Measuring and Explaining Water-Quality Trends in the Chesapeake and its watershed: *Support for the MPA*

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(representing many partners)

for

Water-Quality Goal Implementation Team

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University of Maryland
Center for Environmental Science

Chesapeake Bay Program
Science. Restoration. Partnership.

USGS
science for a changing world

Using Monitoring Data To Measure Progress and Explain Change

Introduction/Outline

Overview:

- Role of project to support MPA and WIPs
- Partners

Major Elements:

1. Measure progress:
   a) Analyze trends of nitrogen, phosphorus and sediment in the watershed.
   b) Analyze trends of water quality in the estuary

2. Explain changes in water-quality in Bay and its watershed.

3. Enhance CBP models

4. Inform management strategies

Summary:

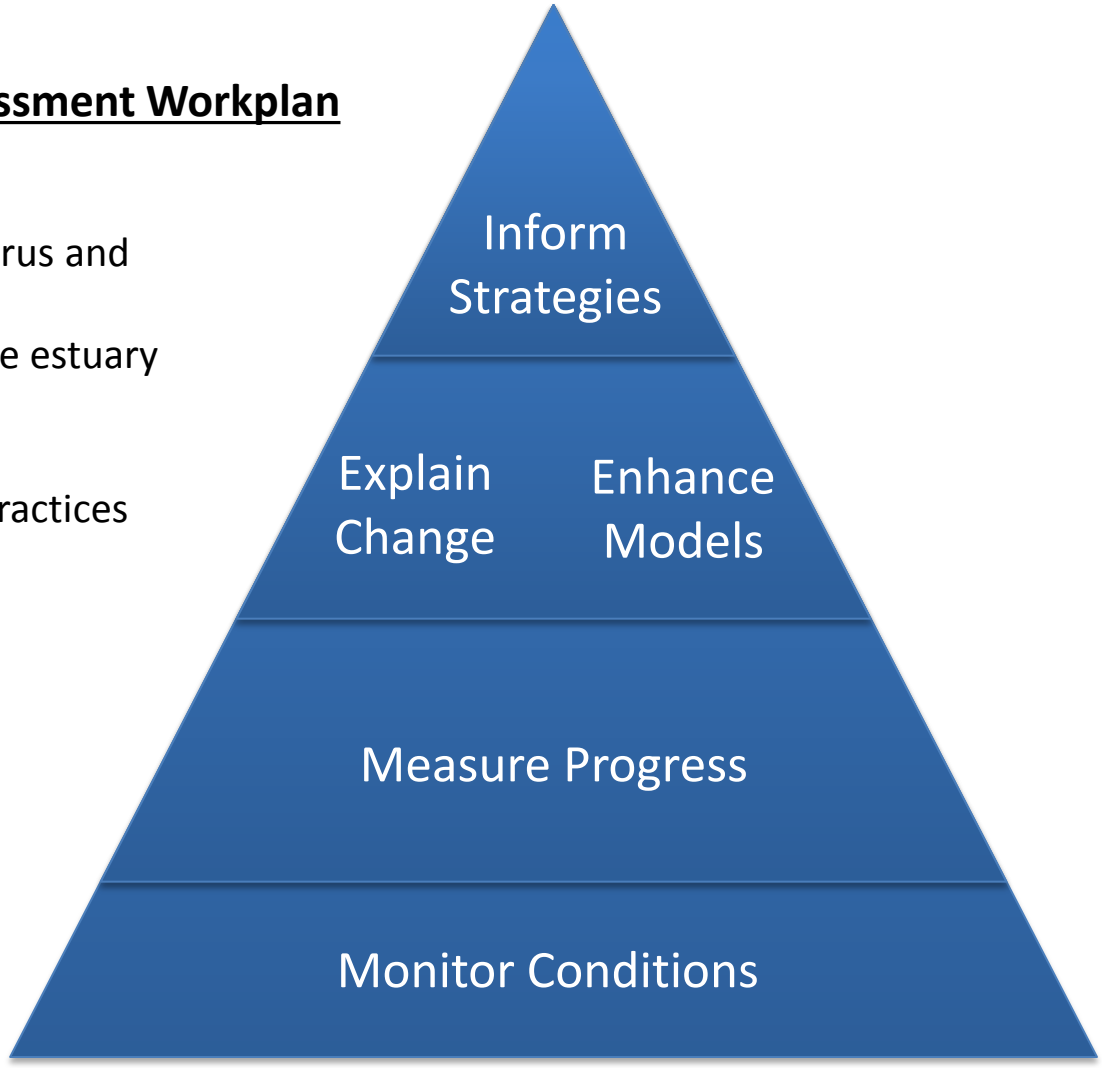
- Discussion questions on products, timing, priorities

Using Monitoring Data To Measure Progress and Explain Change

Overview: STAR Workplan Elements

Elements of STAR Mid-Point Assessment Workplan

1. Measure progress
   - Trends of nitrogen, phosphorus and sediment in the watershed.
   - Trends of water quality in the estuary
2. Explain water-quality changes
   - Response to management practices
3. Enhance CBP models
4. Inform management strategies
   - WIPs
   - Water-quality benefits



Using Monitoring Data To Measure Progress and Explain Change

Overview: Decision Framework

Water-Quality Outcomes

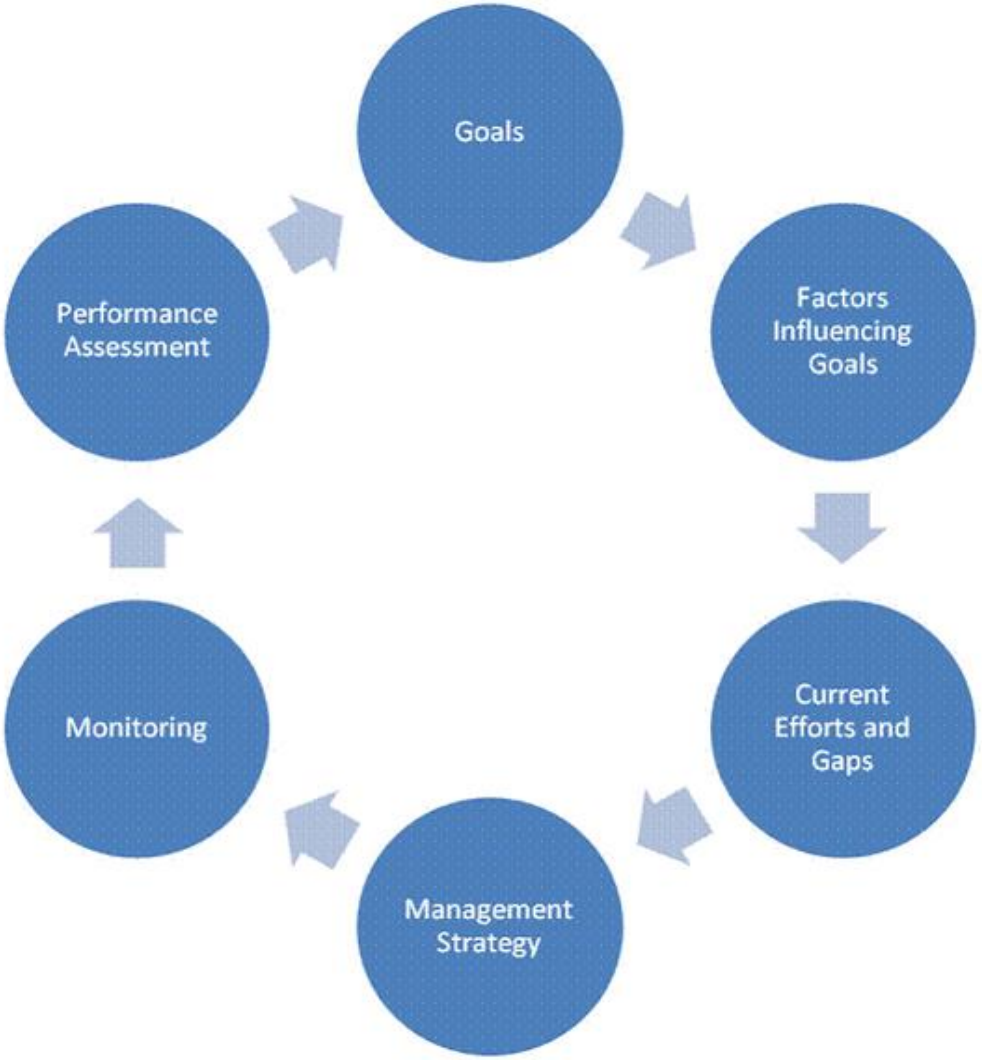
- 60 % by 2017
- 100% by 2025
- Monitoring to assess progress and attainment

MPA

- Assess Performance
  - Practices implemented
  - Water-quality improvements
  - Standards attainment
- Phase 3 WIPs

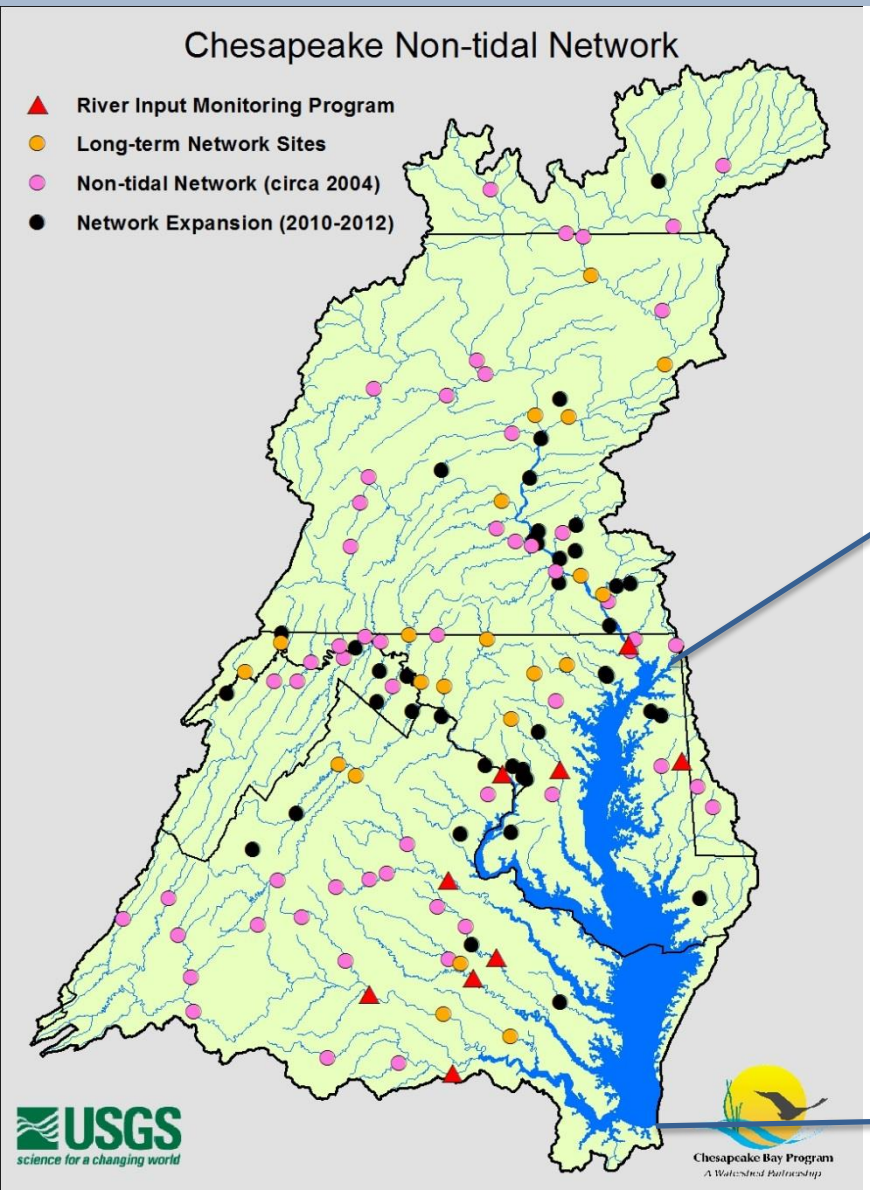
Carry out WIPs

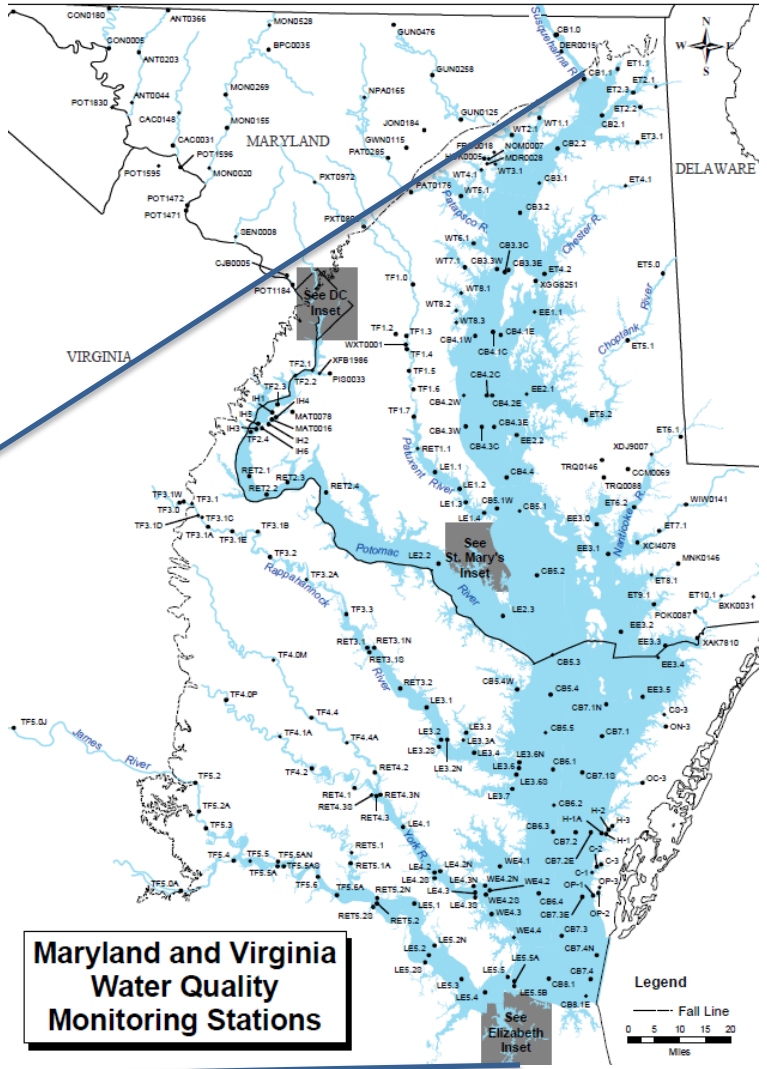
- Water-quality response to practices
  - what, where, why
- 2-year milestones



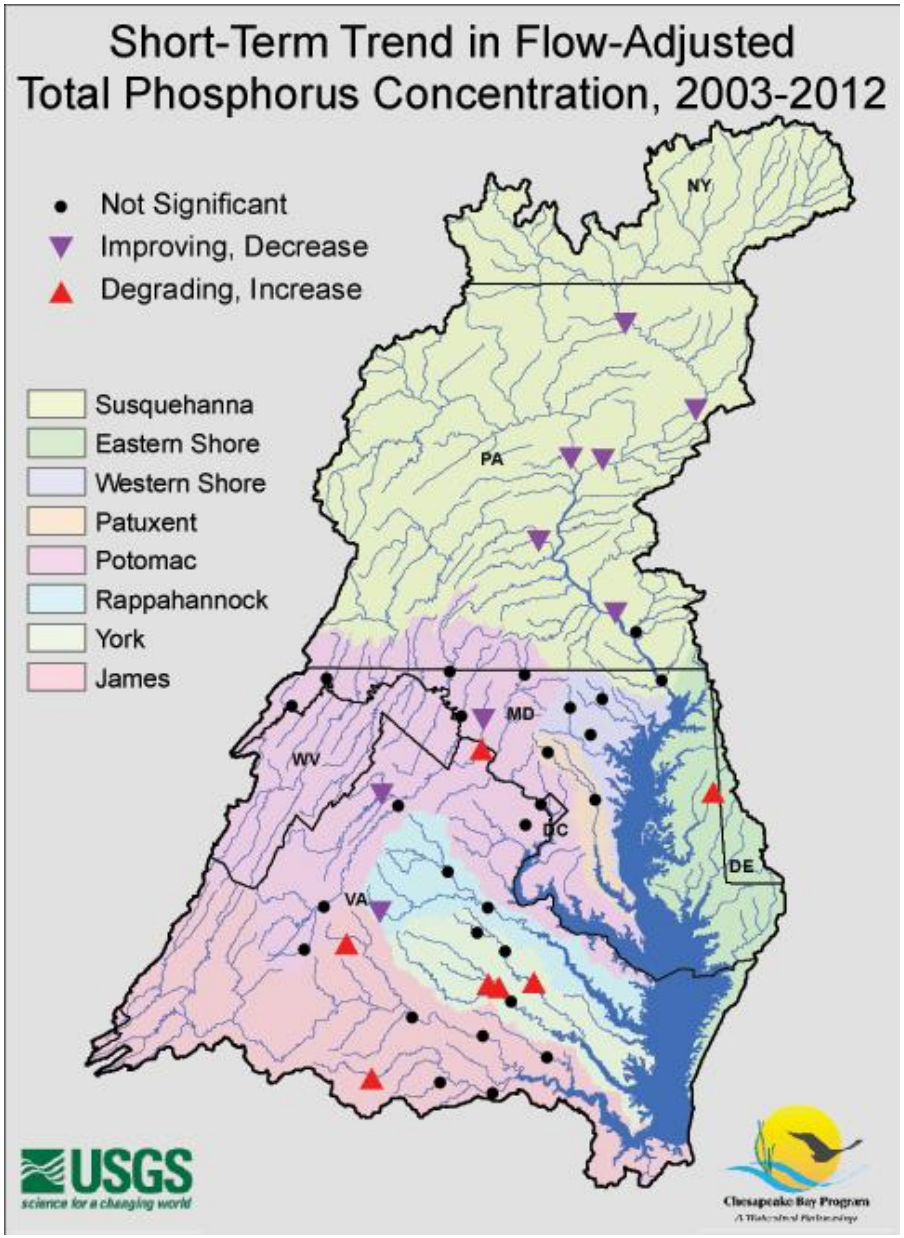
Using Monitoring Data To Measure Progress and Explain Change

Foundation: Monitoring networks

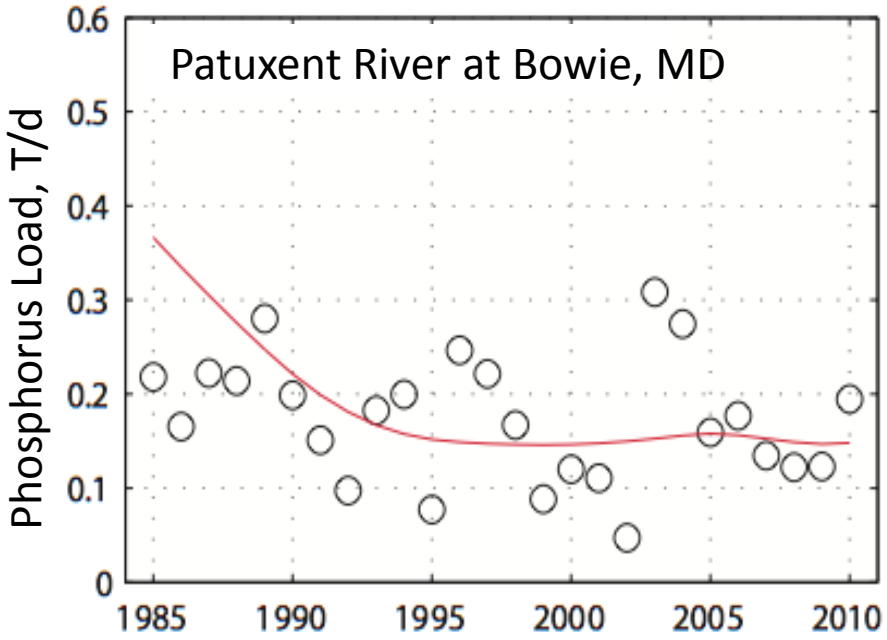




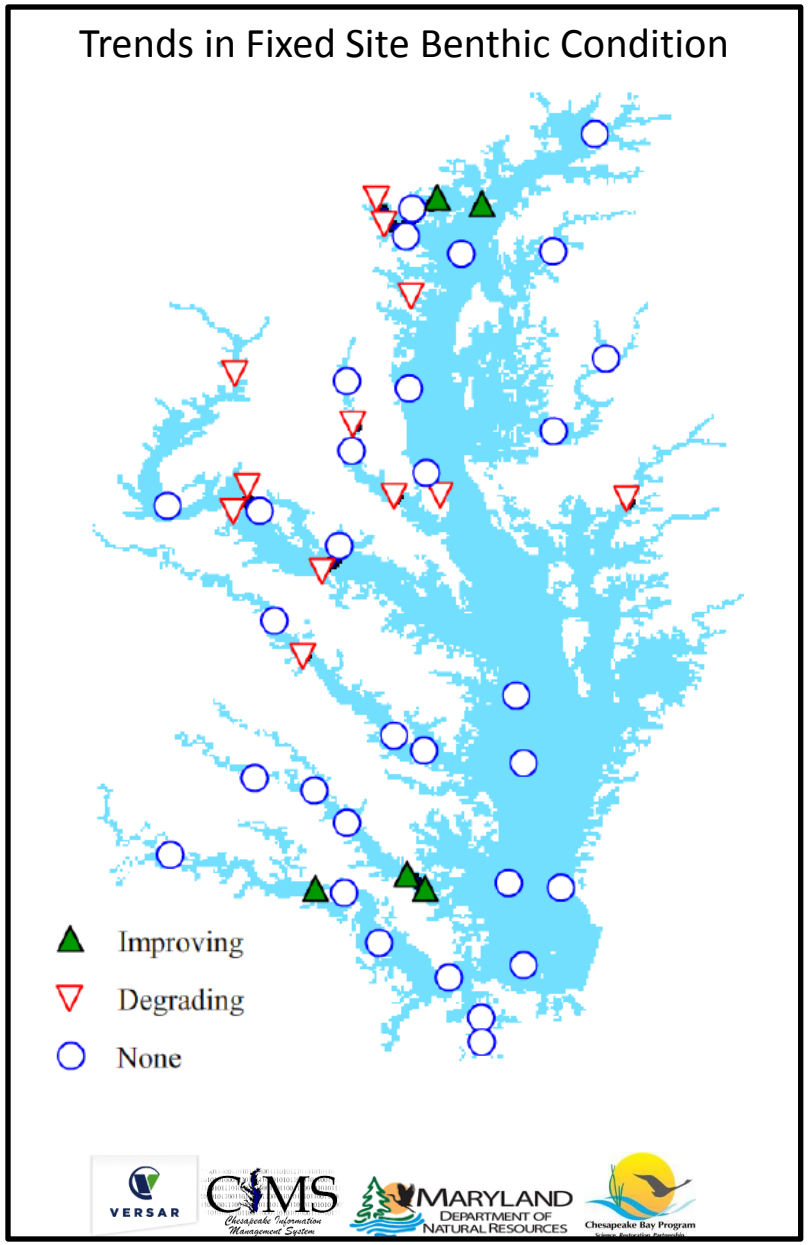
Using Monitoring Data To Measure Progress

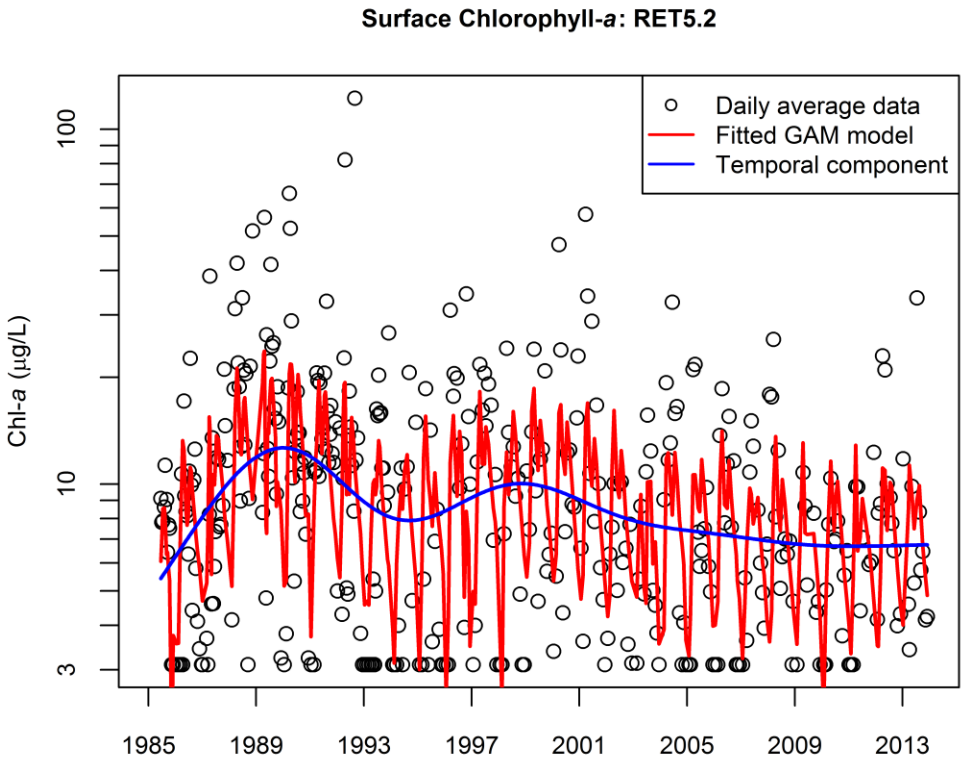


WRTDS Trends
Flow-Normalized Flux
With Annual Flux

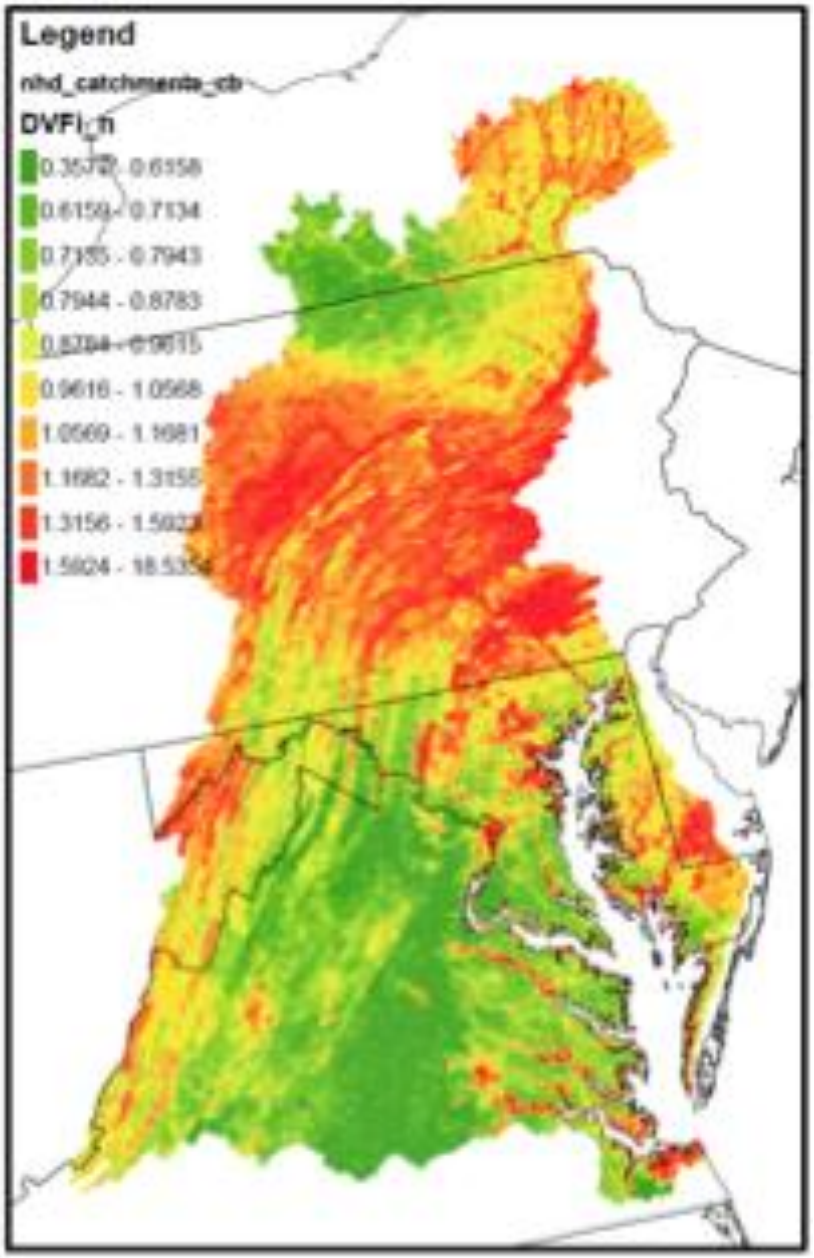


Using Monitoring Data To Measure Progress





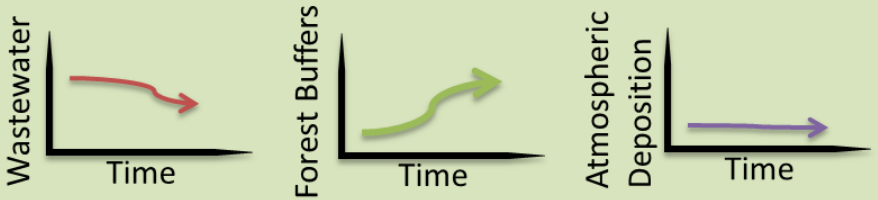
Using Monitoring Data To Enhance CBP Models



- Monitoring data provide the foundation for WSM and WQSTM
- CBP Applications of SPARROW:
  - Land-to-Water Delivery Factors improved WSM delivery factors.
  - Determination of Land use loadings
  - Improvement of In-stream processes.
- Multiple tools are being used to explain trends

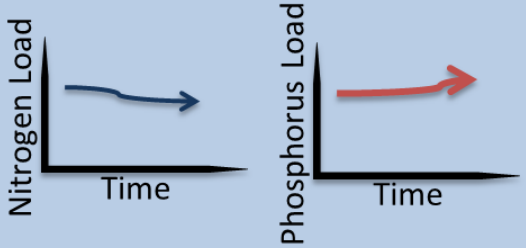
Using Monitoring Data To Explain Changes In Water Quality

Management Actions

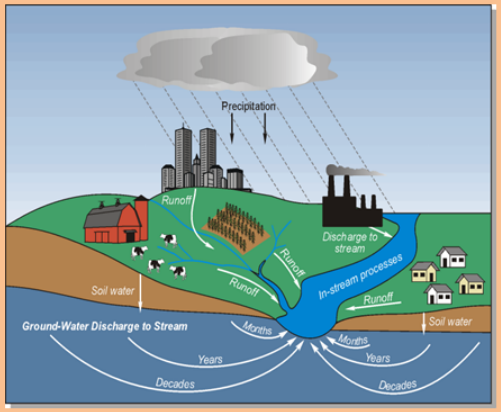


River Loads

WRTDS

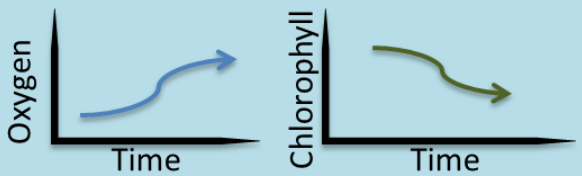


Natural Factors



Bay Water Quality

GAM



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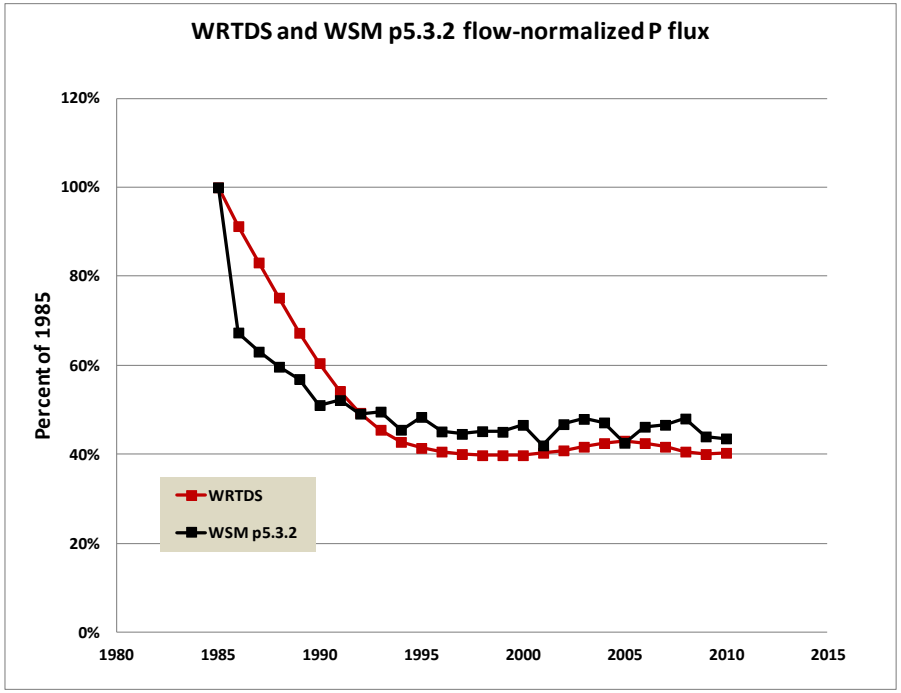
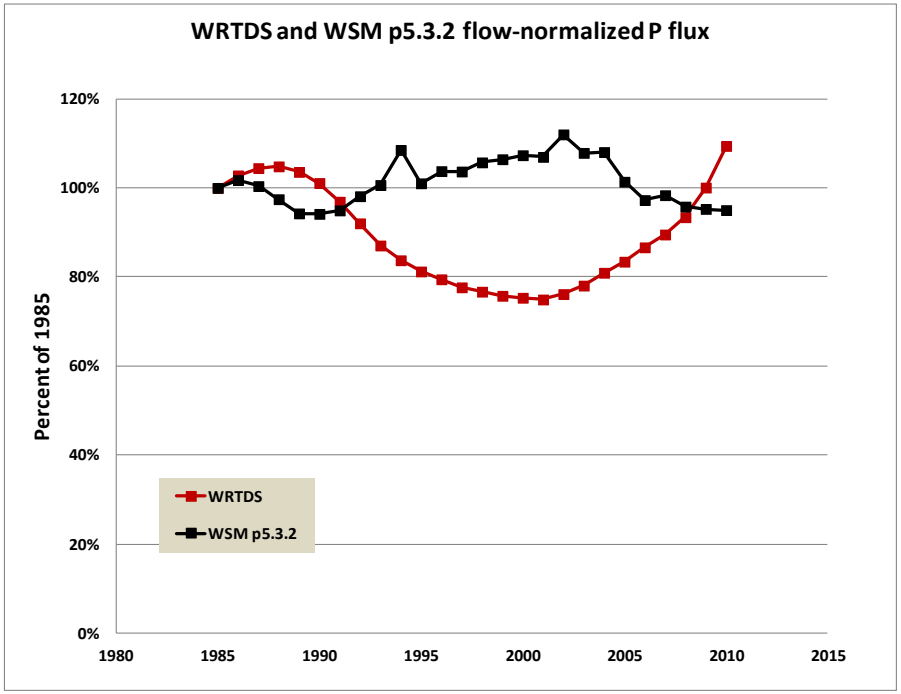
Patuxent



James



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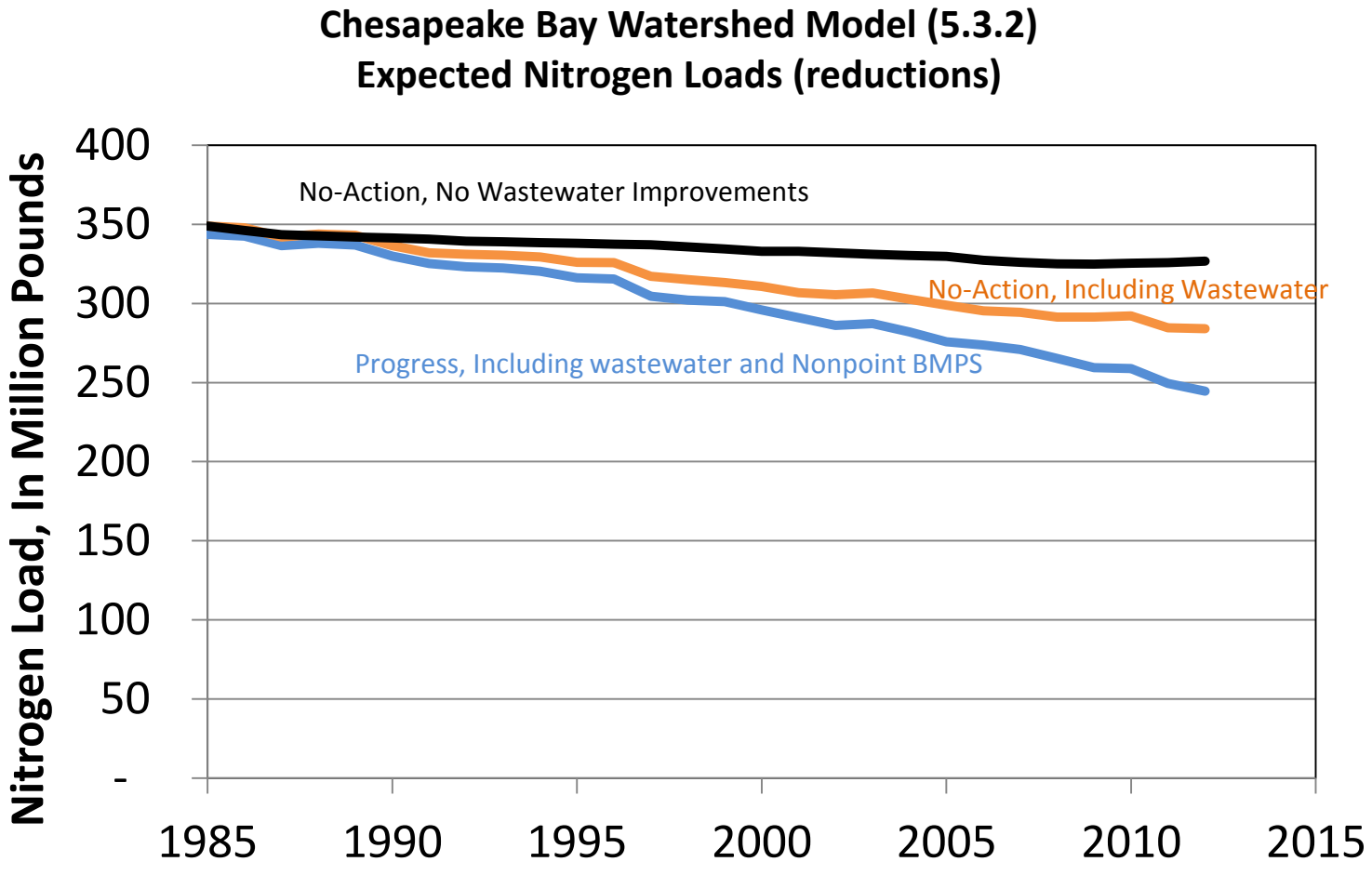

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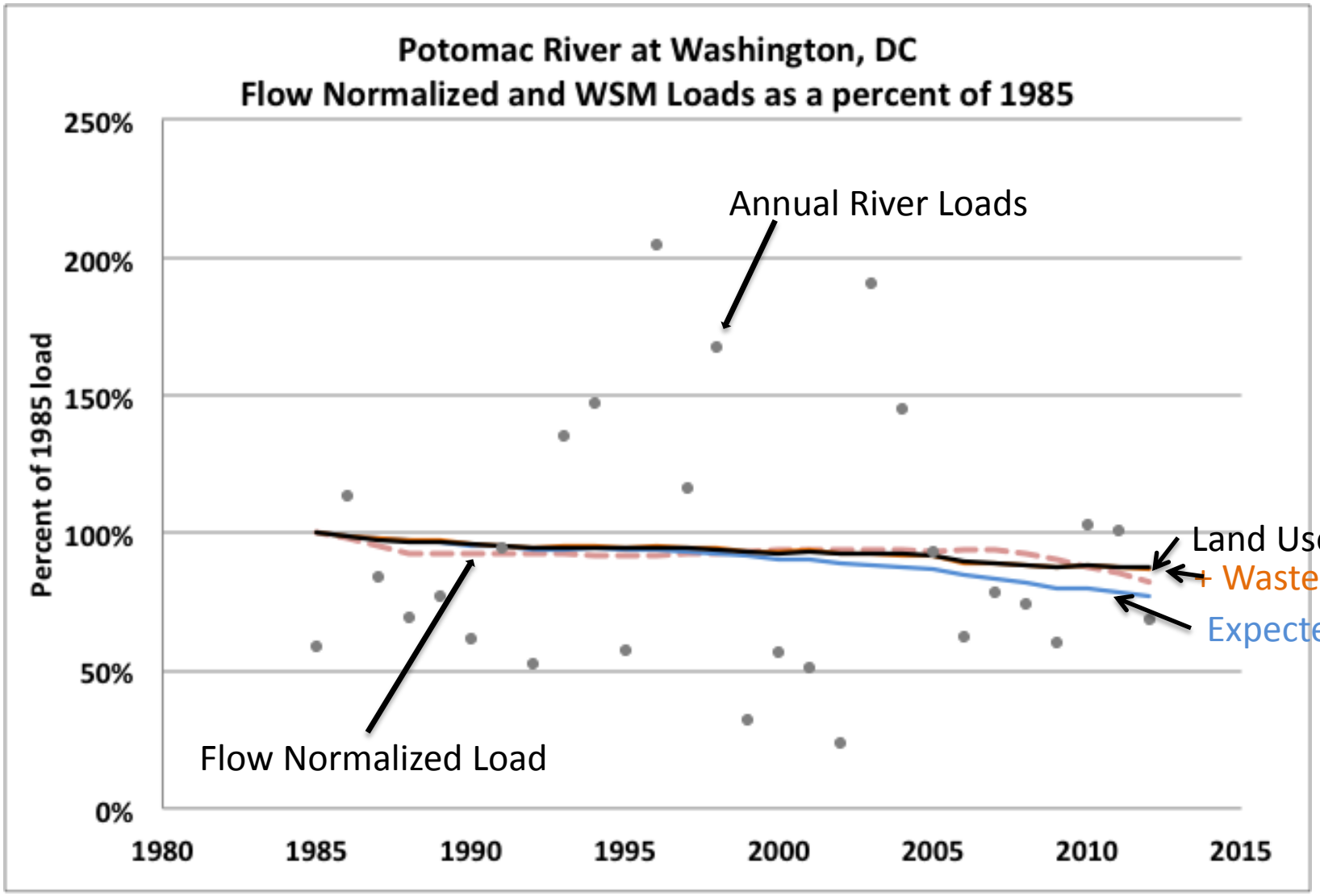
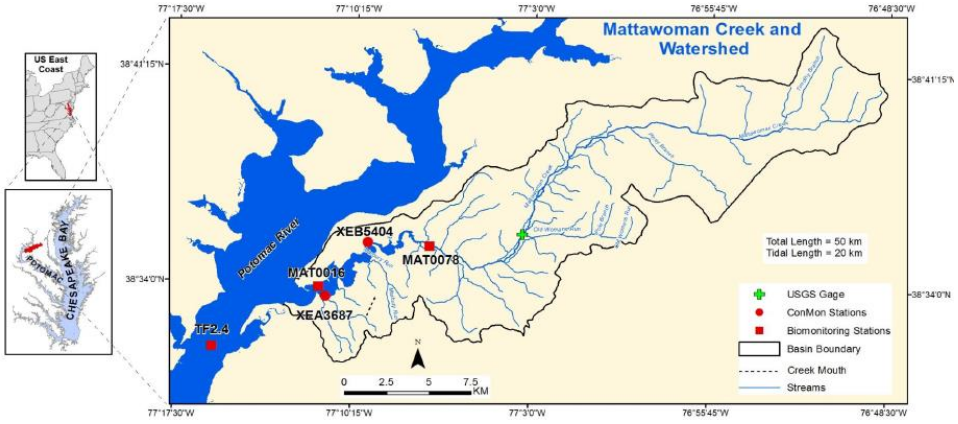
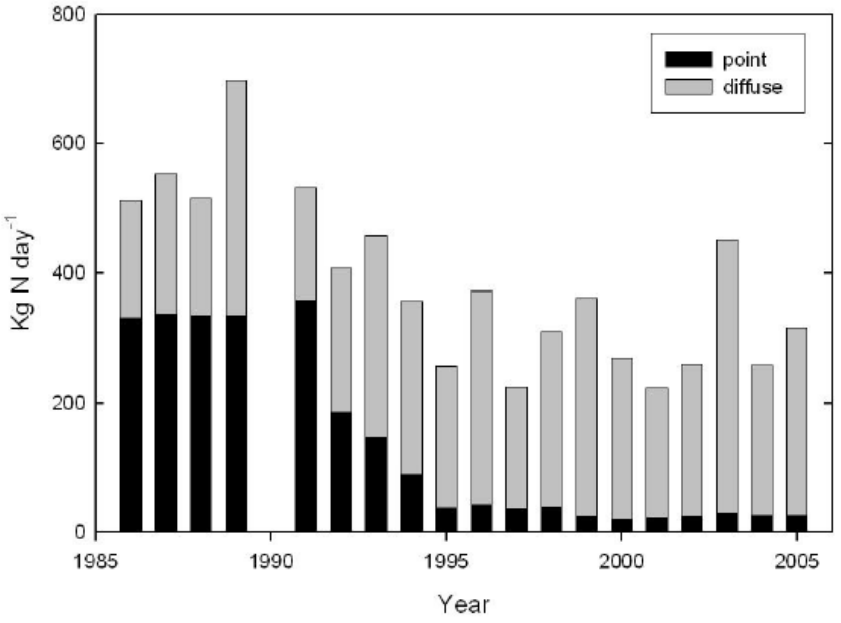


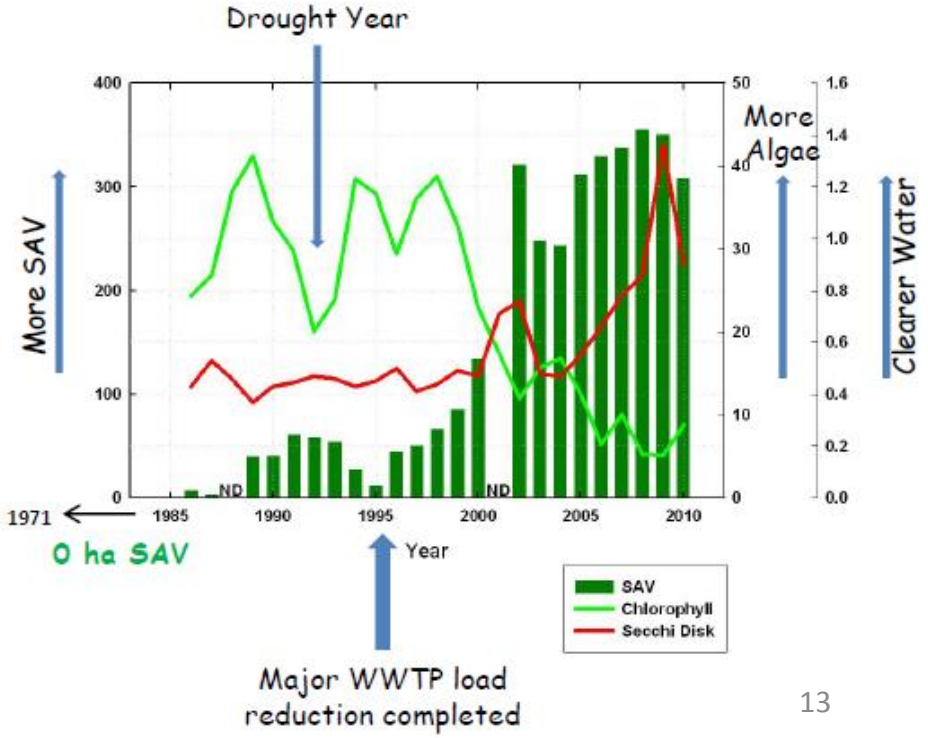
Using Monitoring Data To Explain Changes In Water Quality

Mattawoman Creek (Potomac R. tributary)





Reduced chlorophyll-a concentrations, SAV resurgence, and improving water clarity following WWTP upgrades



Using Monitoring Data To Explain Changes In Water Quality

STAC Workshop: "Management Effects on Water Quality Trends"

Purpose:

- Identify promising technical approaches to advance the science of explaining effects of management actions on water-quality in the watershed and estuary;

- Promote discussion and generate recommendations on analytical approaches and data needed to support them

Outcomes:

- Workshop report in review
- Clear, concise findings and recommendations for collection and distribution of information, an inventory of promising technical approaches to pursue

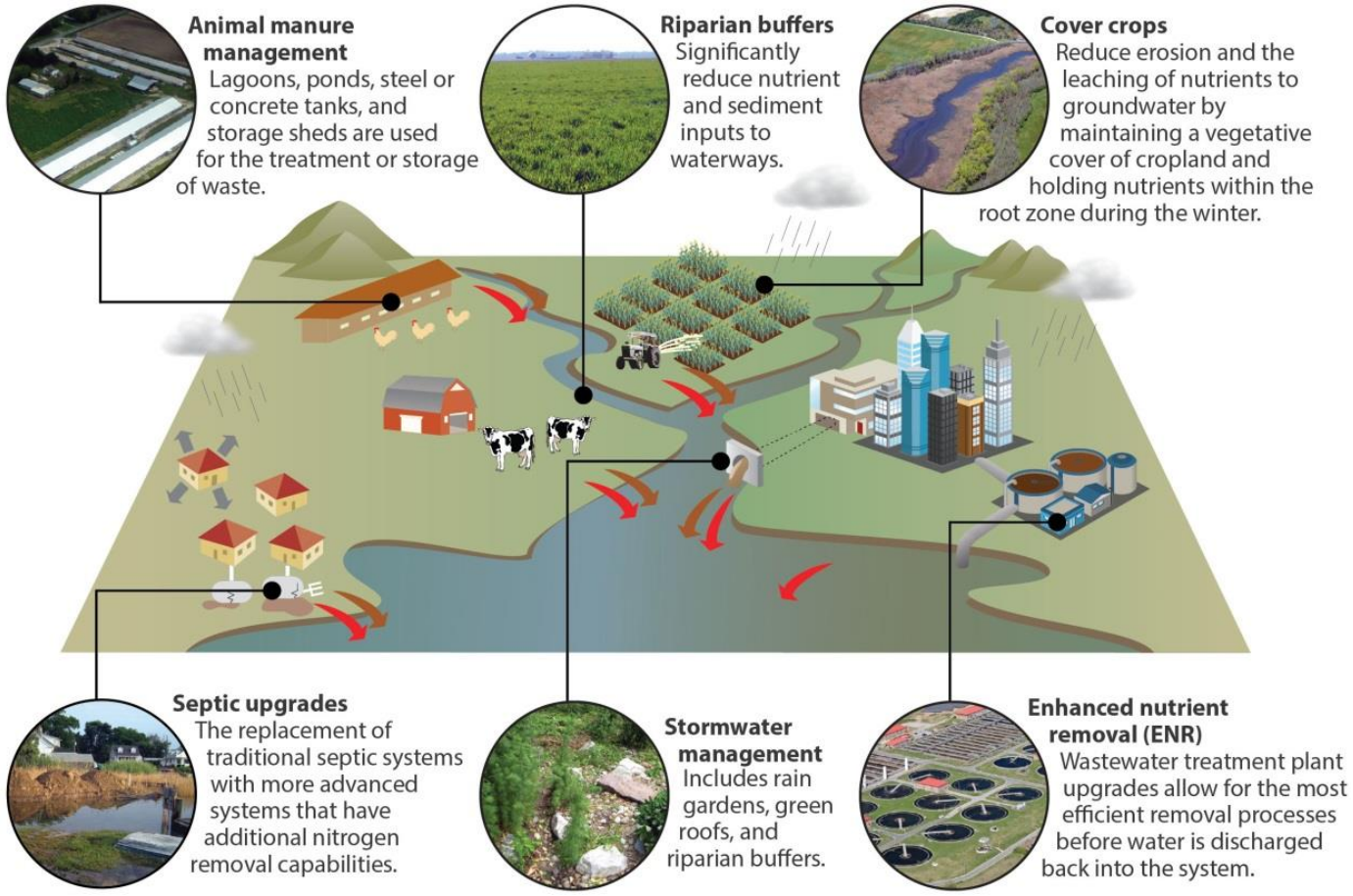
"Energize the academic and federal research communities to conduct collaborative studies using the most promising and feasible of techniques from among those suggested in this report."

Using Monitoring Data To Inform Management Strategies

MPA
- Evaluate Progress
- Enhance Models
- Explain

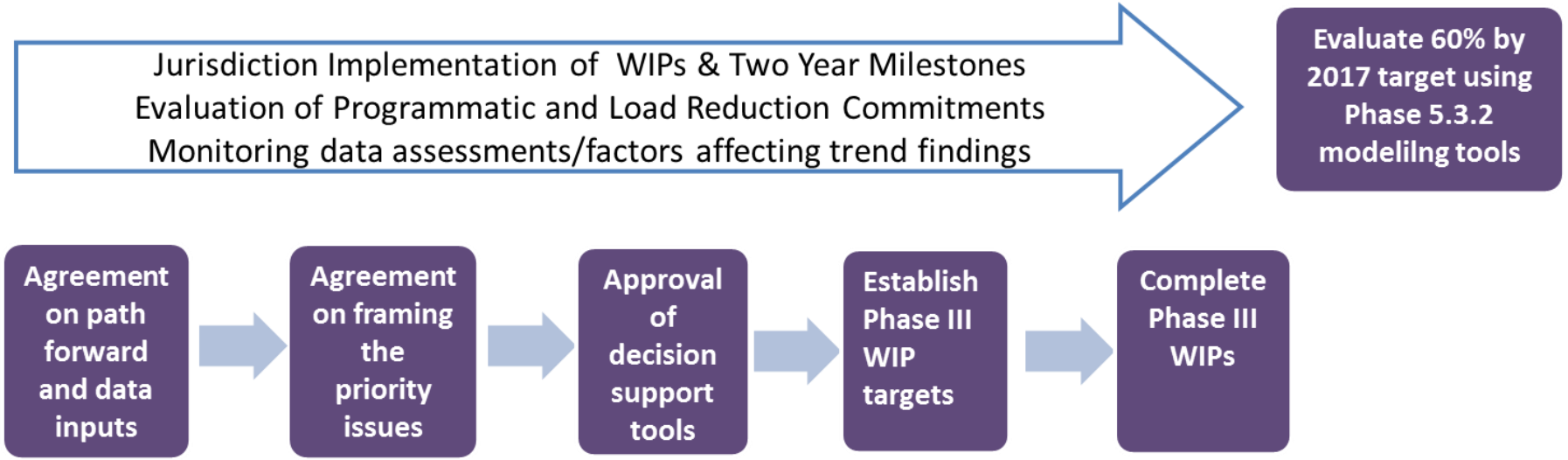
WIPs
- Phase 3 WIPs
- Water-quality response to practices
- 2-year milestones

Effective Interaction
- Adaptive management
- Audiences
- Products
- Types and timing of communication



Inform Management Strategies

Midpoint Assessment Timeline



Measure Change
- Indicators 2015, 2016, 2017….
- GAMs Application 2015, 2016, 2017

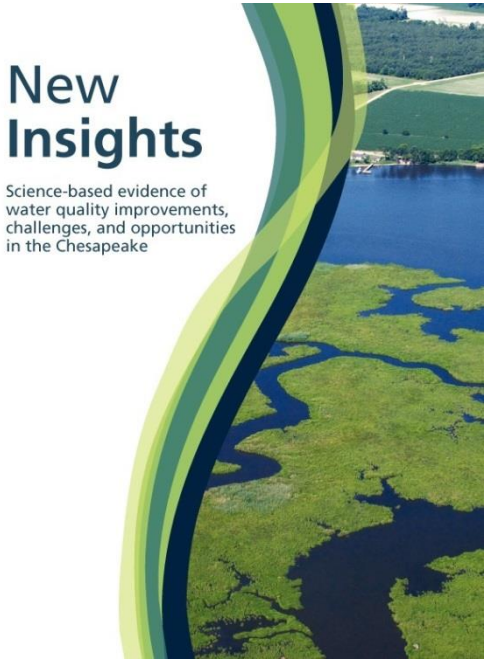
Model Enhancements:
- WSM support 2014, 2015, 2016

Trends Explanations:
- Coastal Plain 2014/15
- Trend Summaries 2016 2017

Using Monitoring Data To Explain Changes In Water Quality

Considerations for explaining trends:

- Integration with tidal trends
- Timing
- Form of products



What will be most useful for you for MPA and WIP-III preparation:

--focus on how water quality responds to WQ practices in specific source sectors?

or

--explain trends in major basins down to the most localized level within those basins?

Additional Questions?

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