Climate Resiliency Workgroup Conference Call

Monday, June 15, 2020
1:30 PM – 3:30 PM

Conference Line: +1 (571) 317-3112 Access Code: 539-329-229
Please see email/calendar notice for password
Webinar*: https://global.gotomeeting.com/join/539329229
Meeting Materials:
https://www.chesapeakebay.net/what/event/climate_resiliency_workgroup_june_2020_meeting

Location: Conference Line

*If you are joining by webinar, please open the webinar first, then dial in.

AGENDA

Action Items:

- ✓ Contact Julie (julie.reichert-nguyen@noaa.gov) with any ideas for potential Financing Coaching hours by **COB Friday, June 19, 2020.** Julie will add additional ideas to spreadsheet.
- ✓ If a member would like to provide input on the GIT-Funding Proposal Table 1, please provide it to Julie, Cuiyin (cwu@chesapeakebay.net), or Breck (bsullivan@chesapeakebay.net) by **COB, Wednesday, June 17, 2020.**

1:30 PM **Welcome and Meeting Overview – Co-Chair Mark Bennett (USGS) and Erik Meyers (The Conservation Fund)**

- Introduce climate interns to CRWG
- Learn about different available data from USGS and NOAA to support the CRWG climate indicator efforts.
- FY20 GIT-Funding Update

Key Announcements:

- Consulting hours with Finance Experts: Between now and August 3, each coach is available to advise for up to 10 hours (hours are shared with STAR). Workgroup members please notify Julie, Cuiyin, or Breck if interested in the option of one-on-one consulting hours for existing or future projects they are working on/planning. Projects must have a climate-related component to them.
    - The list of potential ideas can be found here (excel sheet).
        - Laurel coordinated the Finance & Investment Forum and said these ideas match perfectly with the work the coaches can provide the workgroups.
    - The CRWG needs to share hours with STAR so the workgroup may not be able to use the total amount of hours allotted.

    - Julie is interested in contacting Josh Parrish as a coach for reviewing the blue carbon proposal.
    - The CRWG will move forward with the ideas on the excel sheet to propose to STAR, sending the request early next week. If anyone wants to send other ideas, please send by **COB Friday, June 19, 2020**.
    - Kate McClure suggested adding an idea on how to engage private funding for conservation easements for flood reduction. Julie will add idea to spreadsheet.
    - Katherine Brownson stated that she likes the ideas on Julie's list, but she wonders if they can be accomplished with the number of hours allocated. Feasibility assessments are pretty involved and would likely require more than 5 hours to do.
        - Julie mentioned she will first see how many hours the CRWG is allotted before removing some of the ideas.
    - Taryn Sudol mentioned how rural or underserved communities typically face bigger challenges for financing options – may want to consider how to incorporate financing options to help these communities.
- Joint meeting June 16th from 10 – 12:15 with the Urban Stormwater WG, CRWG, and Modeling WG.
    - This meeting will focus on coordination between the workgroups on projects related to projected IDF curves, BMP climate resilience, and climate change indicator development.

1:35 PM **Welcome CRWG Interns!**

New summer interns will introduce themselves and Julie will share their project descriptions with workgroup.

- Shalom Fadullon (NCBO-CRC) – Development of ecological indicators related to assessing the climate resiliency of living resources
    - Shalom is an incoming Junior at the University of Delaware with a major in Chemical Engineering and Environmental Policy.
- Selaam Dollisso (CBP-CRC C-StREAM) – Development of strategies to assess climate change impacts related to flooding and sea level rise affecting communities within the Chesapeake Bay Watershed
    - Selaam is from Iowa and goes to Washington University where she majors in Environmental Policy and Korean.

1:45 PM **The potential effects of land-use and climate change on future stream conditions – Kelly Maloney (USGS),** Kevin Krause, Lauren Hay, Greg McCabe, Terry Sohl, and John Young (USGS) and Claire Buchanan and Zachary Smith (ICPRB)

This USGS study examined the possible effects of a suite of land-use and climate scenarios on the biological condition of 70,772 small streams in the Chesapeake Bay watershed for the years 2030, 2060, and 2090. The study used the Chesapeake Basin-wide Index of Biotic Integrity (a benthic macroinvertebrate

index) to represent stream condition. Researchers evaluated four land-use scenarios representing a range of landscape futures and, for the future climate scenarios, summary statistics from 122 downscaled global circulation models. A current scientific challenge is projecting future stream conditions while accounting for the high variability among the possible future land-use and climate scenarios. This study is among the first to project future stream biological conditions based on a suite of disparate land-use and climate scenarios.

The Stream Health Workgroup has a restoration goal to improve stream health and function for 10% of stream miles above a 2008 baseline. Kelly found previous baseline estimates from 2004 – 2008 through the Chessie basin-wide index of biotic integrity (BIBI) using random forest analysis, which showed 63.6% catchments in Fair/Good stream condition. However, there is not available data through the Chessie BIBI for the entire watershed. They wanted to merge the model data with the observed data to fill gaps and found 60% of the basin's area had acceptable stream ratio ratings. Land cover and climate changes can affect these stream mileage improvements, so they conducted another study with the objective to build a predictive (Base 2005) model for stream integrity using the Chessie BIBI (2000 – 2011) and baseline stressor data. They want to use this model to predict conditions for all unsurveyed streams in the watershed and project future stream conditions (2030, 2060, 2090) using future land use and climate scenarios.

The predictors for landscape and stressor conditions included characterizing bioregion, elevation, catchment area, soils, soil erodibility, lithology chemistry, base flow, runoff, seasonal total precipitation and average temperature, land covers, and topographic wetness index. They used the random Forest analysis again, and since there was so much data, they split it up between training data and test data to validate the study. The model explained 36.1% of variation in the training data. In the test data 60% condition classes correctly classified. They then used the observed data and predicted it to all the areas of the watershed while using the landscape and stressor predictors. For the baseline 2005 period, they got 33.5% poor stream conditions, 29% fair, and 37.5% good.

To project the data, they use relationships in the baseline model to predict future biological conditions based on alternative land use and climate scenarios. For the land cover scenarios, they used USGS EROS Land Cover Modeling data and used four scenarios based on the IPCC Special Report on Emissions Scenarios. They took the Coupled Model Intercomparison Project Phase 5 (CMIP5) and summarized the differentials at 25^{th}, 50^{th}, and 75^{th} percentiles for the climate scenarios. Then they added the differentials to the PRISM baseline data (Lauren Hay's work). The projection results show some areas that will lose the good stream condition standard such as between Harrisburg, PA and Baltimore, MD. This is not constant though because areas in NY will lose poor sites probably because there will be agricultural abandonment. These results

show a predicted decline condition in 1- 16.2% of stream kilometers by 2090 which results in a large increase of stream kilometers that require improvements to reach the Stream Health Workgroup goal. The predicted model can help identify spatially which areas are best to work on and improve. It also highlights areas that already are improving so that planners can investigate why and use some of the same techniques in other areas.

Their next steps include continuing to refine the stream health modeling efforts by adding predictors, refining IBI, and examining assemblage components. They want to incorporate BMPs into the modeling effort and update future projection with refined future data. Once they look more into the Fish Habitat Assessment for the Chesapeake Bay, they hope to project future fish habitat based on land use and climate scenarios. Here is a link to the paper on his work.

Mark Bennett said the modeling team had developed climate scenarios for the Chesapeake Bay modeling suite. The modeling took a similar approach of using Chesapeake specific downscale models and used a midpoint. The biggest difference is the CBP used long term trend information in the newer term and married to the farther out projections (2045, 2055) to reduce the uncertainty of the near-term conditions for 2025. Mark also suggested setting up a meeting with the Modeling Team to understand what data went into it to help his work. Kelly said he would get in touch with the Modeling Team.

Julie said the modeling team used the RCP4.5 climate change scenarios so she asked if Kelly expected using these new scenarios. Kelly said they want to use the RCP scenarios but it takes a long time to downscale so they are still trying to see if they can get it done.

2:15 PM **NCBO CBIBS data - Taylor Giordano and CJ Pellerin (NOAA)**

CJ will give an overview of the NOAA Chesapeake Bay Interpretive Buoy System (CBIBS) and available data with emphasis on water temperature and salinity data. These data may be of use in supporting the development of a Bay water temperature climate indicator.

CBIBS is a network of observing platforms (buoys) that collect real time meteorological, oceanographic, and water quality data. Historically there was 10 locations in the Chesapeake Bay, and they are looking to put more out there once the COVID environment allows it. The data is collected continuously at 6, 10, and 60 minute intervals, and raw data averaging is completed onboard the buoy computer.

CJ then went through a live demo to show where the data is located on their website. If members are interested in having a computer (personal computer) to computer (buoy computer) connection, they can send out a security code. Another way to access the data is through the NDBC website.

Julie asked when they started collecting data for water temperature. CJ said they started deployments in 2007.
Julie also asked how robust the salinity data was available from the CBIBS. Is it a relatively new parameter? Taylor said that whenever water temperature is available, salinity will be available. Julie followed up with asking if it is available only at the surface. Taylor said yes. They collect only sea surface temperature at 1 meter down. They are looking to measure different depths, but that is not available now.

2:45 PM **Satellite Water Temperature Indicator for Chesapeake Bay – Ron Vogel (NOAA)**
Ron Vogel (UMD) will review the prior developments of satellite temperature's inclusion in CBP's Climate Change Indicator Implementation Plan (2018). CRWG member's thoughts on potential paths forward will be discussed after the presentation.

The goal of project initiated by EPA National Estuary is to develop water temperature indicators for U.S. estuaries using satellite data because most U.S. estuaries do not have monitoring programs. NOAA CoastWatch is developing the nationwide indicator which is currently in Phase 2. The Chesapeake Bay is an initial pilot estuary. This data was already identified in the CBP Indicators Implementation Plan 2018 conducted by the Eastern Research Group (ERG). The data is available from the NASA Jet Propulsion Lab from 2002 to present and is collected daily. The data from all available satellites is blended together, and new data is added daily. The advantages of this data as an indicator are:

- Data points at 1km grid spacing, resolution adequate for most estuaries
- Capitalizes on spatial coverage (global & cloud-free) and spatial resolution (1km) compared to in-situ data (ship-based or buoy/mooring)
- On-going, new data available daily
- Daily data is better temporal resolution than ship-based data but not as frequent as buoy/mooring data
- Automated processes calculate monthly & annual statistics for web display

Disadvantages as an indicator include:

- Surface water only
- Only available back in time to 2002
- Nighttime temperature estimation – need to take diurnal bias into account when comparing with daytime or day-night combined data sets

The methodology follows CBP STAC 2008 climate change report. To understand how good the satellite data is, they did a comparison study with the in-situ (CBP monthly monitoring) data for the Chesapeake Bay area for a 14-year period (2003 – 2016). Their correlation comparison between the two data showed that not all the data falls on the 1:1 line with a bias of 0.5 degree Celsius which means

the satellite data is underestimating the temperature by that value. The bias and variability for Chesapeake Bay are higher in the satellite data for earlier time period, but the earlier period has errors because it uses older versions of two of the input satellite data sets. As a result, only data from 2007 – present are used in the indicator. The web display for the indicator can be found here.

Estuarine Managers at the National Estuarine Program was also interested in the rate of temperature change between seasons. Ron showed the average temp for February and August through the years 2007 – 2016. In February the temperature is going down while the temperature is increasing in August. There can be variation in the rate of temperature change between seasons which impacts the biology.

Their next steps for the EPA & NOAA include expanding the indicator to more estuaries, expanding to NOAA's National Estuarine Research Reserves, and eventually expanding to all U.S. estuaries. For the Chesapeake Bay, they would like to work with CBP partners on a multi-data set water temperature climate indicator to leverage data from the satellite and CBP's monthly monitoring data.

Lew stated he heard there was concern for swimming in the Bay when the water reached a certain temperature. Lew asked if there were primary sources on this topic and was wondering if there was a way to provide this information to the public. Ron said he is not a public health expert, but this data could be used in other ways to demonstrate an indicator that is more centered around public health. Lew commented this could be a way to highlight co-benefits.
Julie mentioned the CRWG intended to look at this indicator to connect it to fish habitat. Looking at public health may be a potential indicator the CRWG can investigate in the future; however public health is not in the CRWG expertise. Temperature indicator involving vibrio may exist somewhere.

Erik wanted to comment on the observation that water temperature is rising in August and declining in February. Is it due to lack of precipitation? Has he heard from others that is using this data on how it is influencing management decisions? Ron said they have not work on incorporating different factors that may be causing the different temperature changes. In terms of feedback, they have not received feedback on what users are using the data for, but they are providing insight on what else they would like to see such as a current temperature measurement along with an average measurement.

3:15 PM **Update on FY20 GIT-Funding Ideas – Julie Reichert-Nguyen, (NOAA)**

- CRWG
    - Literature review of carbon-related studies associated with wetlands and SAV to inform potential future climate resilience finance-related strategies. Table 1 is available here.

- If a member would like to provide input, please provide it to Julie, Cuiyin, or Breck by **COB, Wednesday, June 17, 2020.** There is more time to provide suggestions after STAR submits the Table 1 on June 22nd. Table 2 due in August.
- Kevin Du Bois stated the Wetlands Workgroup is collecting information on the variety of state plans and initiatives that promote wetlands restoration and living shorelines to demonstrate co-benefits (including carbon storage and climate resilience). Erik has reached out to some of the people involved in that effort.
- Rebecca Chillrud mentioned she is excited to see the communications aspect of this project. The Communications Workgroup would like to be involved or kept informed of this action: "Contractor will gather feedback from CRWG and reviewers on appropriate communication products (e.g. StoryMap if appropriate)." They could also potentially write a blog about the review once complete, or update our "Learn the Issues" pages on climate, wetlands or SAV.
- Katherine stated one idea to make a stronger connection with conservation finance might be to consult with finance experts and investors at the beginning of the project to identify the key modeling uncertainties that are currently limiting blue carbon investments.
    - Erik mentioned this is an idea Julie is already putting forward with the Finance Coaching hours.
- Nicole mentioned A US Climate Alliance project is underway to prioritize coastal habitats for carbon and resilience benefits from NY to NC. Some of the literature used in the project may benefit this project as well.

- Other Workgroups

    - SAV Workgroup: SAV Synthesis Project 2.0: Synthesizing the future of SAV in Chesapeake Bay by modeling climate impacts to restore important living resources

    - Wetland Workgroup: Incorporating Marsh Migration and Shoreline Condition Data into Wetland Restoration Targeting

3:30 PM **Meeting Adjourn**

Next Meeting: July 20, 2020 1:30 – 3:30

Participants: Breck Sullivan, Cuiyin Wu, Julie Reichert-Nguyen, Taylor Giordano, Charles Pellerin, Ron Vogel, Kelly Maloney, Shalom Fadullon, Selaam Dollisso, Ann Phillips, Ian Yue, Isabel Whaling, Neil Ganju, Kevin Du Bois, Kristin Saunders, Ben McFarlane, Annabelle Harvey, Jim George, Mark Bennett, Jackie Specht, Taryn Sudol, Nicole Carlozo, Cassandra Davis, Katherine Brownson, Lindsay Byron, Wuillam Urvina, Laurel Abowd, Krista Romita Grocholski, Zoe Johnson, Heidi Bonnaffon, John Denniston, Julianna Greenberg, Katie D, Jessica Rodriquez, Rebecca Chillrud, Erik Meyers, Angie Wei, Lewis Linker, Mandy Bromilow, Carl Friedrichs, Kate McClure