Recovery Potential Screening in Utah: Tools for State Planning and Prioritizing

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EPA Office of Water
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What is Recovery Potential Screening?

A method to help states and restoration planners compare restorability across all watersheds

- Origins in impaired waters program (TMDLs, 303(d) listing)
- Broader audiences now, many states (watershed plans, nonpoint source control, fisheries, restoration, teaming up with HWI)
- Systematic but very flexible approach
- Science-based, indicator-driven (GIS and field monitoring data)

ecological capacity,
exposure to stressors, *and*
social context *affecting restoration efforts*

How Recovery Potential Screening Is Used

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

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

- **TMDL implementation**: how do waters with TMDLs appear to differ in restorability? which TMDLs are good prospects?

- **nonpoint source program strategies**: how can considering restorability factors help watershed plans or statewide strategies?

- **special interest projects**: e.g., how does restorability differ across all nutrient impaired waters? across all urban waters? for fish restoration? among threatened waters?

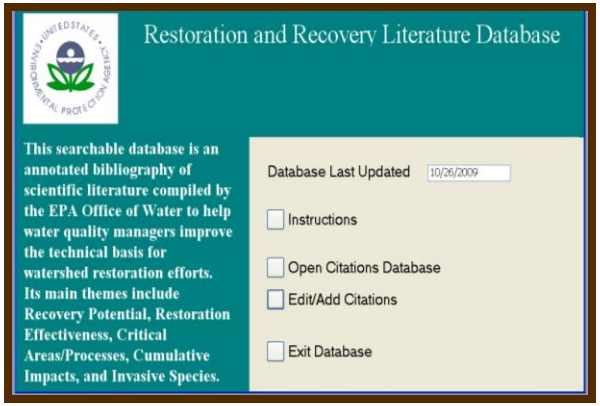
Where it started (2004)…

- **Numerous ecological and social factors are associated with the relative ability to recover from impairment**

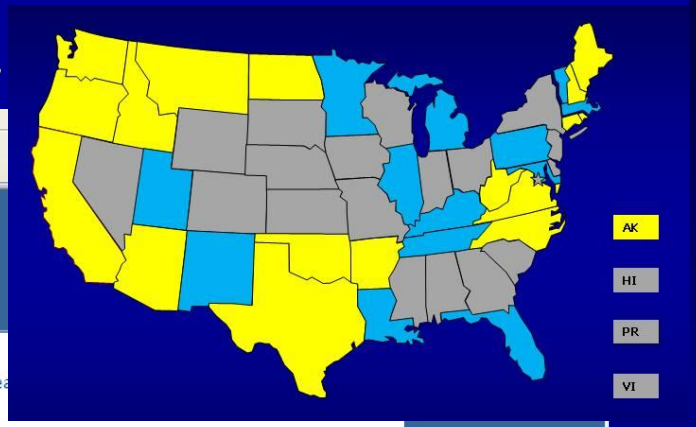
- Data… e availa… GIS da…)
- Anal…ng mult… reveal… f… nc…
- A syste… r…
- Rapid, flexible … (vs. a single outp…
- Systematic co… judgment in info…

Recovery Literature Review

- over 1700 published papers
- identification of factors influencing or associated with impaired waters recovery
- development of a cumulative literature database
- EPA researchers key role in design (Jim Wickham, Tim Wade NERL/RTP)



…and where we are now…



Recovery Potential Screening | Re...

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Water: Recovery Potential

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Recovery Potential Screening

Tools for Comparing Impaired Waters Restorability

Monitoring programs under the Clean Water Act have identified tens of thousands of US water bodies that do not meet Water Quality Standards and are in need of restoration. This website provides technical assistance for restoration programs to help them consider where to invest their efforts for greater likelihood of success, based on the traits of their own geographic area's environment and communities. There are three main website components. Step-by-step instructions in recovery potential screening provide watershed managers with a methodology for comparing restorability differences among their waters. The steps in the methodology link to several online tools and resources that are used in recovery potential screening. A library of recovery potential indicators offers technical information on specific recovery-related factors (ecological, stressor, and social), how they influence restorability, and how to measure them.
More ...

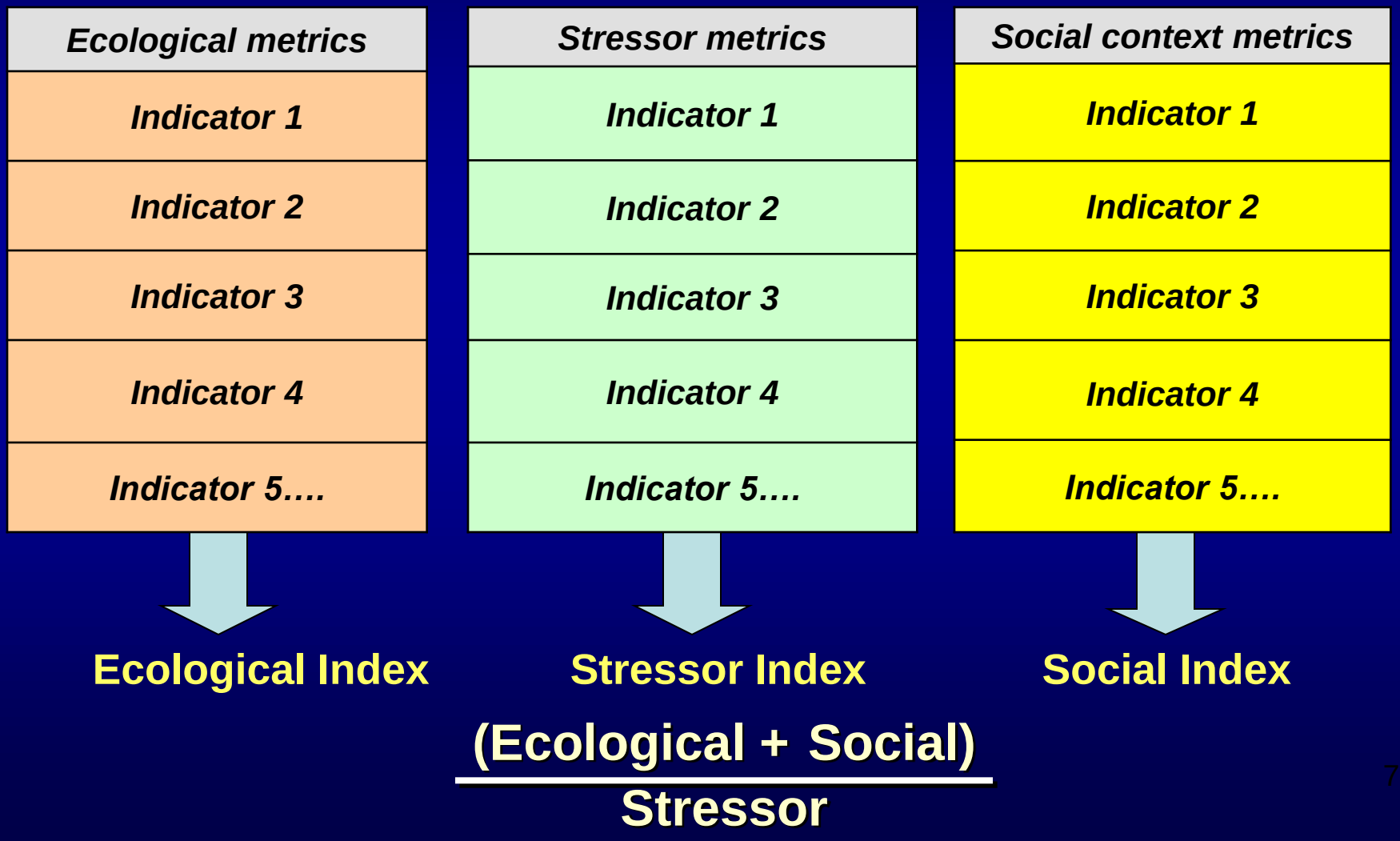
Quick Links

Home
Overview
Screening methodology
Step-by-step screening example
Example projects
Recovery tools & resources
Literature database
Indicators & reference sheets
Scoring techniques
Displaying screening results

www.epa.gov/recoverypotential/

How does it work?

Recovery Potential Screening - Basic Concept



RPS Ecological indicator types

• describe condition (physical structure, key processes) and implications for capacity to regain function:

1. **watershed natural structure**
2. **corridor condition**
3. **flow and channel dynamics**
4. **biotic community integrity**
5. **aquatic connectivity**
6. **ecological history**

RPS Stressor indicator types

• describe condition (sources and stressors) and the magnitude of risk they represent:

1. **watershed disturbance & sources**
2. **corridor or shorelands disturbance**
3. **flow or channel alteration**
4. **biological stressors**
5. **severity, complexity of pollution**
6. **land use legacies**

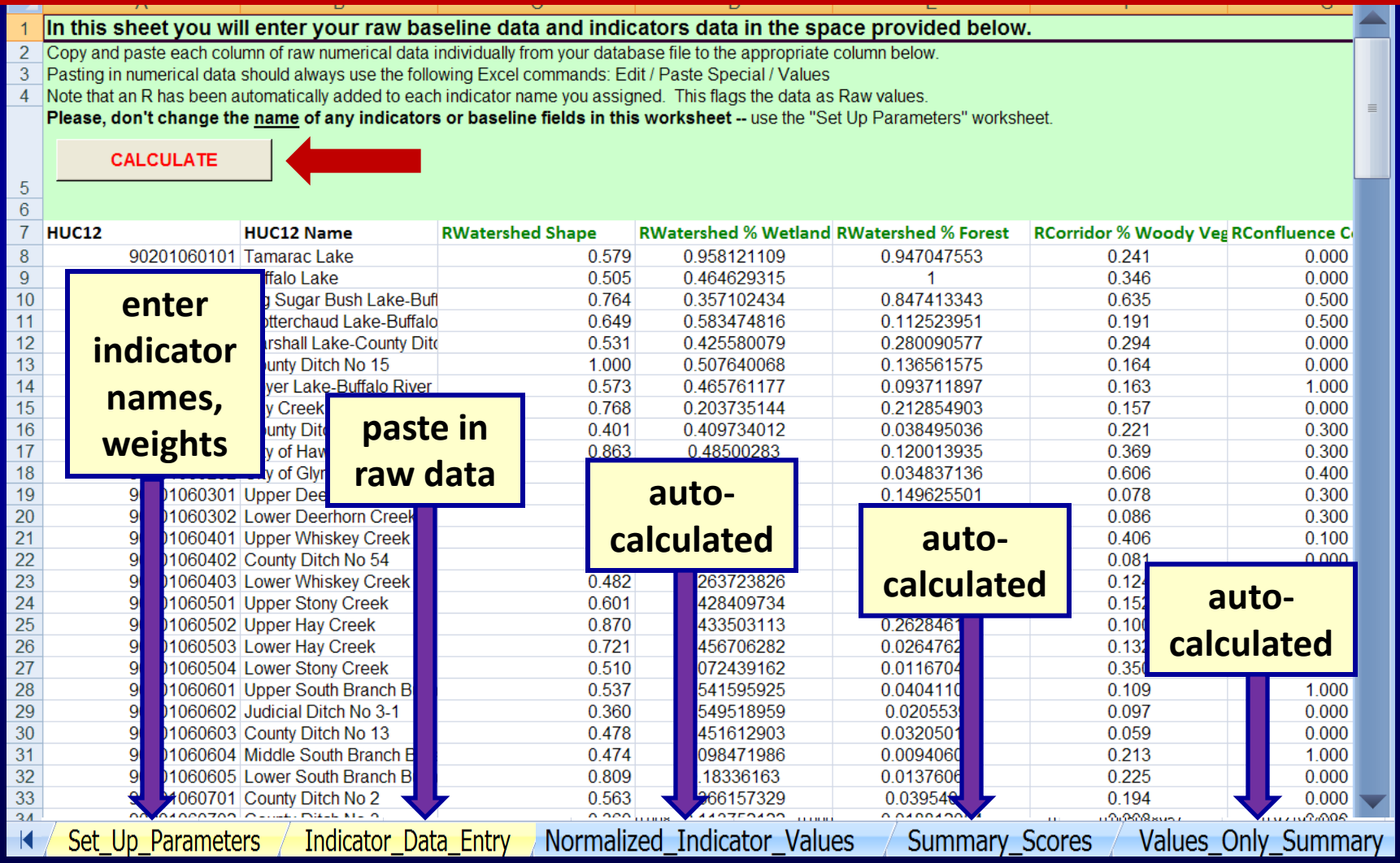
RPS Social indicator types

• these do not address ecological condition – they are societal factors that influence restoration success:

1. **leadership, organization, engagement**
2. **protective ownership or regulation**
3. **level of information, planning, certainty**
4. **cost, complexity**
5. **socio-economic factors**
6. **human health, uses, incentives**

RPS Auto-Scoring Spreadsheet Tool

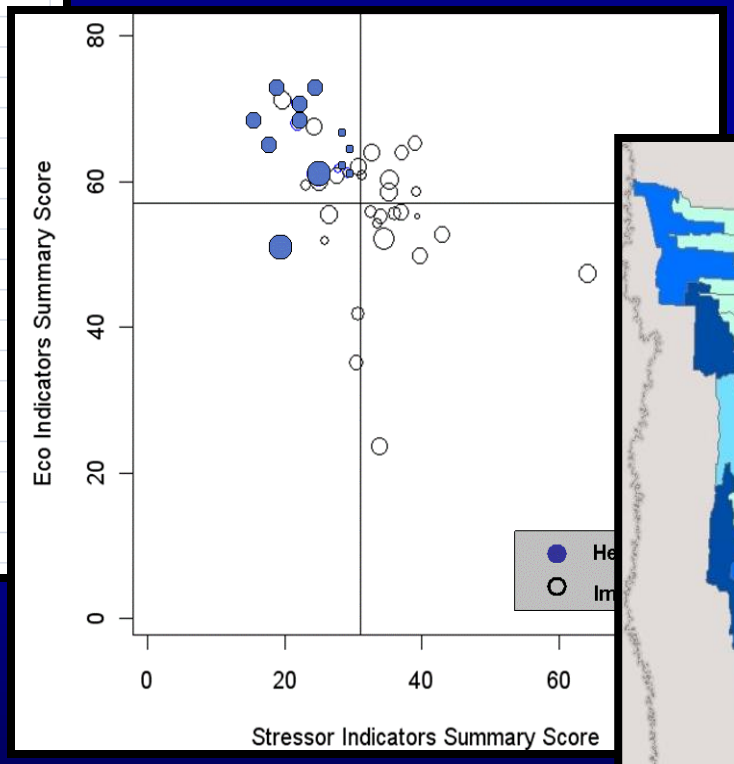
Creates statewide watershed scores spreadsheet in minutes, can vary screening factors and weights, run many scenarios



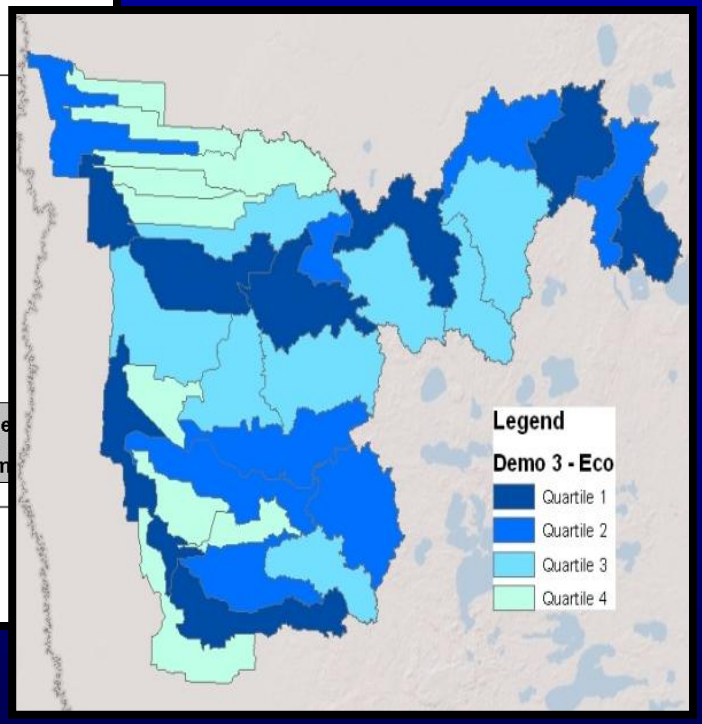
Three Types of Recovery Potential Screening Products (from the indicator scoring)

	A	B	C	D
1	HUC12ID	NAME	SUMFORMULA	SUMRANK
2	010802040205	Ware River-Barre F	35.31	1
3	011000050203	Hubbard Brook	3.84	2
4	010900020206	Sagamore groundw	3.74	3
5	010802040102	East Branch Swift F	3.74	4
6	010802070204	West Branch Farmi	3.63	5
7	010802060101	Westfield River-hea	3.56	6
8	010700040205	Nashua River-Catac	3.44	7
9	010900020203	Chequesset ground	3.43	8
10	010802060103	Dead Branch Westf	3.39	9
11	010802040202	East Branch Ware F	3.38	10
12	010802060202	West Branch Westf	3.37	11
13	010802060201	West Branch Westf	3.35	12
14	010900020301	Sippican River	3.25	13
15	011000050105	Housatonic River-V	3.23	14
16	010802020206	Millers River-Orcut	3.23	15
17	010802070201	Otis Reservoir	3.23	16
18	011000050204	Housatonic mainst	3.21	17
19	010802020203	Tully River	3.21	18
20	010802040206	Muddy Brook	3.18	19

Rank Ordering



Bubble Plotting



Mapping

Using Recovery Potential Screening Products

Comparing differences

	A	B	C	D	E	F	G	H	I	J
1	HUC12ID	NAME	SUMFORMULA	SUMRANK	ECOSUMSCORE	ECORANK	STRESSUMSCORE	STRESSORRANK	SOCIOSUMSCORE	SOCIORANK
2	010802040205	Ware River-Barre F	35.31	1	31.52	125	1.89	1	35.11	43
3	011000050203	Hubbard Brook	3.84	2	53.72	4	22.77	53	33.74	119
4	010900020206	Sagamore groundw	3.74	3	57.00	2	33.20	180	67.22	1
5	010802040102	East Branch Swift F	3.74	4	35.62	73	19.07	2	35.70	28
6	010802070204	West Branch Farmi	3.63	5	34.80	80	20.53	22	39.63	4
7	010802060101	Westfield River-hea	3.56	6	32.44	112	19.19	5	35.89	26
8	010700040205	Nashua River-Catac	3.44	7	52.07	5	25.20	97	34.74	59
9	010900020203	Chequesset ground	3.43	8	42.96	23	23.82	78	38.84	7
10	010802060103	Dead Branch Westl	3.39	9	35.13	77	20.78	23	35.25	39
11	010802040202	East Branch Ware F	3.38	10	37.46	56	21.45	31	35.07	46
12	010802060202	West Branch Westl	3.37	11	32.93	104	20.01	14	34.56	67
13	010802060201	West Branch Westl	3.35	12	42.69	25	23.13	58	34.76	58
14	010900020301	Sippican River	3.25	13	38.56	45	22.49	46	34.51	68
15	011000050105	Housatonic River-W	3.23	14	47.17	15	25.76	106	36.05	25
16	010802020206	Millers River-Orcut	3.23	15	34.64	82	22.00	37	36.42	20
17	010802070201	Otis Reservoir	3.23	16	36.07	64	23.75	76	40.55	3
18	011000050204	Housatonic mainst	3.21	17	37.73	53	22.52	47	34.65	61
19	010802020203	Tully River	3.21	18	33.73	90	21.29	29	34.61	64
20	010802040206	Muddy Brook	3.18	19	35.42	75	22.67	51	36.58	19
21	010700061201	Salmon Brook	3.14	20	40.75	32	23.87	80	34.11	94
22	010700040302	Squannacook River	3.13	21	48.42	11	26.31	113	33.82	113
23	010700040402	Nashua mainstem-	3.12	22	46.83	17	25.84	107	33.80	115
24	010802040104	Quabbin Reservoir-	3.12	23	21.35	222	19.32	6	38.90	6
25	010802030201	Deerfield River-She	3.12	24	31.33	128	22.52	48	38.92	5
26	010900010102	Parker River-Jackm	3.11	25	54.26	3	28.29	135	33.62	129
27	010802020101	Whitney Pond	3.08	26	37.56	54	23.66	72	35.34	38
28	010802010601	Sawmill River	3.06	27	31.84	119	21.81	34		
29	011000050107	Housatonic River-H	3.05	28	42.20	27	25.31	99		
30	010900040802	Assonet River	3.04	29	37.95	50	23.58	68		
31	010802040106	Swift River, includir	3.03	30	28.35	174	21.04	25		

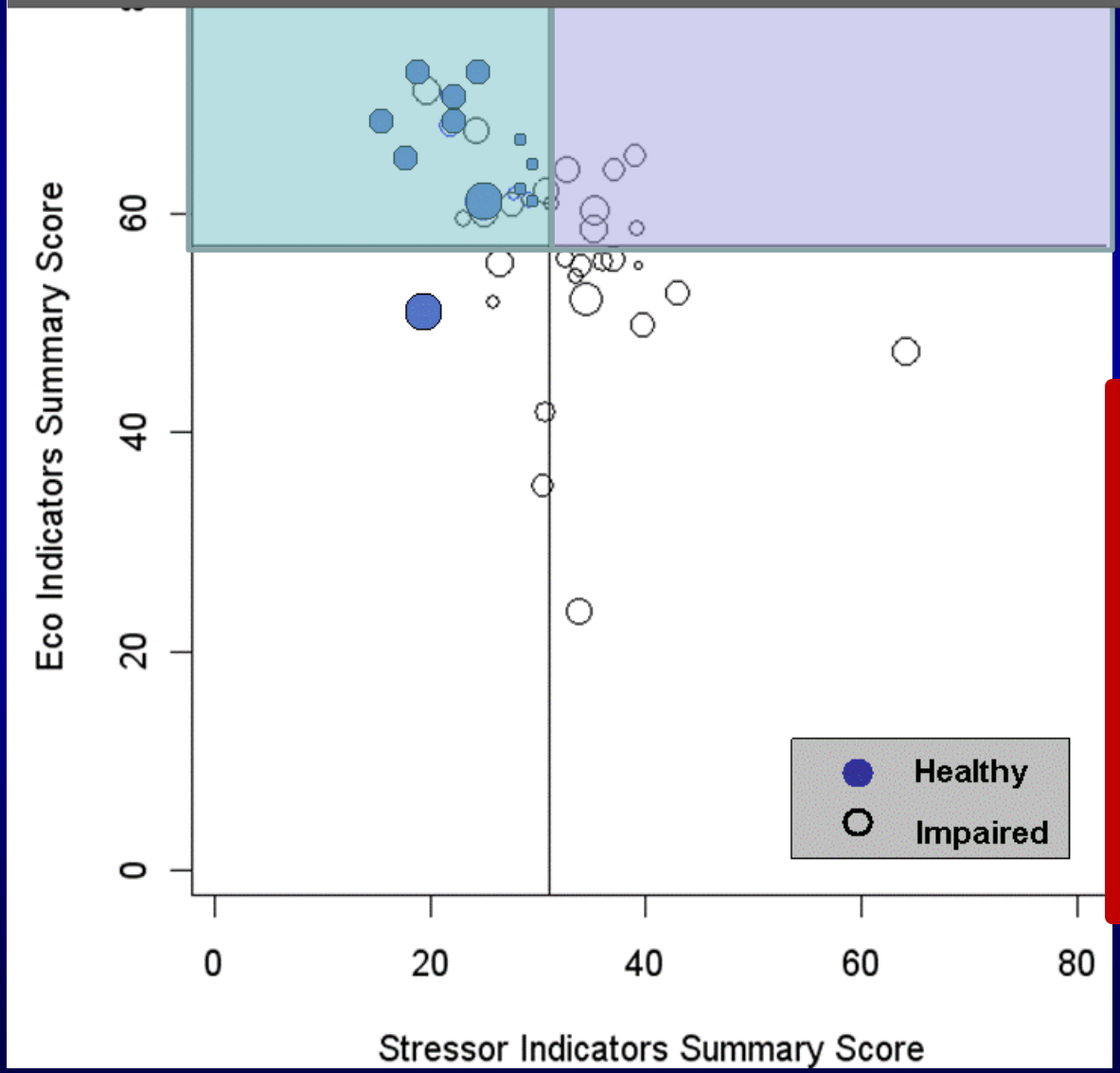
RANK-ORDERED WATERSHEDS (4 OPTIONS)

MASSACHUSETTS RECOVERY POTENTIAL SCREENING

Draft data, for concept demo only

Recovery Potential Screening:

RPS tools reveal impaired watersheds with good recovery prospects, healthy watershed risks



Bubble Plotting Tool

simultaneously compares differences in eco, stressor, social RPS scores

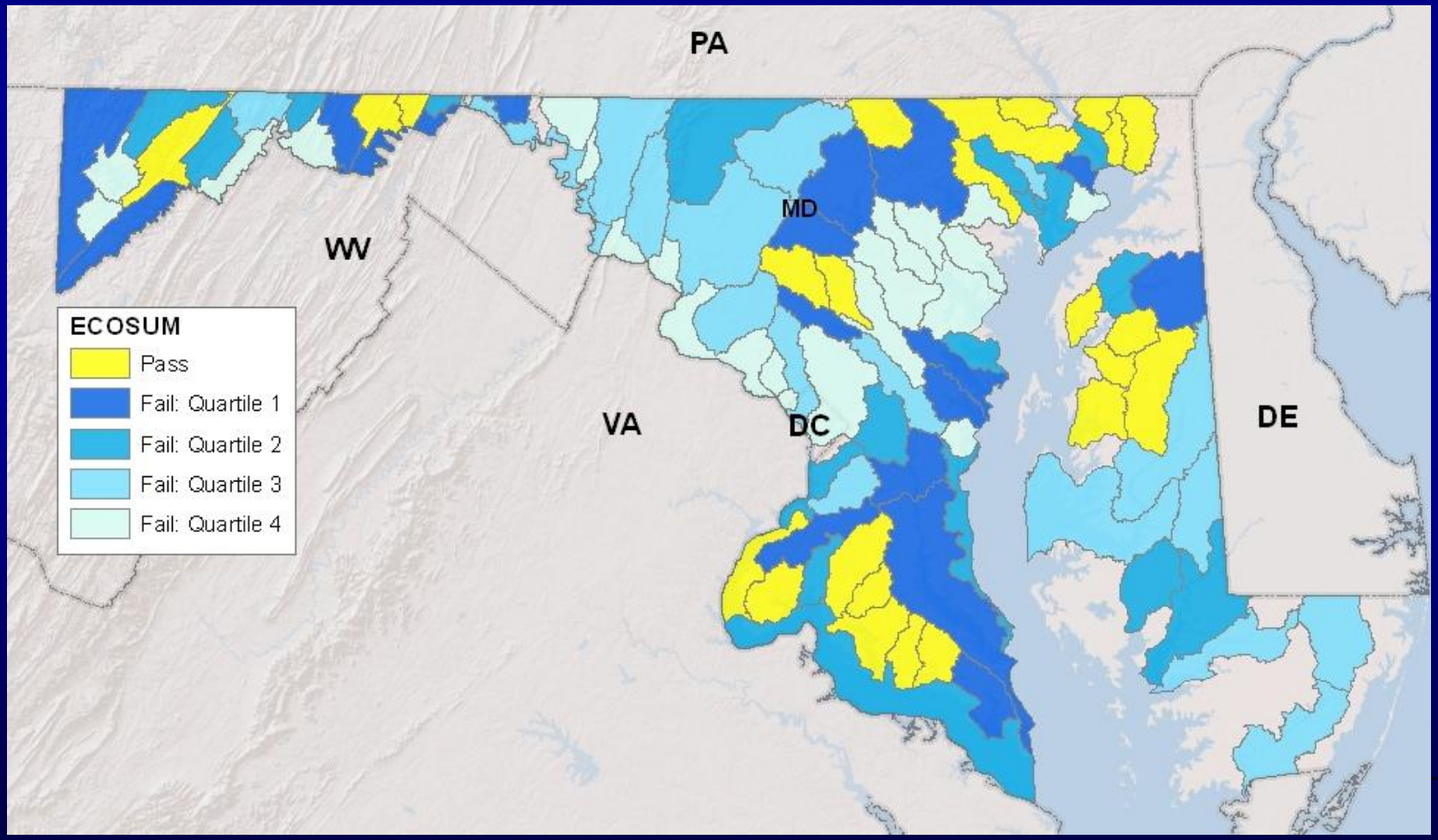
- ***upper left impaired watersheds are most like healthy***
- ***smaller healthy watershed dots - poorer social score may imply risk***

Using Recovery Potential Screening Products

Communicating findings

Mapping

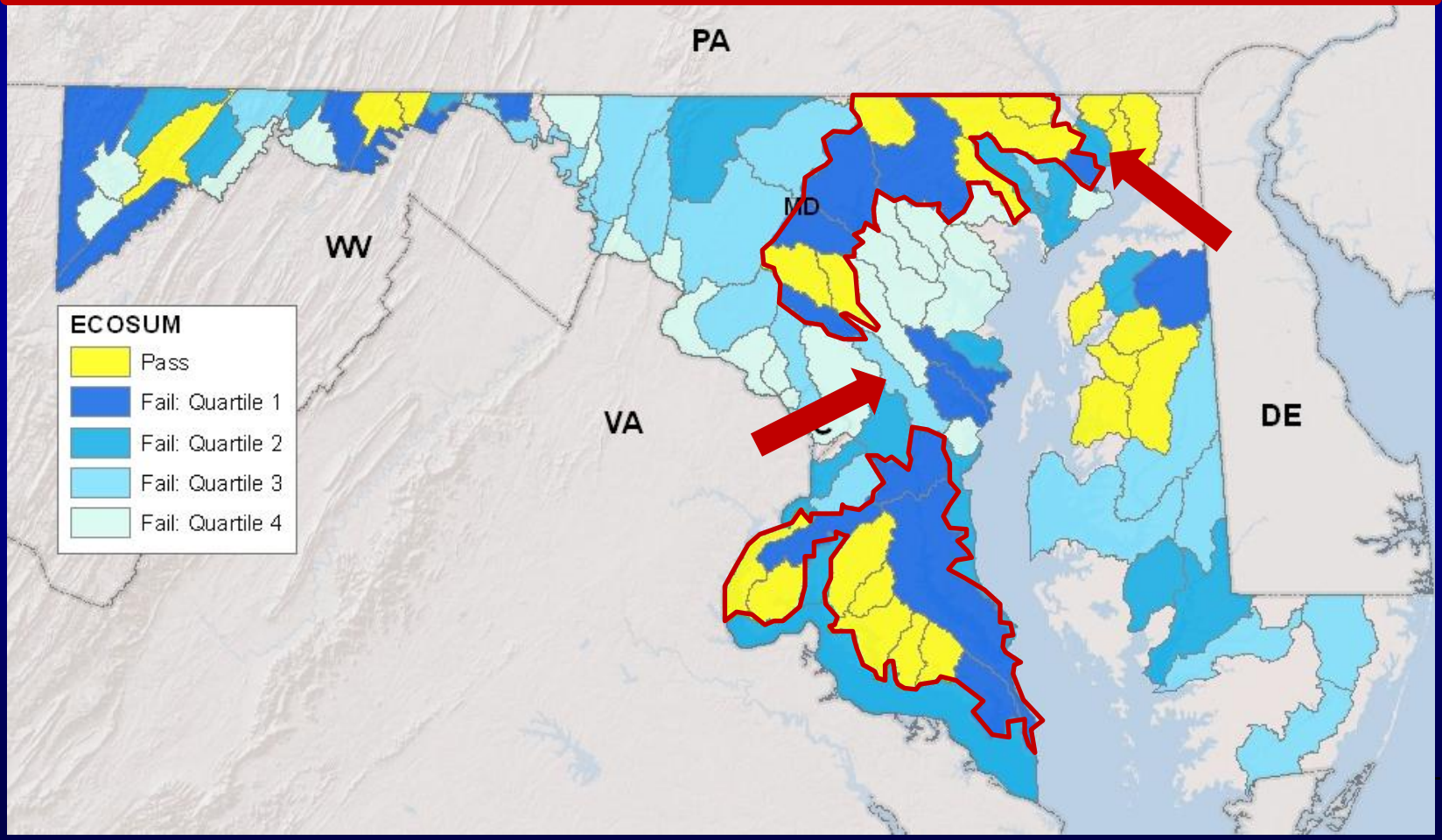
How can geographic settings influence selection of restoration priorities?



Recovery Potential Screening:

Locating best 'expand/connect' watersheds

Which restorations would most help meet healthy watershed goals by expanding patch size and connecting corridors?



Highlight: Applying RPS in Nutrients Strategies

Comparing nutrients-impacted watersheds

A simple starting point (re NP policy memo of 2011):

- **Compare HUC8 watersheds statewide or ecoregionally, based on nutrient load magnitude**

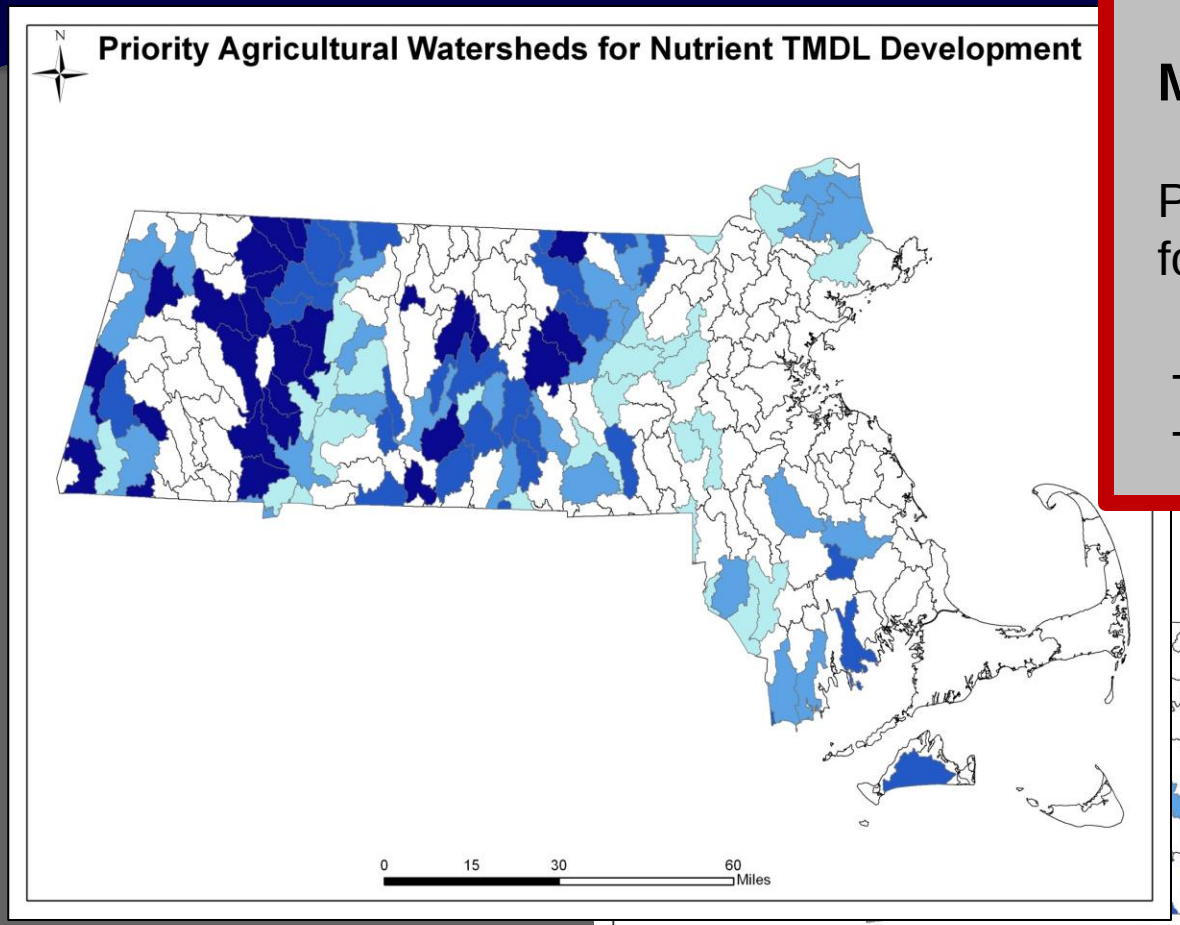
- **Within a priority subset of HUC8s, compare differences in recovery potential among their component HUC12s per watershed**

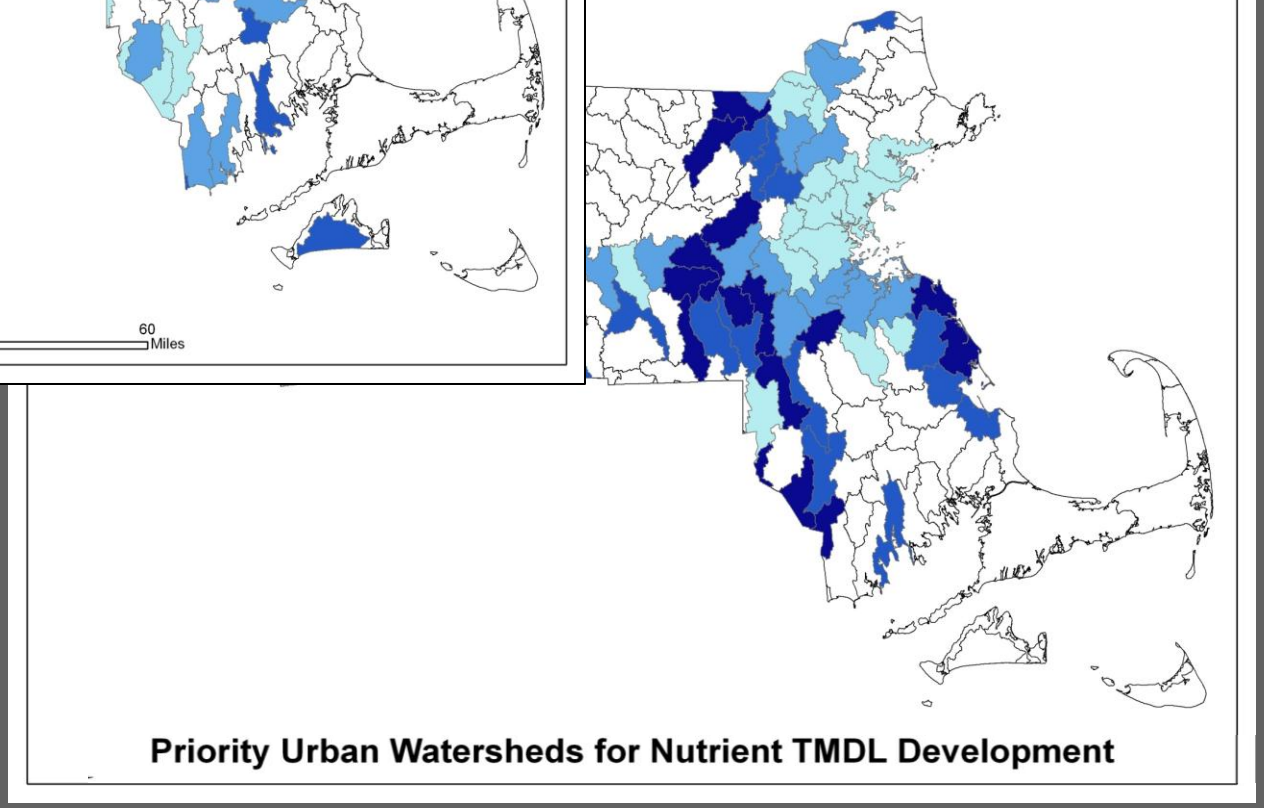
- **Invest effort in the HUC12s with the best combinations of recovery potential and load magnitude within each HUC8**

Massachusetts

Prioritized HUC12 watersheds for nutrient load reduction:

- Agricultural subset
- Urban subset





MASSACHUSETTS RECOVERY POTENTIAL SCREENING

Draft data, for concept demo only

Comparing nutrients-impacted watersheds

Maryland RPS Nutrients Example
(in response to USDA request for priority watersheds)

- ***Needed:***
  - ***systematic comparison of same metrics***
  - ***agricultural nutrients relevance***
  - ***restorability prospects***
  - ***social factors***

Two draft statewide RPS screenings were completed between lunch and mid-pm break at a states conference

Six screenings were completed, later refined, results used in recommendations to USDA

Recovery Potential Screening

Comparing nutrients-impacted watersheds

Descriptions of MDE Watershed Screenings for optimizing selection based on Agricultural Risks and higher Recovery Potential			
Screening	**Description**	**# Watersheds Identified of 94 total**	**# Qualifying watersheds also 303(d)**
S1	Ag stressors above statewide mean and within top quartile of RP eco index	14 of 94	**4**
S2	Ag stressors above statewide mean and within top quartile of RP social index	19 of 94	**16**
S3	Ag stressors above statewide mean and within top quartile of RP eco index and RP social index	1 of 94	**0**
S4	Ag stressors above statewide mean and within top quartile of RP eco index or RP social index	32 of 94	**17**
S5	Ag stressors above statewide mean and within top 10 of RP eco index or RP social index	16 of 94	**7**
S6	Rank-ordered watersheds by >1 time identified in S1 through S5, and failed bioassessment (303(d))	33 of 94 scored at least once in 5 screenings	**20**
S6a	Rank-ordered watersheds by >3 times identified in S1 through S5, and failed bioassessment (303(d))	14 of 94 scored at least 3 out of 5 screenings	**7**

Comparing nutrients-impacted watersheds

Maryland RPS Nutrients-Based Watershed Screening Results

MDE8DIGT	MDE8NAME	S1	S2	S3	S4	S5	S6 TOTAL SCORE FROM SYNTHs	PASSFAIL
02130609	Furnace Bay	1	1	1	1	1	5	Pass
02131108	Brighton Dam	1			1	1	3	Pass
02140504	Conococheague Creek		1		1	1	3	Fail
02130507	Corsica River	1			1	1	3	Pass
02120202	Deer Creek	1			1	1	3	Pass
02140302	Lower Monocacy River		1		1	1	3	Fail
02140503	Marsh Run		1		1	1	3	Fail
02130306	Marshyhope Creek		1		1	1	3	Fail
02140301	Potomac River FR Cnty		1		1	1		
02130508	Southeast Creek		1		1	1		
02140105	St. Clements Bay	1			1	1		
02130308	Transquaking River		1		1	1		
02130203	Upper Pocomoke River		1		1	1		
[illegible]	[illegible]	1			1	1		
02140305	Catoctin Creek		1		1			
02140304	Double Pipe Creek		1		1			
02120201	L Susquehanna River	1			1			
02130506	Langford Creek	1			1			
02130804	Little Gunpowder Falls	1			1			
02130805	Loch Raven Reservoir	1			1			
02130202	Lower Pocomoke River		1		1			
02130509	Middle Chester River		1		1			
02131106	Middle Patuxent River		1		1			
02120203	Octoraro Creek	1			1			
02140202	Potomac River MO Cnty		1		1			
02140501	Potomac River WA Cnty		1		1			
02130806	Prettyboy Reservoir	1			1			
02131107	Rocky Gorge Dam	1			1			
02130510	Upper Chester River		1		1			
02140106	Wicomico River				1	1		
02140502	Antietam Creek		1					
02130403	Lower Choptank		1					
02130908	S Branch Patapsco	1						

State RPS projects with EPA support

EPA Office of Water

- *project manager facilitates state input in design, uses*
- *indicator measurement and GIS dataset compilation (contractor)*
- *tech transfer/how to use screening tools with State's dataset*

State

- *involve state programs in planning uses, selecting indicators*
- *provide state GIS sources*
- *receive tech transfer training, the database and tools*

EPA Region

- *ensure consistency with state/EPA program relationships*

Outcome: State receives RPS data, learns user-driven tool

Environmental Management
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A Method for Comparative Analysis of Recovery Potential in Impaired Waters Restoration Planning

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John V. Thomas · Paul Zeph

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Abstract Common decision suppor
body of knowledge about ecologic
inform and guide large state and fe
grams affecting thousands of impair
federal Clean Water Act (CWA), wa
Water Quality Standards due to imp
are placed on the CWA Section 303

Thank you for your time!

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