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

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Chesapeake Bay Program

DIWG

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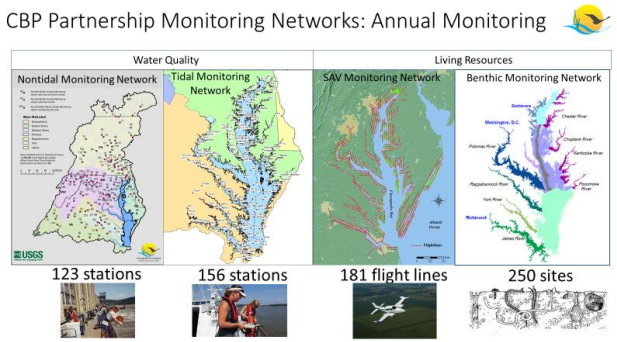
Why are we here?

- Preview of the upcoming Report and PSC presentation
  - Requested by the PSC about how to improve the CBP Monitoring Networks.

What are we asking for?

- Identify Opportunities to Address Monitoring Needs
  - Federal and state agencies identify monitoring items they could support
  - Have discussions with CBP monitoring team on potential to implement
- Invest and build the CBP monitoring capacity by 2025
  - Enhance the monitoring for multiple CBP outcomes so the partners can tell the story of progress.



Key Findings

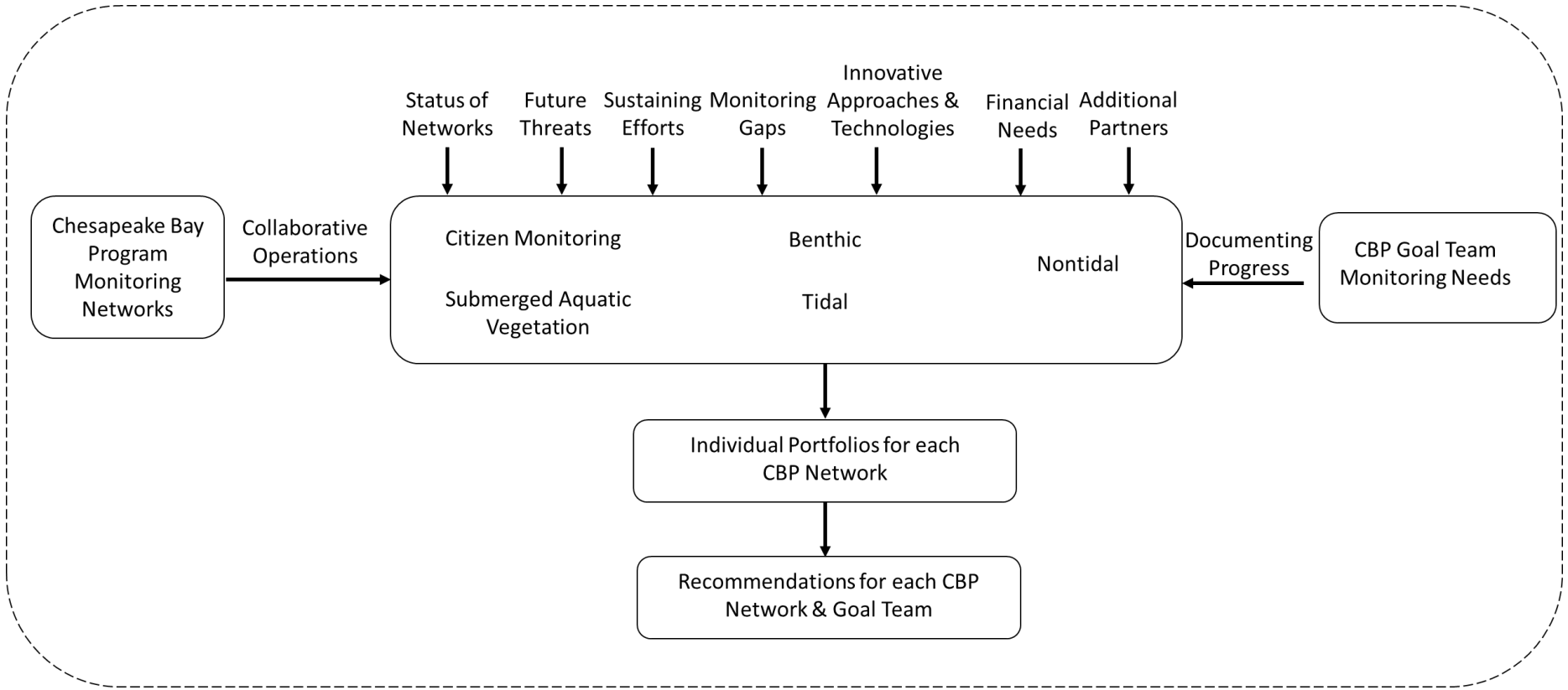
- Monitoring is critical
  - Monitoring shows CBP partners progress from water-quality and restoration efforts
  - Need to maintain and enhance core CBP monitoring networks AND partner monitoring programs

- Monitoring for many CBP outcomes is insufficient
  - No segment of the bay has assessed all water-quality criteria, and therefore can't be delisted!
  - Some Outcomes need a more coordinated effort to track progress
  - Some Outcomes lack information to assess progress

- Opportunities for fundings exist
  - The CBP partners committed to achieving these outcomes have a unique opportunity to build monitoring capacity.

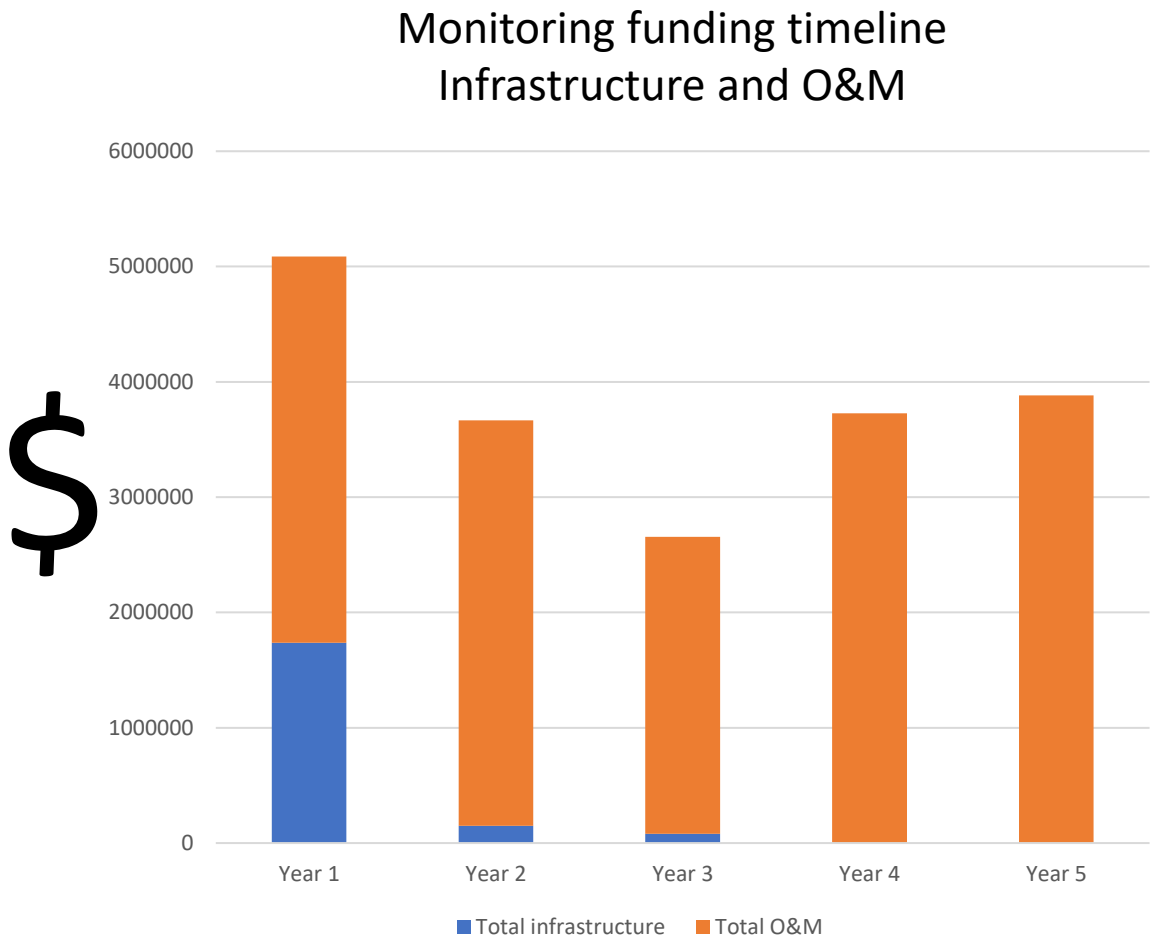
How did we get here?

STAR-STAC team engaged multiple CBP partners and GITs to refine monitoring needs and develop recommendations.



Big picture of review findings
Monitoring funding – Timeline

- 5 year timeline
- $1M of O&M in year 1,2, 4 & 5 is Land Use Land Cover monitoring support.
- The rest is basically our water quality monitoring networks support

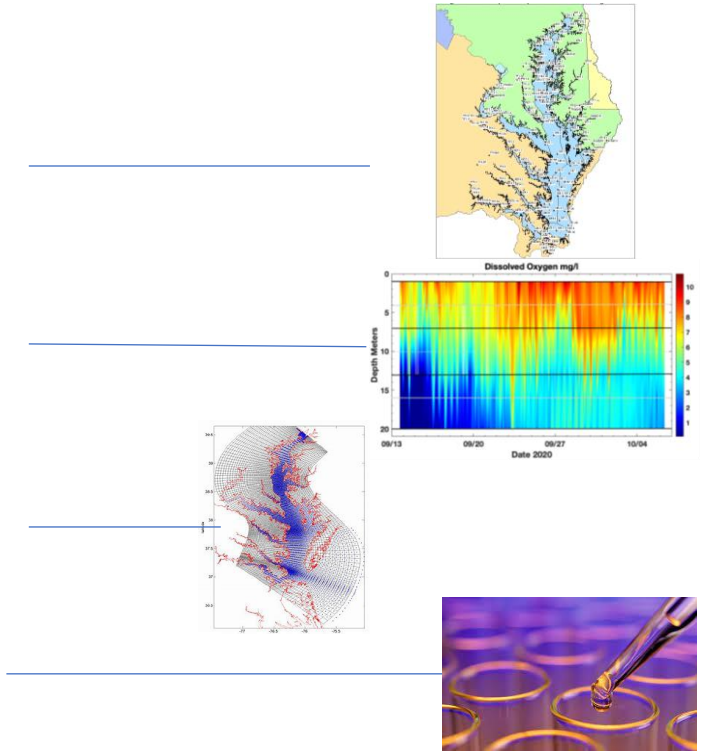


Projected costs Years 1-5

Just digging in a little on what is covered by the numbers then…

Tidal Monitoring Support Requests

- Tidal enhancements amount to:
  - Maintain long-term programming consistent with COLA impacts
  - Hypoxia network development supporting data needs on unassessed short duration dissolved oxygen criteria and high temporal resolution fish habitat info.
  - 4D interpolator development to use our data effectively in assessments
  - Nutrient limitation program funding – test current statistical models of water quality change, calibrate and verify bay models of water quality

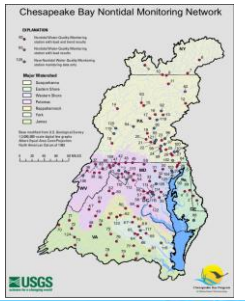


Cost *estimates* as of 2/22/22 PT&BS

			Year 1	Year 2	Year 3	Year 4	Year 5
Tidal WQ	Infrastructure	Vertical sensor arrays packages for adding 8 new s	600,000				
Tidal WQ	O&M	Vertical sensors arrays - operate/maintain	300,000	315,000	330,750	347,288	364,652
Tidal WQ	O&M	Sustain existing program	100,000	180,000	260,000	340,000	420,000
Tidal WQ	O&M	4D interpolator	90,000	90,000	90,000	90,000	90,000
Tidal WQ	O&M	Nutrient Limitation survey calibrate and verify m	230,000	235,750	241,644	247,685	253,877
Tidal WQ	O&M	VADEP 5% COLA (no increase in nearly 10 years)	50,000	52500	52625	52631.25	52631.56

Nontidal Monitoring Support Requests

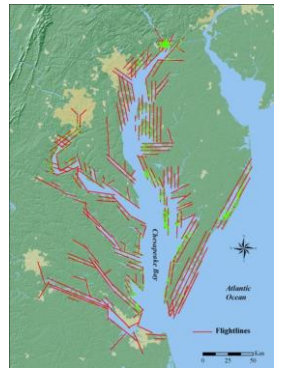
- Non-Tidal enhancements amount to:
  - Maintain long-term programming consistent
  - Expand RIM Continuous Monitoring to all stations (+1 Richmond, VA)
  - Lower Susquehanna River Monitoring enhancements (3 ConMon + discretes at Marietta)
  - Local scale management effectiveness monitoring (5 small watersheds)
  - Community science Nitrate Monitoring support (Showcased more on next slide.)

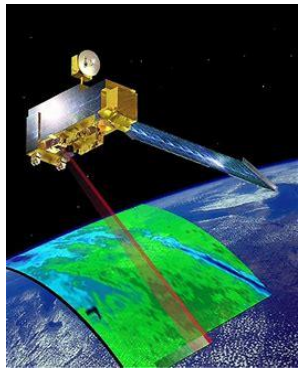


		Cost *estimates* as of 2/22/22 PT&BS	Year 1	Year 2	Year 3	Year 4	Year 5
Nontidal Network	Infrastructure	7 RIM Con-Mon sensor packages completes RIM n	455,000				
Nontidal Network	Infrastructure	3* Lower Susquehanna Reservoir input ConMons,	126,300				
Nontidal Network	O&M	10 more discrete samples at Marietta annually	17,460	17460	17722	17988	18258
Nontidal Network	O&M	new 7 RIM ConMon network O&M	210,000	214,200	218,484	222,854	227,311
Nontidal Network	O&M	Lower Susquehanna Reservoir (Marietta) ConMor	125,520	146,380	148,576	150,804	153,066
Nontidal Network	O&M	PADEP funded through EPA	233,000	233,000	233,000	233,000	233,000
Nontidal Network	O&M	Station loss backfill annual risks coverage	45,000	45,000	45,000	45,000	45,000
Nontidal Network	Infrastructure	5 new Small Watershed ConMon locations. 6 sens	375,000				
Nontidal Network	O&M	Operating 5 new Small Watershed ConMon locati	150,000	157,500	165,375	173,644	182,326

SAV Monitoring Support Requests

- SAV requests amount to:
  - Maintain long-term programming consistent
  - Expanding assessments with algorithm development support
  - Calibrate to historical assessments
  - Sentinel Site Network Development
  - Community Science SAV Watchers support





		Cost *estimates* as of 2/22/22 PT&BS	Year 1	Year 2	Year 3	Year 4	Year 5
Tidal - SAV	Infrastructure	satellite imagery				TBD	TBD
Tidal - SAV	Infrastructure	AI interpretion of diverse satellite imagery	80,000	80,000	80,000		
Tidal - SAV	Infrastructure	Computer science SAV area polygon drawing with	70,000	70,000			
Tidal - SAV	O&M	Calibrate/align historical and new assessments			50,000	50,000	50,000
Tidal - SAV	O&M	Sentinel Site network	120,000	126,000	132,300	138,915	145,861
Tidal - SAV	O&M	Proof of concept: Test AI satellite-derived assessi	150,000	150,000			
Tidal - SAV	O&M	SAV program COLA of 5% annually	17,500	18,375	18,419	18,421	18,421
Community Science	O&M	Volunteer/Community Science SAV Watchers + N	205,000	215,250	236,013	247,813	260,204
Community Science	Infrastructure	SAV Watchers database development	30000				

Presentation example

Network Portfolios:

Basis for recommendations

Each Portfolio contains:

- Status
- Gaps
- Current Investment
- Innovations
- Vulnerabilities
- Monitoring Gaps
- Recommendations
  - LINE ITEM expressed in overall recommendations

TIDAL LONG TERM WATER QUALITY NETWORK – BAY MONITORING

RECOMMENDATIONS

- $100,000. Operations. Support network sustainability and integrity. Annual cost to tidal network funding addressing existing cost of living impacts in MD, Yr 1. Additional growth of $80,000 each year required in Yrs 2-5.
- $600,000. Infrastructure. Enhance hypoxia network efficiency and capacity with One time purchase of equipment and supplies for 8 advanced vertical profile water quality monitoring stations.
- $300,000. Operations and maintenance. Support the expanded hypoxia monitoring network to address short duration water quality criteria assessment. +5% COLA adjustment annually.
- $233,000. Operations. Nutrient limitation annual survey. Verify predictions on management progress, calibrate bay model. +5% COLA annually.
- $90,000. Infrastructure. Annual cost. Design & implement the 4-D interpolator. Support water quality criteria attainment assessments.
- **Total Infrastructure investment need:** $690,000 initially, 90K per year through 2025 for 4D tool development and implementation.
- **Total Operations and maintenance annual investment need:** Yr $633,000, estimated growth of 100K more needed each year in Yrs 2-5.
  - Funding for data analysis and reporting are not included.

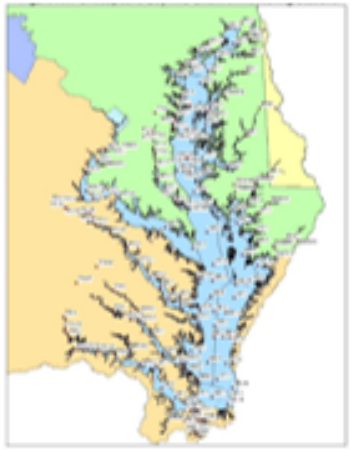


Figure 1. Tidal Bay Monitoring Program locations

STATUS:

- The current tidal monitoring network was established in 1984, its first full year was 1985. There are 154 active stations sampled for physical, chemical, and biological measures throughout the water column with baywide consistent collection and analysis protocols. One or more monitoring sites are located in each of the 92 Bay segments. Stations are sampled 1 or 2 times per month depending on location and season. Targeted sampling occurs in shallow water in a limited number of Bay segments each year either mapping surface water quality or providing continuous (i.e., every 15 minutes) water quality measures at one depth for a fixed location in a season. Advanced statistical analyses are used to report annual and seasonal trends.

VULNERABILITIES:

- Cost of living increases when funding remains unchanged leads to less buying power and decisions for reducing the size of the network.
- Winter weather influencing seasonal assessments

MONITORING GAPS:

- Short duration water quality (dissolved oxygen) criteria attainment assessment.
- Shallow-water monitoring representation.
- Annual full bay water clarity and chlorophyll measures and assessment

CURRENT INVESTMENT:

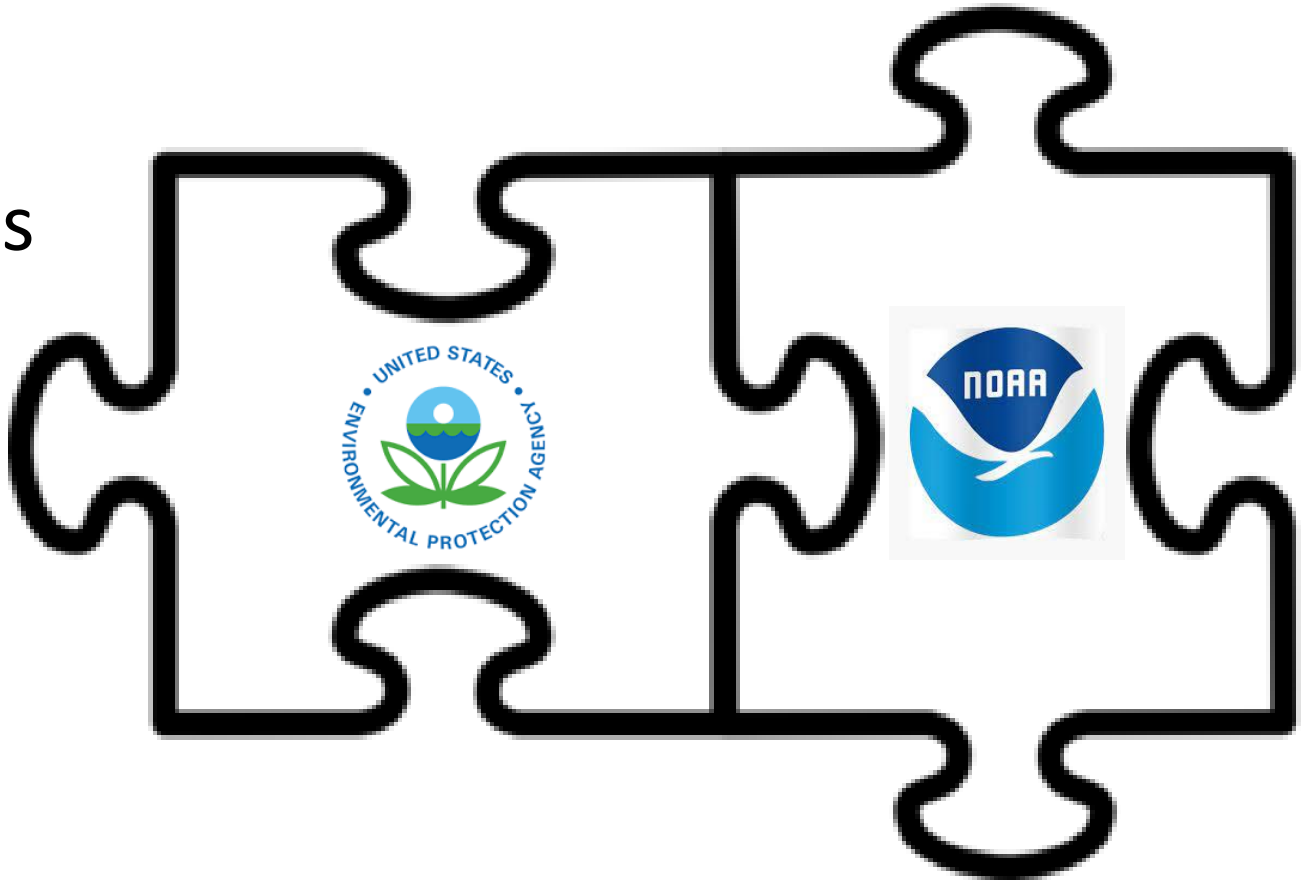
- Approximately $2.7M. Federal Clean Water Act 117e program funds which includes 1:1 matching support from grant partners.

INNOVATIONS:

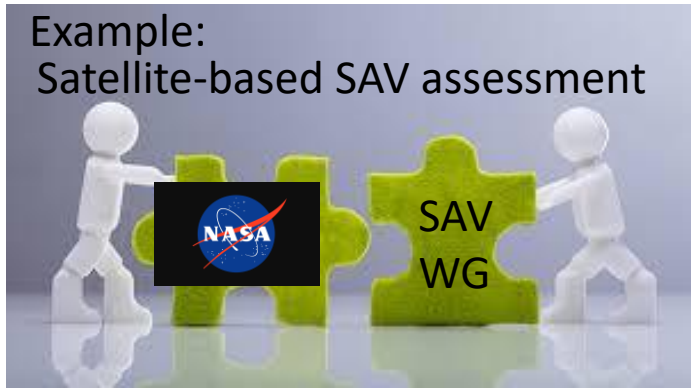
- Robust, cost-effective continuous monitoring sensor units (vertical arrays) for open water, shallow and deep water, water column water quality monitoring. (oxygen, salinity and temperature)
- "Big data" management.
- Advanced statistical analyses

Building Monitoring Capacity

- Need a *multi-partner approach* to invest in gaps.
- Partners can identify which monitoring items they want to support
- Example: Hypoxia collaborative



Several partnerships are developing!



Example: Small Watershed Network needs addressing BMP effectiveness

Maintain Success of Existing Monitoring Network

12 Outcomes

Examples
Blue Crabs
Oysters

Enhance Efficiency and Capacity of Monitoring Network

12 Outcomes

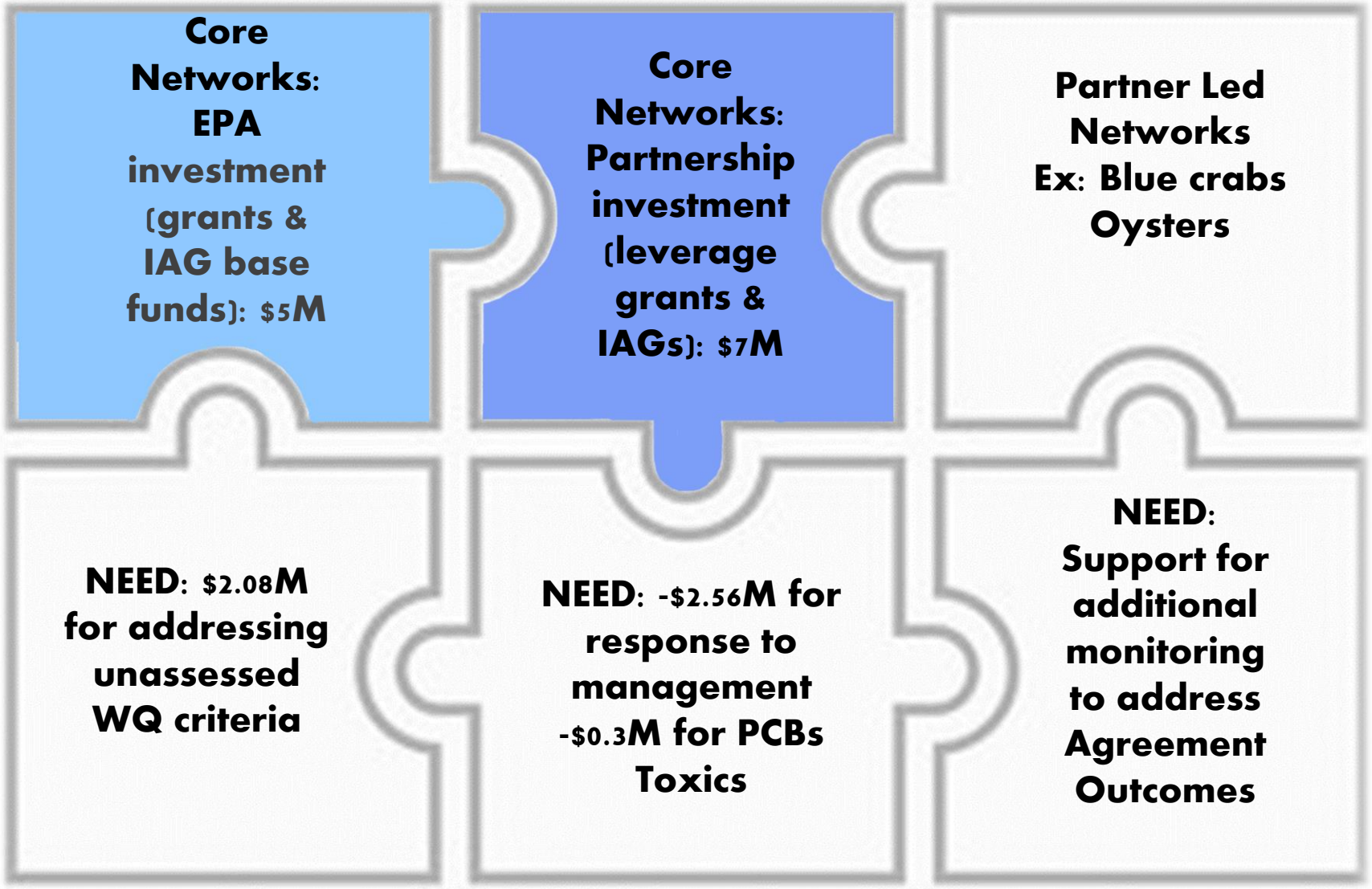
Examples
Wetlands
Stream Health

Establish a New Coordinated Monitoring Network

7 Outcomes

Examples
Climate
Local Leadership

Core Networks Now with More to Come



Needs and Opportunities

- **We need to show we have assessments in place by 2025 for the 2014 Agreement.**

- **Partnership investment for menu of recommendations**
  - Address monitoring gaps
  - Fill knowledge gaps
  - Delist Waters
  - Track and Understand progress toward meeting goals and outcomes.

For PSC – Next steps

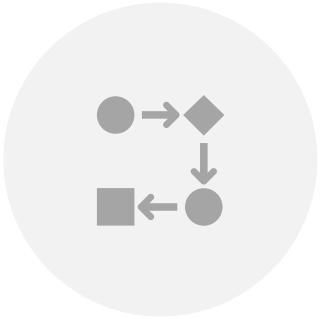
- The report will be shared with the PSC, MB, and CBP once completed.
  - Expected to be the end of March

- **We ask the PSC to:**
  - Identify monitoring items their respective agencies are interested in supporting.
  - Provide a point-of-contact (POC) for the monitoring item.
  - Have the POC work with the STAR monitoring team on potential resources to implement the monitoring item.

- **Identifying monitoring items for support doesn't commit an agency to provide resources.**
  - We need to have the more in-depth discussions on what are the potential resources.
  - Based on these discussions, an agency can decide to move forward (or not) on providing resources.

DIWG related questions:

Do we have the capacity to manage the additional data from the newly proposed stations? If not, what is needed?



How can the DIWG help integrate new methods for use by non-traditional partners?

What are the burdens to that auditing cycle due to the increase in water quality indicators and added community science groups?

What other new technologies should we explore for analyses?

Thank You!

Questions?

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

Chesapeake Bay Program

PSC

March 2, 2022