9:40 AM Session

Are we missing any important implications for ecosystem processes influencing stream and river health?

Asking if ag areas dominated by drain tiled fields act like impervious areas to affect temperature change because of short-circuiting the cooling impacts of extended filtering and release into surface waters. P. Tango

How do we address interaction with changes in precip?

Groundwater comes into streams at 55 degrees F. So mapping springs would be helpful to id where streams would be more resilient to rising air temps (Scott P.)

How are the reservoir water supply, water management decisions affecting the watershed? We tend to get some cold-water management that is great but probably inconsistent with non-reservoir affected waterways. P.Tango

Given Rich's comments, we should probably change title, which infers looking at stream and river health (Scott P.)

USGS did projections on stream health out until 2090 due to climate and land change. Link to reference (Scott P)

https://www.usgs.gov/centers/cba/science/projecting-stream-conditions-under-future-land-use-and-climate-scenarios?qt-science_center_objects=0#qt-science_center_objects

Do we have a sense from the Anacostia Storm Flow Tunnel project that captures runoff and slowly releases it back, are we gaining additional temperature benefits from such a BMP effort? Is that a model for other areas? P. Tango

Resiliency added by cold groundwater inputs and interaction with karst areas

Including impervious cover would be an interesting co-variate. Particularly roads, and hydrologically connected. Anne Hairston-Strang (and did groundwater comments- MD Fisheries has the cold water mapper)

As there is an increasing push to research forests and soils for carbon capture, it will be increasingly important to determine how much difference in WT impacts there will be if we emphasize one approach over the other.

Agree with Katie Brownson - different tree communities have different evapotranspiration rates and affecting local temperature conditions.

Link to rising temp article (and map) presented by Nora https://www.usgs.gov/centers/cba/science/stream-temperature-rising-throughout-chesapeake-bay-region?qt-science_center_objects=0#qt-science_center_objects (Scott P.)

Will this synthesis topic include effects on stream biota (IBIs)? (Scott P.)

We are seeing differences in paired air vs. water temp relationships at our monitoring stations in MD brook trout streams vs. streams without brook trout. (Dan Goetz)

With regard to brook trout and other trout species, does the temperature regime affect the bug life (diversity and abundance) that support these populations? (Kevin Du Bois)

Climate-induced shifts in riparian vegetation may also influence stream temperature (certain veg types are better coolers than others) while also impacting in-stream nutrient cycling (Katie Brownson)

Is there any connection between increased stream temperature and vegetation type and growth rate? (Kevin Du Bois)

Links to the ability of existing BMPs (e.g., riparian buffers) to mitigate temperature stressors

Shifts in macroinvertebrate communities

10:30 AM Session

What are the most critical management questions/needs and scales for information about factors/geographies most influencing water temperature in local waters?

Need

Instead of looking at the CB restoration goals in silos, we should always be thinking about ways to achieve multiple co-benefits with the same project.

+1

There will always be limitations in staff, money, land, etc to accomplish our goals. (The Lorax)

Understanding key thresholds of landscape factors influencing water temperature.

Types of buffers (shrubs, trees, both, etc.) suited to mitigate temperature increases, ranging from small streams to larger river banks.

Need a framework to consider the mitigation of temperature impacts within the construction erosion & control process and post-development stormwater management.

This is needed at a development site scale and assessment at a cumulative watershed scale. Jim George

Do we need to model at the local cold water stream scale in order to drive implementation there? Can't we just target buffers where the land use data shows buffers are lacking.

Where (what stream and landscape characteristics) do riparian buffers have the most effect on stream temperature? (G. Noe)

Streamside land cover (%forest)

Relative potential for longer term Conservation and Preservation efforts to mitigate/reduce water temp compared to more active/recurring BMPs (and targeting conservation to priority areas) [Jeremy H.]

Living resource declines are often a function of population losses, not unlike watching local populations of Brook trout disappearing.

Overall range may look decent but population level understanding of living resources seems necessary for long-term success in management. P. Tango

Stream locations/network

Karst and cold spring sources

Interaction of infiltration and groundwater inputs

Location of groundwater inputs - catchment scale

Threshold levels for points of no return from a brook trout/coldwater sensitivity standpoint (e.g. percent forest cover, impervious, ponds etc...) Dan Goetz

where are cold and cool water fisheries most vulnerable to rising in stream temp; Scale: streams (first and second order?) where habitats exist for these species (Scott P.)

Many BMPs are implemented adjacent to small streams, so need 1st/2nd order streams need to be represented in WSM (Scott P.)

In addition to Karst, some relevant management actions or factors will be regionally prevalent in "hot spots" , pun intended (e.g., irrigation systems, ditches, etc.) [Jeremy H.]

First, do no harm. If we are moving toward trying to build a single model to answer the Bay TMDL questions and local water temperature questions (among others), we must not degrade the TMDL model in the process.

Scale

All scales (watershed, catchment, county, parcel, municipality)

Scale on living resource populations is the scale at what supports the successful life history for a species for survival, growth and reproduction. That will vary by species of course (P. Tango)

US continental scale for atmospheric temperature changes (this would be for model forcing)

3 m scale for land cover

Scale should be model dependent. Assigning HUC levels (i.e. scale) will vary by landcover type, geology, groundwater influence, elevation etc...

Finest scale possible, 1:24K minimum (Steve Faulkner)

Scale and quality of inputs available will constrain the scale of simulation.

11:25 AM Session

What are some key opportunities to use BMPs more strategically to mitigate rising water temperatures?

Using data from the CBP Phase 6 Watershed Model to estimate the cumulative effect of relative heaters and cooler BMPs implemented over the past 30 years

versus the change to the land uses over the same timeframe. [Rich Batiuk]

btw, some Bay TMDL sed and nutrient restoration projects do conflict or leave opportunities on the table for thermal optimization g golden

Charge future CBP BMP Expert Panels to develop information on temperature effects of future BMPs in additional of the N, P and sediment pollutant load reduction efficiencies. [Rich Batiuk and Rebecca Hanmer]

available offline to discuss BMP regulatory review for thermal factors in new BMPs and retrofitsg golden

MBSS data contains physical factors that could inform some of this research. (physical habitat: riparian veg, adjacent LC, buffer breaks)

Infiltrate first flush from impervious surfaces to minimize heat increase delivered to streams.

Identify interaction/mapping opportunities of springs and buffers to find opportunities to connect headwater coldwater resources such as brook trout.

As the partnership moves to focus on forest buffers and wetlands in the July meeting of Mgmt Board, let's think about how to nest this information within whatever initiative or big ideas they pursue...

particularly if we can combine use of forest buffers and wetlands to fend off stream temp climate impacts AND inland and coastal flooding - because we know those issues are of concern at the local level

Are there opportunities to use fast-growing shrubs to provide some temporary shading benefits while riparian trees mature?

Ag land use was shown to effect stream temp, so more info on ag BMPs will be important (Scott P.)

Greater promotion of "known coolers" especially in areas with greatest portion of impacts or known heating factors (hot spot ag or urban areas, etc.)

Are there opportunities to cool treatment plant discharges?

Applications of white roofs/reflective paints are increasingly being applied. Part of the equation, carbon reducing equivalent, cooling is not necessarily equal to cold, it's a resiliency element though. P. Tango

Is 'drainage ditch management' a viable equivalent to first order stream management? Something we can work with there? P. Tango

What is the potential around the watershed to invite landowners across the spectrum of development density to convert lawn to tree cover to enhance cooling around all manner of waterways? P. Tango

Pool bay state temp data. Identify land use thresholds and watersheds that have considerable restoration opportunities. Concentrate funds/efforts in these watersheds.

11:25 AM Session

What are some messages we could use to communicate about these opportunities to managers, planners, and policy makers?

Bring this to the local engagement group - we can try to work this message into the technical assistance meetings being done for the WIP implementation, and impress the need.

Importance of conservation

Connect the synthesis messages to the local manager needs (economic, public health, infrastructure, education)

This could be incorporated into the local watershed educational curriculum materials and tie it to the known priorities of local leaders.

Nature article: https://www.nature.com/articles/d41586-021-01241-2. Messaging around mitigation benefits (carbon sequestration of nature-based BMPs)

minimize clearing of riparian buffers to the minimum necessary to achieve project outcomes. Plan for minimal disturbance.

Improve planning for trees in larger public works projects, including rooting zone space for urban trees

Cooler waters are more pleasant for all swimmers (humans AND fish) in the summer. Choosing the right BMPs that clean the water can also make aquatic activities more enjoyable!

From Chat: Regarding messaging - making the connection between increased infiltration to reduced risk or magnitude of flooding.

Expand use of slow it down, spread it out, soak it in, and combine with shelter your streams and your streets.

11:25 AM
Session

How can we further enhance the cooling benefits of forestry and habitat restoration practices?

Research on how to increase vertical and lateral growth rates of planting mix in riparian buffers, in order to maximize cooling effects faster.

improve maintenance and tree care practices to avoid premature vine overgrowth and tree death.

11:50 AM Session

What are the primary stream-temperature monitoring needs of the other watershed synthesis elements?

tracking down (monitoring and analysis) recurring watershed characteristics of historic coldwater systems. Also, not all systems heat in the same manners/distances/ prgressions (profiles).

We need to learn more about groundwater and tributary contributions, combined with shade, etc., for the differing types of geographic stream characterisitics g golden

Paired air vs. water relationships for all bay watersheds. Identify thermally resilient watersheds and prioritize restoration in those watersheds.

Distribution of the high frequency sites is important. P. Tango

From Chat: I like the idea of representativeness - site locations by geography (pie chart), stream order, latitude, longitude. A few key summaries like that. - Peter Tango

This is a good example of (inclusion) within our data and analysis. There has long been a call to better incorporate the wealth of data and information from not only feds, states but also citizen monitoring.

(be sure Stewardship GIT knows this!)

Supporting work on development and calibration of the Phase 7 Chesapeake Bay Watershed Model's stream temperature simulations--filling in gaps in 1st and 2nd order streams [Rich Batiuk]

More Adaptive Management/research -focused monitoring to help improve understanding of how certain BMPs are influencing water temperature

Interaction of water temperature and algal growth

Aid in targeting riparian forest buffers