Preliminary Healthy Watersheds Assessments (PHWA)

helping states better protect high quality waters

Healthy Watersheds Program Team

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What is the PHWA?

- Statewide healthy watersheds assessments for lower 48 states
- Health and vulnerability index scores for all HUC12 watersheds (avg size 36 sq mi)
- Each HUC12 is separately scored ***relative*** to all HUC12s statewide and ecoregion-wide

Why was the PHWA done?

- The PHWA was designed to:
  - Help states implement Clean Water Act goal of maintaining high quality waters as well as restoring impaired waters
  - Provide a foundation of nationally consistent data that can be built on and enhanced
  - Help states and EPA communicate with partners about opportunities for healthy waters protection

Who are the intended users?

- States, tribes and other government/non-government entities engaged in watershed protection
- Broader audiences may include planners, fish and wildlife managers, large-scale projects seeking to avoid impacting beneficial environments, counties and local communities

METHODS

Healthy Watersheds Assessment Framework

identify essential ecological attributes that support healthy ecosystems

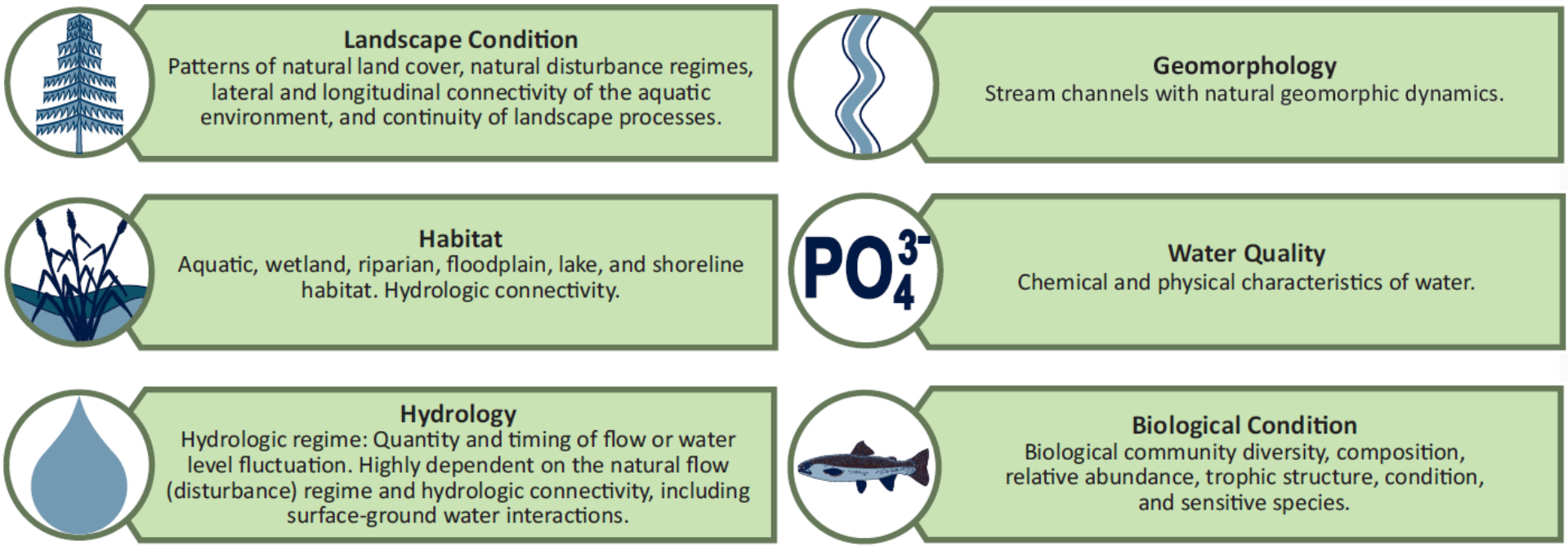
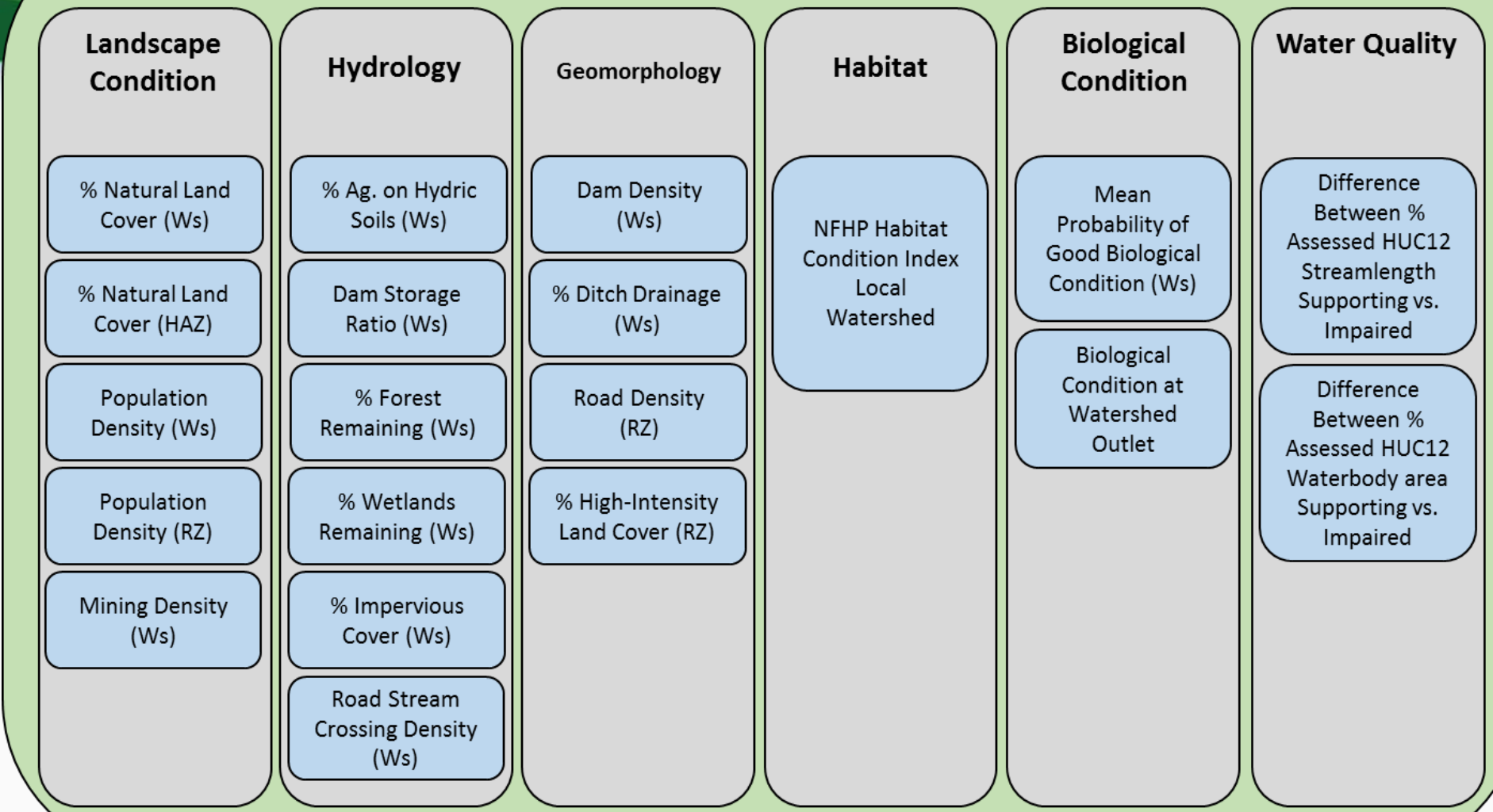


Figure 1. Six attributes of watershed health described in *Identifying and Protecting Healthy Watersheds: Concepts, Assessments, and Management Approaches* (USEPA 2012). Measurement of watershed indicators related to each attribute (i.e., "sub-index") provides the basis for the Watershed Health Index score.

Watershed Health Index

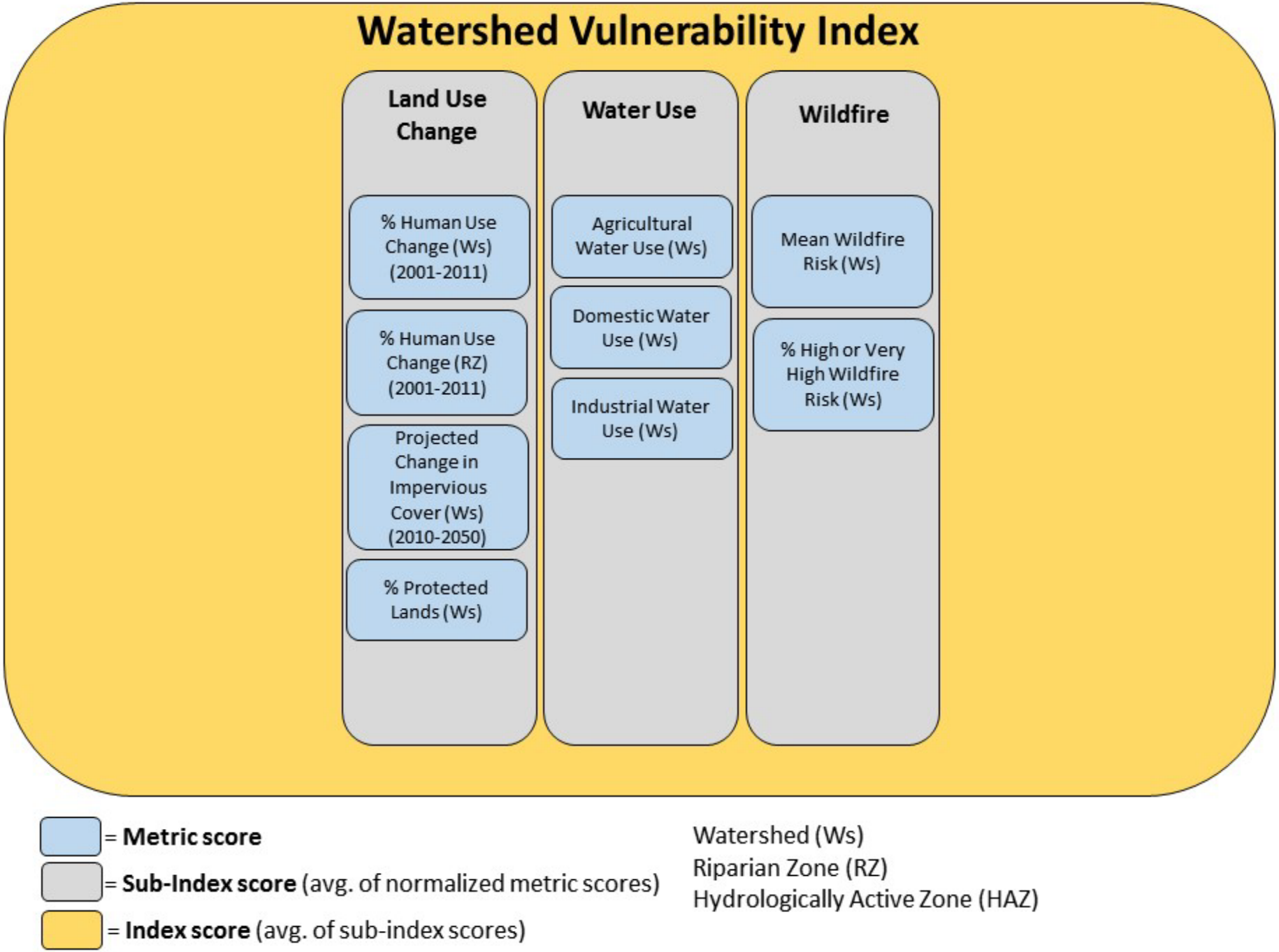


= **Metric score**

= **Sub-Index score** (avg. of normalized metric scores)

= **Index score** (avg. of sub-index scores)

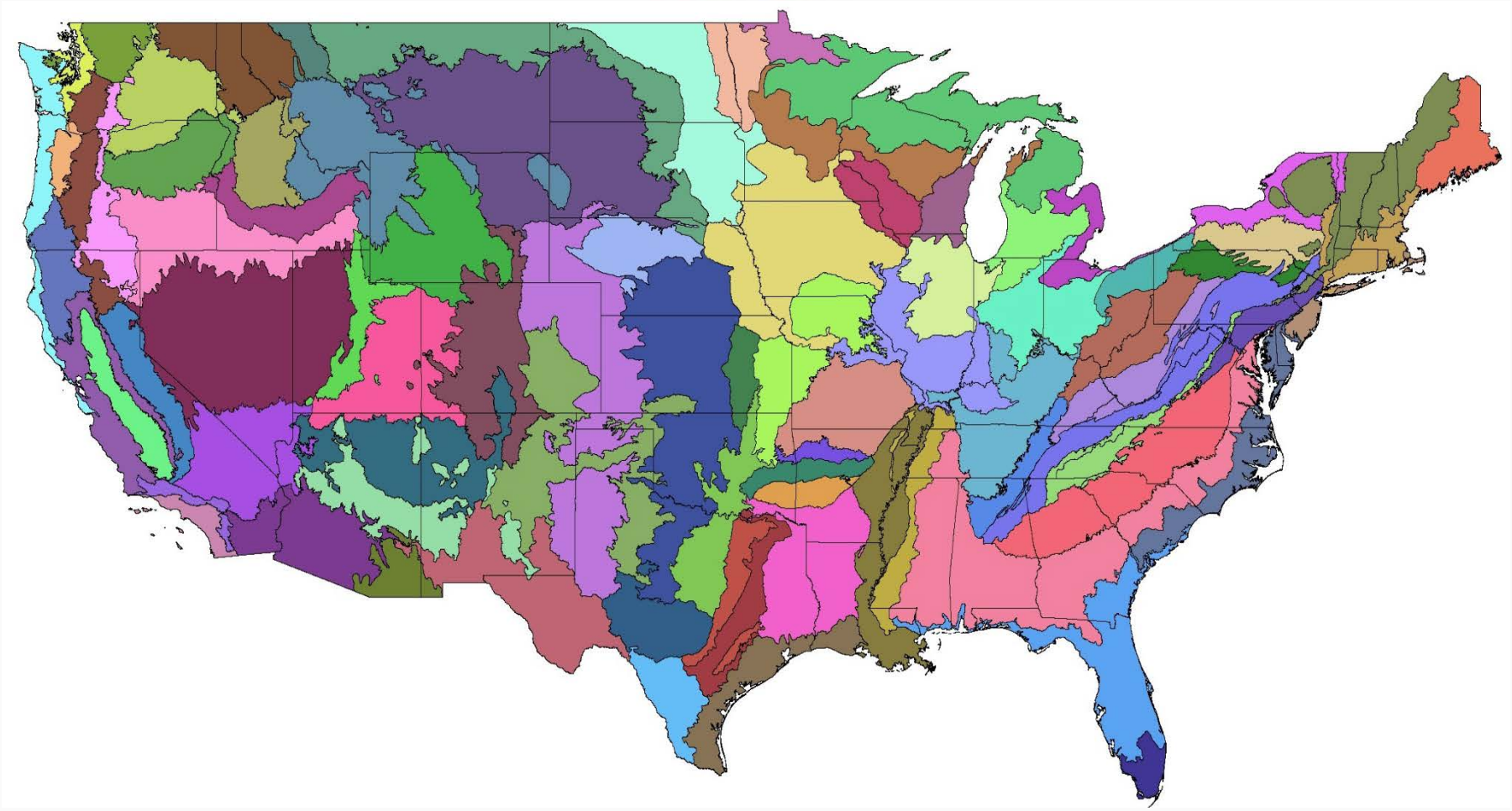
Watershed (Ws)
Riparian Zone (RZ)
Hydrologically Active Zone (HAZ)

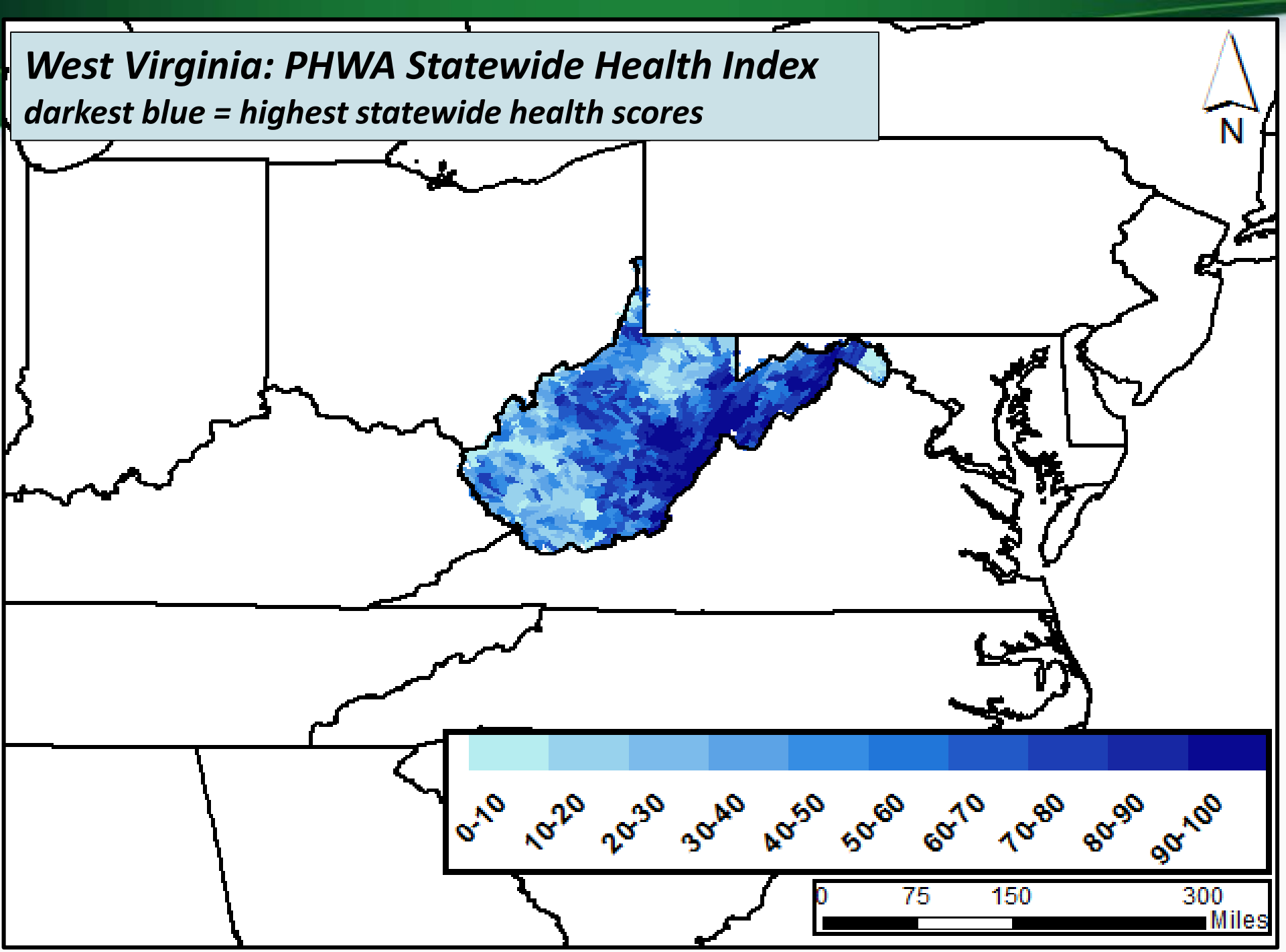

Watershed Vulnerability Index
Land Use Change
% Human Use Change (Ws) (2001-2011)
% Human Use Change (RZ) (2001-2011)
Projected Change in Impervious Cover (Ws) (2010-2050)
% Protected Lands (Ws)
Water Use
Agricultural Water Use (Ws)
Domestic Water Use (Ws)
Industrial Water Use (Ws)
Wildfire
Mean Wildfire Risk (Ws)
% High or Very High Wildfire Risk (Ws)
= Metric score
= Sub-Index score (avg. of normalized metric scores)
= Index score (avg. of sub-index scores)
Watershed (Ws)
Riparian Zone (RZ)
Hydrologically Active Zone (HAZ)

Caveats

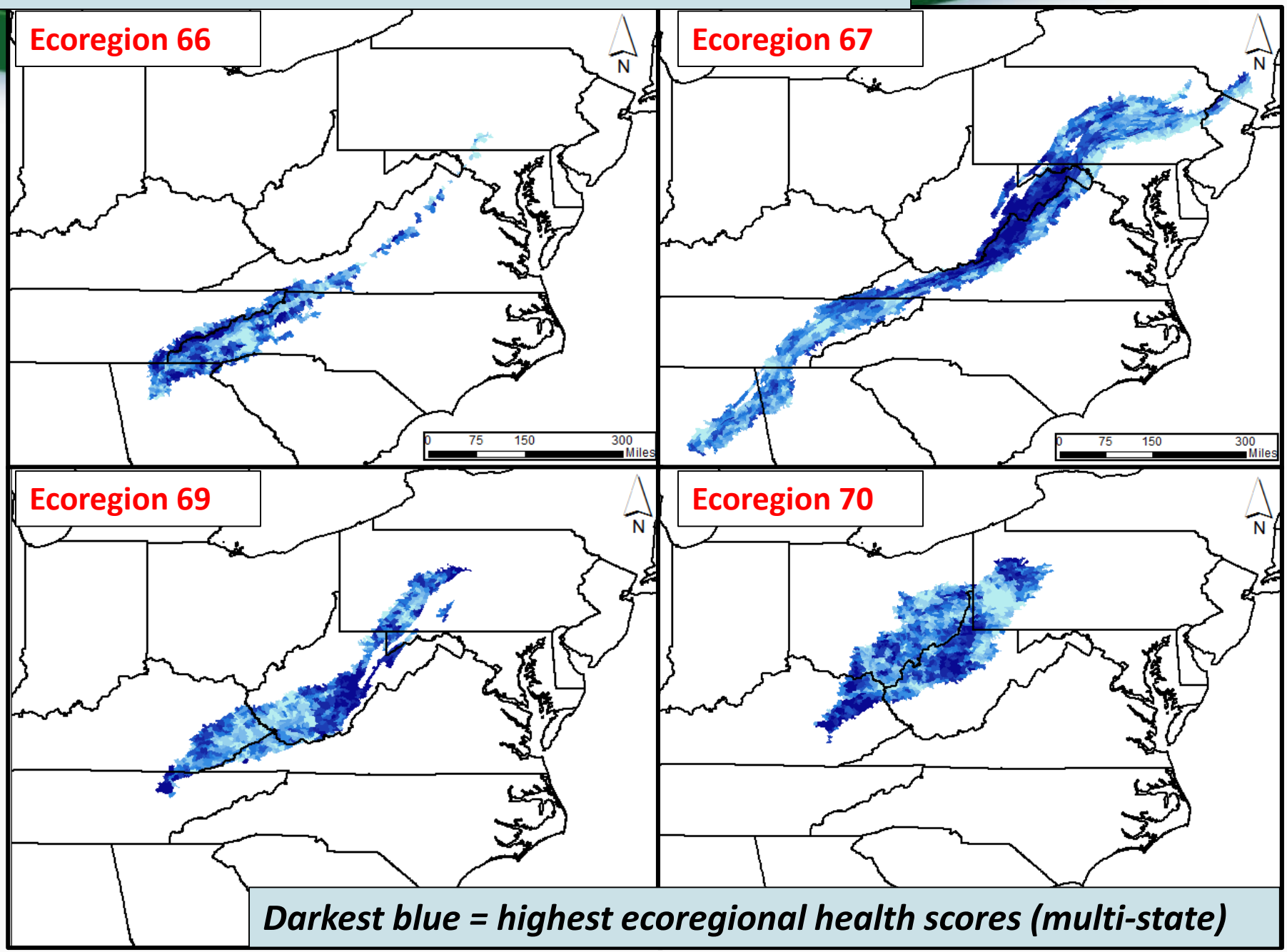
- Does not specify healthy/unhealthy threshold
- Does not compare HUC12s at national scale
- Scores represent the single HUC not its full watershed (i.e., upstream HUCs)
- All indicators were weighted equally
- Based on datasets nationally available in 2016
- In Vulnerability index, current land and water use serve as surrogates for future use

Statewide vs. Ecoregional Scoring



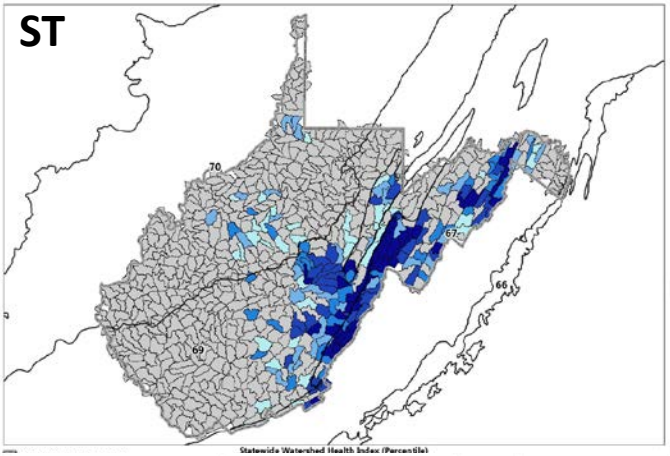

West Virginia: PHWA Statewide Health Index
darkest blue = highest statewide health scores
N
0-10
10-20
20-30
30-40
40-50
50-60
60-70
70-80
80-90
90-100
0
75
150
300
Miles

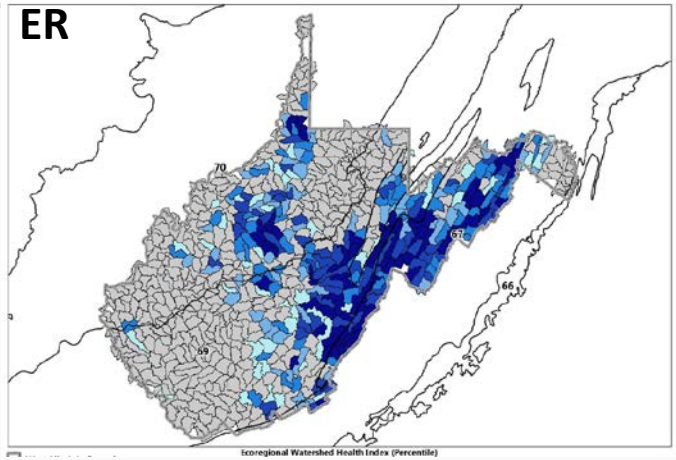
West Virginia intersects four Level III ecoregions



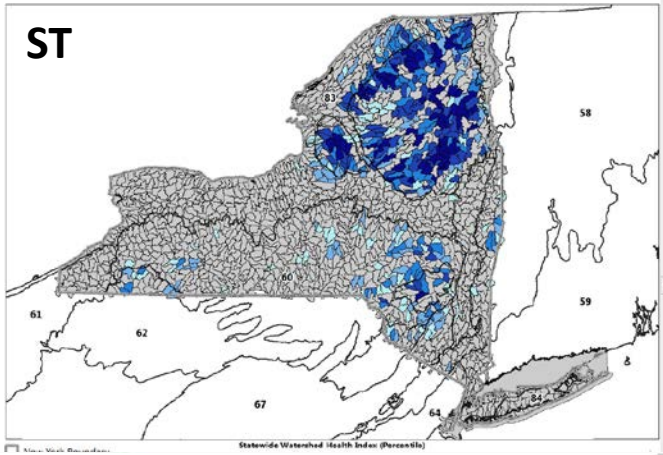
Darkest blue = highest ecoregional health scores (multi-state)

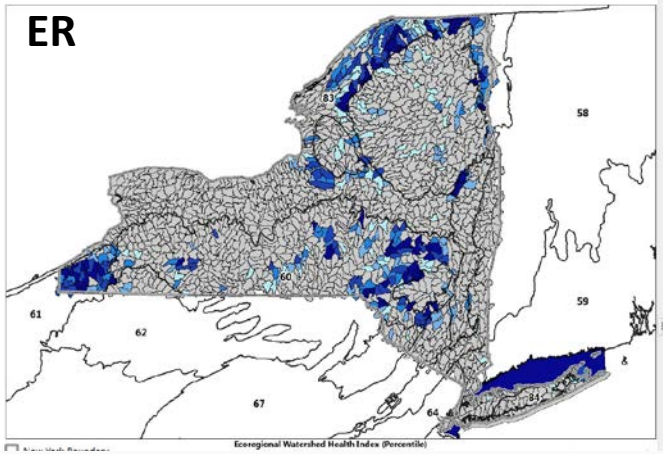
STATEWIDE VS. ECOREGIONAL SCORING: WHY DO BOTH?





- Provides two alternate viewpoints on health
- ST and ER high-scorers sometimes differ a lot
- ST more relevant for supporting state-based actions and decisions
- ER means more ecologically as within-ER HUCs are more similar to begin with

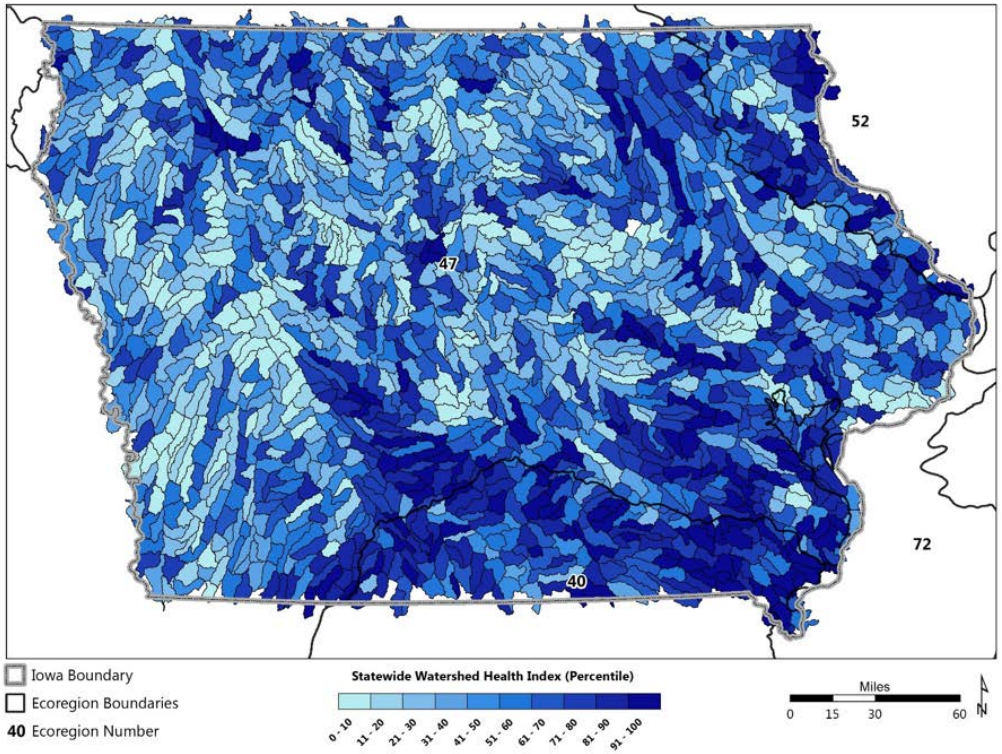


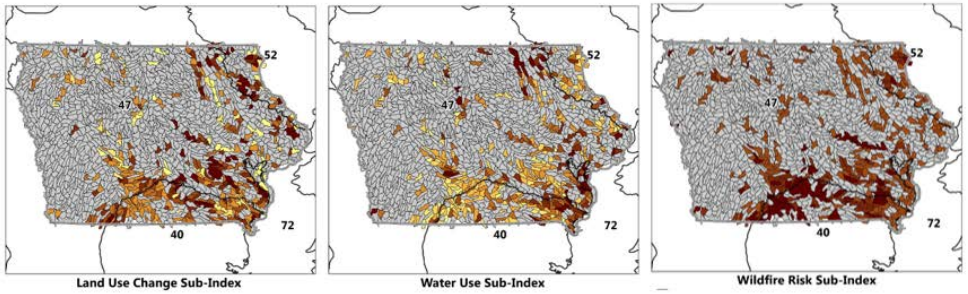


PRODUCTS AND INTENDED USES

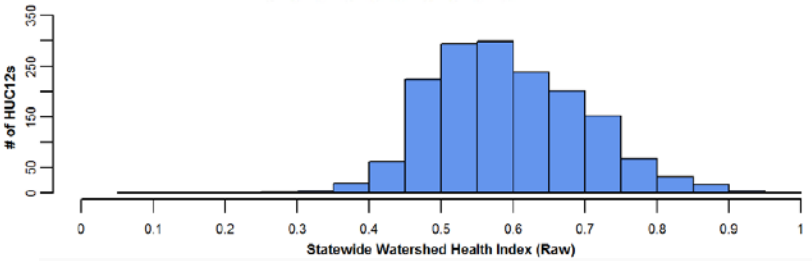
Main Products

1. Geodatabase
2. Overview Document
3. Excel Watershed Data File





Watershed (HUC12) health and vulnerability scores for all watersheds in each lower 48 state and each Level 3 ecoregion



File Geodatabase

- State-specific ArcGIS file geodatabase enables
  - Easier integration of PHWA results with other state datasets
  - Further modification of state-specific index calculation and data sources
- Each state geodatabase includes
  - State, HUC12, and instate ecoregional boundaries
  - Values from all indicators, sub-indices, and indices

Watershed Data File

Colorado's Preliminary Healthy Watersheds Assessment (PHWA) evaluated the relative watershed health and vulnerability of Colorado's 2,988 12-digit hydrologic unit code (HUC12) watersheds. Watersheds were assessed at both the statewide and ecoregional scale, resulting in paired *Watershed Health* and *Watershed Vulnerability* scores per HUC12 watershed (i.e., one set of statewide scores and one set of ecoregional scores per watershed). Together, these scores provide insights on a watershed's condition relative to others within the state, as well as those watersheds sharing similar ecological characteristics across the ecoregion.

Statewide and ecoregional index scores are presented below as both raw scores ("Score", between 0 and 1) and percentiles (0 to 100%). The "Top 10%" and "Top 25%" columns denote watersheds scoring in the top percentiles of watershed health, both within the state and their ecoregion.

Blue-highlighted watershed names indicate those scoring in the Top 25% of watershed health both within the state and their ecoregion. Among these Top 25% "healthiest" watersheds, yellow-highlighted watershed names indicate those that also have an elevated (> 75th percentile) statewide vulnerability score. This information helps distinguish between healthy watersheds and healthy watersheds most at risk to degradation.

Please note that the full PHWA dataset, including indicator and sub-index scores that comprise each overall index, is available in other worksheets of this file.

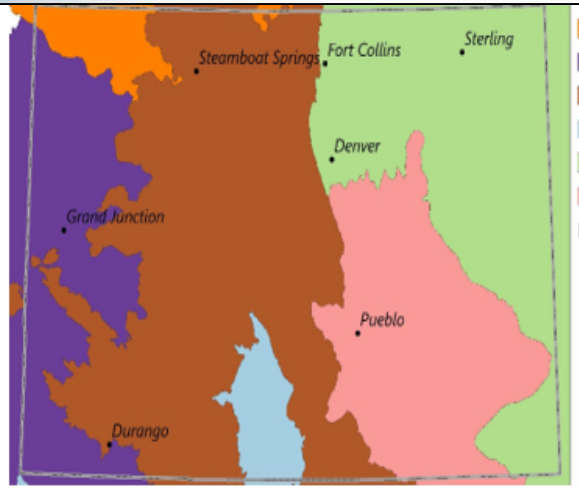


Figure: Colorado includes parts of six Omernik Level III ecoregions

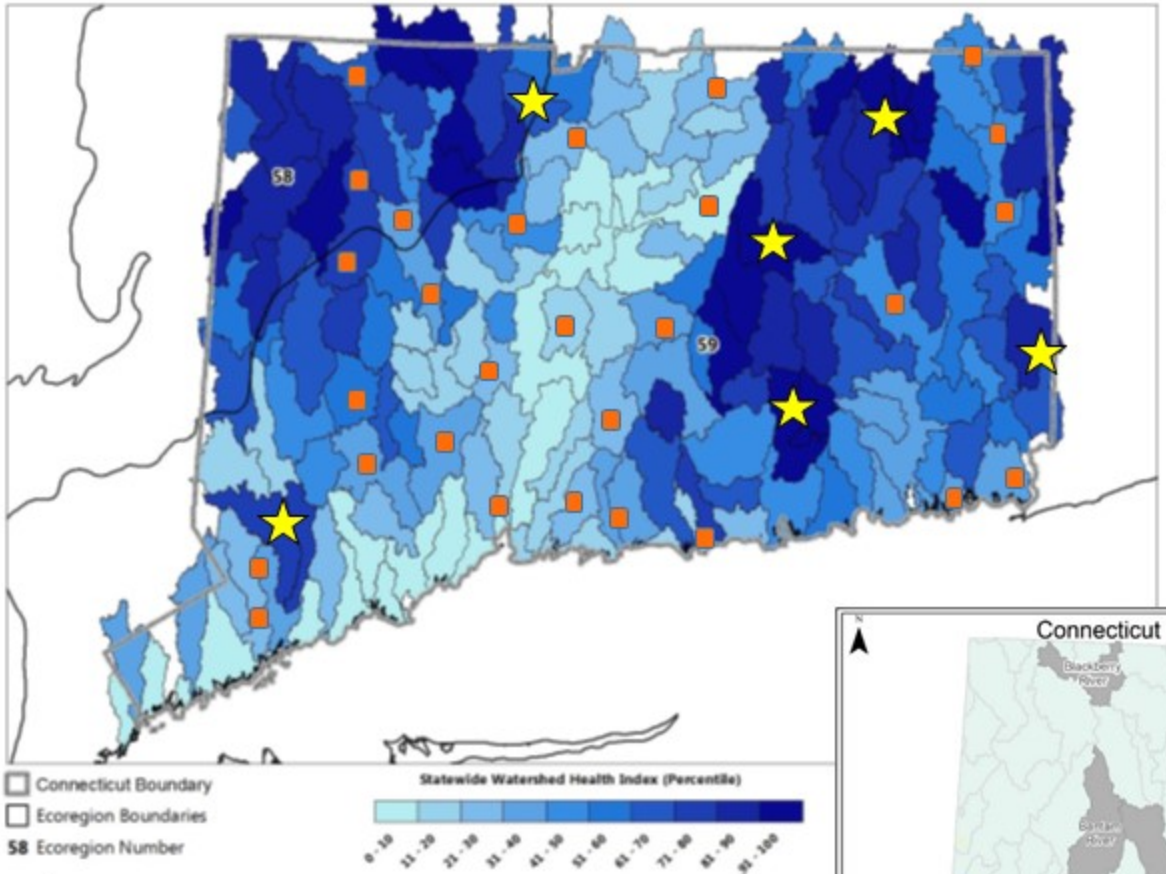
PHWA Watershed Index Summary

				WATERSHED HEALTH INDEX						WATERSHED VULNERABILITY INDEX			
				STATEWIDE		ECOREGIONAL		Top Scoring Watersheds		STATEWIDE		ECOREGIONAL	
Watershed Name	HUC12	ECOREGION	STATE	Score	Percentile	Score	Percentile	Top 10%	Top 25%	Score	Percentile	Score	Percentile
Bronco Canyon-Purgatorie River	110200101604	26	CO	0.66	17.7	0.82	63.8	No	No	0.13	49.0	0.13	30.4
Browns Canyon	110200010708	21	CO	0.76	41.0	0.74	52.3	No	No	0.11	35.1	0.12	34.8
Browns Creek	110200010704	21	CO	0.81	59.2	0.75	55.5	No	No	0.13	49.6	0.14	47.3
Browns Draw	140500020605	20	CO	0.90	90.7	0.90	84.0	No	Yes	0.35	96.7	0.32	90.0
Brumley Valley-Disappointment Creek	140300020506	20	CO	0.91	94.4	0.91	87.7	No	Yes	0.25	86.0	0.23	69.9
Brunker Creek	102500020101	25	CO	0.81	58.4	0.78	45.1	No	No	0.19	75.1	0.19	76.5
Brush Creek	110200011001	21	CO	0.79	52.6	0.73	48.2	No	No	0.06	6.8	0.07	13.9
Brush Creek	140100050904	20	CO	0.86	76.6	0.83	54.1	No	No	0.23	83.4	0.25	75.4
Brush Creek	140100051106	21	CO	0.77	45.9	0.75	57.2	No	No	0.15	59.4	0.17	54.6
Brush Creek	140200010202	21	CO	0.89	88.5	0.88	96.0	No	Yes	0.05	4.1	0.05	6.4
Brush Creek-Cedar Creek	101900120807	25	CO	0.94	98.0	0.91	89.1	No	Yes	0.11	37.9	0.10	11.5
Brush Creek-Roaring Fork River	140100040602	21	CO	0.66	16.5	0.47	1.7	No	No	0.17	67.0	0.25	75.9
Brush Hollow Creek-Arkansas River	110200020408	26	CO	0.64	14.3	0.59	5.2	No	No	0.16	62.7	0.20	66.6
Buck Canyon-Two Butte Creek	110200130106	26	CO	0.89	87.3	0.85	77.6	No	Yes	0.16	66.6	0.17	54.2
Buck Creek	101900130404	25	CO	0.71	27.5	0.70	25.3	No	No	0.12	40.6	0.11	25.9
Buck Creek-Hermosa Creek	140801040407	21	CO	0.87	81.5	0.83	84.3	No	Yes	0.20	75.8	0.23	73.4
Bucktail Creeks-San Miguel River	140300030702	20	CO	0.88	83.9	0.84	58.6	No	No	0.28	90.6	0.26	77.1
Buffalo Creek	101900020303	21	CO	0.74	36.4	0.79	70.8	No	No	0.16	65.7	0.18	60.2
Buffalo Gulch	101900010302	21	CO	0.80	55.2	0.73	47.9	No	No	0.07	9.7	0.07	14.3

Potential Uses

- Support state actions to prioritize, protect and maintain high quality waters
- Raise awareness of where the healthiest watersheds occur
- Raise awareness that healthy watersheds are sometimes highly vulnerable
- Improve communication and coordination by providing nationally-consistent data on watershed health and vulnerability
- Help promote high quality waters protection within other landscape management efforts
- Provide an initial dataset upon which others can build better watershed condition information

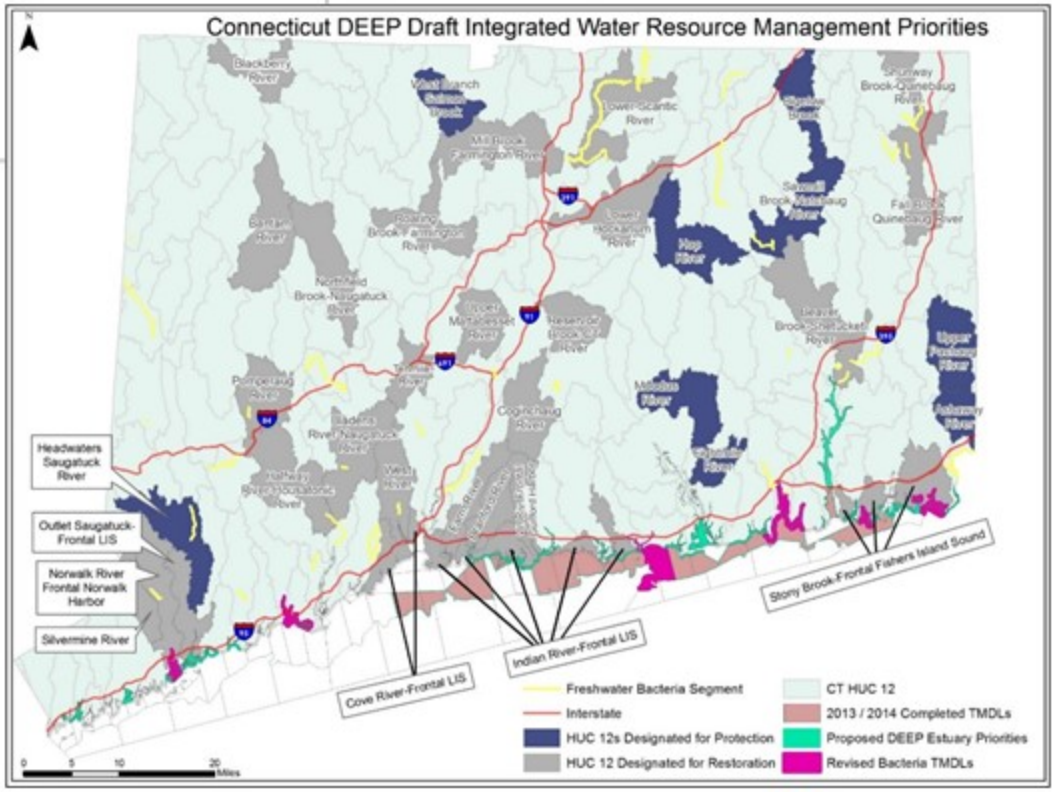
Comparing Connecticut's HUC12s: PHWA Health Index (left) and State 303(d) Vision Priorities (below)



★ HUC12 priority for protection

■ HUC12 priority for restoration

Darker blue = higher health score



For more information about EPA's Healthy Watersheds Program, including information about the PHWA and other ongoing projects, please visit: https://www.epa.gov/hwp/

QUESTIONS?

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