



Recovery Potential Screening in Maryland Watersheds using Monitoring and Landscape Data

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**National Water Quality Monitoring Conference
Denver, CO ~ April 2010**

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“Recovery potential should be a primary consideration in restoration programs whose main aim is to bring about recovery.”

EPA TMDL Program Results Analysis Web Site,
May 2009

“We are undertaking a multi-year initiative to target watershed restoration resources to biologically degraded non-tidal streams with high recovery potential. Our objective is to remove waters from Maryland's 303(d) list.”

Jim George, Manager
MDE WQ Protection & Restoration Program

What is Recovery Potential Screening?

A method to help impaired waters restoration planners compare restorability

- Origins in TMDL/303(d) impaired waters program priority setting
- Flexible, indicator-based
- Largely GIS-driven
- Landscape and monitoring metrics

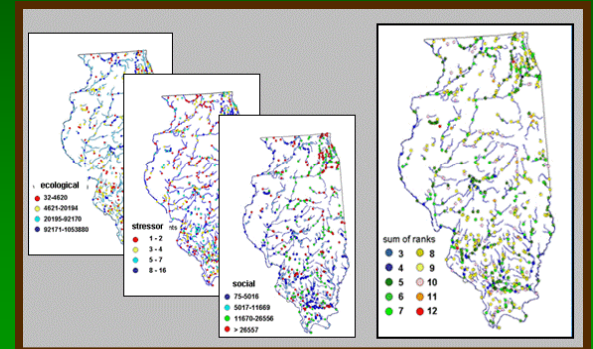
Recovery potential *is the likelihood of an impaired water to reattain Water Quality Standards or other valued attributes, given its*

- *ecological capacity,*
- *exposure to stressors, and*
- *the social context affecting efforts to improve its condition.*

State and EPA Regional Recovery Potential Screening Assessments

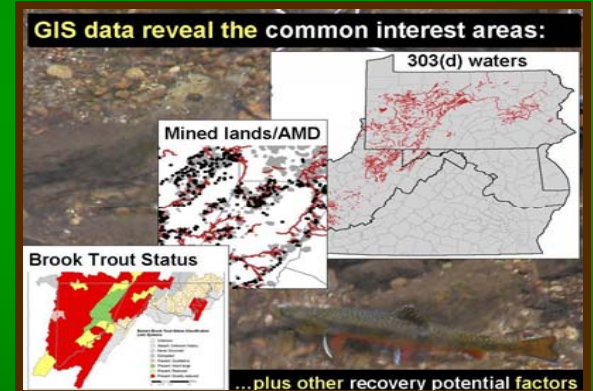
Illinois 303(d) list prioritization pilot study

- 303(d) list 'prioritized schedule' support tool
- 104 ecological, stressor and social indicators



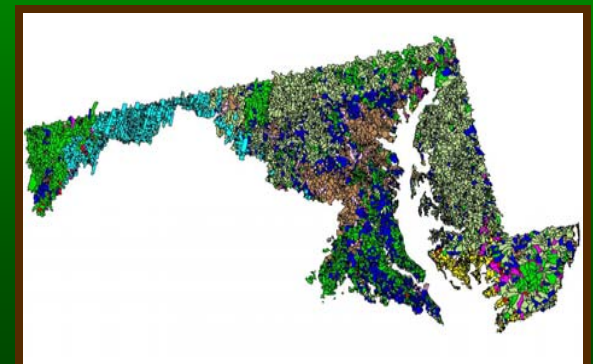
Mid-Atlantic states recovery screening

- narrowly focused on native trout recovery factors
- rapidly completed by states, EPA Region 3



Maryland impaired watersheds screening

- addressed restorability at two scales
- which are the most restorable?
- which would improve larger watershed's condition?



Recovery Potential Screening in Maryland Watersheds

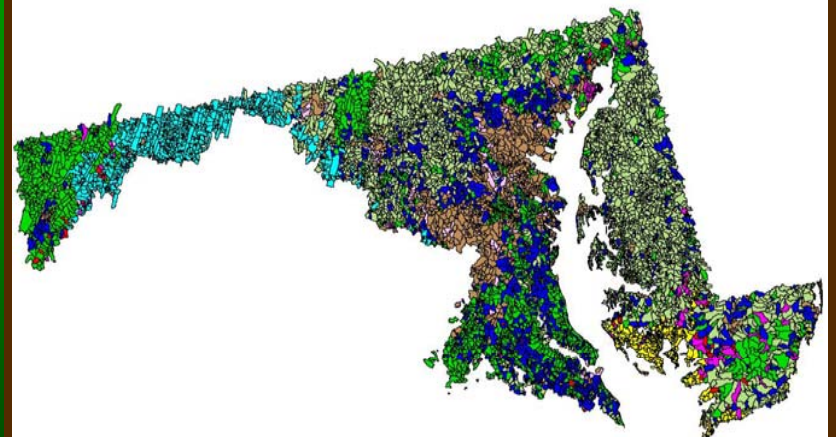
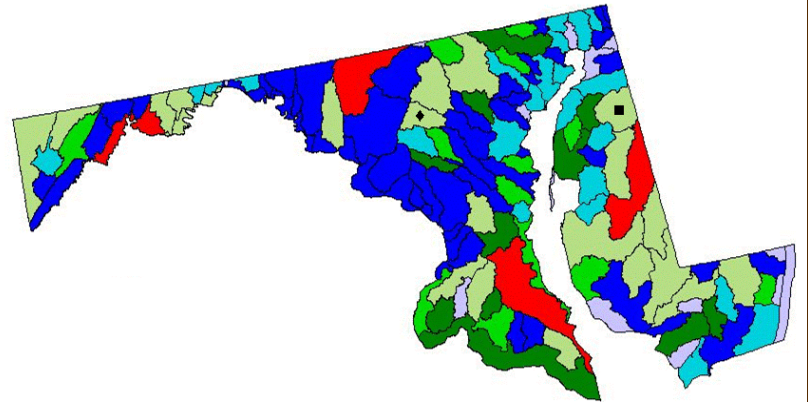
Two scales of interest

- **94** MD HUCs, 303(d) listing level screening statewide

➔ *which HUCs are the most restorable?*

- **1367** catchments, compared within individual HUCs

➔ *which catchments' restoration would most likely improve a specific HUC's condition?*



HUC	Watershed	WQI	WQI	WQI	WQI	WQI	WQI	WQI
120000	Island East	17.8	7	1,121	Pass	3.00	2,000	
120001	Island West	24.4	10	1,121	Pass	4.00	2,000	
120002	Jensen Bay	24.2	9	1,111	Pass	4.00	2,000	
120003	Johnson Bay	41.8	13	1,121	Pass	5.00	2,000	
120004	Johnson Bay W Side	31.2	12	1,121	Pass	4.00	2,000	
120005	Kent East	11	12	1,111	Pass	3.00	1,170	
120006	Kent West	24.2	10	1,100	Pass	3.00	1,000	
120007	St. Charles Bay	46.7	12	1,121	Pass	3.00	2,000	
120008	Mad Bay	10.8	12	1,121	Pass	3.00	2,000	
120009	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120010	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120011	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120012	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120013	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120014	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120015	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120016	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120017	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120018	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120019	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120020	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120021	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120022	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120023	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120024	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120025	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120026	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120027	Mad River	10.8	12	1,121	Pass	3.00	2,000	
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120029	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120030	Mad River	10.8	12	1,121	Pass	3.00	2,000	
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120070	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120071	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120072	Mad River	10.8	12	1,121	Pass	3.00	2,000	
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120076	Mad River	10.8	12	1,121	Pass	3.00	2,000	
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120081	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120082	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120083	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120084	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120085	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120086	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120087	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120088	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120089	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120090	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120091	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120092	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120093	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120094	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120095	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120096	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120097	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120098	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120099	Mad River	10.8	12	1,121	Pass	3.00	2,000	
120100	Mad River	10.8	12	1,121	Pass	3.00	2,000	

Screening among AND within HUCs in MD:

Several **borderline-impaired MD HUCs** (left) seem to stand out from bioassessment screening metrics alone as good targets for restoration.

What might further illuminate HUC recovery potential if **more comparison metrics** are used –

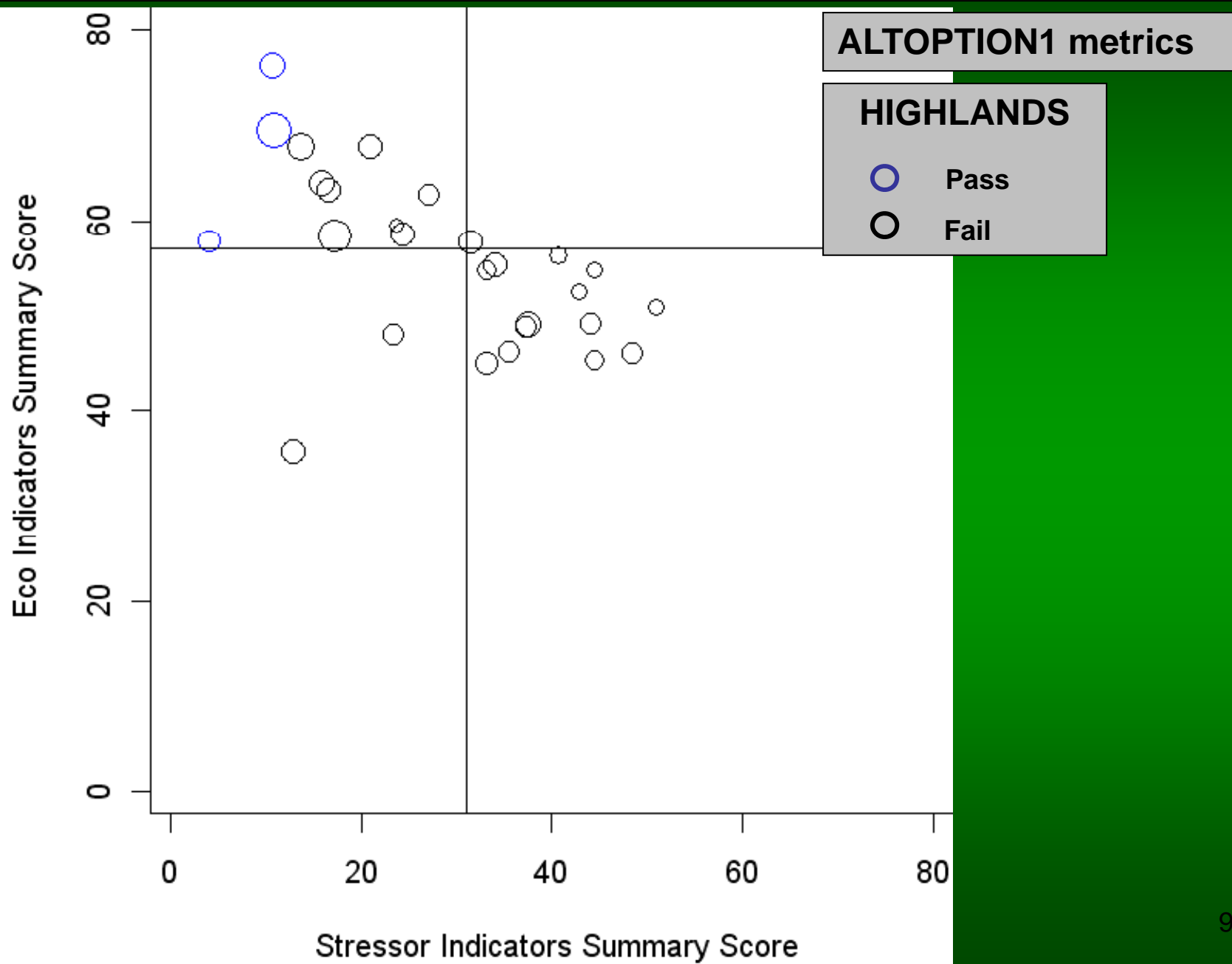
- to compare one HUC to another?
- to compare smaller catchments within each HUC?

Recovery Potential Screening of 94 MDE Watersheds

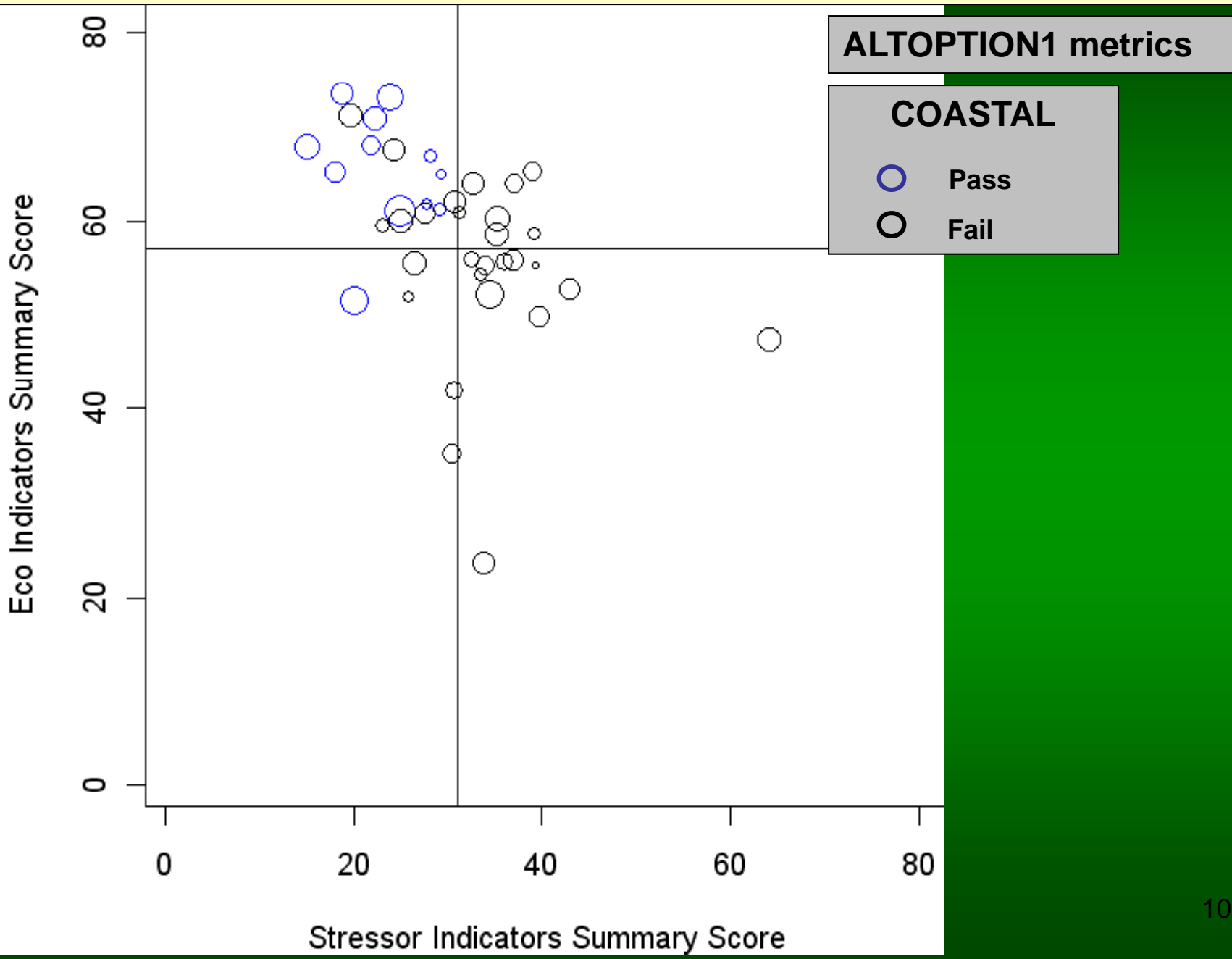
Selected Indicators

<i>Ecological metrics</i>	<i>Stressor metrics</i>	<i>Social context metrics</i>
Biotic condition: benthic IBI score	Proportion of degraded sites per watershed	Protected landownership % by watershed
Biotic condition: fish IBI score	Corridor % impervious cover per watershed	Proportion of stream miles with stressor-attributed risk
Recolonization: density of confluences	Watershed % cropland and pasture	Complexity: watershed # of local jurisdictions
Bank stability: MBSS buffer vegetation	Housing counts per corridor length in watershed	Tier 2 waters % per watershed
Natural channel form and condition	Watershed 2006 # of 303(d) impairment causes	Watershed % targeted by DNR for protection

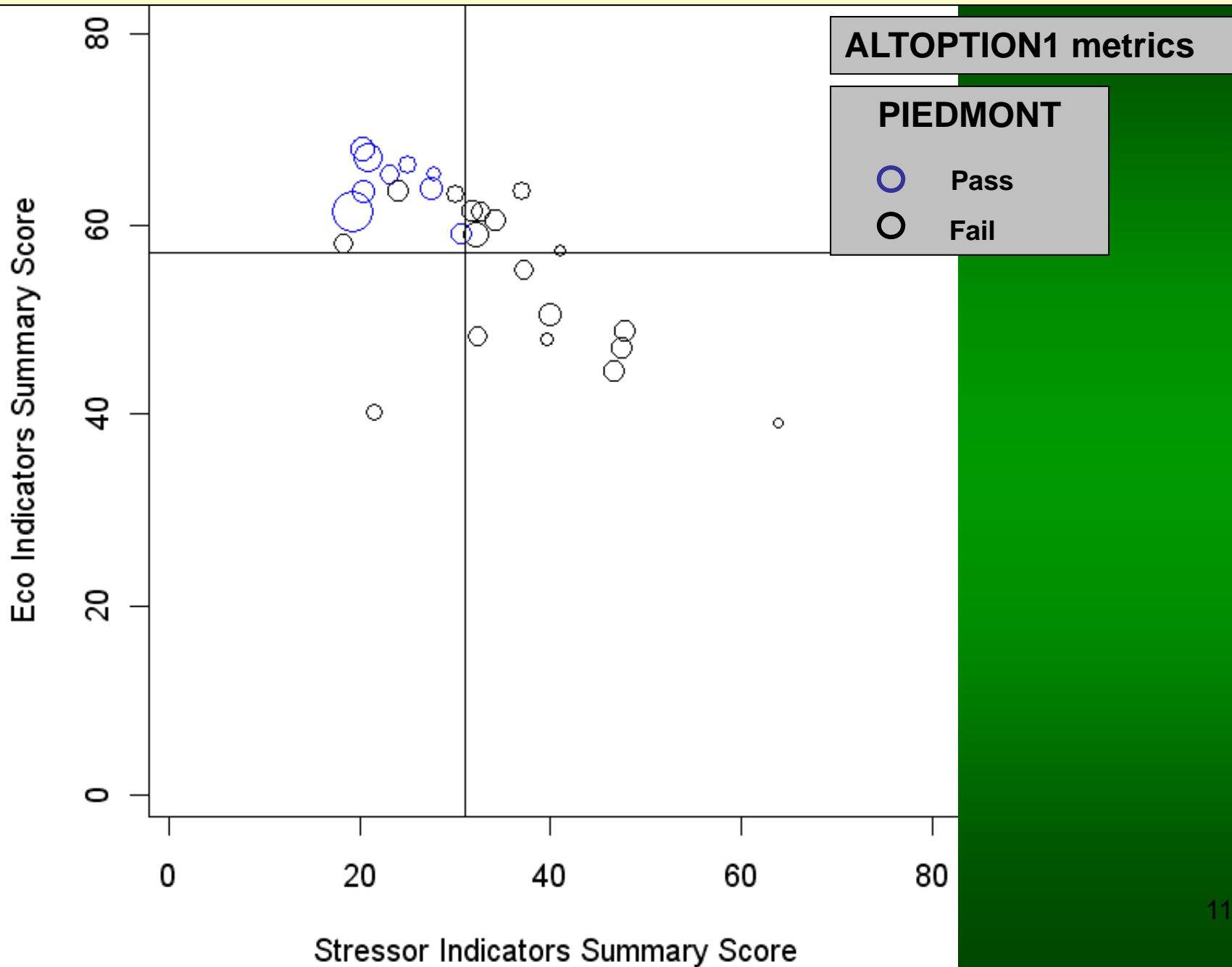
MDE RECOVERY POTENTIAL SCREENING, HIGHLANDS ECOREGION SUMMARY



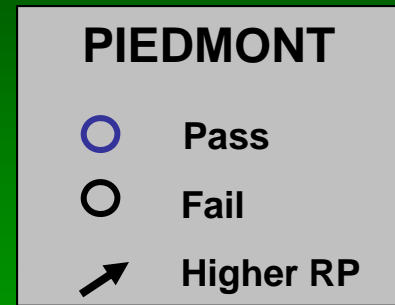
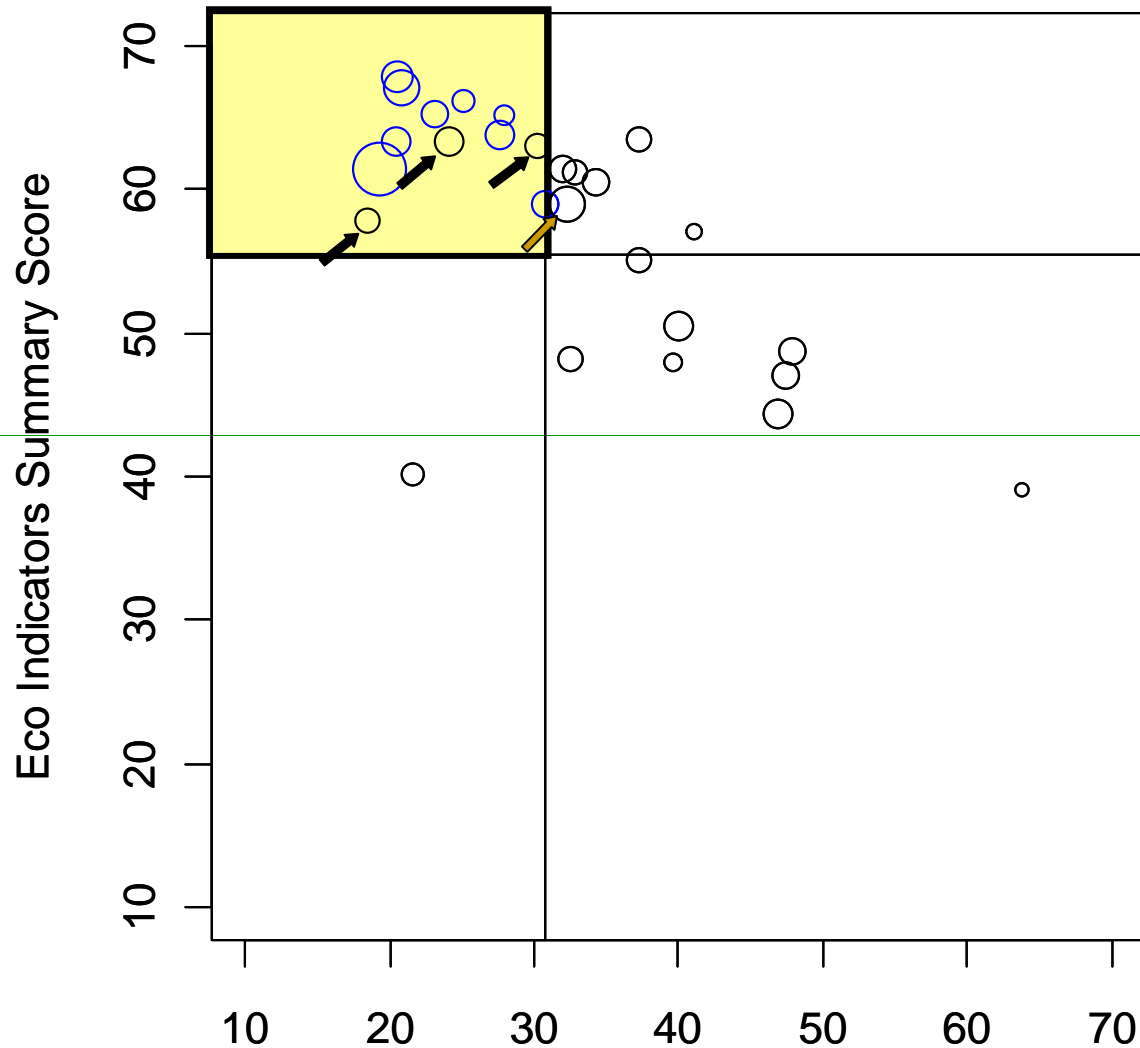
MDE RECOVERY POTENTIAL SCREENING, COASTAL ECOREGION SUMMARY



MDE RECOVERY POTENTIAL SCREENING, PIEDMONT ECOREGION SUMMARY

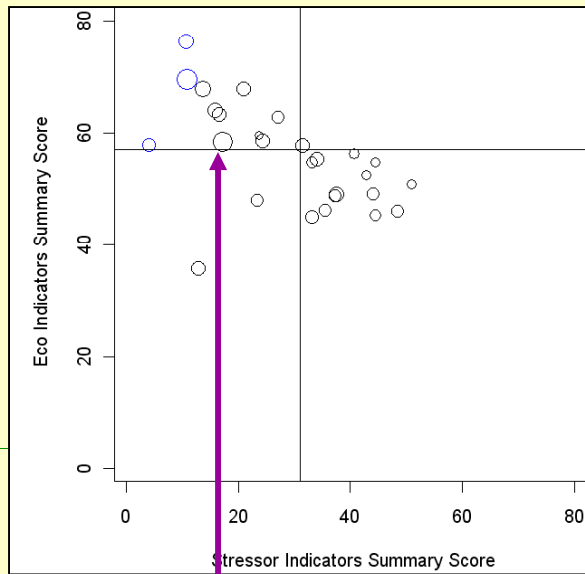


Focusing on more restorable watersheds



Stressor Indicators Summary Score
Circle size increases with Social Context summary score value

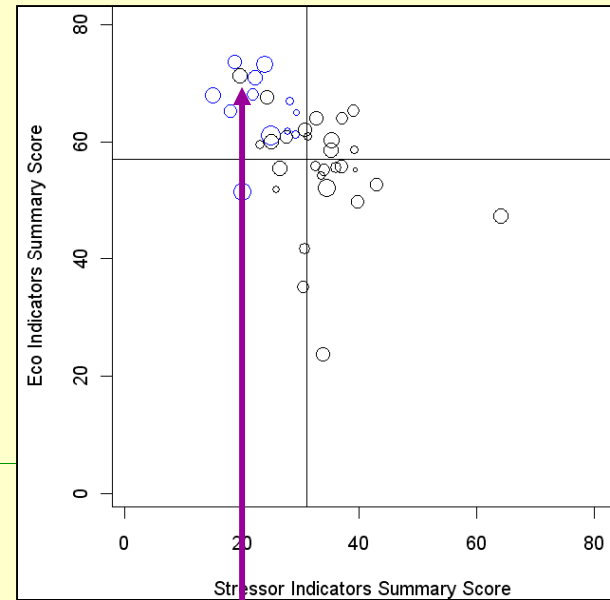
Where do *high-interest watersheds* fall out on the plots?



S. BRANCH PATAPSCO

SumRanks (of 18 fails)

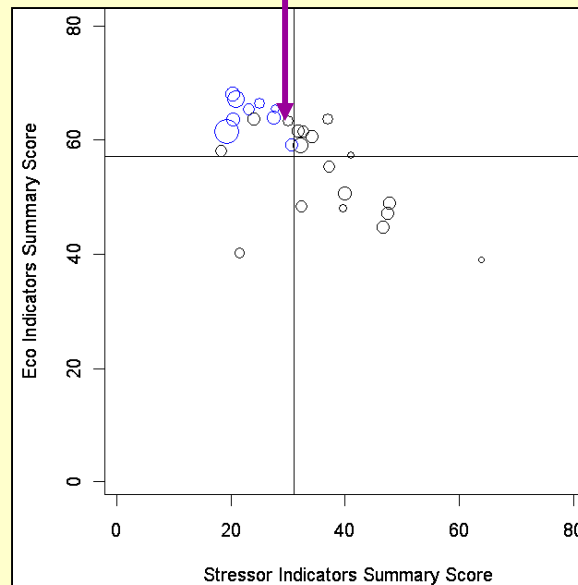
ECOSUM:	3
STRESSUM:	4
SOCIOSUM:	14
SUMFORMULA:	5



CASSELMAN RIVER

SumRanks (of 24 fails)

ECOSUM:	8
STRESSUM:	5
SOCIOSUM:	1
SUMFORMULA:	3



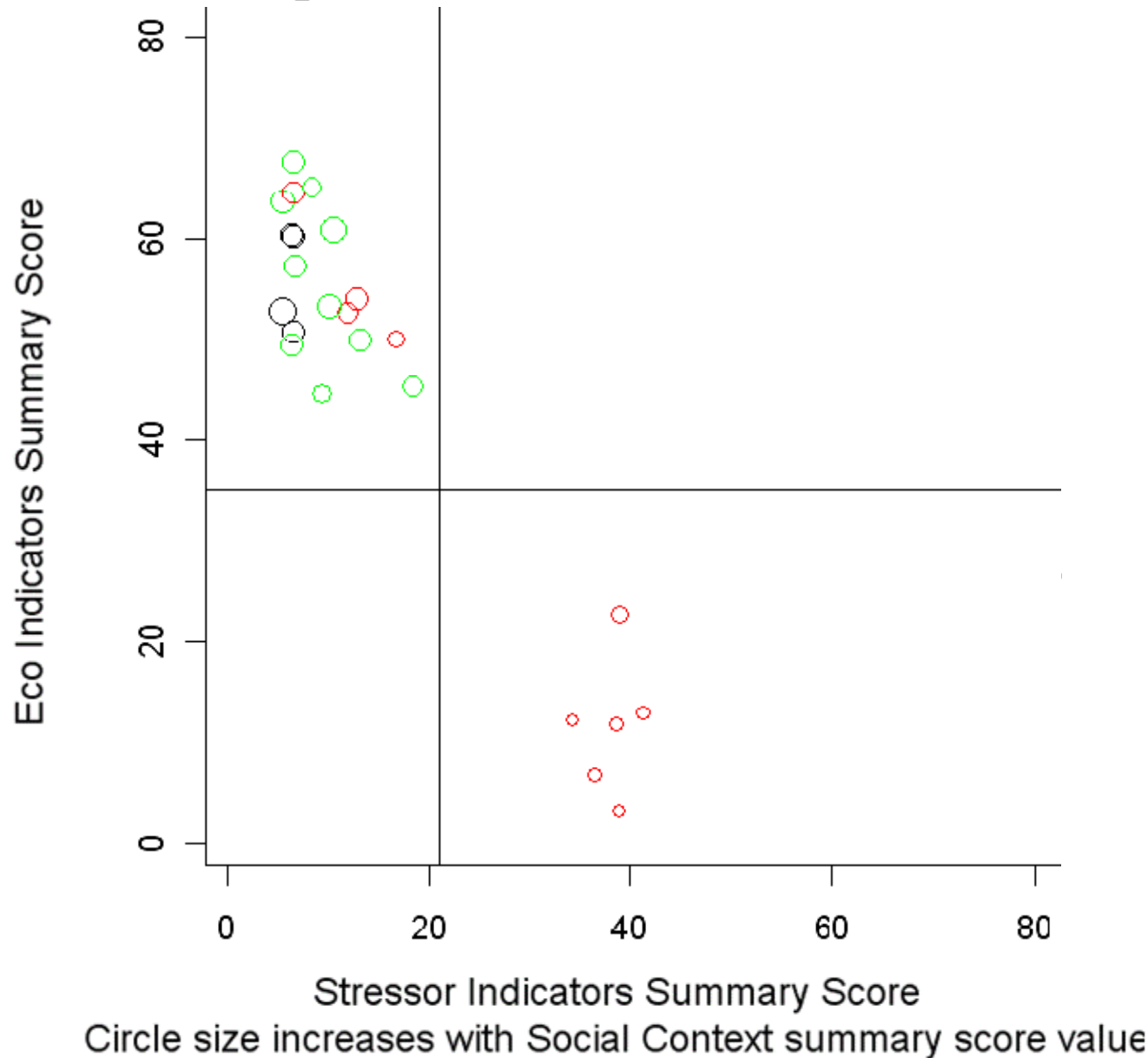
MATTAWOMAN RIVER

SumRanks (of 29 fails)

ECOSUM:	1
STRESSUM:	1
SOCIOSUM:	4
SUMFORMULA:	1

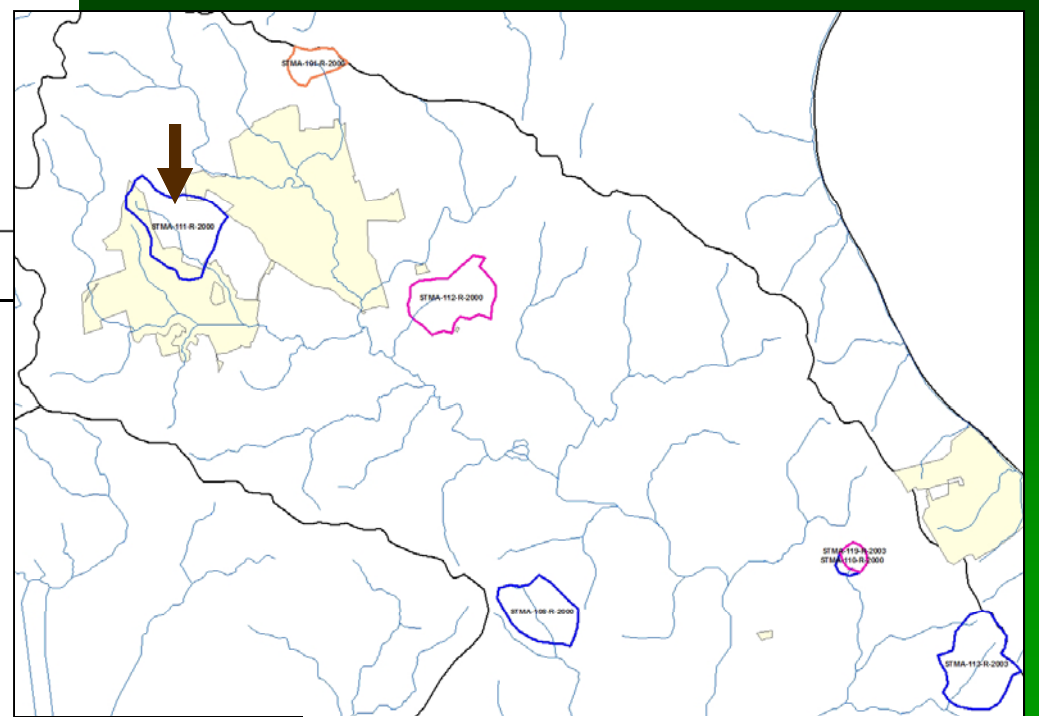
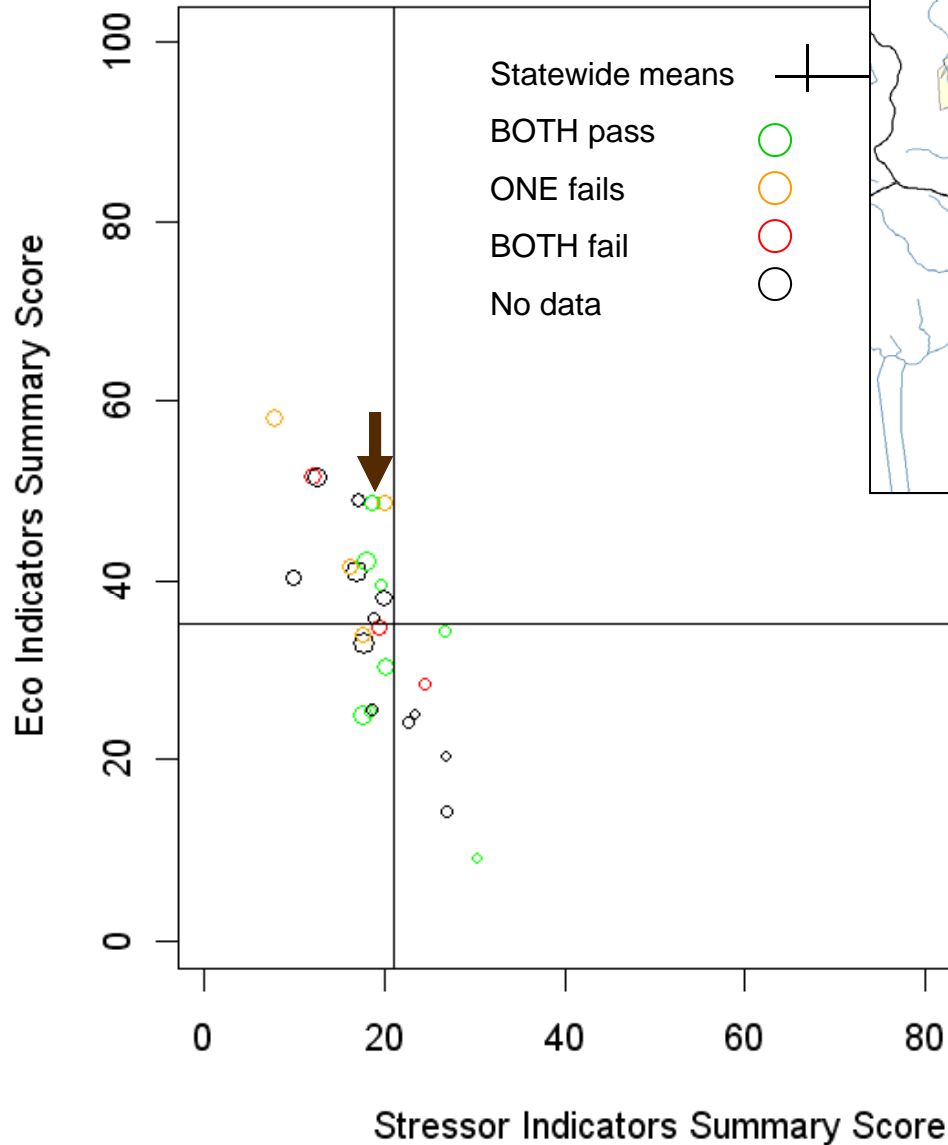
Screening subwatersheds in a priority watershed

Upper Monocacy River MBSS Screening, BIBI color scheme



St Mary's River MBSS Recovery Potential X DNR buffer potential

(1 site high RP + DNR land + stream)



ST MARY'S RIVER DNR LANDS X RECOVERY POTENTIAL			
MBSS fails	Recovery Potential	% DNR-admin lands	NHD stream x DNR
STMA-101-R-2000	low	0	N
STMA-108-R-2000	high	0	N
STMA-110-R-2000	high	0	N
STMA-111-R-2000	high	29%	Y
STMA-112-R-2000	med	0	N
STMA-113-R-2003	high	0	N
STMA-119-R-2003	med	0	N

Stressor Indicators Summary Score
Circle size increases with Social Context summary score value

Maryland activities involving recovery potential

- informing TMDL development and implementation
- screening sub-watersheds for NPS control placement options
- supporting discussions and collaboration with:
 - Bay Trust Fund
 - Biological Restoration Initiative
 - BayStat framework, Stream Print
 - Green Infrastructure projects

Take-home messages about screening

- Priority setting for restoration is inevitable, affects track record and funding
- Priority decisions need systematic, transparent and science-based tools
- Clear screening objective and appropriate metrics are crucial
- Consistent comparisons can reveal surprising patterns, e.g., ecologically “worst” sites frequently also have a bad social context score
- Build up the scientific basis and tools for better prediction of restorability...

Recovery Potential Screening

Tools for Regions and States: *Publications and a Tools Web Site*

Environmental Management
DOI 10.1007/s00267-009-9304-x

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 April 2009
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Abstract Common decision support tools and body of knowledge about ecological recovery inform and guide large state and federal restoration programs affecting thousands of impaired waters. federal Clean Water Act (CWA), waters not meeting Water Quality Standards due to impairment by are placed on the CWA Section 303(d) list, sch

Thank you for your time!

(watch for our Recovery Potential Tools web site)

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