Chesapeake Bay Program
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Climate Resiliency Workgroup

October 17th, 2022
1:30-3:30 PM EST

Event webpage:
https://www.chesapeakebay.net/what/event/climate-resiliency-workgroup-meeting-october-2022

This meeting will be recorded for internal use to assure the accuracy of meeting notes.

Minutes

Action Items

- GIT-Funded Marsh Adaptation Project: Have project team follow-up with tool creators regarding these tools to inform the Spring 2023 workshop, which will focus on identifying focus areas for marsh restoration and resilience research to pursue federal funding opportunities
- TNC Resilient Lands and Resilient Coastal Sites Tools: Contact Michelle Canick (mcanick@tnc.org) regarding inquiries to access the datasets from these tools.

1:30 PM **Welcome, Opening Remarks, and Announcements – Mark Bennett, Co-Chair (USGS), Jackie Specht, Co-Chair (The Nature Conservancy) & Julie Reichert-Nguyen, Coordinator (NOAA) [10 minutes]**

Focus of meeting:

- *Share information on the development of various coastal resilience tools and how they have been used or might be used to target resiliency projects. Presentations will be from The Nature Conservancy, NOAA, and USGS.*
- *Discuss next steps in the current Strategy Review System cycle*

Announcements:

- *Introduction from Jackie Specht, new Climate Resiliency Workgroup Co-Chair*

Summary

Julie, Mark, and Jackie welcomed everyone to the October Climate Resiliency Workgroup meeting. This meeting focused on sharing information about three different resilience tools developed by The Nature Conservancy (TNC), NOAA, and USGS, and having an informal discussion about the utility of these tools for the workgroup. Julie mentioned that a future

meeting can delve deeper into how these tools might be utilized to target different resilience projects, especially with the influx of resilience and habitat funding. Additionally, Julie mentioned she would be providing an update about the current Strategy Review System cycle; the November meeting will focus on developing the next 2-year workplan and identifying the climate science needs to be added to the STAR Science Needs Database.
Jackie Specht, the new co-chair, to the workgroup, who officially assumed the role in October introduced herself. She is the Resilience Coast Program Director with TNC for Maryland and Washington D.C. She has been with TNC for three years and before that she was with the Maryland Department of Natural Resources as a NOAA Coastal Management Fellow. She hopes to support adaptation efforts and the continued integration of community resilience goals into the workgroup's activities. Julie also asked Mark Bennett (Co-Chair) and Jamileh Soueidan (Staffer) to introduce themselves as there were a number of new participants at the meeting. She asked everyone to put their name and affiliation in the chat so that there was a record of attendance.

1:40 PM **Overview of The Nature Conservancy's Resilient Land Mapping tool and Maryland and Virginia Resilient Coastal Sites tool (Michelle Canick) [25 minutes]**

- These tools created by The Nature Conservancy aim to assist decision-making in the face of a changing climate. The tool includes a coastal resilience layer analyzes physical and condition characteristics of the area to assess resilience. Currently, the tool is under refinement to incorporate finer scale data that accounts for variations within existing parcels.

Summary
Michelle Canick with The Nature Conservancy (TNC) presented on the Resilient Land Mapping Tool and the Maryland and Virginia Resilient Coastal Sites Tool. The presentation started with an overview of TNC's Resilient Land Mapping Tool, including terrestrial resilience and the Resilient and Connect Network. The Resilient Land Mapping tool is a national tool; the default mapping layer that appears when first opened is the resilient sites layer. This layer depicts the resilience scores of land with high terrestrial resilience coded in shades of green, average resilience in shades of yellow, and low resilience in shades of brown. The analysis to calculate terrestrial resilience did not take sea level rise into account. She later reviewed an entirely separate analysis for coastal sites that includes sea level rise considerations. In this mapping tool, resilient tidal habitats were coded in a pale grey/blue, with migration space coded in a darker blue. She suggests that users use the Resilient Land Mapping Tool if they are interested in assessing terrestrial sites.

The main components for the terrestrial resilience calculation include landscape diversity (i.e., topography, elevation range, and wetlands) and local connectedness (i.e., major roads, development, energy infrastructure, and industrial farming and forestry land). Landscape diversity refers to the microhabitats and climate gradients available in the surrounding land. The persistence of species in an area is predicted to increase if that area is surrounded by a

wide variety of micro-climates. Local connectedness refers to the degree of fragmentation and strength of barriers that create resistance to movement within that landscape. The report, methods, and data for this analysis are all available on the Conservation Gateway.

The national tool also combines areas of high terrestrial and coastal resilience into a resilient and connected network. In order to be included in the network, the resilient site must also have either climate flow (i.e., high degree of connectivity along climate gradients) and/or recognized biodiversity. The tool uses the coastal resilience data form regional analyses and provides a wealth of information about the components that go into calculating site resilience.

As she previously stated, TNC's terrestrial resilience methodology does not account for the impacts of sea level rise. However, tidal marshes are threatened by sea level rise, as some are unable to build elevation fast enough to keep pace with sea level rise. A case-study she presented reviewed the changes at Blackwater National Refuge in Maryland. The marsh lost 5,028 acres of marsh but has gained 2,949 acres at the upland edge with the one-foot of sea level rise over the past 68 years.

The National Resilient Lands Mapping tool includes the Resilient Coastal Sites as determined by the regional analyses for the Northeast and Mid-Atlantic, and a separate analysis for the South Atlantic, which uses the same methods as the analysis for the Maryland and Virginia analyses. A resilient coastal site is defined as a tidal marsh with characteristics that will allow it to migrate to adjacent lowlands, thereby maintaining diversity and key processes as it adapts to sea level rise.

Each coastal site receives a resilience score based on the likelihood that its coastal habitats can and will migrate to adjacent lowlands. A site is considered more resilient if it had more opportunities for adapting to or accommodating risk or was categorized as more vulnerable if it had fewer options. The map she showed as an example depicted tidal complex, migration space, and buffer area. The tidal complex is a unit of tidal habitat that is composed mainly of tidal marsh with interconnected brackish marsh and unconsolidated shore. In this presentation, she refers to the "tidal complex" as the "marsh." Migration space is determined by the physical structure of the site as well as the antagonist of the processes that facilitate migration. The butter area consists of the natural and agricultural lands surrounding the marsh and its migration space.

One difference highlighted between the regional analysis and the MD/VA analysis is the way that estuarine wetlands were grouped into tidal complex units. In the regional analysis, wetlands within 150m of each other were grouped into units. In the MD/VA analysis, they grouped contiguous pixels using the "8 neighbor rule," resulting in a much greater number of tidal units which each received a separate resilience score.

A resilience score is a relative metric as it is compared to other sites in the same coastal shoreline region. A coastal shoreline region (CSR) is a region that share similar processes and dominant estuary types. The MD/VA analysis is divided into two regions, the Chesapeake Bay

and Piedmont River Dominated and the Mid-Atlantic Coastal Lagoon. For this analysis, each site was compared only to the portion of the coastal shoreline region that falls within Maryland or Virginia.

TNC calculate resilience for several different scenarios ranging from 2 feet to 7 feet of sea level rise. In the online mapper, the default layer shows the 3 feet scenario. This matches Maryland's 2018 sea level rise projection's central estimate under growing emissions scenario. Resilience attributes were categorized by physical attributes and condition attributes. Physical attributes determine if there is land available that will support migration. Condition attributes focus on the processes that enable migration and formation of new tidal marsh.

For each physical attribute calculated, the resilience scores are binned into categories based on the relationship to the average score to the other tidal complexes in the same CSR. In the example, she shows marsh migration space size, where regions coded green have an above average marsh migration space size, while regions coded brown have a below average size; this color coding system is used for all physical attributes. A large migration space is an essential condition for a large tidal complex in the future. The next physical attribute described was tidal class diversity and evenness, as future habitats in the migration space are partially a function of the tidal classes in that space. It is assumed that marshes with greater tidal class variety and evenness in their migration space will be more resilient. The next attribute reviewed is shared upland edge; marsh migration is facilitated by having migration space directly adjacent to the existing habitat. Having a high proportion of tidal complex's upland edge shared with its migration space helps ensure that all regions of the marsh have direct access to the migration space. The size of the existing tidal complex is likely to influence its ability to migrate because large complexes provide a larger source of biotic material. The physical score combines the described physical attributes through a formula.

Condition attributes focus on the processes that enable migration and formation of new tidal marsh. The first attribute described is the developed upland edge; it is the most heavily weighted attribute. Tidal complexes with development and roads along their upland edge have less access to migration space thus are less likely to migrate. Watershed derived sediment is a key source of tidal wetland accretion, with a surplus resulting in either vertical growth and/or lateral expansion. Sediment deficit may result in drowning and/or lateral contraction of the marsh. Decline in sediment may be attributed to agriculture or dams. Nutrient pollution and excess nitrogen may impede ability to build elevation by increasing rates of decomposition and weakening root systems. To estimate water quality, the tool uses the water chemistry index from EPA's StreamCat database. Freshwater inflow is necessary for healthy and productive estuaries and strongly influence plant composition in tidal wetlands. Upland development impacts the amount of freshwater that marshes would receive under natural conditions. Sites with less altered flows are more likely to successfully migrate. The condition score is calculate using a formula that incorporates all the condition attributes.

A final resilience score was calculated for each site under each of the sea level rise scenarios. The physical and conditional attributes described comprise 90% of the final score, while the

buffer attributes comprise 10% of the final score. The National Resilient Lands tool does not have the data from this new MD/VA analysis, however there is a separate web map that allows users to interact with the data and explore areas of interest. For the web map, the available attributes include the categorized physical score, condition score, and final resilience score.

Next steps for this work include using this analysis in conjunction with other targeting tools (e.g., Sea Level Affecting Marshes for Maryland [SLAMM]), identifying sites for conservation action, and guiding effective and equitable use of funding opportunities. The Resilient Coastal Sites and other tools may be used to help target different project types. These tools can help answer questions such as "where is resilient migration space currently unprotected?" "Where are the marshes that score well on other metrics, but have development or roads along their upland edge?" and "where are vulnerable populations located in resilient migration space?"

Clarifying Questions

Michelle then answered a couple clarifying questions that were posed in the chat. Peter Claggett asked about how often the resilient lands data would be updated? He mentioned that the LiDAR data are continuously changing and are critical to measures of coastal resiliency. Michelle mentioned that there are no current plans to update the data, but she mentioned that in addition to the LiDAR data, there are going to be updates to the water quality data, and likely many of the metrics that she reviewed.

Jason Dubow asked if the "resilient coastal sites" be protected or the "migration space" adjacent to those sites. Michelle responded that it is more critical at this point to focus on protecting the migration space as many of the marshes have protections built into them because they are wetlands. Peter Claggett agreed that focusing on protecting the migration space is key. In their new high-resolution land-use change data, they see new development encroaching up to the edge of the mapped tidal wetlands.

2:05 PM Overview of NOAA's Sea Level Rise Viewer (Nate Herold) [25 minutes]

- The NOAA Sea Level Rise Viewer tool helps visualize community-level impacts form coastal flooding or sea level rise. It incorporates photo simulations of how future flooding might impact local landmarks as well as data related to social vulnerability and marsh migration.

Summary

Nate Herold presented on the NOAA Sea Level Rise (SLR) Viewer, with a focus on marsh resilience. He began his presentation with an outline of what he would be reviewing which covered overviews of the Sea Level Rise Viewer, a marsh resilience analysis that was conducted with the National Estuarine Research Reserve system (NERRs), and the Coastal Change Analysis Program (C-CAP).

The overview of the Sea Level Rise Viewer was comprised of screen captures of the tool to ensure that he could review what the tool looks like, how it functions, and the portions that are involved with the tool without having to navigate the tool in real-time during the presentation.

The SLR Viewer is one of the tools that is found within the Digital Coast website. The website provides an overview of the tool as well as access to some of the data and map services that the tool utilizes. Additionally, on this site, users can find detailed documentation of mapping methodology and the related data sets and tools uses, which they call "Stories from the Field," which is how the tool is being utilized by end-users around the country. Lastly, the website provides access to additional tools and trainings such as the coastal inundation training or adaptation for coastal communities training.

The viewer opens up to a national scale; Nate mentioned they are working on gathering more data for regions like Alaska. To target a specific region, users can search using the box at the top or zoom in to the region with their mouse. He zoomed into the Chesapeake Bay region. The default layer is the sea level rise viewer, which shows mean higher high water surface, which is created from the best available LiDAR. There are blue and green features highlighted in this view; the green features are areas that are not connected to the main water bodies. He focused in on the site-specific photo simulations that are included in this default layer. They are local landmarks that are included to show what sea level rise looks like at that location.

He then moved to the local scenarios tab, which is where the most recent iterations of the tool have been updated. This tab allows users to move more into local sea level rise information. Nate noted that there is a tutorial in this section, which walks users through what Nate showed during his presentation. This tab requires users to select a specific location; in his presentation, Nate selected Cambridge, MD. This allows the tool to customize the tool to match local sea level rise and be explicitly tied into the NOAA sea level rise projections. This section allows users to include both the previous 2017 scenarios as well as the newer 2022 projections. They do not tie modeling to specific scenarios, rather they create a wall to wall output for each of the 1-ft increments, which allows the user to adjust the slider to match local values as they navigate from region to region. In the viewer, the color range represents the depth of the water. As this tool has been available to users, they realized that they needed to think about wetlands model within the tool and how wetlands are handled. Before he discussed the wetlands and marsh aspects to the tool, he highlighted some of the other sections within the tool, which include a tab that speaks to mapping confidence (i.e., a spatial representation of how well they feel they can place that mean higher high water extent), a social vulnerability tab (i.e., inundation surfaces and how it relates to the social vulnerability index), and the high tide flooding tab (i.e., areas currently impacted by high tide flooding and how duration and number of flood days are projected to change in the future).

Nate then navigated to the marsh migration portion of the tool. He mentioned that there is a training video for this tool. He stated that the key component to this portion of the tool is that in addition to factoring in mean higher high water surface, they use the same LiDAR data to create several different surfaces (e.g., mean lower low). Additionally, they have a layer above that called a 66% wetland majority, which is based on elevations currently compared to the current land cover data and where the region shifting from majority of wetland land covers existing within those elevations to a minority. This information is combined with the C-CAP land cover datasets, which is what is used as the current state of wetland mapping. As a result, the

various tidal surfaces work as a 6-layer deck within their modified wetlands model; essentially the model examines how these various surfaces transition through time. He mentioned that the transitions that occur within these areas are driven by when those features transition across these tidal thresholds from one datum to another. To make sure their modeling is consistent with how wetlands progress in the landscape, they incorporate that wetlands can only move down the spectrum (i.e., they can only get wetter or saltier).

He selected a location, like he did in the last scenario when showing the SLR Viewer; there is also the ability to select an accretion rate. He notes that by selecting an accretion rate, there is a change in the tick marks on the left-hand side of the tool. By selecting the accretion rate, the user can change the net impact of sea level rise within the region through the following formula: *SLR-[(accretion rate)(# of years)]=Net SLR Impact*. Nate then reviewed some key pieces in the intermediate scenario for the region he selected. He underscored how in this tool, they have halfway increments on the scale; this is important as there would be quite a number of scenarios or time-steps that they would not be able to model. This tool also allows users to switch to a view-by-year screen, which allows users to change the slider on the right-hand portion of the toolbar to be able to look at different years and see how each scenario plays out in that year.

He reiterated that the data are available within the digital coast website. The wetland migration data are organized on a state by state basis, and the data are distributed through a different page within the digital coast website. Overall the tool is a simplistic representation in terms of both the modeling and in terms of the power of what users can do with the data sets. He pointed out that users can explicitly download those data products, figure out which layers are most interesting to compare and map them. This allows users to see which types of wetlands are changing or being lost.

Nate then reviewed a marsh resilience analysis that was conducted in partnership with the National Estuarine Research Reserve Association (NERRA) for their Landscape Scale Marsh Resilience Project. The study aimed to make comparisons about saltmarshes over broad geographies in a very systemic fashion. The project takes into account the marsh conditions as well as the surrounding land-use and land cover conditions. The project can be used for monitoring as well as management decisions. This is information that they hope to combine with site specific information such as vegetation. In this work, they examined ~12 different metrics that were related to marsh resilience; these included current condition variables (e.g., marsh configuration and land-use/land cover), vulnerability aspects (e.g., tides and erosion), and adaptive capacity (e.g., shoreline and migration ability). There is a story map that presents this data and includes the resilience scores that were calculated using the metrics listed before. This allows for an in-depth look at each of the HUC-12 watershed that were included in the analysis. NERRA also equating what the resilience scores mean and how to interpret what the landscape may look like to the types of management options that are available. He highlighted that this is a dataset that is available within the digital coast website.

Lastly he provided a brief update on the Coastal Change Analysis Program (C-CAP). C-CAP is a Federal Geographic Dara Committee (FGDC) National Geospatial Data Asset and provides a coastal expression of the National Land Cover Database. Their regional products at a 3-meter resolution are updated every 5 years. Their high resolution product at 1-meter, which was historically expensive to produce, is now faster and less resource intensive to produce; there is an expected national build out of this program by 2025. This high resolution mapping is expected for all coastal counties that C-CAP has mapped within in the contiguous United States with the exceptions of Vermont and the Chesapeake Bay, where they are working with the Bay Program and State of Vermont to leverage their datasets.

Clarifying Questions

Jason Dubow asked if there is a particular projection that NOAA uses to assume a certain increase in salt concentration as sea levels rise, and therefore a change in wetland type over time. Molly Mitchell followed up by asking for further clarification about the elevation based categorization and how it relates to the different wetland types. Nate responded by stating that NOAA does not use a particular projection or scenario. They standardize a set of outputs. What they look at is agnostic of how much sea levels rise. They produce 1-foot increments of impact and then manipulate the slider within the tool to match net impacts. The net impact is driven by how much sea level rise is occurring and how much marsh accretion is occurring. The elevation based characterization is what NOAA uses to drive the changes form one wetland category to the next.

2:30 PM **Overview of USGS's Coastal Wetland Synthesis Products and Tools for Chesapeake Bay (Neil Ganju) [25 minutes]**

- The USGS Chesapeake Bay Study has completed analysis of the UnVegetated-Vegetated marsh Ratio (UVVR) and elevation for over 90,000 wetland units in Chesapeake Bay, and will demonstrate uses of the data in decision-making for prioritization and restoration. They will also demonstrate the use of the marsh lifespan in estimating present-day vulnerability under future SLR scenarios, and restoration benefits.

Summary

Neil Ganju presented on the coastal wetland synthesis products and tools that his team has been developing for the Chesapeake Bay. He began by discussing the geomorphic vulnerability of saltmarshes, stating that there are three physical processes that control this (i.e., edge erosion, internal deterioration, and migration potential). Neil mentioned that they are conducting research within this framework, with a manuscript forthcoming. This research will hopefully develop a model for marsh lifespan that considers all three of the processes in tandem. For the presentation, Neil mentioned that he will just be focusing on the internal deterioration process.

He reviewed the research they conducted connecting sediment budgets to the unvegetated-vegetated marsh ratio (UVVR). UVVR is a geospatial metric that was developed by this team, which indicated disintegration of the wetland complex. They analyzed sites around the country, measuring sediment budgets and the corresponding UVVR. They determined that sediment

budget is highly, negatively correlated with vegetation, and as the marsh moves towards a negative budget, there is a corresponding increase in open water and loss of vegetative plain. He mentioned that healthy marsh plain should have minimal ponding from root collapse. This concept ties sea level rise (SLR), sediment budget and vegetative cover into one framework. He stated that there is a tipping point when UVVR is at ~0.10-0.15 when the marsh loses stability. He showed examples of what each marsh looks like at different levels of UVVR, with those with the highest ratio having the most ponding.

He reviewed the geospatial analysis that his team conducted for the Chesapeake Bay. He mentioned that over the past 5-6 years, they have been mapping and measuring UVVR at marsh sites across the country. He mentioned that they focused on sites where the stakeholder need existed to develop these metrics. Currently, they are working on a project that assesses the Northeast, including the Chesapeake Bay. For the analysis, their team delineates the marsh into individual units along the lines of a tide-shed or watershed. Then across each of those units, they use air imagery to calculate the UVVR by classifying the pixels. Additionally, they use LiDAR data to determine elevation. They then develop a lifespan model, which combines UVVR, elevation, and SLR into a tangible metric that can be used for prioritization of restoration. This analysis will be available as a shapefile and also in their geo-narrative which has a point and click viewer as well as a lifespan calculator.

Neil then reviewed some highlights about Blackwater National Refuge in Maryland, which he used as an example. On the maps, each polygon depicts a marsh unit, where a large portion of the units are barely 10 cm above sea level; the interior marsh units are very low in elevation compared to the surrounding units. The map showed the UVVR, where the ratio follows a similar trend, with many units over the 0.15 threshold. Overall, the Blackwater area has a UVVR of ~1. The UVVR was color coded green for low ratios, white around the neutral or tipping point, and pink for a higher UVVR. Things to note for Blackwater are that there is a lot of deterioration within the internal part of the marsh, with many units over the threshold of 0.10. So while the overall UVVR is ~1, this example shows how the analysis is broken up into discrete units.

Deal Island is another example on how to use the data. This marsh is similar to Blackwater, where there is lower elevation which is consistent with a high UVVR; this is a trend that is seen across the Northeast. Another pattern seen throughout the Chesapeake is the tendency for marsh edge units to have more intact plains and higher elevation than the units in the interior of the marsh. He then showed Plum Tree Island as an example. This marsh has a consistent pattern of deterioration along the edges which corresponds with lower elevation. The interior units had less deterioration. These examples highlight how the analysis is conducted on discrete units, which might make it easier for management decisions and identifying parcels.

Neil reviewed the hypothetical decision matrix that his team developed. The idea is to take these data, identify thresholds for what is high elevation and low elevation and what is high UVVR and what is low UVVR. Then users are able to bin the parcels/marsh units into the boxes, which represent protecting the marsh (low UVVR/high elevation), restoring the marsh (high

UVVR/high elevation), monitoring the marsh (low UVVR/low elevation), or determining if the marsh is worth restoring (high UVVR/low elevation). This matrix is a good screening tool for determining tidal restrictions. These four outcomes/decisions can then be mapped across the landscape. He showed the example of Deal Island, which at a UVVR threshold of 0.15 and a vegetative plain elevation of 0.4 meters. He mentioned that if there is a target number of acres that need to be restored, users can choose thresholds to meet that target number and help classify marsh units in a way to target those that will be most successful with restoration. In the Deal Island, most of the units fall within the "protect" box. Some of the interior units fall within the "restore" and "monitor" boxes, and a large number of the interior units fall within the "determining if the marsh should be restored" box.

Neil provided an example to help define the marsh lifespan concept. He showed a cartoon of a man sitting on a grassy patch, which is floating in the middle of the ocean. He stated to imagine the whole cartoon is a marsh unit with the grassy patch depicting the vegetated plain and the water is the unvegetated area. The mass in the vegetated plain above mean sea level is the sediment balance. With SLR, the UVVR increases, creating a sediment deficit. To offset the deficit the account balance has to be drawn down until the whole complex is at mean sea level and/or unvegetated. Essentially, the vegetated portion of the marsh unit above sea level rise is being "cannibalized" to feed the other portion of the marsh unit. This process is simple mathematics and geometry that make it easy to model with lots of different sea level rise scenarios.

Neil and his team plan on mapping the sediment-based lifespan across the Chesapeake as soon as the first layers from this analysis are published. He showed an example from Assateague and Chincoteague. Marsh lifespan is shorter on the northern side of this region, while further south, marsh lifespan is much longer. The striking difference between the north side and south side is due to ditching in Maryland versus no ditching in Virginia. Currently, their team is developing an online calculator to provide lifespan calculations under different SLR scenarios. He mentioned that federal employees are eligible to participate in the calculator testing this fall and to touch base with him via email (nganju@usgs.gov) if interested. He provided some examples of these lifespan calculations under different SLR, UVVR, sediment scenarios.

Lastly, Neil highlighted their national Landsat product, which utilized 30-meter resolution data. These data are used for very specific objectives due to the limitations that were highlighted in the previous presentation for 30-meter resolution data. They conducted a trend analysis from 2014-2018, to show areas with a consistent vegetation change trend over the 5 year period. Areas coded in blue have had increases in vegetation while areas in red have seen decreases in vegetation. This can be overlaid with the decision matrix layer to help with determining how to address (e.g., monitor, restore, protect) a specific marsh unit.

He ended the presentation with examples on how to use the geospatial data and lifespan estimates. This includes identifying priority marshes and restoration techniques; conducting robust benefit-cost analyses with the lifespan calculator; establishing restoration targets based on objective data; selecting candidate marshes based on proximity to other interests;

conducting avian and fish habitat assessments under present and future conditions; and conducting basic research on mechanisms of salt marsh trajectory and connections with hydrology, land-use, sediment transport, and hydrodynamics.

Clarifying Questions

Jason Dubow asked if the user looks at different SLR scenarios, would the thresholds change regarding what to protect in place versus what to restore versus what to allow for migration. Neil confirms that this is a correct interpretation; he also thinks that the lifespan calculator provides an additional level of resolution. Erik Meyers asked if there is a calculation that quantifies edge erosion rate in tidal marsh complexes. Neil mentioned the work that Larry Sanford conducted that developed the equation and formulation for assessing edge erosion around the entire Chesapeake Bay as a function of wave energy and depth. They plan on mining that dataset and formulation to map wave energies within Larry Sanford's formulation to develop an idealized edge erosion rate. They plan to move transect by transect along the wave directions within the Bay to calculate an edge erosion rate lifespan. This will help develop a larger lifespan picture, as it adds to their internal lifespan calculation presented earlier and the migration lifespan work conducted by Grace Molina. Erik responded that he thinks it will be critical for potentially stacking restoration and marsh adaptation techniques.

2:55 PM Discussion/ Q&A about Resilience Tools [20 minutes]

- After hearing these three presentations on different resilience tools, the workgroup will have a chance to ask the presenters more about their tools as well as discuss how they may be utilized in targeting resilience projects.
    - How would you use these tools to help target or design your resilience projects (e.g., marsh restoration, living shorelines, forest conservation) to maximize benefits (e.g., coastal shoreline protection, bird and fish habitat, flood reduction, etc.)?
    - Which metrics interested you the most or could be the most helpful in identifying where to implement natural infrastructure to enhance resiliency (reduce vulnerability of shorelines, protect nearby communities, etc.)?

Open Discussion

Julie began the discussion by highlighting the questions that were listed above in the agenda to help meeting attendees think about how these tools can be utilized in targeting projects. She mentioned that attendees can discuss ideas that they might have on how to use the tools, if there is any particular metrics that would be helpful for their project or if there are consistent metrics across the tools that would be worthwhile for the workgroup to look into as the workgroup continues to try to synthesize this information and develop guidance.

Jason Dubow started the conversation by asking about how the NOAA marsh resilience metrics that were presented compare to the USGS marsh lifespan metrics. Nate responded by mentioning their differences which include accounting for different attributes, such as the

UVVR that looks at the vegetated and unvegetated ratio, while the NOAA tool takes into account other metrics like land cover upstream within the watershed. While the tools are portrayed as similar things, they actually evaluate different metrics, thus their outputs will be different. Neil added that the marsh lifespan is simply a mass balance of what is available in the marsh to offset SLR; it is not considering all of the different factors contributing to marsh instability. He then mentioned that if he were the end-user, he would first identify what restoration techniques are available to him, and then use every tool available to overlay vulnerability from every metric available to see if the tools agree and why. He mentioned that there is a scientific aspect to this type of analysis in knowing how to merge disparate vulnerability metrics.

Julie mentioned that it was interesting how the TNC tool weighted different factors around marsh condition and marsh migration. She was wondering if there is an ability to weigh factors differently within the tool, for more refined jurisdictional and local uses. She was wondering if there is ability to customize the information. Michelle responded that if they have the full dataset and are able to use ArcGIS, end-users would be able to change those weights. She mentioned that they do not have a slide tool set up to allow non-GIS users to do that. She said that if there is someone who is working within a particular area who is interested in adjusting those weights, she would be happy to talk with them.

Peter Claggett asked if the TNC data could be downloaded for direct comparison with the NOAA and USGS tools. Michelle responded by saying she can make the data available upon request. She also mentioned that there are two different datasets with the Chesapeake Bay data separate from the Coastal Lagoon dataset.

Jason Dubow asked how TNC will be using the Resilient Lands Mapping and Coastal Sites tools to carry out resilience and adaptation work. He is hoping to hear TNC's perspective as it help inform how his organization may utilize the tools as well. Michelle responded by first mentioning and agreeing with Neil said in his presentation; first look at all the tools that exist and see where these tools are aligned and where they are not aligned when analyzing a particular area. She mentioned that there are many individual metrics that are built into these tools so she would aim to understand what is influencing the final resilience scores of a particular area. This could help in determining management strategies. She asked Jackie Specht for her insights on the question, as Jackie works within that adaptation space for TNC. She discussed how they utilize these tools to understand where there are habitats that have potential for restoring so that they can persist into marsh migration phases or so that these marshes can provide those resilience benefits to coastal communities. She mentioned that they think about how they can bring these tools together to identify critical sites for marsh persistence and for protecting coastal communities from the impacts of storms.

Nicole Carlozo mentioned that the current GIT-funded Marsh Adaptation project will be pulling together marsh resilience metrics as well as surveying organizations about their geographic and organizational priorities. This will inform a workshop in the spring that will focus on identifying focus areas where partners can collaborate and build partnerships to pursue federal funding

opportunities. She sees this project as an opportunity to use all of these tools to overlay the metrics to see where the tools align and do not align, and then investigate the areas where they are not aligning. This will also help identify priority areas for the initial partnership building effort.

In the chat, Erik Meyers asked if TNC's tool is also mapping the presence of phragmites in the landscape to help inform on barriers or added techniques needed to ensure resilience. Michelle mentioned that the tool does not incorporate the amount of phragmites in the analysis.

Julie mentioned that Jackson Martingayle's (NCBO Summer 2022 Climate Intern) work involved diving into these tools and looking for commonalities across metrics. Jackson did highlight that he was not quite sure how habitat was built into these tools. Julie asked Neil, Michelle, and Nate if they could speak to how their tools can provide insights into habitat such as bird or fish habitats. Michelle responded by saying they do not have habitat directly built into TNC's tools; they used the NOAA C-CAP marsh migration data so they do not get any finer detail than that. She mentioned that there might be some broad generalizations that can be made about certain categories of tidal wetland. Nate mentioned that his response would be similar to Michelle's as NOAA's tools uses the same data. He mentioned that users might be able to combine the outputs from other tools that show high risk areas with other existing habitat data sets. He mentioned work done in New Hampshire where they utilized a saltmarsh habitat dataset produced by the state instead of the national C-CAP data. Neil Ganju responded by saying that within the Chesapeake part of their participation in the USGS study is to look at black duck, so they are incorporating an avian habitat assessment as part of their work. They are still working on mapping those things in tandem with marsh condition. Additionally, this year they are working on a project throughout the Northeast which will combine geomorphic metrics like in their tool with saltmarsh habitat data, with a focus on the saltmarsh sparrow. This project should help develop a framework for merging geomorphic metrics with habitat use. Julie mentioned that this topic was raised at the Maryland Sea Grant Large Scale Marsh Persistence and Restoration in the Chesapeake Bay workshop. During the workshop, discussions touched on trying to connect the ecosystem benefits of the marshes and examining marsh persistence. She mentioned that these tools are helpful in evaluating the condition of the marsh.

Julie thanked the presenters on sharing information about these tools. She mentioned that this topic is relevant as the workgroup develops their next two-year workplan. She discussed how the workgroup is looking to develop actions around marsh adaptation and persistence and that the workgroup can utilize these tools to help target projects. Additionally, she mentioned that the workgroup can work with the tool creators to help provide user case scenarios of how these tools are utilized.

3:15 PM **Review of Strategy Review System Next Steps and Workgroup Feedback [10 minutes]**

- As we prepare for the Quarterly Progress Meeting Dry-Run during the October 20, 2022 Coordinator/Staffer Meeting, we are asking the workgroup to begin reviewing the Narrative Analyses and draft

Management Board presentations for the Adaptation and Monitoring and Assessment Outcomes. If you would like to attend this meeting, please email Jamileh Soueidan (jamileh.soueidan@noaa.gov) to be added to calendar invitation. Comments will be due Monday, October 25th. We will review the next steps in the SRS process and key deadlines.

Summary

Julie just briefly mentioned that the workgroup is currently working through their Strategy Review System process, which occurs every two years. This process includes reviewing progress made on the last two-year workplan, which was covered at the August and September workgroup meetings, drafting narrative analyses reviewing progress made towards the Adaptation and Monitoring and Assessment Outcomes, successes and challenges, and how the Management Board can help support the workgroup, and the Quarterly Progress Meeting Presentation covering the information in the narrative analyses. These materials are posted to the October meeting calendar page. She asked the workgroup to please review those materials by the October 24th, 2022 as the final materials are due to the Management Board by October 27th, 2022. She ended the overview of upcoming dates in the SRS process by mentioning the importance of the November CRWG meeting, as this meeting will focus on developing the next two-year workplan.

3:25 PM Additional Announcements and Wrap-Up [5 minutes]

Announcements and Opportunities:

- EPA Region 3 Announcements:
  - The EPA Region 3 Office recently released their Climate Adaptation Implementation Plan, which reaffirms the strong commitments made in EPA's 2021 Climate Adaptation Action Plan to address the devastating impacts of climate change on communities across the nation, while advancing environmental justice and equity. It also provides details on the specific actions Region 3 will take to protect human health and the environment and to increase the resilience of the Mid-Atlantic Region, even as the climate changes.
  - Registration for the virtual EPA Region 3 Climate Workshop taking place **November 9-10, 2022** is now open. This two-day workshop is an extension of the climate track from our Spring EPA Mid-Atlantic 2022 Summit and is intended to identify the shared climate and hazard mitigation priorities between Region 3 and our partners. For more information please reach out to Matthew Konfirst (konfirst.matthew@epa.gov) and to register click here.
- NPS Chesapeake Gateways is now accepting proposals for their Networks Grants program, which focused on advancing equity, inclusion, accessibility, and community engagement across two strategic themes: Advance a Major Inclusive Interpretive Initiative with an Equity Lens and

Promote Resilient Communities & Landscapes through Tourism, Sustainability, Conservation & Local Economies. Total funding amounts to ~$1,000,000 with an estimated range between $25,000 and $150,000 per award. NPS Chesapeake Gateways will be hosting two webinars to provide an overview about the grant program as well as two grant writing workshops. Applications are due January 30, 2023; for more information about the awards program, webinars, and workshops click here.

- Recently the Chesapeake Conservancy, USGS, and the CBP successfully updated the high-resolution land data and conducted a change analysis. The updated data includes more land-use classes, with the change analysis identifying increases in development, loss of forests, and growing numbers of solar farms. Read more in this new science summary and contact Peter Claggett (PClagget@chesapeakebay.net), who has been involved in the effort for over a decade, for more information: New high-resolution, land-use and change data improves decision-making in the Chesapeake Bay watershed | U.S. Geological Survey (usgs.gov).
- The Journal of Urban Tree Forestry and Urban Greening recently released a call for papers that focuses on green infrastructure futures. This Special Issue aims to highlight options within land management (i.e., waste, economic thinking via business engagement, the role of metrics) in assessing the added-value of Green Infrastructure, and socio-cultural divergence in the use of Green Infrastructure in the future. The submission deadline for this issue is May 30, 2023.

3:30 PM Adjourn

Next Meeting: November 21st, 2022 from 1:00 PM-4:00 PM

Attendance: Kate Ackerman, Moriah Baybrick, Maggie Bennett, Mark Bennett ,Gopal Bhatt, Donna Bilkovic, Mike Bonnell, Katie Brownson, Samuel Canfield, Michelle Canick, Nicole Carlozo, Laura Cattell Noll, Ken Choi, Peter Claggett, Adrian Dascalu, Cassie Davis, Katie Davis, Zafer Defne, Lisa Dosmann, Jason Dubow, Neil Ganju, Helen Golimowski, John Griffin, Alex Gunnerson, Grace Hansen, Nate Herold, Debbie Herr Cornwell, Arianna Johns, Matt Konfirst, Matt Konfirst, Henry Legett, Kate McClure, Ben McFarlane, Bart Merrick, Erik Meyers, Molly Mitchell, Dave Montali, Mindy Neil, David Newburn, George Onyullo, Megan Ossman, Rachael Peabody, Scott Phillips, Julie Reichert-Nguyen, Julieta Rodrigo, Jessica Rodriguez, Kristin Saunders, Mike Sheffer, Jamileh Soueidan, Jackie Specht, Jennifer Starr, Taryn Sudol, Breck Sullivan, Deborah Sward, Renee Thompson, Marek Topolski, Young Tsuei, Holly Walker, Sophie Waterman, John Wolf, Taylor Woods