Healthy Watersheds Goal:

View of the Nanticoke River and wetlands in Wicomico County
Photo by Matt Roth/CBP

Goal: *Sustain state-identified healthy waters and watersheds recognized for their high quality and/or high ecological value*

Outcome: *100 percent of state-identified healthy waters and watersheds remain healthy.*

Chesapeake ~~Healthy~~ Watersheds Assessment

SIGNALS OF CHANGE INDICATORS TO SERVE MULTIPLE OUTCOMES

Where it all started

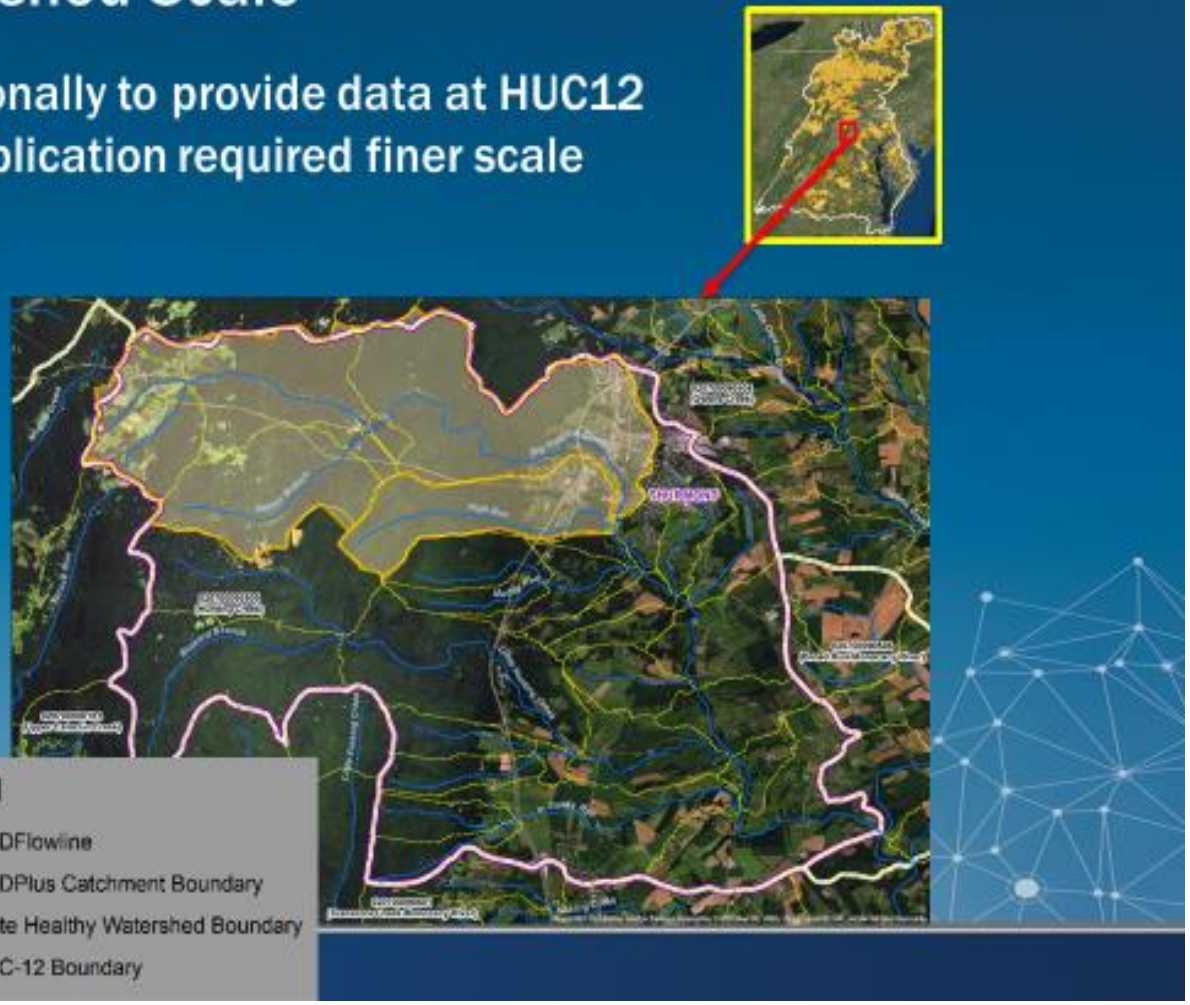
EPA's Preliminary Healthy Watersheds Assessment (PHWA)

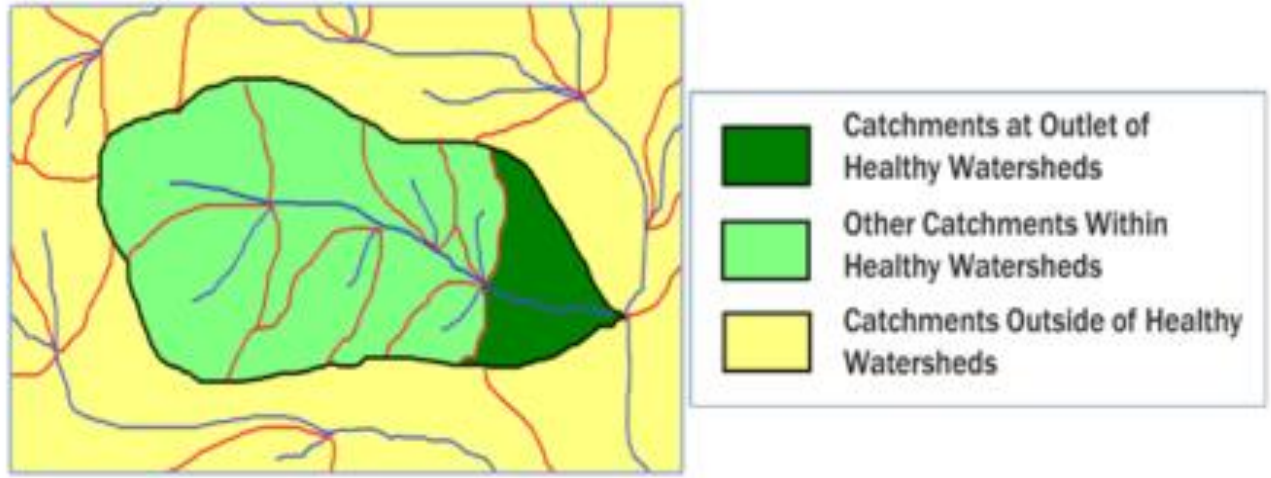
- EPA's Healthy Watersheds program brought together key, nationally consistent data to assess watershed health and vulnerability.
- EPA's PHWA included a set of 48 statewide and 85 ecoregional-scale assessments of watershed health and vulnerability across the conterminous United States.
- The PHWA was intended to serve as a useful framework that could be built upon by states and regions. To support further use and refinement, EPA produced state-specific geodatabases including a suite of indicators at the 12-digit hydrologic unit code (HUC) scale.

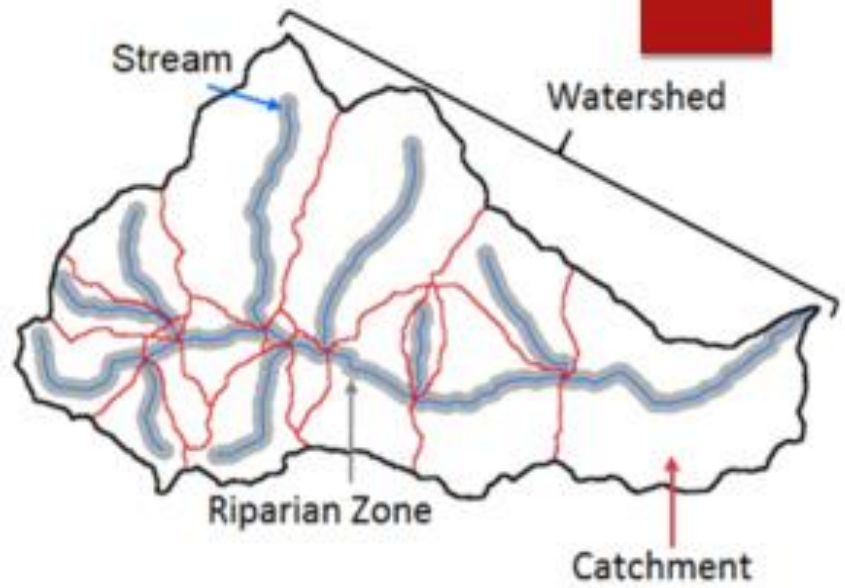
TETRA TECH

Addressing Watershed Scale

- PHWA developed nationally to provide data at HUC12 scale; this regional application required finer scale
- Developed metrics at NHDPlus catchment scale
- Calculated for all 83,623 catchments in Chesapeake watershed (average area ~2 km²)



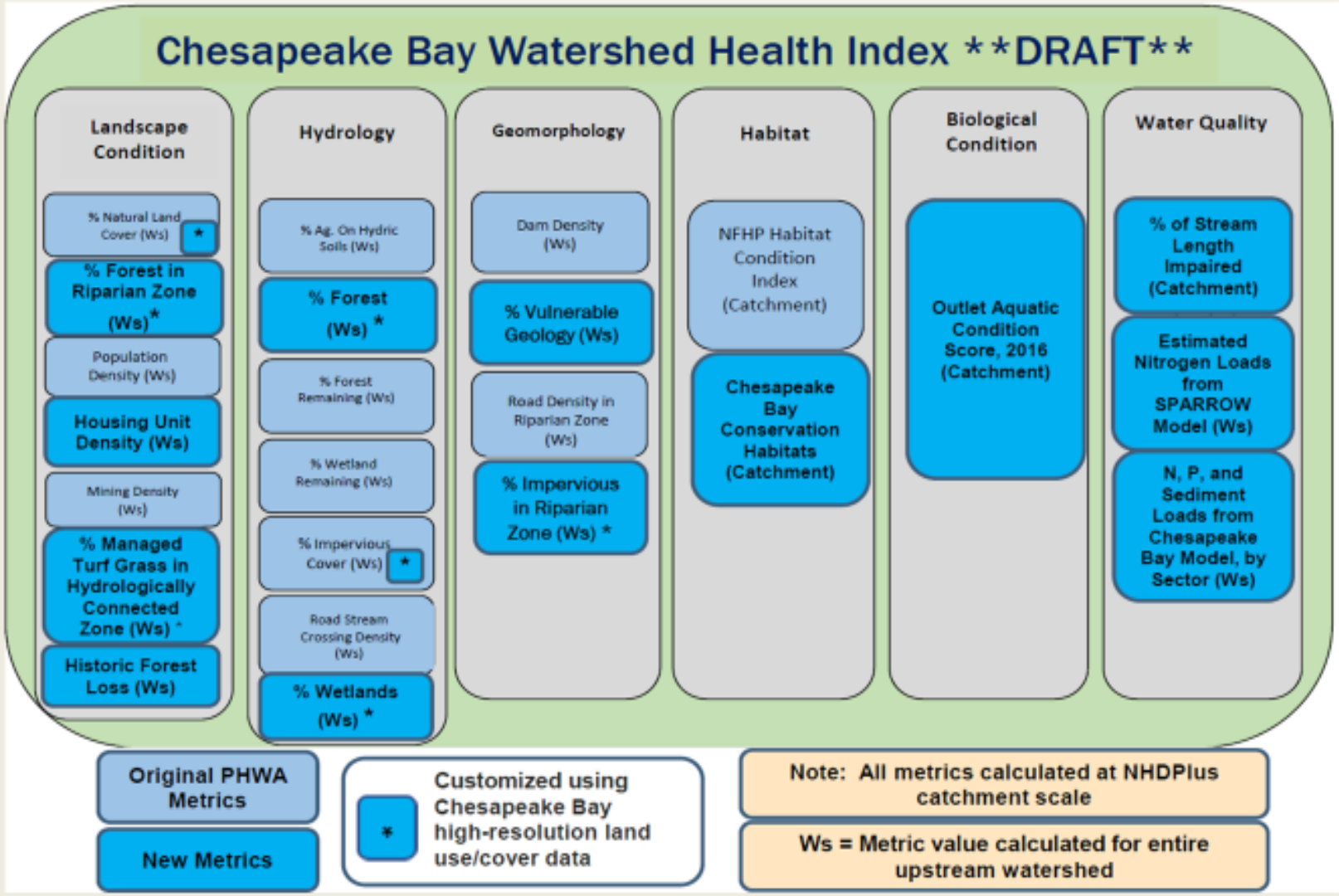




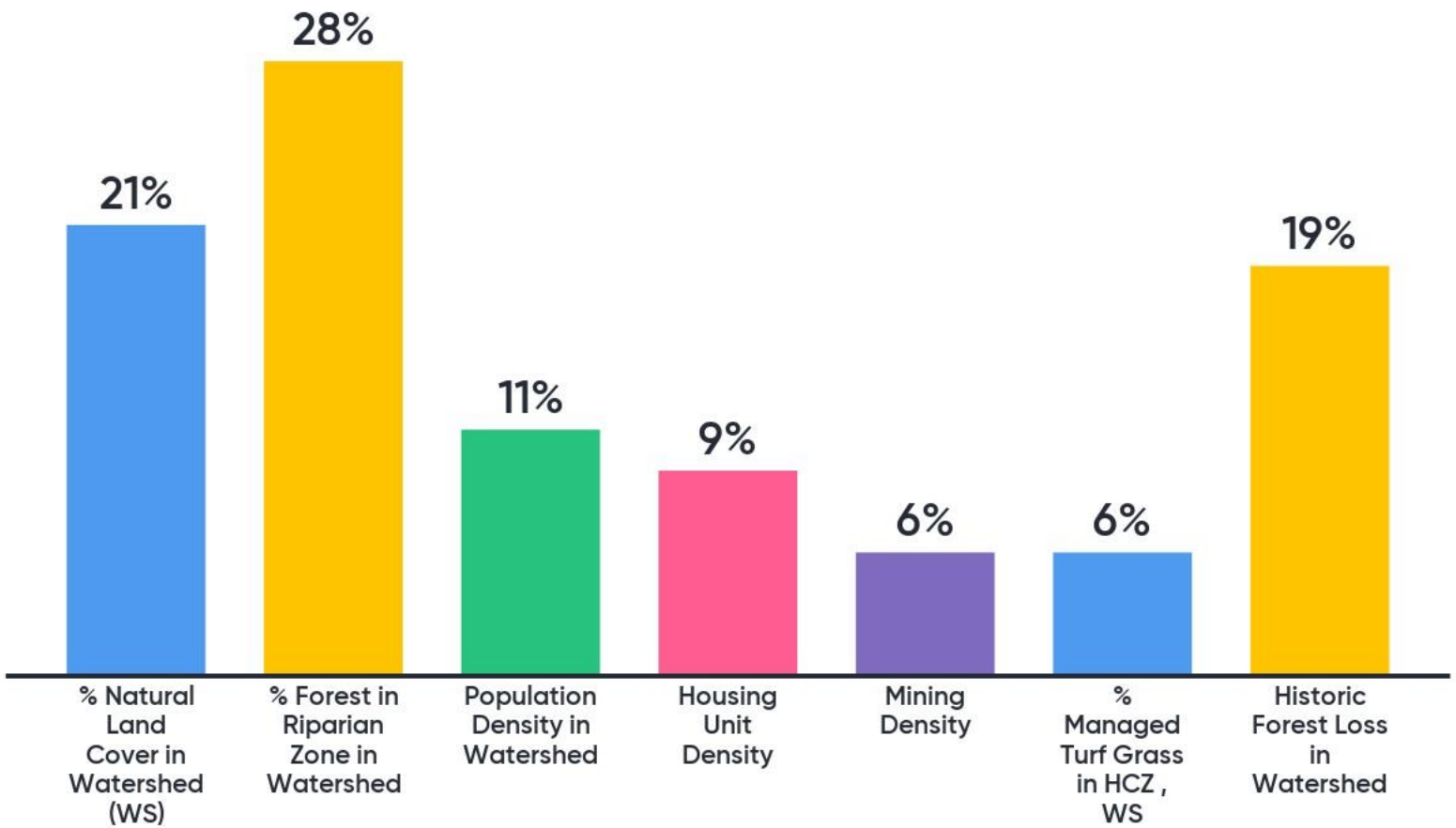
SCALE OF ANALYSIS

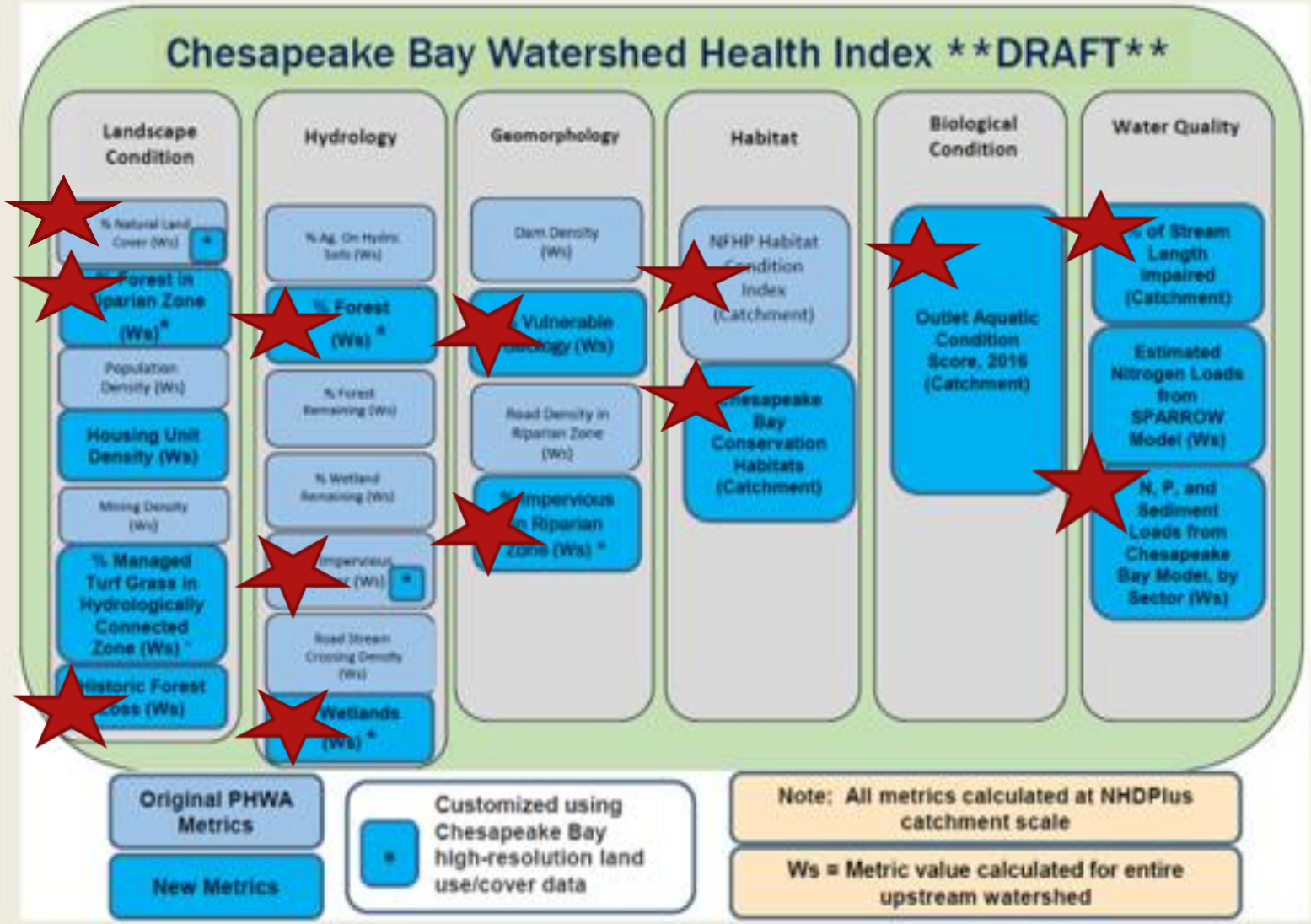
Chesapeake Bay Watershed Health Index

- Landscape Condition
- Hydrology
- Geomorphology
- Habitat
- Biological Condition
- Water Quality


Chesapeake Bay Watershed Health Index **DRAFT**
Landscape Condition
% Natural Land Cover (Ws) *
% Forest in Riparian Zone (Ws)*
Population Density (Ws)
Housing Unit Density (Ws)
Mining Density (Ws)
% Managed Turf Grass in Hydrologically Connected Zone (Ws) *
Historic Forest Loss (Ws)
Hydrology
% Ag. On Hydric Soils (Ws)
% Forest (Ws) *
% Forest Remaining (Ws)
% Wetland Remaining (Ws)
% Impervious Cover (Ws) *
Road Stream Crossing Density (Ws)
% Wetlands (Ws) *
Geomorphology
Dam Density (Ws)
% Vulnerable Geology (Ws)
Road Density in Riparian Zone (Ws)
% Impervious in Riparian Zone (Ws) *
Habitat
NFHP Habitat Condition Index (Catchment)
Chesapeake Bay Conservation Habitats (Catchment)
Biological Condition
Outlet Aquatic Condition Score, 2016 (Catchment)
Water Quality
% of Stream Length Impaired (Catchment)
Estimated Nitrogen Loads from SPARROW Model (Ws)
N, P, and Sediment Loads from Chesapeake Bay Model, by Sector (Ws)
Original PHWA Metrics
New Metrics
* Customized using Chesapeake Bay high-resolution land use/cover data
Note: All metrics calculated at NHDPlus catchment scale
Ws = Metric value calculated for entire upstream watershed

What are your health index priorities? (Landscape Condition)




Chesapeake Bay Watershed Health Index **DRAFT**
Landscape Condition
Hydrology
Geomorphology
Habitat
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Water Quality
% Natural Land Cover (Ws) *
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Impervious (Ws) *
Road Stream Crossing Density (Ws)
Wetlands (Ws) *
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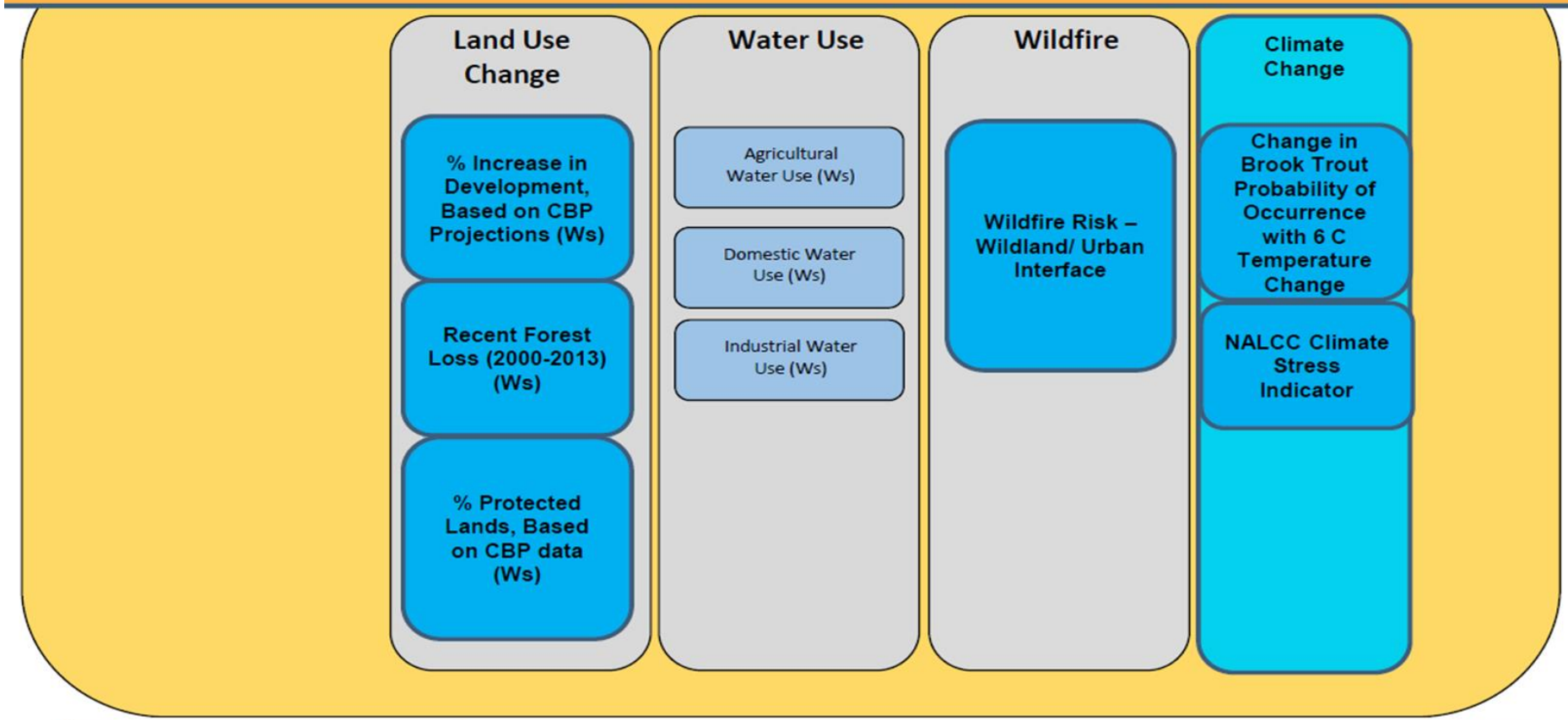
CHESAPEAKE BAY WATERSHED VULNERABILITY INDEX

Chesapeake Bay Watershed Vulnerability Indicators **DRAFT**



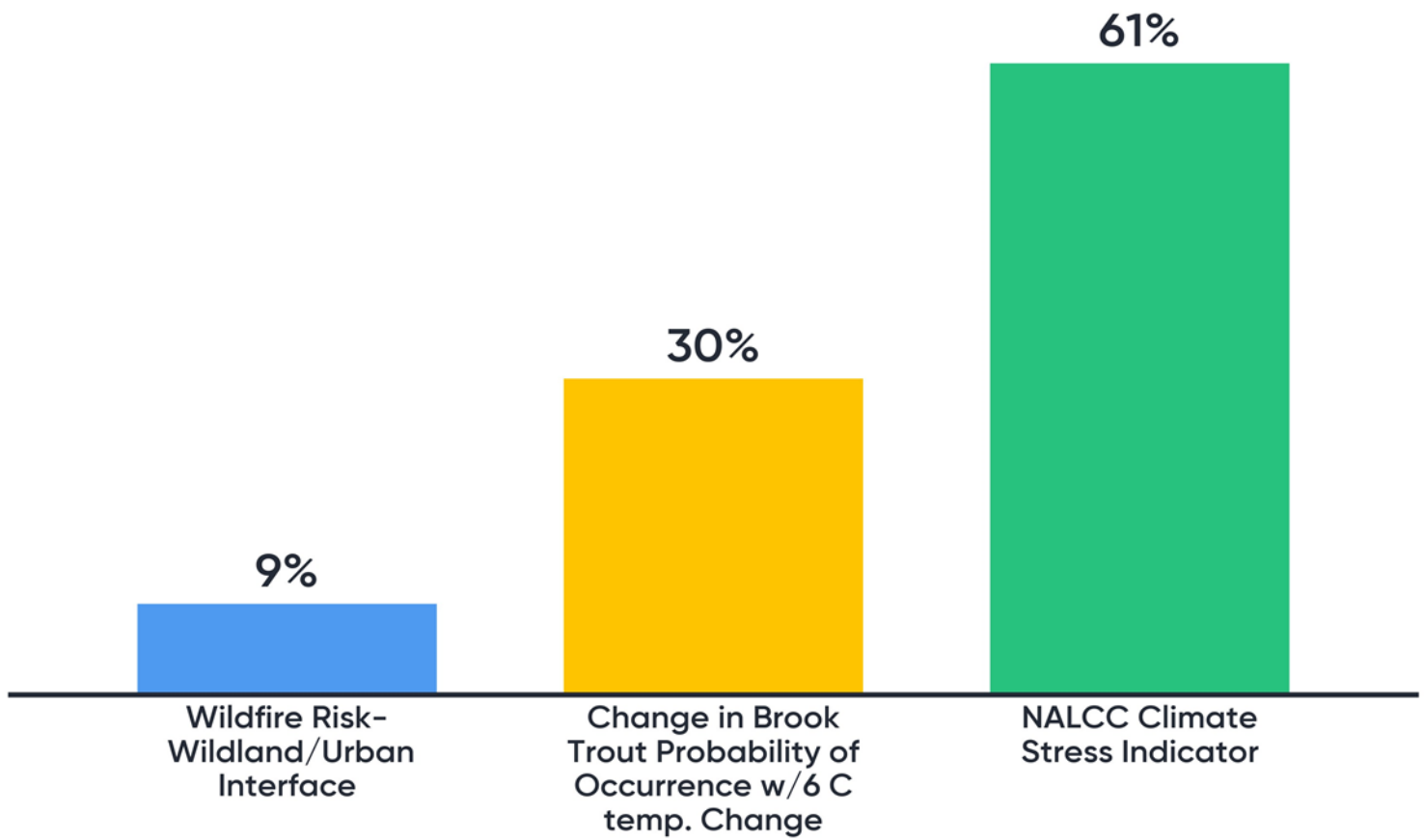
Original PHWA Metrics

New Metrics

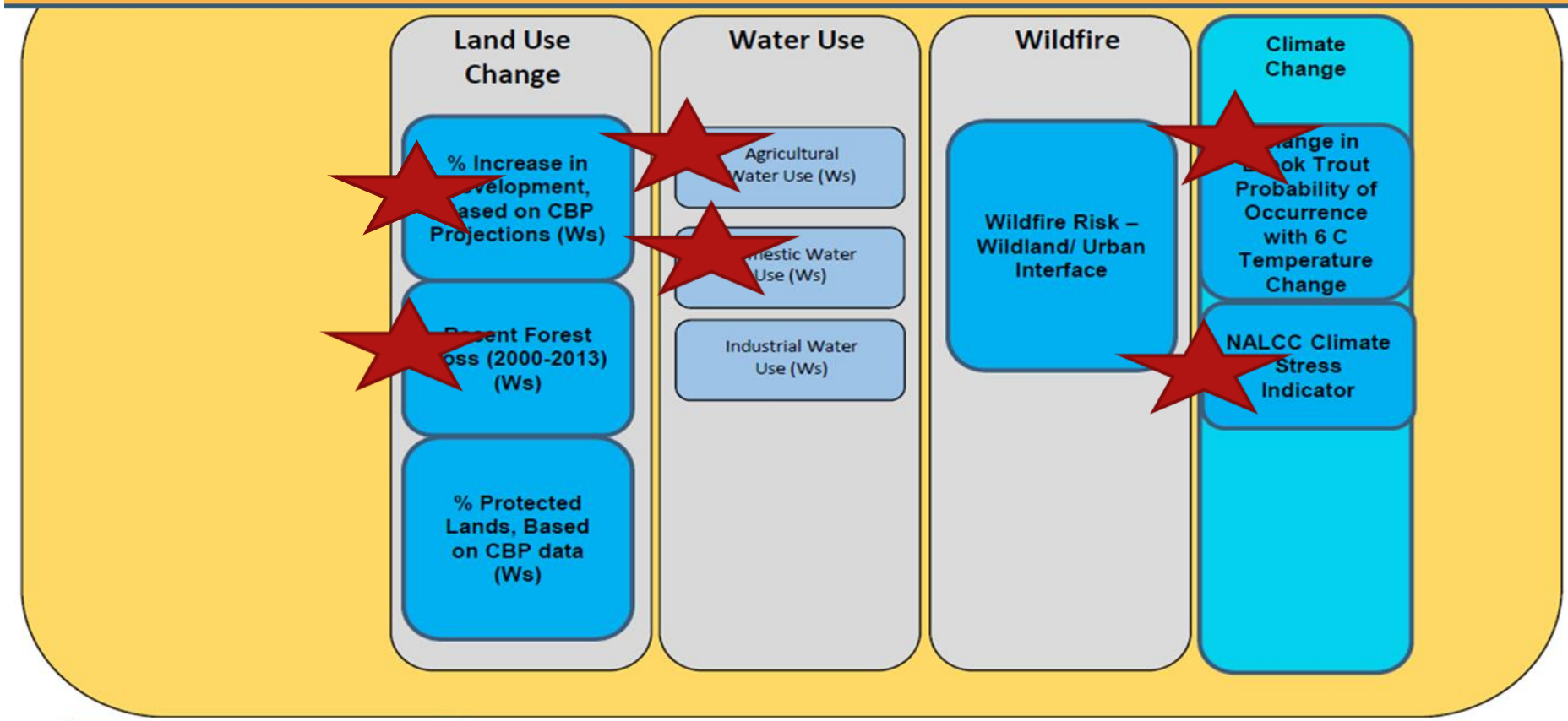
Note: All metrics calculated at NHDPlus catchment scale

Ws = Metric value calculated for entire upstream watershed

What are your vulnerability index priorities (Wildfire and Climate Change)



Chesapeake Bay Watershed Vulnerability Indicators **DRAFT**



Original PHWA Metrics

New Metrics

Note: All metrics calculated at NHDPlus catchment scale

Ws = Metric value calculated for entire upstream watershed

WATERSHED HEALTH AND VULNERABILITY

What other data should be included?

What metrics are missing?

Cross-GIT Mapping

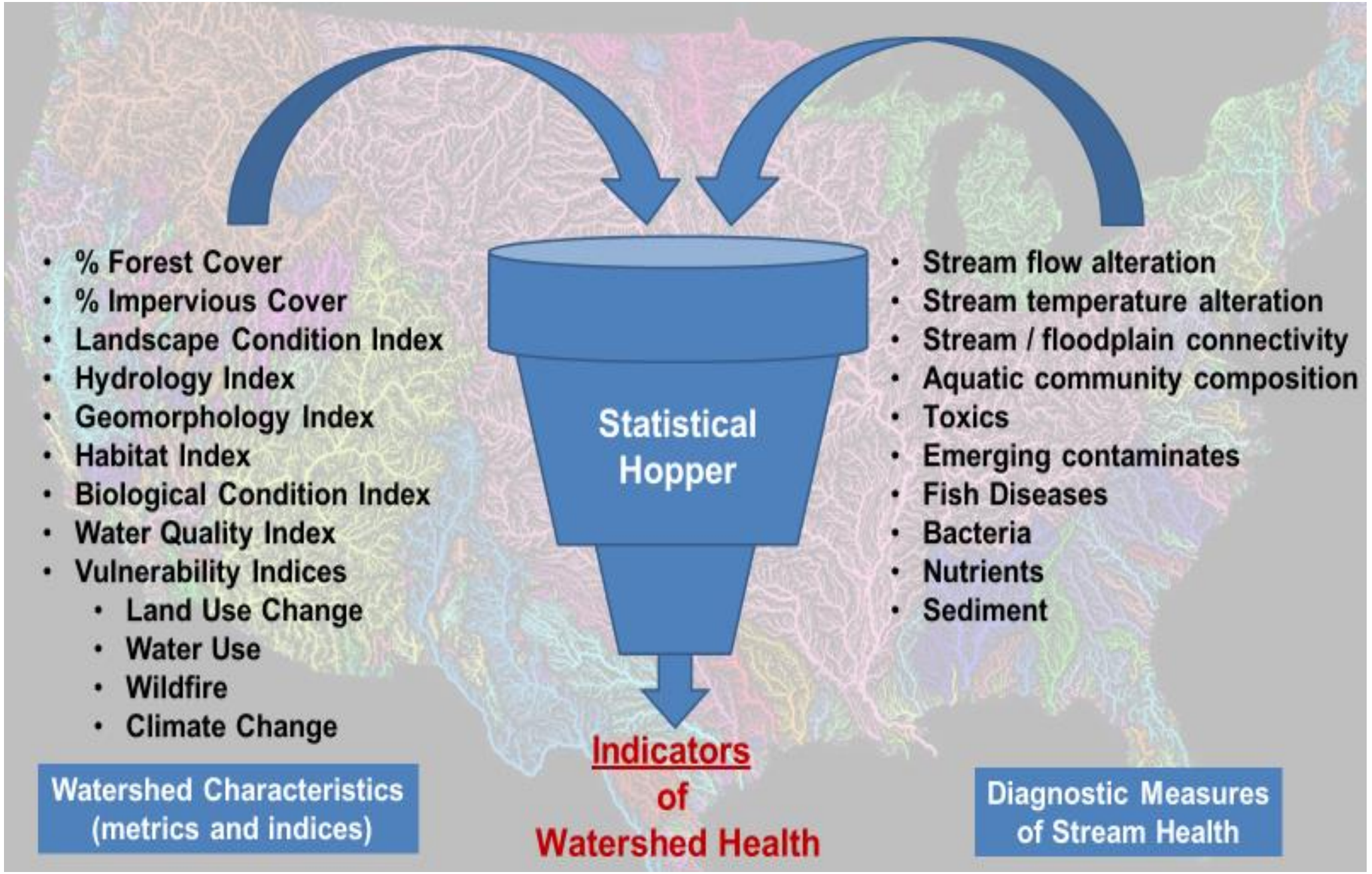
WATERSHED HEALTH AND VULNERABILITY

Fish Habitat

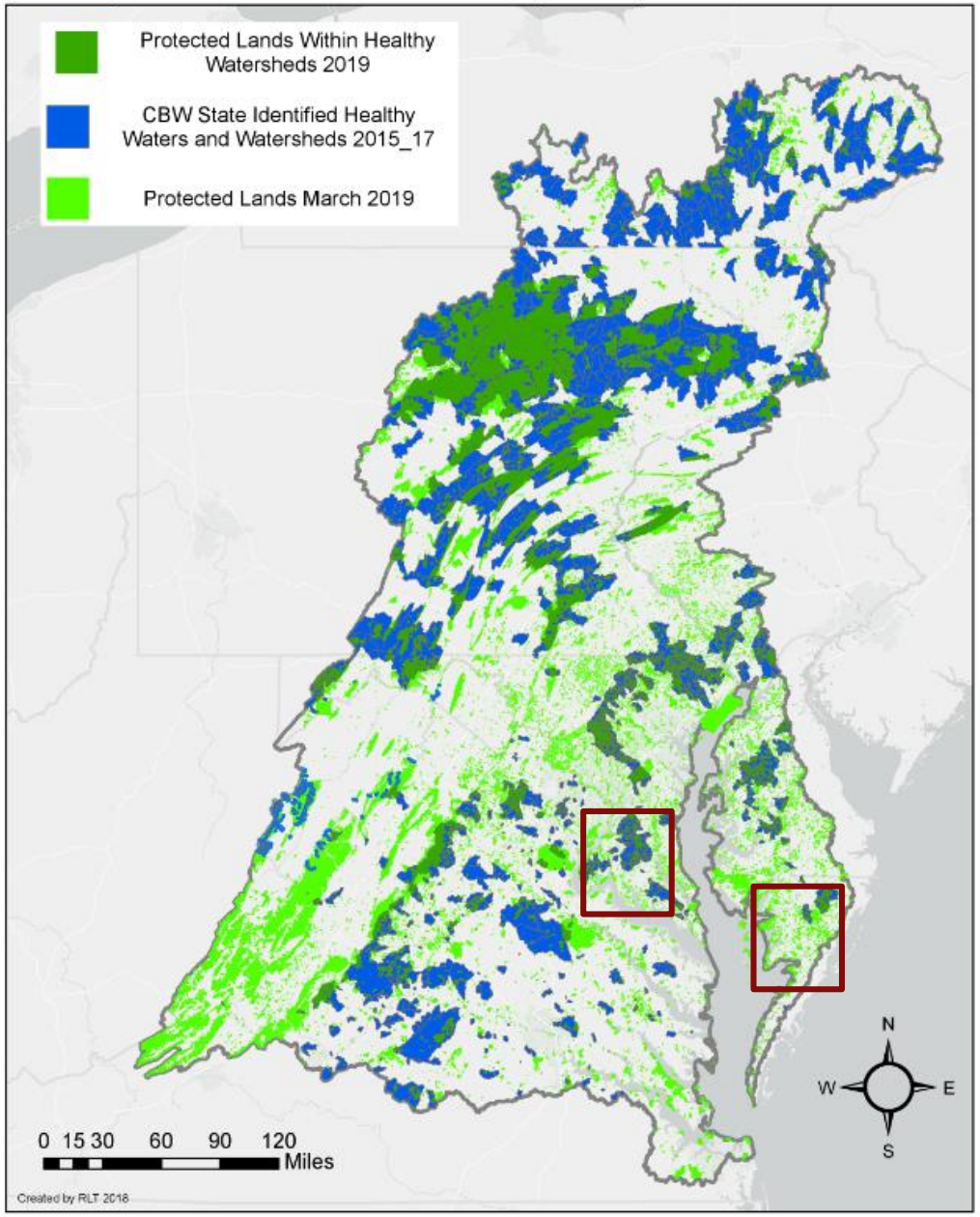
SPAWNING AREAS

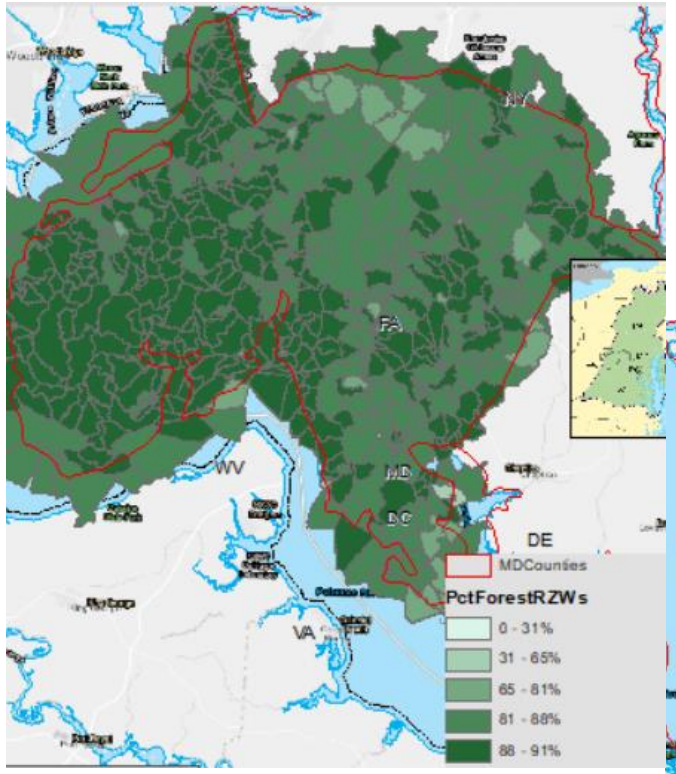
Stream Health

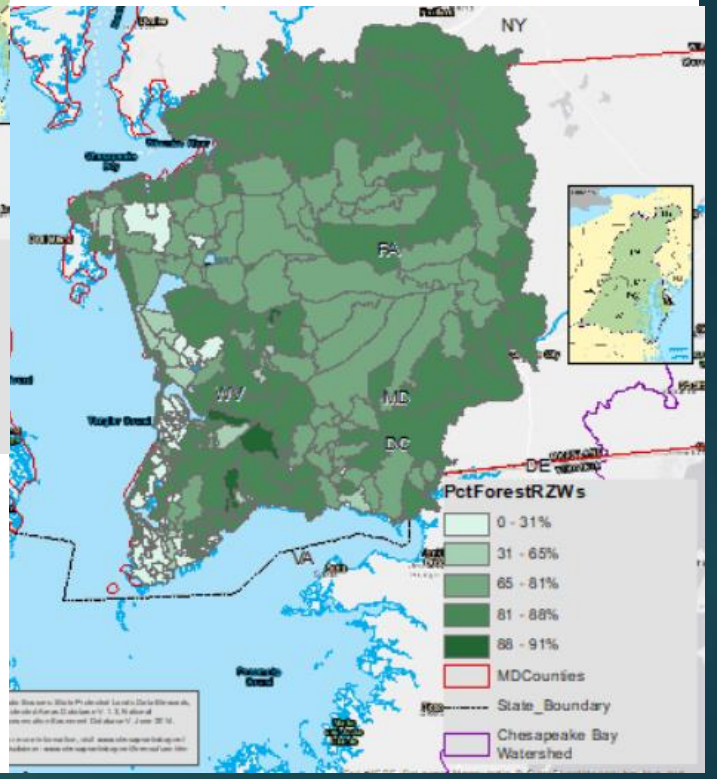
ALL INDICES RELATE TO STREAM HEALTH!

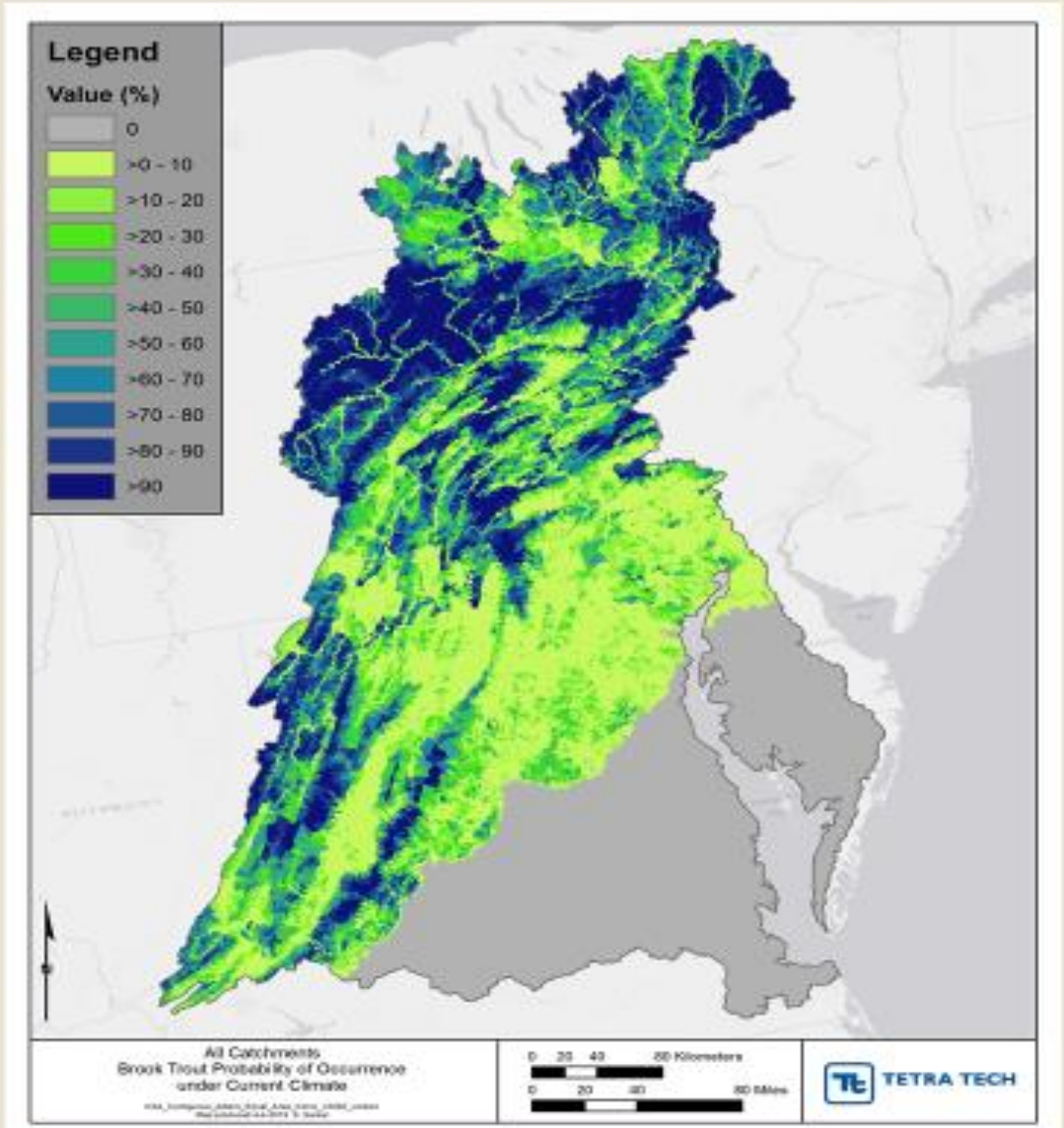

% Forest Cover
% Impervious Cover
Landscape Condition Index
Hydrology Index
Geomorphology Index
Habitat Index
Biological Condition Index
Water Quality Index
Vulnerability Indices
Land Use Change
Water Use
Wildfire
Climate Change
Statistical Hopper
Stream flow alteration
Stream temperature alteration
Stream / floodplain connectivity
Aquatic community composition
Toxics
Emerging contaminates
Fish Diseases
Bacteria
Nutrients
Sediment
Watershed Characteristics (metrics and indices)
Indicators of Watershed Health
Diagnostic Measures of Stream Health

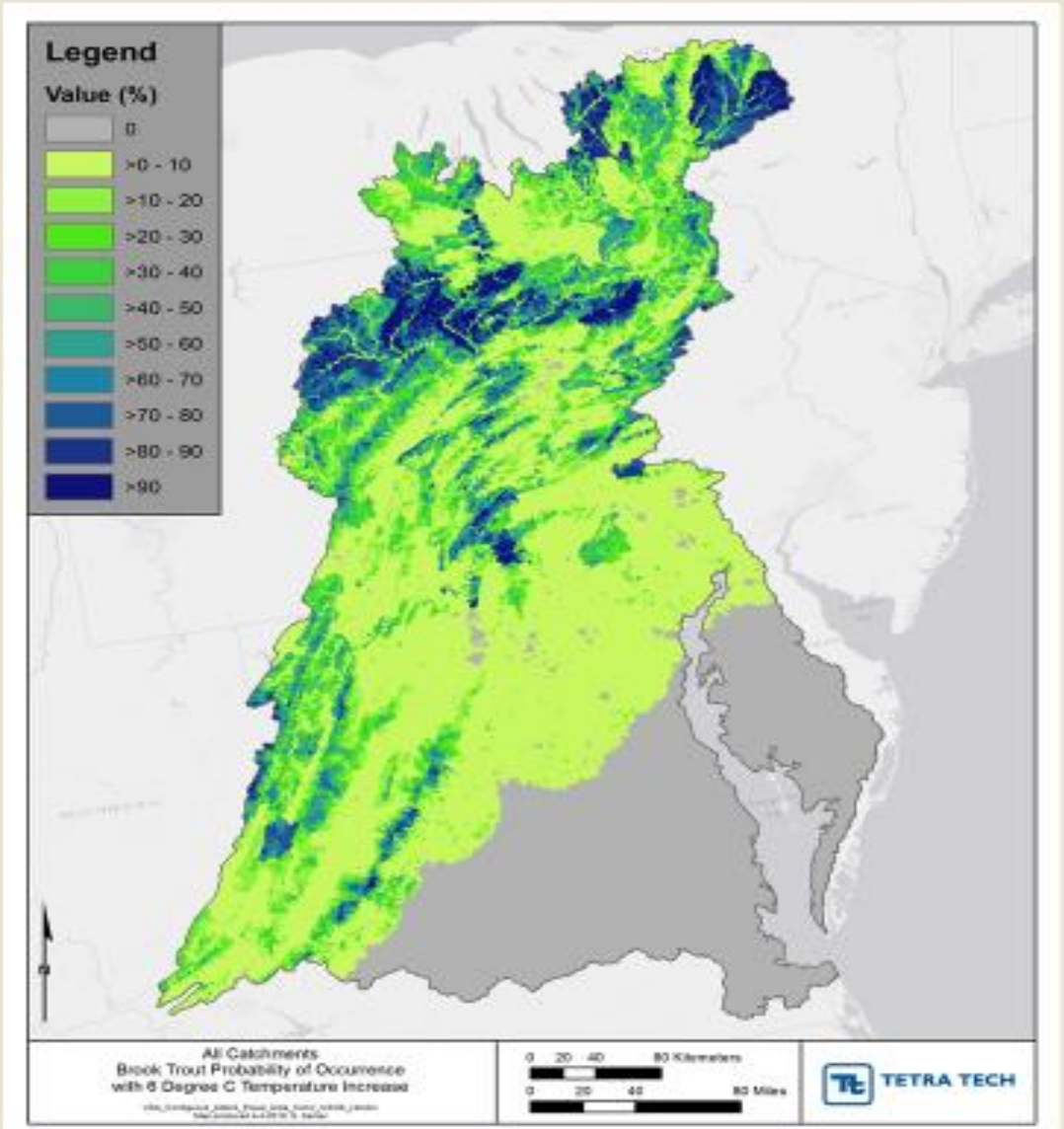
State Identified Healthy Waters and Watersheds (2017) and Protected Lands (2019)








Legend
Value (%)
0
>0 - 10
>10 - 20
>20 - 30
>30 - 40
>40 - 50
>50 - 60
>60 - 70
>70 - 80
>80 - 90
>90
All Catchments
Brook Trout Probability of Occurrence
under Current Climate
0 20 40 80 Kilometers
0 20 40 80 Miles
TETRA TECH


Legend
Value (%)
0
>0 - 10
>10 - 20
>20 - 30
>30 - 40
>40 - 50
>50 - 60
>60 - 70
>70 - 80
>80 - 90
>90
All Catchments
Brook Trout Probability of Occurrence
with 6 Degree C Temperature Increase
0 20 40 80 Kilometers
0 20 40 80 Miles
TETRA TECH

Thank you and please make a commitment to stay involved

Renee Thompson rthompson@chesapeakebay.net

The Chesapeake Healthy Watersheds Assessment applied the framework of the EPA's Preliminary Healthy Watersheds Assessment to compile metrics related to the health and vulnerability of all NHD Plus catchment regions in the Chesapeake Bay Watershed. The final product will include Bay-wide geospatial data delivered as a geodatabase that has potential to inform multiple outcomes aside from Healthy Watersheds. Although the final product will not be ready until early November, we have some ideas of how to use it and how it relates to other outcomes.

Links for you to explore:
Preliminary Healthy Watershed Assessment Presentation slides
https://www.chesapeakebay.net/channel_files/38201/cbp_hw_git_meeting_june_2019_final_2019-06-06.pdf

Chesapeake Healthy Watershed Assessment Poster
https://www.chesapeakebay.net/channel_files/29905/ii.d._ches_healthywatersheds posterusgssciencemtg61719thompson.pdf