Chesapeake Bay Program
Science. Restoration. Partnership.

User Research to Enhance Water Quality Modeling Tools

Interviewing the Partnership on Phase 7, CAST, and Related Decision Support Resources

Watershed Technical WG - 8/6/2026

Alex Gunnerson, Koniag Government Services
Sophie Waterman, USGS

Agenda

1. **Background & Methods**
   Who We Interviewed, How We Did It, And Why
2. **Phase 7 Review Visualizations**
   Key Findings & Recommendations
3. **Phase 7 CAST Website**
   Key Findings & Recommendations
4. **Spatially Explicit Interface to CAST**
   Key Findings & Recommendations
5. **BMP Optimization Tools**
   Key Findings & Recommendations

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Background and Methods

Who We Interviewed, How We Did It, And Why

CBPO Requested a User Research Study to Inform Phase 7 Products

Recognition that tailored development of Phase 7 products to users enhances:

- Applicability to partner workflows
- User confidence in tool operation
- User willingness to engage and experiment

Those Phase 7 Products Included Existing and Experimental Resources

In Development

- Phase 7 CAST Website
- Phase 7 model review products

Experimental

- Spatially Explicit Interface to CAST
- BMP Optimization

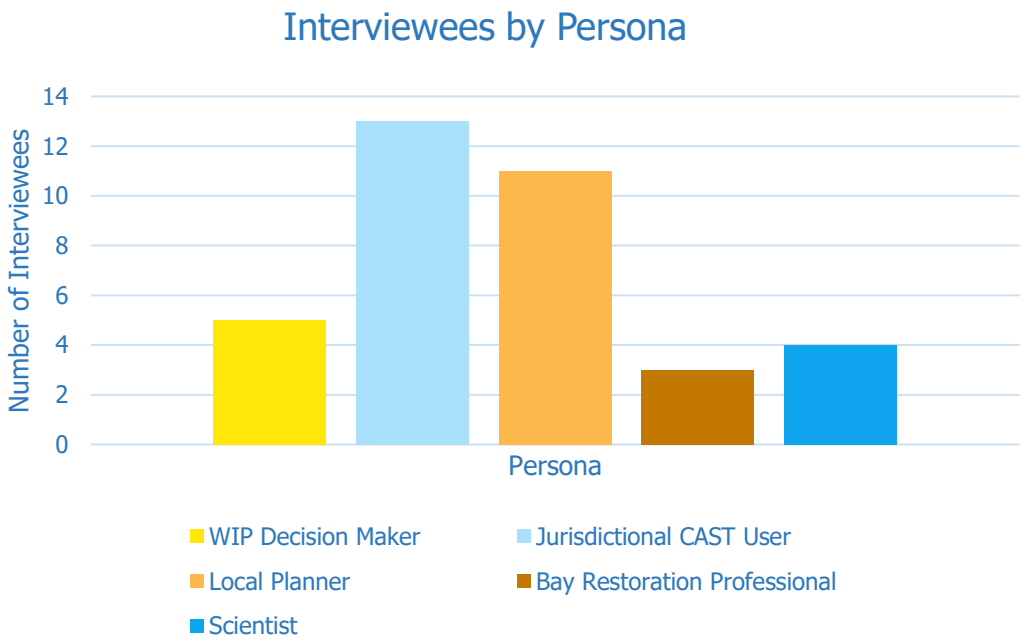
Interviewed A Large Sample of Partners …

- Interviewed 36 people across 23 organizations

79% Response Rate

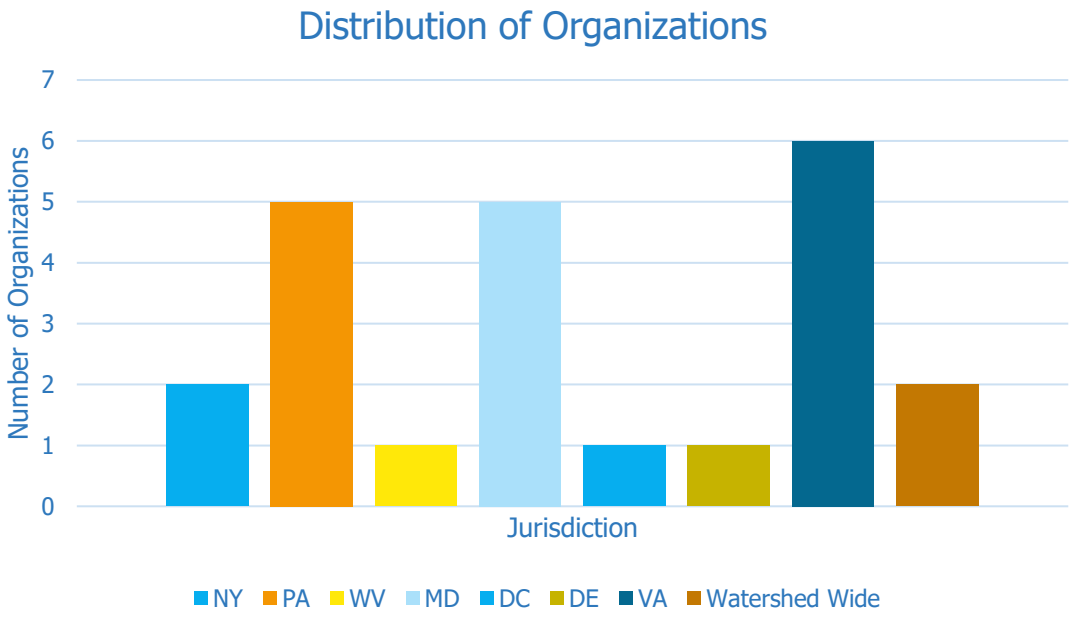
Representing Many Organizations …

- Personas reflected current and potential end users
- Varying levels of partnership involvement and experiece



Across the Watershed

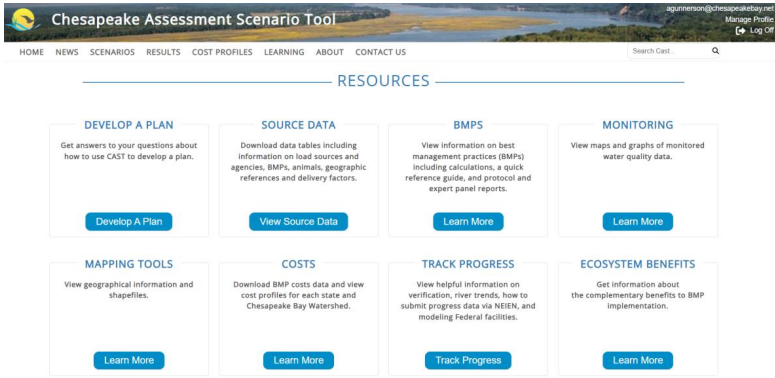
- Every jurisdiction was represented
- Focused on big three that comprise majority of the watershed



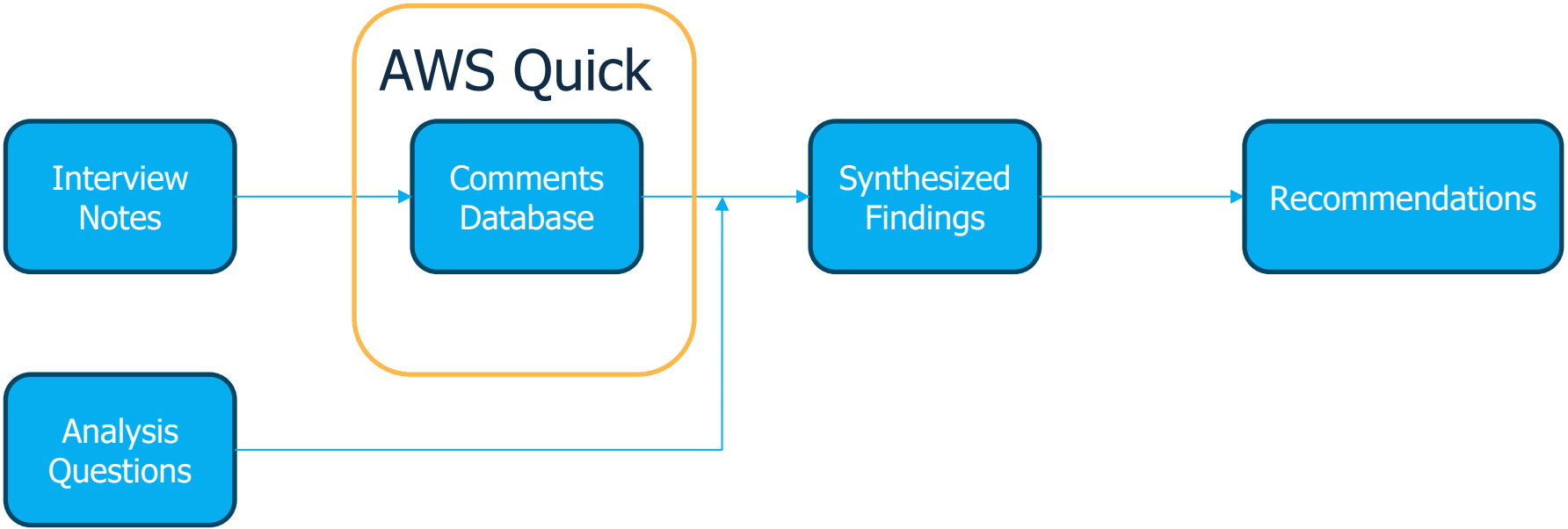
1-hour Interviews Covered Topics Relevant to the Persona

- Specific and open ended questions

- Example for CAST website:
  - What sections of the CAST website do you use and why?
  - If you were redesigning the CAST website, what would you change and why?



AI Assistance in Analyzing Results Through Careful Supervision



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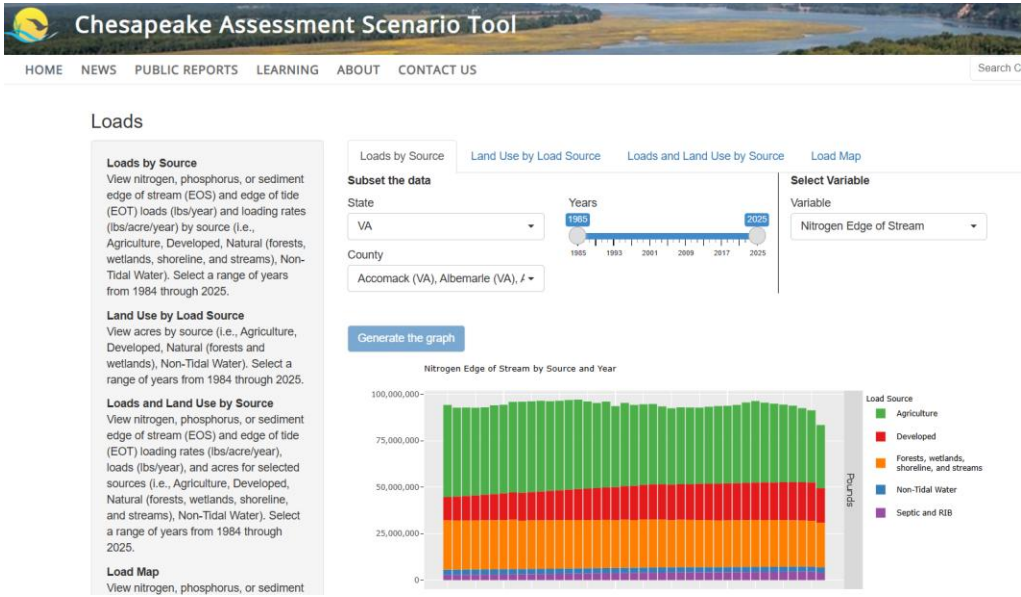
Phase 7 Review Visualizations

Key Findings and Recommendations

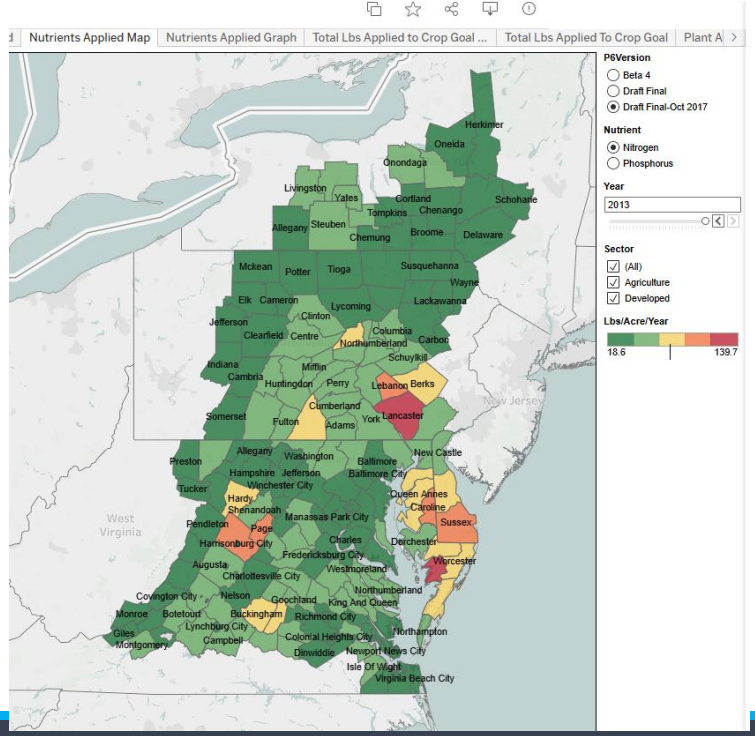
The Phase 6 Review Products Are a Good Place to Start

- 33% of respondents involved in P6 review
- Nearly all of those P6 reviewers found the visualizations at least somewhat helpful



Communicate the Comparative Magnitude of Inputs & Their Sources

- Visualizations used for:
  - Assessing magnitude of error for key inputs and outputs at a glance
  - Confirming submitted data is represented in CAST



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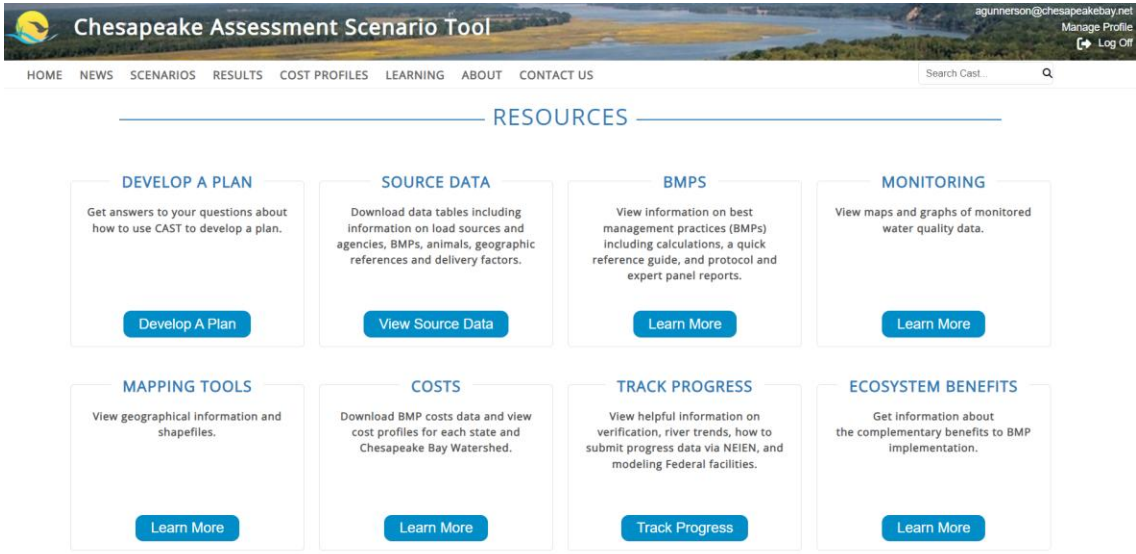
Phase 7 CAST Website

Key Findings and Recommendations

Prioritize Section Updates by Usage & Provide More Detailed Metadata

- BMPs, Source Data, Reports, Scenarios most used sections
- Expert panels and spatial data need streamlined access



Quick Access to Complete Model Documentation & Simplified Versions

- Model documentation was
  - Difficult to find
  - Difficult to understand

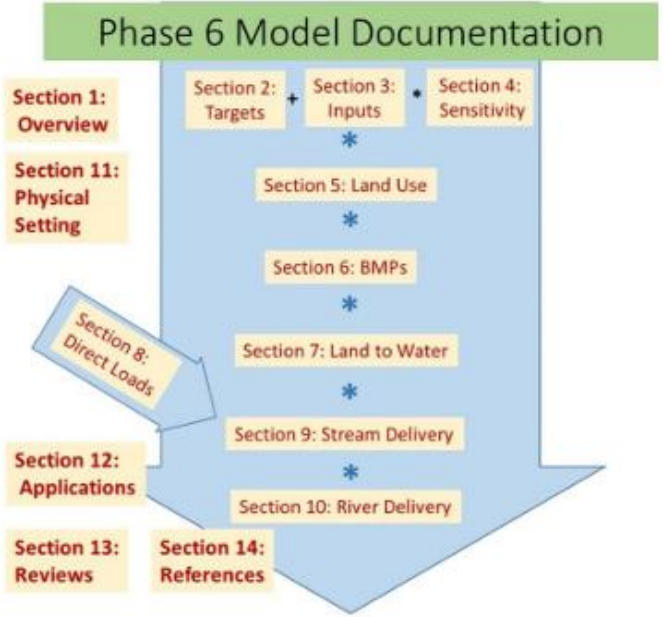


Figure 1-5: Model documentation structure

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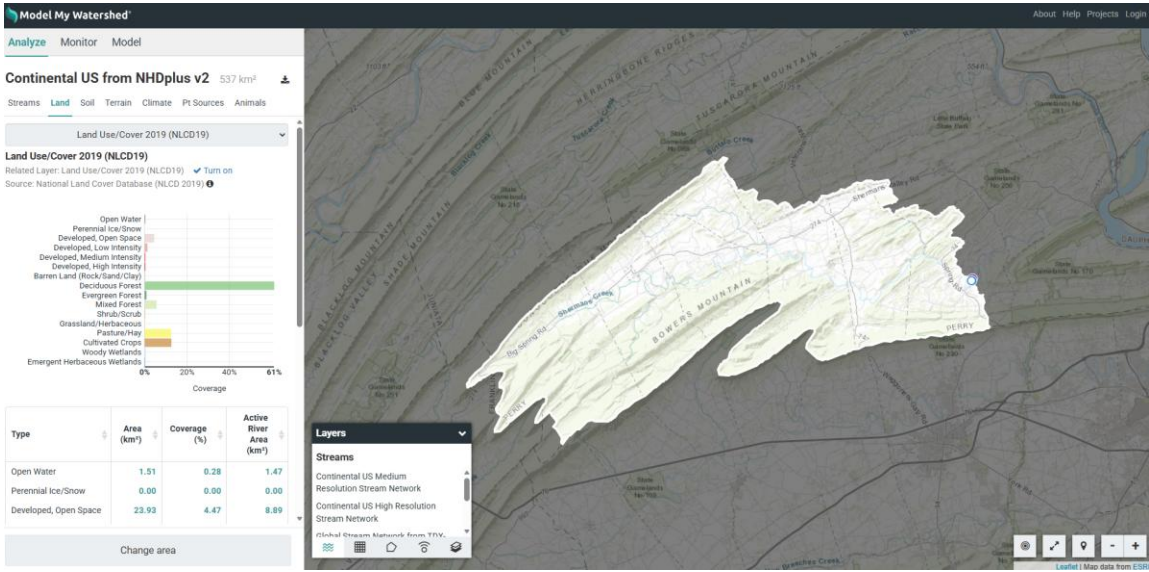
Spatially Explicit Interface to CAST

Key Findings and Recommendations

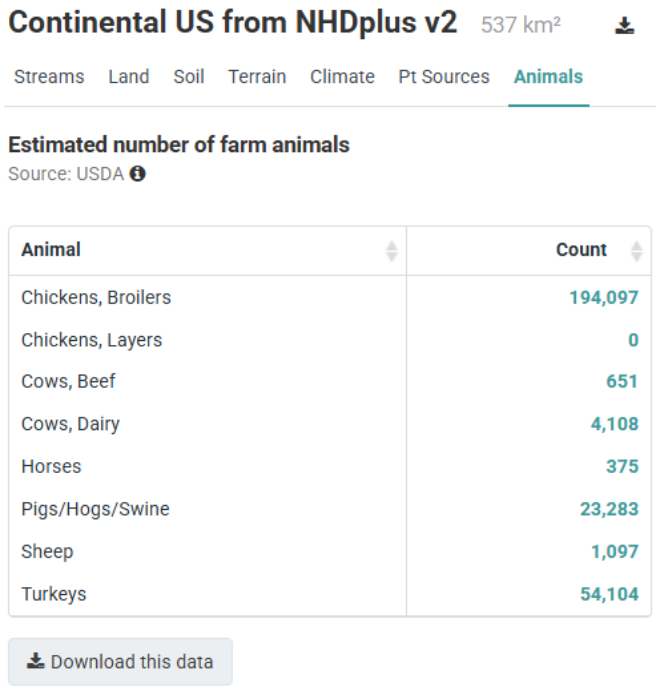
Fast Zonal Stats + CBPO Data = A More Useful and Interactive CAST

- Support for functionality found in Model My Watershed & METRIC
- Lowers barriers to tool usage



Scale of Data Limitations Must be Clear and Uncertainty Conveyed

- Concern that users may confuse interpolated numbers for actual data
- Caution that CAST is being used at a scale finer than originally intended



Continental US from NHDplus v2 537 km²

Streams | Land | Soil | Terrain | Climate | Pt Sources | Animals

Estimated number of farm animals

Source: USDA

Animal	Count
Chickens, Broilers	194,097
Chickens, Layers	0
Cows, Beef	651
Cows, Dairy	4,108
Horses	375
Pigs/Hogs/Swine	23,283
Sheep	1,097
Turkeys	54,104

Download this data

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BMP Optimization Tools

Key Findings and Recommendations

Optimization Efforts Should be Simple, Include Benefits Beyond Water Quality, and Piloted Carefully

- Many partners are skeptical of BMP optimization tools:
  - Limited use at finer scales
  - Lack of holistic integration with non-water quality focused actions

Support Jurisdictional Cost Data Collection and Distribution Efforts

- Partners are unsatisfied with the accuracy, recency, and documentation associated with CAST cost data

- CAST cost data used more frequently by non-profits, bay restoration professionals, usually as dataset of last resort

Take Home Message

P7 Review Tools & CAST

- Modernize for ease of use
- Consistent conceptual structure
- Clear indication of data sources
- Geographic filtering

Spatial CAST & Optimization

- Fast watershed delineation and zonal stats
- Clear disclosure of uncertainty
- Simple optimization tool - benefits beyond WQ

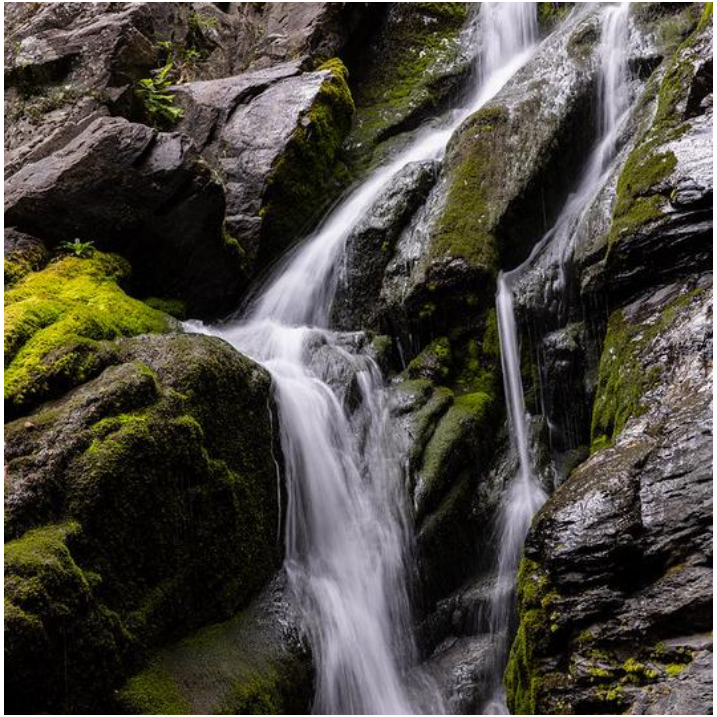

Photo by Charlie Nick/Chesapeake Bay Program

Thank you!

Alex Gunnerson - agunnerson@chesapeakebay.net
Sophie Waterman – sewaterman@usgs.gov

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