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

Doug Norton, Watershed Branch AWPD/OWOW EPA Office of Water October 2012



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

• <u>revealing level of difficulty</u>: 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?

• <u>special interest projects</u>: 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 GIS da

• Analy reveal

• A sys

• Rapid, flexible (vs. a single out

 Systematic cor judgment in info

e availa 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...

The Edit view Favorites roots help



US Recovery Potential Screening | Re...

SEPA United States Environmental Protection Age

LEARN THE ISSUES SCIENCE & TECHNOLOGY LAWS & REGULATIONS ABOUT EPA

Water: Recovery Potential

Water Home

You are here: Water » Laws & Regulations » Laws & Executive Orders » Clea (303d) » Recovery Potential Screening

Recovery Potential Screening

Drinking Water

Education & Training

Grants & Funding Laws & Regulations Policy & Guidance Laws & Executive Orders Regulatory Information Regulatory Info by Business Sector Tribal

Our Waters

Pollution Prevention & Control

Resources & Performance

Science & Technology

Water Infrastructure

What You Can Do

Tools for Comparing Impaired Waters Restorability
Recovery Potential Screening



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/

AK HI PR VI

How does it work?

Recovery Potential Screening - Basic Concept

Ecological metrics	Stressor metrics	Social context metrics					
Indicator 1	Indicator 1	Indicator 1					
Indicator 2	Indicator 2	Indicator 2					
Indicator 3	Indicator 3	Indicator 3					
Indicator 4	Indicator 4	Indicator 4					
Indicator 5	Indicator 5	Indicator 5					
Ecological Index	Stressor Index	Social Index					
(Ecological + Social)							
	Stressor						

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 <u>do not</u> 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

	In this sheet you w	ill optor vour row bo	ooline date and india	atora data in the a	naaa provided belew					
1	in this sheet you w	in enter your raw ba	iseline data and indic	ators data in the s	pace provided below	•				
2	Copy and paste each column of raw numerical data individually from your database file to the appropriate column below.									
3	Pasting in numerical data should always use the following Excel commands: Edit / Paste Special / Values									
4	Note that an K has been automatically added to each indicator name you assigned. This flags the data as Kaw values.									
	Please, don't change the name of any indicators or baseline fields in this worksheet use the "Set Up Parameters" worksheet.									
-										
5	_									
7	HUC12	HUC12 Name	RWatershed Shape	RWatershed % Wetlan	d RWatershed % Forest	RCorridor % Woody Ve	RConfluence C			
8	00201060101	Tamarac Lako	0.570	0.058121100	0.047047553	0.241	0.000			
q	3020100010	ffalo Lake	0.575	0.464629315	1	0.346	0.000			
10	ontor	I Sugar Bush Lake-Bu	0.303	0.357102434	0.847413343	0.635	0.500			
11	enter	tterchaud Lake-Buffal	0 0 649	0.583474816	0 112523951	0.191	0.500			
12	indicator	rshall Lake-County Di	tc 0.531	0 425580079	0 280090577	0 294	0.000			
13	Indicator	unty Ditch No 15	1.000	0.507640068	0.136561575	0.164	0.000			
14		ver Lake-Buffalo River	r 0.573	0.465761177	0.093711897	0.163	1.000			
15	names,	y Creek	0.768	0.203735144	0.212854903	0.157	0.000			
16	• • •	unty Dite past	ein 0.401	0.409734012	0.038495036	0.221	0.300			
17	weights	y of Hav	0.863	0.48500283	0.120013935	0.369	0.300			
18		y of Glyr raw	data		0.034837136	0.606	0.400			
19	9 01060301	Upper Dee		auto-	0.149625501	0.078	0.300			
20	9 01060302	2 Lower Deerhorn Creek				0.086	0.300			
21	9 01060401	Upper Whiskey Creek	Ca	alculated	auto-	0.406	0.100			
22	9 01060402	2 County Ditch No 54				0.081	0.000			
23	9 01060403	B Lower Whiskey Creek	0.482	263723826	calculate	C 0.12				
24	9 01060501	Upper Stony Creek	0.601	428409734		0.152	auto-			
25	9 01060502	2 Upper Hay Creek	0.870	433503113	0.2628461	0.100				
26	9 01060503	Lower Hay Creek	0.721	456706282	0.0264762	0.132 Cal	culated			
27	9 1060504	Lower Stony Creek	0.510	072439162	0.0116704	0.35	1 000			
28	9 01060601	Upper South Branch B	0.537	541595925	0.0404110	0.109	1.000			
29	9 01060602	2 Judicial Ditch No 3-1	0.360	549518959	0.020553	0.097	0.000			
30	9 01060603	Gounty Ditch No 13	0.478	451612903	0.0320501	0.059	0.000			
31	9 11060604	Initiale South Branch E	0.474	0984/1986	0.0094060	0.213	1.000			
32	9 01060605	County Ditch No 2	0.809	. 10330103	0.0137000	0.220	0.000			
34	000/01	County Ditch No 2	0.003	440750400	0.03934	U.194				
K	Set_Up_Paramet	ers / Indicator_Da	ta_Entry Normaliz	ed_Indicator_Val	ues / Summary_	Scores Values	Only_Summary			

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



Mapping

Using Recovery Potential Screening Products Comparing differences

	А	В	С	D	E	F	G	Н	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-Cata	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 West	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 West	3.37	11	32.93	104	20.01	14	34.56	67	
13	010802060201	West Branch West	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-V	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	25.24	20	
28	010802010601	Sawmill River	3.06	27	31.84	119	21.81	34	MASSACHU	SETTS	
29	011000050107	Housatonic River-H	3.05	28	42.20	27	25.31	99	DECOVERY DOTENTIAL		
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	SCREENING		

RANK-ORDERED WATERSHEDS (4 OPTIONS)

SCREENING Draft data, for concept demo only

0

🗖 X

¥.

Recovery Potential Screening:

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



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

Recovery Potential Screening

Comparing nutrients-impacted watersheds

<u>A simple starting point (re NP policy memo of 2011):</u>

- 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



Recovery Potential Screening

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

		# Watersheds Identified	# Qualifying watersheds
Screening	Description	of 94 total	also 303(d)
	Ag stressors above statewide mean <u>and within top</u>		
S1	quartile of RP eco index	14 of 94	4
	Ag stressors above statewide mean <u>and within top</u>		
S2	quartile of RP social index	19 of 94	16
	Ag stressors above statewide mean <u>and within top</u>		
S3	quartile of RP eco index and RP social index	1 of 94	0
	Ag stressors above statewide mean <u>and within top</u>		
S4	quartile of RP eco index <u>or</u> RP social index	32 of 94	17
	Ag stressors above statewide mean <u>and within top 10 of</u>		
S5	RP eco index <u>or</u> RP social index	16 of 94	7
	Rank-ordered watersheds by >1 time identified in S1	33 of 94 scored at	
56	through S5, and failed bioassessment (303(d))	least once in 5	20
	Deals and and watersheds by 2 times identified in C1	14 of 94 scored at	20
	Rank-ordered watersneds by >3 times identified in S1	least 3 out of 5	
S6a	through S5, <u>and</u> failed bioassessment (303(d))	screenings	7

Comparing nutrients-impacted watersheds

Maryland RPS Nutrients-Based Watershed Screening Results

							S6 TOTAL SCORE		
MDE8DIGT	MDE8NAME	S1	S2	S3	S4	S5	FROM SYNTHs	PASSFAIL	
02130609	Furnace Bay	1	L 1	L 1	1 1	. 1	5	Pass	
02131108	Brighton Dam	1	L		1	. 1	3	Pass	
02140504	Conococheague Creek		1	L	1	. 1	3	Fail	
02130507	Corsica River	1	L		1	. 1	3	Pass	
02120202	Deer Creek	1	L		1	. 1	3	Pass	
02140302	Lower Monocacy River		1	L	1	. 1	3	Fail	
02140503	Marsh Run		1	L	1	. 1	3	Fail	
02130306	Marshyhope Creek		1	L	1	. 1	3	Fail	
02140301	Potomac River FR Cnty		1	L	1	. 1	A D	C D E 7 G	H I SE TOTAL SCORE
02130508	Southeast Creek		1	L	1	. 1	1 HOESDIGT HOESHAME 51 2 A219163 Farmar Bay 3 A219168 Daylow Daw 4 A2141584 Communication Careful	52 53 54 55 4 4 4 4 4 1 1 1 1 1	FROM SYNTH. PASSP 1 5 P 1 1 P 1 1 P 1 1 P
02140105	St. Clements Bay	1	L		1	. 1	5 REMIST Consultance 6 REMIRE Drue Const 7 REMIRE Dure Const 1 REMIRE Lower Human Race		
02130308	Transquaking River		1	L	1	. 1	1 R201016 Handshap Conk 1 R201016 Palance Rev /R Calg 1 R201018 South and Conk		
02130203	Upper Pocomoke River		1	L	1	. 1	12 0240105 331. Ganzala Bug 13 0240308 Transgadag Rerr 14 02593208 Upper Parameter Rerr 15 02493208 Upper Parameter Rerr 15 02493208 Upper Parameter Rerr		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
02120502	Whe Biver	1	L		1	. 1	11 R240385 Collarlo Coroli 12 R240386 Daulo Par Coroli 11 R2428284 L24000 Ranne 12 R240386 Landerd Coroli		2 Fa
02140305	Catoctin Creek		1		1	-	21 R213101 Ulle Gaugender Fan 21 R213102 Luik Rave Revenue 22 R213122 Luik Rave Revenue 23 R213122 Luie Caulas Rave		2 P.a 2 F. 2 F.
02140304	Double Pipe Creek		1	L	1	-	24 R2151185 Hilds Palaneal Rave 25 R212285 Oalar are Creek 26 R2142282 Palaneae Creek 28 R2141222 Palaneae Rave MO Calg		2 Par 2 Par 2 Iu
02120201	L Susquehanna River	1	L		1	-	21 A210101 Perilliga Revenue 23 A2101102 Reading George Dam 31 A2101102 Reading George Dam		1 10 2 Pa 1 14 1 14
02130506	Langford Creek	1	L		1	-	21 ACMINE Weather Kern 22 ACMINE Adulta Creek 23 ACMINE Laure Capital 24 ACMINE Sprank Palapan		
02130804	Little Gunpowder Falls	1	L		1		25 R251715 Alkerdree Prans Grand 36 R250215 Alkerdree Prans Grand 37 R250215 Alkerdree Revenue 31 R2513181 Dask Reven		
02130805	Loch Raven Reservoir	1	L		1	_	17 A 202202 Deleaser Recker 17 A 200200 Deleaser Recker 17 A 200200 Deleaser Recker 17 A 202200 Decead Correls 17 A 202200 Decead Correls		
02130202	Lower Pocomoke River		1	L	1	_	43 R2132784 Departe Res 44 R2148287 Code John Corrols 45 R5121214 Construct Reser		
02130509	Middle Chester River		1	L	1	_	Control Control Control Control Control Control Control Contr		
02131106	Middle Patuxent River		1	L	1		51 7240197 Givel Sump 51 7219195 Guyen Fun 52 7219194 Jane Fun 53 7219194 Jane Fun		
02120203	Octoraro Creek	1	L		1		24 Zentistik Lakan Greek 25 Zentisti Lille Pulawal Rane 26 Zentisti Lille Pulawal Rane 27 Statistik Lille Tananag Greek 28 Statistik Lille Yanakashara R		
02140202	Potomac River MO Cnty		1	L	1		21 R210102 Lourr Generator La 21 R210101 Lourr Warnes Rarr 21 R210101 Lourr Warnes Rarr 21 R210102 Lourr Walres Res		
02140501	Potomac River WA Cnty		1	L	1	-	22 REVENTER Hallauman Creek 23 REVENTER Hallauman Creek 24 REVENTER Hauseung Creek 24 REVENTER Hauseung Creek		
02130806	Prettyboy Reservoir	1	L		1		IS R201688 Nuclinaal Roor 1 R2010186 Pulayees Roor Little R2010186 Pulayees Roor and R2010181 Pulayees Roor and R2010182 Pulayees Roor and		
02131107	Rocky Gorge Dam	1	L		1		51 200110 Palantal Rate appre 21 2001205 Pacabase Gent 21 200105 Part Takana Rate 22 200105 Palanta Rate At Cala		
02130510	Upper Chester River		1	L	1		23 R2101811 Palanan Ruor Lift Paranti 24 R200181 Palanan Ruor Lifta 25 R200182 Palanan Ruor Lifta		
02140106	Wicomico River				1	. 1	27 EHERT Palman Revelling 21 EHERT Palman Revelling 21 EHERT Rack Court		
02140502	Antietam Creek		1	L			II REMER Severa Corek II REMER Severa Rare R REMER Stray & Corek II REMER Stray & Corek		
02130403	Lower Choptank		1				14 R2101103 SL Marga Rave 15 R2101216 Suza Corek 16 R2101216 Suza Corek 17 R2101512 Task Corek		
02130908	S Branch Patapsco	1					11 R201414 Upper Chaptest 11 R201414 Upper Chaptest 11 R201413 Upper Humany Rece 11 R201415 West Chapter Day		
							32 RC12100 Westware 32 R219103 Westware Prank 33 R219103 Westware Prank		⊨ ≓≓ë

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

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

Douglas J. Norton · James D. Wickham · Timothy G. Wade · Kelly Kunert · John V. Thomas · Paul Zeph

Received: 8 September 2008 / Accepted: 2 . © Springer Science+Business Media, LLC

Abstract Common decision suppor body of knowledge about ecologica 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!

Contact information:

Doug Norton, USEPA Office of Water

202-566-1221 or norton.douglas@epa.gov

Jim Wickham, USEPA ORD

919-541-3077 or wickham.james@epa.gov