

Proposed Climate Change Indicators for CBP Partnership to Focus On

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Request

- The Climate Resiliency Workgroup (CRWG), in coordination with STAR leadership and the Status and Trends Workgroup, will provide a descriptive list of which climate indicators have been prioritized based on requests from other GIT workgroups, recommended timeframes for updating, and potential responsible party for maintaining.
- Discussed list of climate change indicators during STAR February 2021 meeting.

Background on CBP Climate Change Indicators

- 2017-2018: [Climate Change Indicators for the Chesapeake Bay Program Implementation Strategy](#) developed through GIT-Funded project with ERG
 - ERG identified 210 potential climate change indicator topics
 - 21 climate change indicator topics were prioritized for inclusion in the implementation plan based on workgroup input, feasibility, and data available
 - 7 of the 21 climate change indicators had data and methods already available to post on [Chesapeake Progress](#) through partnership effort with U.S. EPA National Indicator Team

Challenges

- Management purposes for the existing climate change indicators were not clearly defined. They were not being used by the other workgroups?
- Majority of outcomes in the Chesapeake Bay Watershed Agreement are affected by climate change.
- Time-intensive to develop—involves complex data integration/synthesis.
- Any indicator developed also needs to be updated—requires coordination & updating of data analyses and metadata documentation.
- CRWG has limited resources and capacity for climate change indicator work—partners needed.

Guiding Principles Moving Forward with Climate Change Indicators

- Has clearly defined management purpose to inform adaptation decision-making for Chesapeake Bay Watershed Agreement outcomes (e.g., water quality, habitats, living resources)
- Has respective workgroup to lead coordination in updating the climate change indicators related to their outcome(s) and review metadata documentation
- Has agency/organization committed to being the indicator developer (pulls data, formats indicator, run stats)

CRWG Role

- Assist workgroups in identifying management purposes related to climate change impacts and adaptation strategies
- Help identify potential data sources and indicator developers
- Collaborate with workgroups on GIT-funded projects aimed to develop and/or update climate change indicators
- Advise on result summaries for Chesapeake Progress

CRWG-Proposed Climate Change Indicator Decisions

Exists On Chesapeake Progress

- Leave Method As Is—Updates Planned
 - Avg. Air Temperature Increase
 - Total Annual Precip Change
- Possible Refinement of Method to Better Connect with Chesapeake Bay Outcomes
 - Stream Temperature Change*
 - Relative Sea Level Rise
 - Change in High Temperature Extremes
- Static—No Updates Planned (Need Lead to Better Connect with Chesapeake Bay Outcomes)
 - River Flood Frequency*
 - River Flood Magnitude*

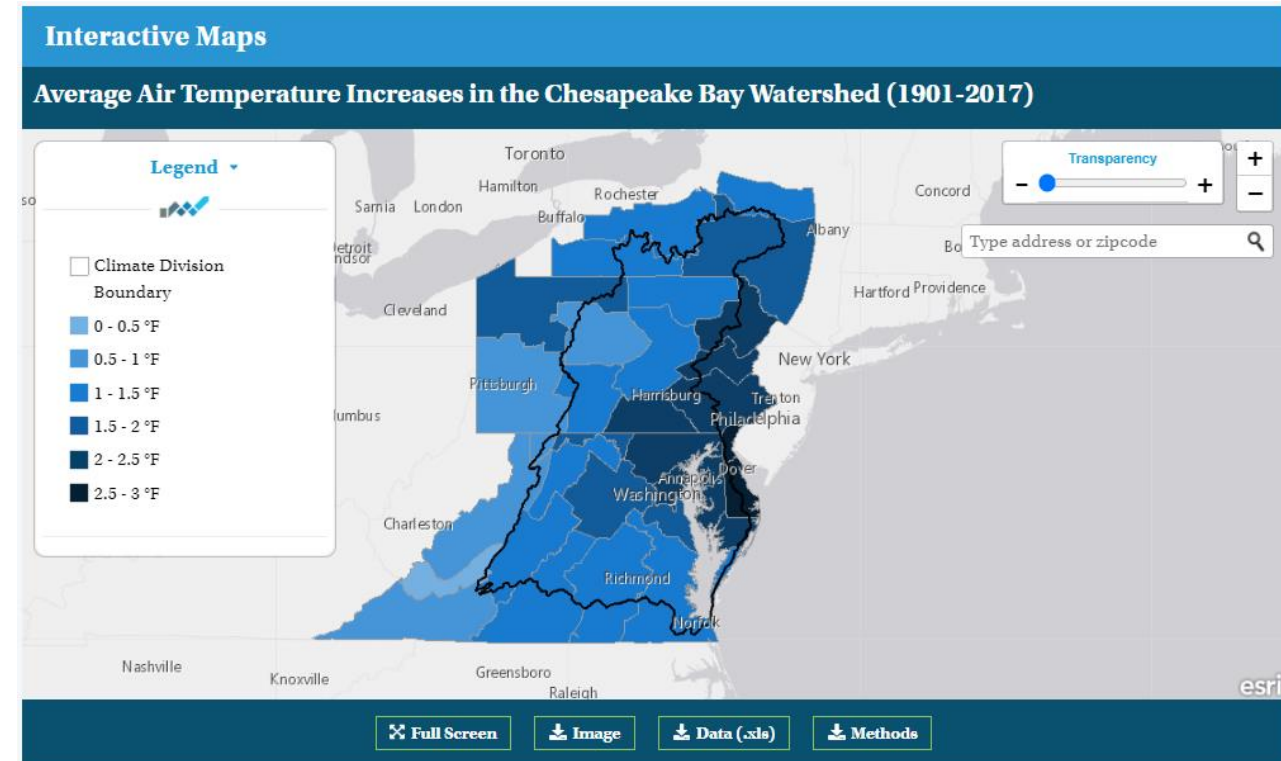
New (Not Currently on Chesapeake Progress)

- Method being Explored
 - Tidal Bay Water Temperature Change

*data updates currently not available

Existing (Leave Method As Is) – Air Temperature and Precipitation Change

- **Average Air Temperature Increase & Total Annual Precipitation Change**
 - Utility: Communication of overall general trends
 - Cross-workgroup: **Status and Trends, Communications Workgroup** (Bay Barometer), CRWG
 - Indicator developer: U.S. EPA National Indicator Project
 - Status: Ready for updates – send data request to U.S. EPA
 - Timeframe: Update every 3 years? 5 years?



*bolded workgroup = potential workgroup to coordinate updates with indicator developer

Existing (Possible Method Refinement) – Stream Temperature

- Revise **Stream Temperature Change** indicator – relate to healthy watersheds
 - Utility: Identifying and protecting resilient brook trout habitat—Healthy Watersheds Assessment includes projected brook trout occurrence with 6 degree Celsius change
 - Cross-workgroup: **Healthy Watersheds GIT**, Brook Trout, CRWG
 - Indicator developer: USGS provides stream temperature updates (currently delayed)
 - Status: Method being explored; 2021 STAC Rising Water Temp workshop
 - Potential Timeframe: Coincide with Healthy Watersheds Assessment Updates

Healthy Watersheds GIT & CRWG Collaboration

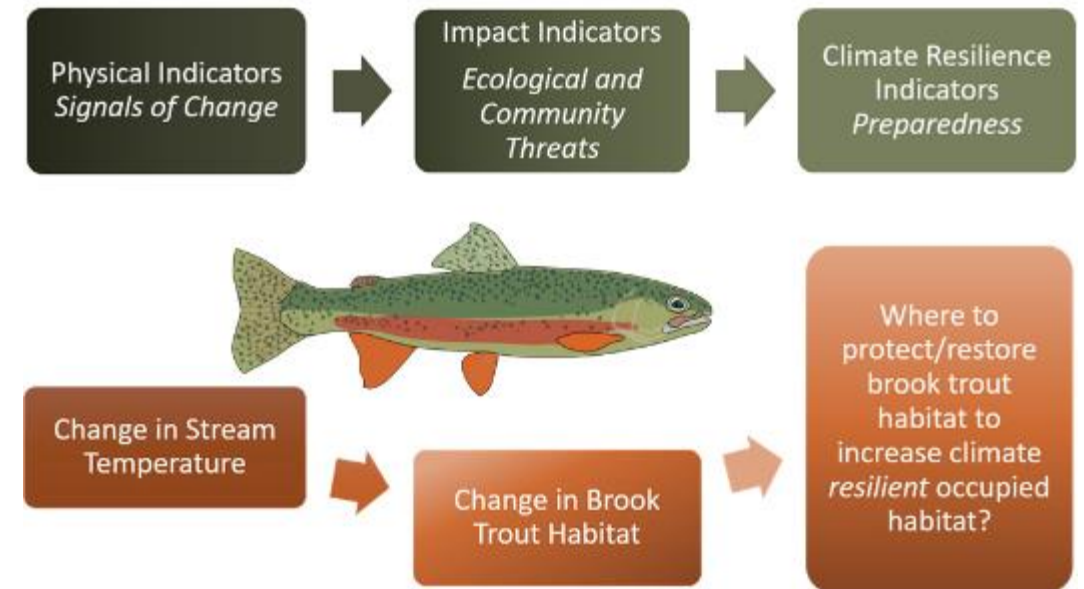
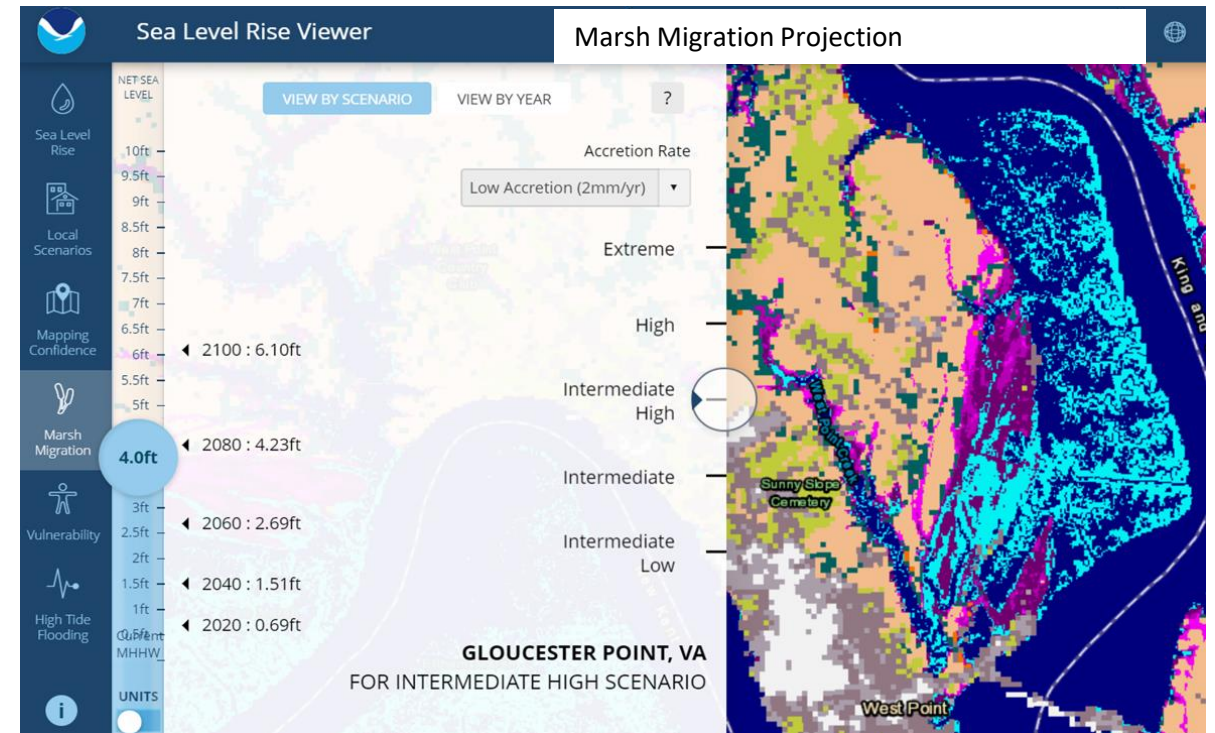


Image Credit: Nora Jackson, Healthy Watersheds
Jane Hawkey, Integration and Application Network, University of Maryland Center
for Environmental Science (ian.umces.edu/imagelibrary/)

*bolded workgroup = potential workgroup to coordinate updates with indicator developer

Existing (Possible Method Refinement) – Sea Level Rise

- Revise **Sea Level Rise** indicator – relate to tidal wetland change
 - Utility: Assess wetland losses (conversion to open water) and gains (migration potential related to adjacent land-use) using sea level rise projections
 - Cross-workgroup: **Wetlands**, GIS Team, CRWG
 - Potential indicator developer: TBD
 - Status: Method being explored; GIT-Funded Project, “Synthesis of Shoreline, Sea Level Rise, and Marsh Migration Data for Wetland Restoration Targeting”
 - Timeframe: TBD



Exploring location-based option

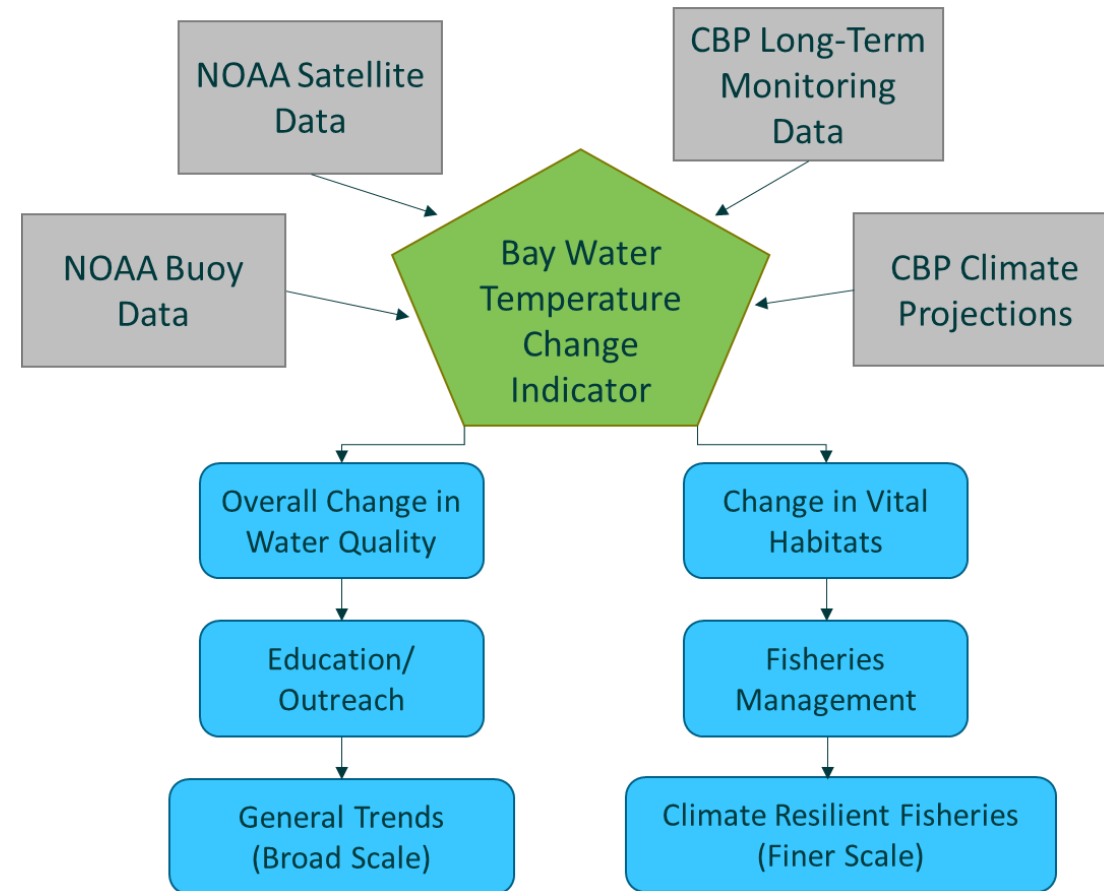
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Existing (Possible Method Refinement) – High Temperature Extreme

- Revise **Change in High Temperature Extreme** indicator—relate to tree canopy outcome
 - Utility: Connect changes in high temperature extremes with vulnerable underserved communities to inform tree canopy resilience projects
 - Cross-workgroup: **Forestry**, DEIJ, CRWG
 - Indicator Developer: TBD
 - Status: Forestry workgroup exploring available tree canopy and environmental justice data sources; CRWG and Forestry workgroups are planning to meet to discuss implementation strategy
 - Timeframe: TBD

New – Tidal Bay Water Temperature

- Develop **Bay water temperature change** indicator – relate to habitat and living resources
 - Utility: Connect with WQ thresholds for fish and SAV management
 - Cross-workgroup: STAR, Modeling, Integrated Trends Analysis, Status and Trends, Water Quality, SAV, Fisheries GIT, Habitat GIT, Modeling, Monitoring
 - Potential indicator developer: NOAA, ITAT, CB monitoring network
 - Status: Method being explored; STAC workshop, “Rising Watershed and Bay Water Temperature – Ecological Implications and Management Responses
 - Timeframe: TBD



*bolded workgroup = potential workgroup to coordinate updates with indicator developer

CRWG-Proposed Climate Change Indicators to Focus On (Next 2-4 Years)

Exists On Chesapeake Progress

- Leave Method As Is—Updates Planned
 - Avg. Air Temperature Increase—general trends for communication
 - Total Annual Precip Change—general trends for communication
- Possible Refinement of Method to Better Connect with Chesapeake Bay Outcomes
 - Stream Temperature Change*—connect with stream health and brook trout habitat
 - Relative Sea Level Rise—connect with wetlands and adjacent land use (e.g., forest, ag)
 - Change in High Temperature Extremes—connect with tree canopy and Environmental Justice

New (Not Currently on Chesapeake Progress)

- Method being Explored
 - Tidal Bay Water Temperature Change—connect with water quality thresholds for fish and SAV

Discussion/Decisions

The Management Board will review the posted list and timeframes in advance and come prepared to decide whether they agree with the selected indicators and timeframes

- Any objections to the proposed climate change indicators for CBP Partnership to focus on?
- Any additional thoughts on the management purposes of proposed climate change indicators?
- Any thoughts on how frequent these indicators should be updated?