1:10 PM Session

Are we missing any important implications for ecosystem processes influencing estuarine ecosystem health?

Implication on benthic habitat?

Timing of habitat refugia

Shallow waters, "triblets", critical to living resource life cycles are the receiving waters from the watershed. Perhaps the scale of influence needs attention.

11,500 miles of shoreline habitat being impacted seems important. Not volume, but linear miles of critical habitat seems key. P. Tango

We don't often speak of disease and parasite changes but I seem to recall some studies on increasing likelihood for certain disease vectors to consider in the eventual influence on the food web. PT

The coastal acidification (carbonate system) storyline is interesting, particularly when we consider that SAV is serving as a buffering system

(not strongly connected to temperature, but might be worth a footnote).

Does temp affect the ability of oysters to draw calcium out of the water for growth and recruitment?

Does the increase in air temperature increase the number of recreational harvest days that might have ecosystem implications?

What is the relationship between sediment loads (or water clarity) and water temperature increases?

Increased Stratification seems inconsistent with the slides that showed a similar temperature change in top and bottom waters.

How does this impact Estuaries abilities to flush pollution?

Temp affects to species distribution, immigration, emigration?

Timing and changes in likelihood of Marine heat waves for SAV at sub-monthly time scales, change in timing of growth and subsequent impact on fisheries

How may future warming affect established oxygen thresholds? As metabolic demands increase in warmer waters, higher O2 concentrations needed. -Kyle Hinson

Is oxygen concentration or percent saturation more important for living resources? Does the answer vary by species?

How will temperature change alter the mix of phytoplankton and the biochemical processing in the Bay? How does that change the assimilative capacity of the Bay?

HABs may appear earlier and last longer, decreasing phytoplankton diversity, contributing to low DO

What does this mean for specifically for commercial fisheries to recruit ?

1:35 PM Session

Are there additional representative species or habitats that were missed in our presentation/synthesis?

Sturgeon, as an endangered species, concerns for habitat impacts with NMFS, and we have explicit temperature thresholds recognized in the D.O. criteria,

so sturgeon/ endangered species representation seems particularly important. PT

Thinking about bottom-up food chains - what are the expected impacts on food/bait fish and how will this impact striped bass, etc.?

should we consider phyto/zooplankton changes?

Do the resilience metrics also include possible increasing influence of warmer water invasive species?

I believe NOAA tracks some zooplankton relationships with climate in the offshore coastal zone.

We have historical bay data on zooplankton but nothing since about 2005 to know how the zooplankton resource may be changing/impacting habitat health in the tidal waters of the bay. PT

What about an increase in 'unpopular' organisms like jellyfish or sea squirts? Seeing jellyfish earlier in the summer could be an indication of rising temps, and people using the tidal rivers notice them and

this provides a connection as well as an understanding of climate effects. Not sure how this impacts fisheries, but surely more fouling organisms on boat hulls is an issue.

Is temperature helping or likely to hurt blue cats as a population in the bay given their new found importance commercially, recreationally, and ecologically? PT

Need to consider more "resident species" inhabiting the low salinity habitats--yellow perch, white perch, largemouth bass. [Rich Batiuk]

Should we consider some species that are likely to join the Bay ecosystem as a result of Climate Change rather than focusing only on legacy Bay species? New competition? New commercial opportunities?

In terms of food resources, mysids seem important, unless I missed that. I think there was some work with MD Sea Grant on mysid assessments recently, perhaps something to work with there. PT

Shrimp? A new commercial fishery is developing around Virginia Beach. Are they getting into the Bay?

1:35 PM
Session

Are there other management frameworks that exist/or are being considered that could be applied to tidal systems?

From Renee - Models/ Management Framework to integrate to Health Watersheds Assessment

Look into State Management Frameworks - from conversation

State wildlife action plans?

2:45 PM Session

What are management applications that a Bay Water Temperature Change Indicator could be useful for related to the effects of changing temperature conditions on living resources and/or habitats?

indicator on important thresholds for SAV species would be one ecological (Scott P.)

SAV time of year restrictions and water clarity attainment criteria are based on growing season water quality data.

If growing seasons change and/or species shift spatially, these seasonal criteria (and associated regs) may need to shift

Could look at seasonal extremes that may guide management actions

Illustrating where throughout the Bay tidal waters where are below (blue), approaching (yellow) and now exceeding (red) key temperature thresholds for key communities--

SAV, representative fish species presented by Bruce V (Rich Batiuk)

Classification of marine heatwaves?

It seems that a temp change indicator is going to be essential if our shallow water modeling in the next phase of the model is going to be useful for living resource considerations

spatial analysis that can be used to guide conservation and restoration priorities for LR productivity and community resilience

Consider lessons learned from development of the CBP water quality multi-metric indicator and UMCES Chesapeake Bay Report Card and

how each of them calculated a single indicator from multiple individual indicators. [Rich Batiuk]

maybe consider not just a change indicator but variability in the change indicator, as some parts of systems respond more to variability rather than overall change

My sense is that indicators are most effective for things that change quickly and respond quickly to changes in management. Otherwise the indicator is fairly static.

Reminder - an indicator is typically a simple, easy to use tool to explain something more complex. Consider if you want an indicator of change

or a more complete accounting and not really a simple indicator measure. E.g. the Dow Jones avg is 30 stocks, not made up of all stocks that exist. (PT)

2:45 PM Session

SAV Impacts

Fisheries Impacts

Estuarine Health

Habitats

Indicator

For your changing temperature-related decision-support purposes, what data needs do you have, where, and for what purpose beyond the existing networks and programming?

Do we have temperature monitoring data in marsh habitat?

In relation to marsh habitat acting as refuge to increasing temperatures

Trends in stream temp, over time, by catchment, for healthy watersheds assessment - relate to watershed health or integrate analysis into thresholds for management applications

Daily temperature in narrow tributaries in spawning habitats

Need more shallow water temp data and more continuous data monitoring

Are there any DEIJ opportunities or synergies? (e.g., better incorporation of citizen science)

New types of data would be helpful, but highest priority should be to continue existing time-series (same location, same frequency, same sensors);

longer (consistent) time series are critical for estimating long-term change.

3:15
Session

For your changing temperature-related decision-support purposes, what data needs do you have, where, and for what purpose beyond the existing networks and programming?

What are the changes or trends in temperature that indicate a decline in important species, or conversely support resiliency?