Watershed Health Literature Review

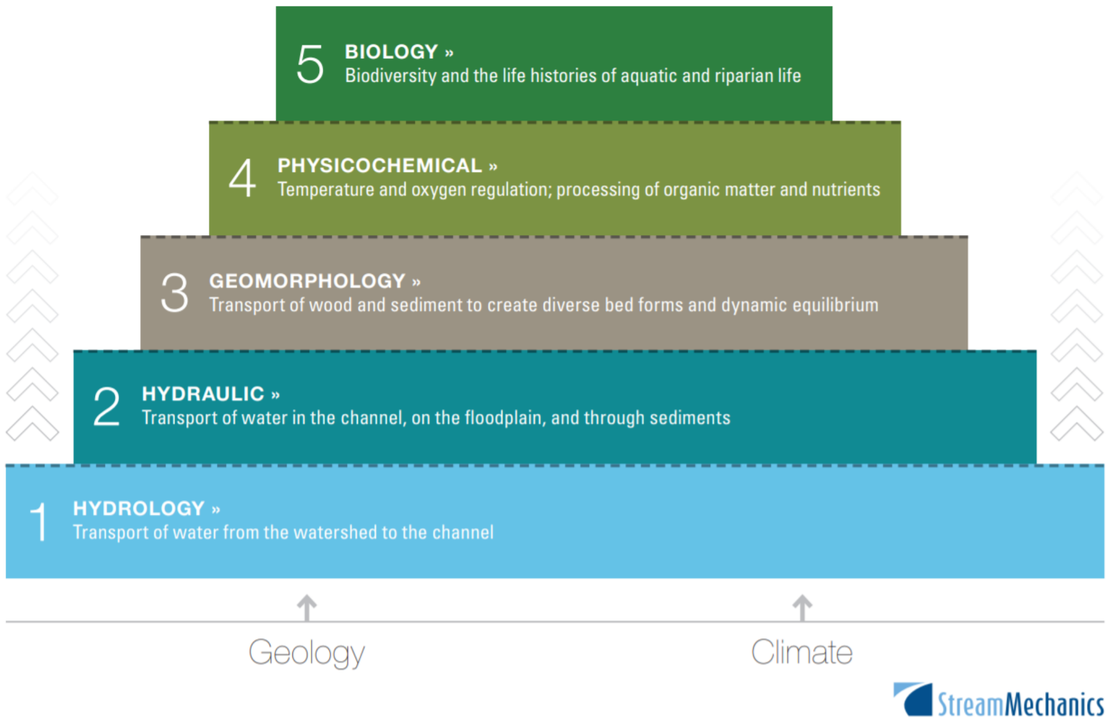
Peter Claggett and Renee Thompson

Healthy Watersheds Goal Implementation Team Meeting

May 27, 2020

U.S. Department of the Interior
U.S. Geological Survey

Stream Functional Pyramid



Watershed-Stream Functional Pyramid

Watershed-Stream Functional Pyramid

Range of a Stream Condition (e.g., pH), Categorized by Health Requirements for a Biotic Community

Degraded **Stressed** **Healthy**

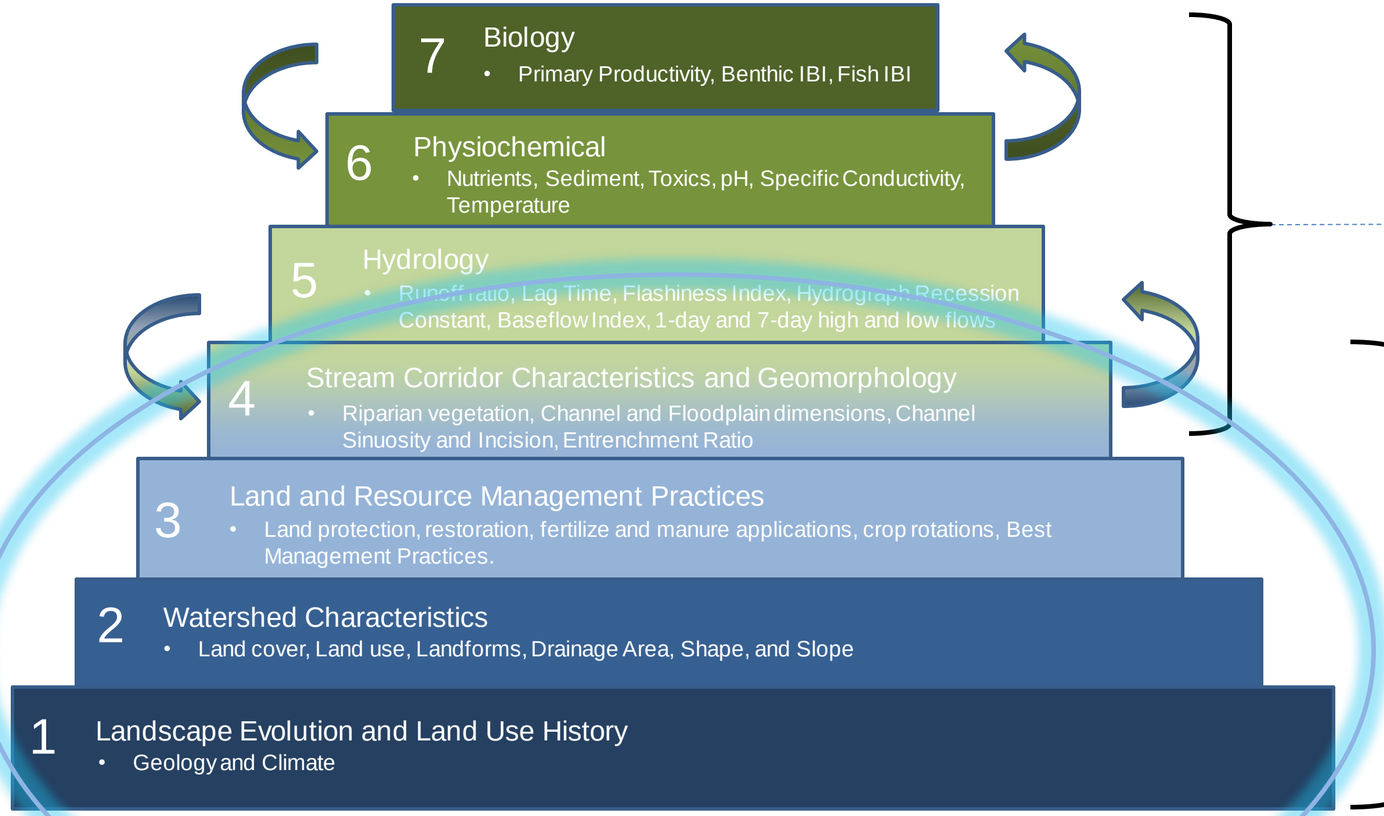
Stream Conditions

Landscape Characteristics

Range of a Watershed Characteristic e.g., % Forest Cover

Least Supportive **Most Supportive**

Watershed-Stream Functional Pyramid



Benthic IBI
Stream Temperature,
Embeddedness

What stream conditions may be sensitive to changes in landscape characteristics?

Focus of Literature review

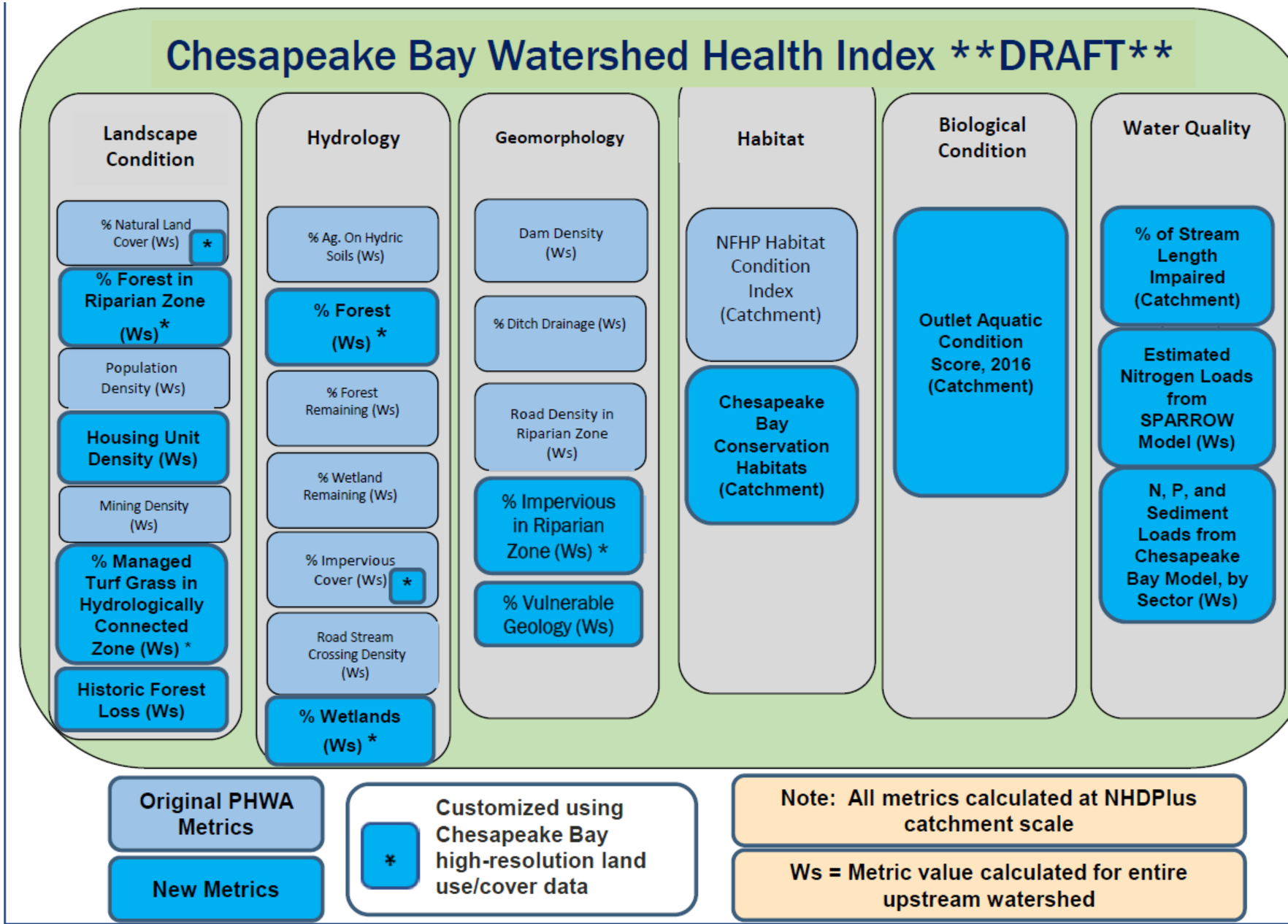
What landscape characteristics may influence changes in stream conditions?

Impervious Cover,
Channel Incision,
Culvert density

Monitoring Watershed Health

Changing land use affects 11 of the 26 Chesapeake Healthy Watershed Assessment metrics.

Changing land use affects 3 of the 10 metrics used to predict the Chessie Benthic Index of Biological Integrity.



USGS Literature Review on Watershed Health, Vulnerability, and Resilience

Who: Billy Justus, Ecologist, USGS Lower Mississippi-Gulf Water Science Center

When: June – November, 2020

What (Research Objectives):

Part 1. Inventory and summarize widely-cited or otherwise influential documents, reports, and journal articles relating landscape characteristics to instream conditions (e.g., temp, flow, water quality, and aquatic habitat) and stream health (biological community metrics);

a) How have watershed health, vulnerability, and resilience been conceptually and operationally defined?
b) What landscape characteristics have been considered?
c) How have landscape characteristics been categorized in terms of their effects on watershed health, vulnerability, and resilience?
d) What landscape characteristics have had the greatest explanatory power for predicting changes in stream conditions and health?
    - Is explanatory power affected by data resolution, analysis scale, or physiography?
e) What new and emerging landscape characteristics have been related to stream conditions and health?

USGS Literature Review on Watershed Health, Vulnerability, and Resilience

What (continued):

Part 2. Summarize methods used to evaluate the relationships between landscape characteristics and stream conditions and health, e.g., (Maloney, Smith et al. 2018).

a) What statistical approaches have been used?
b) Were effect thresholds identified and how?

Part 3. Summarize how monitored changes in landscape characteristics have been used, or planned for use, as a trigger for management response (e.g., verifying health, threats, and local capacity; avoiding and minimizing impacts; incentivizing planning and conservation activities)

Deliverables

1. Outline (to be approved prior to initiating work)
2. Process Steps
   - e.g., search terms, years, and database engines
3. Summary of relevant research focused on answering the research objectives (USGS Open File Report)
4. Citation and PDF database produced and/or compatible with EndNote


USGS
science for a changing world