Factors Affecting Stream Health and Implications for Management Decisions

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Better understanding the drivers and stressors affecting the quality of stream health throughout the Chesapeake Bay watershed remains a significant management need. Millions of dollars are being spent annually to protect and restore stream health; however, stream and watershed managers still require an improved understanding of the factors affecting stream health, which of these drivers and stressors can be managed, and how stream health is responding to management efforts (both in stream restoration and watershed management). The Stream Health Workgroup and USGS developed three questions regarding the factors affecting stream health:

1. Which stressors (e.g. water quality, toxic contaminants, geomorphology) and drivers (e.g. land use change, climate variability) are most affecting stream health?
2. Which of these stressors and drivers can be changed through management activities, especially those management activities that align with practices identified in the new jurisdiction Watershed Implementation Plans (WIPs) to reduce nutrients and sediment delivery to the Bay?
3. Following the implementation of management efforts, how is stream health changing, and how can we better characterize the response through both biological and non-biological metrics?

A multi-year effort is needed to understand these factors, inform management activities, and observe response trajectory.

Purpose: USGS will, in collaboration with the Stream Health Workgroup, develop a team to address question #1 by summarizing currently available information.

Brief overview of the technical approach for multi-year activities and 2020 tasks: During 2020, USGS will collaborate with the Stream Health Workgroup to stand up a project team to begin to summarize what is known about the stressors and drivers that are affecting stream health in the Chesapeake watershed. The project team will be responsible for summarizing information on the factors affecting stream health and presenting this material to the Stream Health Workgroup to inform management implications. The implications will be used to decide on future scope of effort for questions #2 and #3. Major components of this task in 2020 include:

1. Establish a project team to summarize information on the factors affecting stream health for addressing question #1 during the next 12-18 months
2. The team will summarize available information regarding the stressors and drivers across a range of landscape types, including both urban, agricultural and mix land uses. To develop this summary, at least 2 approaches will be considered:
    a. The project team will develop a white paper to summarize our current understanding of the stressors and drivers affecting stream health in urban and agricultural settings in the Chesapeake and Mid-Atlantic region.
    b. Working with the lists of state-identified impaired waters, the team will consider summarizing the stressors that have been identified as responsible for causing impairment of streams throughout the Chesapeake Watershed. Variability in jurisdictional approaches to characterizing likely stressors may represent a challenge to applying this approach in a regional manner.
3. The project team will begin to consider other potential stream-health metrics that can characterize both current conditions and indicators of recovery.
4. The project team will briefly summarize which factors also affect other CBP outcomes (suggested focus on fish habitat, brook trout, fish passage).

5. The Stream health Workgroup will be briefed on the summarized list of stressors and drivers, and the Workgroup can use the results to discuss which stressors can be managed and to inform potential restoration activities.
6. The Workgroup will work with the project team to discuss scope of effort needed to address questions #2 and #3, and the best partners to contribute. More detailed work plans would be prepared for the follow-up efforts.

External science partners and roles: Members of the Stream Health Workgroup will be asked to participate on the project team to help design and execute the project. Potential team members will include representatives from:

- Interstate Commission on the Potomac River Basin (ICPRB)
- Virginia Department of environmental Quality
- Maryland Department of Natural Resources
- Pennsylvania Department of Environmental protection
- Local Governments
- NGOs and nonprofits

Contributing USGS projects and researchers: During the early portion of 2020, USGS will identify a project lead and several contributing scientists to support this effort. Numerous USGS scientists are currently working on different components of question #1 above and it will be our goal to leverage as many ongoing USGS studies (and other partner studies) as possible to inform this task. Specific ongoing USGS cooperative projects that will be leveraged include:

1. Regional BIBI modeling and forecasting (K. Maloney)
2. Fairfax Water-quality and biological monitoring network (J. Jastram).
3. Montgomery County Maryland monitoring efforts (K. Hopkins)

USGS programs or cooperators supporting this task: Support for this effort will be provided by Chesapeake PES support, along with significant contributions from the Water Mission Area's Cooperative Water Program, as well as reimbursable funding in support of the cooperative studies. USGS expects to support the leader of the effort about quarter time, with lesser amounts for other contributing USGS investigators. Members of the stream Health Workgroup will support this effort through in-kind contributions of staff time on the project team.

Planned products for 2020-21: During 2020, the team will begin drafting:

1. A white paper that describes our current understanding of the factors affecting Stream Health, based on currently available and relevant Chesapeake Bay literature. The project team will explore options with the Stream Health Workgroup on the final format for the white paper (formal report, briefing sheet, etc). The white paper also will include a summary of drivers and stressors that have been identified as impairing state waters within the Chesapeake.
2. Presentations to the Stream Health Workgroup during the project.

Any other information needed to characterize a given activity or task:

1. Critical to the success of this effort is the support of the Stream Health Workgroup. USGS can provide leadership and technical understanding, but collaborative participation of the workgroup is critical to ensuring that results directly address science needs and inform management actions.
2. A detailed project and 2020 timeline cannot be prepared until the initial project team is developed.