

# Innovative Water Quality Monitoring workshop

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# Initial questions: Technology, Sampling design, Efficiencies

1. How can more recent technologies (e.g. fixed continuous monitoring, AUV's, vertical water quality profilers) be better utilized to assess water quality standards attainment of the suite of Chesapeake Bay water quality criteria?
2. Are there monitoring network designs that have, for example, fewer stations that could be sampled more frequently and linked with "intelligent interpolation" to improve water quality standards attainment assessments?
3. What approaches could be used to foster greater monitoring efficiencies to improve the information acquired and improved certainty in estimates of attainment relative to the cost of the sampling effort?

# Brainstorming and voting on priorities for developing innovative monitoring



# Voting results clearly identified Rich Batiuk as solution to all monitoring needs



# Dynamic tension in monitoring goals between resource managers and environmental scientists

## Resource managers

“How are we doing?”

“Give me a number  
& define uncertainty”

Adaptive management:  
Management action  
effectiveness

Reallocate \$

Local impacts

## Environmental scientists

“How does it work?”

“It depends . . .”

Maintain longevity &  
continuity

Add \$

Global process understanding  
‘unknown unknowns’

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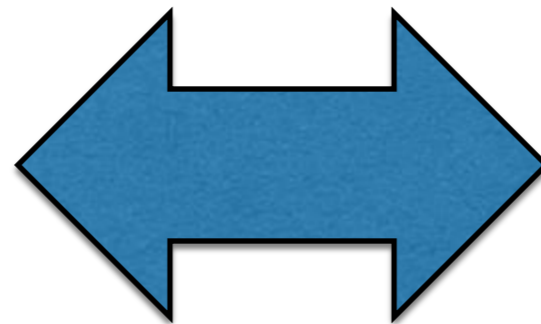
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# Dynamic tension in monitoring goals between resource managers and environmental scientists

Resource managers

Environmental scientists

Desire for a better Chesapeake Bay

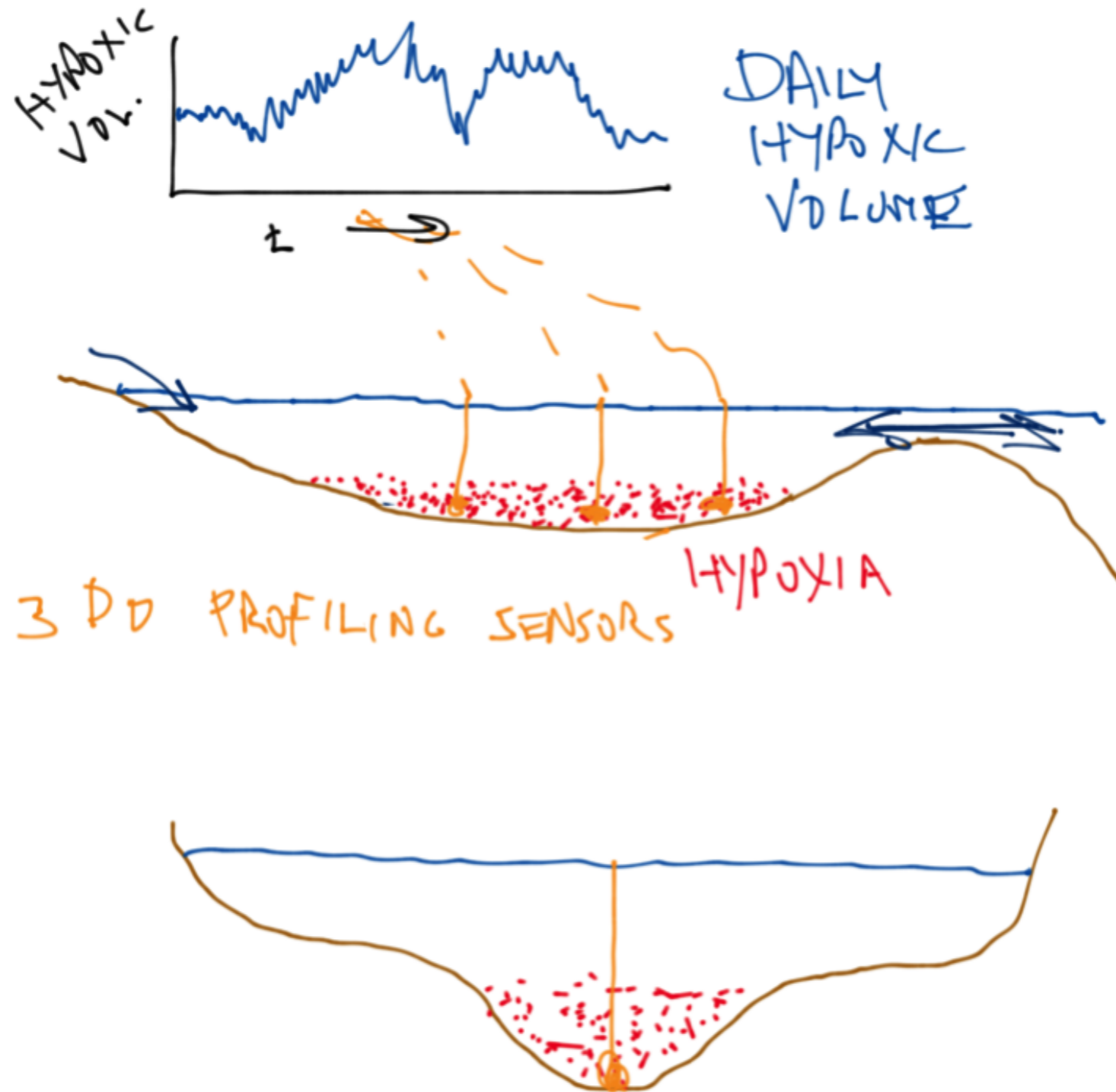
Become the premier restoration project in the world

Cost effective

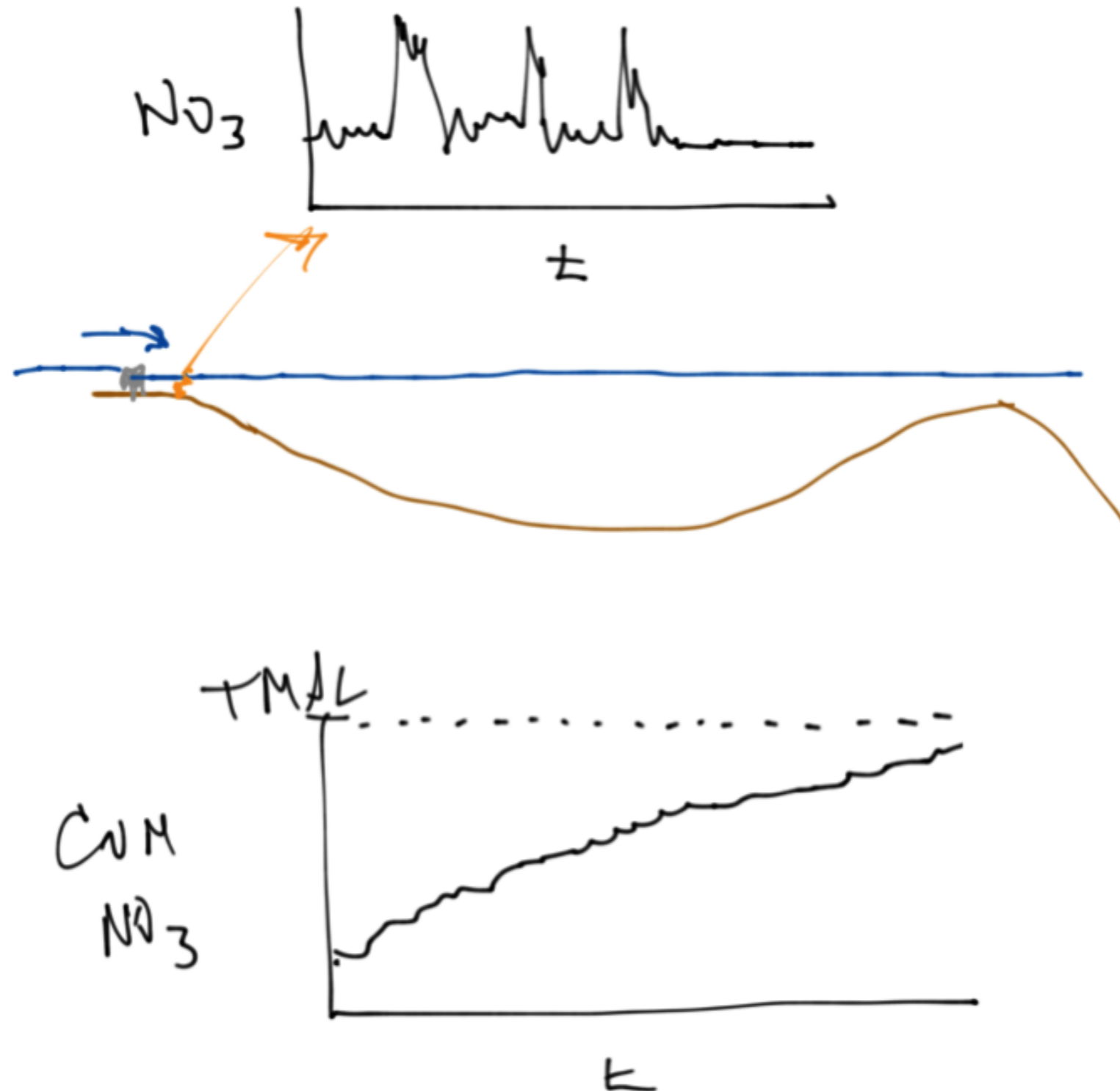
Reduce uncertainties

Robust approaches

# Creating a new monitoring vision: Mainstem hypoxia



# Creating a new monitoring vision: Nitrate inputs



# Monitor smarter, not more

Develop better understanding AND better tracking

Select sentinel sites for continuity and longevity

Use models to prioritize sentinel sites

Monitoring data visualizations are key

Ramp up new technologies with overlap to ensure continuity

# Reformulated questions & recommendations: Technology

**Which current or emerging technologies are most cost-effective and robust for evolving criteria assessment for the CBP?**

**Recommendation** – Incorporate emerging technologies into the overall monitoring effort in order to positively redirect resources for a more comprehensive effort

- 1) Useful
- 2) Cost-Effective

-Note, we need to develop methods for interpreting data brought in by new technology

# Reformulated questions & recommendations: Sampling design

**How can we design a monitoring network to assess WQ standards attainment?**

**Recommendation:** Use simulation modeling and interpolation modeling techniques to develop a targeted monitoring program that measures the WQ response to management actions and environmental stressors.

- Provide cost-effective solutions
- Address management priorities
- Reduce uncertainties

# Reformulated questions & recommendations: Efficiency

**How do we ensure that management needs are being met while maintaining sufficient confidence levels in the monitoring program?**

**Recommendation:** A monitoring user-council (monitoring providers, resource managers, citizen science representatives, and the scientific community) which regularly liaise with the monitoring team needs to be established by the management board in order to create and maintain a productive dialogue.