Proposed Climate Change Indicators for CBP Partnership to Focus On

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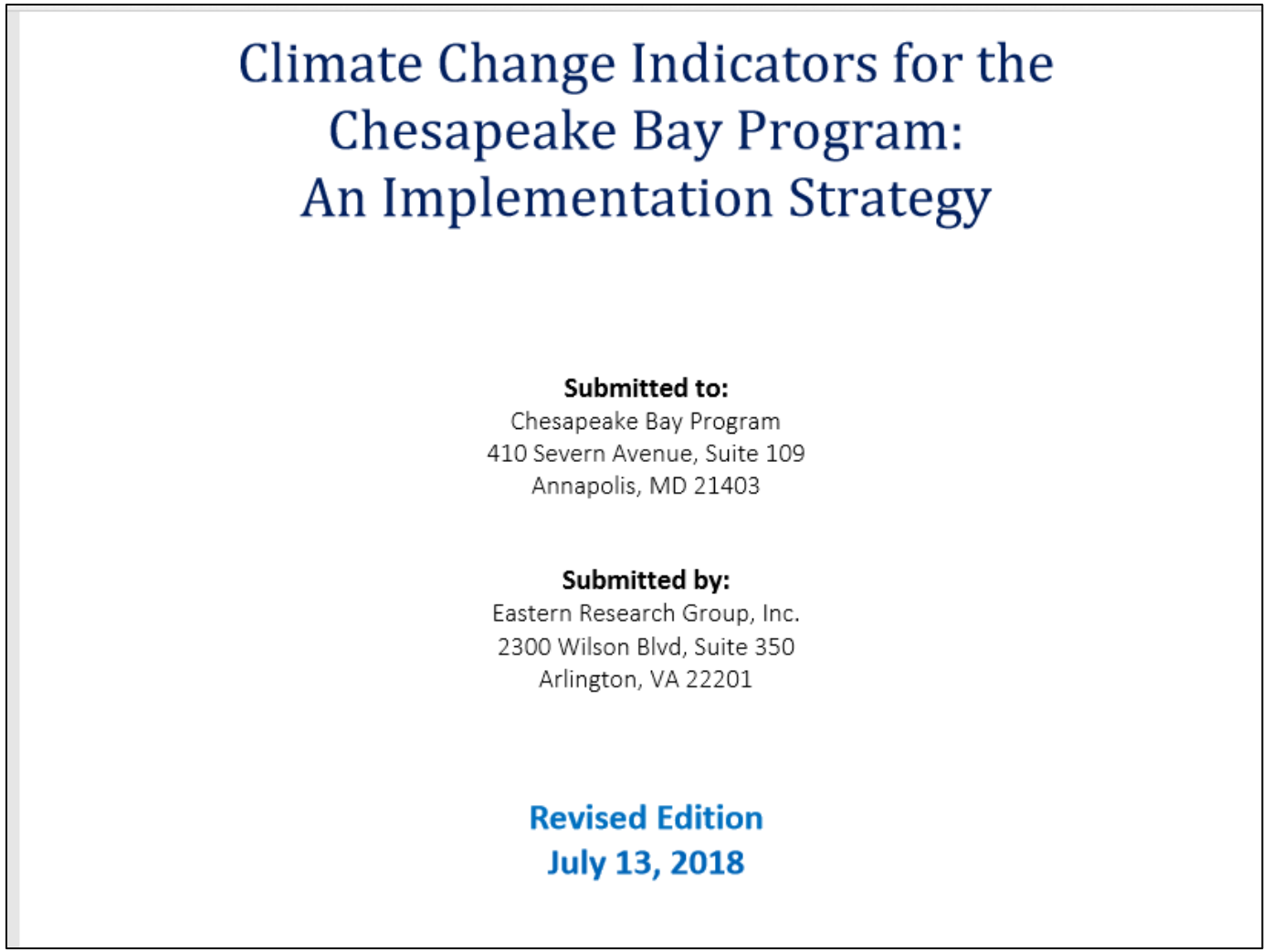
CRWG Climate Indicators Project

- GIT Funded Project:
  - 2017 - 2018
  - Eastern Research Group, Inc. (ERG)
- Goal: Conceptualize, select, and partially develop a suite of indicators that can be used to track progress toward the Climate Resiliency goal and outcomes in the 2014 Watershed Agreement



Climate Change Indicators for the Chesapeake Bay Program: An Implementation Strategy

Submitted to:
Chesapeake Bay Program
410 Severn Avenue, Suite 109
Annapolis, MD 21403

Submitted by:
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Arlington, VA 22201

Revised Edition
July 13, 2018

www.chesapeakebay.net/channel_files/31218/indicator_implementation_plan_-_revised_-_07-13-18.pdf

Indicator development process

210 topics

- ERG developed a master list of potential topics

21 indicators

- Criteria was created for choosing indicators for development (included data availability and quality considerations)
- ERG proposed a suite of 21 indicators for possible development

10 Existing CBP indicators

- Data and metrics were available immediately
- Three were existing indicators with other workgroups: Protected Lands, Restored Oyster, and Ag Wetland Habitat
- Seven were new climate change indicators posted to Chesapeake Progress through partnership with U.S. EPA Indicator Team

Challenges

- Majority of outcomes in the Chesapeake Bay Watershed Agreement are affected by climate change
- Management purposes for the existing climate change indicators were not clearly defined. Are they being used?
- 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

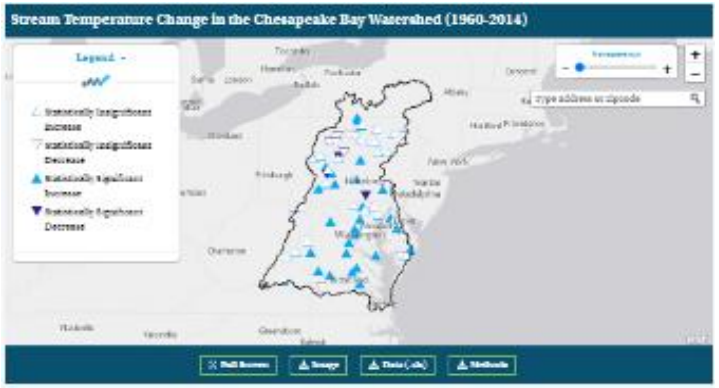
CRWG-Proposed Climate Change Indicator Decisions

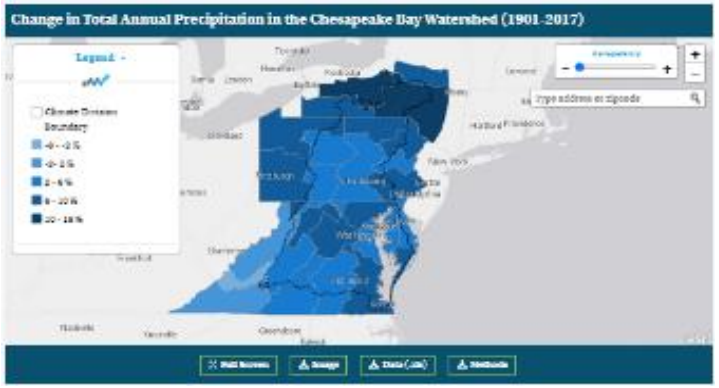
Exists On Chesapeake Progress

- Leave Method As Is
  - Avg. Air Temperature Increase
  - Total Annual Precip Change
- Possible Method Revision to Better Connect with Chesapeake Bay Outcomes
  - Stream Temperature Change*
  - Relative Sea Level Rise
  - Change in High Temperature Extremes
- Archive—Stop Pursuing Updates
  - River Flood Frequency*
  - River Flood Magnitude*

New (Not on Chesapeake Progress)

- Method being Explored
  - Tidal Bay Water Temperature Change



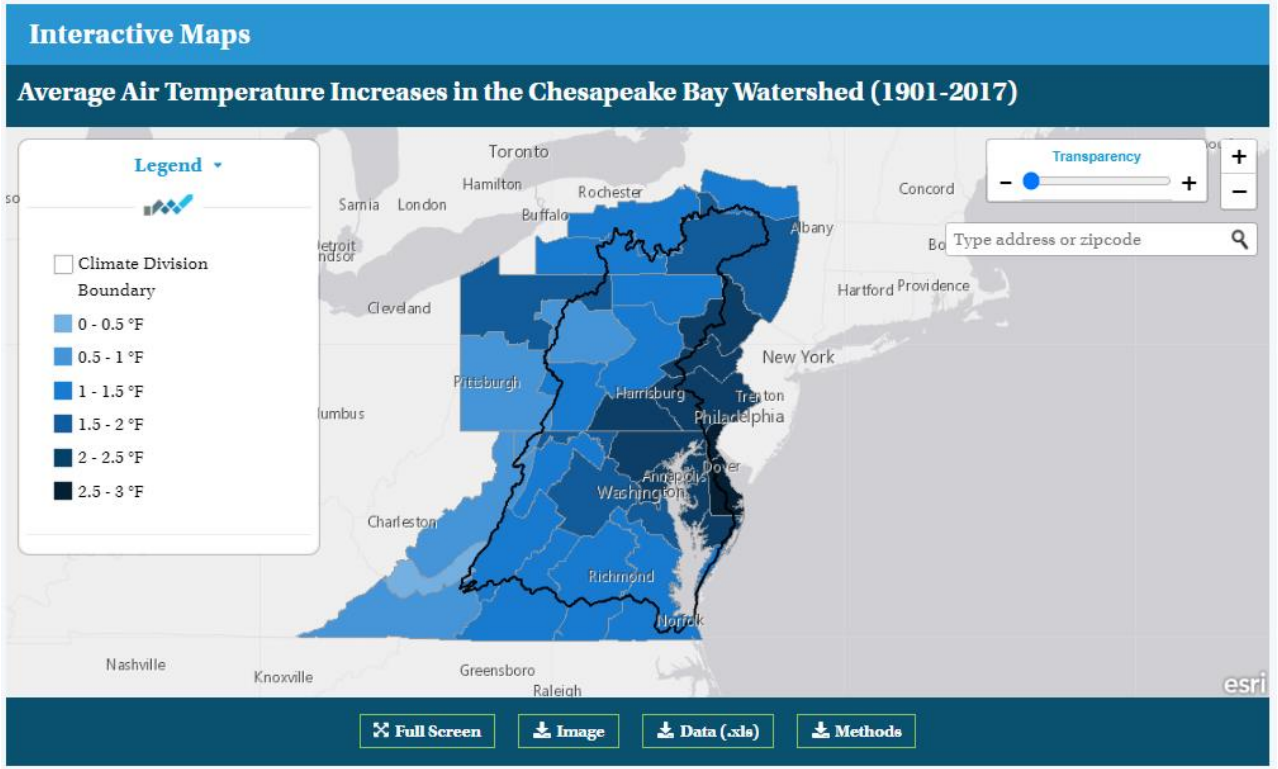


https://www.chesapeakeprogress.com/climate-change/climate-monitoring-and-assessment

*data updates 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 Revision) – 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

Healthy Watersheds GIT & CRWG Collaboration

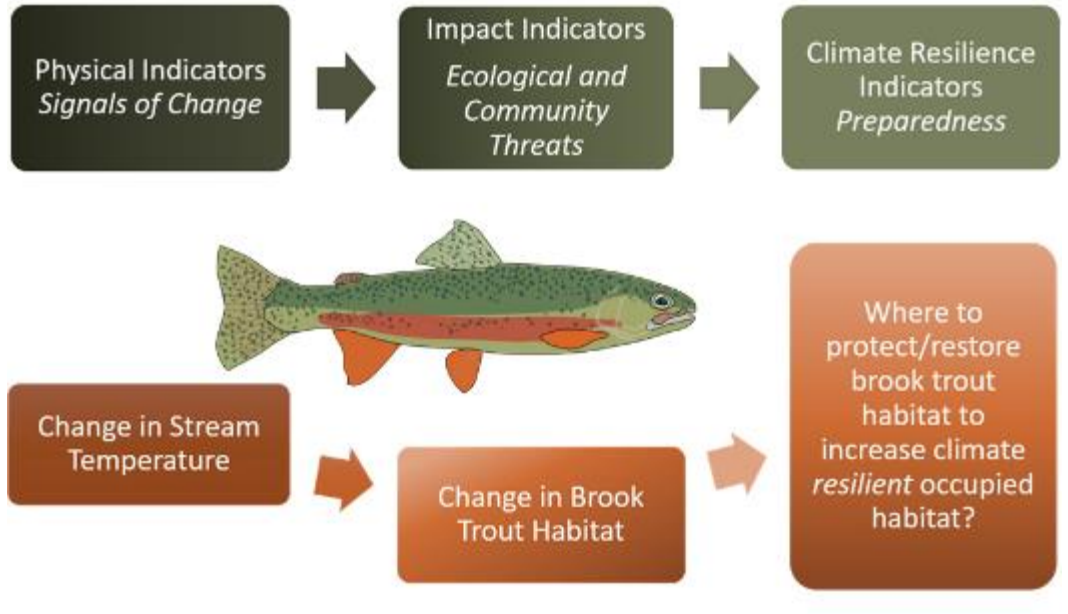
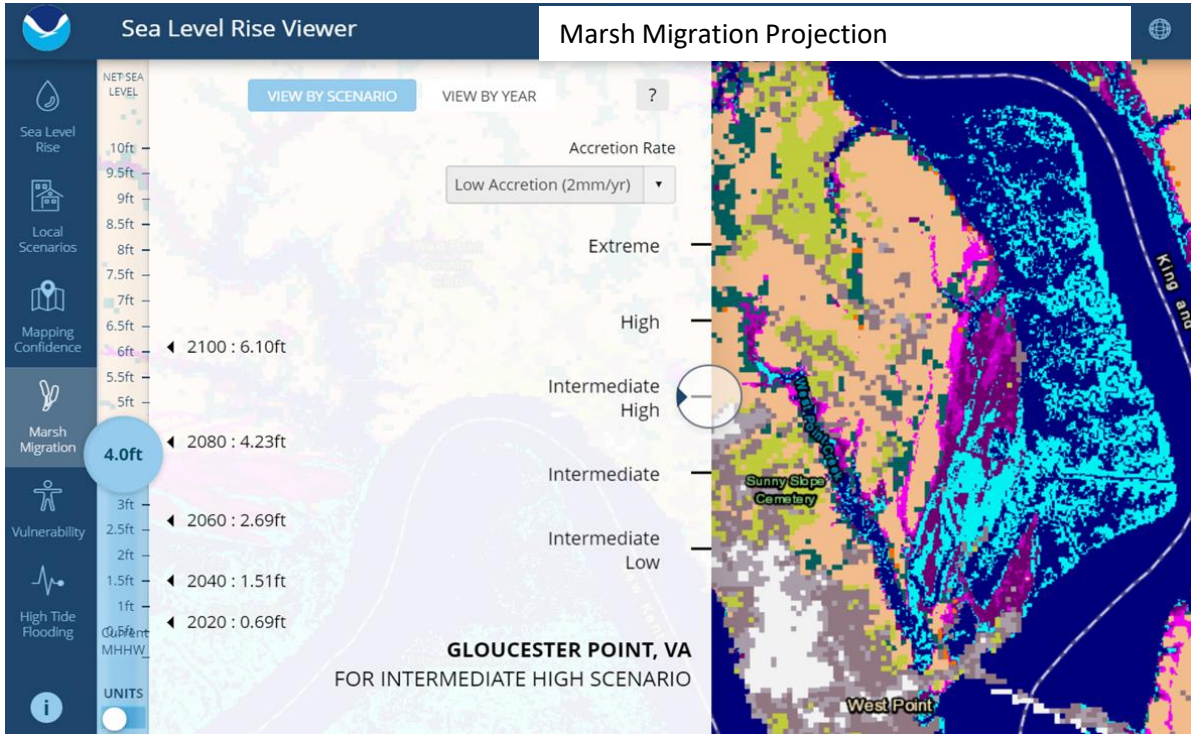


Image Credit: Nora Jackson, Healthy Watersheds
Jane Hawkey, Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/imagelibrary/)

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

Existing (Possible Method Revision) – 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: VIMS
  - Status: Method being explored; GIT-Funded Project, “Synthesis of Shoreline, Sea Level Rise, and Marsh Migration Data for Wetland Restoration Targeting”



Exploring location-based option

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

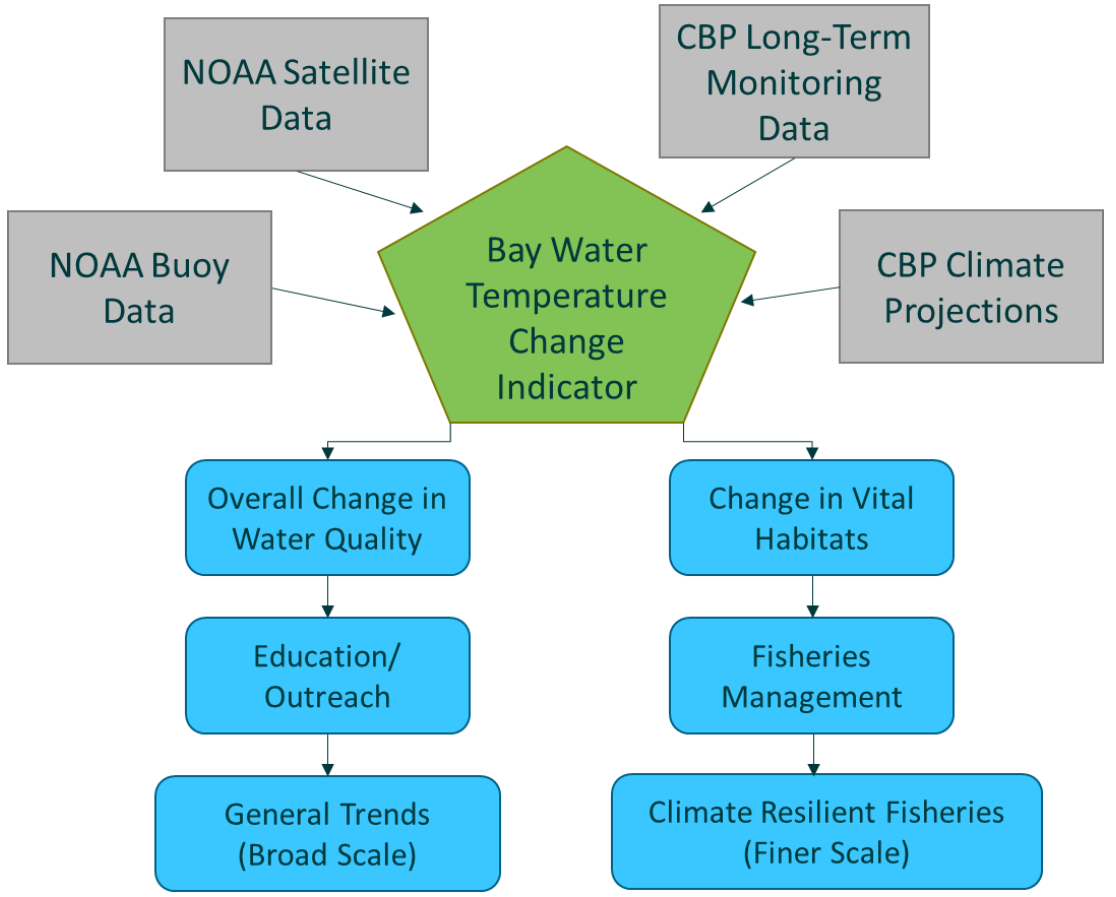
Existing (Possible Method Revision) – High Temperature Extreme

- 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
  - Status: Forestry workgroup exploring available tree canopy and environmental justice data sources; CRWG and Forestry workgroups are planning to meet to discuss implementation strategy

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

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



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Summary: CRWG-Proposed Climate Change Indicators to Focus CBP Partnership Efforts On

Existing—Leave Method As Is

1. Average Air Temp Increase—general trends for communication
2. Total Annual Precipitation Change—general trends for communication

Existing—Possible Method Revision to Connect with Outcome

3. Stream Temp Change—connect with healthy watersheds related to identifying & protecting resilient brook trout habitat
4. Relative Sea Level Rise—connect with tidal marsh extent/migration corridors to inform targeting of wetland restoration/conservation efforts
5. Change in High Temperature Extremes—connect with vulnerable underserved communities to inform tree canopy resilience projects

New

6. Tidal Bay Water Temperature Change—connect with temperature thresholds for fish and SAV habitat to inform adaptive management decisions

Discussion

- Any objections to the proposed climate change indicators for CBP Partnership to focus on?
  - List to be presented to the Management Board during March meeting as follow-up to CRWG Quarterly SRS Review
- Any additional thoughts on the management purposes of proposed climate change indicators?
- Any thoughts on how frequent these indicators should be updated?