Responding to the PSC Request to Improve the CBP Monitoring Networks- Update

Peter Tango Breck Sullivan, Scott Phillips, Lee McDonnell & Denice Wardrop

Chesapeake Bay Program

HGIT Meeting

November 10, 2021
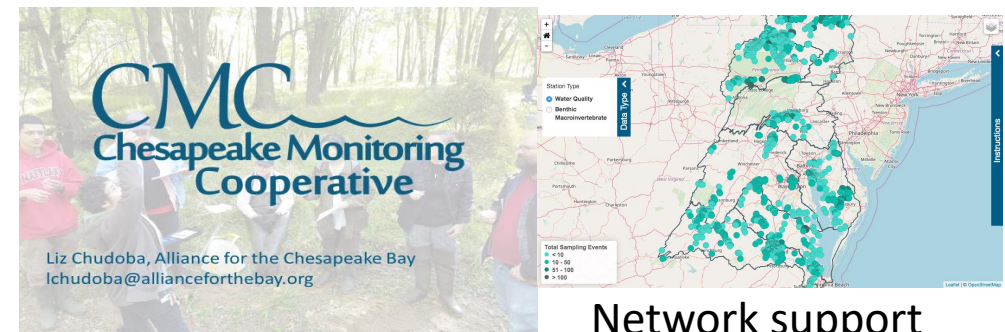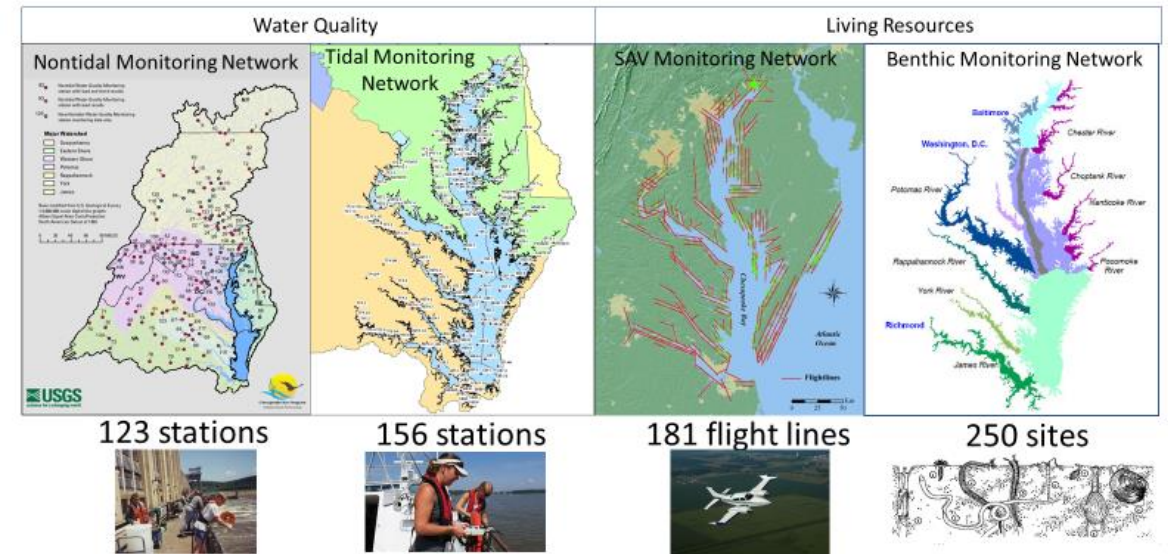
Feedback Needed from the PSC in November

- How recommendations to the PSC for monitoring support are best presented so that they are actionable
- Scope of report that will be delivered

- Outline for today:
  - Quick introduction
  - Some preliminary findings
  - Potential format for recommendations
  - Scope of report
  - Feedback

REMINDER: Monitoring Presentation to the Principal Staff Committee

- Lee McDonnell provided monitoring presentation on March 2

- Help them better understand CBP budget and funding for monitoring

- CBP networks:
  - Tidal water quality
  - Nontidal nutrients and sediment
  - SAV
  - Tidal Benthic organisms
  - Citizen Monitoring

- Current Funding:
  - CBP $5M and partners >$7M

CBP Partnership Monitoring Networks: Annual Monitoring

Water Quality		Living Resources	
Nontidal Monitoring Network	Tidal Monitoring Network	SAV Monitoring Network	Benthic Monitoring Network
123 stations	156 stations	181 flight lines	250 sites

CMC Chesapeake Monitoring Cooperative

Liz Chudoba, Alliance for the Chesapeake Bay
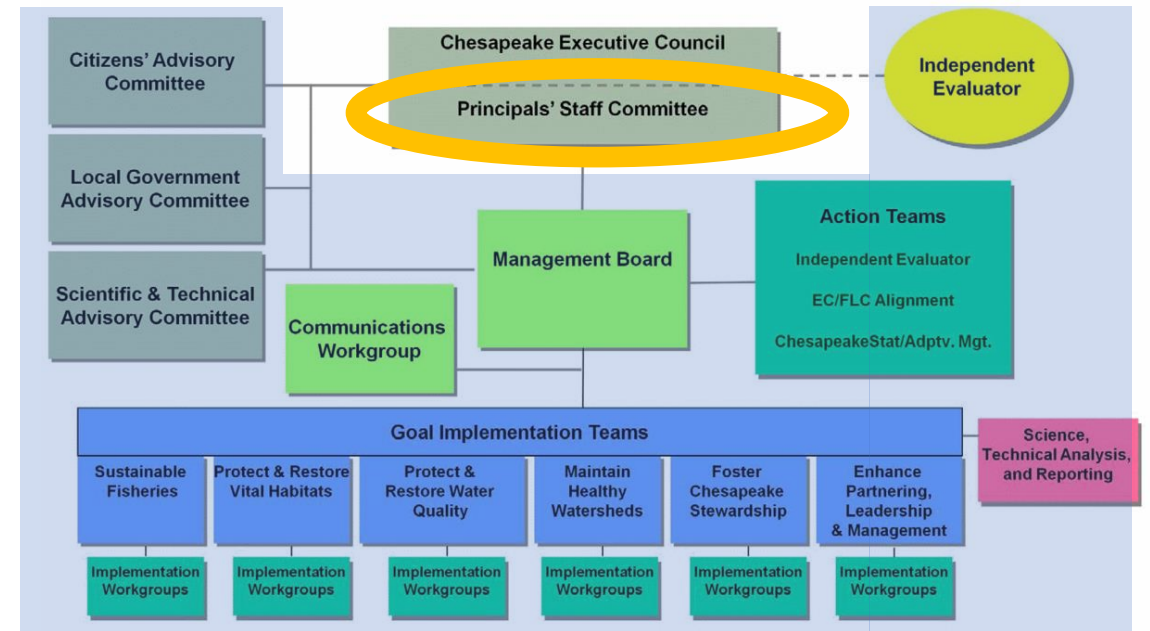lchudoba@allianceforthebay.org

Network support

Addressing the Principal Staff Committee Request

- Provide information needed to improve CBP monitoring networks, including:
  - (1) Current status and threats to the networks,
  - (2) what is needed to improve the monitoring sustainability, and
  - (3) what is already available to address monitoring and assessment capacity shortfalls.
  - (4) Opportunities for CBP networks to address multiple outcomes

- STAR will Coordinate Response
  - Work plan shared with PSC June 2021
  - Deliver network assessment and recommendations by January (FEBRUARY) 2022

CBP Organizational Structure and Leadership 09-20-10

Citizens' Advisory Committee

Local Government Advisory Committee

Scientific & Technical Advisory Committee

Chesapeake Executive Council

Principals' Staff Committee

Independent Evaluator

Communications Workgroup

Management Board

Action Teams

Independent Evaluator

EC/FLC Alignment

ChesapeakeStat/Adptv. Mgt.

Goal Implementation Teams

Sustainable Fisheries | Protect & Restore Vital Habitats | Protect & Restore Water Quality | Maintain Healthy Watersheds | Foster Chesapeake Stewardship | Enhance Partnering, Leadership & Management

Science, Technical Analysis, and Reporting

Implementation Workgroups | Implementation Workgroups | Implementation Workgroups | Implementation Workgroups | Implementation Workgroups | Implementation Workgroups

Process

9 months start to finish

8 questions to answer

Provide a short synthesis to address the questions, vision going forward.

Teams/Groups	April 2021	May	June	July	Aug	Sept	Oct	Nov	Dec	2022
	General path of recommendations development for PSC: 9 months									Winter
NTN							**In Progress**			Consolidate recommendations, financials for PSC Presentation
CAP WG with DIWG										
Hypoxia Collaborative	**SPRING** Status and vulnerabilities of existing network			**SUMMER** Innovation Assessment, Financials of Sustaining networks			**FALL** Innovation Assessment continues, Evaluate limitations, Financials for adopting innovations, recommendations			
Cit Sci										
Fish Forage/Black Duck/117e grants	✓			✓						
Fish Habitat										
SAV							**In Progress**			
4-D Interpolator										
STAC Workshop	✓	✓	✓	Planning ... ase	✓	*In Progress too*	Early Themed Workshop meetings			Continue
STAR/WQGIT updates	✓	✓	✓	✓		Input from all GITs	Presentation prep STAC Workshop panels, meeting support as targeted		Early PSC material PPT and review	
PSC Presentation										★
STAC input				In progress: STAR presents at STAC						

Tidal Water Quality

Issue

- We are not assessing all applicable water quality criteria *for any segment* in the Bay
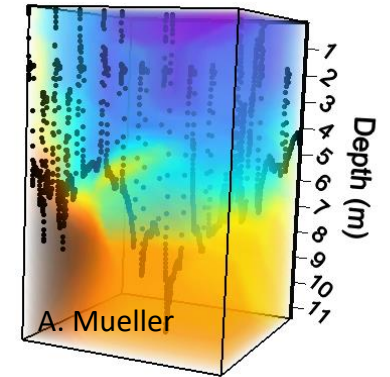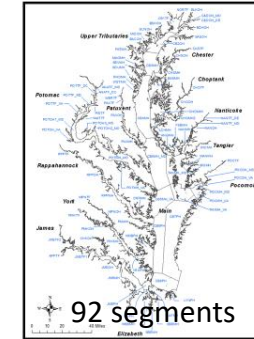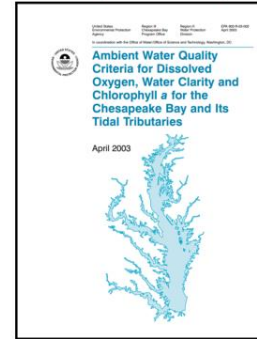
Gaps and opportunities

- **Unmet need:** effect of inflation on level funding for long-term water quality monitoring program support
- **Innovation**. Vertical sensor arrays to collect high frequency dissolved oxygen, salinity and temperature data.
- **Innovation.** Expanded use of Community Science data
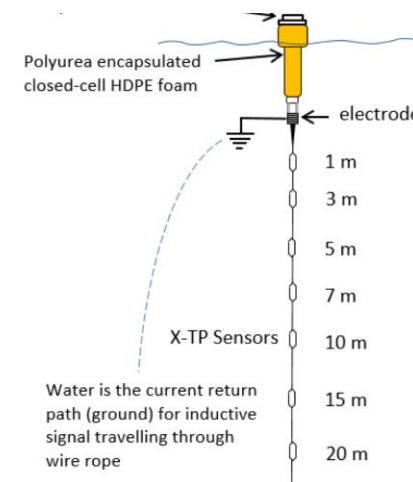- **Innovation**. 4-dimensional water quality interpolator

Application

- Provide jurisdictions with the data necessary to fully assess all applicable water quality criteria in bay segments that reflect fish and shellfish habitat needs for their survival, growth and reproduction
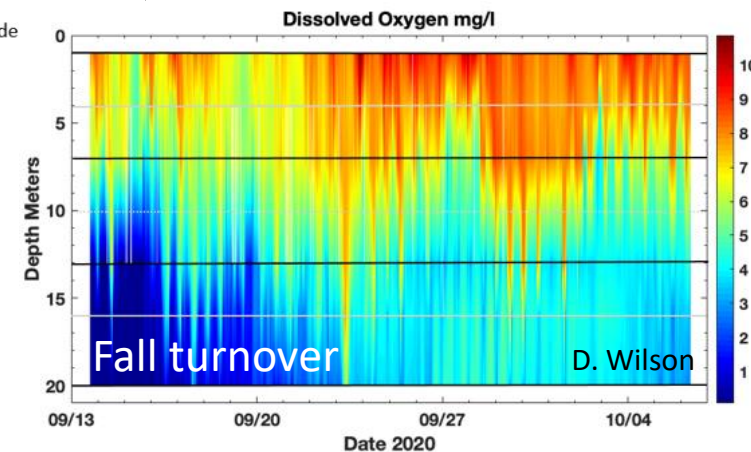- Support bay models for calibration and verification

Chesapeake Bay Water Quality Standards

Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for the Chesapeake Bay and Its Tidal Tributaries

April 2003

92 segments

A. Mueller

New water quality interpolator

Polyurea encapsulated closed-cell HDPE foam

electrode

1 m
3 m
5 m
7 m

X-TP Sensors 10 m
15 m
20 m

Water is the current return path (ground) for inductive signal travelling through wire rope

Vertical sensor array

Dissolved Oxygen mg/l

Fall turnover

D. Wilson

Date 2020

High temporal frequency water quality profile data

Watershed Water Quality

Issue

- Annual threats to station loss threaten the integrity of the Nontidal Network

- Under-represented geography in assessment, i.e., Coastal Plain
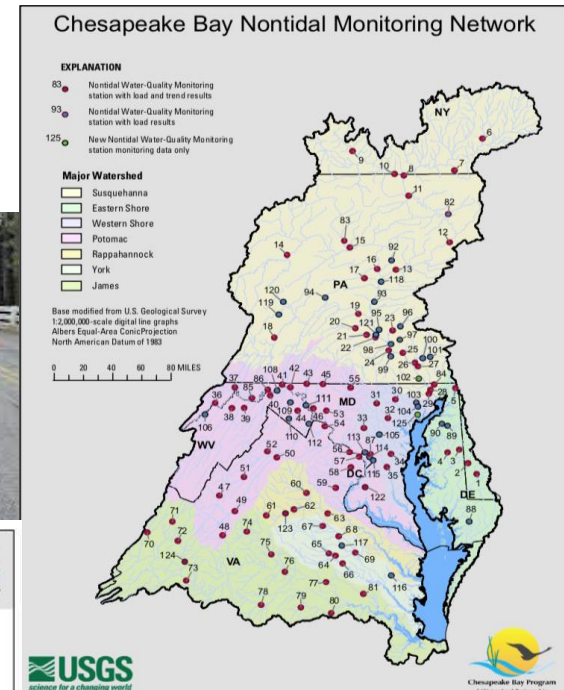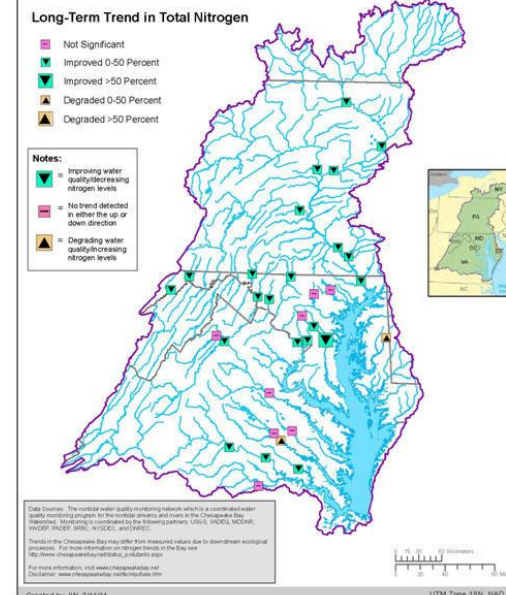
Gaps and opportunities

- **Unmet need**. Sustain existing long-term water quality monitoring program support

- **Unmet need**. Geographic representation of stations

- **Innovation**. Continuous monitoring sensors to collect high frequency water quality data reducing uncertainty in the assessments

Application

- Provide jurisdictions with locally and regionally relevant loads and trends assessing progress from management actions

- Provide models with high integrity, high resolution calibration and verification data.

Tidal Benthic Macroinvertebrates

Issue

- Summer sampling season is a key living resource assessment supporting Aquatic Life Use in the Water Quality Standards.
  - Benthic macroinvertebrates are fish forage.

Gaps and opportunities

- **Unmet need.** Sustain existing long-term water quality monitoring program support

Application

- Aquatic Life Use assessment
- Gold standard of support to creating water quality criteria
- Fish food is essential to estuary productivity and health
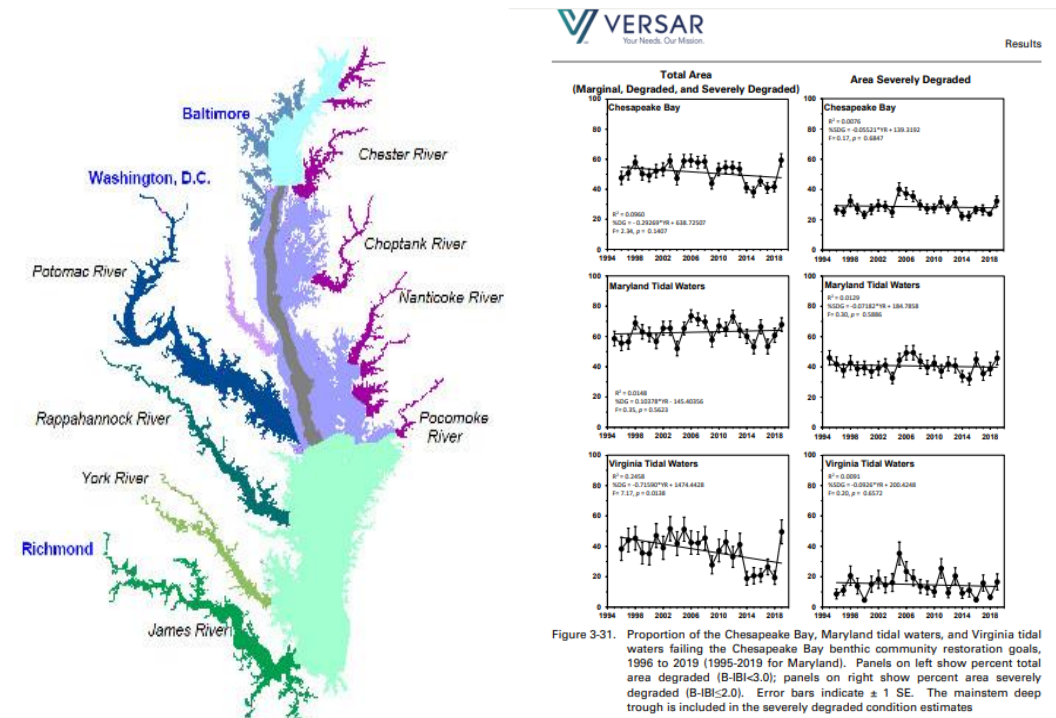
Benthic macroinvertebrate sampling regions and the Bay, MD and VA specific results 1995-2019
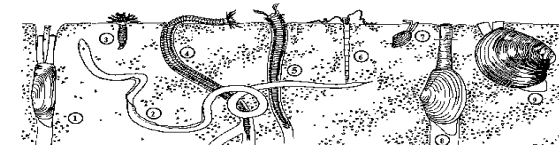
Submerged Aquatic Vegetation

Issue

- Rising annual contractor costs

- Expanding air space restrictions and changing climate patterns are making it more difficult to collect imagery from planes.

- Satellite imagery options, and image access and evaluation protocols for the Bay are still evolving.

Gaps and opportunities

- **Unmet need**. Sustain long-term SAV monitoring program support

- **Innovation**. Hi-res satellite image assessment offers a potentially cost-effective monitoring option (i.e., free imagery)

- **Innovation**. Artificial Intelligent (AI)/machine-learning algorithms to enhance image processing efficiency

Application

- Intra-annual imagery can provide uncertainty estimates on water quality criteria assessment, seasonal change tracking

- Provide models with high integrity calibration and verification data

- Provide biomass and carbon sequestration estimates for carbon budgeting and the Blue Carbon Market (restoration financing potential)
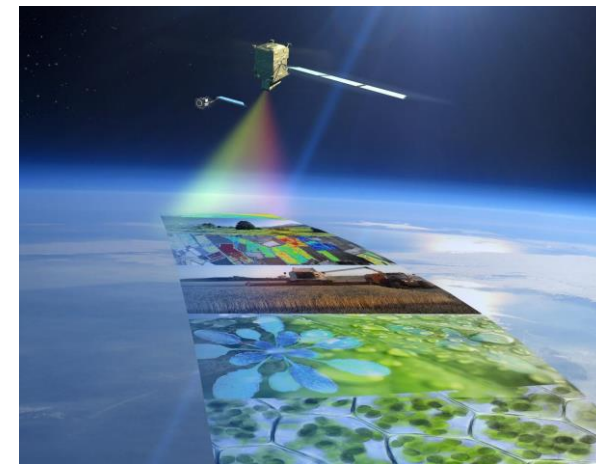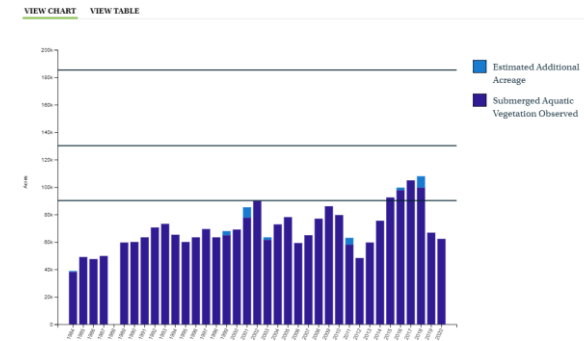
SAV Annual Survey results on Chesapeake Progress
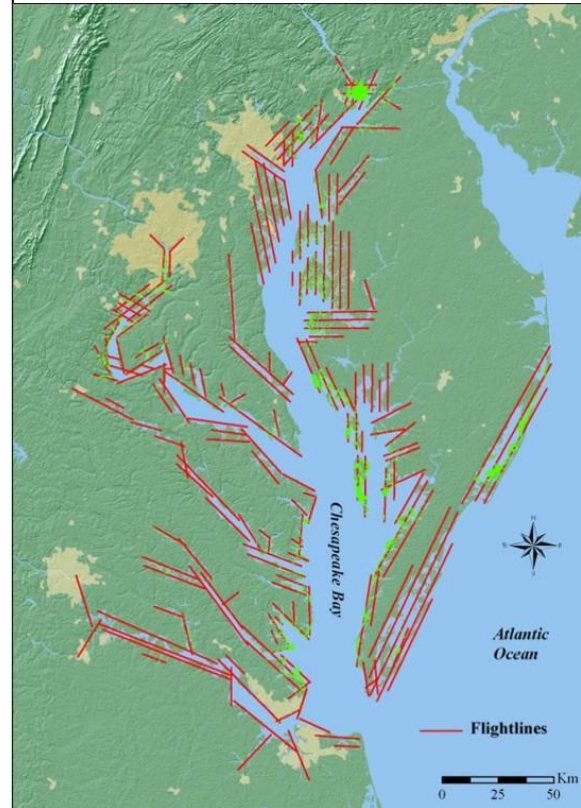
SAV Annual Survey transects

Satellite survey techniques are improving for eventual use as satellite data becomes more widely and publicly available

Community Science

Liz Chudoba, Alliance for the Chesapeake Bay
lchudoba@allianceforthebay.org

Issue

- Growing support for key monitoring programs

Gaps and opportunities

- **Unmet need**. Expanding monitoring group equipment availability

Application

- Improved spatial representation of water quality conditions for water quality standards attainment

- Provide models with high integrity, high resolution calibration and verification data.

- Fill gaps in Stream Health data needs (stream bug sampling and analysis support)
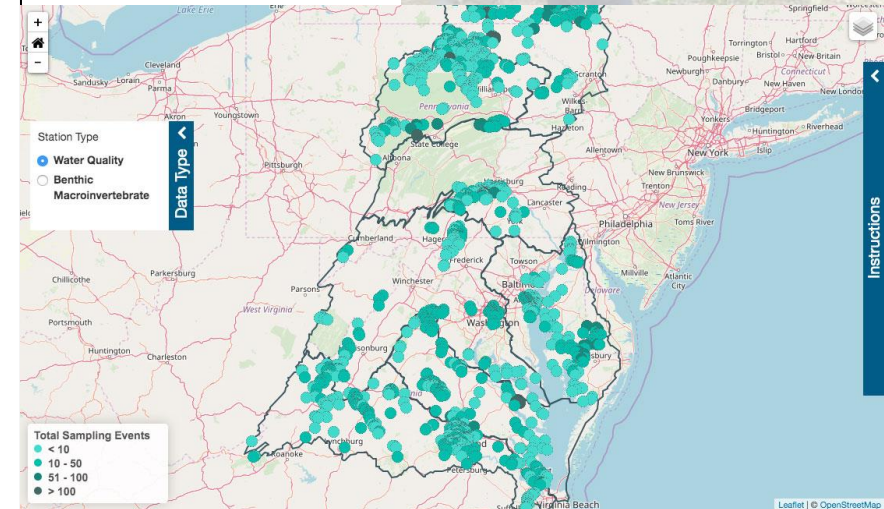
Opportunities for CBP networks to address multiple outcomes

Issue

- Indicator assessment needs

- BMP effectiveness assessment needs

- Living resource response to management actions

- Information being gathered for selected goals and outcomes

Gaps and opportunities

- **Unmet need**. Address monitoring needs for multiple outcomes

- Innovation: Enhance existing networks to address selected monitoring needs
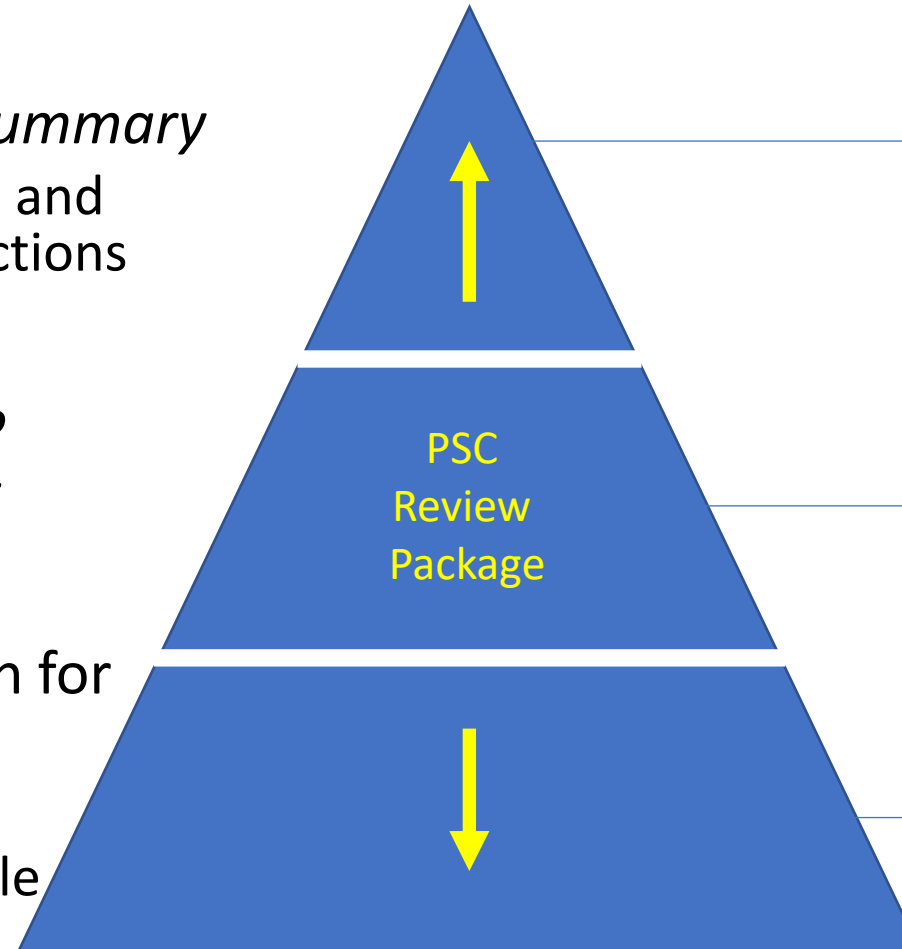
Application (Examples)

- Improve understanding in SAV, water quality, living resource responses to climate change and management actions

- Understand SAV, fish, wildlife habitat requirements

- Response to PCB mitigation actions

CHESAPEAKE
WATERSHED
AGREEMENT

2 0 1 4

Tiered Communications

- **Section 1**: *Prospectus – Overall Summary*
  - Recommendations on strategies and resources needed for data collections

- **Section 2**: *Summary for each CBP network: Gaps and Opportunities*

- **Section 3**: Supporting information for each CBP network
  - More details for each network
  - Opportunities to address multiple outcomes

Level of information for addressing multiple outcomes

1) Table of Monitoring Needs – the most general

2) Goal statement of monitoring needs – 3-4 sentences. Application, details coming soon.

3) Detailed data need (what, where, when, how, why) with background and costs

How Habitat Goal Team can help

Give us input on which outcomes you want reflected in these:

1) Table of Monitoring Needs – the most general

2) Goal statement of monitoring needs – 3-4 sentences. Application, details coming soon.

3) Detailed data need (what, where, when, how, why) with background and costs

CBP Partnership Monitoring Networks: Annual Monitoring

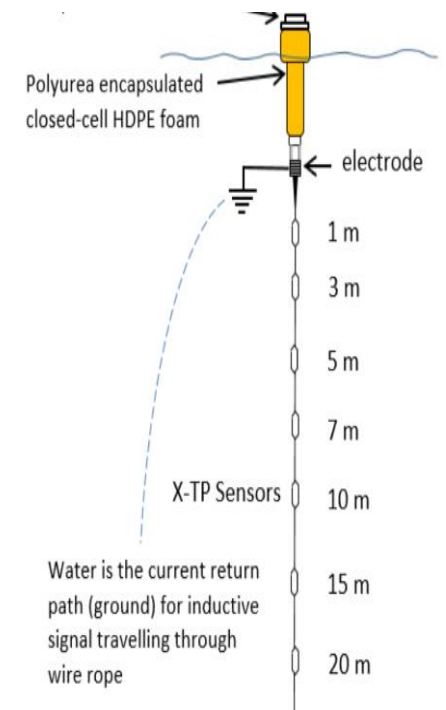123 stations   156 stations   181 flight lines   250 sites

Thank you!

Q&A

Chesapeake Bay Program
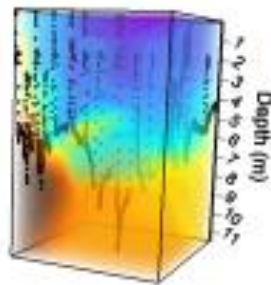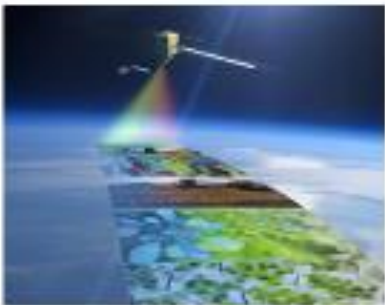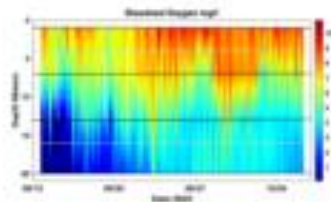
Example of detailed preparation supporting monitoring need: Translate concept to $$$

- Estimated budget for future deployments:
- Instruments $5000 each, delivered and calibrated.
- Buoy $7000 with controller and cable
- Mooring anchor/chain $600
- Prep by CWLLC, including testing and build $4000
- Deployment / Recovery / Maintenance per trip, incl. vessel cost, CWLLC $2000 each
- Data management $1000
- For a 6-instrument deployment and recovery, approximate cost would be around $47K.
- From a power standpoint, batteries will last an entire hypoxia season (estimated 8 months).
- One may want to budget one cleaning trip, totaling under $50K. One might also consider a spare instrument

Polyurea encapsulated closed-cell HDPE foam

← electrode

1 m

3 m

5 m

7 m

X-TP Sensors   10 m

Water is the current return path (ground) for inductive signal travelling through wire rope

15 m

20 m

See CBT website for full report: https://cbtrust.org/wp-content/uploads/16793_Caribbean-Wind_Final-Report_Jan2021.pdf

Monitoring gaps, options and innovations

CBP Network	Gaps	Options & Innovations
Tidal Network	Sustain existing networks Shallow water Open water high frequency	4D interpolator Community Science and Sensor arrays Vertical arrays
Nontidal Network	Continuous monitoring key loads Coastal Plain stations	Strategic investment of new resources
SAV	Intra-annual uncertainty assessments	Repeated satellite imagery, Community Science protocols
Benthic	None	COLA support needed
Community Science	None	Strategic expansion under discussion

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Network support