Chesapeake Bay Program Strategic Science & Research Framework: Climate Change and Resiliency

Breck Sullivan, STAR Co-Staffer
Pam Mason (VIMS), Ben Lewis (VA DWR), Mark Bennett (USGS)

STAC Quarterly Meeting
3/23/2021

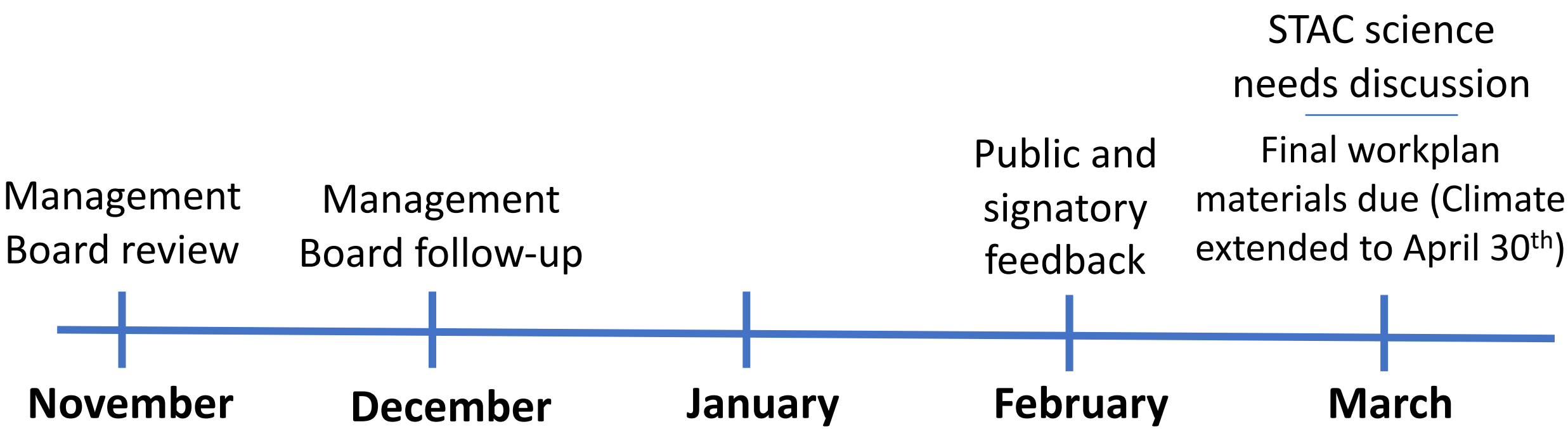
Reminder: CBP Strategy Review System (SRS)

- Cohorts of workgroups for each outcome report progress to Management Board
- Workgroups develop and update short-term action plans for achievement of long-term goals
- New 2019: incorporated Strategic Science & Research Framework into SRS

Climate Change and Resiliency Cohort

- Wetlands
- Black Duck
- Climate Monitoring & Assessment
- Climate Adaptation

Clean Water cohort SRS schedule



Climate Change and Resiliency Cohort

Feedback requested from STAC:

- Do you or any of your colleagues have interest in contributing to addressing 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?
- Do you have recommendations on ways to improve our engagement with you through this process?

Wetland Outcome

Outcome: *Continually increase the capacity of wetlands to provide water quality and habitat benefits throughout the watershed. Create or reestablish 85,000 acres of tidal and non-tidal wetlands and enhance function of an additional 150,000 acres of degraded wetlands by 2025. These activities may occur in any land use (including urban), but primarily occur in agricultural or natural landscapes.*

Wetland Outcome

Science needs:

- Identify areas where wetland restoration would greatly benefit water quality and habitat.
  - Consider capacity based on wetland type and opportunity based on landscape position.
  - Develop models to considered multiple benefits.
- Coordinate with Black Duck and Fish Habitat Action Teams to identify potential wetland projects/areas that are suitable black duck and fish habitat.
  - Shared meeting

Wetland Outcome

Science needs continued:

- Assess the impacts on wetland extent, distribution and function due to climate change. Particularly isolated (groundwater) non-tidal wetlands.
  - Starting to understand impacts to tidal wetlands (GIT funded project). Little understanding of riverine and groundwater wetlands.
- Understanding the extent and amount of tile and open ditch drainage within the major 10-digit HUC watersheds and how hydrologic modifications lead to wetland acreage and functional loss. How do these changes affect watershed functions that factor into nutrient processing.
  - The historic ditching and drainage of wetlands changes areal extent and function.
  - Ditched tidal marshes may be more susceptible to drowning
  - Drained, or partially drained, nontidal wetlands could be priorities for restoration

Black Duck Outcome

Outcome: *By 2025, restore, enhance and preserve wetland habitats that support a wintering population of 100,000 black ducks, a species representative of the health of tidal marshes across the watershed. Refine population targets through 2025 based on best available science.*

Black Duck Outcome

Science needs:

- Development of new black duck indicator
- Fully evaluate and model the recent sea level rise scenarios and how they are impacting black duck habitat (energetic availability and refugia) in the Chesapeake.
- Evaluate ABDU Decision Support Tool assumptions and update with updated SLAMM and Urban growth model data.

Climate Monitoring & Assessment Outcome

Outcome: *Continually monitor and assess the trends and likely impacts of changing climatic and sea level conditions on the Chesapeake Bay ecosystem, including the effectiveness of restoration and protection policies, programs and projects.*

Climate Monitoring & Assessment Outcome

Science needs:

- Better understanding of precipitation changes with regards to intensity, annual amounts, seasonal impacts, storm events and stormwater management
- Data and research needs for impacts of SLR, storm surge, increased temperatures, extreme precipitation events and saltwater inundation on BMP climate resilience (i.e., maintenance, shelf life, siting and design, etc.)
- Method/metrics to track climate resilience progress related to Chesapeake Bay Watershed Agreement goals
- Better understanding of sea level rise and subsidence impacts related to wetland loss, marsh migration, and adjacent land use considerations

Climate Adaptation Outcome

Outcome: *Continually pursue, design, and construct restoration and protection projects to enhance the resiliency of Bay and aquatic ecosystems from the impacts of coastal erosion, coastal flooding, more intense and more frequent storms and sea-level rise.*

Climate Adaptation Outcome

Science needs:

- Changing climate conditions and their impacts on SAV
- Better understanding of green infrastructure (e.g., living shorelines) performance in building resilience to climate change impacts, cost-effectiveness of these strategies, and potential unintended consequences to other restoration metrics (e.g., sediment dynamics)
- Evaluation of science needs to implement blue carbon financing strategies
- Saltwater inundation impacts on wetland habitats (e.g., brackish waters), SAV, and land use (e.g., ag, forest)
- Effective designs for combining gray-green infrastructure approaches

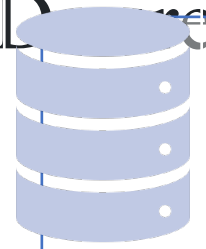
Impact of SLR on wetlands Science Need

Better understanding of sea level rise and subsidence impacts related to wetland loss, marsh migration, and adjacent land use considerations

- Projected sea level rise suggest wetland loss could be substantial in the Chesapeake Bay. There is a need to better understand the extent of the problem:
  - Non-uniform aspects of subsidence and SLR
  - Availability of sediment for wetland stability
  - Ability of wetlands to retreat
  - Release of sediment and nutrients from failing wetlands

Impact of SLR on wetlands Science Need

- Current Resource:
  - FY20 GIT-Funded project, "Synthesis of Shoreline, Sea Level Rise, and Marsh Migration Data for Wetland Restoration Targeting“
  - Desired Outcomes:



Data Synthesis: Compilation of metadata of available studies/data related to sea level rise, topography, shoreline condition, wetland area, and migration corridors.

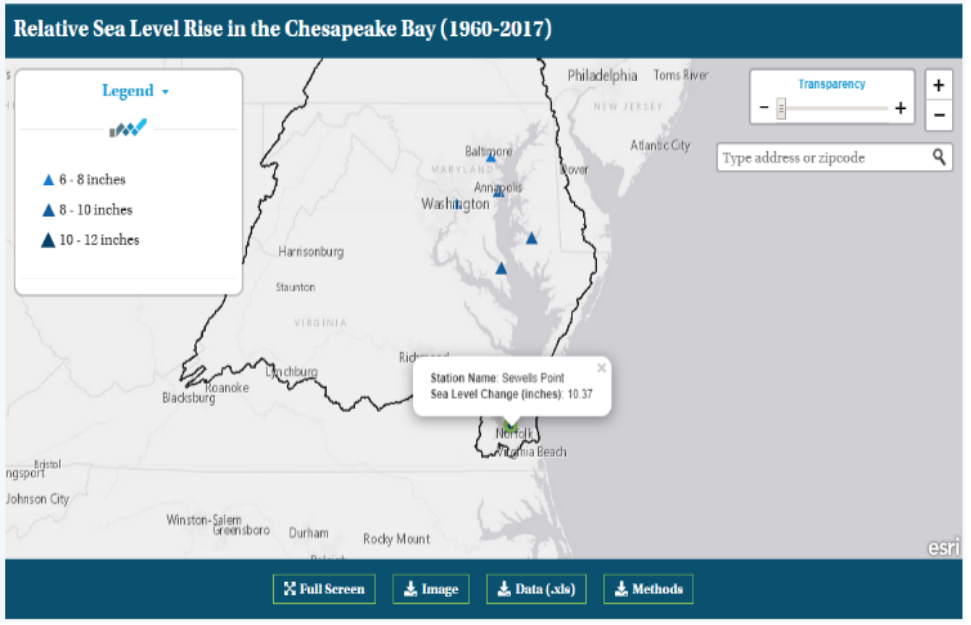
Pilot Project: Apply synthesized information to wetland restoration and conservation targeting at a fine-scale, directly influencing decision-making in an area of interest by working with local stakeholders.

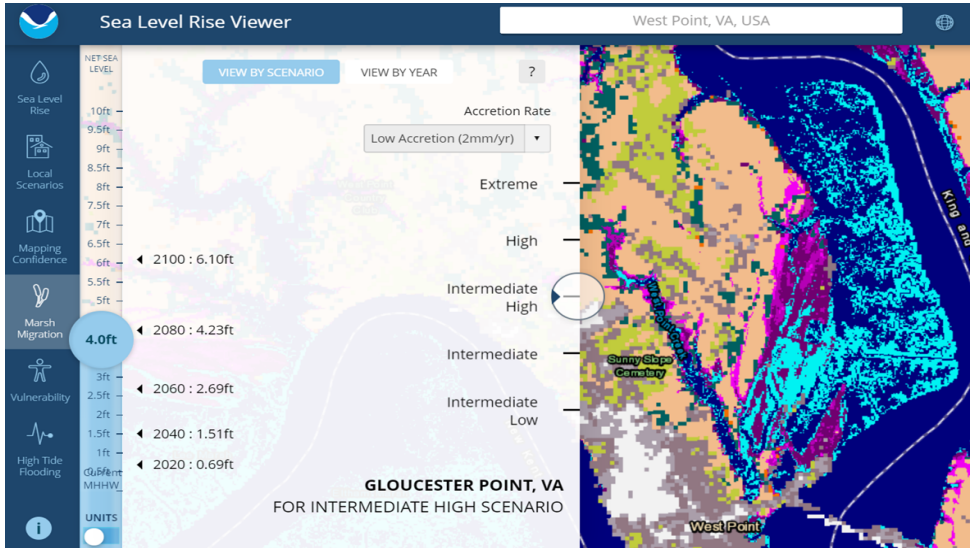
Data Methodology: Make this process accessible and replicable in other communities.

Impact of SLR on wetlands Science Need

Chesapeake Bay Program
Science. Restoration. Partnership.

- Current CBP SLR Indicator
  - data from tide-gauge stations
  - Not very useful for management decision making
- The Data Synthesis from GIT-Funded Project will hopefully inform revision to SLR Indicator
  - Utility: Assess wetland losses (conversion to open water) and gains (migration potential related to adjacent land-use) using sea level rise projections
  - Exploring location-based indicator





Impact of SLR on wetlands Science Need

- Do you or any of your colleagues currently address a research gap for this science need?

- For the GIT-Funded project, what are some potential data sources we could look at/provide to the contractor as a starting point?

- For the revised indicator, are their any potential indicator developers?

Impact of climate change on BMPs Science Need

Data and research needs for impacts of SLR, storm surge, increased temperatures, extreme precipitation events and saltwater inundation on BMP climate resilience (i.e., maintenance, shelf life, siting and design, etc.)

- Pressing and ongoing research need of the CBP
- Direct response to a PSC directive to the CBP to, "Develop a better understanding of the BMP responses, including new or other emerging BMPs, to climate change conditions."

Impact of climate change on BMPs Science Need

- Current Resources:
  - Virginia Tech - STAC funded climate science synthesis project assessing climate resilience of urban, ag, and natural BMPs
  - NOAA – NOAA-EPA Inter-Agency Agreement funding added to the above STAC project assessing climate change impacts to tidal water BMPs with habitat/fish co-benefits
    - Combined report will be submitted end of September 2021

Impact of climate change on BMPs Science Need

- Current Resources:
  - CSN - Chesapeake Stormwater Network-EPA Cooperative Agreement assessing climate vulnerability of urban stormwater BMPs
    - Report should be completed this week.
  - Rand Corporation – FY19 GIT-Funding for piloting development of IDF curves for the Chesapeake Bay Watershed.

- Potential Resource – STAC Water Temperature Workshop

Impact of climate change on BMPs Science Need

- There is no recurring funding to fully answer the request from the PSC and fulfilling the request is extensive.

- Such an undertaking would be infeasible for the CRWG to tackle alone and will require overarching CBP Partnership support and dedicated-funding.

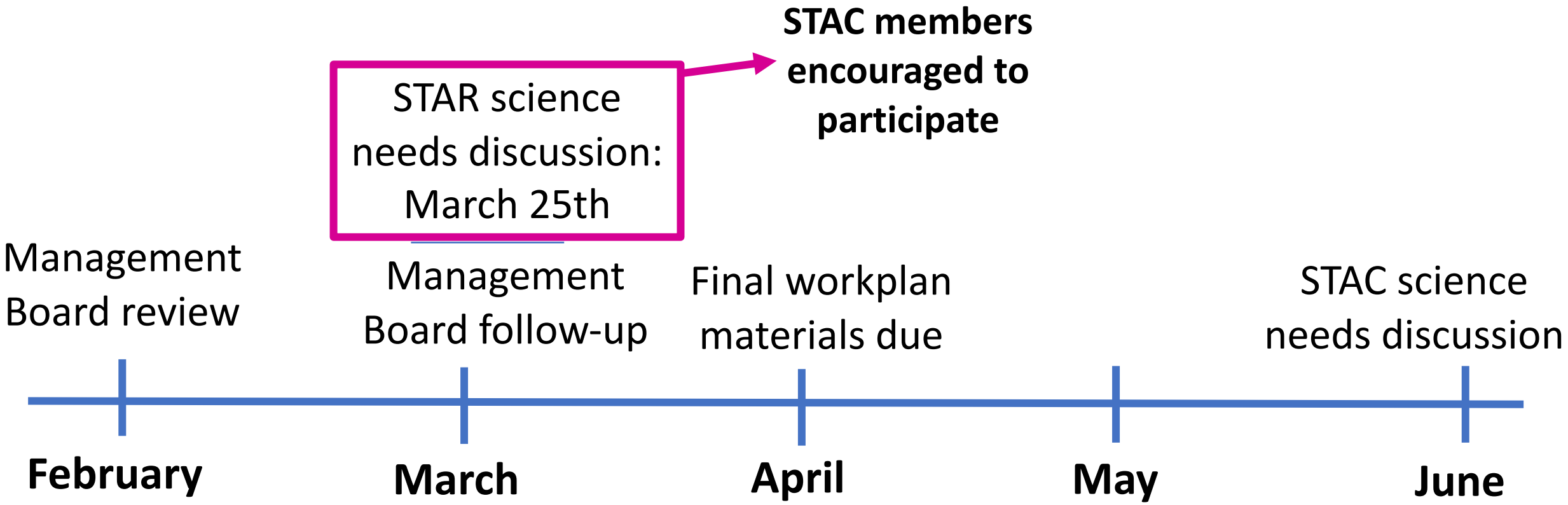
- The CRWG is working with the Management Board to identify which BMPs have the greatest need for climate change research and next steps.

Impact of climate change on BMPs Science Need

- Do you or any of your colleagues currently address a research gap for this science need?

- Do you or any of your colleagues know of funding strategies to meet this need?

Local Action Cohort SRS Schedule



Local Action Cohort SRS Schedule

- **Tree Canopy:** *Continually increase urban tree canopy capacity to provide air quality, water quality and habitat benefits throughout the watershed. Expand urban tree canopy by 2,400 acres by 2025.*

Local Action Cohort SRS Schedule

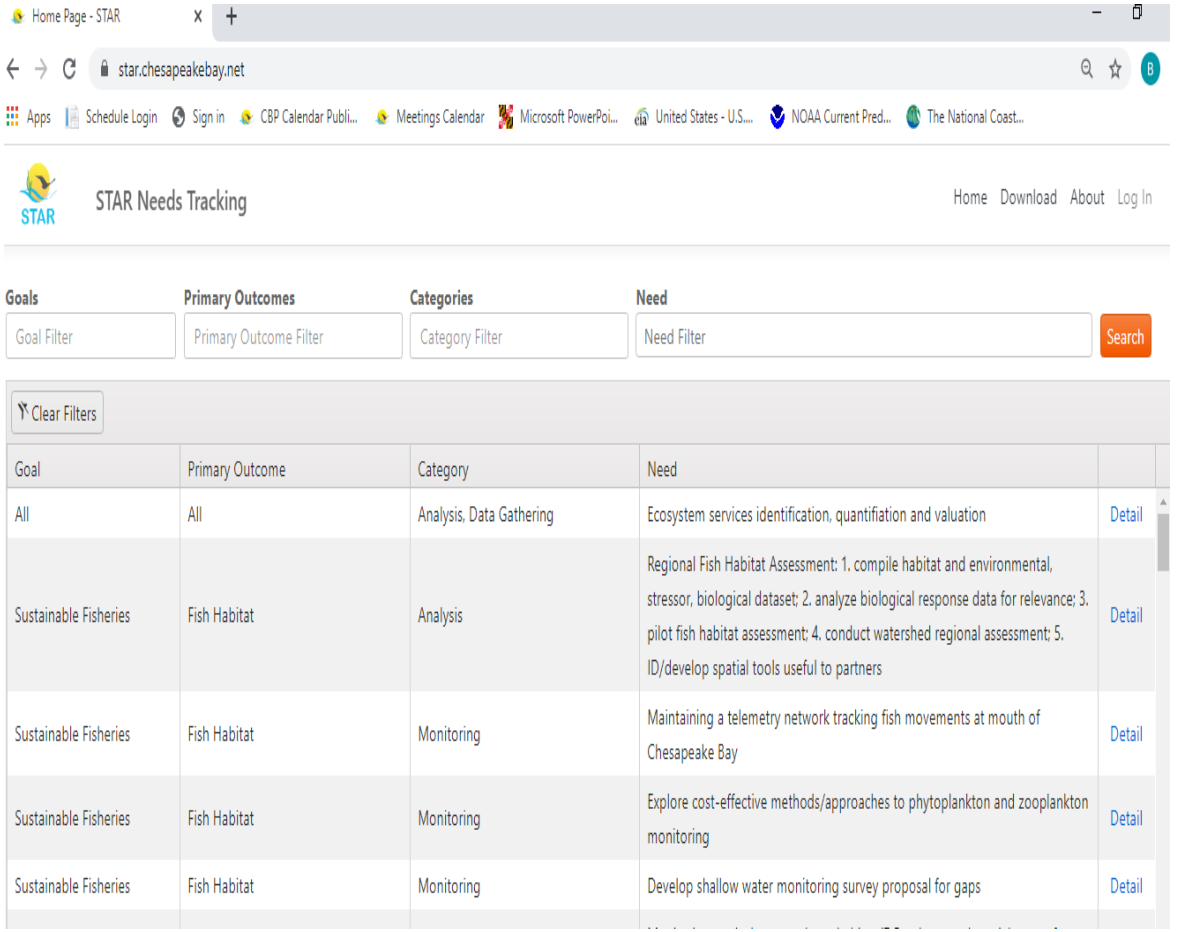
- **Land Use Options Evaluation:** *By the end of 2017, with the direct involvement of local governments or their representatives, evaluate policy options, incentives and planning tools that could assist them in continually improving their capacity to the reduce the rate of conversion of agricultural lands, forests and wetlands as well as the rate of changing landscapes from more natural lands that soak up pollutants to those that are paved over, hardscaped or otherwise impervious. Strategies should be developed for supporting local governments' and others' efforts in reducing these rates by 2025 and beyond.*

Local Action Cohort SRS Schedule

- **Land Use Methods and Metrics Development:** *Continually improve our knowledge of land conversion and the associated impacts throughout the watershed. By December 2021, develop a watershed-wide methodology and local-level metrics for characterizing the rate of farmland, forest and wetland conversion, measuring the extent and rate of change in impervious surface coverage and quantifying the potential impacts of land conversion to water quality, healthy watersheds and communities. Launch a public awareness campaign to share this information with local governments, elected officials and stakeholders.*

CBP Science Needs Database

- All Science Needs are available on the database: https://star.chesapeakebay.net/
- Please provide any feedback or recommendations on how to improve the database to Breck Sullivan, bsullivan@chesapeakebay.net



Chesapeake Bay Program Strategic Science & Research Framework: Climate Change and Resiliency

Breck Sullivan, STAR Co-Staffer

bsullivan@chesapeakebay.net