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

2004 National Wadeable Stream Survey
Effectiveness of Aquatic Resource Management

Rock Castle Creek
Patrick Co. VA
Effectiveness of Aquatic Resource Management
Sometimes our management strategies have gone horribly wrong.
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.

Maury River at Goshen Pass, VA
ProbMon
Virginia’s Probabilistic Stream Monitoring Program
Randomly sampling streams since 2001
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 river miles not meeting expectations for the 18 most common stressors in Virginia streams

Virginia 2012 305(b)
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

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OLIGOTROPHIC SYSTEMS – POPULATION ESTIMATES

Percent of Virginia Stream Miles with TP below detection
Percent of Stream Miles meeting Biological Expectations in Virginia

![Graph showing the percent of stream miles meeting biological expectations in Virginia from 2001-2003 to 2010-2012. The trend indicates an increase over time.](image-url)
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.