# Shallow Water Habitat Sentinel Site Program Development Workshop:



## **A GIT-funded Project**

September 17<sup>th</sup>-18<sup>th</sup>, 8:30 am – 4:00 pm

@CBP 1750 Forest Drive Annapolis, MD



## Things to Know and Do

- Please sign in! The Sign-in sheet is on the long bench by the entry door.
- CBP doors are all locked. Take a key card with you (they're also on the bench) if you leave the room during the meeting. Don't take a key card with you if you leave for lunch!
- The bathroom is out the door and to the left. To access the bathroom, press "2" and "4" at the same time, then "3", then "Enter".
- There is food (for sale) in the snack space in the main lobby.



1750 Forest Drive, Suite 130, Annapolis, MD 21401

#### Shallow Water Habitat Sentinel Site Program Development Workshop

September 17th and 18th, 2025

In person at the Chesapeake Bay Program Blue Crab Conference Room OR via Zoom HERE.

Meeting ID: 859 3238 2638 Passcode: 638548

[There will be interactive activities during this workshop. Please bring your computer and plan to log into the meeting in the room.]

#### September 17<sup>th</sup>, 2025 (Day 1):

8:30-9:00 am | Arrival and Check-in

9:00-9:30 am | Welcome, workshop goals, & setting expectations (Dave Jasinski)

9:30-10:00 am | Vision for the Shallow Water Habitat Sentinel Site Program (Brooke Landry)

10:00-10:15 am | Coffee Break

#### 10:15-12:00 pm | Session #1 | Existing Sentinel Site and Monitoring Programs

10:15-11:00 am | Review of Existing Programs and Interview Results (Dave)

11:00 am-12:00 pm | Sentinel site program examples (Brooke)

- 11:00-11:30 am | National Estuarine Research Reserve Sentinel Sites (Erin Shields)
- 11:30-12:00 pm | Chesapeake Bay Sentinel Site Framework (Taryn Sudol)

#### 12:00 -1:00 pm | Lunch on your own

### 1:00-2:40 pm | Session #2 | Designing the Program to Answer Management Questions

1:00 - 1:10 pm | Introduction (Brooke)

1:10 - 1:40 pm | Overview of Priorities Beyond 2025 (Rachel Felver)

1:40 - 2:10 pm | The Living Resource Assessment Effort (Bruce Vogt/Kaylyn Gootman)

2:10 - 2:40 pm | Designing the Program to Answer Management Questions (Brooke, interactive, Zoom whiteboard)

#### 2:40-2:50 pm | Break

### 2:50-3:30 pm | Session #3 | Shallow Water Habitat Sentinel Site Program Design (Dave)

- Draft Framework Presentation [Shallow Water Habitat Sentinel Site Defined]
- Participant Input on Monitoring Parameters open discussion and input on what parameters to include in sentinel site program (interactive, Zoom whiteboard)

3:30-4:00 pm | Wrap Up & Look Ahead for Day Two (Dave/Brooke)



## Chesapeake Bay Program Science. Restoration. Partnership.

1750 Forest Drive, Suite 130, Annapolis, MD 21401

#### September 18th, 2025 (Day 2):

8:30-9:00 am | Arrival and Check-in

9:00-9:30 am | Welcome, Recap Day 1, & Agenda for Day 2 (Dave)

#### 9:30 am -10:45 am | Session #4 | Sentinel Site Locations and Frequency (Ryan Woodland)

- What is the ideal number of sites for adequate representation? Does it vary by parameter?
- · What is the ideal frequency of collection? Does it vary by parameter?

10:45 - 11:00 am | Break

#### 11:00 - 12:00 pm | Session #4 | Continued

 Map activity - Where should our shallow water habitat sentinel sites be located (broad categories and specific locations, interactive Zoom whiteboard)?

#### 12:00-1:00 pm | Lunch on your own

#### 1:00-3:00 pm | Session #5 | Zeroing in on Parameters to Include

- Parameter Prioritization (building a tiered approach) (Brooke, interactive Survey)
- Overlap and integration with historical and existing monitoring efforts (parameters, frequency, methodology) (Dave)

#### 3:00-3:15 pm | Break

#### 3:15-4:00 pm | Wrap Up & Next Steps (Dave/Brooke)

- Review workshop takeaways and decision points
- Next steps & key decisions
- Workshop #2 date scheduled (if needed)
- Post-workshop survey



**Workshop Goals and Expectations** (Dave Jasinski, GFS)

Thanks to each of you for your time today. Thanks also to our project team and steering committee:

Project Lead: Green Fin Studio

Dave Jasinski Macon Thompson Lauren Huey

HGIT Technical Lead: Brooke Landry

Steering Committee: Peter Tango

Kathy Boomer Taryn Sudol

Joe Carr Jeremy Hanson

Ken Hyer
Gina Hunt

Denice Wardrop
Dave Parrish
Ryan Woodland



## Project Background

**Project Background and Vision** (Brooke Landry, Maryland DNR and CBP SAV Workgroup)

# Shallow Water Habitats Small Group Recommendations

FEBRUARY 28, 2024



## Beyond 2025 Shallow Water Habitats Small Team Report

#### IFADS:

Gina Hunt, Habitat GIT Co-Chair

Brooke Landry, SAV Workgroup Chair

#### INVITED CESR CONTRIBUTERS:

Denice Wardrop - Chesapeake Research Consortium

Kenneth Rose – University of Maryland Center for Environmental Science

#### STEERING COMMITTEE MEMBERS:

Larry Sanford, Scientific and Technical Advisory Committee

Bruce Vogt, Sustainable Fisheries GIT

Laura Cattell Noll, Local Government Initiative Director

Stefanie Tallion, VA Natural and Historic Resources

Chris Guy, Fish & Wildlife Service

Adrienne Kotula, Chesapeake Bay Commission

Jessica Blackburn, Stakeholders' Advisory Committee



## Shallow Water Habitat Small Team Scope and Vision

**SCOPE-** Edges and Nearshore Waters of 3 ecological zones:

- Non-tidal
- Fresh Tidal Fresh
- Tidal Estuarine.

VISION- Healthy and sustainable shallow water habitats that support resources, communities, and economies that are resilient to long-term changes in watershed conditions.





## Recommendation Development Process

- ► First step, where we wanted to go Vision and Scope
- ► We started with the Workgroups most closely related to shallow water habitats
  - Fish Habitat (Dec 4th)
  - Wetlands(Dec. 12th)
  - Stream Health (Dec. 15th)
  - ▶ SAV (Jan 12th)
- ▶ Listening Session more than 600 Comments

- Organized comments into 13 themes and summarized into strategies. Further grouped the strategies and used Al to develop summaries.
- These strategies and summaries were presented and discussed during expert office hours.
- Strategies were modified and summaries were refined into recommendations based on expert feedback.
- Teams finalized recommendations, spreadsheet and narrative

Feb.

Nov. Team developed Vision, Scope, and Issue areas.

Dec. Workgroup
Meetings
Invited CESR
Contributors

Listening Session Three Expert Office Hour Meetings

**Public** 

Team Meetings

2 person Teams / Recommendation



## Shallow Water Habitat Small Team Recommendations

- 1. Climate Resilient Restoration
- 2. Integrated Modeling and Monitoring
- 3. Implement an Adaptation Strategy to inform Habitat Management and Project Planning
- 4. Communication and Engagement
- 5. Effective Governance, Collaboration, and Innovative Funding

## **Integrated Modeling and Monitoring**

**Issue**: Shallow water habitats in Chesapeake Bay and its watershed are not adequately monitored or modeled. There is limited understanding of the connectivity between upstream, downstream, land, and water, and how shallow water habitats and living resources respond to changes in water quality and management actions.



**Recommendation**: Improve understanding of connectivity and habitat function under changing conditions by expanding Chesapeake Bay and watershed monitoring and modeling to include continuous shallow water habitats.



## Recommendation #2 Modeling & Monitoring Strategies

## **Strategies:**

- Implement continuous, long-term shallow water living resource monitoring and assessment to understand habitat connectivity and habitat function under changing conditions. **Modeling consistent with Climate recommendation.**
- Explore new methodologies for long-term habitat monitoring and modeling, potentially including the use of satellite technology and artificial intelligence (AI) to quantify parameters such as temperature, clarity, and chlorophyll-a in shallow water habitats.
- For all restoration projects, include pre- and post-restoration monitoring of sufficient duration to detect long-term causes of failure or success.
- Develop and implement a shallow water habitat sentinel site program.
- Develop economic valuations of ecosystem services for shallow water habitats.



## Recommendation #2 Modeling & Monitoring Strategies

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- For all restoration projects, include pre- and post-restoration monitoring of sufficient duration to detect long-term causes of failure or success.
- Develop and implement a shallow water habitat sentinel site program.
  - Develop economic valuations of ecosystem services for shallow water habitats.



## Develop and Implement a Shallow Water Habitat Sentinel Site Program

Chesapeake Bay Shallow Water Habitat Sentinel Site
Program Development
Proposal for Goal Implementation Team Funding
Submitted by the CBP's SAV Workgroup
April 8th, 2024

We propose a GIT-funded project to explore the development of a Chesapeake Bay Shallow Water Habitat Sentinel Site Program. The program would monitor climate impacts on the functional value of shallow water habitats in Chesapeake Bay as well as the effectiveness of management measures taken by the Chesapeake Bay Program (CBP) partnership beyond 2025.

## Chesapeake Bay Shallow Water Habitat Sentinel Site Program Development Proposal for Goal Implementation Team Funding Submitted by the CBP's Submerged Aquatic Vegetation (SAV) Workgroup April 8th, 2024

We propose a GIT-funded project to emplore the development of a Chesapeake Bay Shallow Water Habitat Sentinel Site Frogram. The program would monitor climate impacts on the functional value of shallow water habitats in Chesapeake Bay as well as the effectiveness of management measures taken by the Chesapeake Bay Program (CBP) partnership beyond 2023. The Chesapeake Bay Program Management Board is in support of this effort and has directed the Submerged Aquatic Vegetation (SAV) Workgroup and Habitat Goal Implementation Team (HGIT) to take the initial steps necessary to determine what a Shallow Water Habitat Sentinel Site Program would entail and if its implementation would be feasible.

#### Background

As the CBF partnership approaches 2025, a number of small teams, workshops, review, and reports have been undertaken or are underwy to evaluate Chesapeake Bay restoration progress to date, address successes and failures, and design a part toward Bay recovery Boyond 2025. These reports in particular are relevant to this workshop proposal: Rising Watershed and Bay Water Temperatures—Ecological Implications and Management Responses (Batuk et al., 2023). A Comprehense Eschapine 5 Sutter Response (CESR, STAC 2023), and Embanding the Chesapeake Bay Program Monitoring Networks: A Report to the Frincipals' Staff Committee (CBF, 2022). Together, these reports highlight and emphasize the importance of maintaining and expanding restoration and monitoring efforts in Chesapeake Bay to accelerate recovery and track impacts associated with climate change, particularly in shallow water habitats. One specific recommendation in the monitoring report to the Frincipal'Staff Committee was to fund the SAV Sentinel Site Frogram to improve understanding of SAV habitat response to shifting conditions and management actions. To date, however, funding has not been identified to maintain the SAV Sentinel Site Frogram and number of site it is operating on a volunteer basis at a minimal number of site.

The SAV Sentinel Site Program was designed to serve as the third and most detailed iter of a hierarchical monitoring approach employed by the CBP's SAV Workgroup to monitor SAV in Chespeake Bay. Partially implemented in 2023, the SAV Sentinel Site Program was designed to monitor twenty sentinel sites distributed throughout the four saintive regimes of the Bay. Development of the SAV Sentinel Site Program happened concurrently with the CBP partnership efforts identified above and consequently, the benefits and necessity of expanding the SAV Sentinel Site Program into a comprehensive Shallow Water Habitat Sentinel Site Program emerged. Estites than concentrating solely on SAV, this comprehensive effort would monitor multiple living resources and water quality measures as well as climate impacts on the functional value of shallow water habitat in Chesapeake Bay and its watershed. The program would also serve to monitor the effectiveness of measures taken by the Patmership beyond 2023 as focus on shallow water habitat restoration is emphasized.

Incorporating a Shallow Water Habitat Sentinel Site Frogram into the Cheaspeake Bay monitoring effort is essential to outcomes within the pattnership. The purpose of sentinel site monitoring is to systematically observe and gather data from specific locations (sentinel sites) to track changes, assess environmental conditions, and provide early warning signals for potential issues. Sentinel site monitoring serves as a proactive and systematic approach to understanding, managing, and preserving ecosystems. By focusing on specific locations with known significance or vulnerability, these monitoring programs contribute to environmental conservation, research, and informed decision-making. Sentinel site monitoring can serve various purposes depending on the contest, but common objectives include:

- Early Detection of Changes: Sentinel sites are strategically chosen to represent key ecosystems or areas vulnerable to specific threats or changes; early detection of changes in environmental parameters, such as land use changes, water quality, habitat health, or biodiversity, allows for timely intervention and management.
- 2. Monitoring Trends and Patterns: By consistently collecting data from sentinel sites over time, trends and patterns in environmental conditions can be identified; understanding long-term changes helps researchers and policymakers make informed decisions about conservation, restoration, or mitigation strategies.
- Indicator of Ecosystem Health: Sentinel sites often serve as indicators of overall ecosystem health; changes observed at
  these sites can reflect broader shifts in ecological conditions, providing valuable insights into the well-being of the larger
  econystem.
- 4. Research and Scientific Study: Sentinel site monitoring provides valuable data for scientific research and studies; researchers can use the collected information to analyze ecological processes, study the impact of human activities, and advance scientific understanding of ecosystems.



By focusing on specific locations with known significance or vulnerability, these monitoring programs contribute to environmental conservation, research, and informed decision-making.

- **1. Early Detection of Changes**: Sentinel sites are strategically chosen to represent key ecosystems or areas vulnerable to specific threats or changes; early detection of changes in environmental parameters, such as land use changes, water quality, habitat health, or biodiversity, allows for timely intervention and management.
- 2. Monitoring Trends and Patterns: By consistently collecting data from sentinel sites over time, trends and patterns in environmental conditions can be identified; understanding long-term changes helps researchers and policymakers make informed decisions about conservation, restoration, or mitigation strategies.
- **3.** Indicator of Ecosystem Health: Sentinel sites often serve as indicators of overall ecosystem health; changes observed at these sites can reflect broader shifts in ecological conditions, providing valuable insights into the well-being of the larger ecosystem.



By focusing on specific locations with known significance or vulnerability, these monitoring programs contribute to environmental conservation, research, and informed decision-making.

- **4. Research and Scientific Study**: Sentinel site monitoring provides valuable data for scientific research and studies; researchers can use the collected information to analyze ecological processes, study the impact of human activities, and advance scientific understanding of ecosystems.
- **5. Risk Assessment and Management:** Identifying changes or abnormalities at sentinel sites helps assess potential risks to ecosystems and biodiversity; this information is crucial for developing management strategies and implementing measures to mitigate or prevent negative impacts.
- **6. Decision Support for Policy and Management**: Data from sentinel sites inform decision-makers and policymakers about the current state of the environment; it aids in the formulation of policies, regulations, and management plans by providing evidence-based and data-driven information on environmental conditions.



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- 7. Validation of Models: Sentinel site data can be used to validate ecological models and simulations; comparing observed conditions at sentinel sites with model predictions enhances the accuracy and reliability of predictive models used for environmental management.
- **8. Community Engagement and Education**: Sentinel site monitoring programs often involve community science, engagement, and education initiatives; by involving local communities in monitoring activities, awareness is raised about environmental issues, fostering a sense of responsibility and stewardship. Sentinel site programs also provide an opportunity to consider socioeconomically vulnerable areas or EJ communities as sites to monitor.
- **9. Adaptive Management:** The data collected from sentinel sites support adaptive management approaches; decision-makers can adjust management strategies based on real-time information, improving the effectiveness of conservation and restoration efforts.



The Shallow Water Habitat Sentinel Site Program that we're developing now will fill data gaps and provide the data necessary to track ecosystem changes in response to climate change and management actions, assess environmental conditions, provide early warning signals for potential issues, and enhance modeling and forecasting capabilities in shallow water habitats where most of the Bay's living resources are located.



## Develop and Implement a Shallow Water Habitat Sentinel Site Program

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Program Development
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## FUNDED!

and awarded to





## Project Components



Step 1: Literature and Existing Program Review; identification of data gaps.

Step 2: Scoping Workshop.

Step 3: Full Shallow Water Habitat Sentinel Site Program Development.



Step 4: Secure long-term funding for the Shallow Water Habitat Sentinel Site Program.

Step 5: Implement the Shallow Water Habitat Sentinel Site Program as a long-term CBP partnership effort.



## Project Deliverables



- A comprehensive review/report of existing shallow water habitat monitoring programs, literature, and data gaps
- A workshop report that guides program development
- A Sentinel Site Program Guidance Document with protocols and datasheets for each parameter
- Recommended locations for sentinel site placement
- A review of data portal options
- Identification of potential program partners
- Identification of potential sustainable funding sources
- A basic feasibility assessment for implementing this Shallow Water Habitat Sentinel Site Program



10:00-10:15 am |

Coffee Break





# 10:15-12:00 pm | Session #1 Existing Sentinel Site & Monitoring Programs

10:15-11:00 pm | Review of Existing Programs and Interview Results (Dave)

11:00 am-12:00 pm | Sentinel site program examples\_intro

- 11:00-11:30 am | National Estuarine Research Reserve Sentinel Sites (Erin Shields)
- 11:30-12:00 pm | Chesapeake Bay Sentinel Site Framework (Taryn Sudol)



## 12:00 -1:00 pm

## Lunch on your own

If you didn't bring lunch, here are some quick options:

- The snack shop in the main lobby.
- The Safeway across the street.
- Ledo's Pizza: 505 S Cherry Grove Ave, Annapolis, MD 21401
- Fast food on West St. via Chinquapin Round Rd.





# 1:00-2:40 pm | Session #2 Designing the Program to Answer Management Questions

1:00 - 1:10 pm | Session Introduction (Brooke)

1:10 - 1:40 pm | Overview of Priorities Beyond 2025 (Rachel Felver)

1:40 - 2:10 pm | The Living Resource Assessment Effort (Bruce Vogt/Kaylyn Gootman)

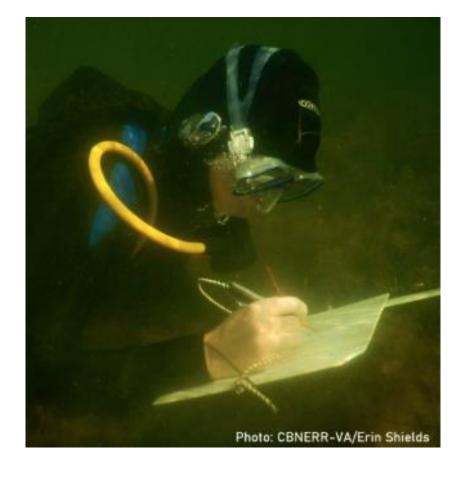
2:10 - 2:40 pm | Designing the Program to Answer Management Questions (Brooke, interactive, Zoom whiteboard)



# 1:00-2:40 pm | Session #2 Designing the Program to Answer Management Questions: INTRO

Within an adaptive-management approach, you start with management objectives, define the decisions based on those objectives, and then monitor what's needed to inform those decisions — and to iterate as priorities evolve.

A sentinel site network tuned to **management questions** is most efficient because it focuses limited funds on the proper parameters, sites, and frequencies; fills known data gaps; provides the signals and thresholds managers need; and feeds standardized information into models and forecasting used for policy and restoration choices.



**Bottom line:** a management-question-driven sentinel site program turns monitoring into **management intelligence**—giving the Bay partnership the right information, at the right places and times, to protect and restore shallow-water habitats and the services they provide.



# 1:00-2:40 pm | Session #2 Designing the Program to Answer Management Questions

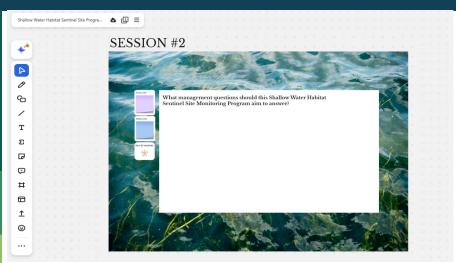
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1:40 - 2:10 pm | The Living Resource Assessment Effort (Bruce Vogt/Kaylyn Gootman)

2:10 - 2:40 pm | Designing the Program to Answer Management Questions (Brooke, interactive, Zoom whiteboard)

# 1:00-2:40 pm | Session #2 Designing the Program to Answer Management Questions: ZOOM



## Instructions

- 1. Follow Lauren or Macon's instructions to open the Zoom Whiteboard We will all be working on the same whiteboard!
- 2. Select a sticky note to the left and find an empty spot on the board for it.
- 3. Click on it and type in a management question either relevant to your outcome or to the Bay Program in general.
- 4. If someone else enters a management question that you think is particularly important, select the star (on the left under the sticky notes) and place it beside the question to "vote it up".



2:40 - 2:50 am |

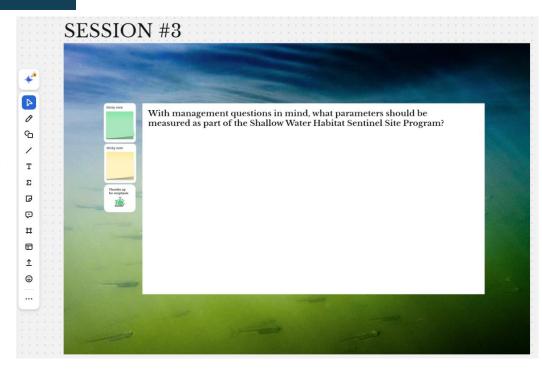
## Coffee Break





# 2:50-3:30 pm | Session #3 Shallow Water Habitat Sentinel Site Program Design

- Draft Framework Presentation
- Participant Input on Monitoring
  Parameters open discussion and input on
  what parameters to include in sentinel site
  program (interactive, Zoom whiteboard, same
  instructions as previously)





3:30-4:00 pm | Look Ahead for

Wrap Up & Day Two



## 9:00-9:30 am | Welcome, Recap Day 1, & Agenda



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8:30-9:00 am | Arrival and Check-in

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#### 9:30 am -10:45 am | Session #4 | Sentinel Site Locations and Frequency (Ryan Woodland)

- What is the ideal number of sites for adequate representation? Does it vary by parameter?
- · What is the ideal frequency of collection? Does it vary by parameter?

10:45 - 11:00 am | Break

#### 11:00 – 12:00 pm | Session #4 | Continued

 Map activity - Where should our shallow water habitat sentinel sites be located (broad categories and specific locations, interactive Zoom whiteboard)?

12:00-1:00 pm | Lunch on your own

### 1:00-3:00 pm | Session #5 | Zeroing in on Parameters to Include

- Parameter Prioritization (building a tiered approach) (Brooke, interactive Survey)
- Overlap and integration with historical and existing monitoring efforts (parameters, frequency, methodology) (Dave)

3:00-3:15 pm | Break

### 3:15-4:00 pm | Wrap Up & Next Steps (Dave/Brooke)

- · Review workshop takeaways and decision points
- · Next steps & key decisions
- · Workshop #2 date scheduled (if needed)
- Post-workshop survey



# 9:30 am -10:45 am | Session #4 Sentinel Site Locations and Frequency of Monitoring

What is the ideal number of sites for adequate representation? Does it vary by parameter?

What is the ideal frequency of collection? Does it vary by parameter?

When we think about sentinel sites in a system as large and diverse as the Chesapeake Bay, the core challenge is distribution—both spatial and temporal. The Bay is not a uniform environment. It's a patchwork of salinity zones, circulation patterns, watershed inputs, and habitat types, each responding differently to stressors like nutrient inputs, storms, and increasing water temperatures. If we cluster too much effort in one area, we risk missing signals elsewhere. If we spread too thin, we risk losing statistical power. So, how do we strike the right balance?



# 9:30 am -10:45 am | Session #4 Sentinel Site Locations and Frequency of Monitoring \_ Prompts

### 1. Spatial Coverage

- 1. Which shallow-water habitats (e.g., SAV beds, tidal creeks, marsh edges, nearshore flats) are most critical to represent across the Bay?
- 2. How do we ensure representation across the Bay's salinity gradient (oligonaline to polyhaline) so that findings are transferable Bay-wide?

### 2. Site Selection Priorities

- 1. Should we prioritize "hot spots" of management activity (e.g., restoration sites, areas facing development pressure), or should we target reference sites that serve as long-term baselines?
- 2. How do we balance coverage between **well-studied systems** and **under-monitored areas** that may hold emerging risks?

### 3. Temporal Frequency

- 1. What ecological processes (e.g., SAV growth cycles, storm impacts, hypoxia events, sea-level rise) require **continuous monitoring**, and which can be captured with **seasonal or annual surveys**?
- 2. How can we use sentinel sites to detect early-warning signals—for example, thresholds that suggest management intervention is needed?

### 4. Resource Optimization

- 1. Given finite resources, would it be better to have **fewer sites with more intensive monitoring**, or **more sites with lighter monitoring**?
- 2. Are there opportunities to integrate with existing networks (e.g., water-quality buoys, marsh monitoring) to expand coverage efficiently?

### 5. Adaptability

1. How can the spatial and temporal design remain **flexible** so that as management questions evolve (e.g., climate adaptation, new restoration priorities), the sentinel network can adapt without starting from scratch?



10:45 - 11:00 am

## Coffee Break





## 11:00 am – 12:00 pm | Session #4 Sentinel Site Locations and Frequency of Monitoring \_ Cont.

**Map activity -** Where should our shallow water habitat sentinel sites be located (broad categories and specific locations, interactive Zoom whiteboard)?

### Instructions

- 1. Follow Lauren or Macon's instructions to open the Zoom Whiteboard and navigate to the map We will all be working on the same whiteboard!
- 2. Use the "palm" in the lower right to pan across the map.
- 3. Use your mouse roller to zoom in or out.
- 4. Click on the red flag on the right to select it and drag it to where you'd like to see a SWH Sentinel Site. If someone already placed a flag there and you want to emphasize the importance of that location, place another flag in that spot.









## Lunch on your own



If you didn't bring lunch, here are some quick options:

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- The Safeway across the street.
- Ledo's Pizza: 505 S Cherry Grove Ave, Annapolis, MD 21401
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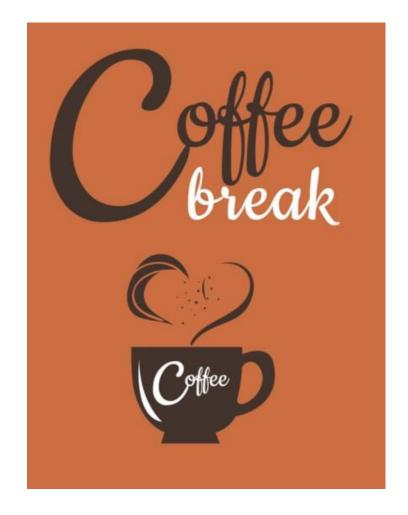
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3:00 - 3:15 pm

Coffee Break



## 3:15 - 4:00 pm Wrap Up & Next Steps

- Review workshop takeaways and decision points
- Next steps & key decisions
- Workshop #2 date scheduled
- Post-workshop survey