Preliminary Healthy Watersheds Assessments (PHWA)

and

Recovery Potential Screening (RPS) Tools Training Session

June 1, 2017 – Shepherdstown WV

Doug Norton
Healthy Watersheds Coordinator
Watershed Branch, WRAPD

AGENDA

	Time (EDT)
• **Preliminary Healthy Watersheds Assessments (PHWA)**	**3:30**
• PHWA overview	
• Relating PHWA to protection programs and data	
• Gallery of state results	
• **Recovery Potential Screening (RPS) Tools and Tips**	**4:30**
• RPS tool basic tour	
• Live demo of some Tool essentials	
• Hands-on time with your state-specific tool	
• **Closing Thoughts and Adjourn**	**5:30**

Breaking News….

X

Dude, You're Gettin' a New 2017 RPS Tool!!

(and this finally includes HI, AK, PR and USVI)

Part One, RPS/PHWA Training

Preliminary Healthy Watersheds Assessments (PHWA)

helping states better protect high quality waters

June 1, 2017 – Shepherdstown WV

EPA Healthy Watersheds Program

Miranda Chien-Hale **Lisa Hair**

Steve Epting **Chris Solloway**

Doug Norton

A YEAR AGO IN SHEPHERDSTOWN….

Assessment to Support Protection (slides from 2016 States' Meeting)

A Conceptual Framework for Protection

ASSESS –- PLAN/PRIORITIZE --- PROTECT

ASSESSMENT: Statewide or Site-Specific

Assessment should help the state identify candidate protection areas and provide useful information for considering protective actions.

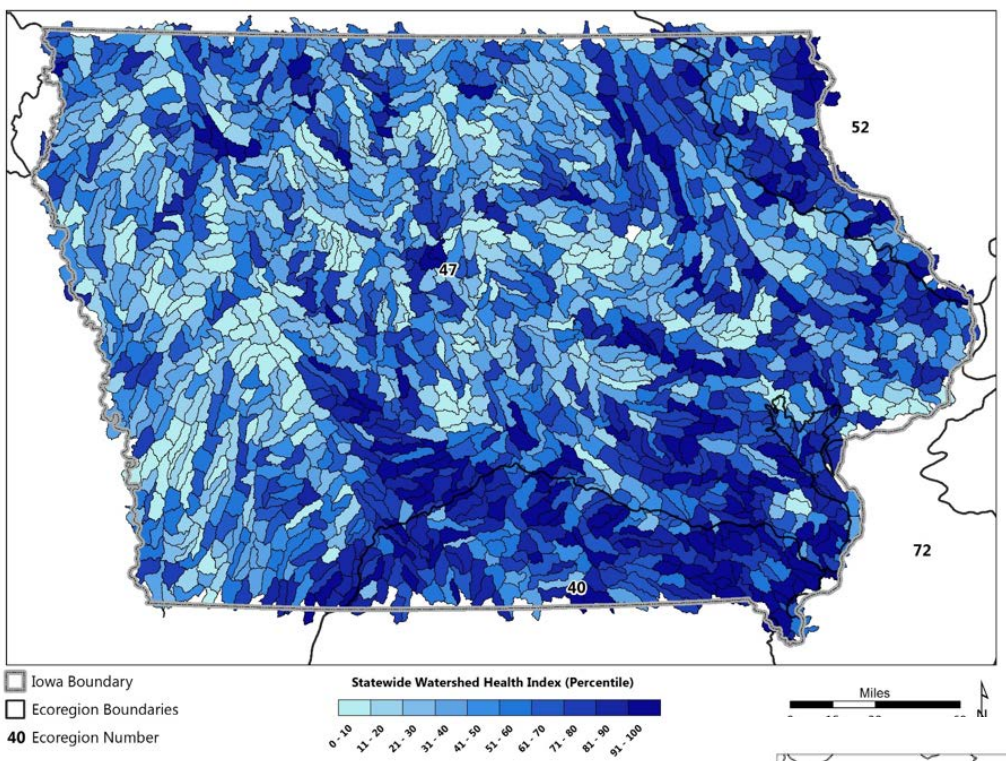
What is the PHWA?

- State-specific 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

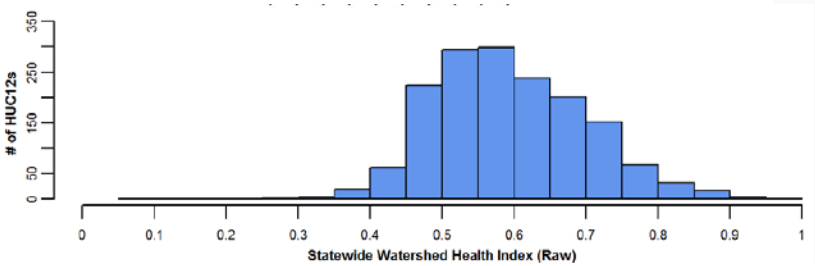
Why was the PHWA done?

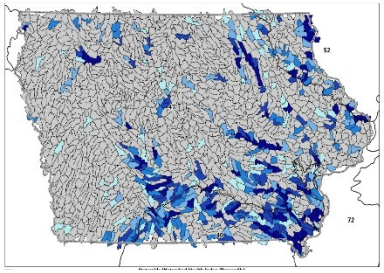
- Help states make progress toward protection (303(d) Vision, other programs)
- Provide comprehensive data on watershed health that complements case-specific protection efforts
- Help states and EPA communicate with partners about opportunities for healthy waters protection

MAIN PRODUCT OF THE PHWA

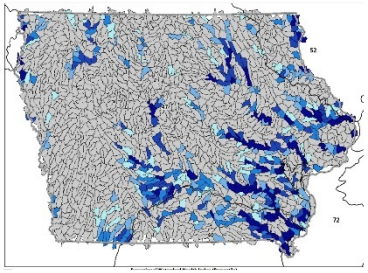


Watershed (HUC12) health and vulnerability scores for all watersheds in each lower 48 state and each Level 3 ecoregion

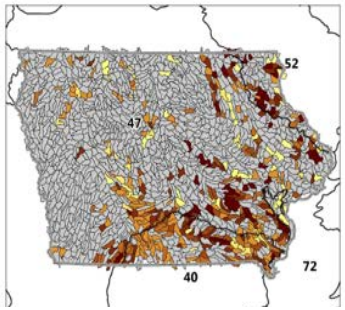




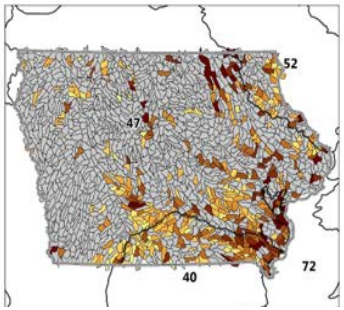
State Top 25%



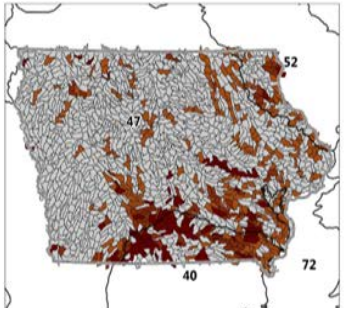
Ecoregions Top 25%



Land Use Change



Water Use



Wildfire Risk

HUCS WITH HIGHEST HEALTH SCORES

VULNERABILITY OF HUCS WITH HIGHEST HEALTH SCORES

METHODS

Healthy Watersheds Assessment Framework

identify essential ecological attributes that support healthy ecosystems

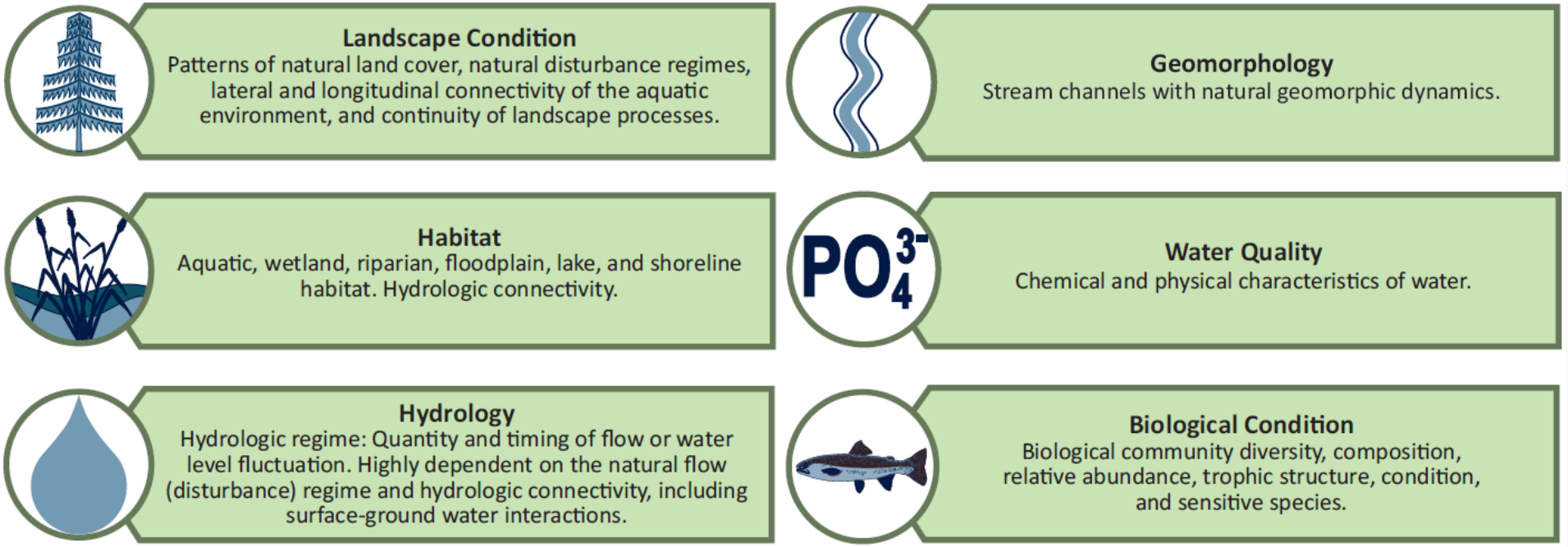
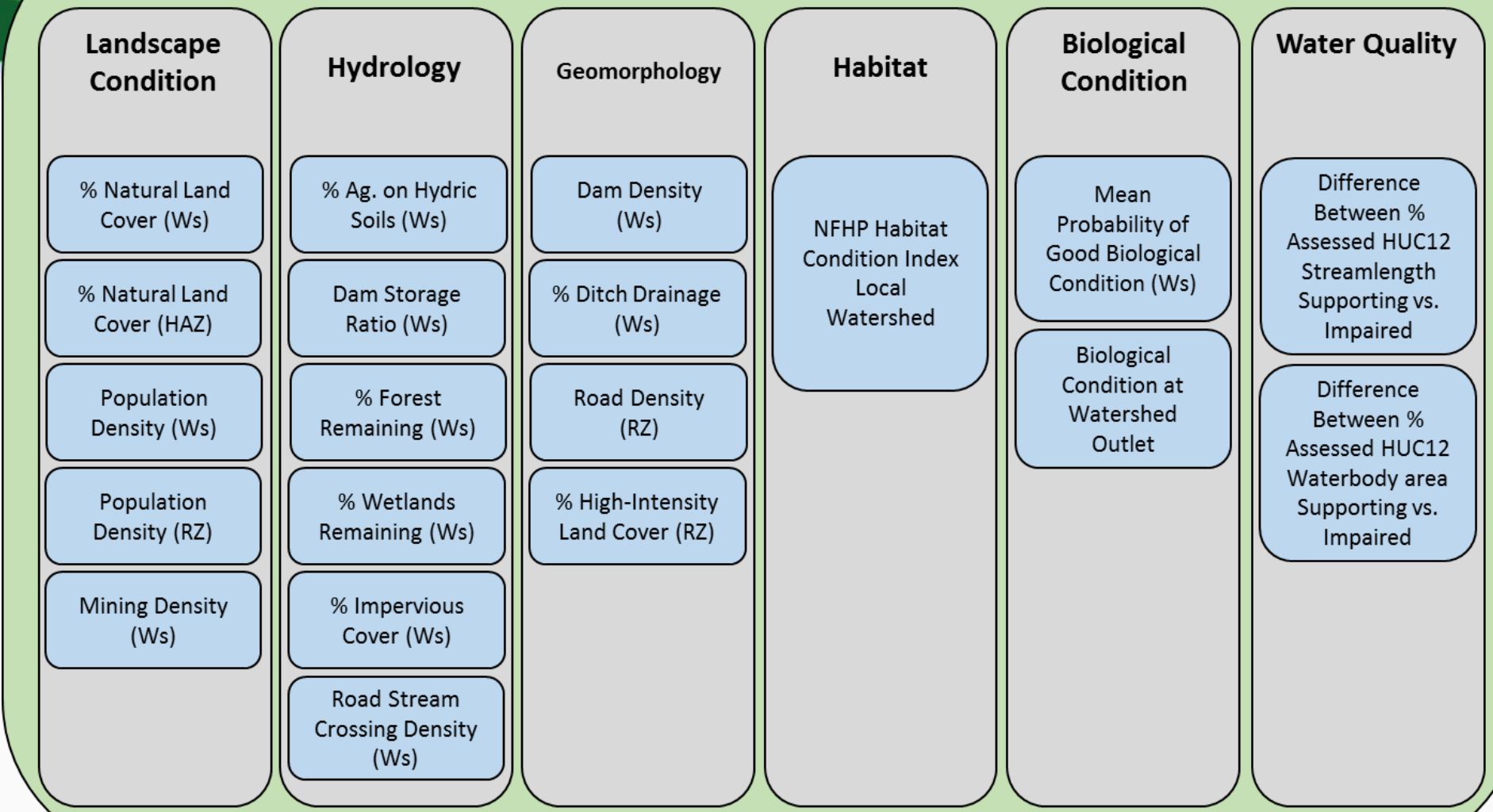


Figure 1. Six attributes of watershed health described in *Identifying and Protecting Healthy Watersheds: Concepts, Assessments, and Management Approaches* (USEPA 2012). Measurement of watershed indicators related to each attribute (i.e., "sub-index") provides the basis for the Watershed Health Index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

Watershed Health Index

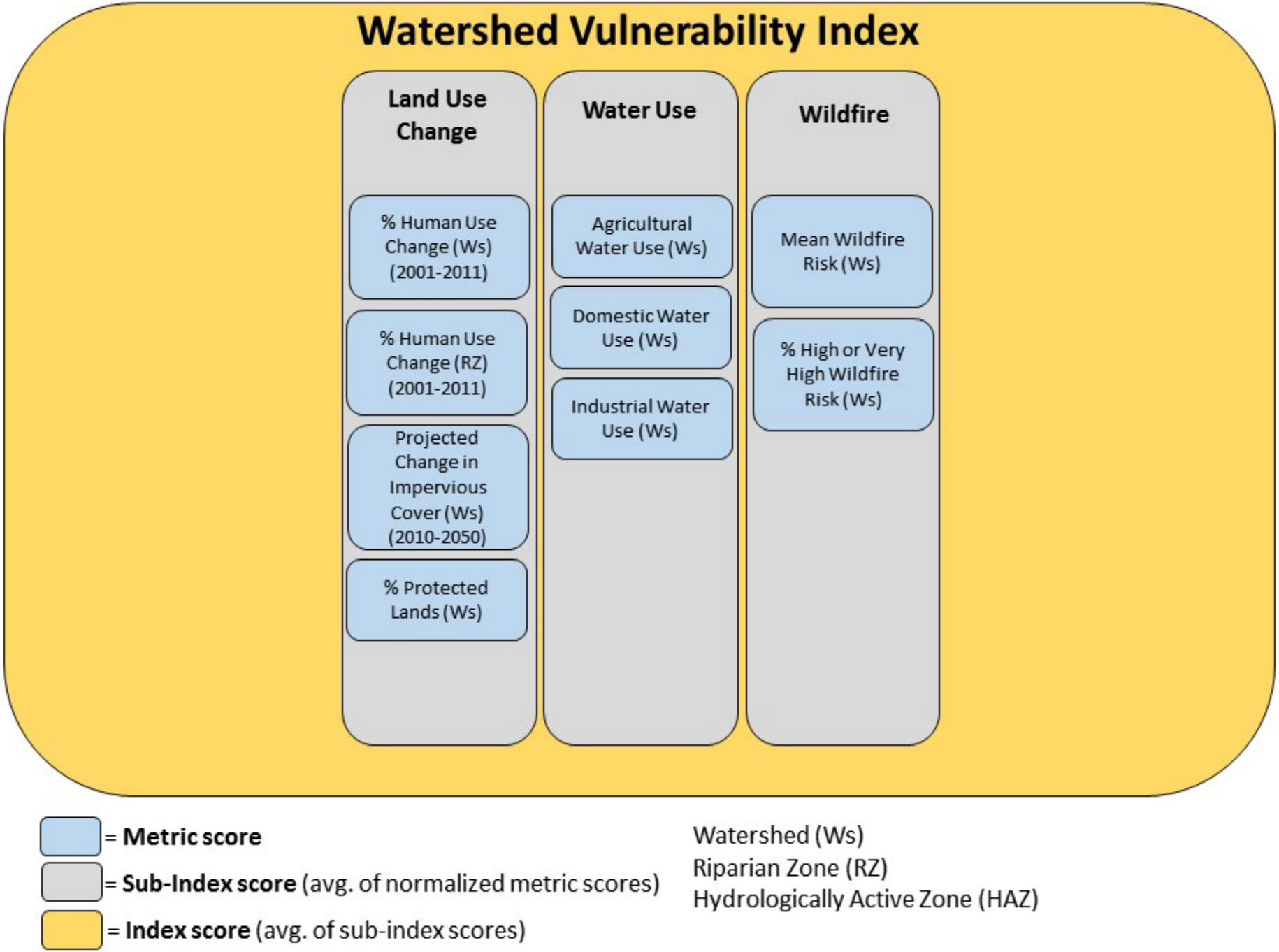


= **Metric score**

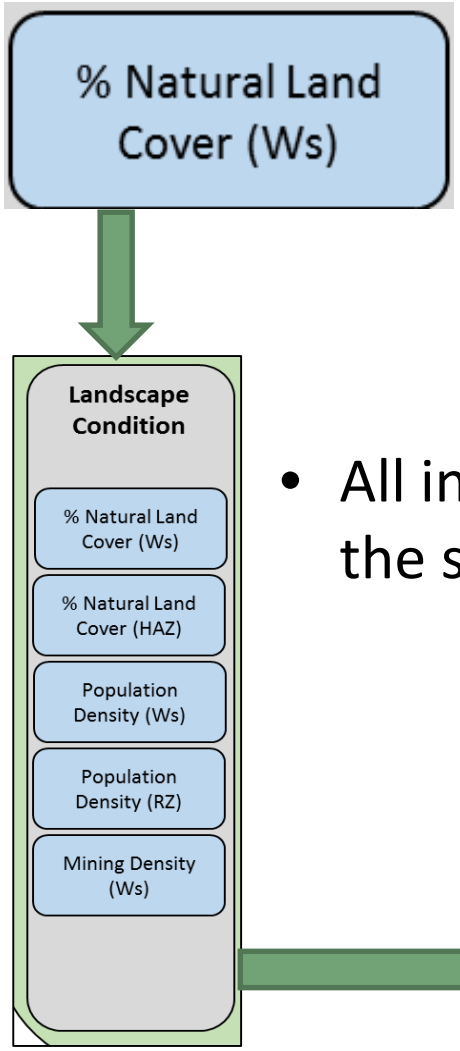
= **Sub-Index score** (avg. of normalized metric scores)

= **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)

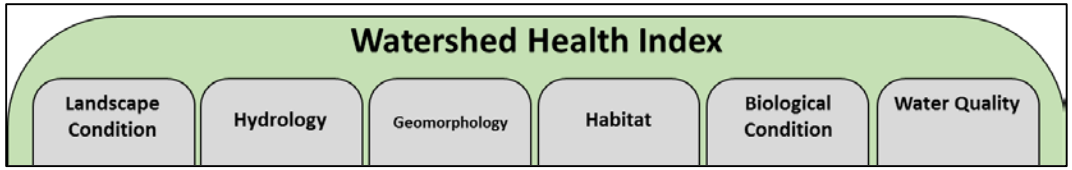
How the PHWA Scores were Developed



- Raw indicator score measured for each HUC12
- Statewide and ecoregional scores are normalized between 0 and 1

- All indicators per sub-index averaged to create the sub-index

- All sub-indices averaged to create the index



State and Ecoregional Indicator, Sub-Index, and Index Values per HUC12 were delivered in state-specific data packages

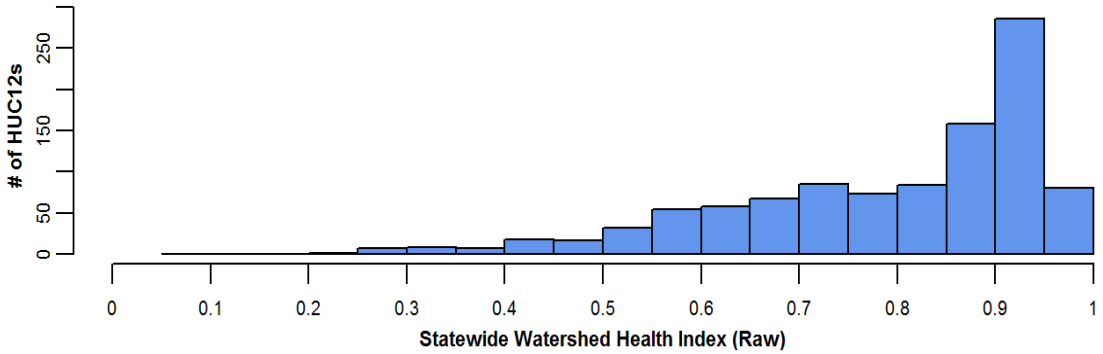
Each individual HUC12 has a data table value for:

- **29 indicators used in indices**
  - **Normalized by state**
  - **Normalized by ecoregion**
- **Health Index and Six Sub-indices**
  - **State values**
  - **Ecoregional values**
- **Vulnerability Index and Three Sub-indices**
  - **State values**
  - **Ecoregional values**

index scores are available as raw or percentile

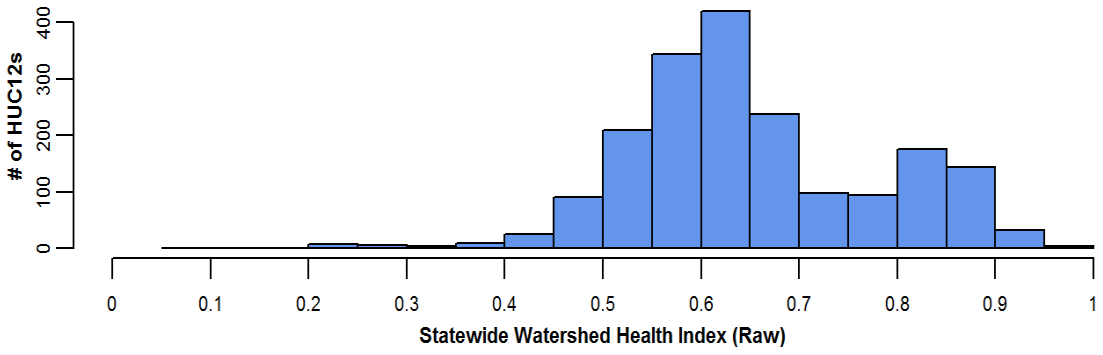
Distribution of HUC12 raw scores – common patterns in states

MAINE



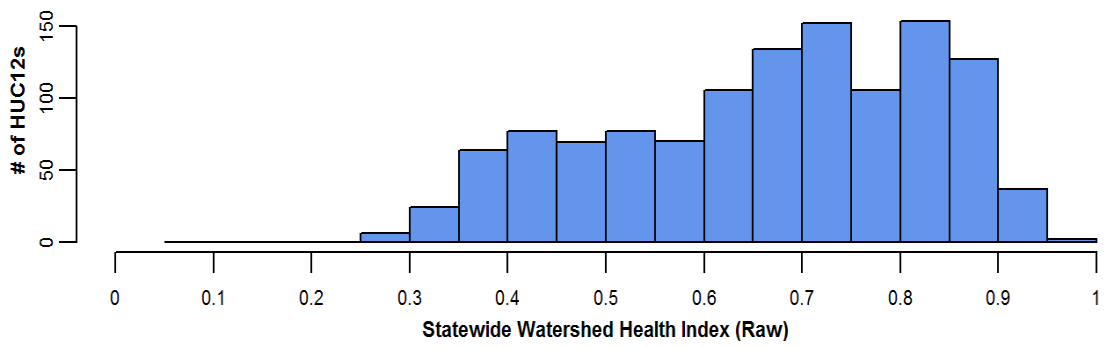
Higher scoring HUC12s are abundant

KANSAS



Middle scores dominate, but significant hi-scorers exist too

LOUISIANA

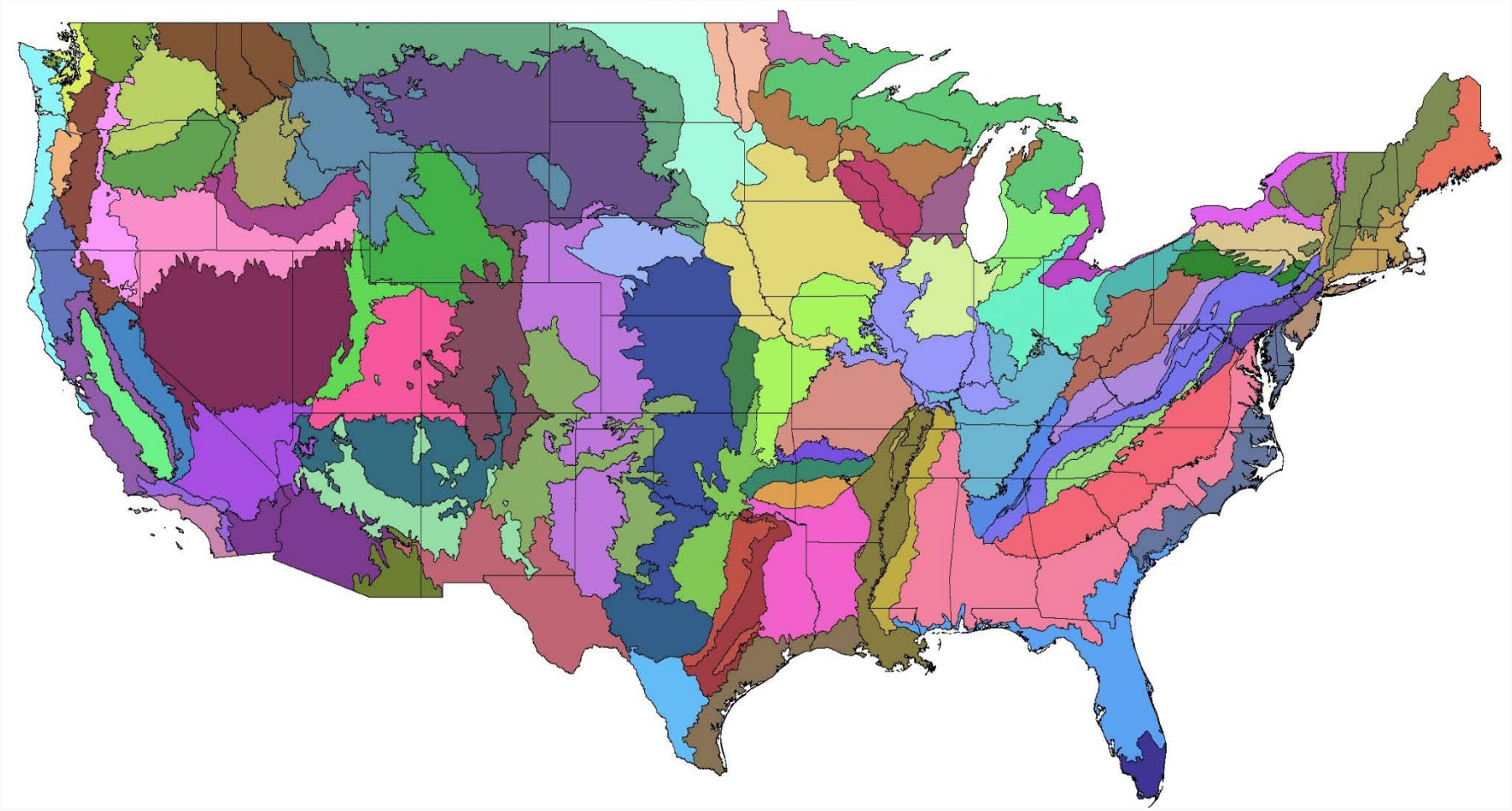


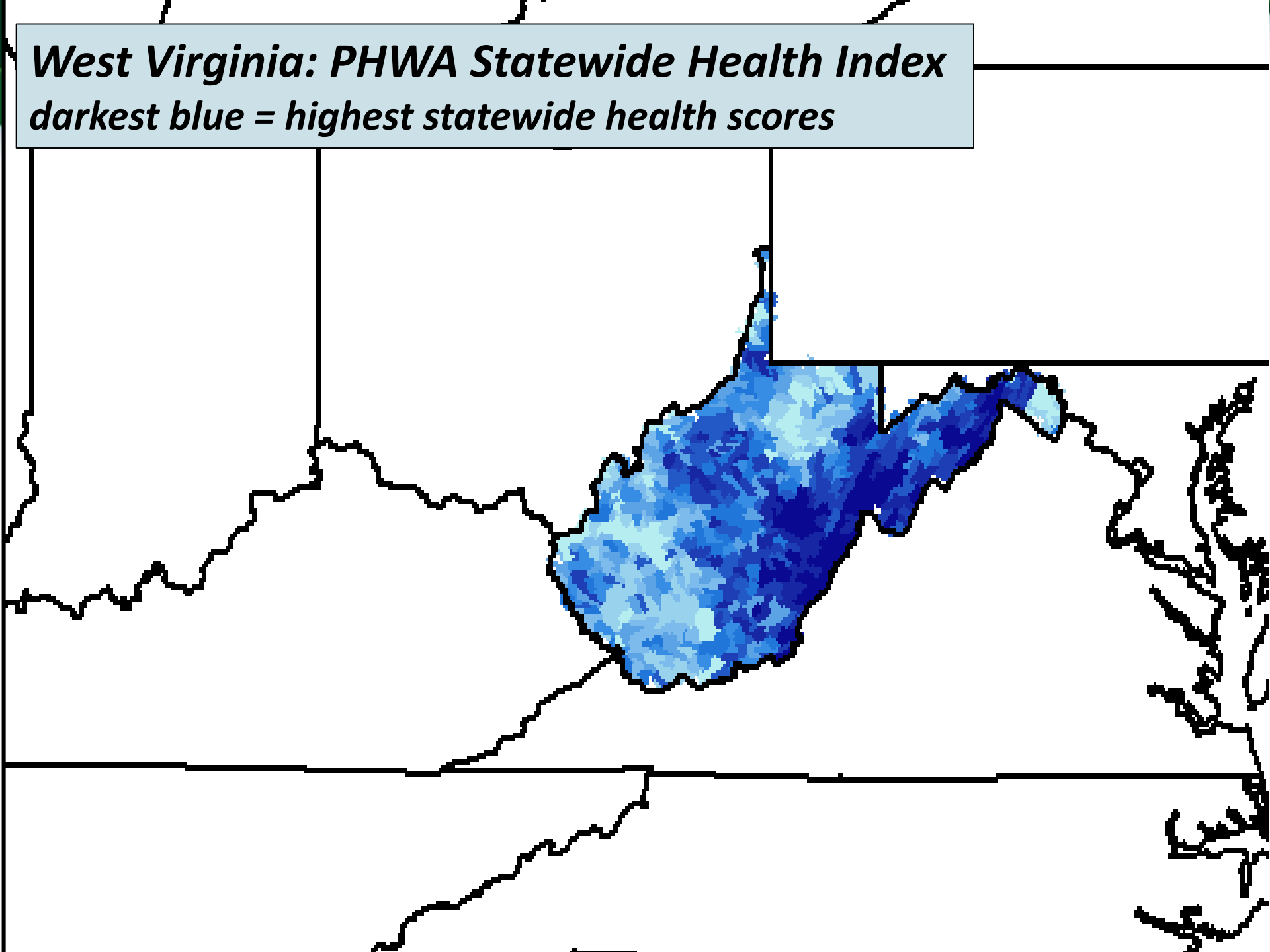
HUC12 scoring is highly variable

Caveats

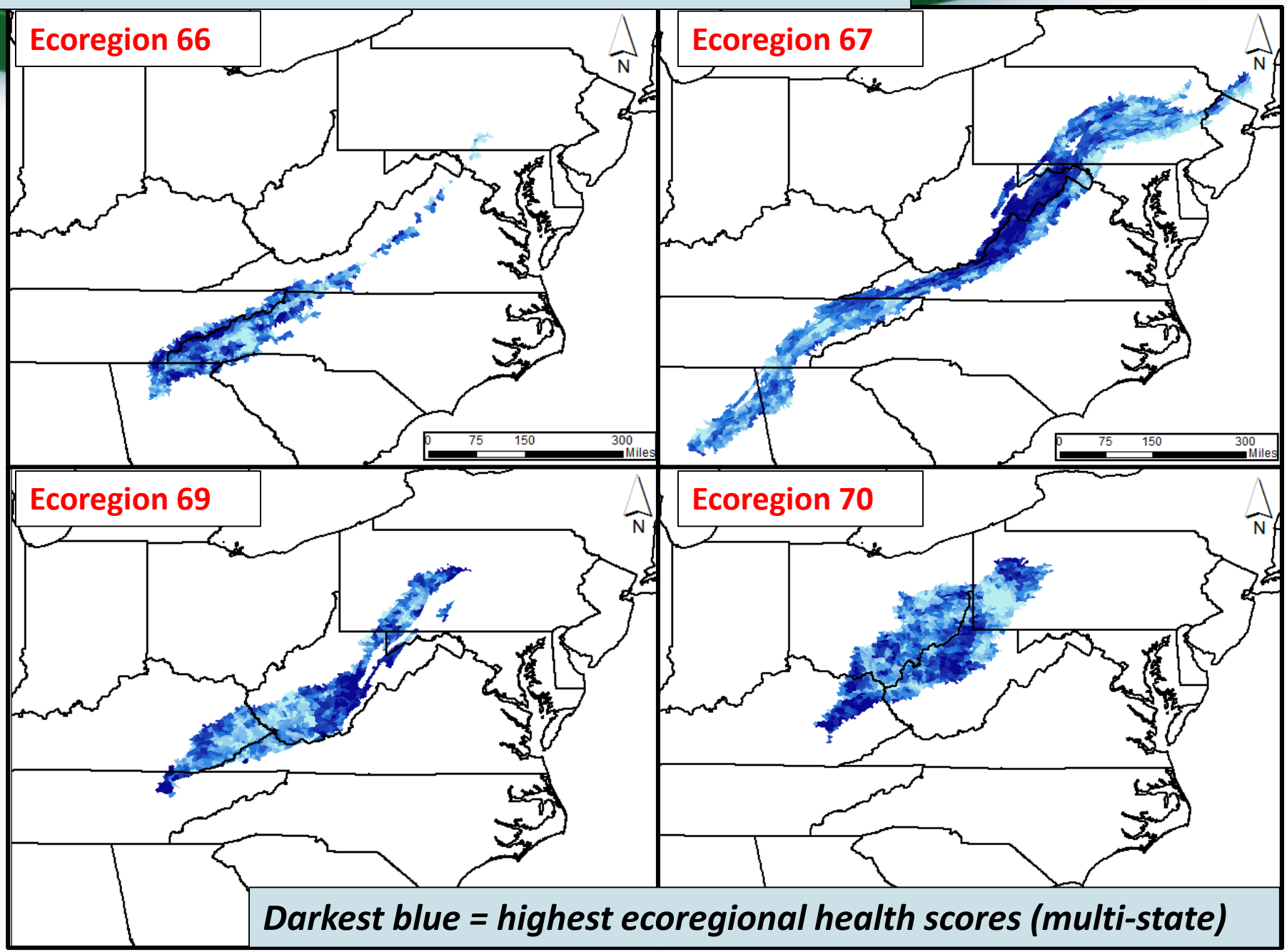
- Does not specify healthy/unhealthy threshold
- Does not compare HUC12s at national scale
- Scores represent the single HUC not its full watershed (i.e., upstream HUCs)
- All indicators were weighted equally
- Based on datasets nationally available in 2016
- In Vulnerability index, recent land and water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

Statewide vs. Ecoregional Scoring



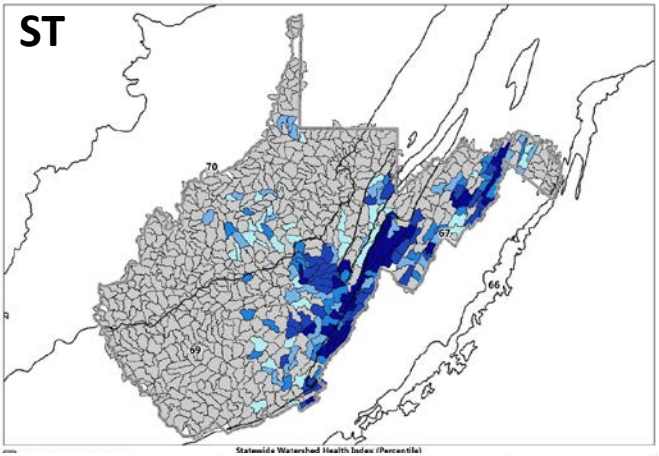

West Virginia: PHWA Statewide Health Index
darkest blue = highest statewide health scores

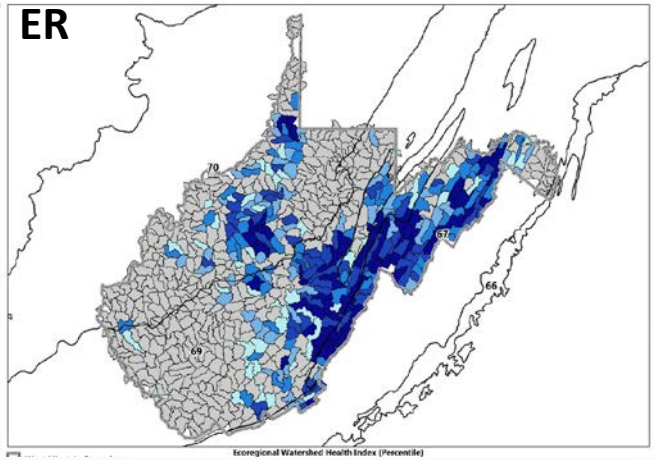
West Virginia intersects four Level III ecoregions



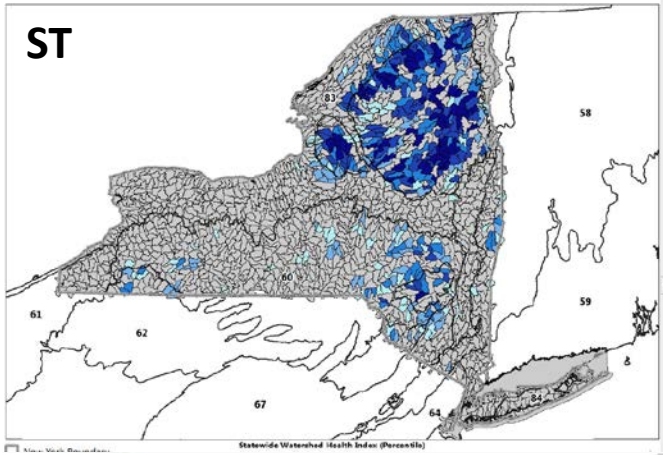
Darkest blue = highest ecoregional health scores (multi-state)

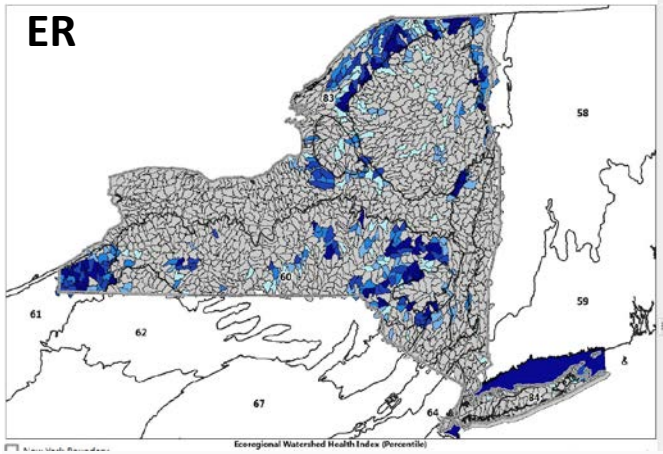
STATEWIDE VS. ECOREGIONAL SCORING: WHY DO BOTH?





- 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

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.

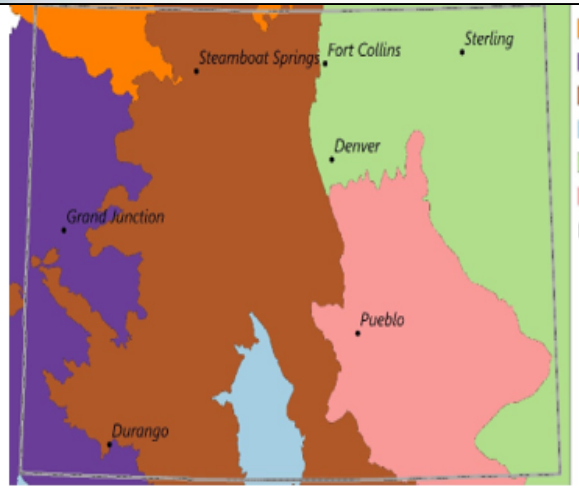
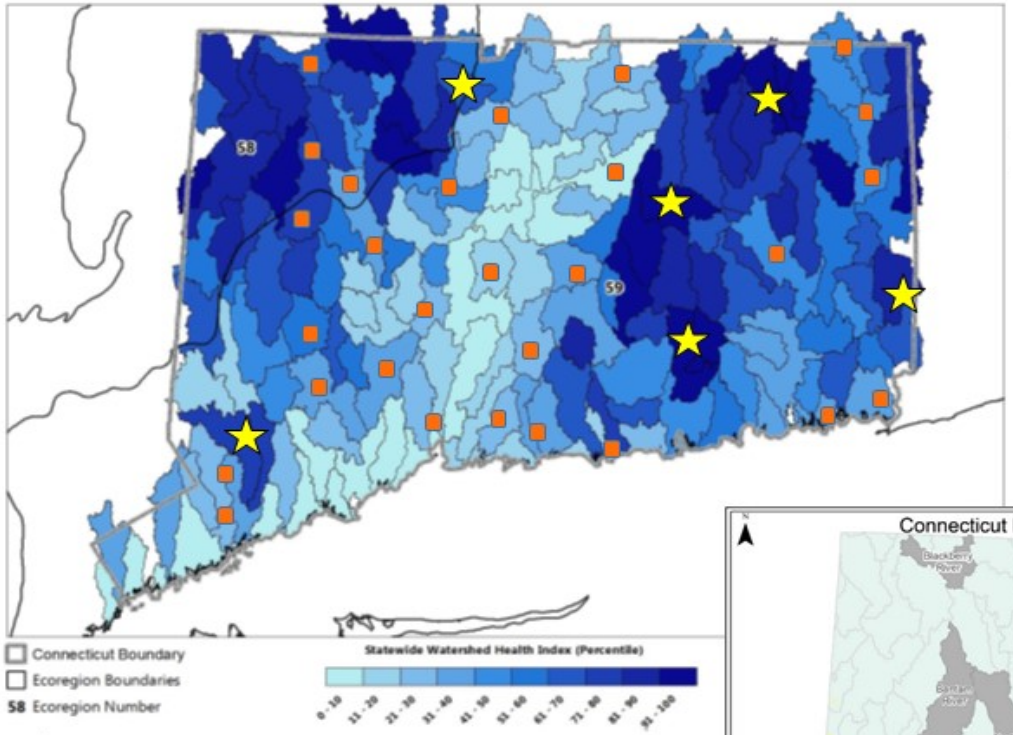


Figure: Colorado includes parts of six Omernik Level III ecoregions

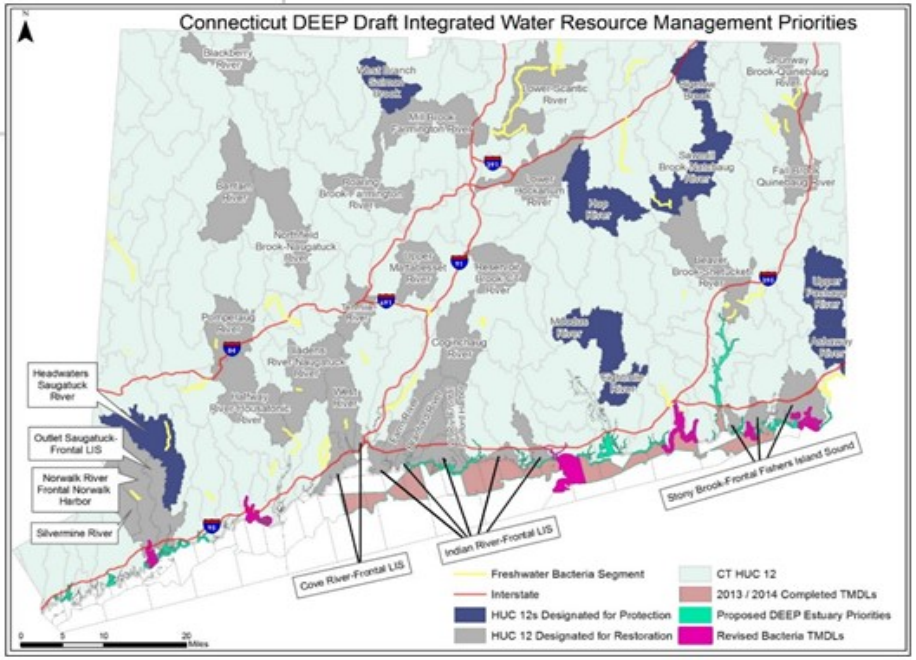
PHWA Watershed Index Summary

				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

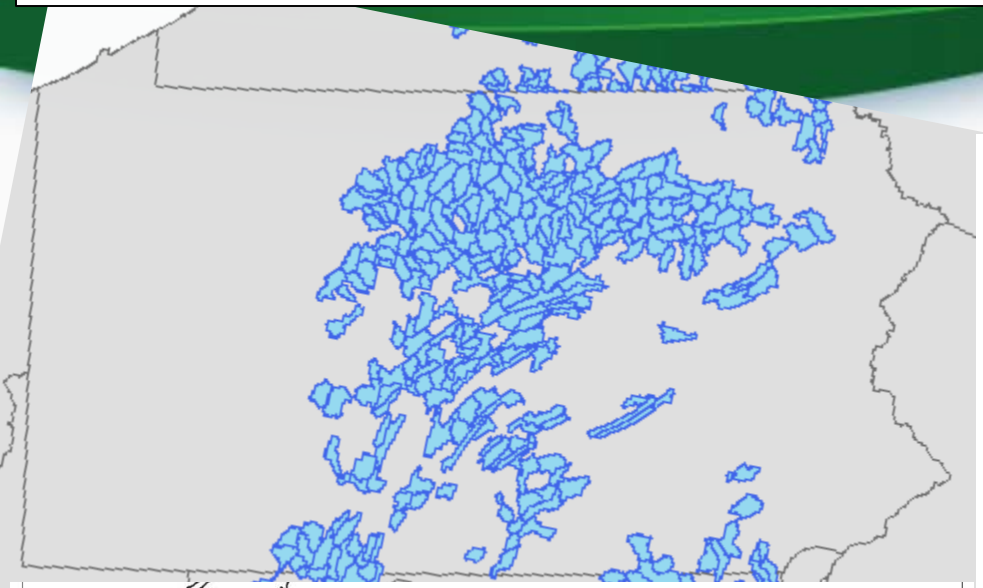
COMPARISONS WITH THE PHWA



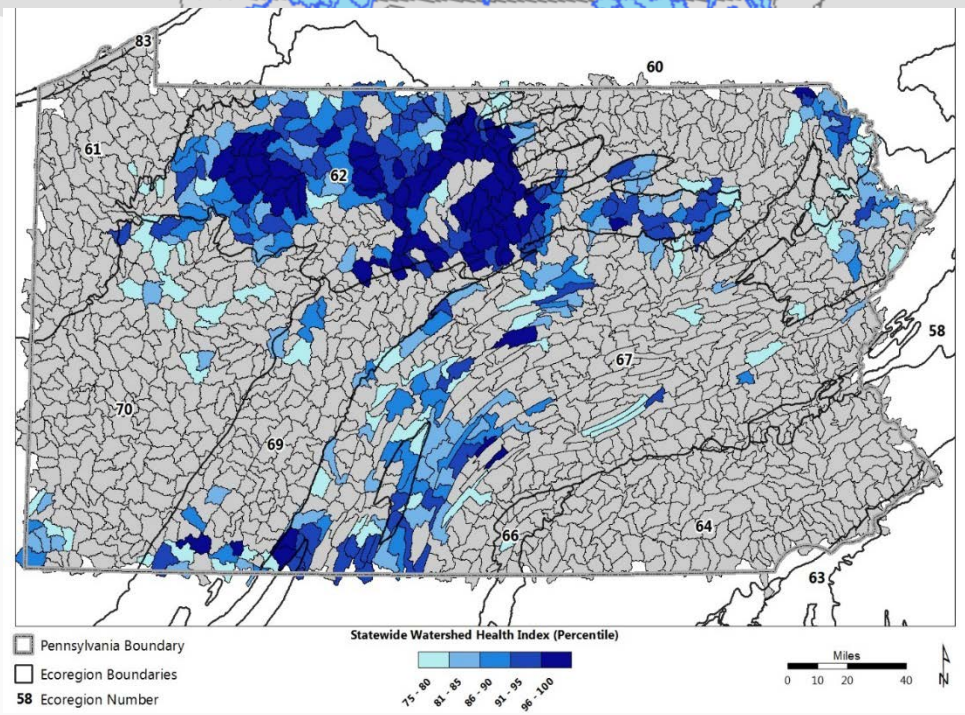
Comparing Connecticut's HUC12s: PHWA Health Index (left) and State Draft 303(d) Vision priorities (below)



COMPARISONS WITH THE PHWA

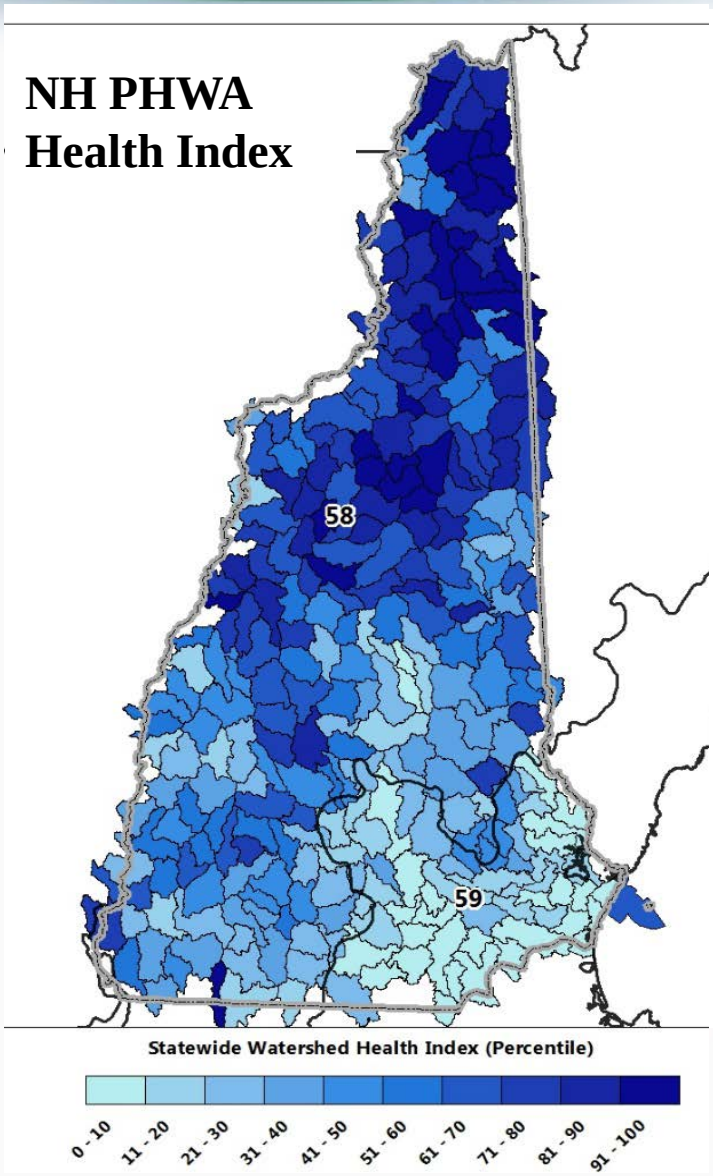


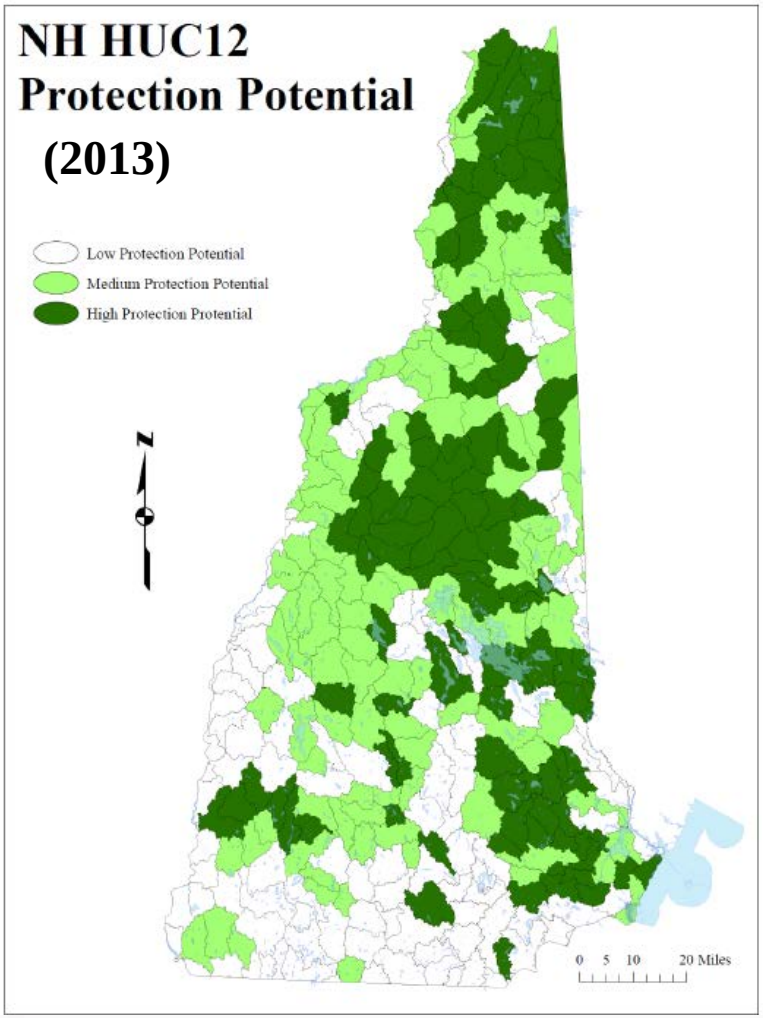
Pennsylvania Healthy Watersheds, Chesapeake Bay Program



Pennsylvania PHWA Statewide Watershed Health Index, Top 25% HUC12s

COMPARISONS WITH THE PHWA





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

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/

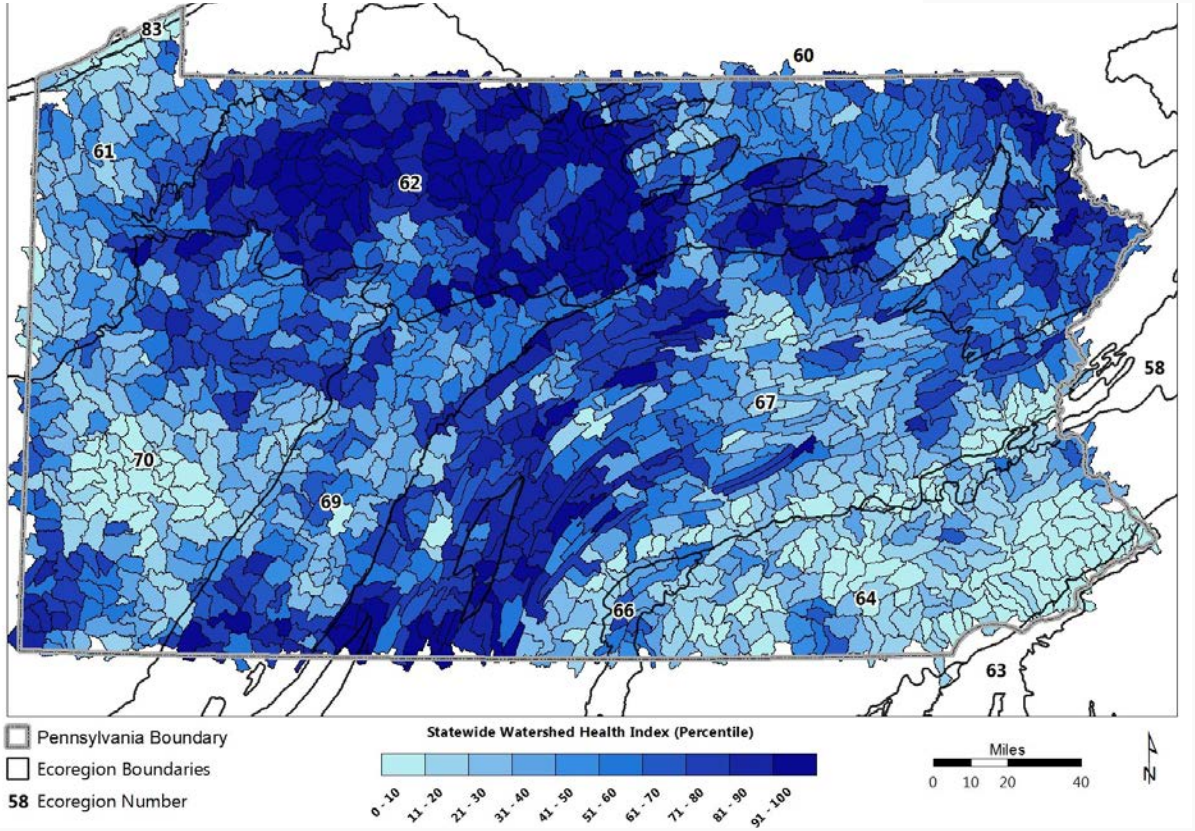
QUESTIONS?

Doug Norton (Healthy Watersheds Coordinator)
norton.douglas@epa.gov or 202-566-1221

A Closer Look at Pennsylvania PHWA

through comparisons with non-PHWA data

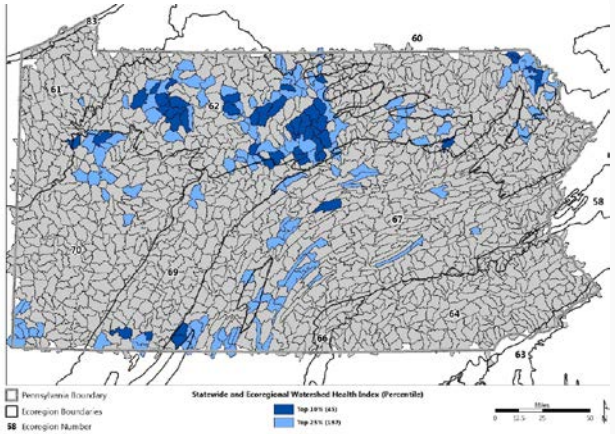
a deeper dive….



PA PHWA Results Compared with Other Data

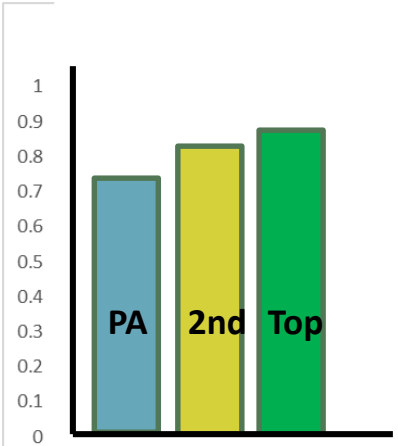
All comparisons in next several slides refer to these groups:

- ***<u>TOP TIER</u>: HUC12s that scored in top 10% of BOTH statewide and ecoregional health index (dark blue at right; n = 45)***
- ***<u>2ND TIER</u>: HUC12s that scored in top 25% of BOTH statewide and ecoregional health index (pale blue and dark blue; n = 167)***
- ***<u>STATEWIDE</u>: All HUC12s with a majority by area within Pennsylvania (n = 1351)***

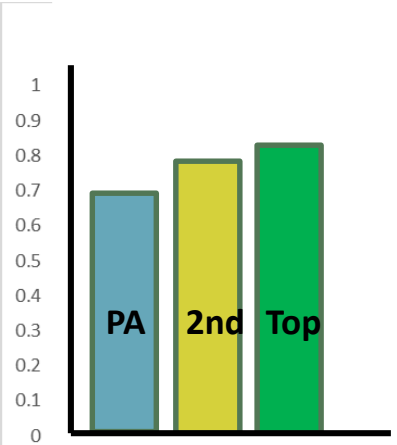


PA PHWA Selected Stats

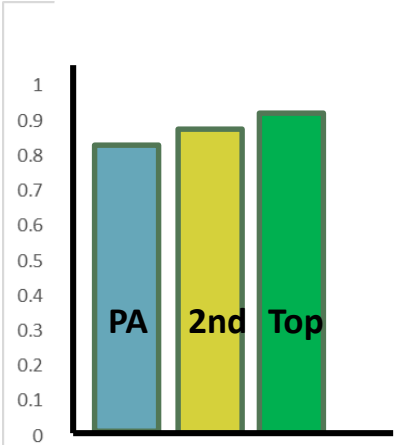
How do the Top Tier, 2nd Tier, and Statewide HUCs compare, relative to their PHWA mean health sub-index scores?



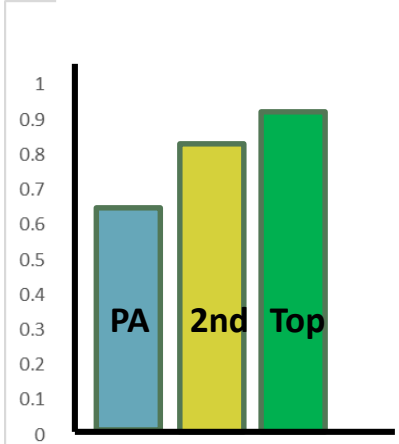
Landscape Sub-Index



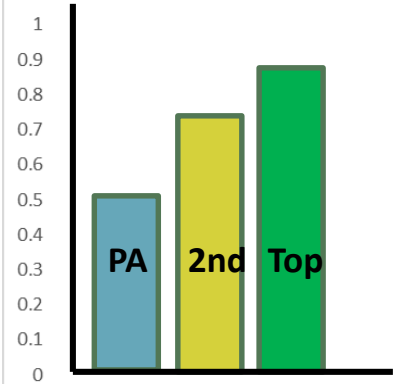
Hydrology Sub-Index



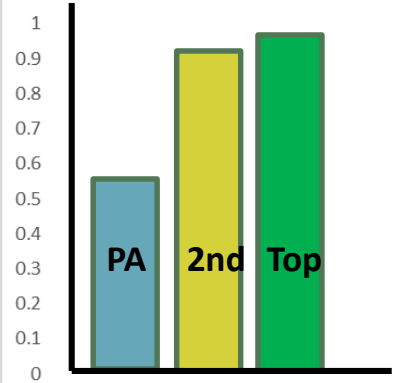
Geomorphology Sub-Index



Habitat Sub-Index



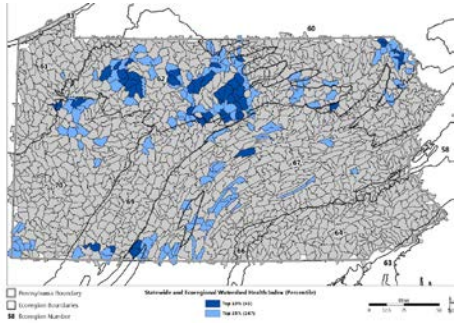
Biotic Condition Sub-Index



Water Quality Sub-Index

PA PHWA
Selected Stats

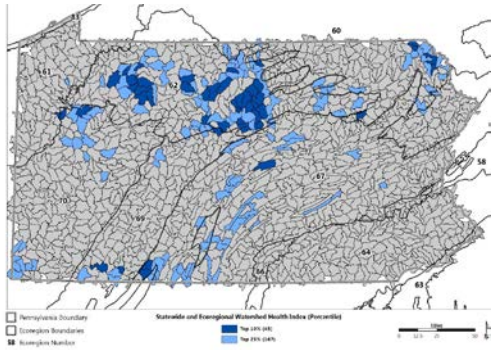
How do Top Tier and 2nd Tier HUCs compare to the rest of the state, relative to other ecological metrics?

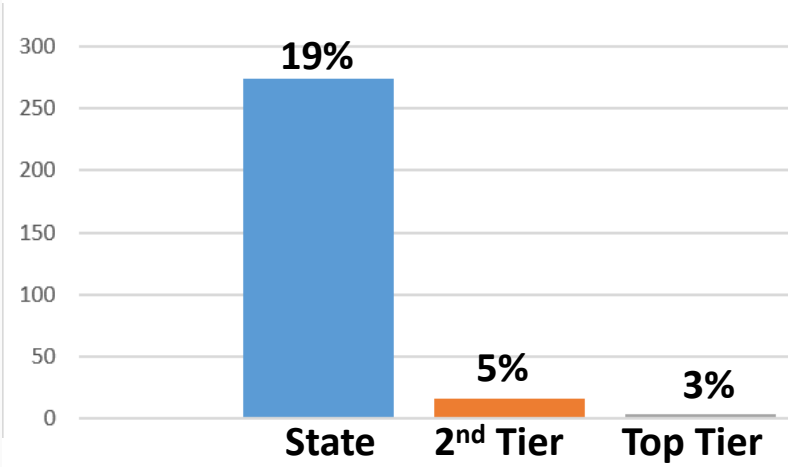


	State	2nd Tier	Top Tier
% of HUC12s that are headwaters	57%	60%	63%
% of HUC12s with rare ecosystems	3%	0%	0%
% of HUC12s with exceptional value EUs	8%	18%	27%
% of HUC12s with high quality fish EUs	23%	37%	46%

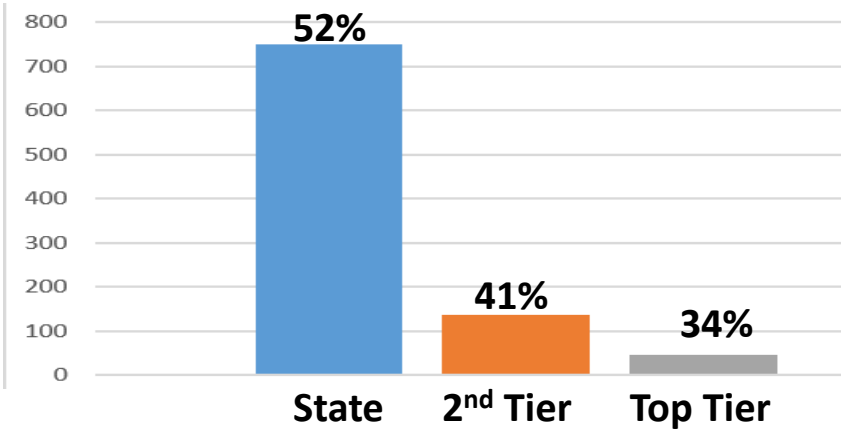
PA PHWA Selected Stats

How do Top Tier and 2nd Tier HUCs compare to the rest of the state, relative to example PA program interests?





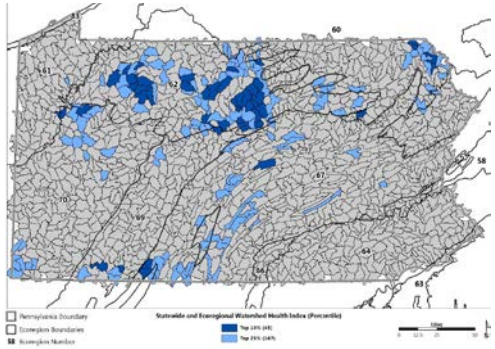
HUC12s with CWA 319 Projects

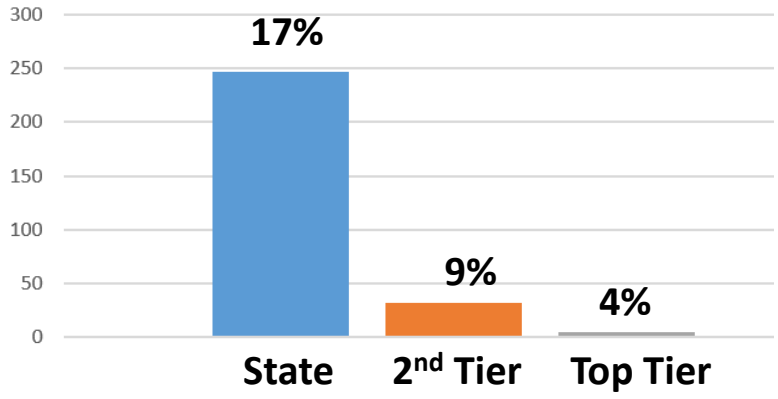


HUC12s with PA Stream ReLeaf Projects

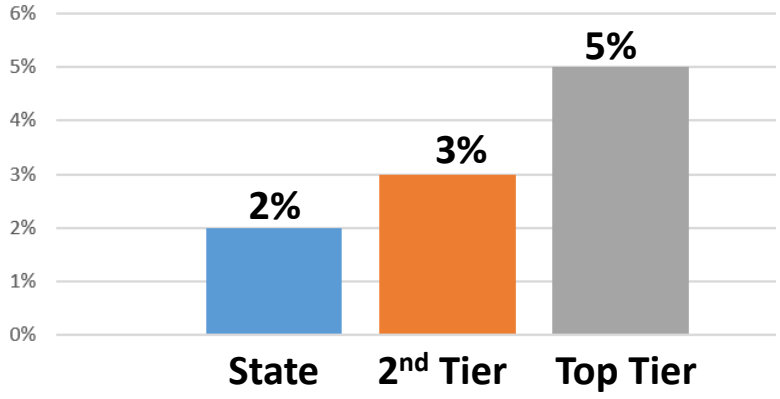
PA PHWA Selected Stats

How do Top Tier and 2nd Tier HUCs compare to the rest of the state, relative to example PA program interests?





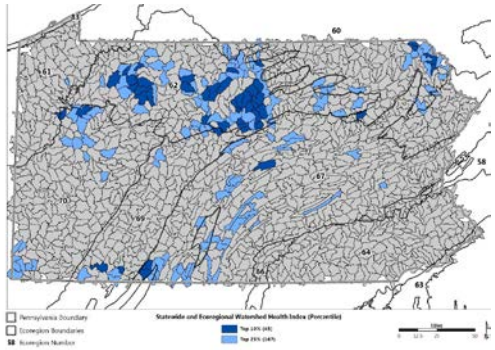
HUC12s with Stormwater Plans > 10%



Mean % HUC12 Area Protected

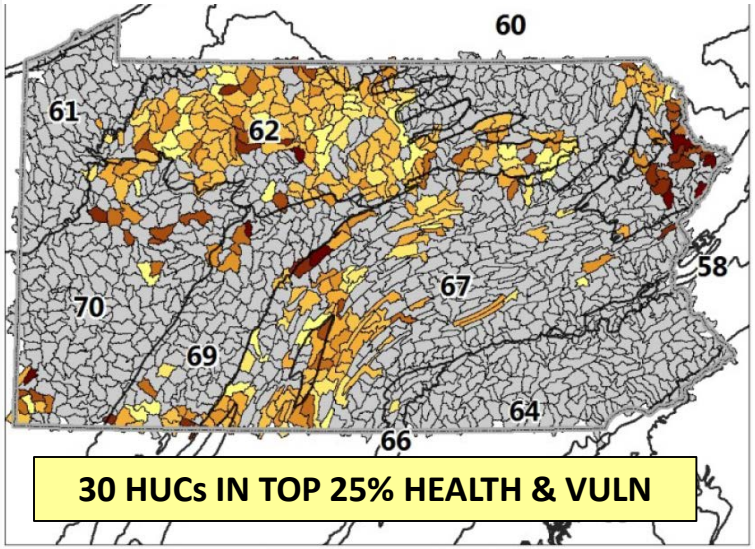
PA PHWA Selected Stats

How do Top Tier and 2nd Tier HUCs compare to the rest of the state, in terms of public benefits of healthy watersheds?

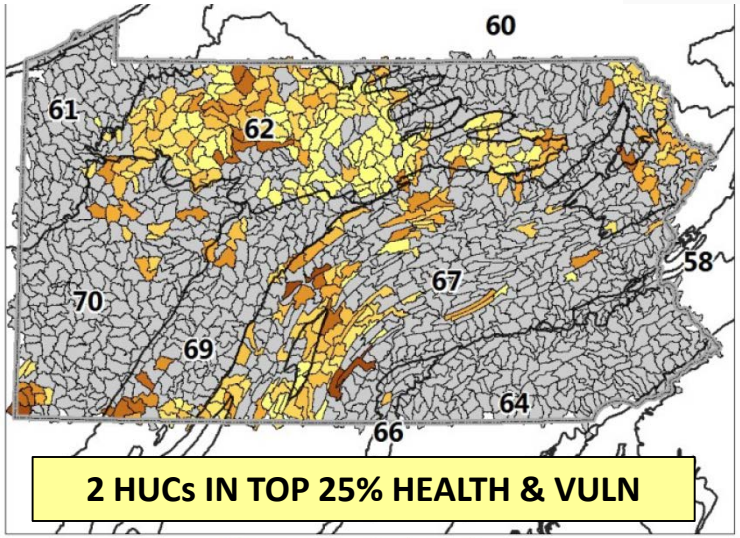


	State	2nd Tier	Top Tier
% of HUC12s with high quality fisheries DUs	44%	70%	78%
mean % of HUC12 area in State open lands	8%	18%	29%
% of HUC12s with any State Game Lands	5%	9%	10%
% of HUC12s with any National Forest Land	2%	9%	14%
% of HUC12s with >20% area in DW SPAs	40%	24%	19%

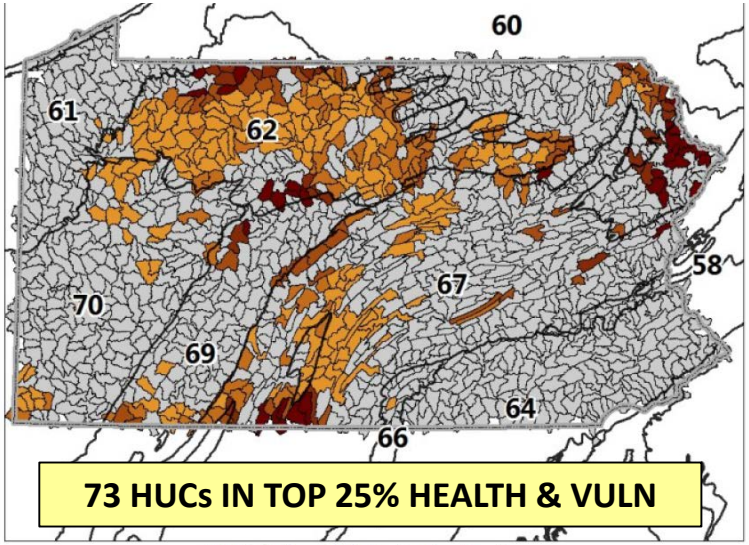
PA PHWA Vulnerability



Land Use Change Sub-Index



Water Use Sub-Index

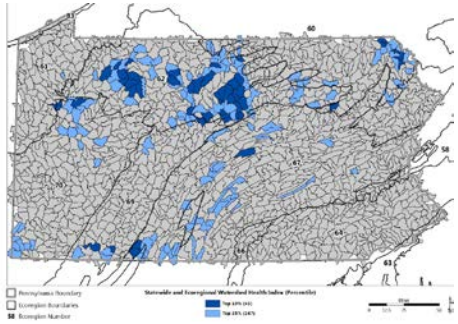


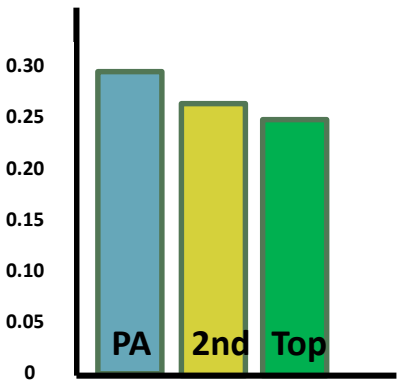
Wildfire Risk Sub-Index

2nd Tier n = 167

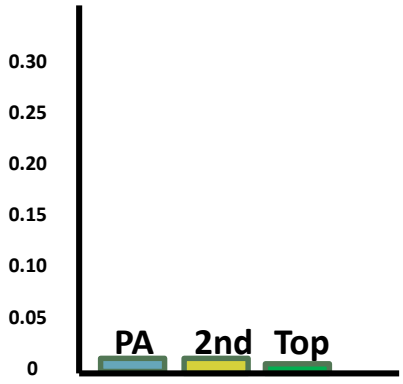
PA PHWA Selected Stats

How do Top Tier and 2nd Tier HUCs compare to the rest of the state, relative to PHWA Vulnerability scores?

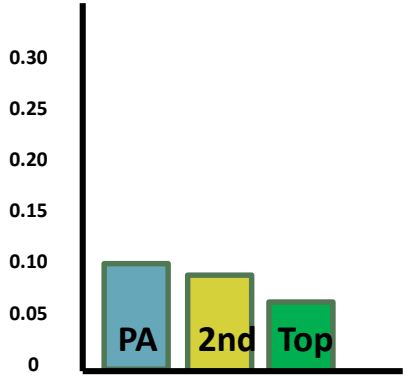




Land Use Change Vulnerability Sub-Index



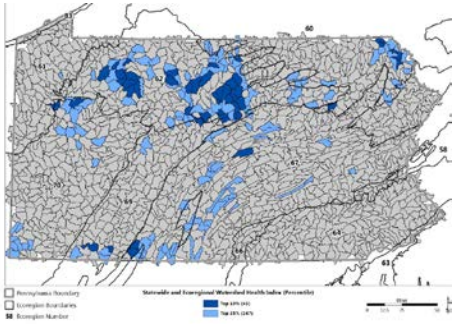
Water Use Vulnerability Sub-Index



Wildfire Risk Vulnerability Sub-Index

PA PHWA
Selected Stats

How do Top Tier and 2nd Tier HUCs compare to the rest of the state, relative to other stressor metrics?

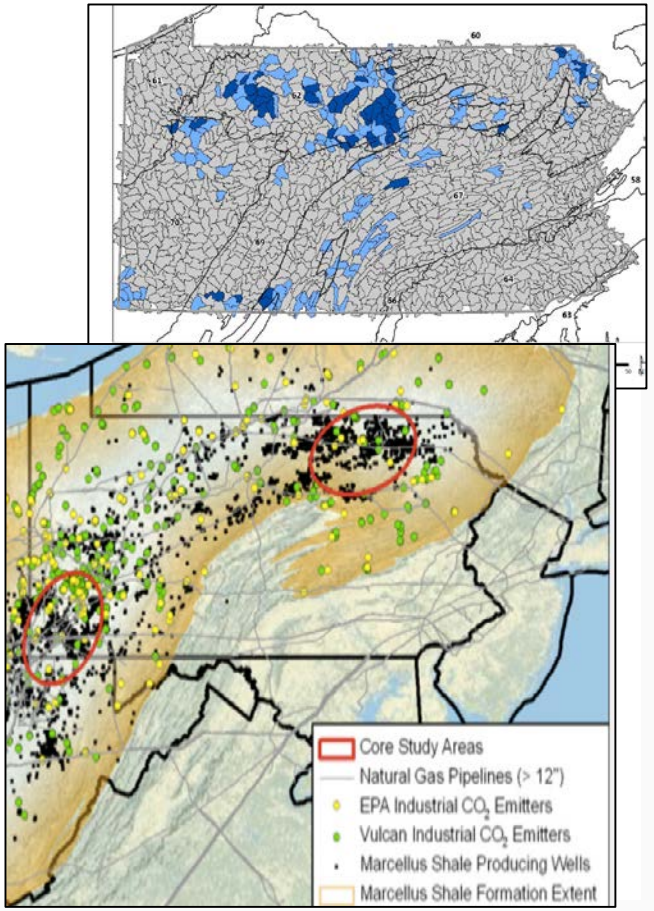


	State	2nd Tier	Top Tier
% HUC12s > State mean for Pasture Slope	50%	60%	58%
% HUC12s > State mean for Cropland in Riparian Zone	33%	6%	0%
% HUC12s > State mean for Cropland on Steep Slopes	31%	12%	3%
% HUC12s > State mean for Agr Change	26%	32%	21%

Vulnerability Assessment was data-limited nationally… what might it have missed?

- Emerging changes in industrial water use demand (e.g., fracking)
- Invasive species
- Abandoned mine drainage
- Aerial deposition of pollutants
- Extreme drought/storm effects
- Future changes in rangeland and timberland practices

state data can enhance/improve PHWA



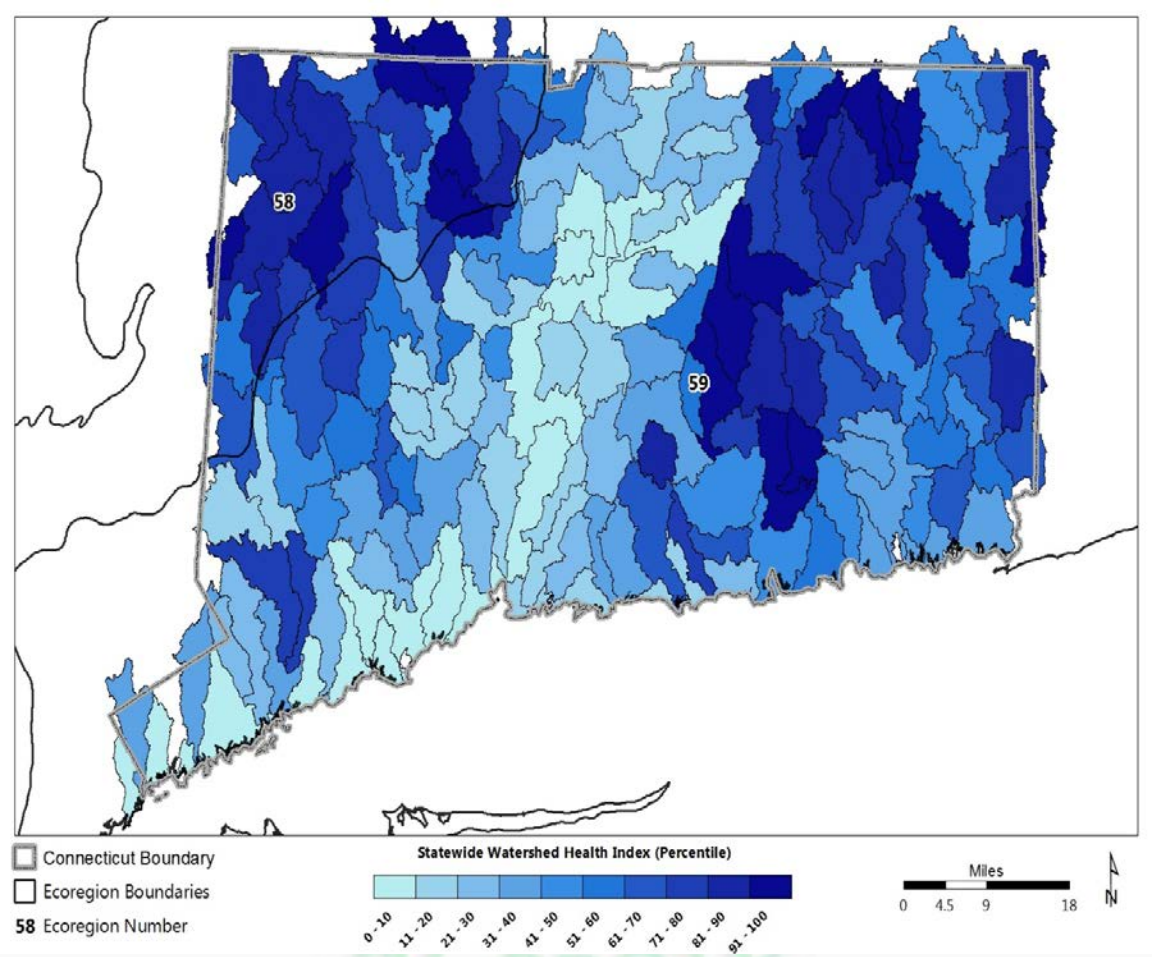
What's YOUR State Look Like?

A lightning round view
of relative watershed health
in the 48 conterminous states

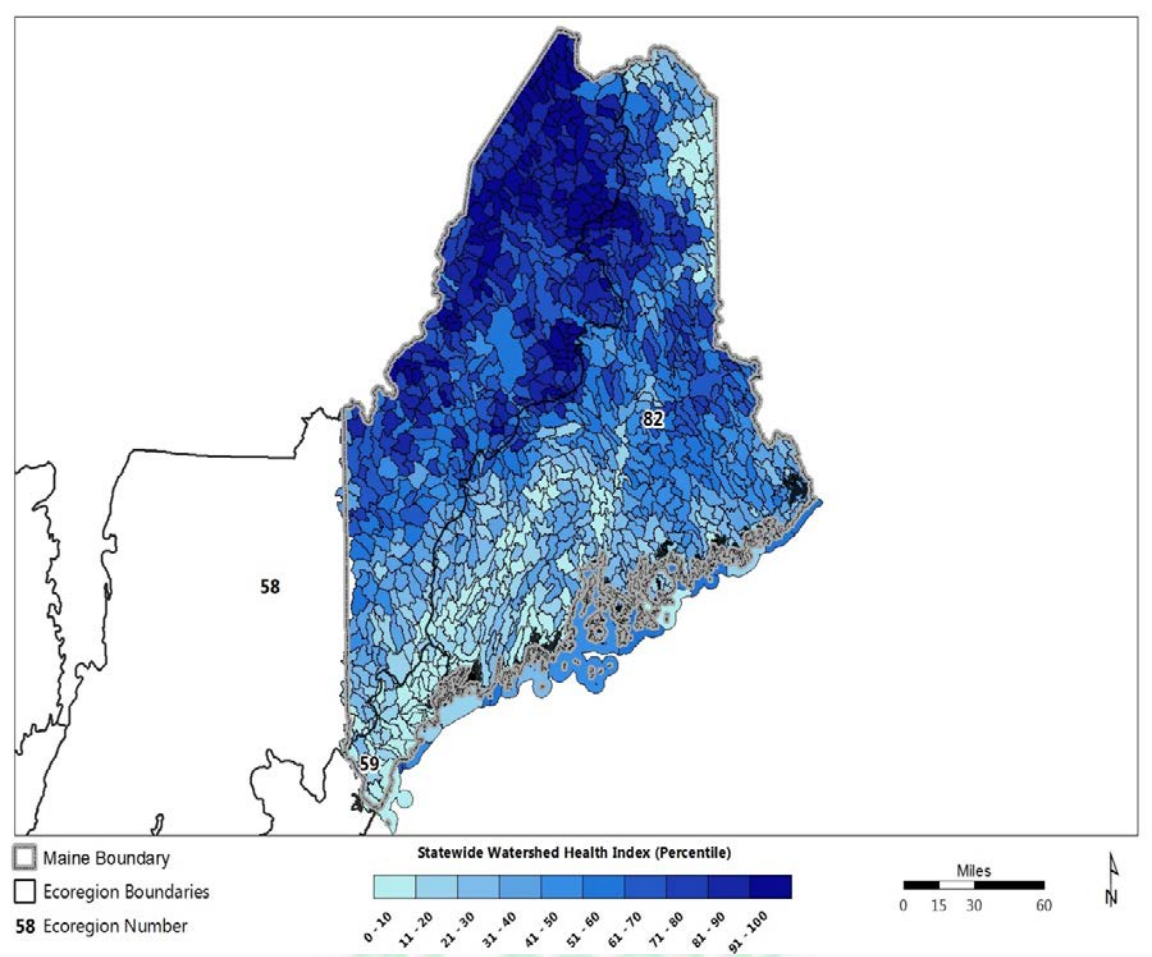
PHWA STATE MAPS BY EPA REGION

REGION 1

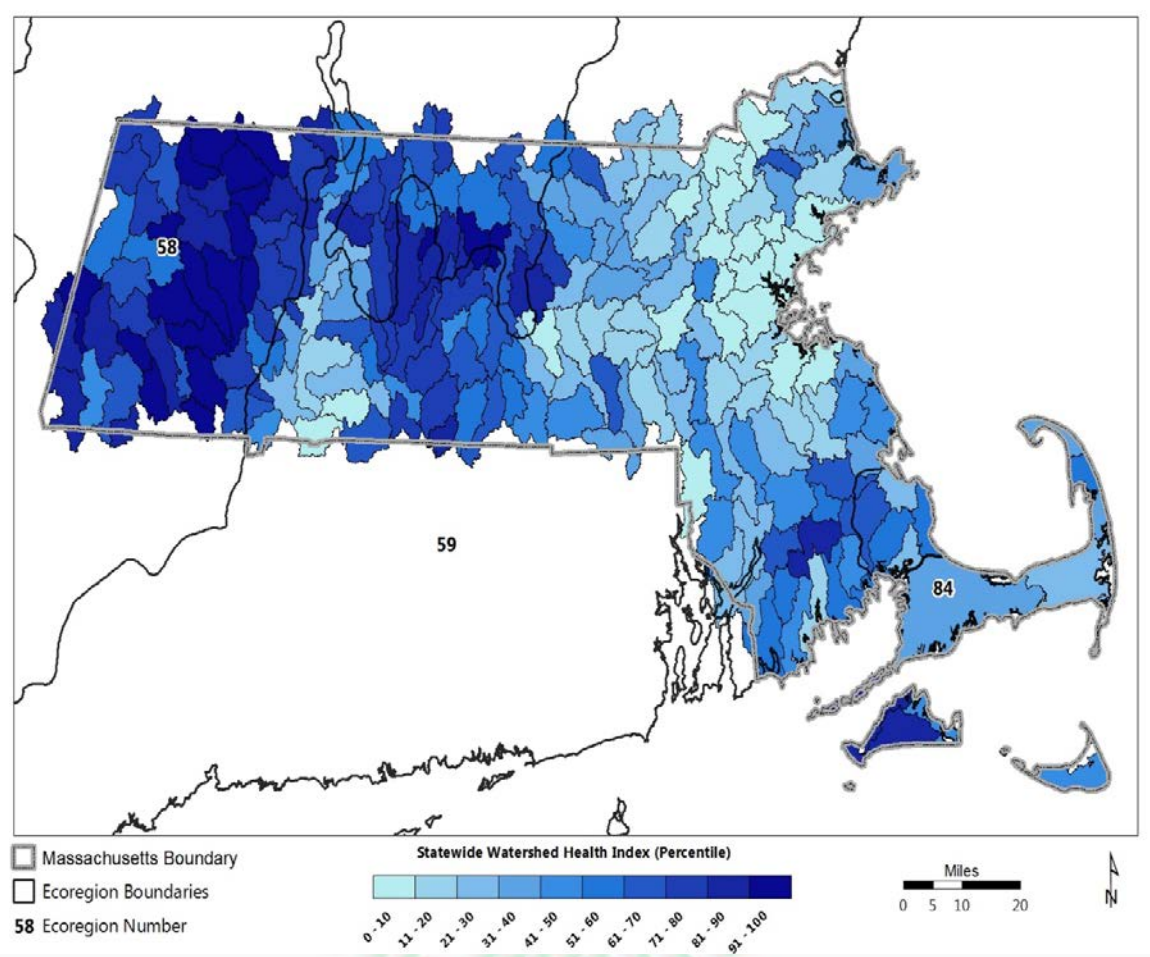
CONNECTICUT



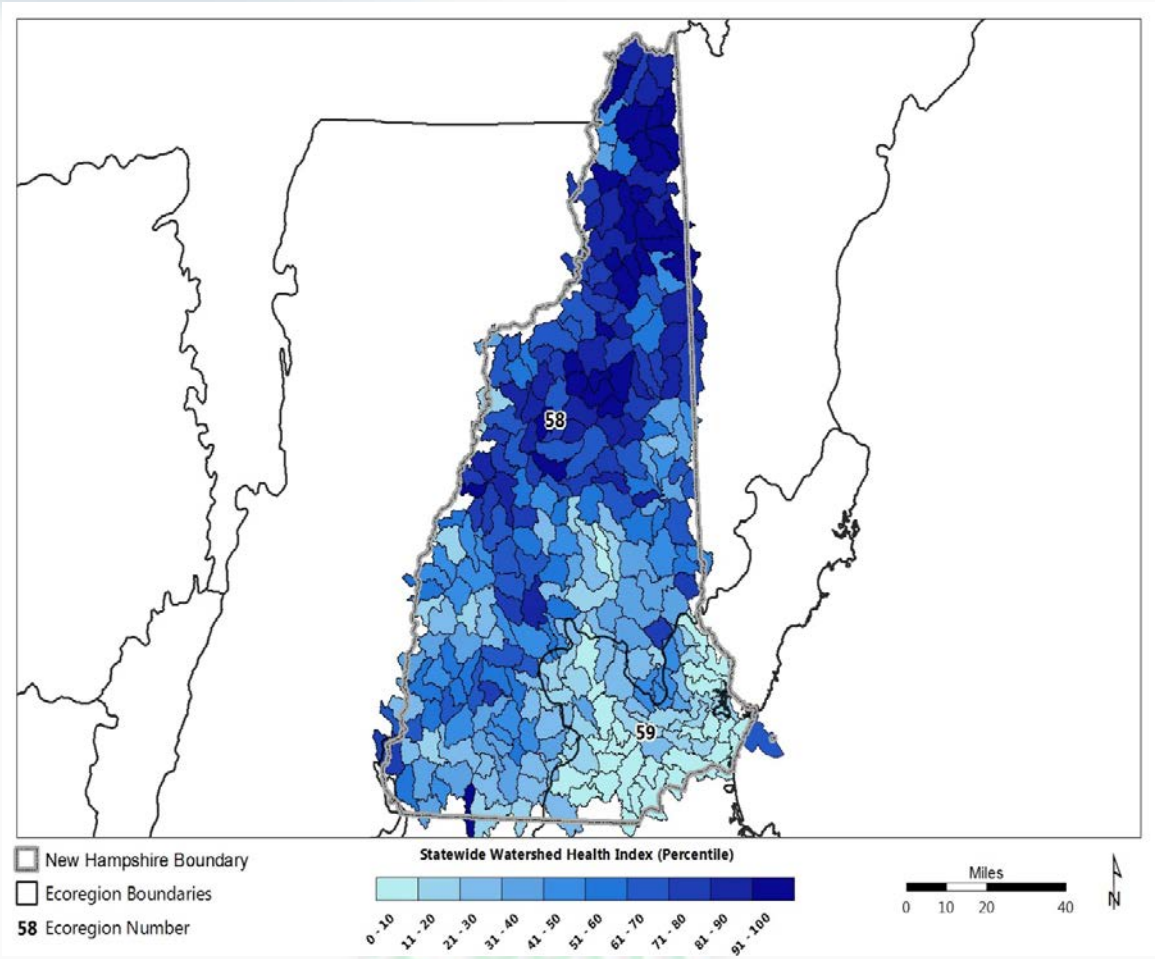
MAINE


82
58
59
Maine Boundary
Ecoregion Boundaries
58 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

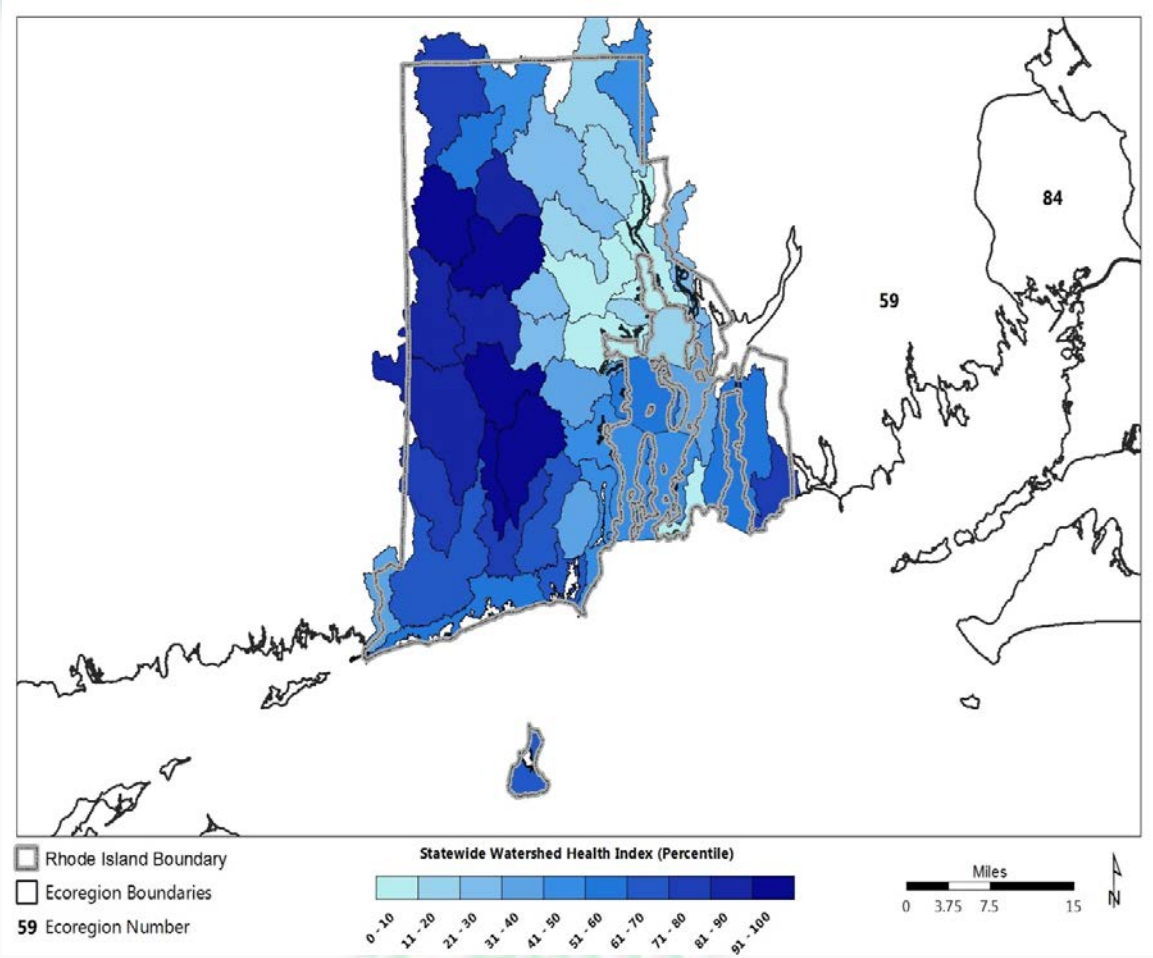
MASSACHUSETTS



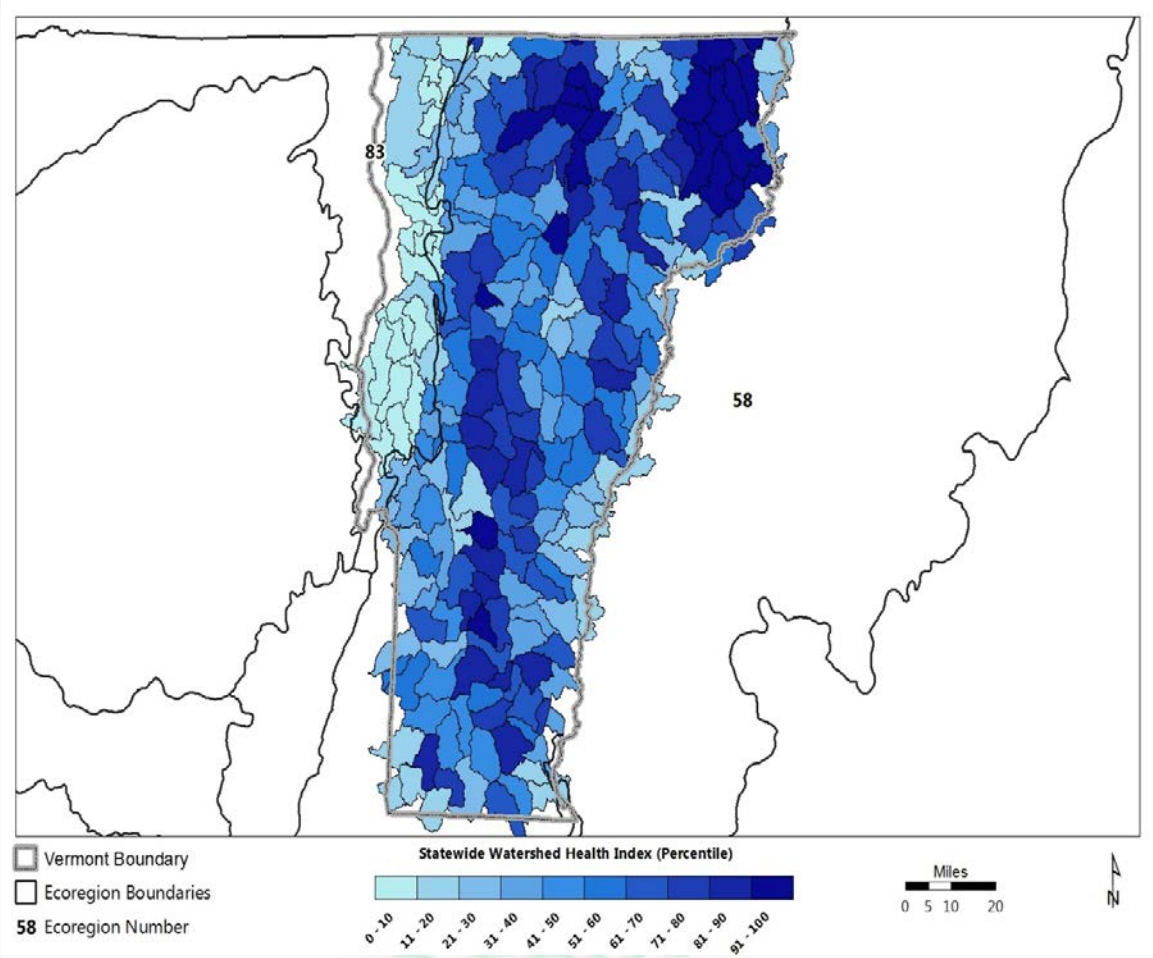
NEW HAMPSHIRE



RHODE ISLAND



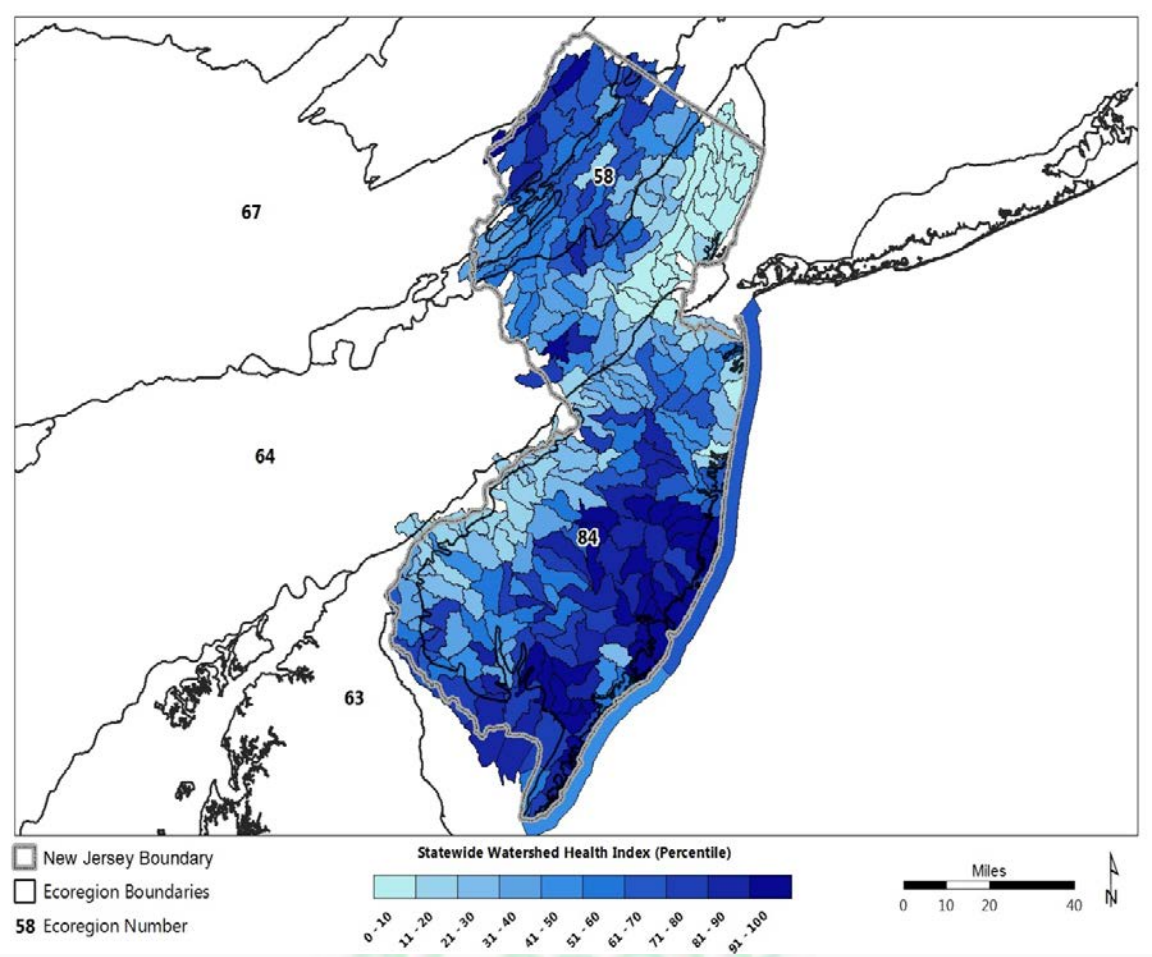
VERMONT


83
58
Vermont Boundary
Ecoregion Boundaries
58 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 5 10 20
N

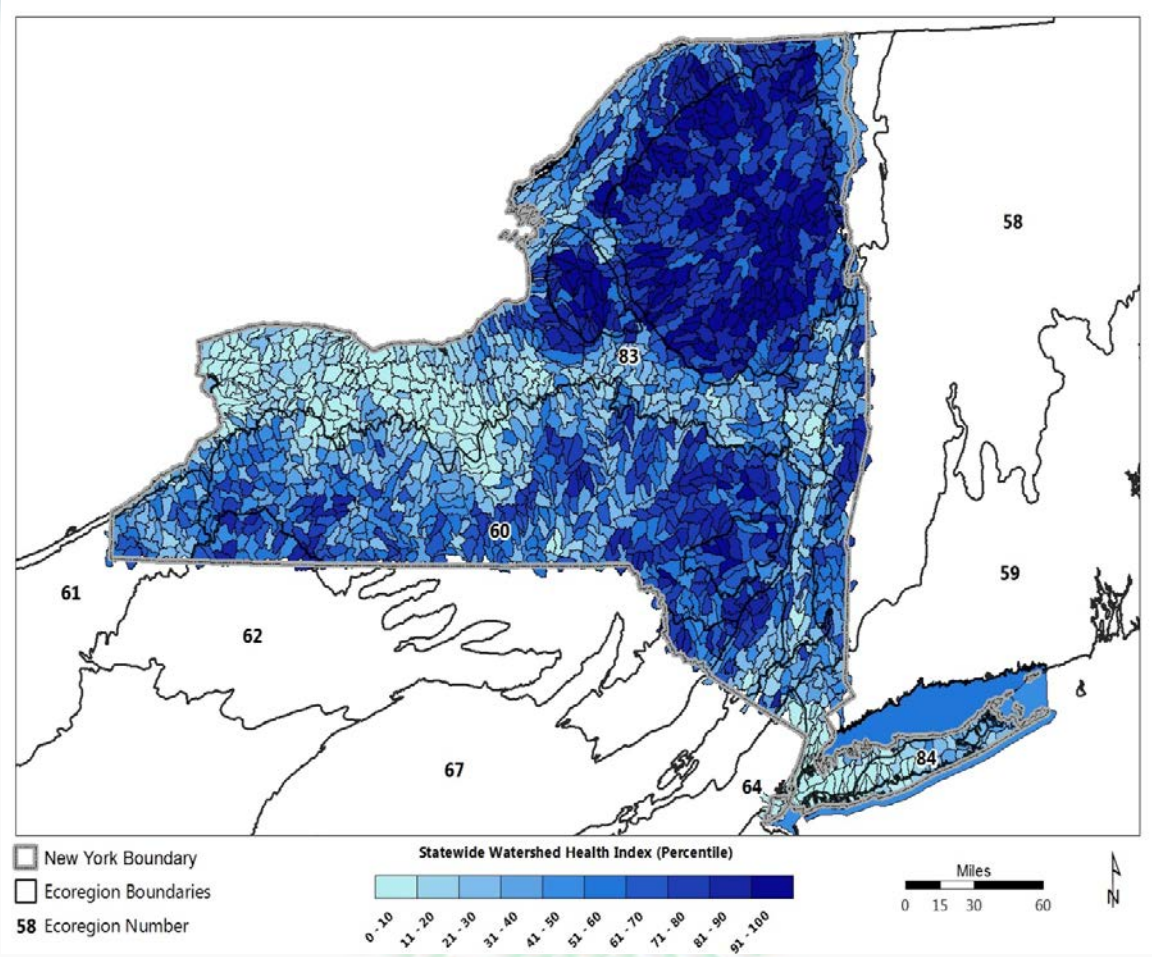
PHWA STATE MAPS BY EPA REGION

REGION 2

NEW JERSEY


67
58
64
84
63
New Jersey Boundary
Ecoregion Boundaries
58 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 10 20 40
N

NEW YORK

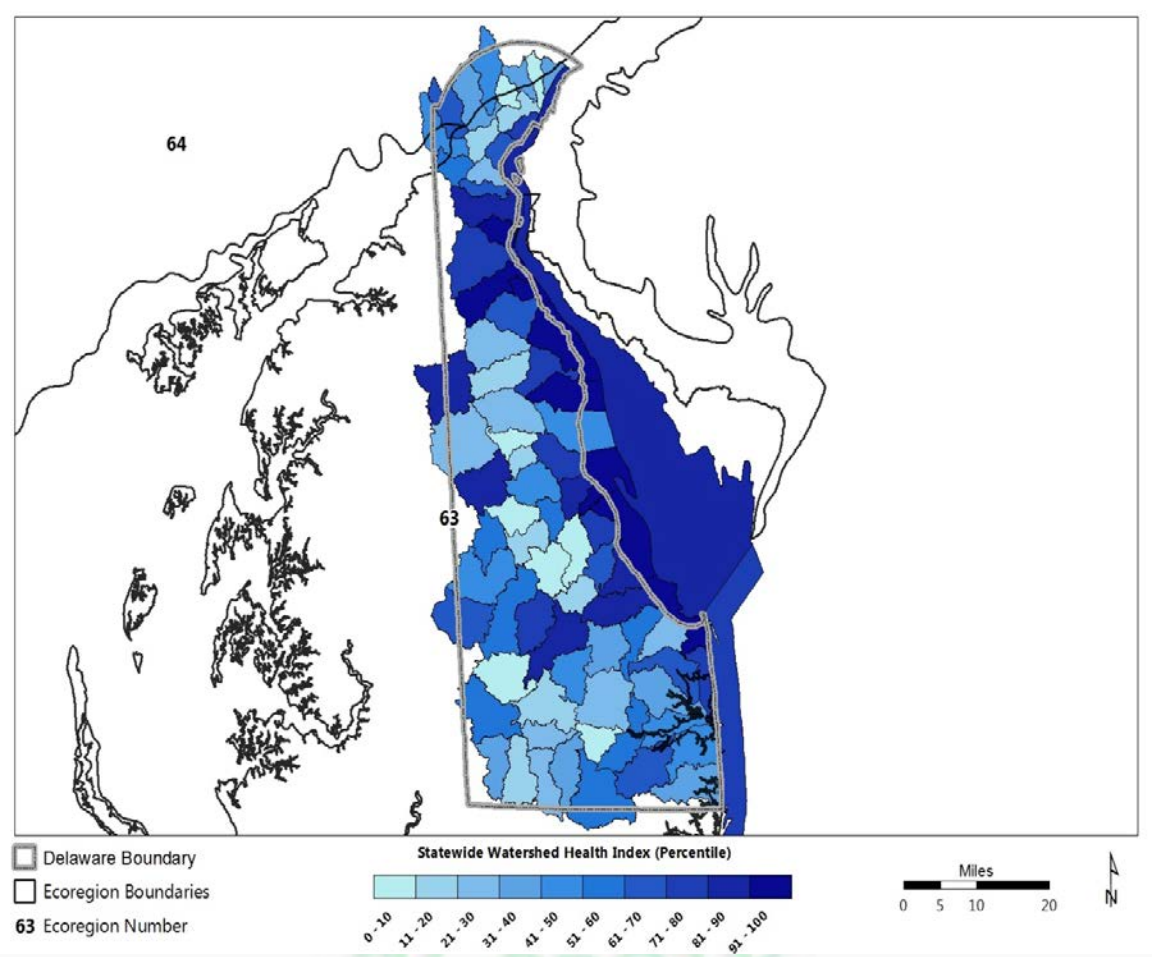

58
83
60
61
62
59
67
64
84
New York Boundary
Ecoregion Boundaries
58 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

PUERTO RICO, US VIRGIN ISLANDS (TBD)

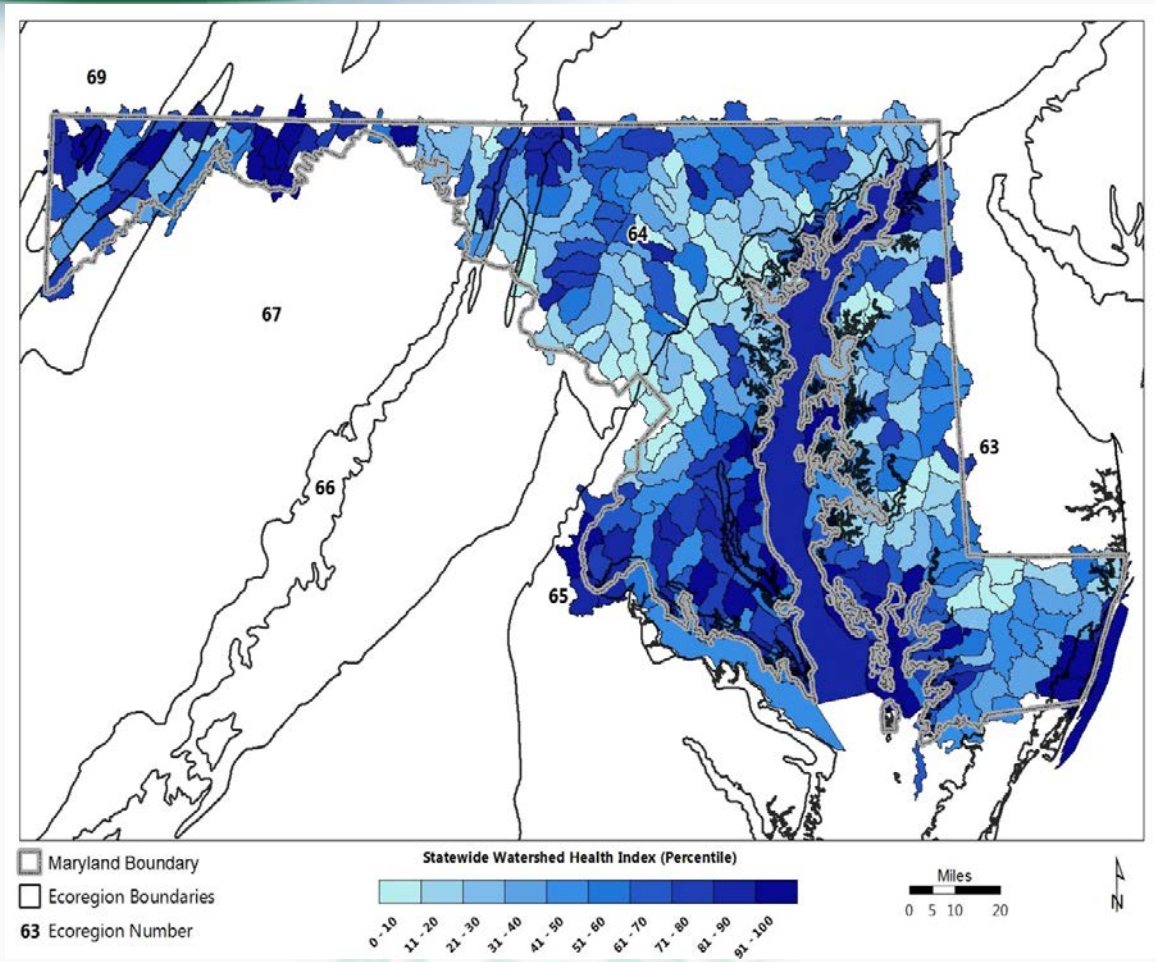
PHWA STATE MAPS BY EPA REGION

REGION 3

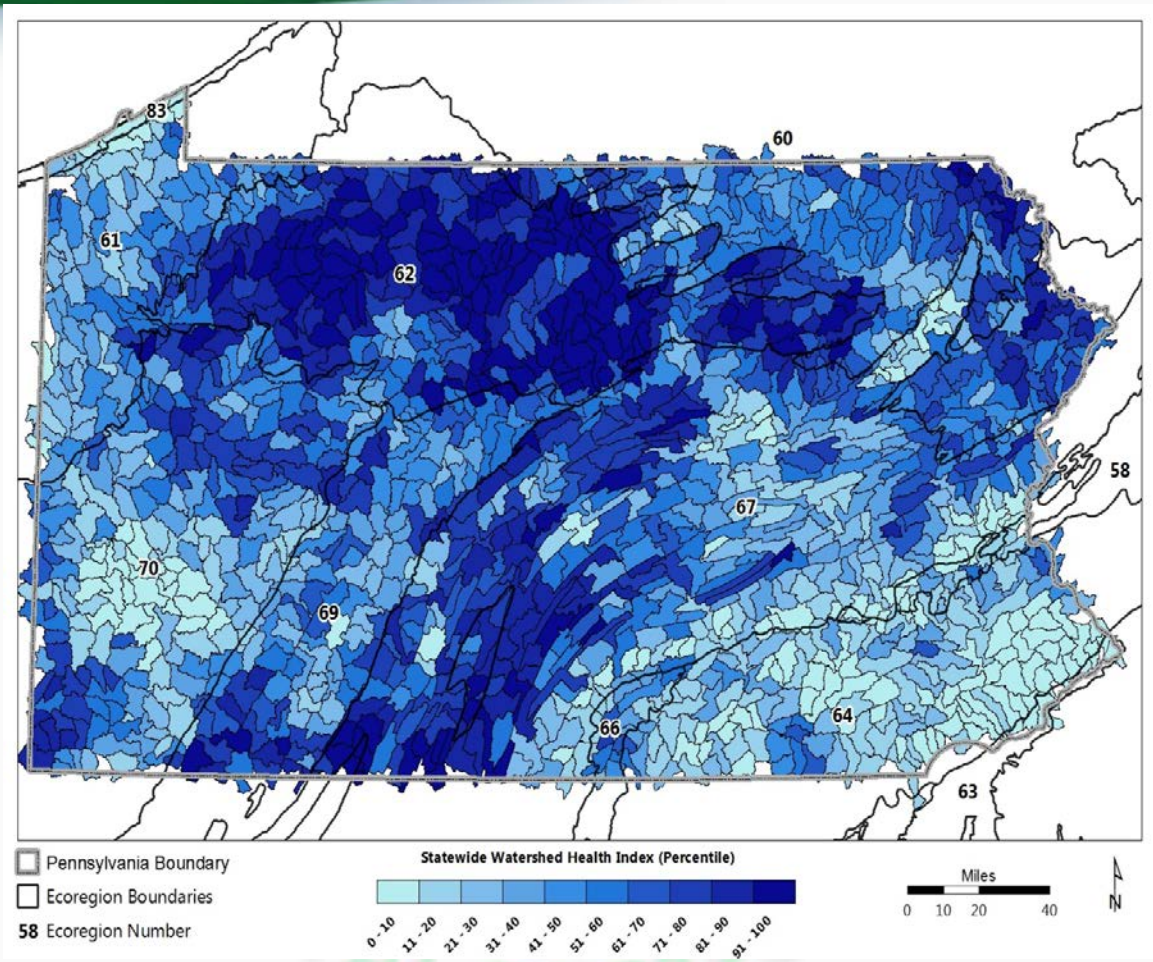
DELAWARE


64
63
Delaware Boundary
Ecoregion Boundaries
63 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 5 10 20
N

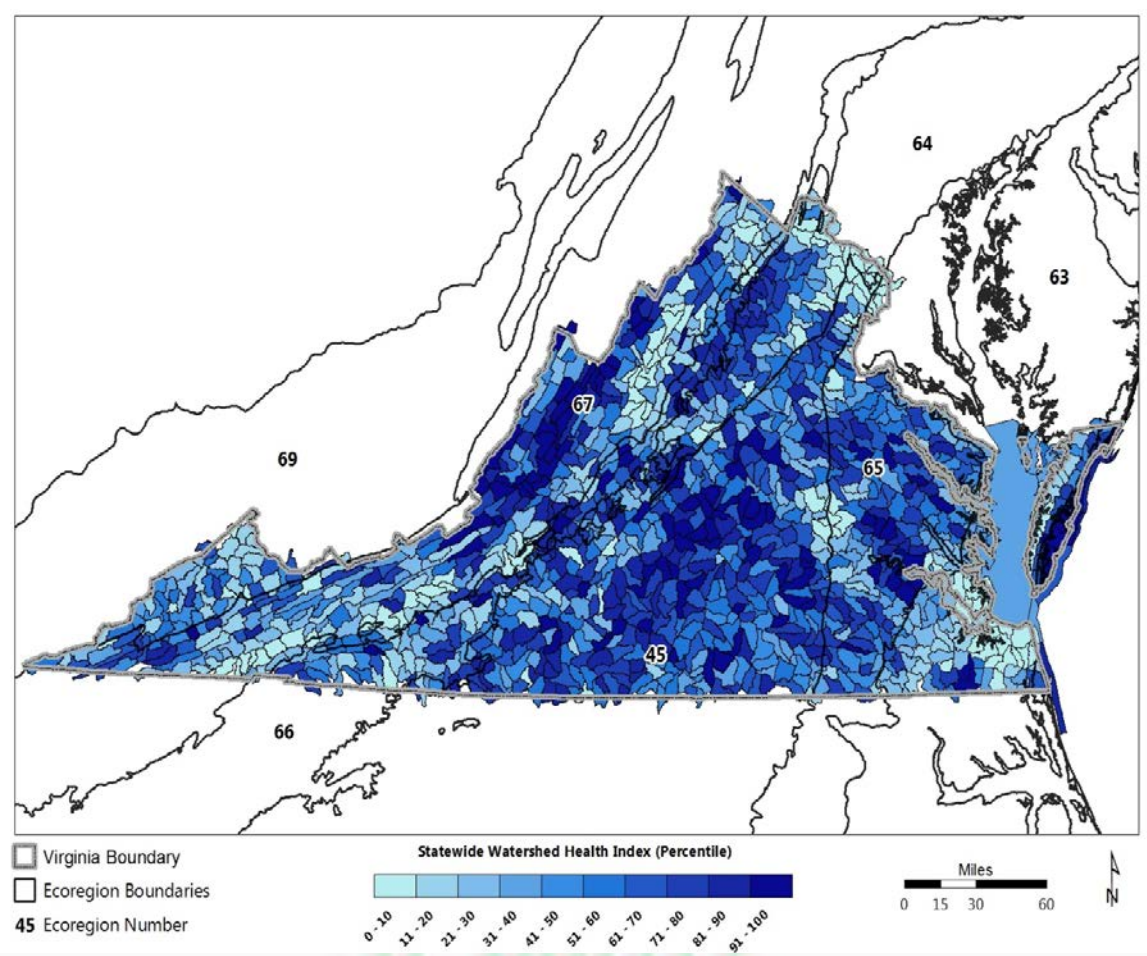
MARYLAND


69
64
67
63
66
65
Maryland Boundary
Ecoregion Boundaries
63 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 5 10 20
N

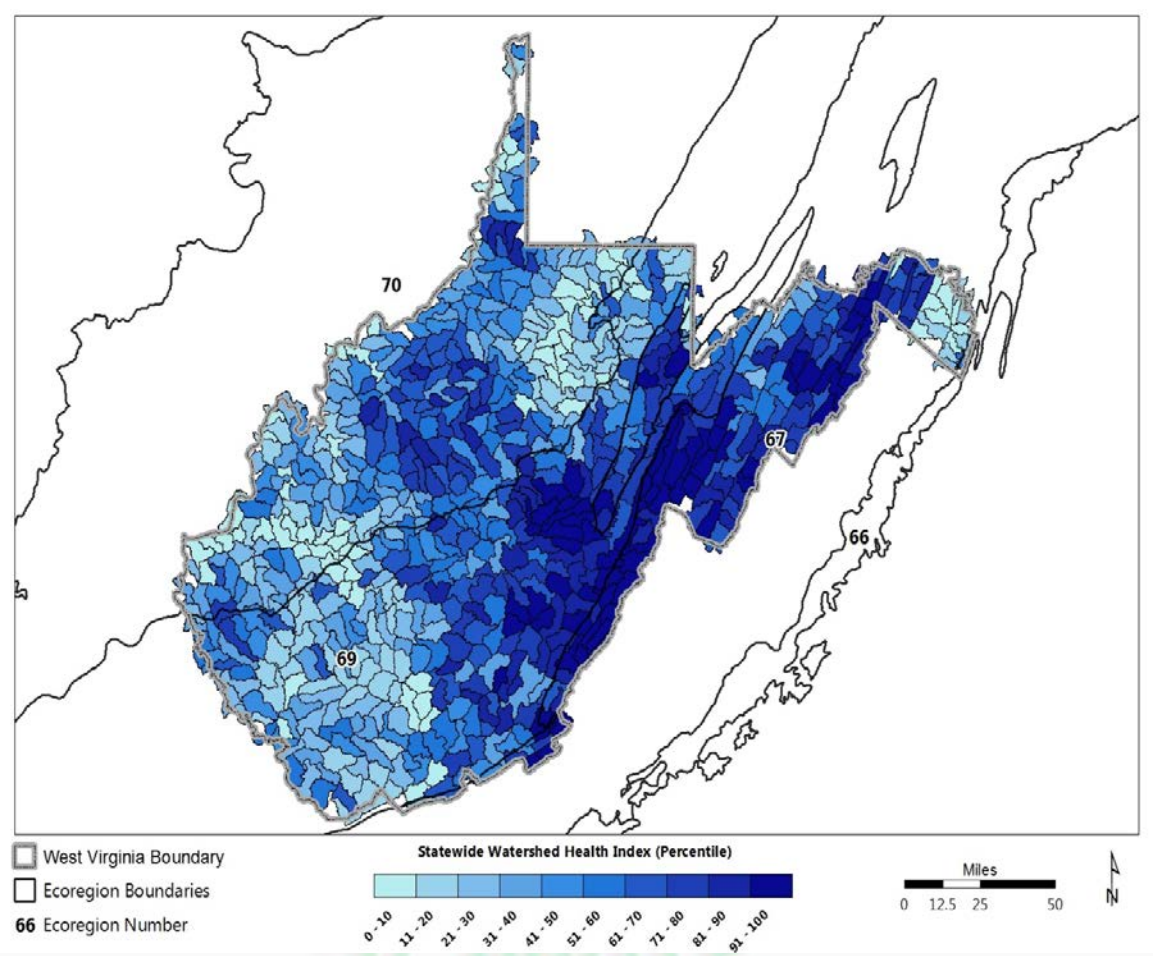
PENNSYLVANIA



VIRGINIA


64
63
67
69
65
45
66
Virginia Boundary
Ecoregion Boundaries
45 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

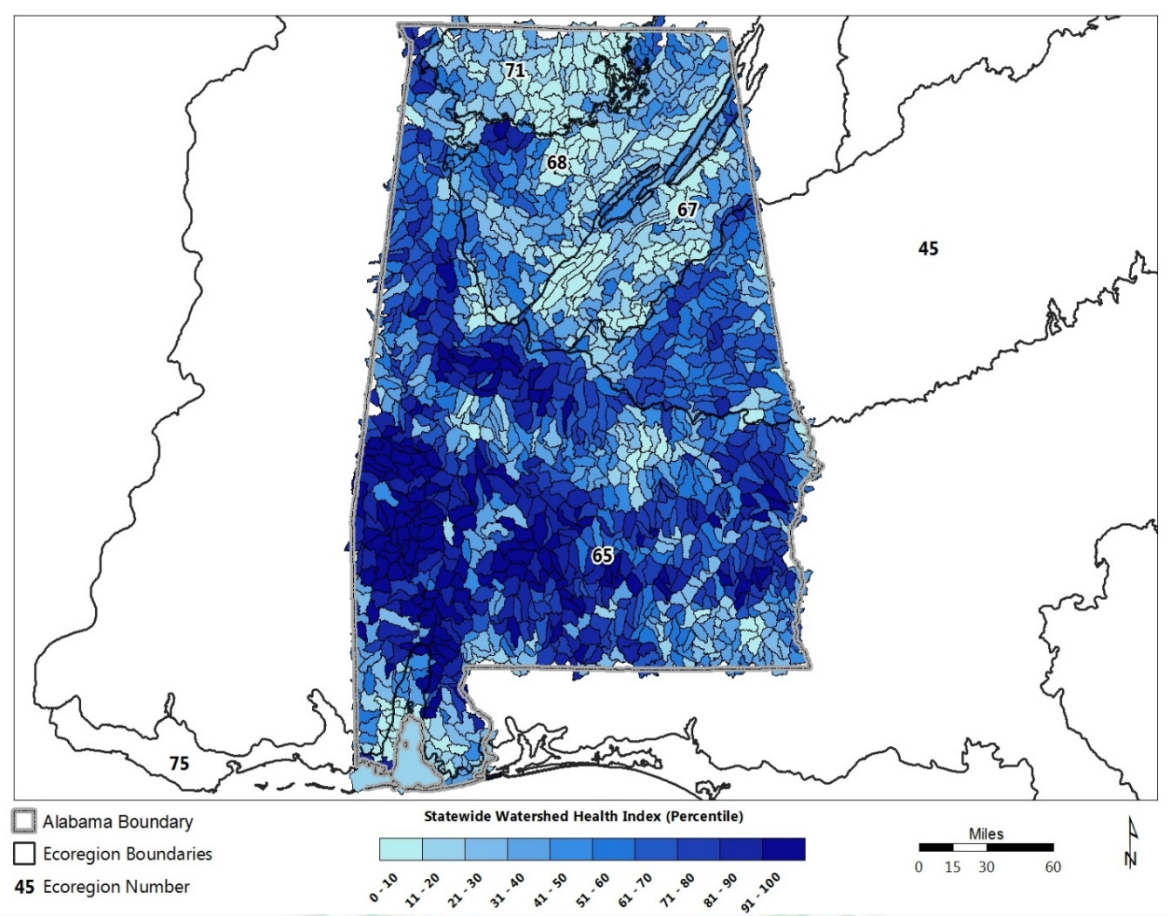
WEST VIRGINIA



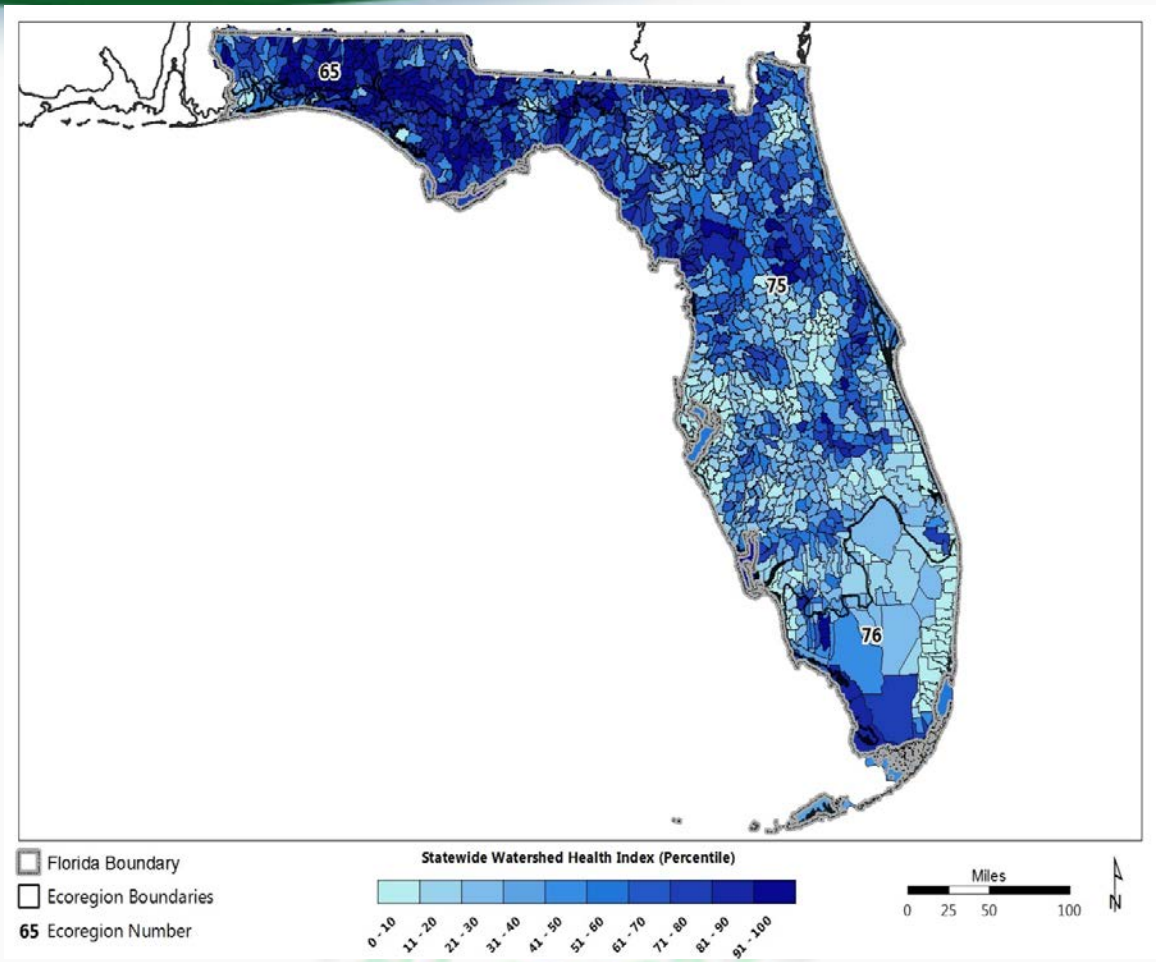
PHWA STATE MAPS BY EPA REGION

REGION 4

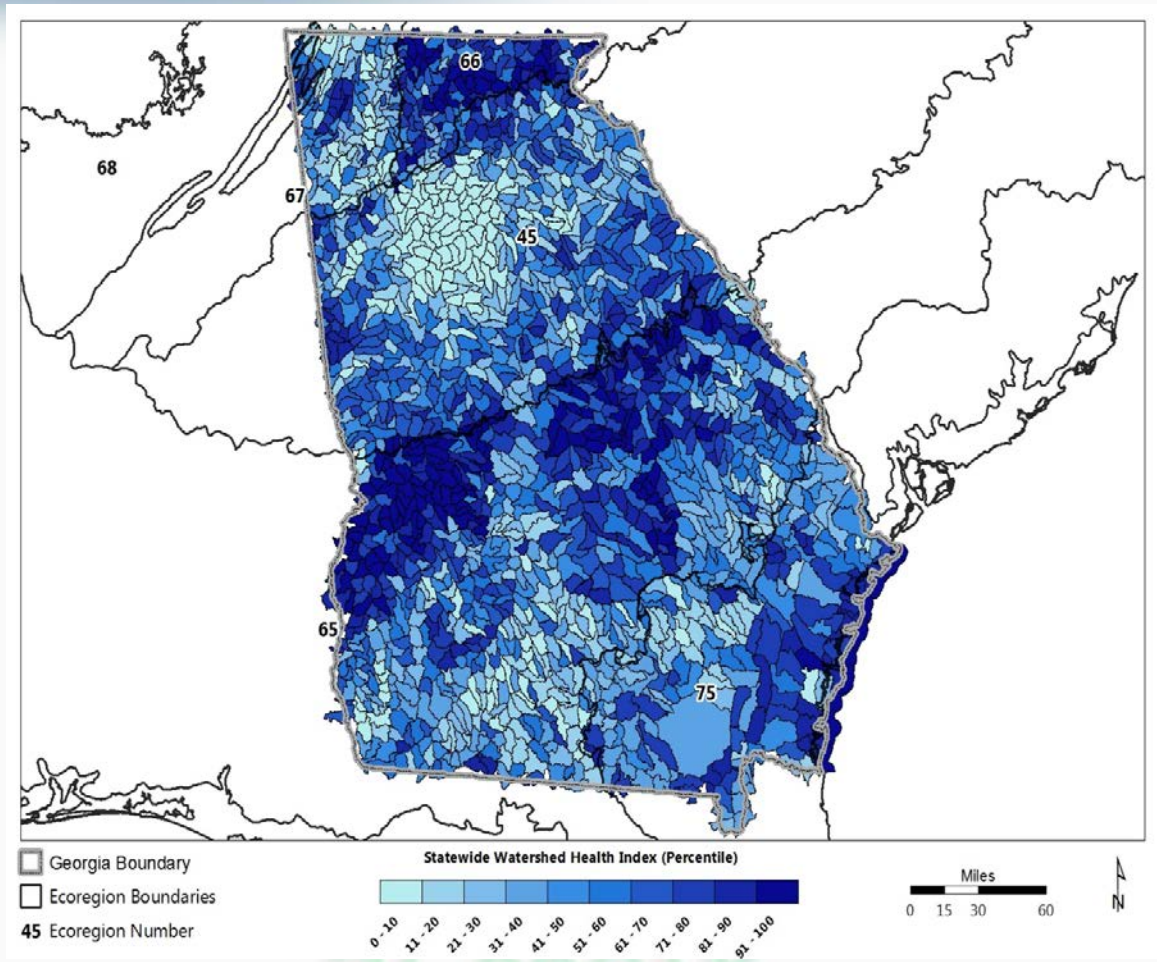
ALABAMA


71
68
67
45
65
75
Alabama Boundary
Ecoregion Boundaries
45 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

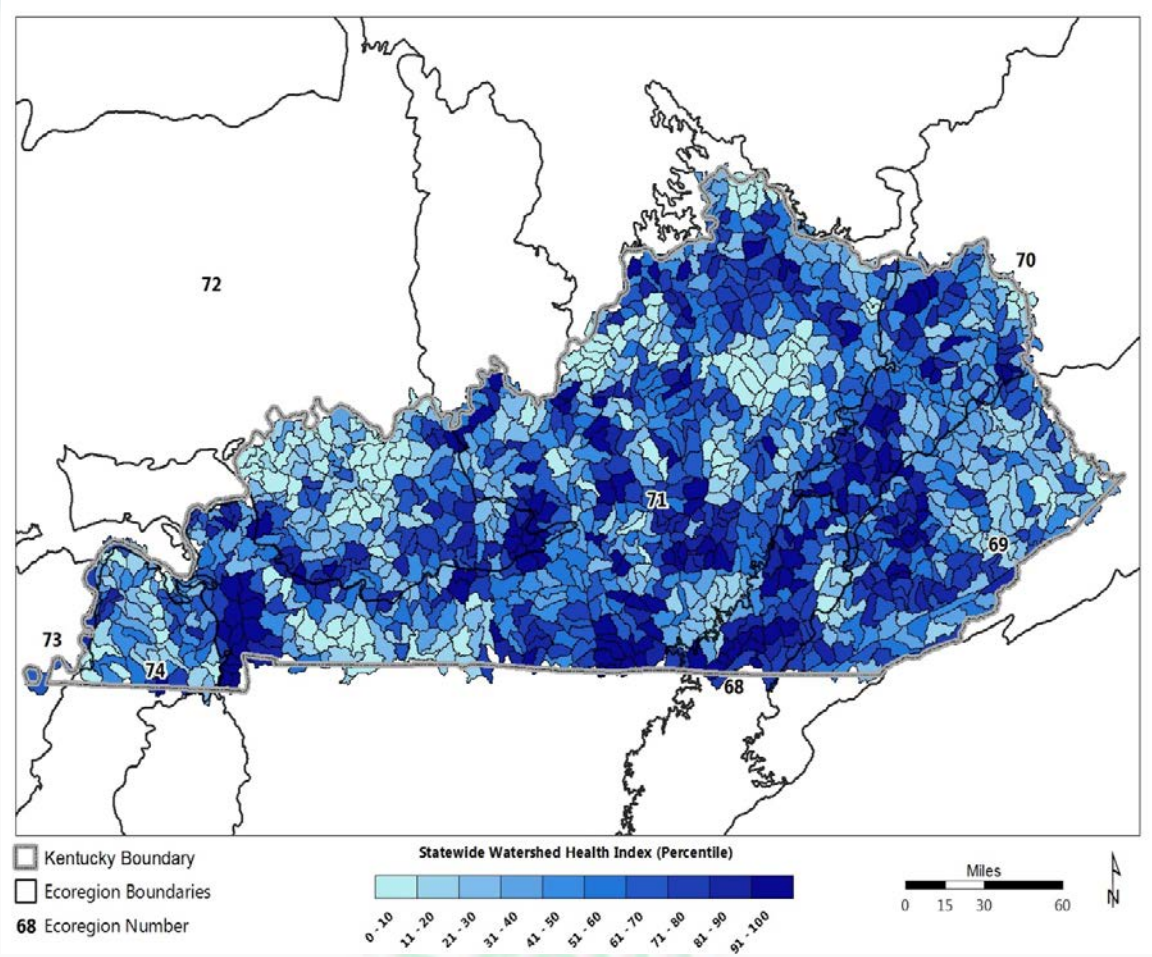
FLORIDA


65
75
76
Florida Boundary
Ecoregion Boundaries
65 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 25 50 100
N

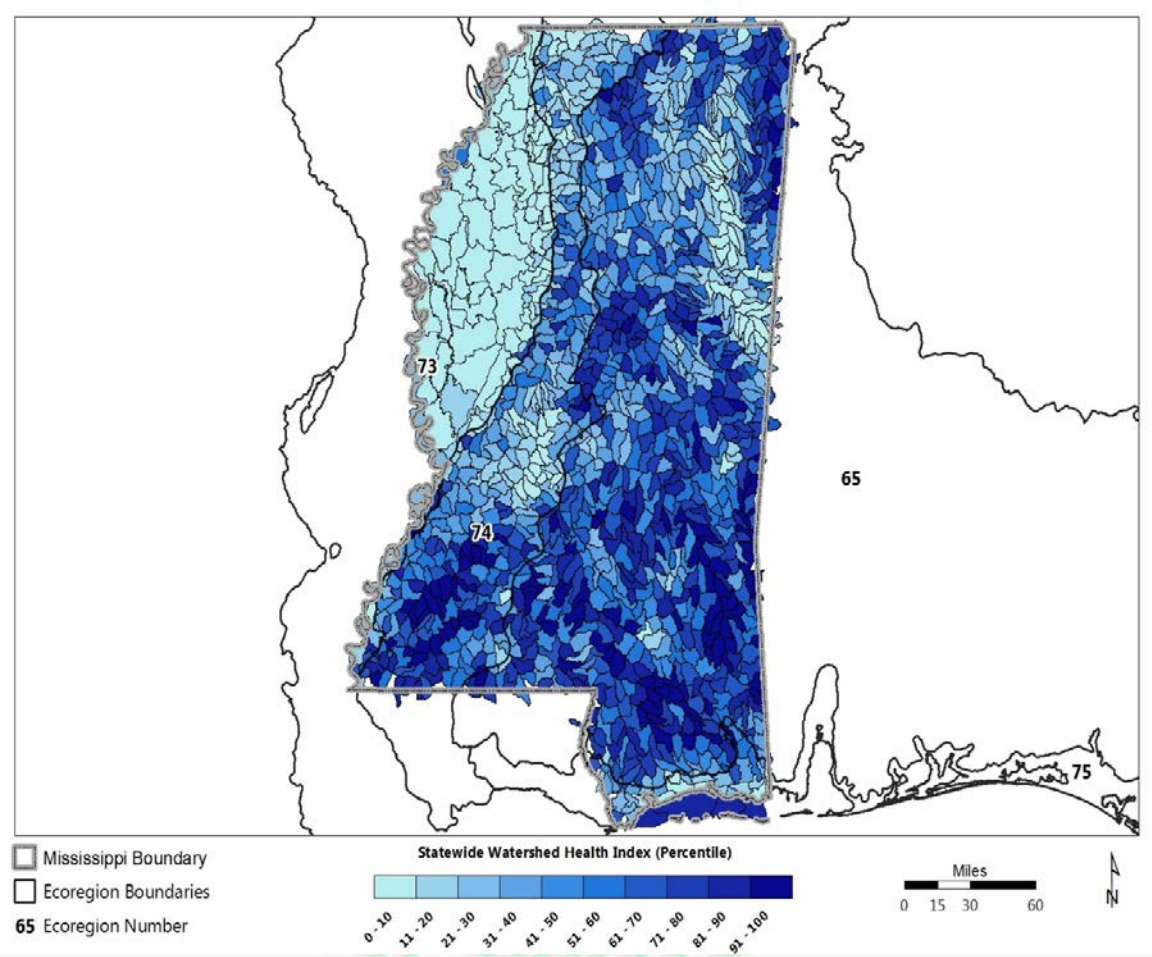
GEORGIA


66
68
67
45
65
75
Georgia Boundary
Ecoregion Boundaries
45 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

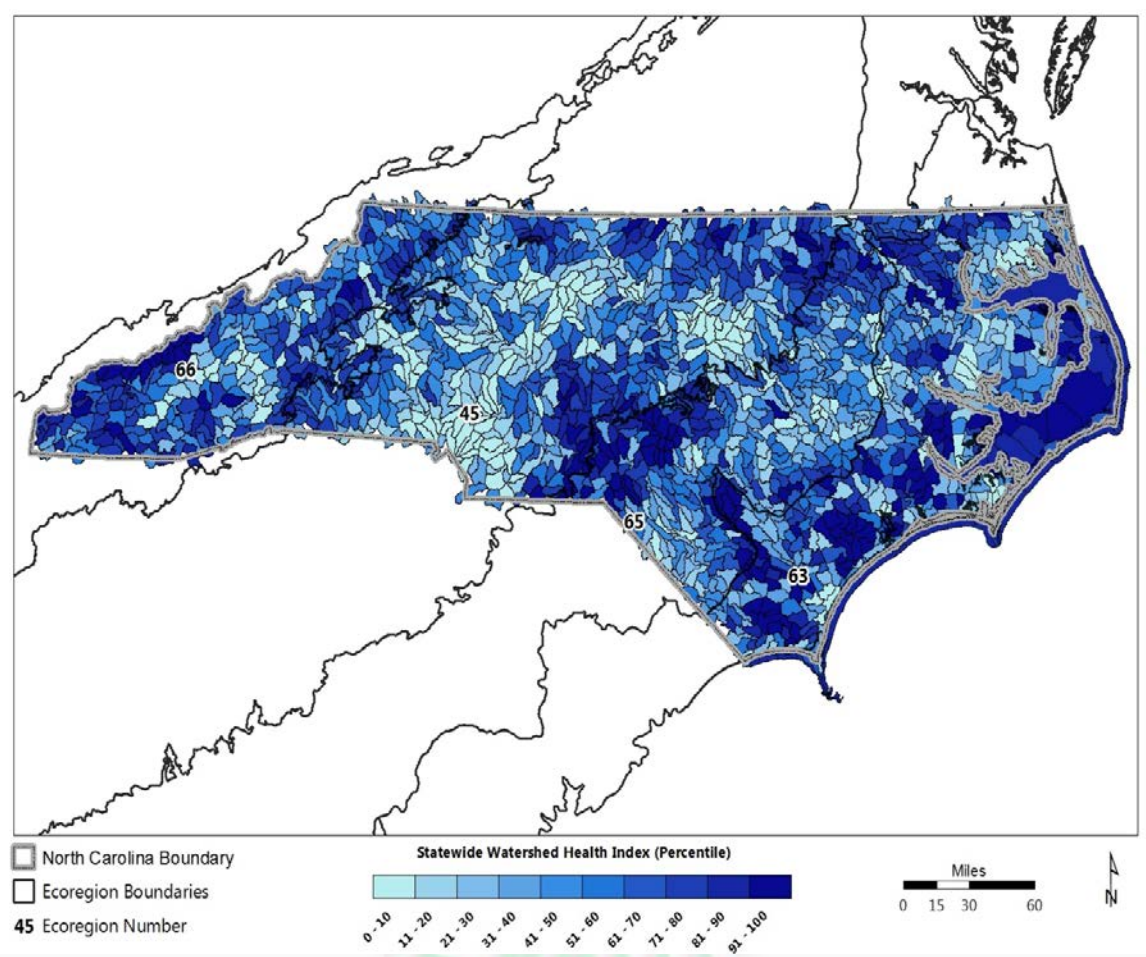
KENTUCKY


72
70
71
69
73
74
68
Kentucky Boundary
Ecoregion Boundaries
68 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

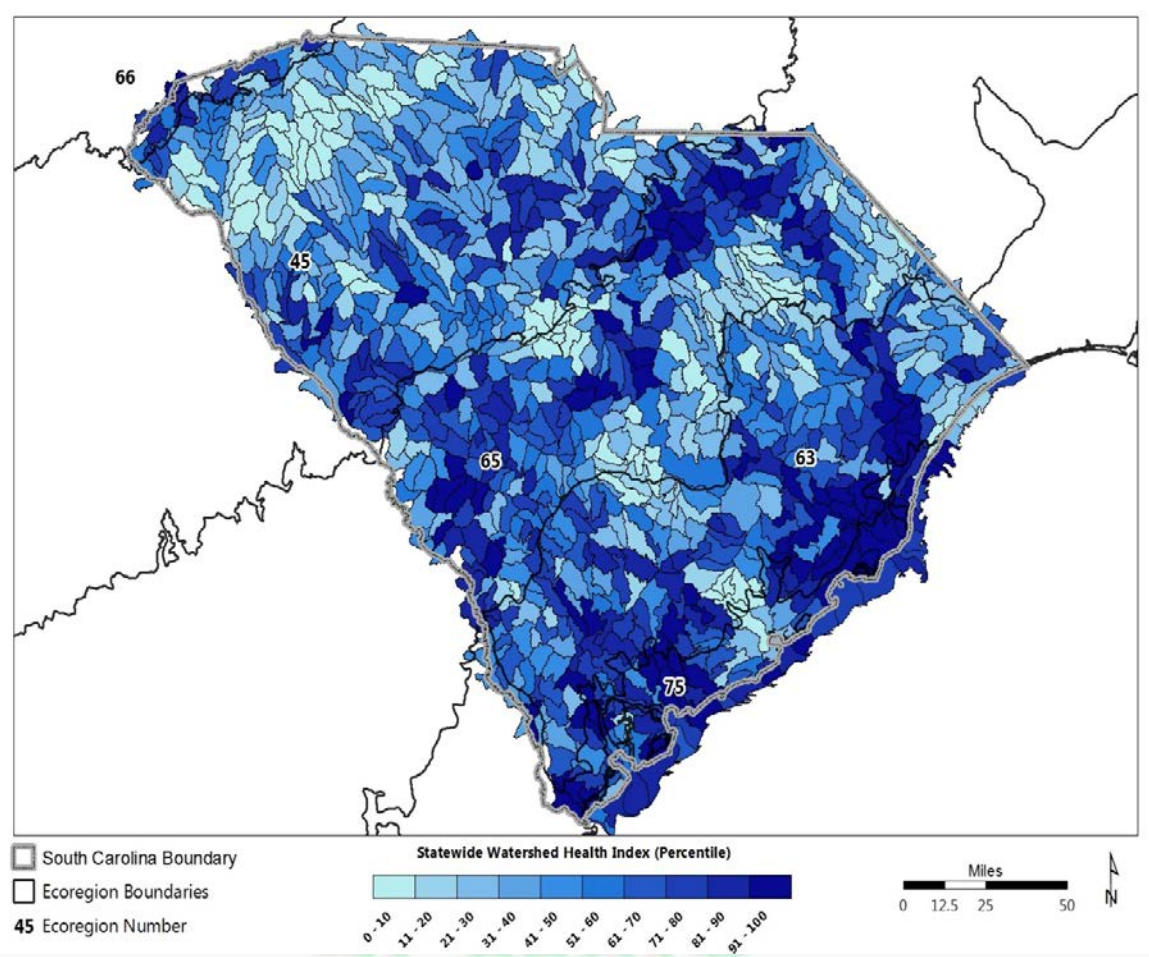
MISSISSIPPI



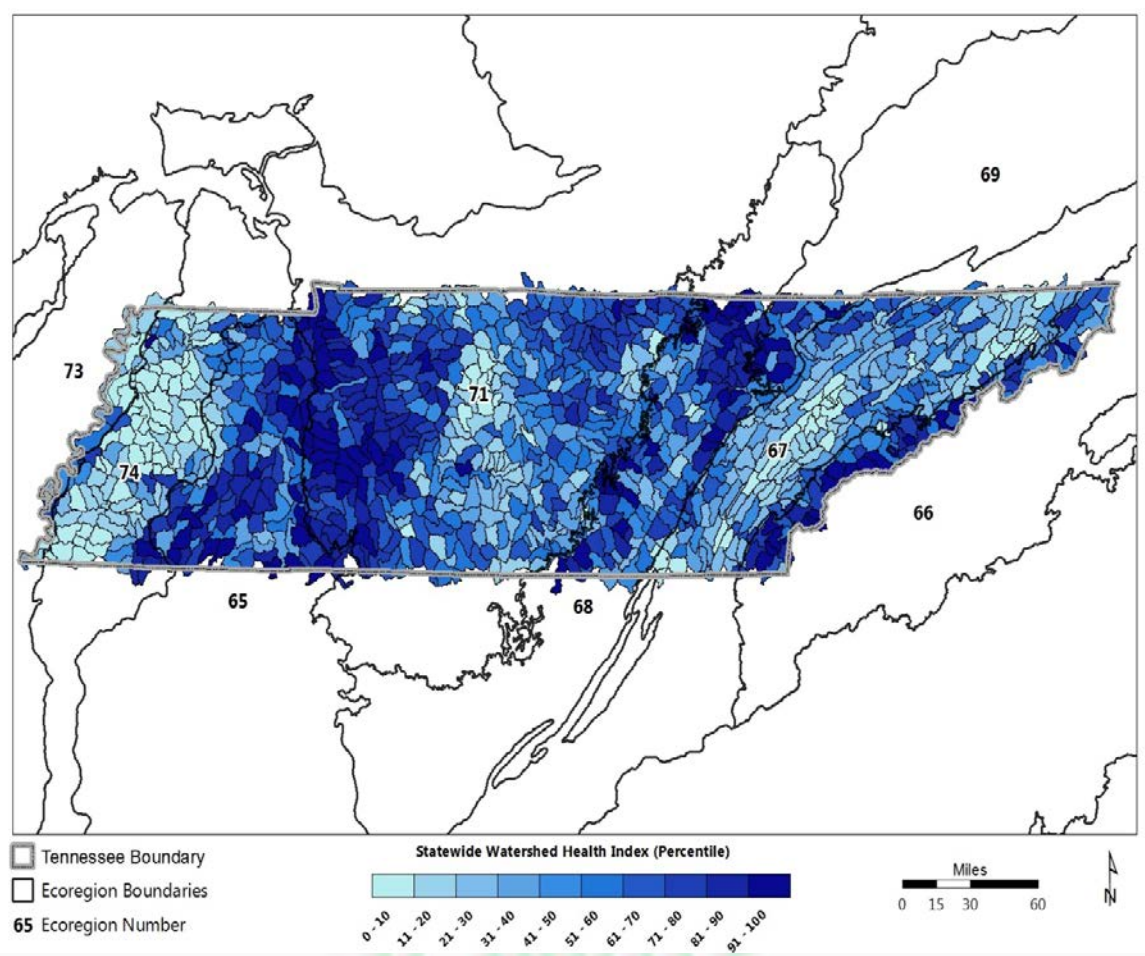
NORTH CAROLINA



SOUTH CAROLINA



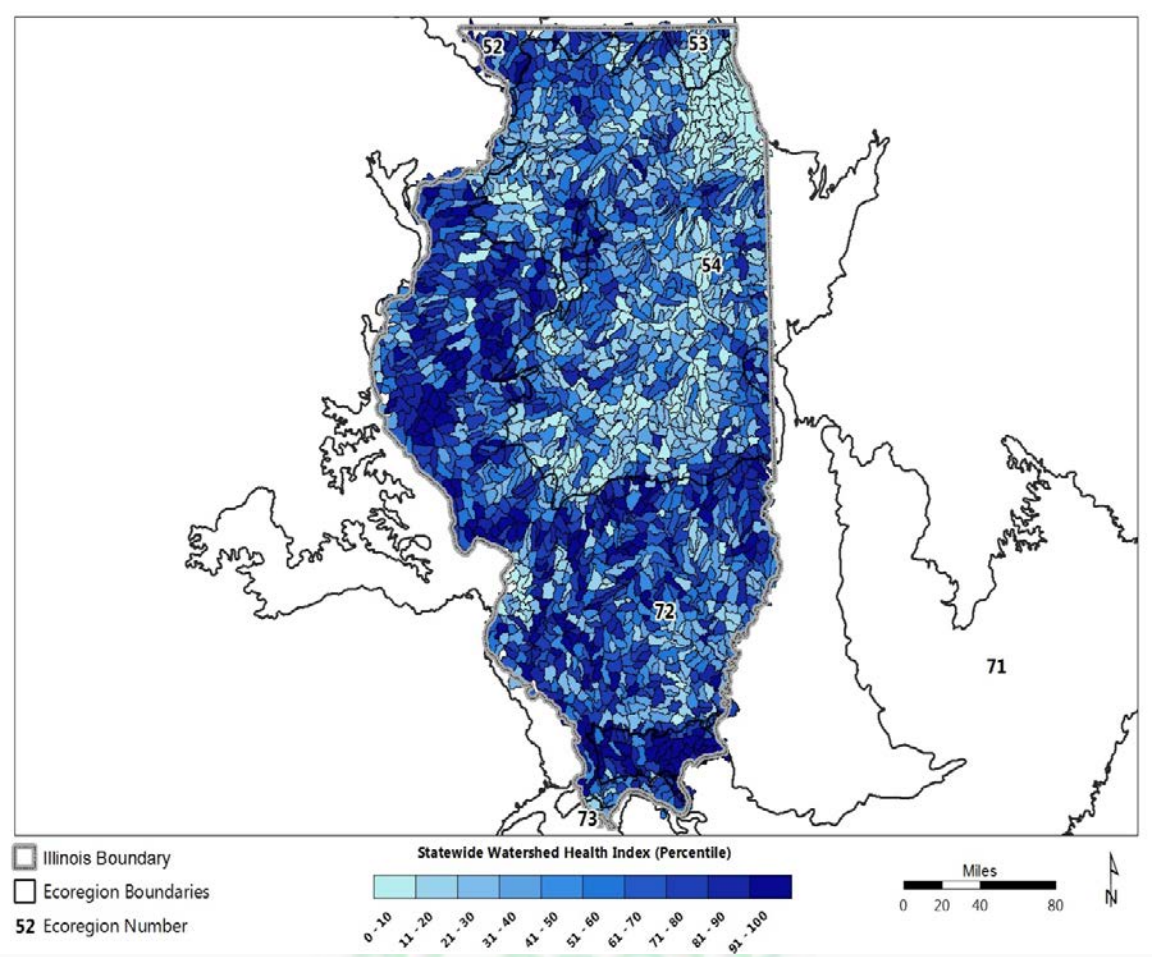
TENNESSEE


69
73
71
67
74
66
65
68
Tennessee Boundary
Ecoregion Boundaries
65 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

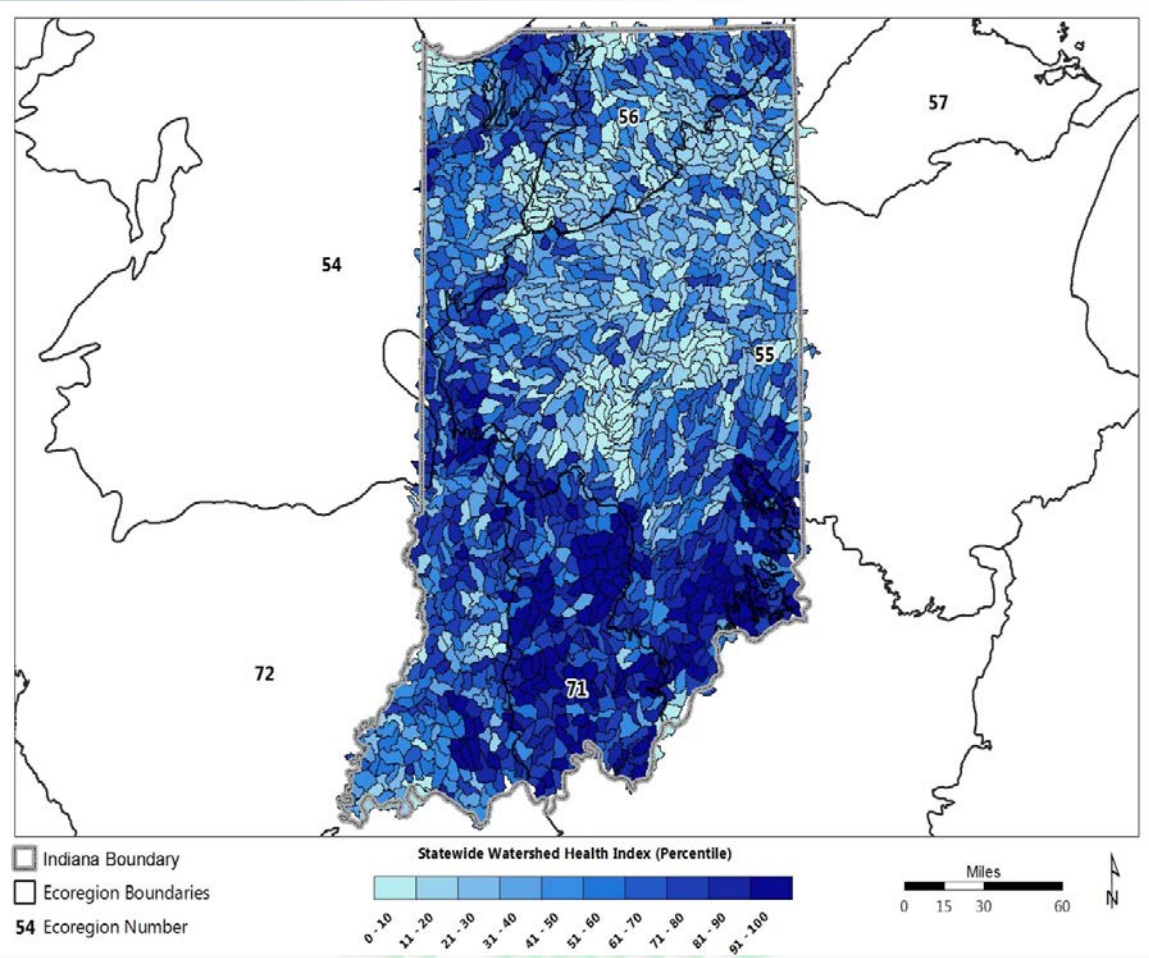
PHWA STATE MAPS BY EPA REGION

REGION 5

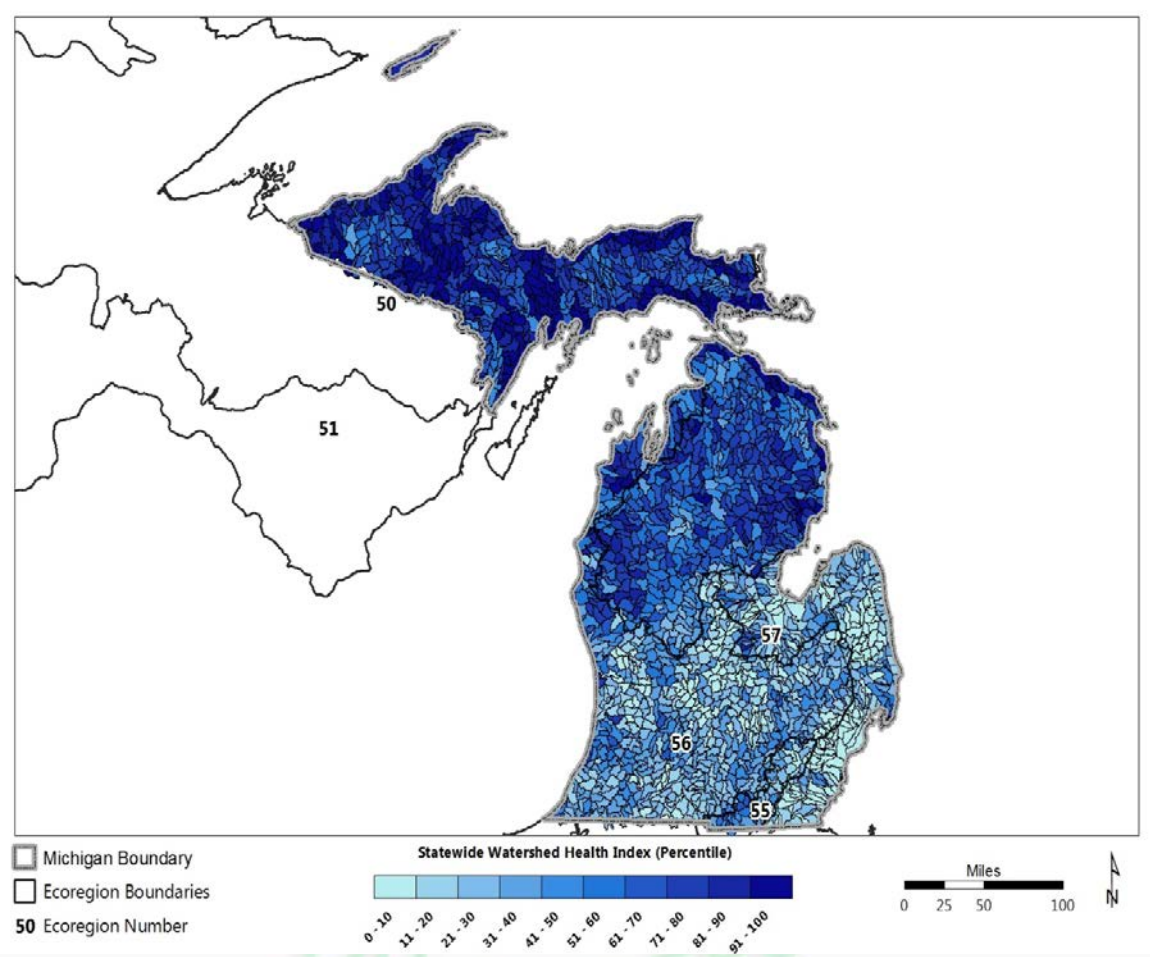
ILLINOIS


52
53
54
72
71
73
Illinois Boundary
Ecoregion Boundaries
52 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 20 40 80
N

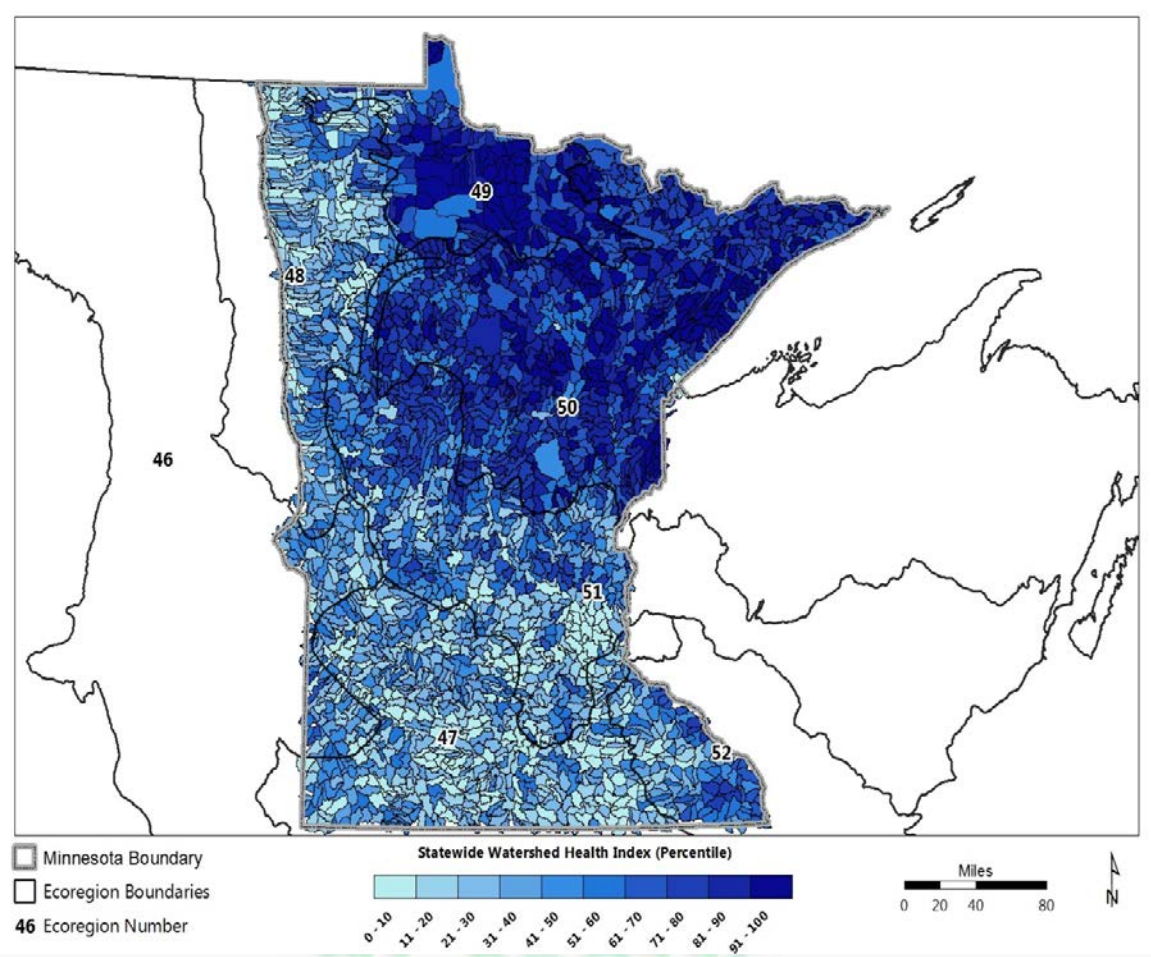
INDIANA


56
57
54
55
72
71
Indiana Boundary
Ecoregion Boundaries
54 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

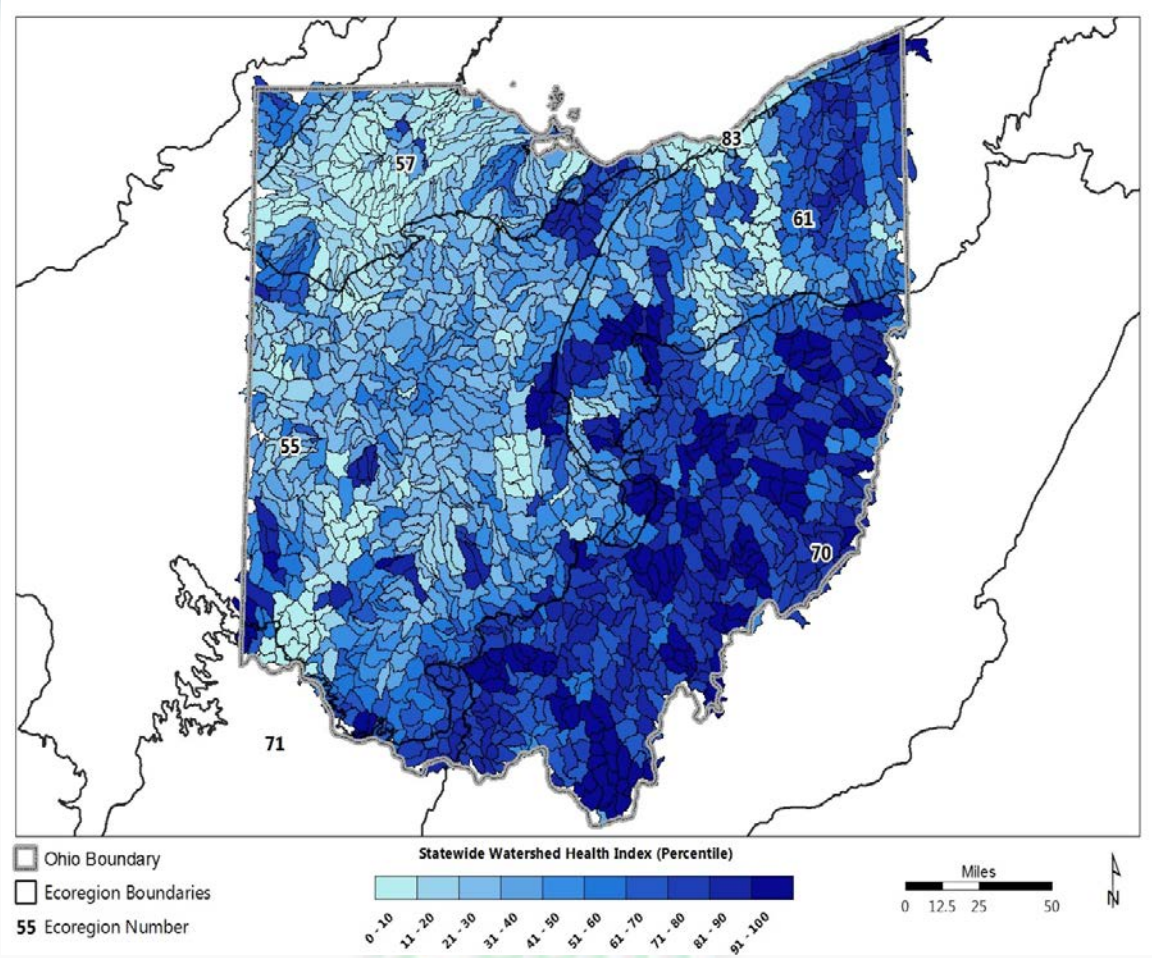
MICHIGAN


50
51
57
56
55
Michigan Boundary
Ecoregion Boundaries
50 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 25 50 100
N

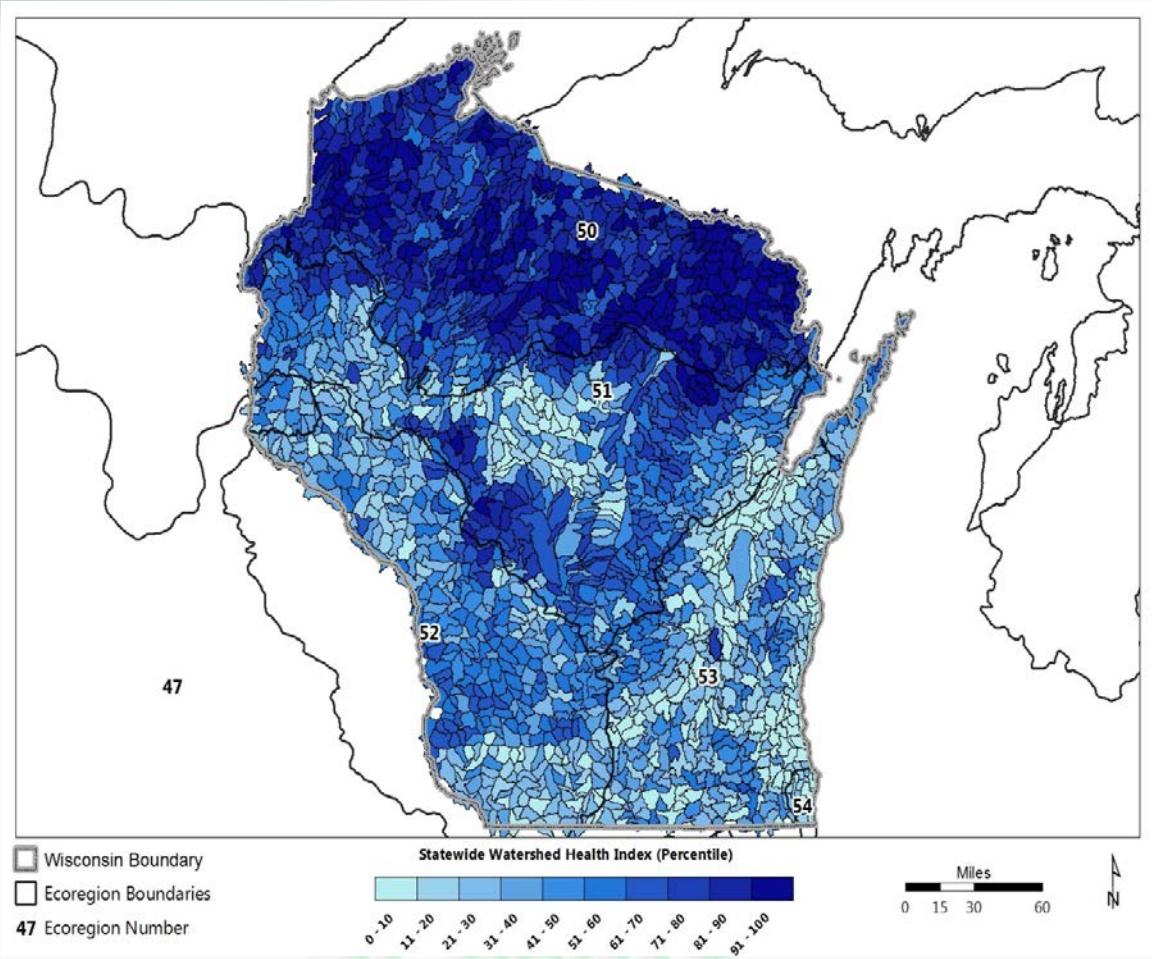
MINNESOTA


49
48
50
46
51
47
52
Minnesota Boundary
Ecoregion Boundaries
46 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 20 40 80
N

OHIO


57
83
61
55
70
71
Ohio Boundary
Ecoregion Boundaries
55 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 12.5 25 50
N

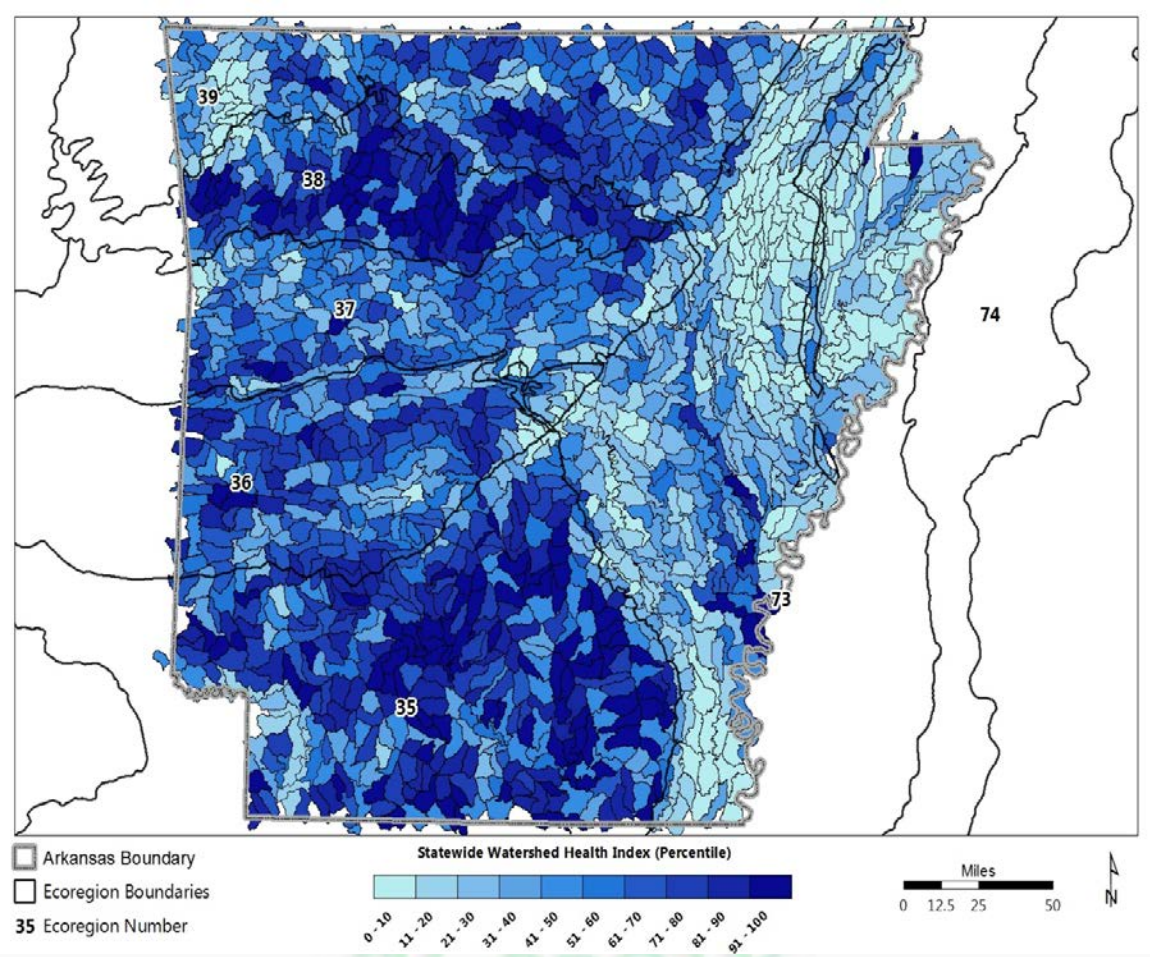
WISCONSIN


50
51
52
53
54
47
Wisconsin Boundary
Ecoregion Boundaries
47 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

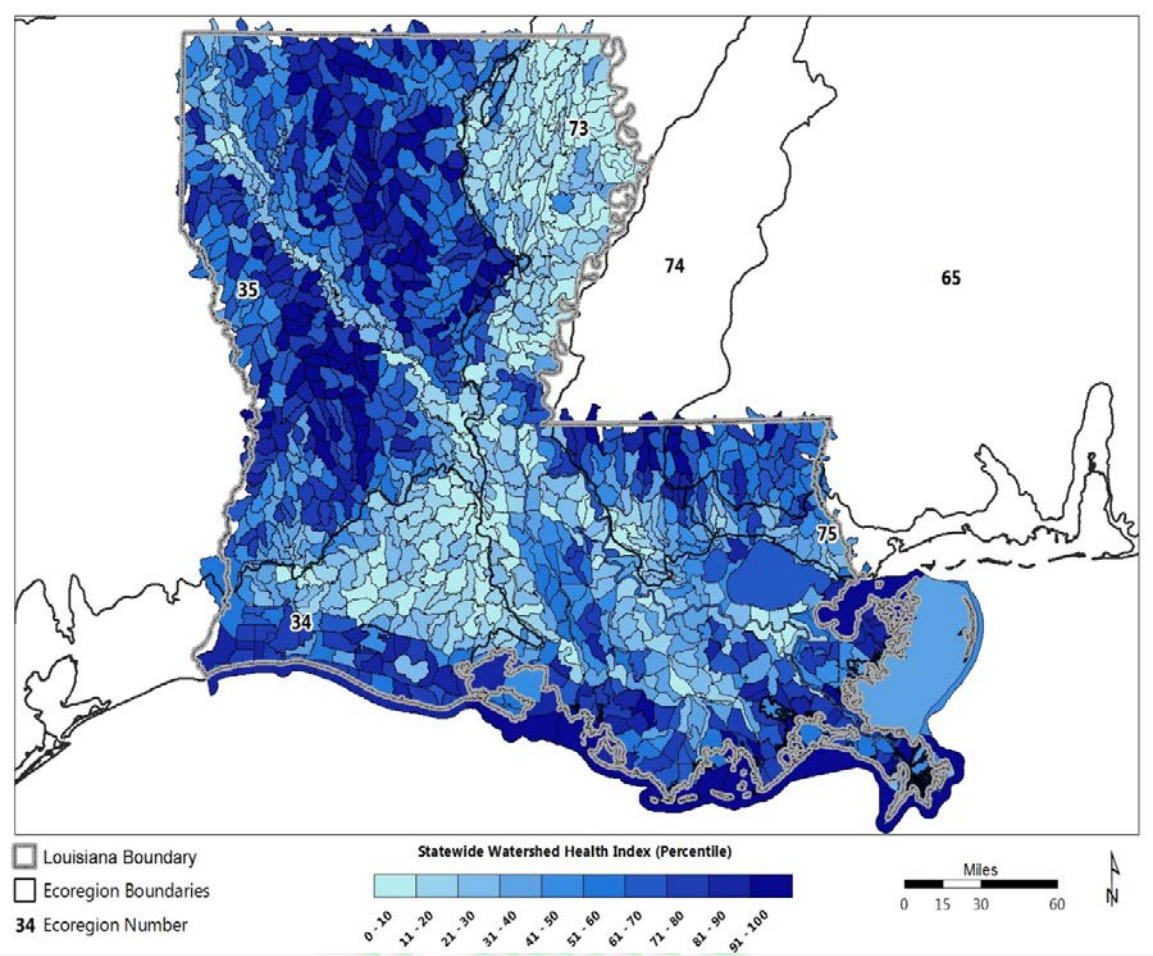
PHWA STATE MAPS BY EPA REGION

REGION 6

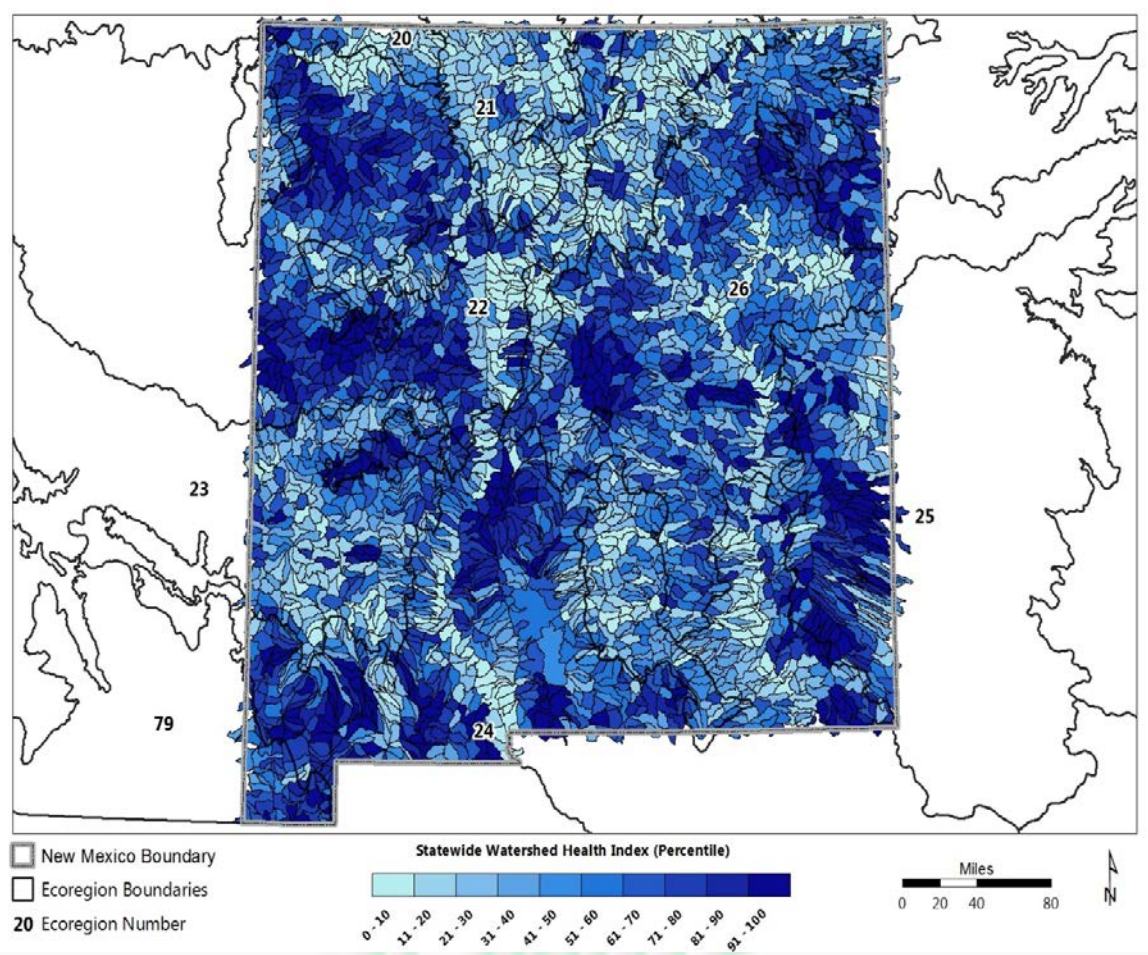
ARKANSAS


39
38
37
36
35
74
73
Arkansas Boundary
Ecoregion Boundaries
35 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 12.5 25 50
N

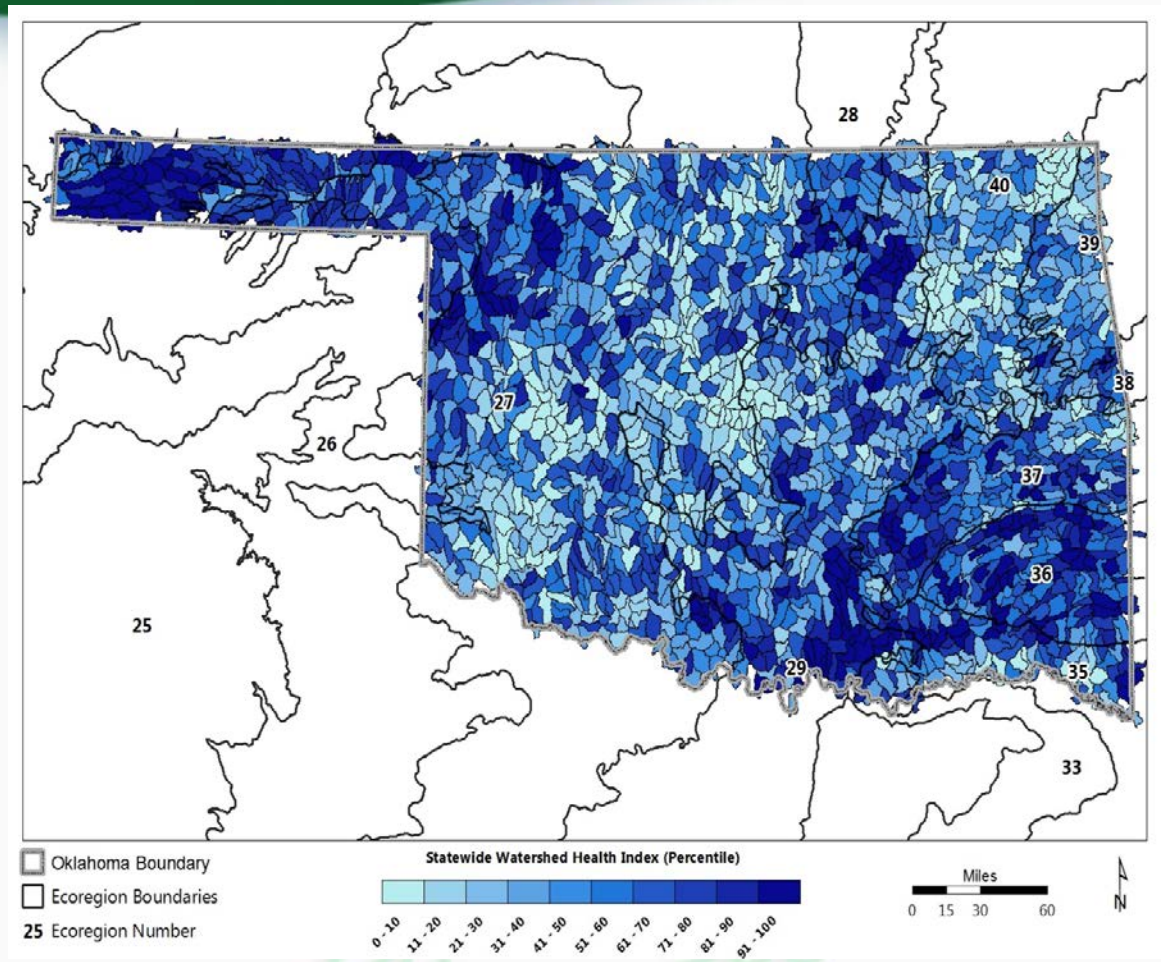
LOUISIANA


73
74
65
35
75
34
Louisiana Boundary
Ecoregion Boundaries
34 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

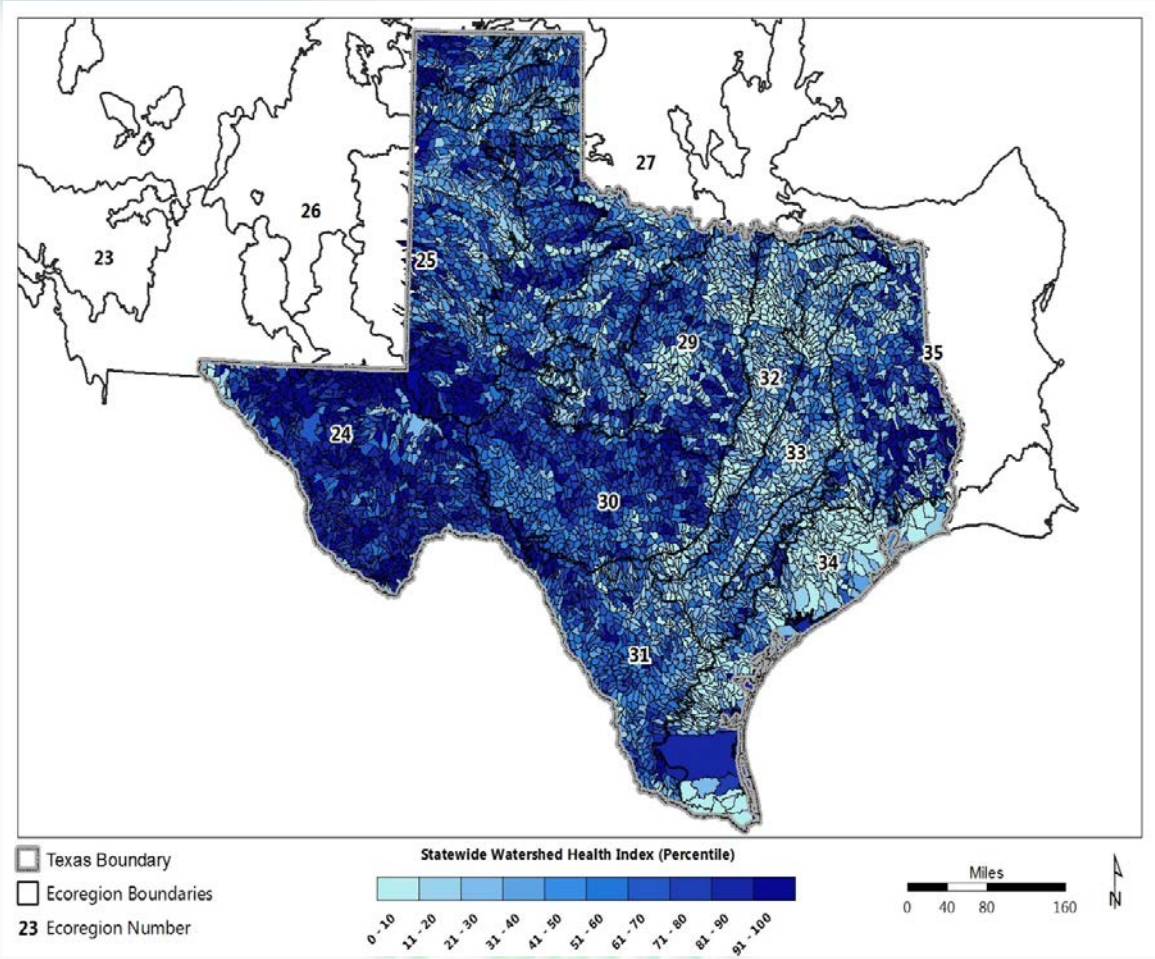
NEW MEXICO


20
21
22
26
23
25
79
24
New Mexico Boundary
Ecoregion Boundaries
20 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 20 40 80
N

OKLAHOMA


28
40
39
38
27
26
37
36
25
29
35
33
Oklahoma Boundary
Ecoregion Boundaries
25 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

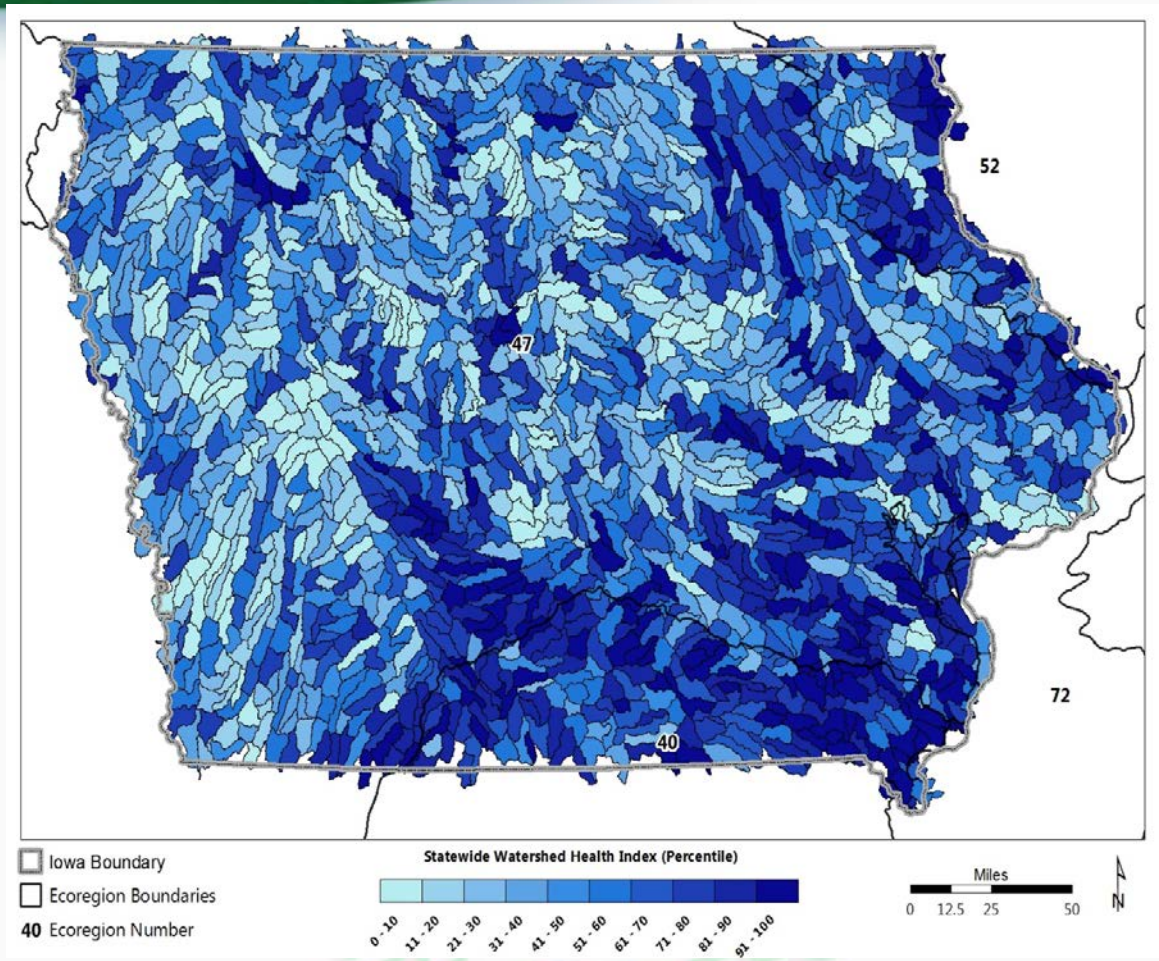
TEXAS


27
26
23
25
29
35
32
24
33
30
34
31
Texas Boundary
Ecoregion Boundaries
23 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 40 80 160
N

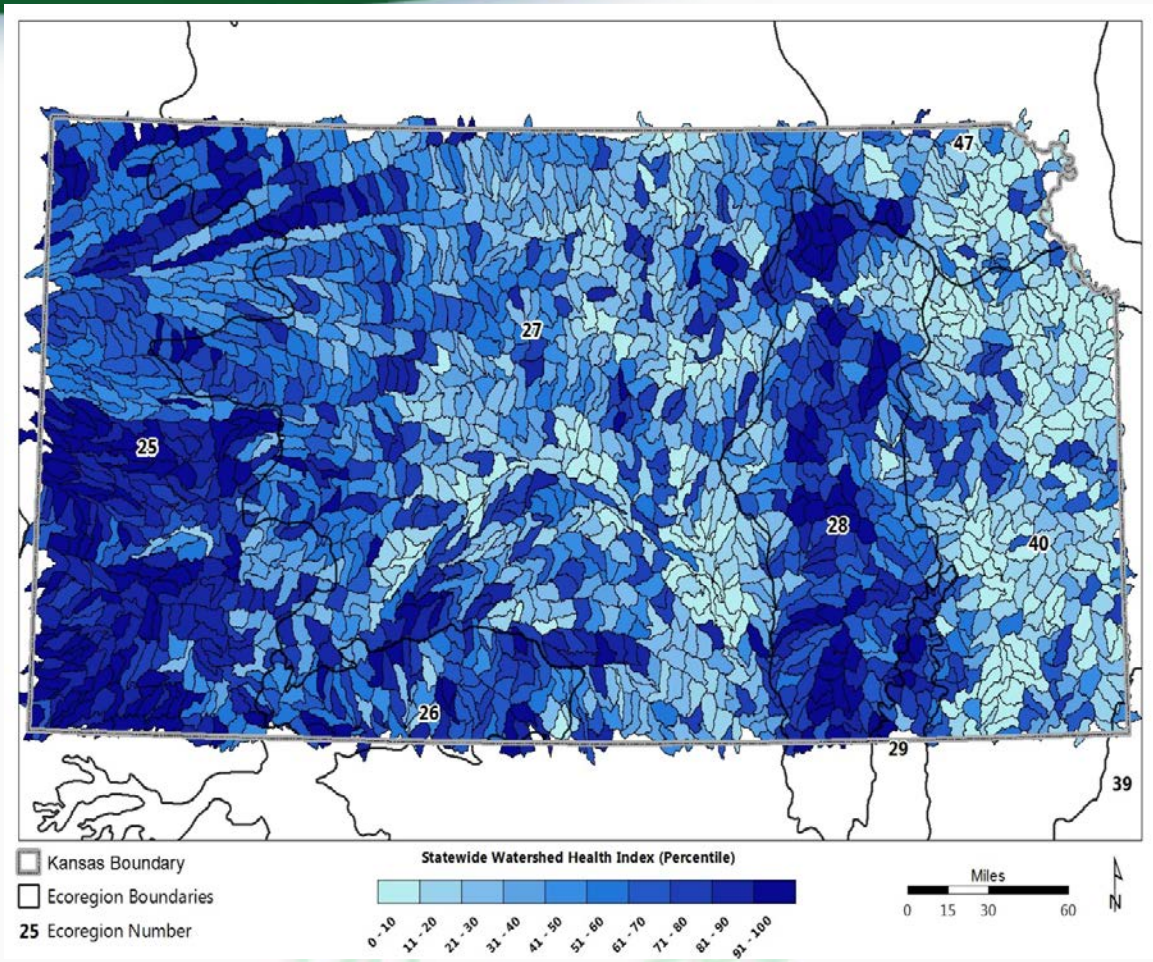
PHWA STATE MAPS BY EPA REGION

REGION 7

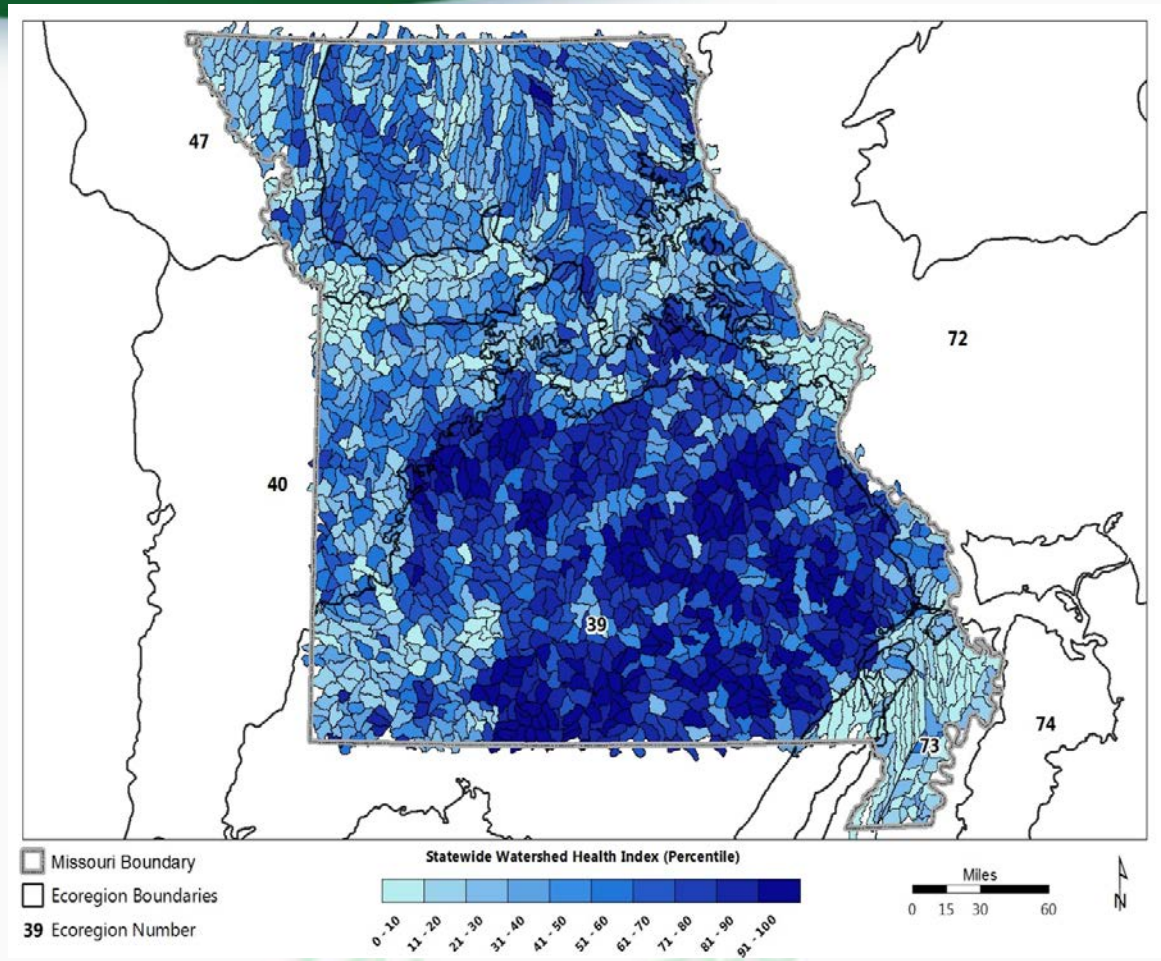
IOWA


52
47
72
40
Iowa Boundary
Ecoregion Boundaries
40 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 12.5 25 50
N

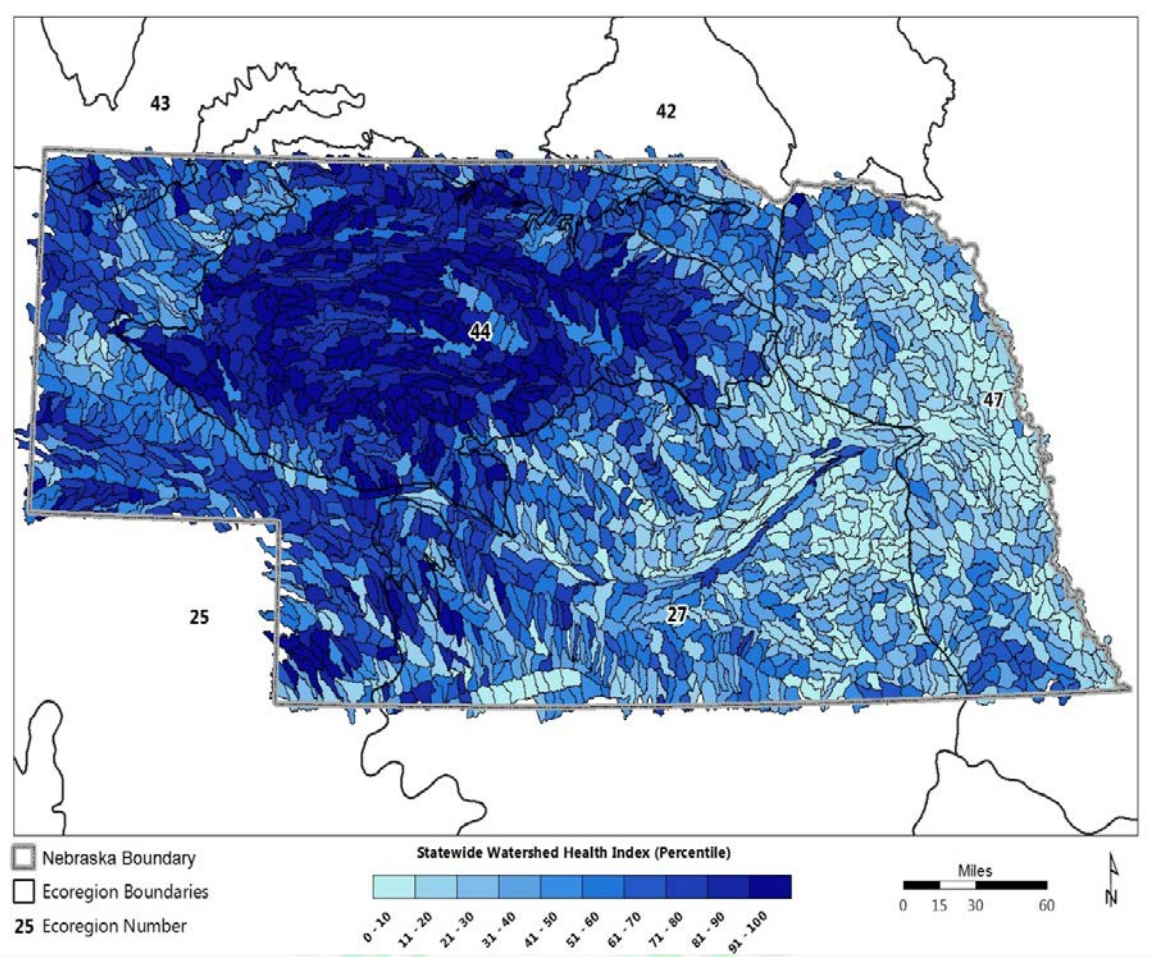
KANSAS


47
27
25
28
40
26
29
39
Kansas Boundary
Ecoregion Boundaries
25 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

MISSOURI


47
72
40
39
74
73
Missouri Boundary
Ecoregion Boundaries
39 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

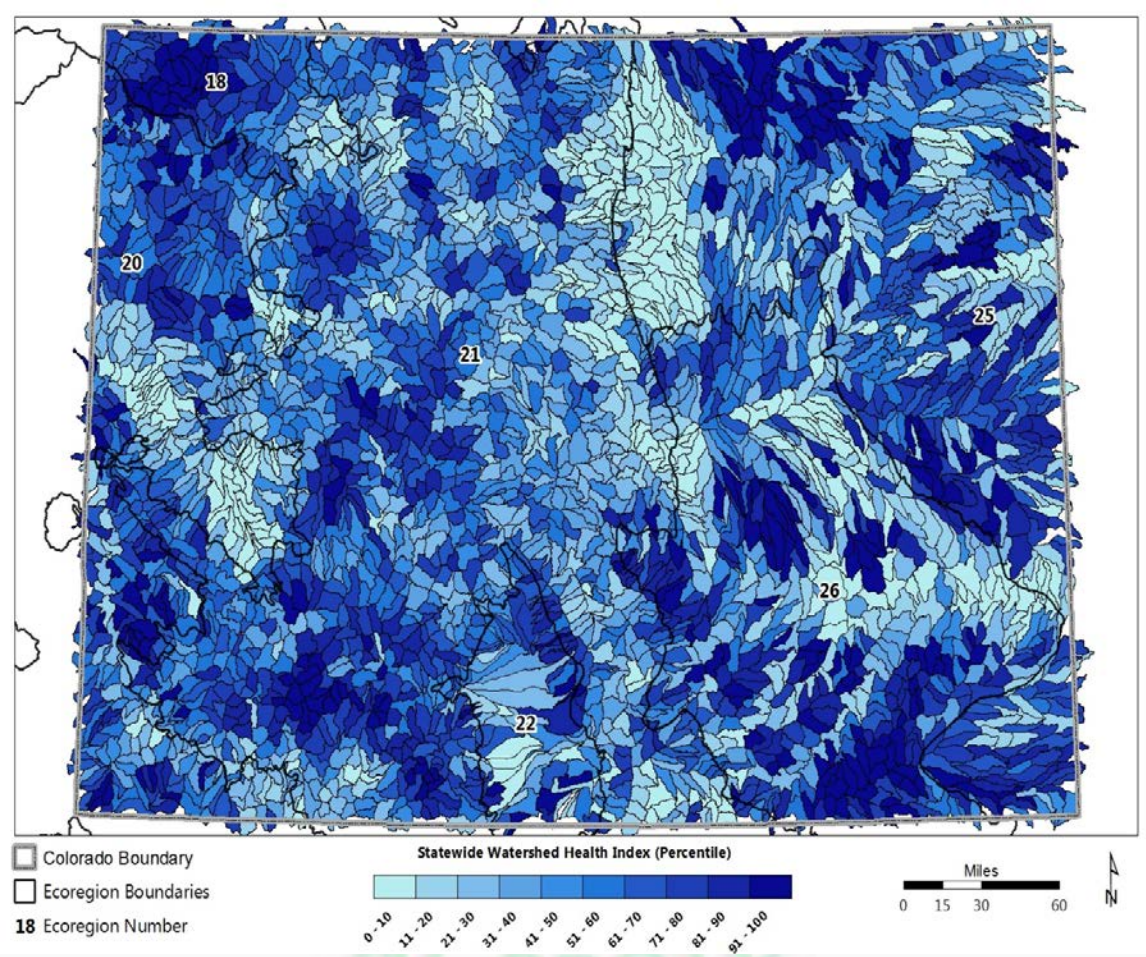
NEBRASKA


43
42
44
47
25
27
Nebraska Boundary
Ecoregion Boundaries
25 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

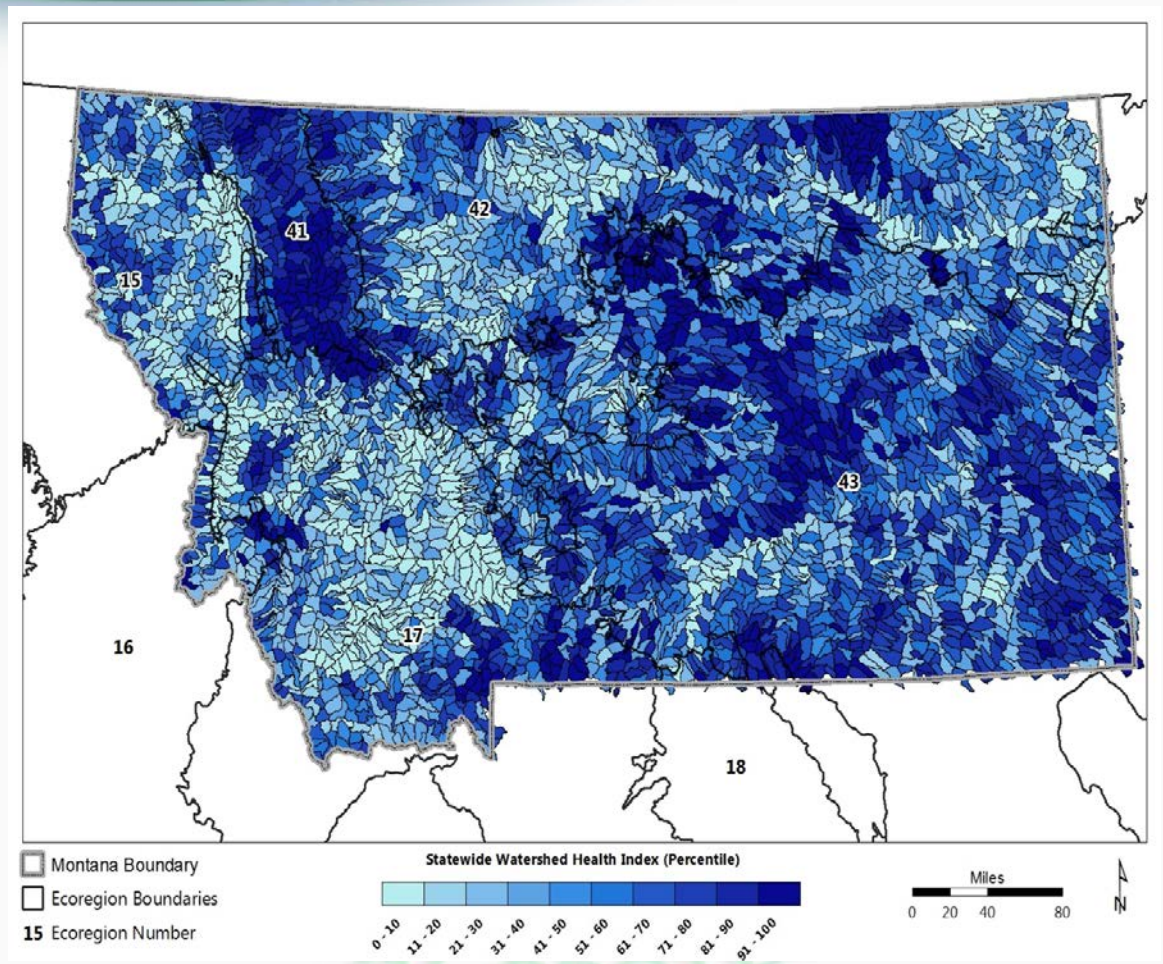
PHWA STATE MAPS BY EPA REGION

REGION 8

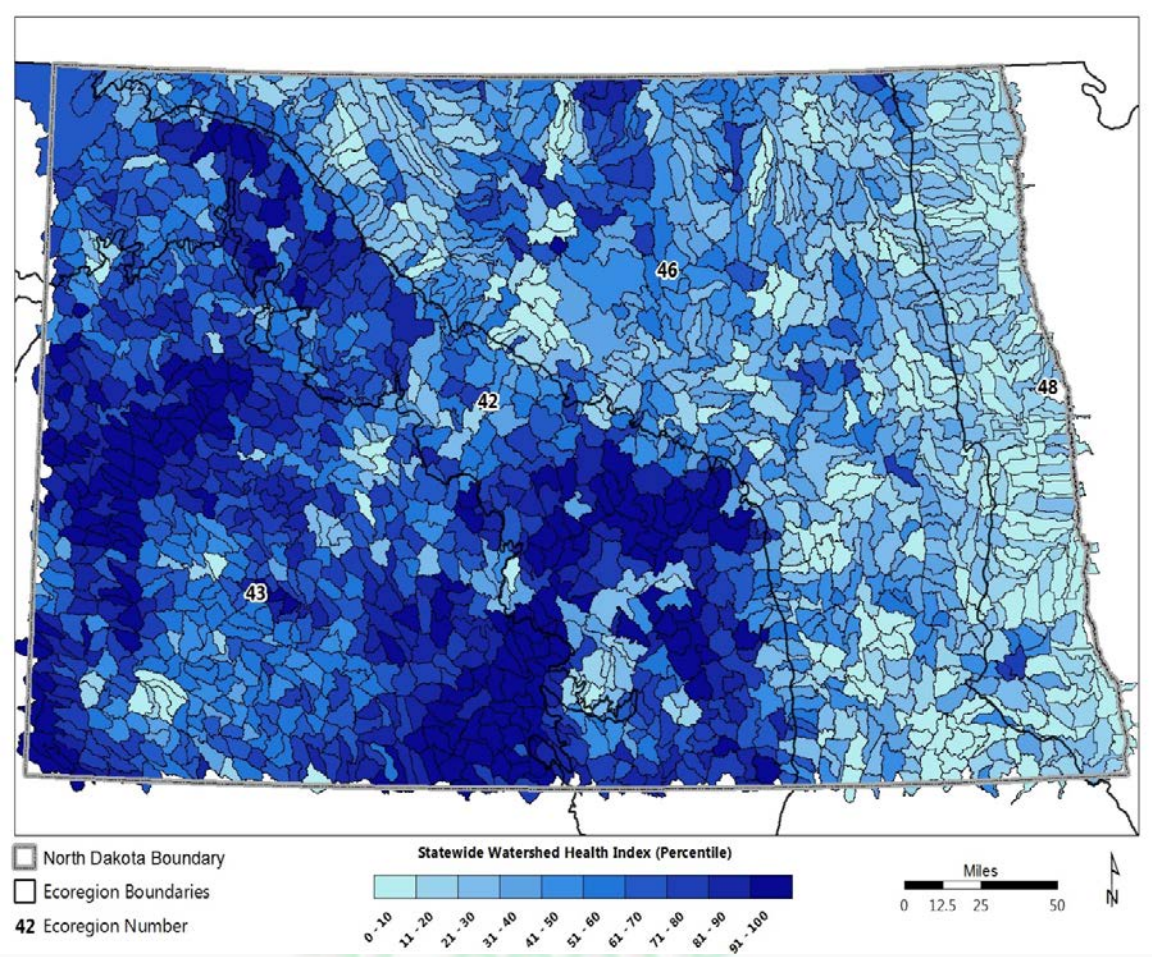
COLORADO


18
20
21
22
25
26
Colorado Boundary
Ecoregion Boundaries
18 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

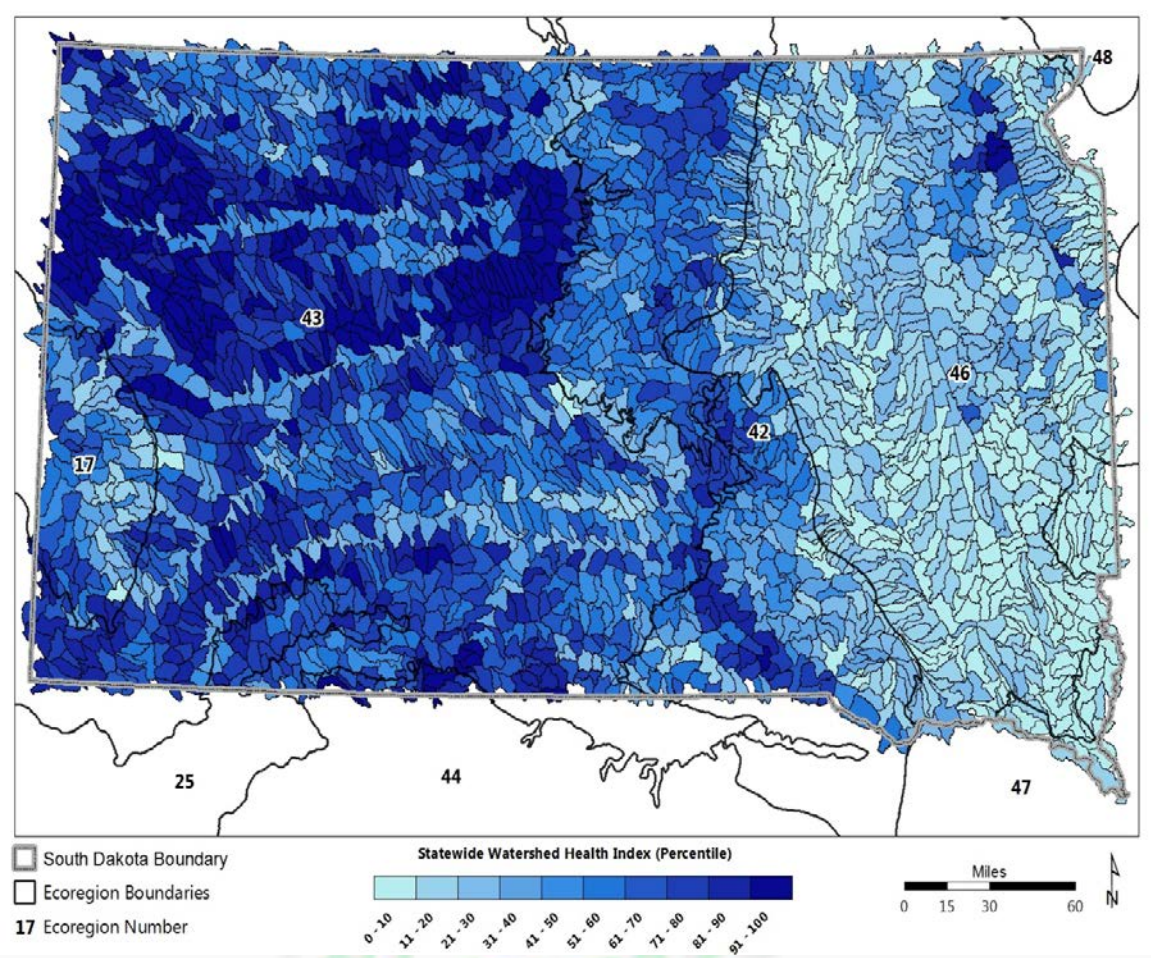
MONTANA


41
42
15
43
16
17
18
Montana Boundary
Ecoregion Boundaries
15 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 20 40 80
N

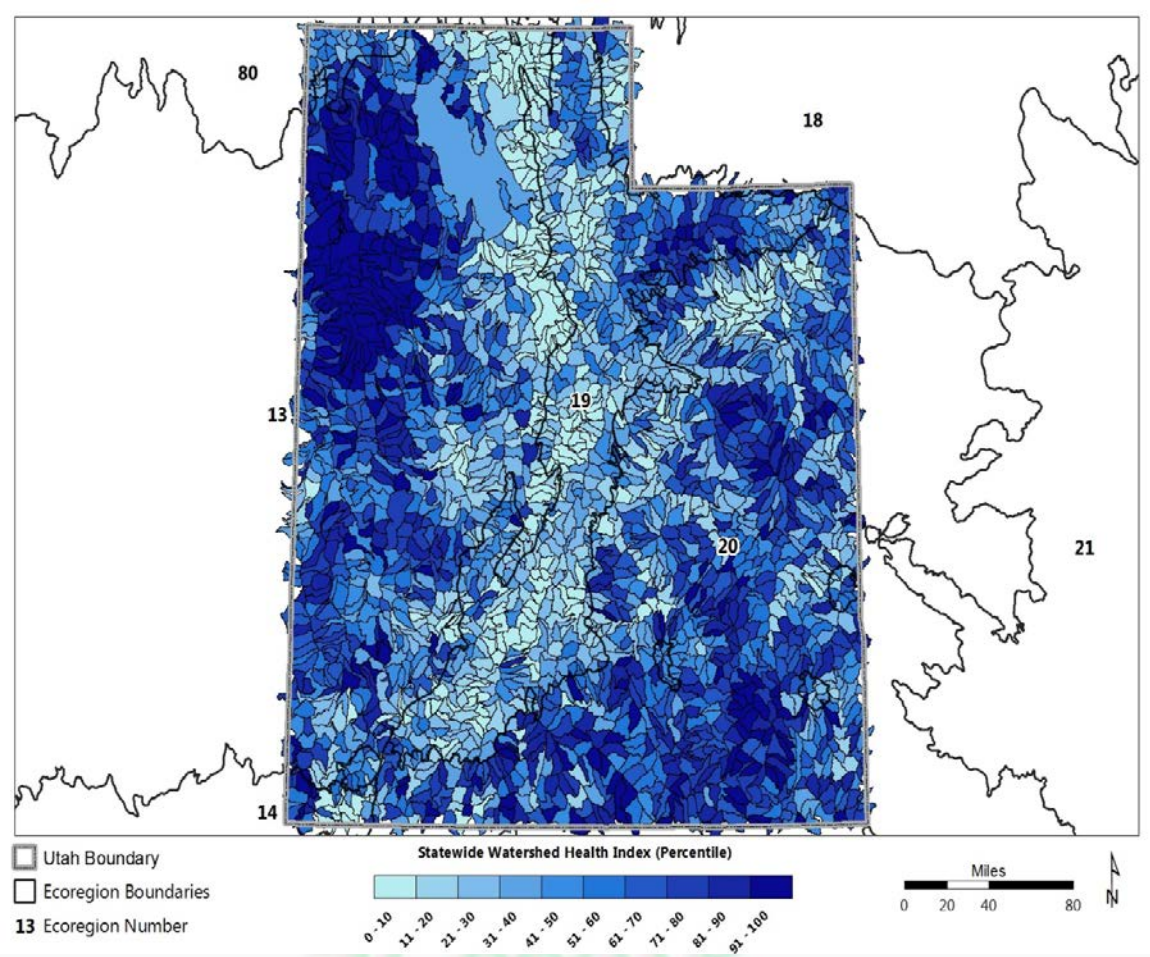
NORTH DAKOTA



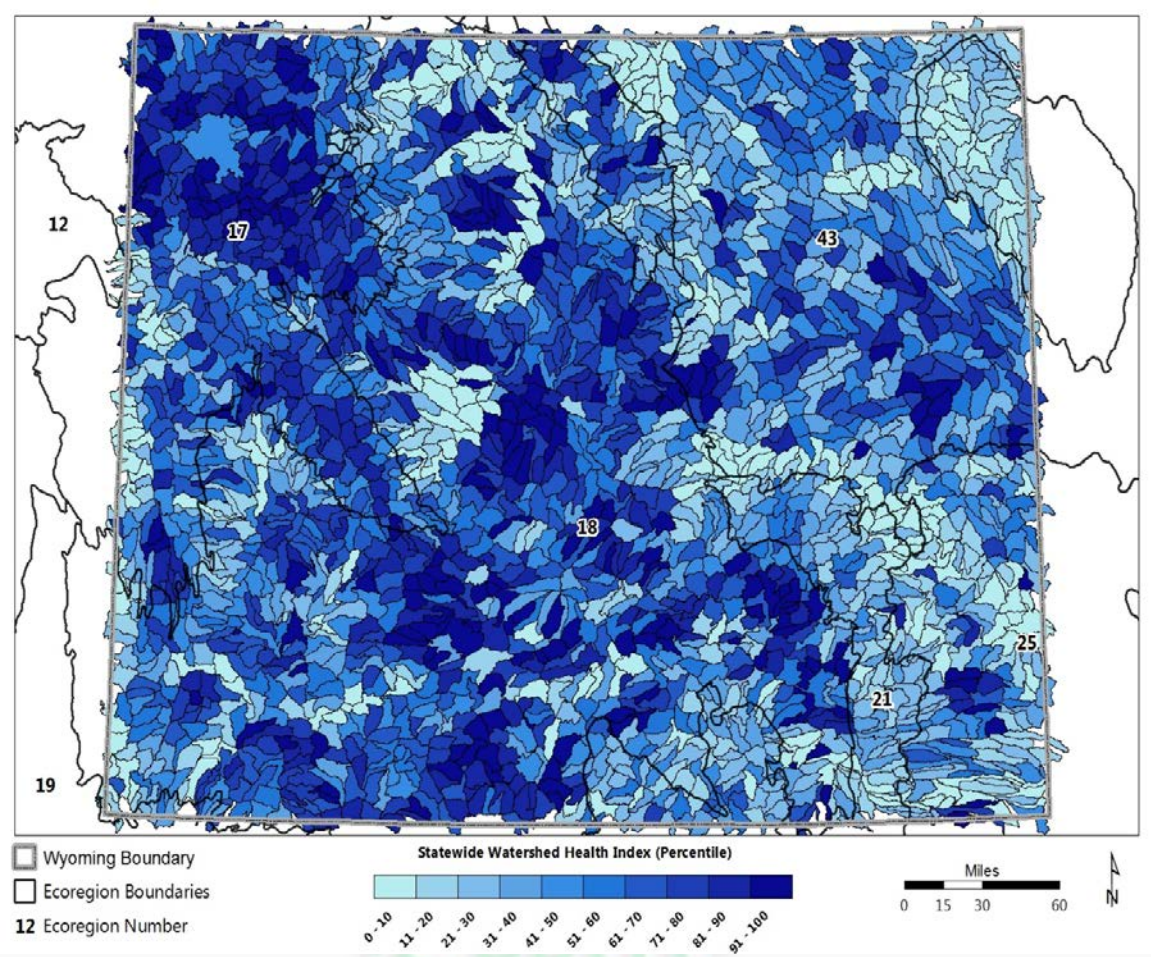
SOUTH DAKOTA



UTAH


80
18
13
19
20
21
14
Utah Boundary
Ecoregion Boundaries
13 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 20 40 80
N

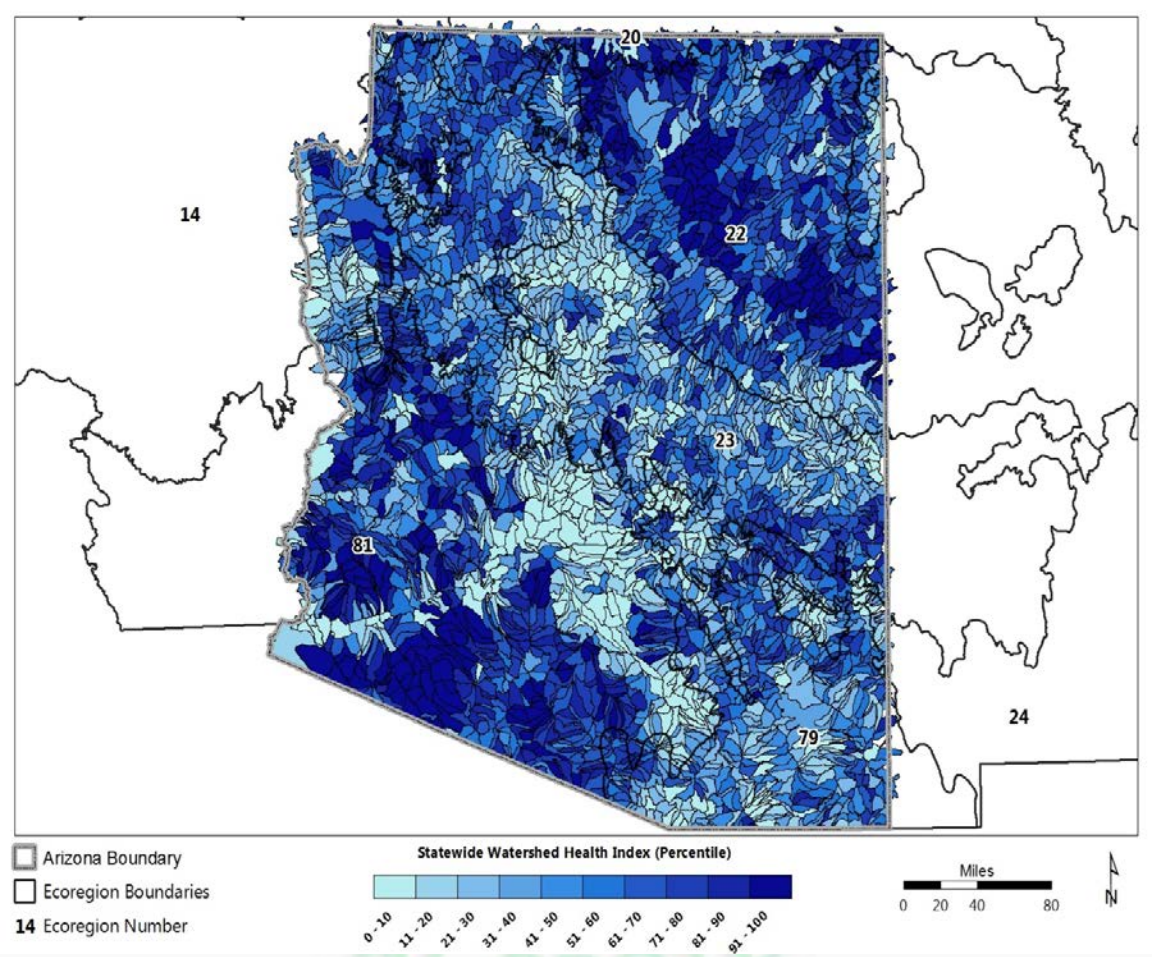
WYOMING


12
17
43
18
25
21
19
Wyoming Boundary
Ecoregion Boundaries
12 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

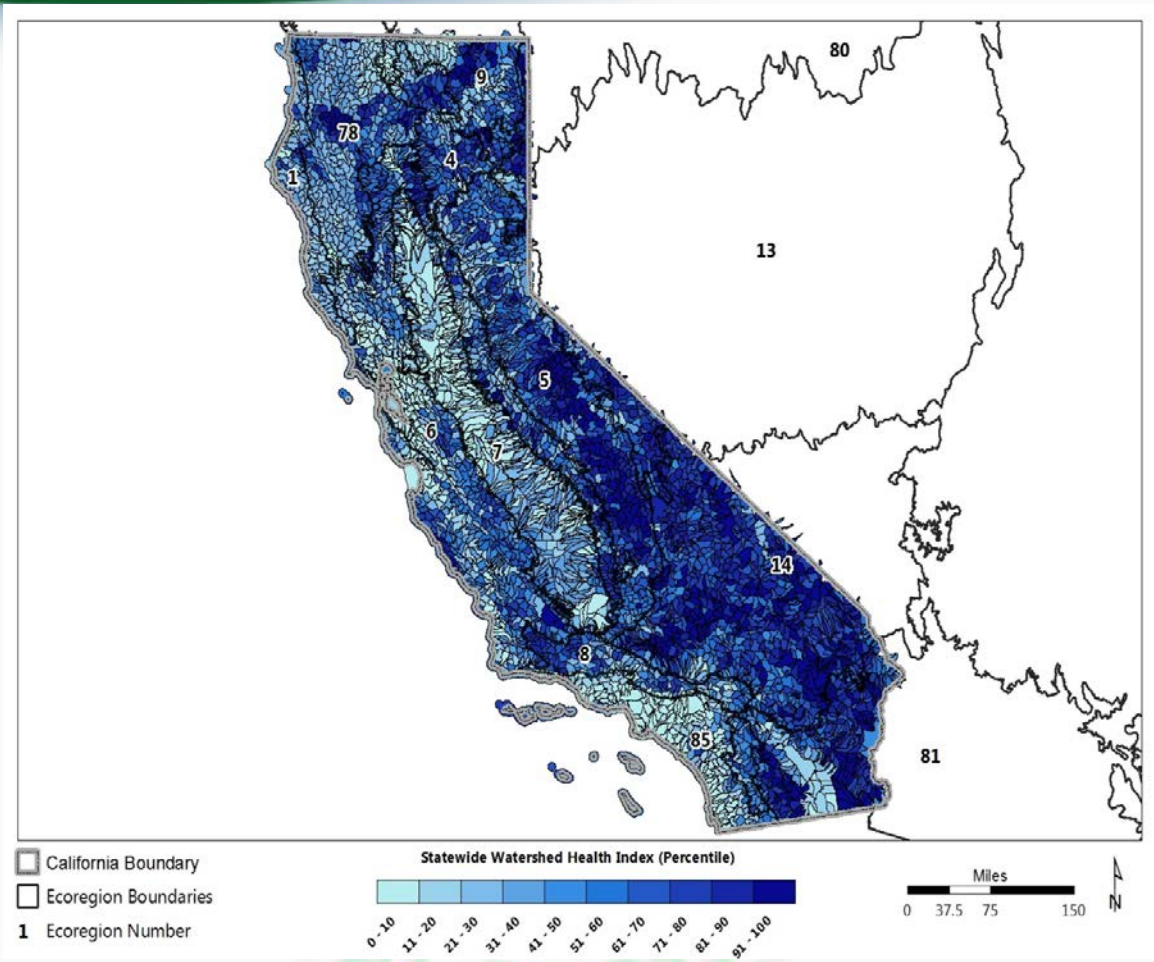
PHWA STATE MAPS BY EPA REGION

REGION 9

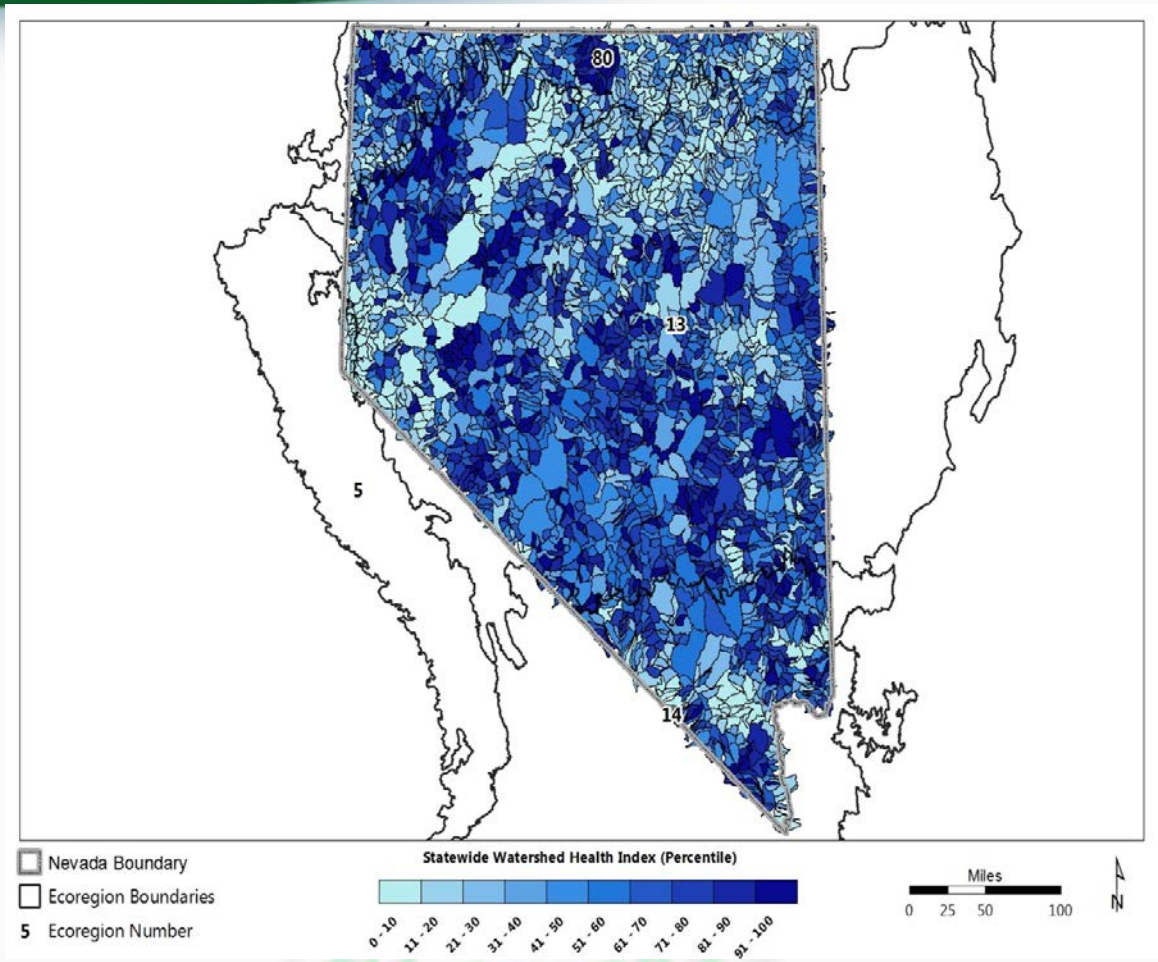
ARIZONA


20
14
22
23
81
24
79
Arizona Boundary
Ecoregion Boundaries
14 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 20 40 80
N

CALIFORNIA


80
9
78
4
1
13
5
6
7
14
8
85
81
California Boundary
Ecoregion Boundaries
1 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 37.5 75 150
N

NEVADA

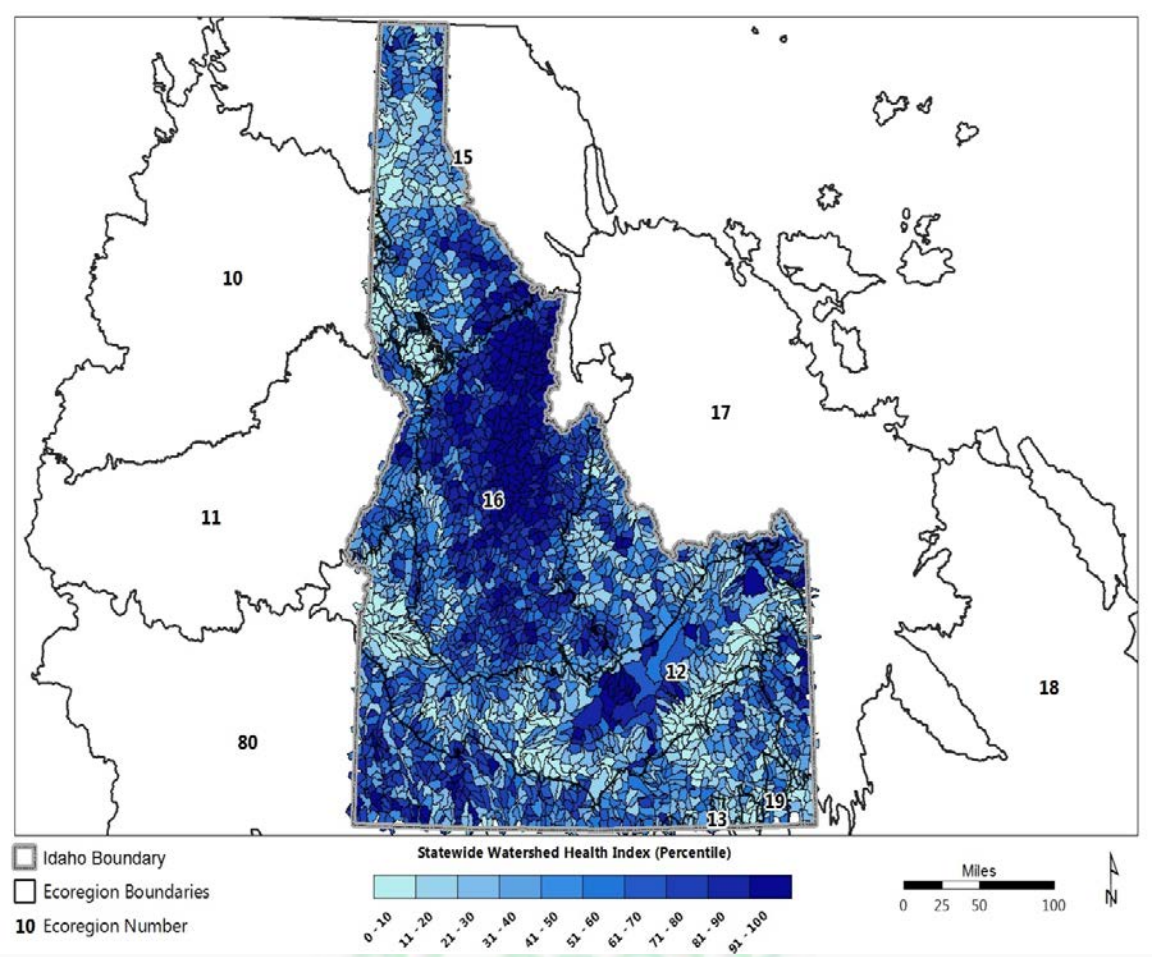

80
13
5
14
Nevada Boundary
Ecoregion Boundaries
5 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 25 50 100
N

HAWAII (TBD)

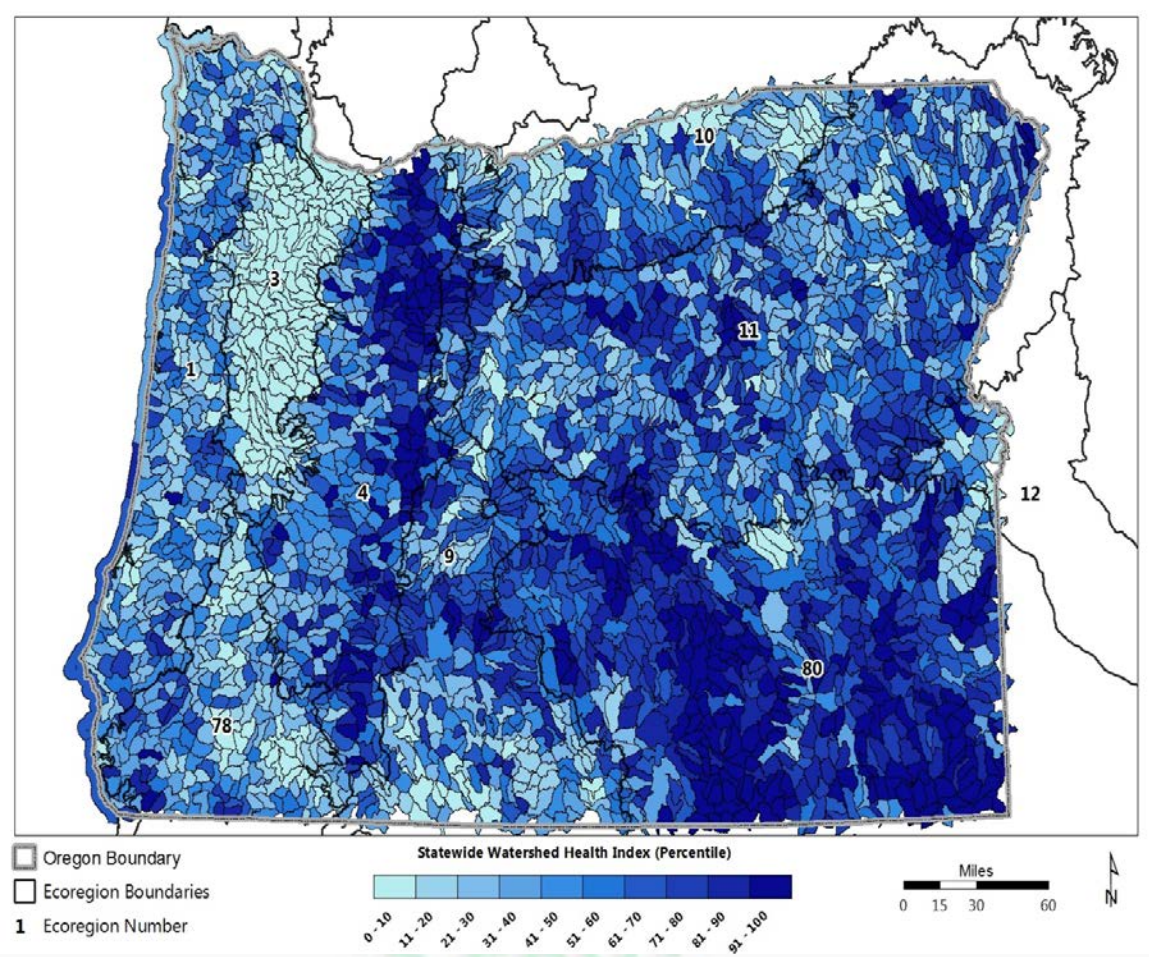
PHWA STATE MAPS BY EPA REGION

REGION 10

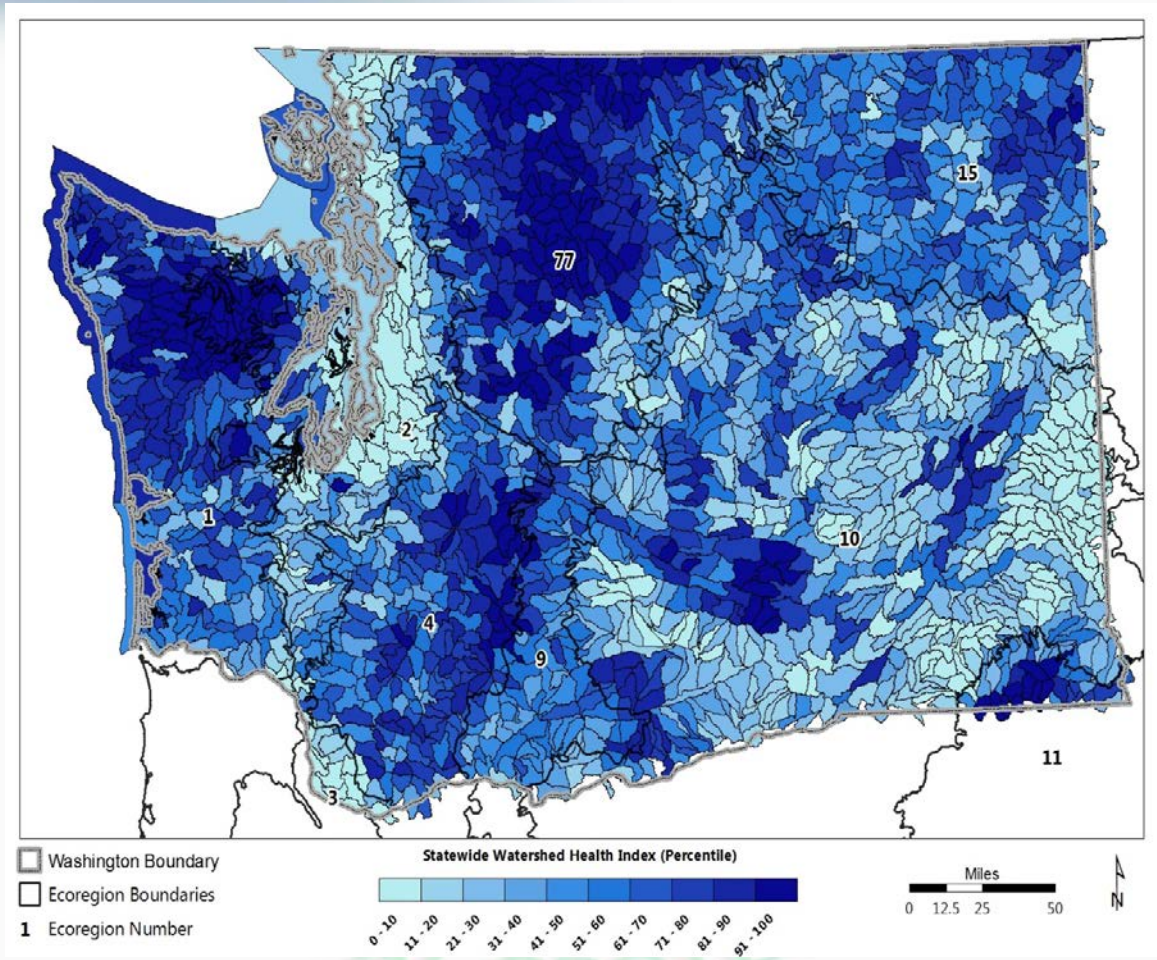
IDAHO


15
10
17
16
11
12
18
80
13
19
Idaho Boundary
Ecoregion Boundaries
10 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 25 50 100
N

OREGON


10
3
11
1
4
12
9
80
78
Oregon Boundary
Ecoregion Boundaries
1 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 15 30 60
N

WASHINGTON


15
77
2
1
10
4
9
11
3
Washington Boundary
Ecoregion Boundaries
1 Ecoregion Number
Statewide Watershed Health Index (Percentile)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Miles
0 12.5 25 50
N

ALASKA (TBD)

Dude, You're Gettin' a New 2017 RPS Tool!!

(and this finally includes HI, AK, PR and USVI)

New for 2017 RPS Statewide Tools:

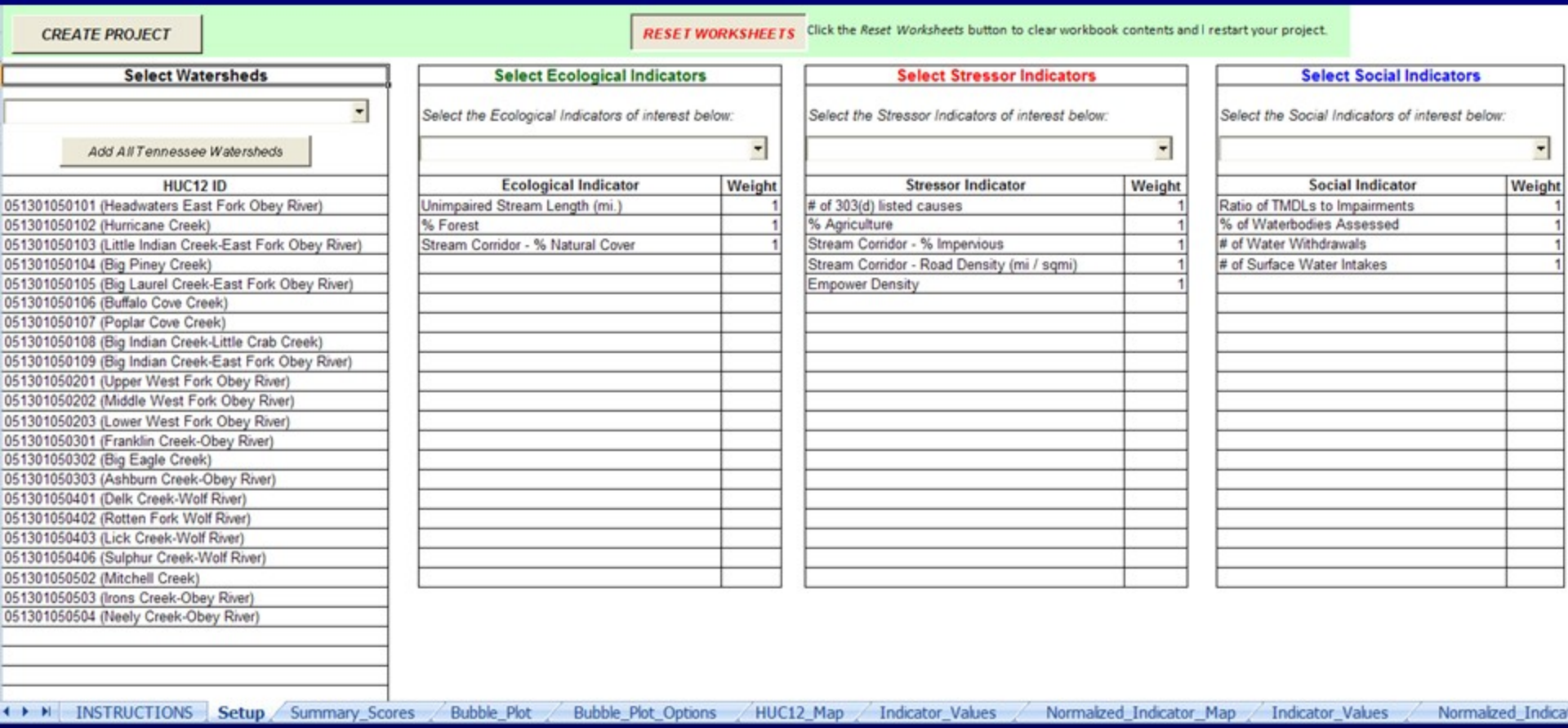
- Increased HUC12 indicators from 230 to 285
- PHWA health and vulnerability scores now included
- Improved ease of user-added new indicator data
- Lower 48 tools reissued, plus new tools for AK, HI, PR and USVI

Not new for 2017:

- All custom-added state data still in your statewide tool
- EPA state-specific support is still available

RPS Scoring Tool

Contains all the statewide data on indicators, watersheds
Creates rank-ordering, maps, and bubble plots in minutes



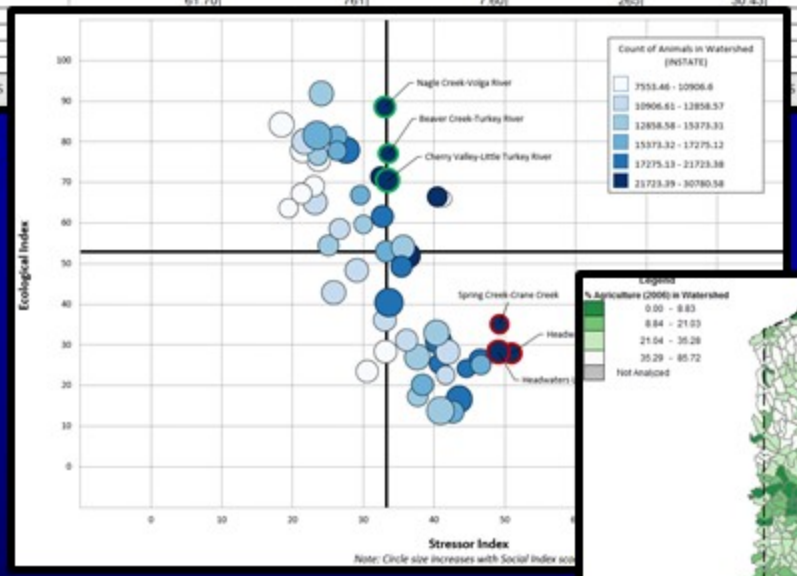
Requires only Excel spreadsheet skills

Three Types of Recovery Potential Screening Products

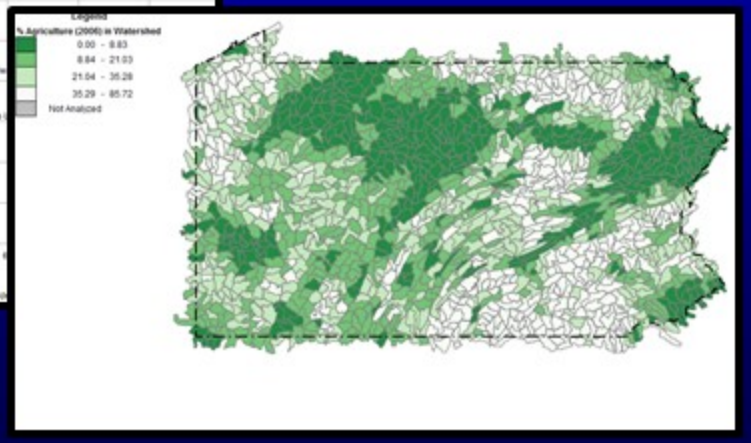
Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
02050107020	Nanticoke Creek	50.78	1039	12.38	673	0.00	1137	46.14	1200
02050107020	Newport Creek	48.93	1068	8.61	352	17.15	700	52.49	871
02050107020	Warrior Creek-Susquehanna River	39.07	1219	13.90	816	8.45	799	44.54	1241
02050107030	Harveys Lake-Harveys Creek	62.52	735	11.56	613	31.95	220	60.97	281
02050107030	Hunlock Creek	70.67	450	10.64	515	1.03	991	53.69	790
02050107030	Little Shickshinny Creek-Shickshinny Creek	70.32	462	10.06	461	0.00	1137	53.42	810
02050107030	Little Wapwallopen Creek	67.80	552	6.63	197	0.00	1137	53.73	788
02050107030	Big Wapwallopen Creek	67.96	545	9.91	447	16.00	712	58.02	477
02050107030	Wapwallopen Creek	76.10	274	8.60	349	1.00	992	56.17	602
02050107030	City of Berwick-Susquehanna River	68.88	509	10.91	543	17.60	695	58.52	444
02050107040	Little Nescopeck Creek-Nescopeck Creek	62.82	721	8.53	338	29.40	258	61.23	263
02050107040	Black Creek	55.50	929	13.61	791	22.63	596	54.84	710
02050107040	Nescopeck Creek-Susquehanna River	54.20	962	14.89	887	28.03	291	55.78	630
02050107050	Headwaters Huntington Creek	83.56	95	6.65	199	0.93	1000	59.28	395
02050107050	Kitchen Creek	74.43	334	3.28	38	8.50	797	59.89	356
02050107050	Pine Creek	70.50	459	14.15	834	11.00	773	55.78	629
02050107050	Huntington Creek-Fishing Creek	67.63	558	17.56	1064	9.80	790	53.29	817
02050107060	Kline Hollow Run-Little Fishing Creek	75.57	297	11.76	630	16.85	703	60.22	323
02050107060	Little Fishing Creek-Fishing Creek	63.60	686	20.60	1238	24.33	564	55.78	632
02050107070	East Branch Fishing Creek	70.95	444	8.99	380	27.10	321	63.02	154
02050107070	West Branch Fishing Creek	84.22	83	4.29	93	0.00	1137	59.98	349
02050107070	West Creek	72.57	389	13.28	759	6.40	833	55.23	668
02050107070	Raven Creek	72.93	374	13.44	770	26.35	350	61.95	213
02050107070	Mud Run-Green Creek	60.07	817	18.65	1124	45.98	110	62.46	184
02050107070	Hemlock Creek	46.88	1110	23.10	1334	49.33	75	57.70	504
02050107070	Fishing Creek-Susquehanna River	54.50	954	19.76	1187	45.58	111	60.10	335
02050107080	Little Catawissa Creek	61.70	761	7.60	265	30.43	240	61.51	237
02050107080	Tomicken Creek						278	57.28	527
02050107080	Messers Run-Catawissa Creek						199	61.40	246
02050107080	Beaver Run-Catawissa Creek						76	72.80	11
02050107080	Catawissa Creek-Susquehanna River						74	63.65	140

Setup | Results | Bubble_Plot | Bubble_Plot_Options

Index Scores & Ranks



Bubble Plotting



Mapping

How Recovery Potential Screening Is Used to Prioritize

- **impaired waters prioritization**: *which watersheds (in a river basin or statewide) are more restorable?*

- **revealing level of difficulty**: *how do waters differ in recovery potential, due to what factors? What am I up against?*

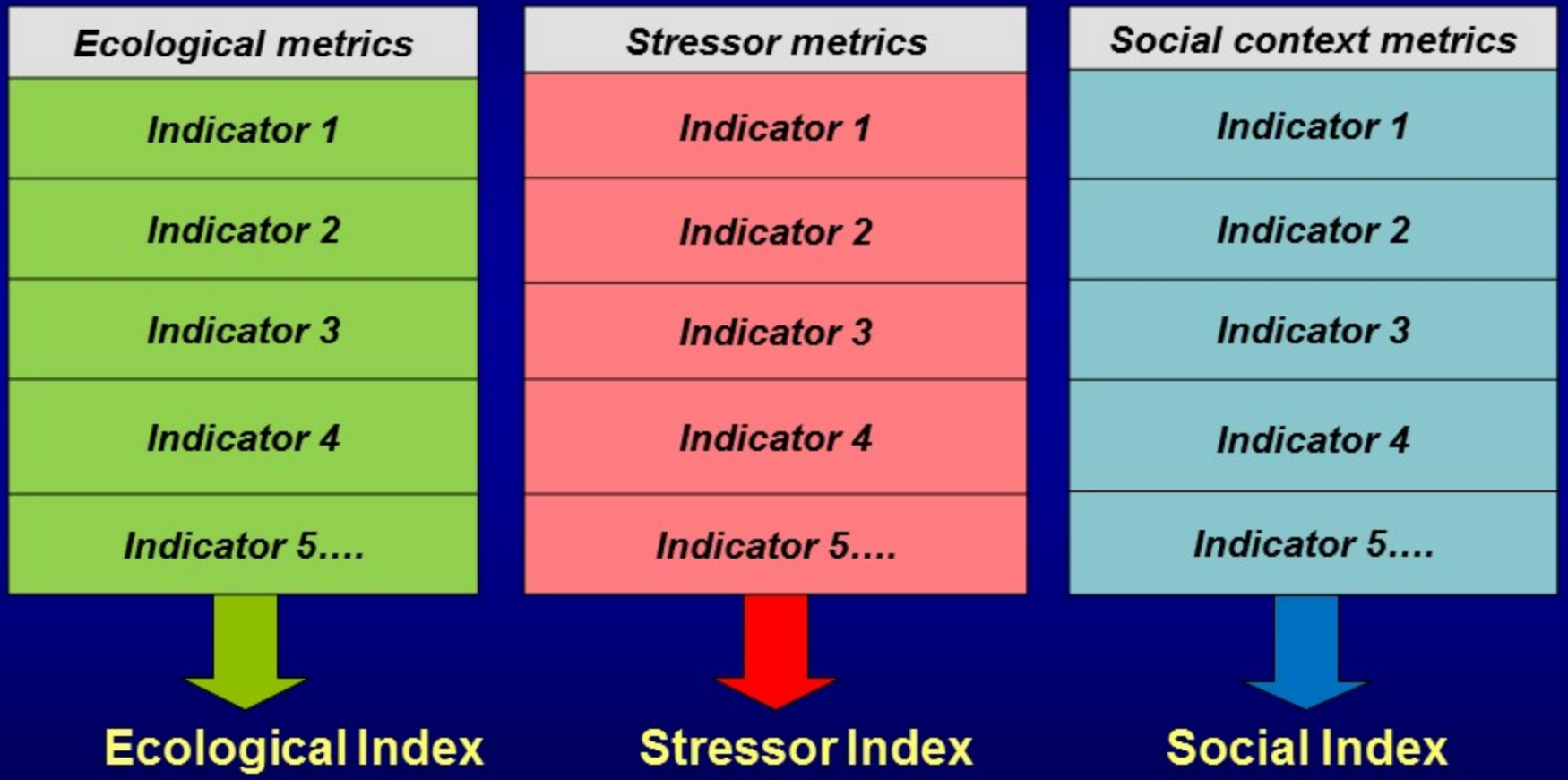
- **NPS or TMDL program planning**: *how can considering restorability factors help watershed plans or statewide strategies?*

- **TMDL implementation**: which *waters with TMDLs may be better prospects to invest in for recovery?*

- **narrowly targeted projects**: *where to restore streams with septic-related pathogen impacts? Where to protect healthy headwaters?*

- **multi-program common ground**: e.g., *where might 303(d), fisheries restoration, source water protection and abandoned mine drainage control priorities co-occur?*

Recovery Potential Screening - Basic Concept



$$\frac{\text{Ecological} + \text{Social} + (100 - \text{Stressor})}{3}$$

Types of Indicators in an RPS Tool

Base indicators

- reference ID information for all watersheds
- value-neutral – do not affect RPS index scores

Examples
HUC12 ID AND NAME
TOTAL WATERSHED (WS), LAND, AND WATER AREA AND %
RIPARIAN (RZ) AND HYDRO CONNECTED ZONES (HCZ) AREA
STREAMLENGTH
PRIMARY ECOREGION
TRIBAL AREA, % AND ADJACENT HUCS
EPA REGION, STATES, % INSTATE, % NON-US
PARENT HUC8 ID AND NAME

New in 2017: majority state and county of each HUC

Ecological indicators

• describe condition (physical structure, processes) and capacity to regain function, e.g.,

watershed natural structure

corridor condition

flow and channel dynamics

biotic community integrity

aquatic connectivity

ecological history

New in 2017: 30 metrics

(mainly PHWA health index and sub-indices, also 2 aq condition metrics)

HIGHER SCORE = BETTER FOR RP

Stressor indicators

• describe conditions (sources and stressors) that impact normal function, e.g.,

watershed disturbance & sources

corridor or shorelands disturbance

flow or channel alteration

biological stressors

severity, complexity of pollution

land use legacies

New in 2017: 20 metrics

(PHWA vulnerability index, sub-indices and indicators)

HIGHER SCORE = WORSE FOR RP

Social context indicators

• include factors that are not environmental, yet influence restoration success -- e.g.,

leadership, organization, engagement

protective ownership or regulation

level of information, planning, certainty

cost, complexity

socio-economic factors

human health, uses, incentives

New in 2017: 2 metrics

(USDA cons reserve area, fishing demand)

HIGHER SCORE = BETTER FOR RP

Some Essentials of RPS Tools (live)

- RPS tool basics
- Using PHWA data in an RPS Tool
- Subsets
- Customizing RPS maps and plots
- Adding new indicators

Closing thoughts:

How can RPS Tools support water program needs?

- **Recovery Potential Screening is flexible**
  - *user-driven methods*
  - *indicator database compiled for your State's watersheds*
  - *custom-selected indicators, weights per screening*
- **Recovery Potential Screening is fast**
  - *main effort is to compile the database and tool…we've done that*
  - *run and revise many screenings in hours without GIS skills*
- **Recovery Potential Screening is accessible**
  - *spreadsheet skills alone*
  - *generates visualization products and uses*
  - *broadens the use of geospatial products*
  - *"discussion support" improves cross-program interactions*

Closing thoughts re. prioritizing, protection, RPS and PHWA

*you **DO** have:*

the need

the data

the tools

and the help from EPA....