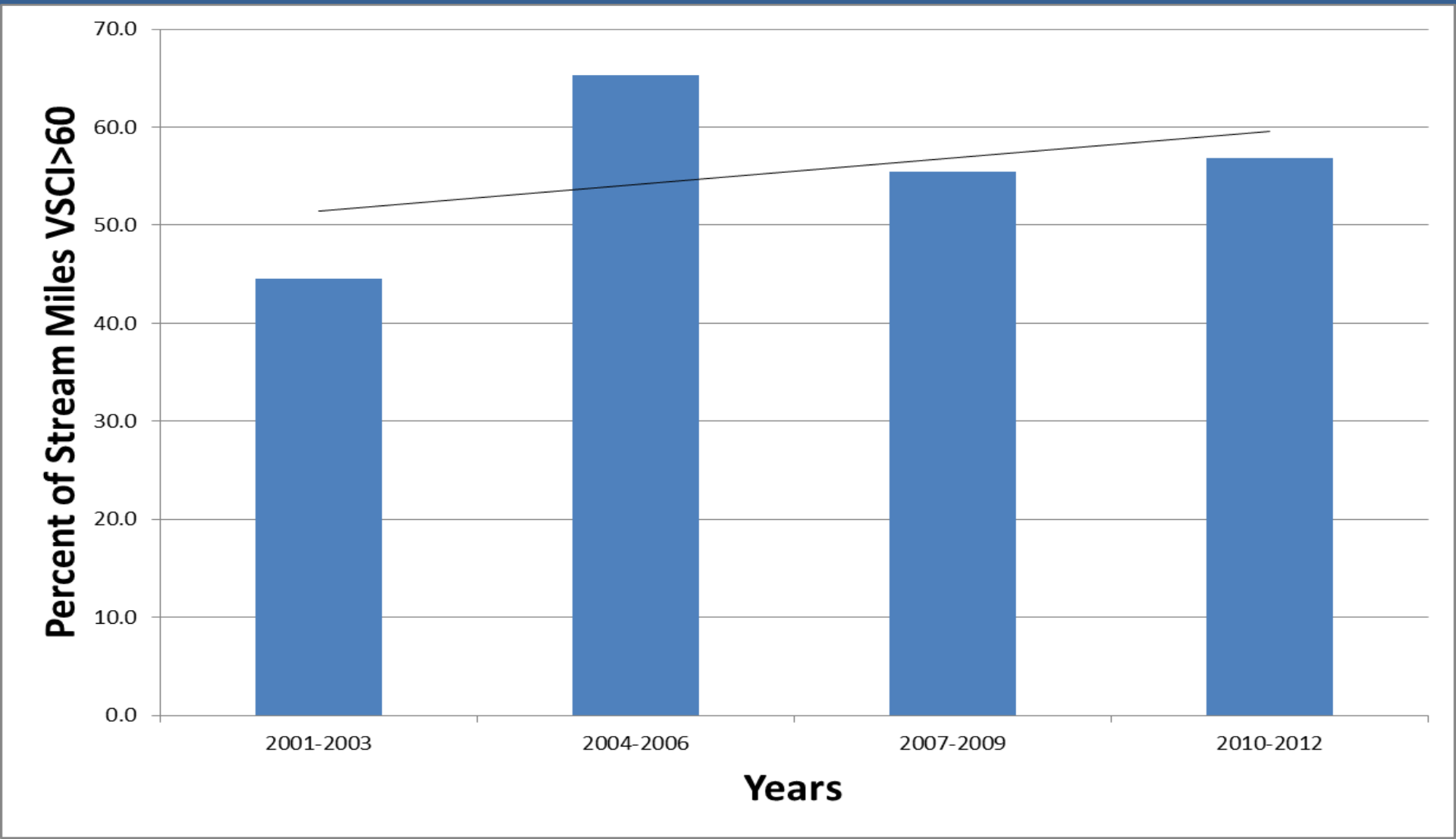


With Permission: John L. Stoddard, John van sickle, Alan T. Herlihy, Janice Brahney, Steven G. Paulsen, David V. Peck, Richard Mitchell, Amina Pollard 2016.

Percent of Virginia Stream Miles with TP below detection



Percent of Stream Miles meeting Biological Expectations in Virginia



Summary:

1. Our effectiveness at managing aquatic resources is mixed.
2. 40% of our streams nationally and in Virginia don't meet biological expectations.
3. WQ Standards appear to be effective.
4. We need to do more to evaluate risks to the best of what is left.
5. Active management of NPS sediment and nutrients is new.
6. In Virginia, biological resources are at least holding the line and may be improving


Questions?