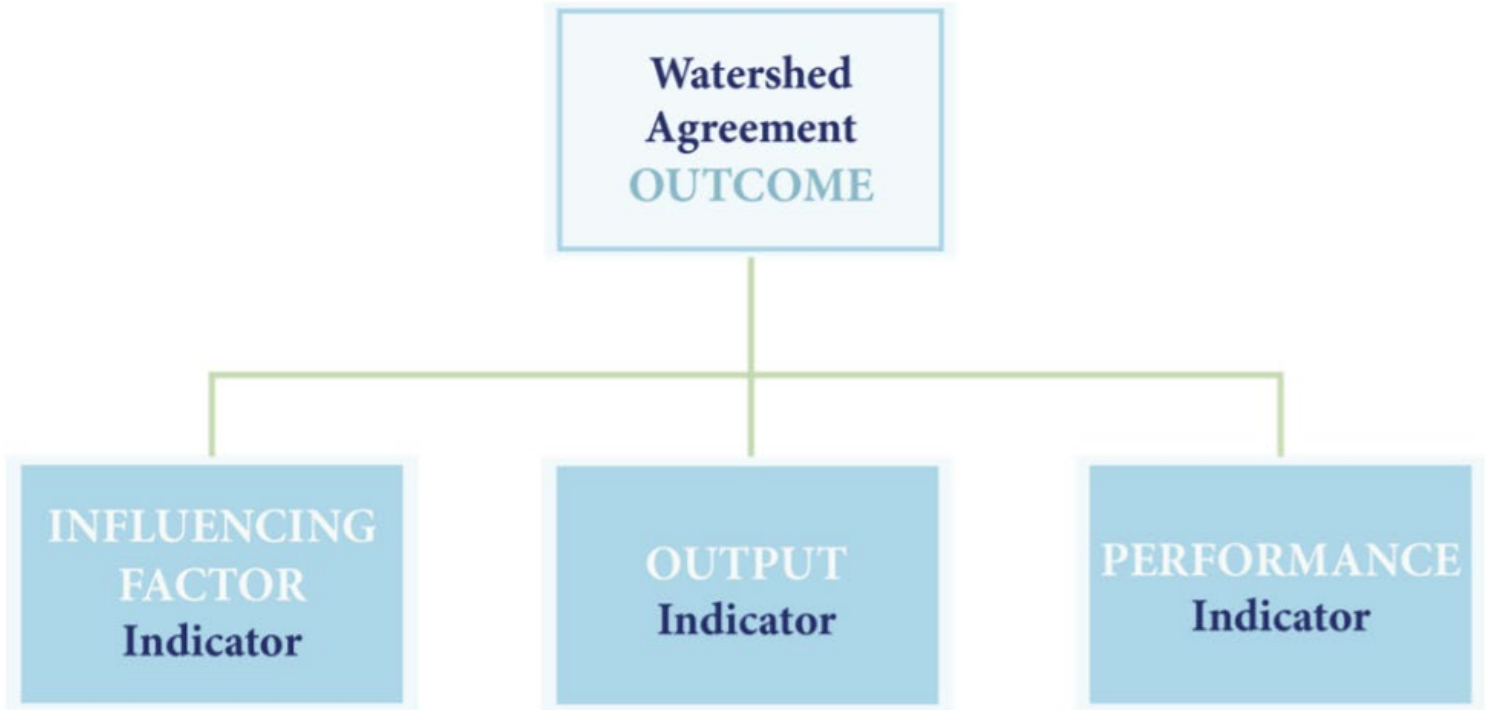
Cross-Workgroup Climate Indicator Follow-up Discussion

Climate Resiliency Workgroup Meeting
February 18th, 2020

Cuiyin Wu, Chesapeake Research Consortium (CRC)
Climate Resiliency Workgroup Staffer

Julie Reichert-Nguyen, NOAA Chesapeake Bay Office
Climate Resiliency Workgroup Coordinator

Chesapeake Bay Program Indicator Framework



Influencing Factors – What KEY influencing factors are impacting the achievement of an outcome?

Outputs – Are we doing what we said we would do in our work plans and management strategies?

Performance – Are we achieving the outcome?

https://www.chesapeakebay.net/channel_files/23821/approved_cbp_indicators_framework_and_management_process.pdf

Chesapeake Bay Watershed Agreement

II. Goal, Outcomes and Baseline

This management strategy identifies approaches for achieving the following goal and outcomes:

Climate Resiliency Goal

Increase the resiliency of the Chesapeake Bay watershed, including its living resources, habitats, public infrastructure and communities, to withstand adverse impacts from changing environmental and climate conditions.

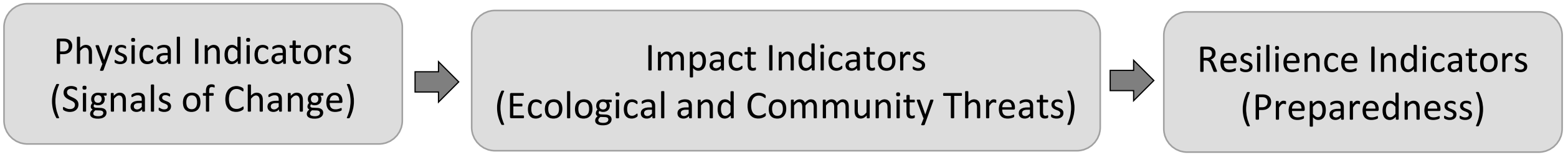
Monitoring and Assessment Outcome

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.

Adaptation Outcome

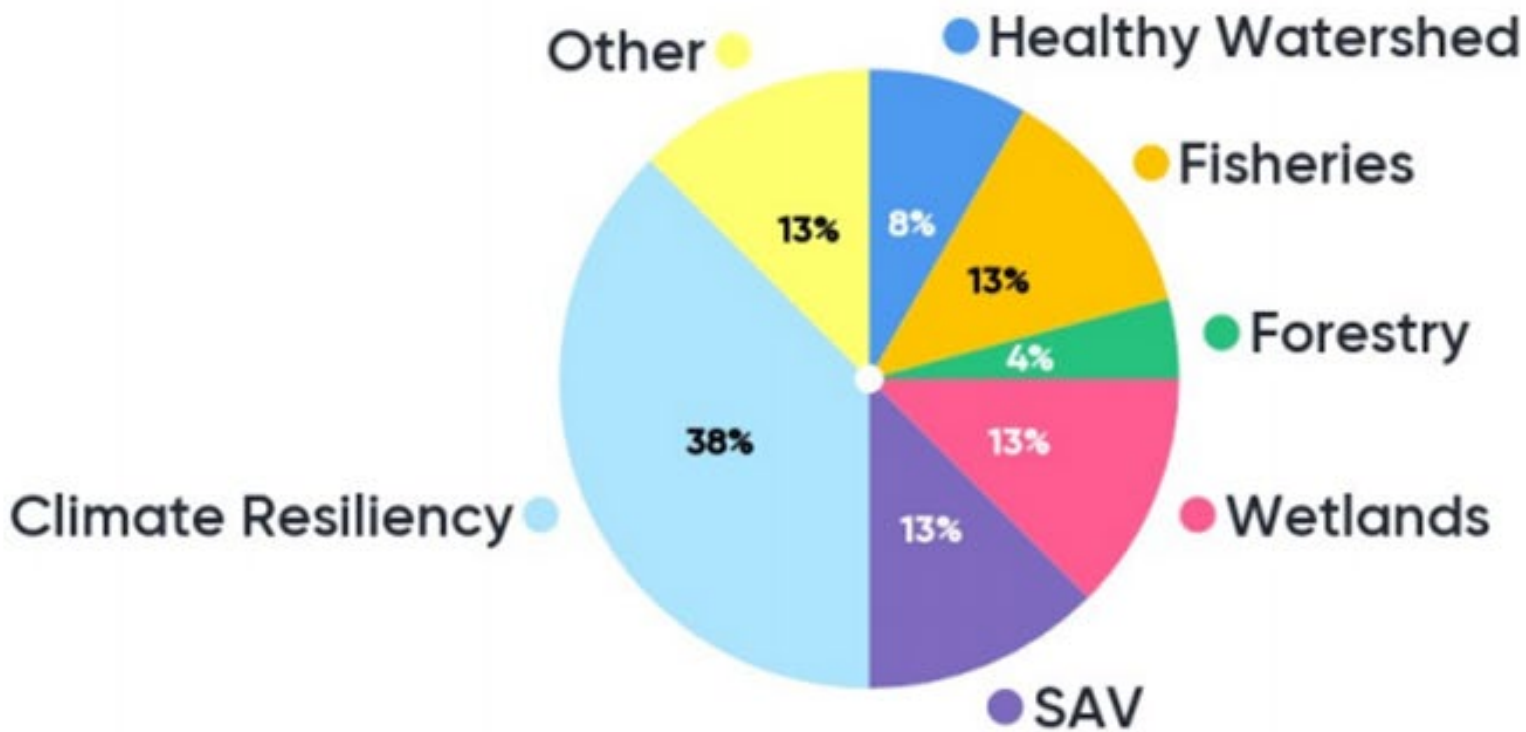
Continually pursue, design and construct restoration and protection projects to enhance the resiliency of Bay and aquatic ecosystems from the impacts of coastal erosion, coastal flooding, more intense and more frequent storms and sea level rise.

Proposed Climate Indicator Framework

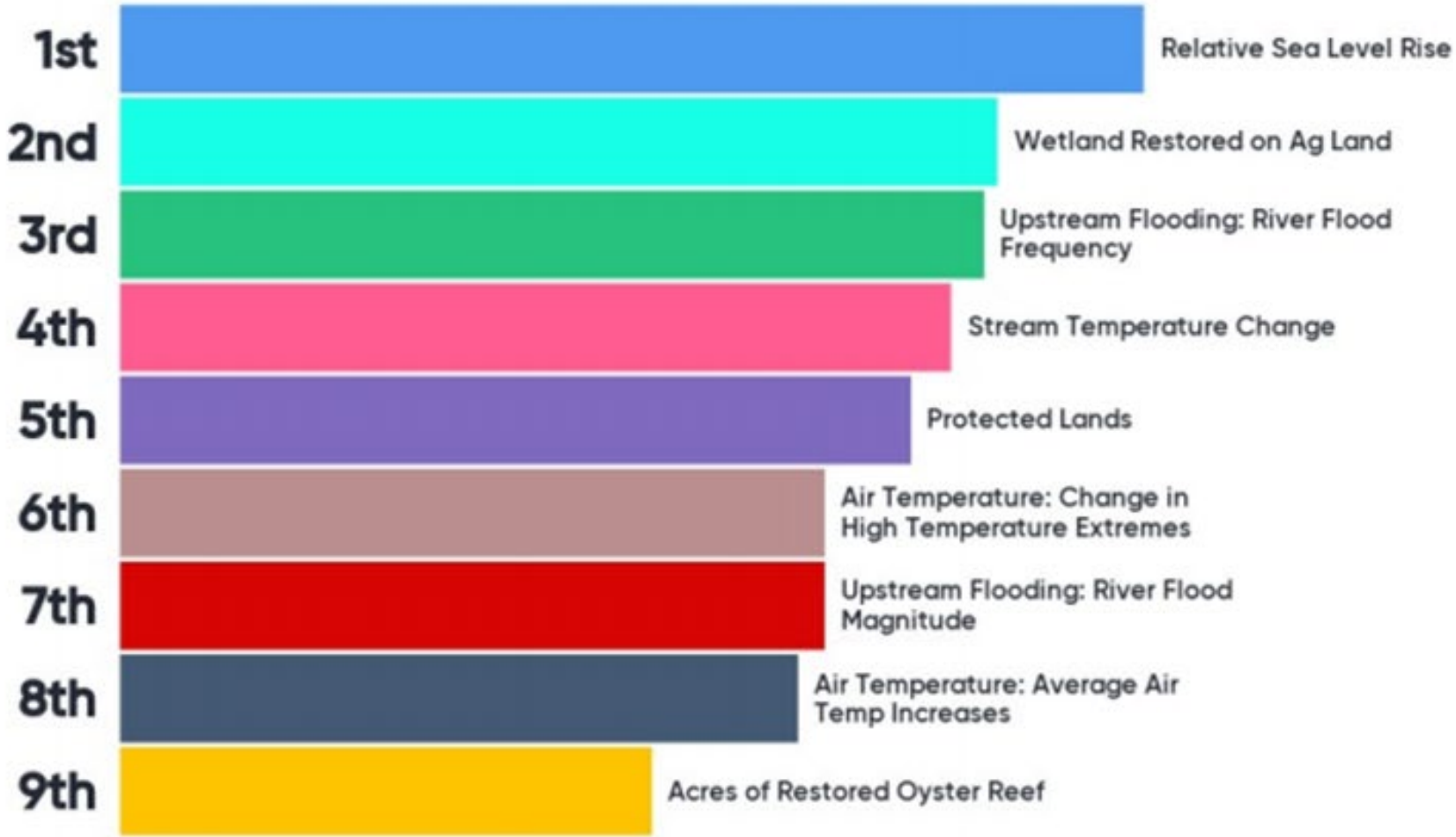


Menti Meter Results

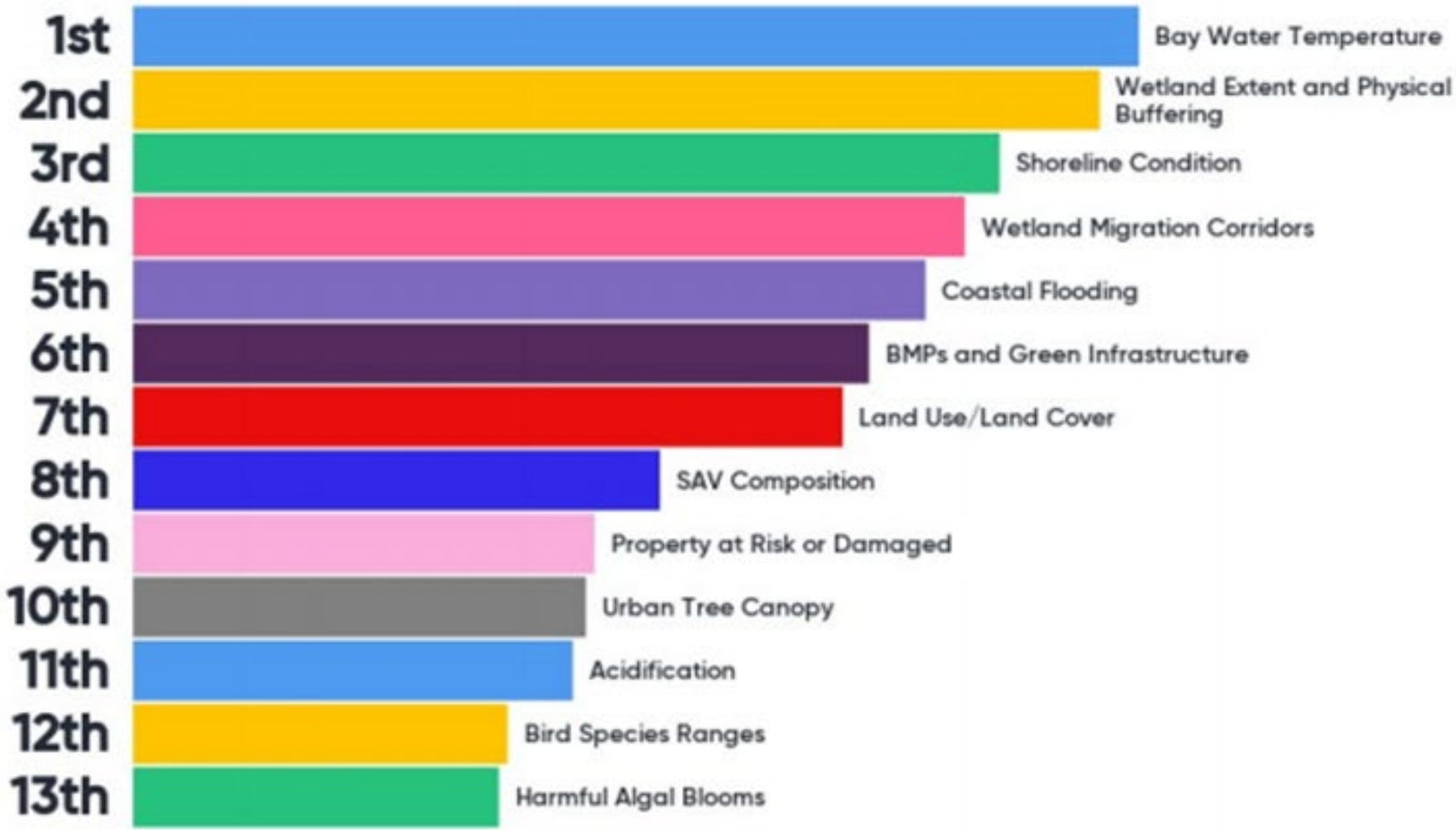
Which workgroup are you representing (choose one)?



Rank in order from most to least which ones you think are relevant to your workgroup's goals and outcomes:



Rank in order of most to least which indicator you would recommend the CRWG develop



List any climate-related indicators not listed previously that you would be interested in (31 responses):

- **Changes in fish range, distribution, species shifts (new ones moving into bay from south)**
- **Changes in Phenology**
- **Changes in seasonal trends**
- **CR relevancy changes with location**
- **Drought risk?**
- **Economic implications**
- **Extreme precipitation and leadings amount**
- **Forest fragmentation**
- **Increase in sub-tropical species**
- **Invasive species**
- **Invasive species distribution**
- **Invasive species distribution**
- **Invasive species spread**
- **Living shoreline inventory**
- **Marsh mosaics**
- **Oyster reef acreage**
- **Pathogen spread**
- **Pathogens**
- **Repetitive loss properties**
- **Riparian forest buffer coverage**
- **Salinity**
- **Salinity (function of increase precip)**
- **Salinity extremes**
- **Seasonal temperature change (air and/ or water)**
- **Seasonality/phenology shifts**
- **Shoreline loss**
- **Something that addresses the vulnerability of historically underserved communities to climate change**
- **Species diversity**
- **Tracking saltwater intrusion**
- **Vulnerability of multiple habitats to climate factors (riverine and estuarine)**
- **Wildfire risk?**

Healthy Watersheds

Physical Indicators (Signals of Change)

- Sea Level Rise
- Stream Temperature Increases
- Change in Precipitation

Impact Indicators (Ecological and Community Threats)

- Decrease in forests and tidal marshes
- Decrease in brook trout populations
- Recent grassland/wetland loss
- Recreational impairments

Resilience Indicators (Preparedness)

- Preservation of brook trout habitat in more climate resilient watersheds
- Shoreline condition (soft versus hardened)
- Percent working forests

Fisheries

Physical Indicators (Signals of Change) → **Impact Indicators (Ecological and Community Threats)** → **Resilience Indicators (Preparedness)**

- Warming water temperatures/ seasonal change
- Freshwater flow/precipitation
- Salinity regimes
- Sea level change

- Summer abundance of forage fish
- Loss in suitable fish habitat/increase in hypoxia zones
- SAV composition (fish habitat)
- Change in fish population distribution
- Harmful algal blooms/phytoplankton

- BMPs that lower water temperature (e.g., riparian buffers)
- Shoreline condition change
- Area of suitable habitat for key fish species (e.g., striped bass)

Forestry

Physical Indicators (Signals of Change)

- Average Air Temperature Increases
- Change in High Temperature Extremes
- Change in Total Annual Precipitation
- Relative Sea Level Rise
- River Flood Frequency
- River Flood Magnitude

Impact Indicators (Ecological and Community Threats)

- Shifting tree species ranges
- Altered disturbance regimes (wildfire, flooding)
- Longer growing seasons (shifting planting schedules)
- Mortality from late-season “flash droughts”
- Increased pressure from invasive species, disease, pests
- Forest loss due to sea level rise and marsh migration

Resilience Indicators (Preparedness)

- Overlay of tree canopy and urban heat island data - priority areas to plant and conserve trees for public health
- Overlay of forest buffers and high-priority aquatic habitat areas
- Forest diversity (stand age, species composition)
- Level of forest fragmentation
- Forest migration corridors (coastal and inland)

SAV

Physical Indicators (Signals of Change)

- Water temperatures (chronic and acute changes)
- Changes in freshwater flow (chronic and acute changes)
- Sea level change
- Ocean/coastal acidification

Impact Indicators (Ecological and Community Threats)

- Pathogens and invasive plants and animals
- Species diversity
- Species distribution changes
- Habitat quality

Resilience Indicators (Preparedness)

- Shoreline condition (armoring associated with SLR as well as nearshore development)

Wetland

Physical Indicators (Signals of Change)

- Hydrology changes (need data and models)
- Sea level rise (SLR)

Impact Indicators (Ecological and Community Threats)

- Change in wetland areal extent and distribution
- Tidal wetlands: Change in Migration Corridors

Resilience Indicators (Preparedness)

- Protection of wetlands in climate resilient areas (less influenced by SLR)