Overview of Strategy Review System and Strategic Science & Research Framework

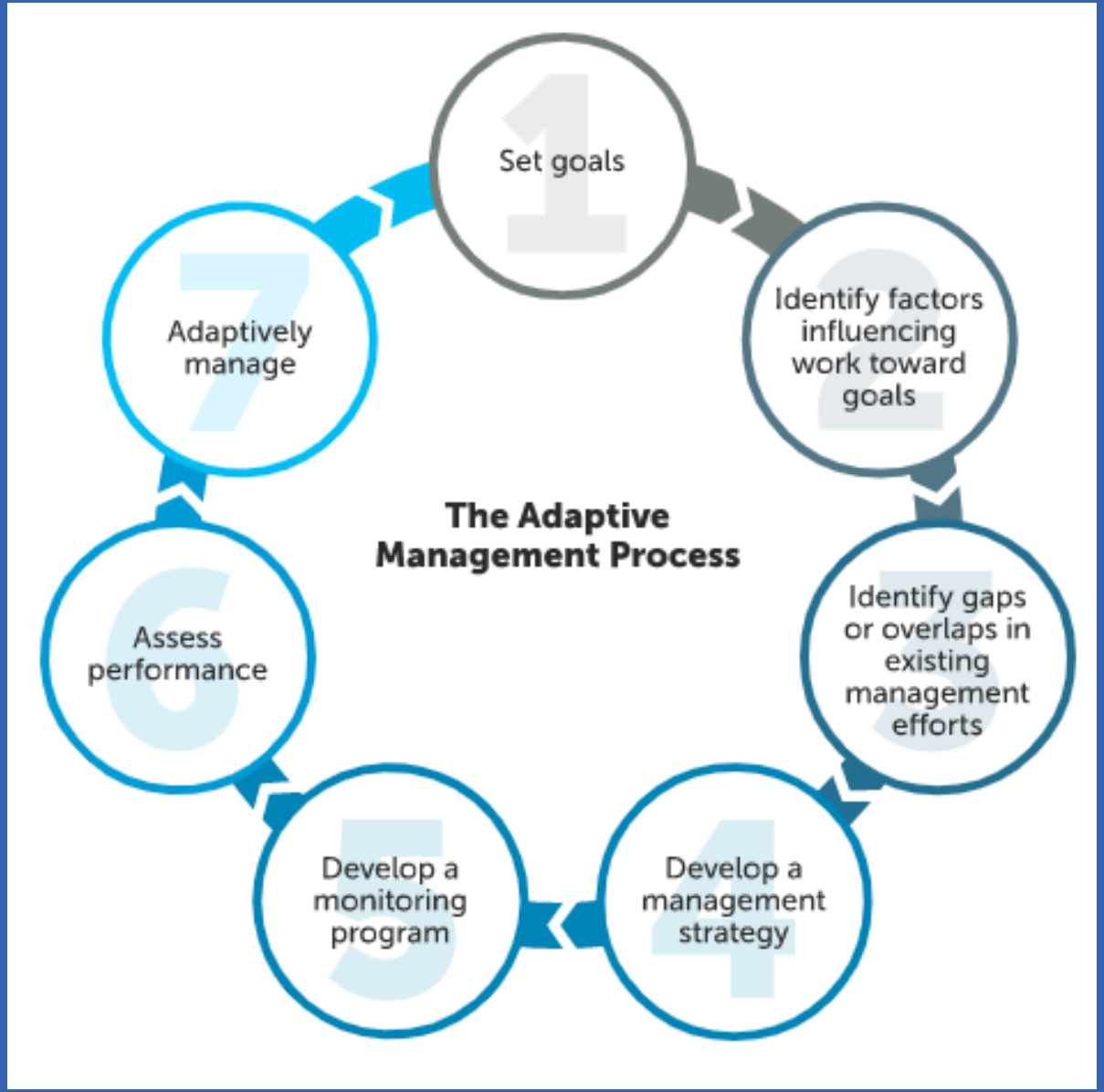
Chesapeake Bay Program
Science. Restoration. Partnership.

Breck Sullivan, STAR Coordinator (USGS)

STAC Quarterly Meeting
3/8/2022

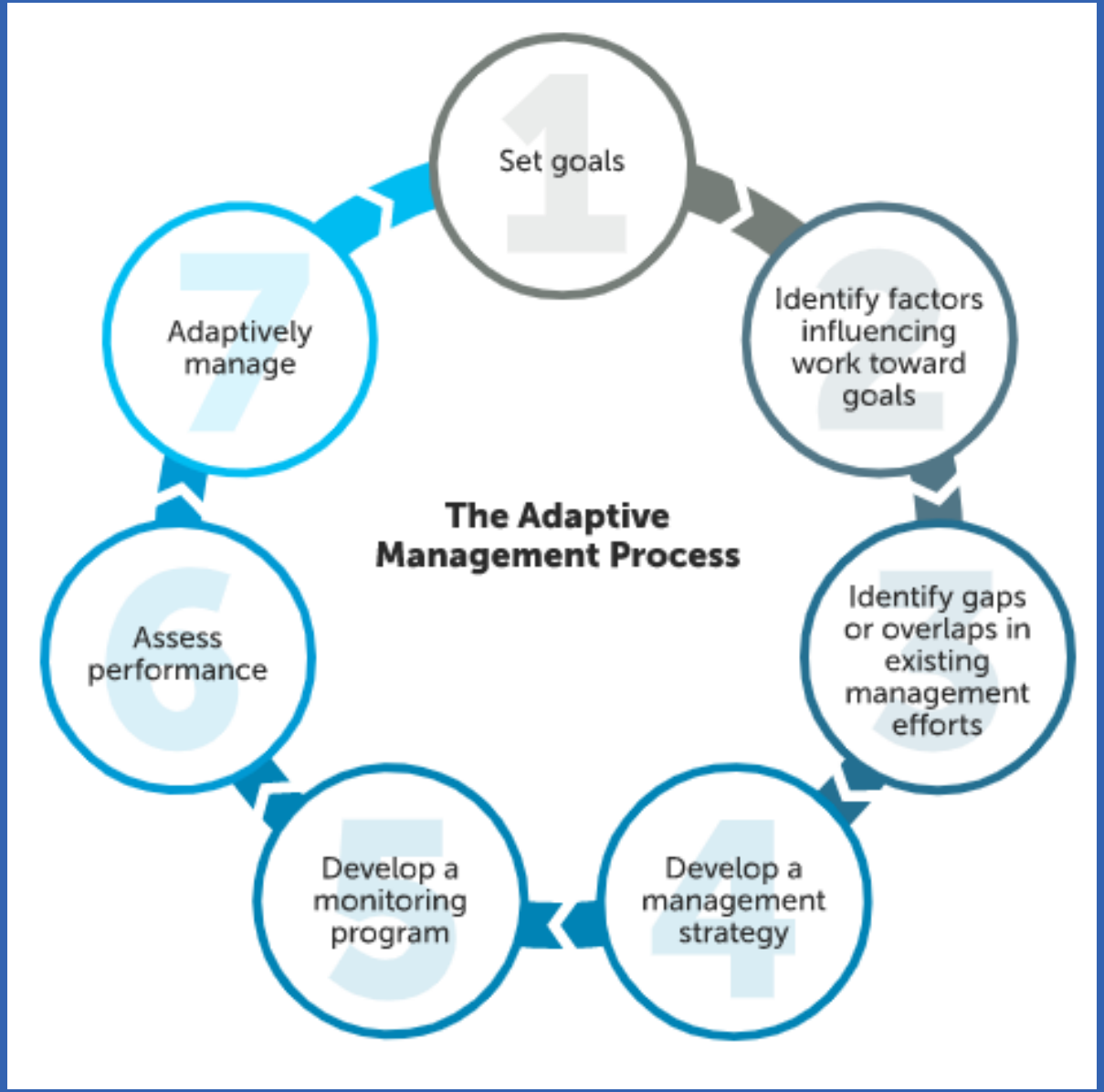
What is the Strategy Review System?

SRS was created to help the CBP apply the adaptive management "decision-making framework" towards achieving the outcomes of the *Chesapeake Bay Watershed Agreement*.

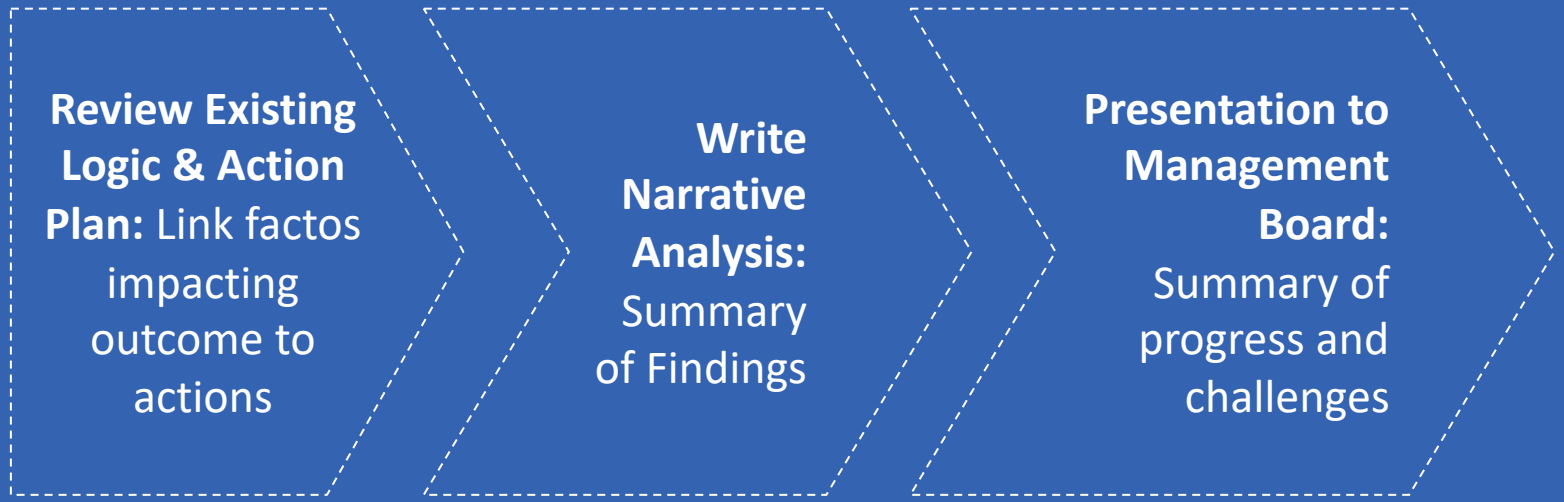


Adaptive Management Framework:

Allows the CBP to take action, monitor results, assess progress, and adjust efforts as needed



When Cohorts assess progress and adjust efforts they consider what policy, financial, and science gaps are needed to be fulfilled to achieve progress towards their outcome.



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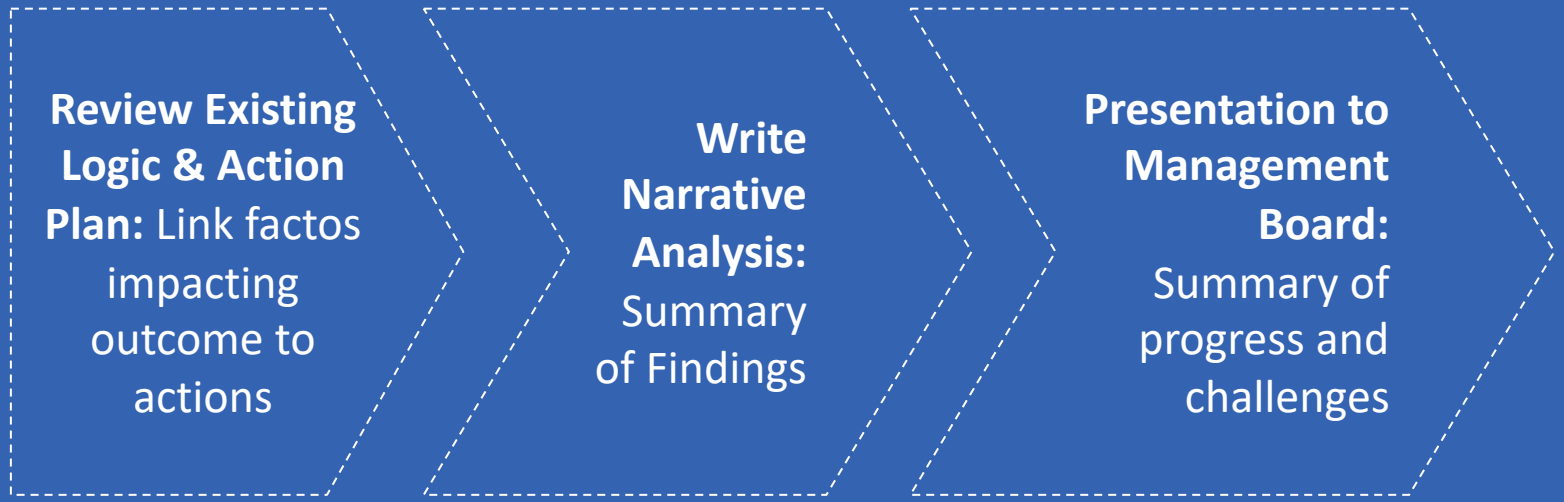

Management Board requested, “develop an approach to identify, track, and help prioritize, both short- and long-term science needs.”

What is the Strategic Science and Research Framework?

SSRF provides a strategic approach to:

- Gather, track, and maintain science needs for different outcomes identified for outcomes
  - This includes science needs identified through the SRS process or STAC workshop recommendations
  - Tracking is through Science Needs Database

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  - This includes sharing and collaborating with the academic community

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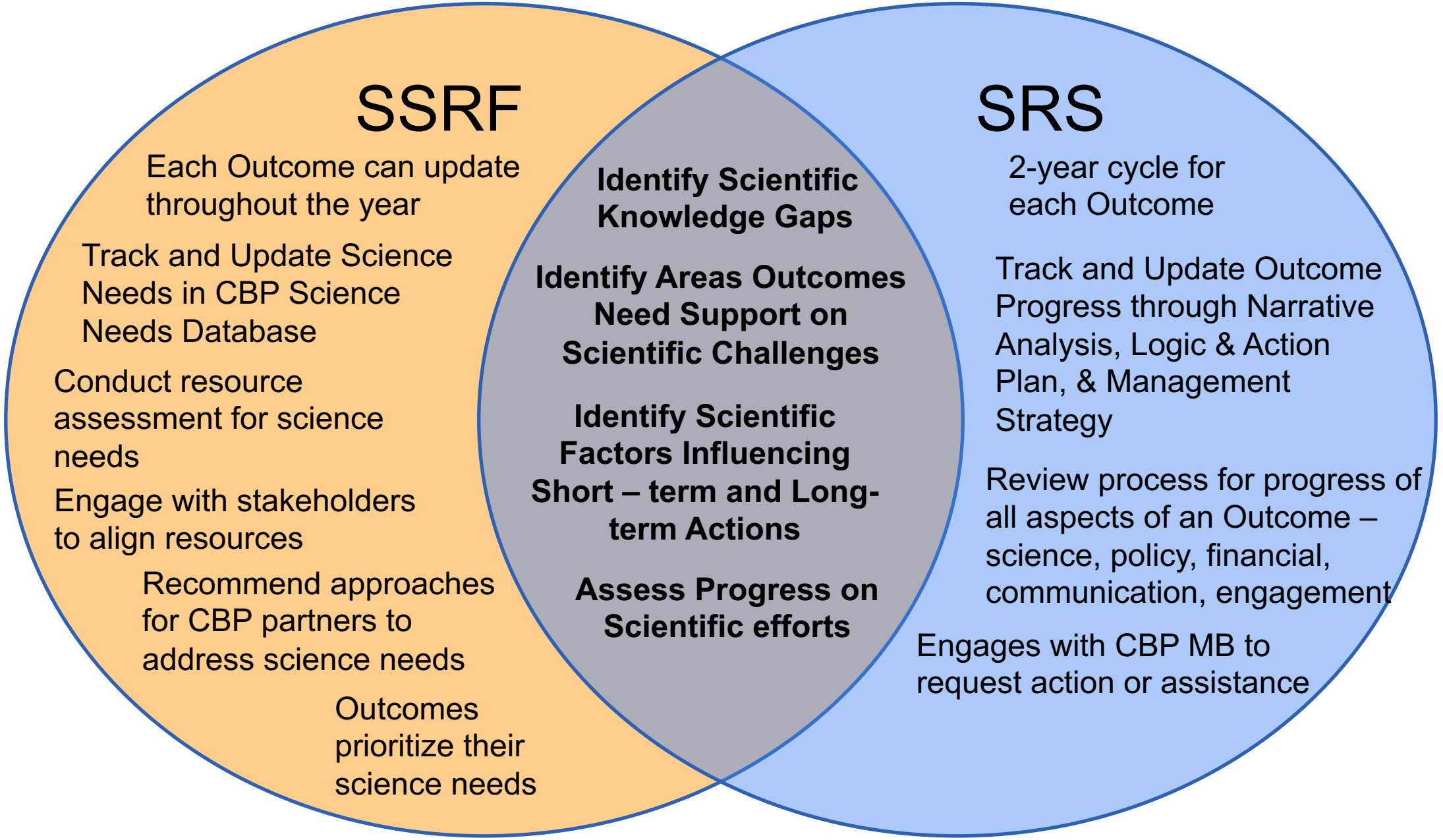
- Focus existing resources to address the science needs
  - This includes sharing and collaborating with the academic community
- Effectively provide science to advance CBP's efforts and decision-making

SSRF and SRF are two different processes, but the processes are complementary.



Chesapeake Bay Program Strategic Science & Research Framework:

Healthy Watershed Cohort

Breck Sullivan, STAR Coordinator
Alison Santoro (MD DNR), Stephen Faulkner (USGS), Bruce Vogt (NOAA), Justin Shapiro (CRC), Renee Thompson (USGS), Olivia Wisner (CRC), Jake Leizear (Chesapeake Conservancy)

STAC Quarterly Meeting
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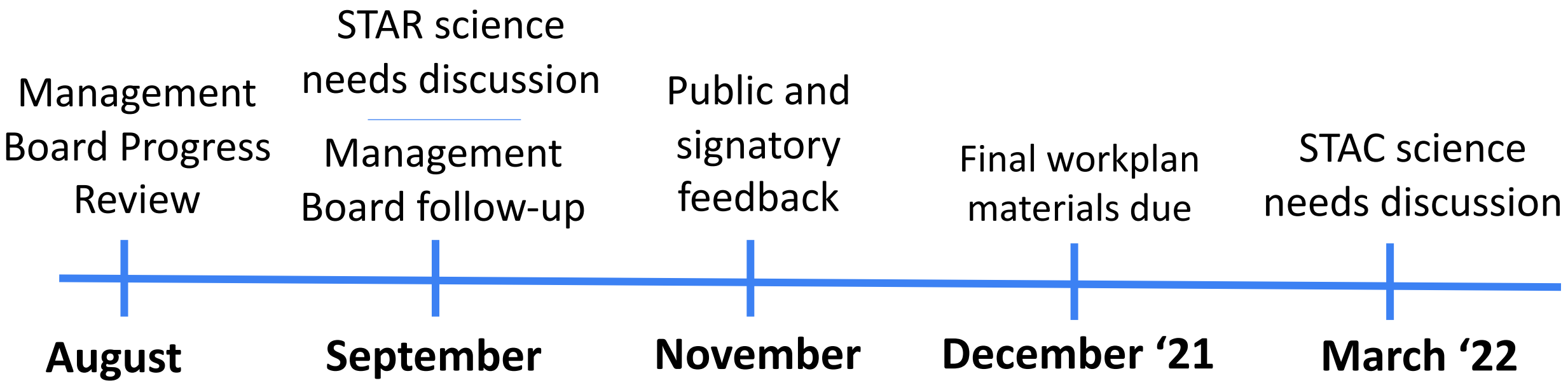
Healthy Watersheds Cohort Schedule



Healthy Watersheds Cohort

Feedback requested from STAC:

- Do you or any of your colleagues have interest in contributing to addressing one of these needs?

- Do you or any of your colleagues know of existing efforts to support one of these needs?

- Do you want more information to come back to STAC from any groups on specific needs/projects?

- Are these needs appropriate? Do you see something missing?

Stream Health Outcome

Benthic data collection from under-represented catchment types

- Freshwater macroinvertebrate data from under-represented catchment types in the Chesapeake watershed are critically needed to fill in monitoring gaps and improve model predictions. Presently “Engaged” resources are very general. Data are pulled from multiple jurisdictions who are monitoring for their own purposes.

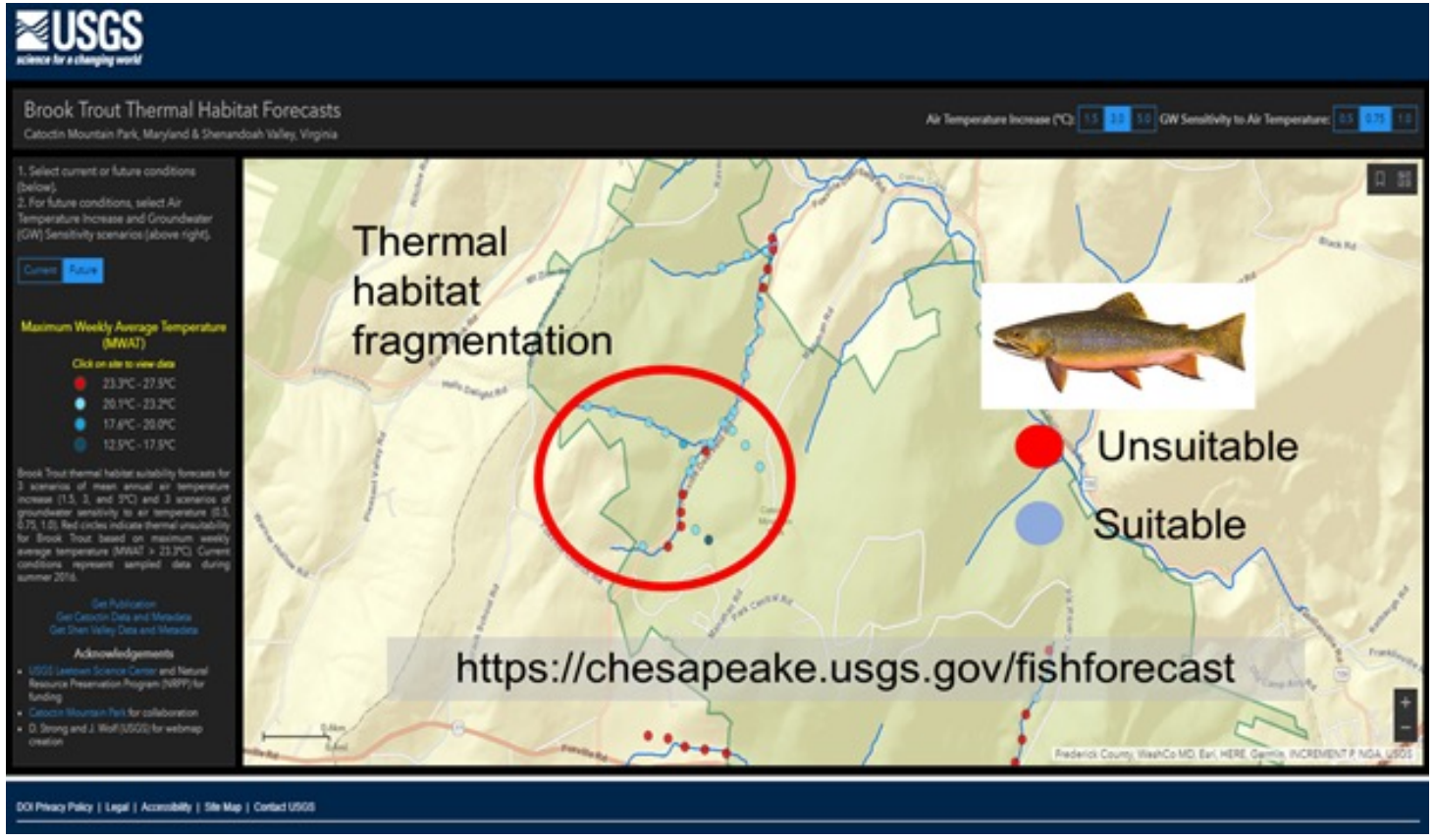
Better understanding of the effects of climate change on stream processes

- Global climate change has increased the occurrence of extreme weather events and has the potential to change patterns of seasonality (annual rainfall, temperature). These changes have the potential to alter fundamental stream processes.
- Separate the impact of climate change vs. management actions on stream health.
    - The negative impacts of climate change may reduce the effects of restoration practices and confound monitoring results.

Brook Trout Outcome Priority Science Needs

1. Expand spatial-temporal groundwater model to rest of Chesapeake Bay Watershed to predict groundwater influence in headwater streams.

- Groundwater can mitigate stream temperatures providing more suitable habitat and prevent loss of brook trout due rising temperatures from changes in climate and land use.
- Need more data on stream reaches with significant groundwater inputs.
- Can't measure everywhere; need models at the stream-reach scale to identify thermally resilient areas to inform management and restoration efforts.

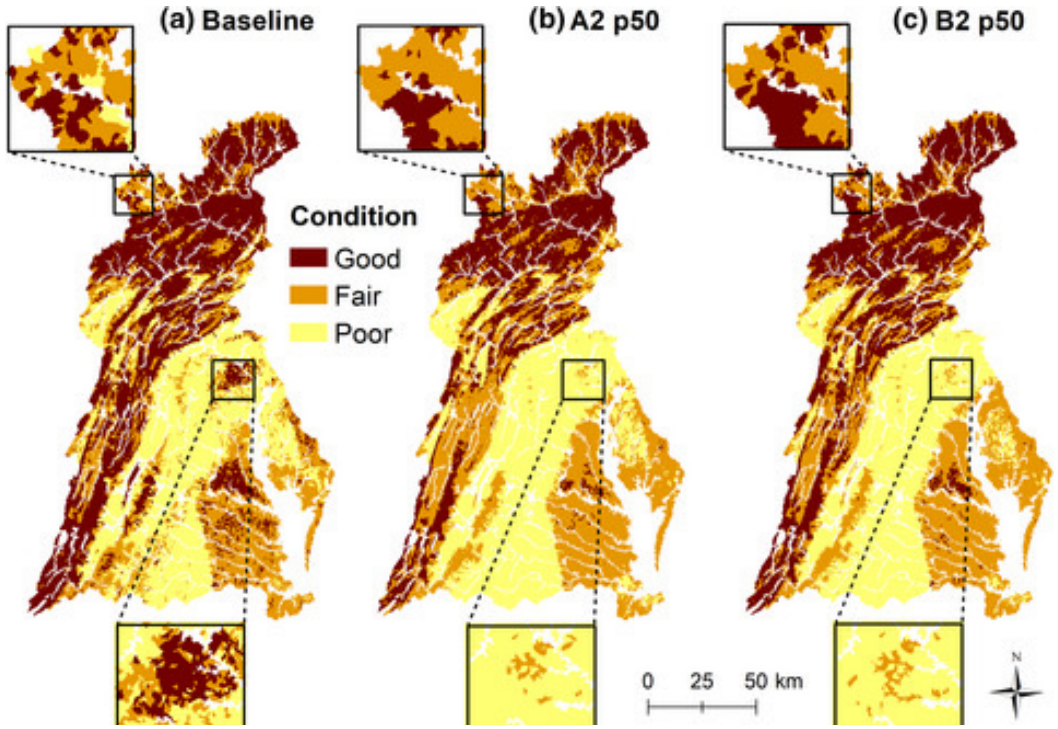


Brook Trout Outcome Priority Science Needs

2. Determine how interactions between climate change and land use will affect brook trout.

- Some climate models suggest the Chesapeake Bay watershed will experience some of the most significant warming in the contiguous United States in addition to increased population growth resulting in changes to land-use patterns in coming decades.
- Small streams are particularly susceptible to land-use and climate change; impacts will significantly affect brook trout populations.
- Recent studies indicate combined scenarios reveal an interactive response in stream condition that was different than the additive effects of land-use and climate.

Maloney KO, Krause KP, Buchanan C, et al. Disentangling the potential effects of land-use and climate change on stream conditions. Glob Change Biol. 2020;26:2251–2269.



State of Science Needs for the Fish Habitat Action Team

Bruce Vogt and Justin Shapiro

Research Science Needs

- ***Synthesis and indicators to support Ecosystem Based Fisheries Management at bay and regional fishery management level***
  - *Ex. Evaluating how changing conditions (T, S, DO) affect fish distribution and abundances by analyzing long term water column observation data with fishery survey data*
  - *Ex. State of the Ecosystem Report*

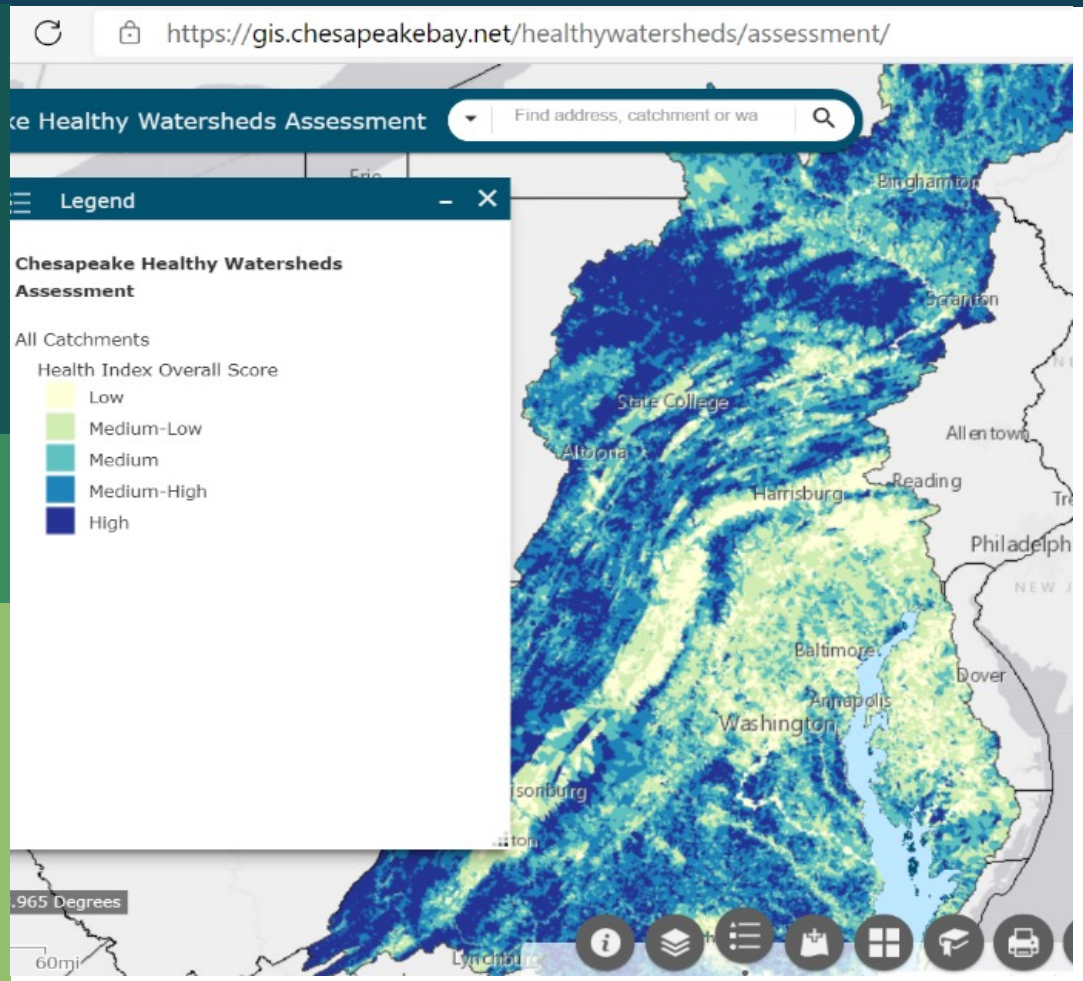
- ***Research to quantify success of nearshore/shoreline restoration sites***
  - *Ex. fish abundance/diversity found across various restoration project types*

- ***Better understand climate change impacts on water quality and fish habitat***
  - *Ex. Changes to salinity, flow rates, and other habitat conditions and development of habitat suitability models and forecasts*
  - *Ex. Leverage new telemetry arrays to track fish movements and relate to habitat conditions*

Healthy Watersheds Outcome Science Needs

Renee Thompson, Coordinator,
Maintain Healthy Watersheds GIT
Geographer, USGS, CPB

Science to inform outcome:



Outcome: 100 percent of state-identified healthy waters and watersheds remain healthy.

Indicator development :

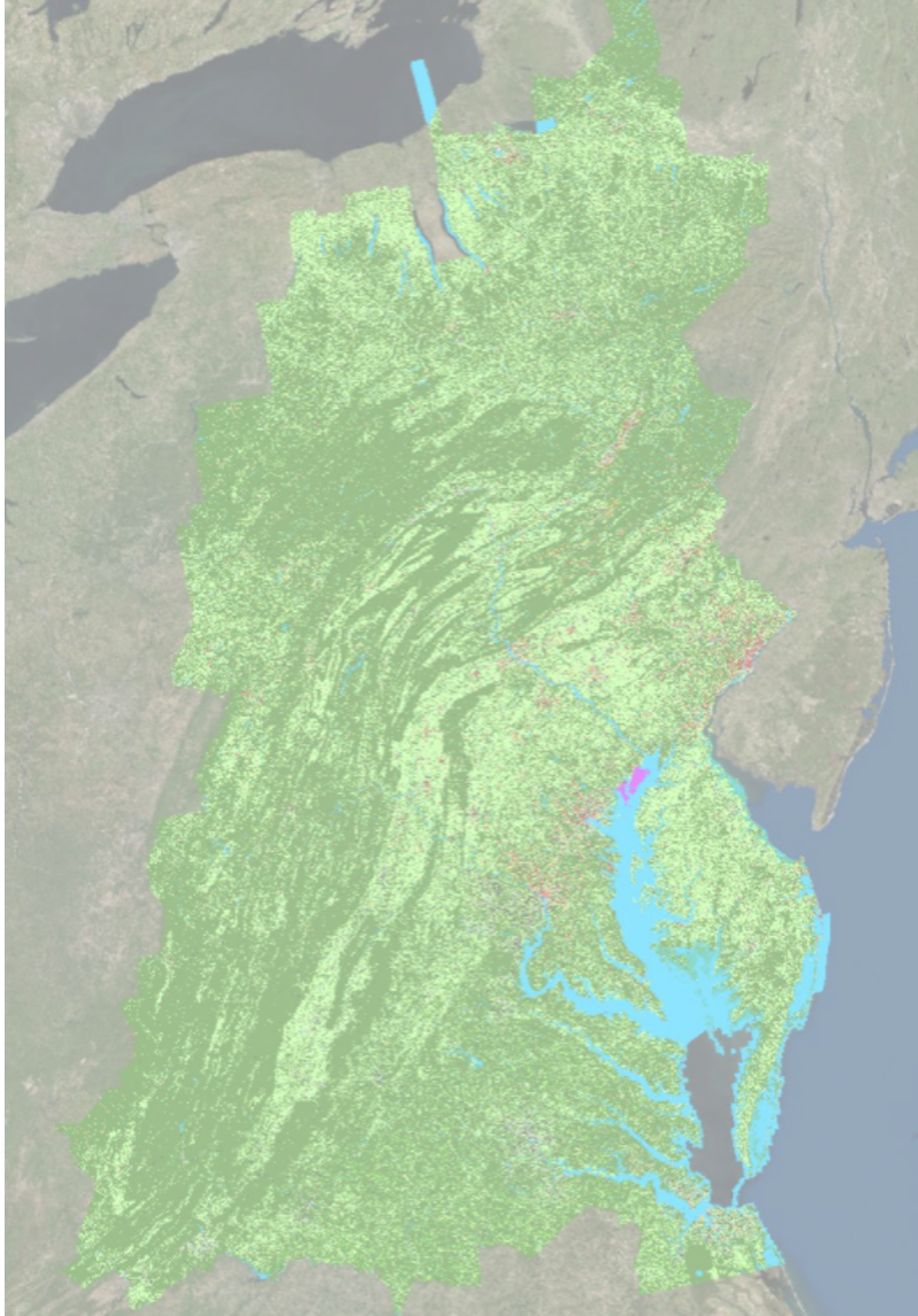
- impervious surface, development pressure and proportion of healthy watersheds protected (interim 2023)
- Healthy Watersheds Assessment 2.0 tool in 2022-2023.
  - Integrate marsh migration, resiliency, rising stream temperature, and thresholds and stressors related to the spectrum of watershed health and vulnerability.

Land Use Metrics / Hi Resolution Data

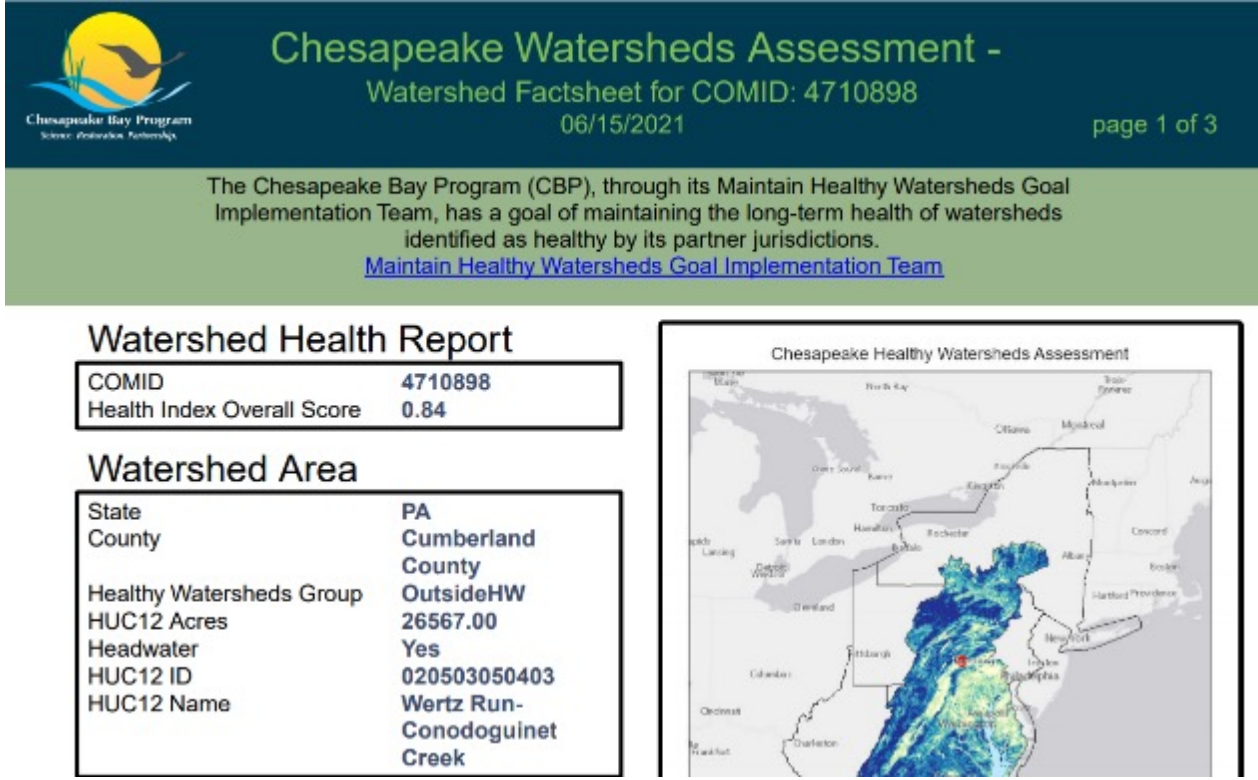
- very-high resolution land cover/use change monitoring currently is funded only until 2024, needs to be extended through at least the year 2030 and beyond.

Online tools (localized and scalable):

- Assess changes in impervious cover, turf grass, forests, wetlands (loss only), tree canopy, and agriculture, for any user-specified geography (e.g., user-drawn polygons, Census Tracts, Municipalities, etc.)



User Experience and Research / Synthesis and Communication



Chesapeake Watersheds Assessment -
Watershed Factsheet for COMID: 4710898
06/15/2021
page 1 of 3

The Chesapeake Bay Program (CBP), through its Maintain Healthy Watersheds Goal Implementation Team, has a goal of maintaining the long-term health of watersheds identified as healthy by its partner jurisdictions.
Maintain Healthy Watersheds Goal Implementation Team

Watershed Health Report

COMID	4710898
Health Index Overall Score	0.84

Watershed Area

State	PA
County	Cumberland County
Healthy Watersheds Group	OutsideHW
HUC12 Acres	26567.00
Headwater	Yes
HUC12 ID	020503050403
HUC12 Name	Wertz Run-Conodoguinet Creek

Chesapeake Healthy Watersheds Assessment

- Understanding end user needs (of different stakeholder audiences)
- Improvements to data and communication to meet local needs
- Communication, Translation, (pathways), and Engagement.
- Translate, format, package and flow information through to trusted sources.
- How to effectively engage locals directly

Protected Lands Outcome Science Need

(NEW) Synthesis of Studies on Human Health and Outdoor Green Space

- Urgent need to provide green spaces that support improved public health, especially in traditionally underserved communities in both rural and urban settings
- Does a synthesis like this already exist that you know of?
- Are you familiar with any studies that should be included in a synthesis like this?

Chesapeake Bay Program Strategic Science & Research Framework:

Aquatic Life Cohort

Breck Sullivan, STAR Coordinator
Brooke Landry (MD DNR), Mandy Bromilow (ERT), Bruce Vogt (NOAA), Justin Shapiro (CRC)

STAC Quarterly Meeting
3/8/2022

Submerged Aquatic Vegetation:

Science and Research needs summary

Restoration science:

- Research into the design and benefits of co-locating SAV and bivalve restoration (oysters, clams, freshwater mussles).
- Continued research into restoration protocols for various high value species.

Updated Habitat Requirements

- Current habitat requirements (N, P, TSS, Chl a, Kd/Secchi depth) are based on the requirements of existing, stable beds rather than seedlings or newly established/restored beds. The dynamic changes in SAV and water quality over the last decade provide the data necessary to update the habitat requirements for SAV to recover, which may inform needed updates to the TMDL.

Carbon Sequestration Capacity of CB SAV

- A detailed study of carbon sequestration capacity (and potential offset by methane production in the TF/OH) of all of the Bay's SAV communities is necessary to join the voluntary carbon market.

State of Science Needs for Oyster Outcome

Current Ongoing Needs

- **Quantifying ecosystem services and economic impact**
  - The large-scale restoration can continue to serve as living lab to understand ecosystem services
  - 7- year ‘Oyster Reef Ecosystem Services’ project complete
- **Oyster restoration BMP**
  - In situ methods and quantification of denitrification rates by restored reefs over a range of Bay conditions

Emerging Science Needs

- **Climate Change impacts and adaptation**
  - Understanding impacts of climate and weather change on oyster restoration and productivity (ex: OA, salinity and temp changes, etc)
  - Evaluating oysters as green infrastructure to provide shoreline resilience

- **Refining restoration approaches**
  - Modeling and mapping larval source/sink dynamics
  - Analyzing reef performance to inform future restoration
  - Evaluating if tributary-based, large scale restoration is the appropriate scale to develop self sustaining reefs that are resilient to seasonal and interannual stressors
  - Spatial analysis informing ways to best link restoration, wild harvest, and aquaculture at a tributary scale

State of Science Needs for Blue Crab Abundance Outcome

Mandy Bromilow

Blue Crab Science Needs

Improving Model Performance

- Currently the primary focus for CBSAC
- Immediately useful for management

Understanding Blue Crab Ecology

- Of great interest, but not as high priority for CBSAC
- Not immediately useful for management; EBFM is not applied to the blue crab fishery

Blue Crab Science Needs

Improving Model Performance

- Investigate potential applications of existing fishery-independent data sets (e.g., environmental effects on catchability, seasonal and sex-specific distributions)

Understanding Blue Crab Ecology

- Evaluate the effects of environmental factors on blue crab abundance and recruitment

State of Science Needs for the Forage Outcome

Research Science Needs

- ***Climate related changes in fish distribution***
  - *Ongoing example:. Ongoing GIT-funded work exploring the relationship between forage indices and key climate indices*

- ***Indicators to support Ecosystem Based Fisheries Management at bay and regional fishery management level***
  - *Ongoing examples: Development of habitat suitability models for top forage species (bay anchovy and juvenile spot, establishing relationships between habitat suitability and forage abundance*
  - *Ongoing: Development of Bay specific abundance estimates for striped bass which can be used to assess the impacts of multiple stressors on bay populations*

- ***Better understand relationships between phyto/zoo plankton base and key Chesapeake Bay fish species***
  - *Ex. Examining plankton abundance in striped bass spawning areas and evaluating relationships*

Resources

CBP Science Needs Database:

- https://star.chesapeakebay.net/

Healthy Watersheds Cohort STAR Science Needs Presentations

- Presentations provide additional science needs then presented today and includes additional details
- https://www.chesapeakebay.net/what/event/scientific_technical_assessment_and_reporting_star_team_meeting_septem2

Aquatic Life Cohort STAR Science Needs Presentations

- https://www.chesapeakebay.net/what/event/joint_c_s_star_december_2021_meeting

Chesapeake Bay Program Strategic Science & Research Framework:

Healthy Watersheds and Aquatic Life Cohorts

Breck Sullivan, STAR Coordinator

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