

Using EPA's EnviroAtlas and Recovery Potential Screening Tools to Support Sound Decision Making



Thursday, October 21, 2021, 1:00pm – 3:00pm Eastern

Speakers:

- **Annie Neale**, EnviroAtlas Lead, U.S. Environmental Protection Agency (EPA)
- **Jessica Daniel**, EnviroAtlas Outreach and Stakeholder Engagement Lead, U.S. Environmental Protection Agency (EPA)
- **Emily Cira**, Recovery Potential Screening (RPS) Lead, U.S. Environmental Protection Agency (EPA)
- **Andrew Somor**, Recovery Potential Screening (RPS) Expert, The Cadmus Group LLC
- **Brett Wiley**, Environmental Specialist, New Jersey Department of Environmental Protection

Watershed Academy Webcast

- The slides for today's presentations are posted on the Watershed Academy webpage.
- A recording of the webcast will be posted within the next month.
www.epa.gov/watershedacademy
- Note: The views expressed in the presentation are those of the authors and do not necessarily represent the views or policies of U.S. EPA. Mention of commercial enterprises, products, or publications does not mean that U.S. EPA endorses them.

Audience Polling

Speakers

- **Annie Neale**, EnviroAtlas Lead, U.S. Environmental Protection Agency (EPA)
- **Jessica Daniel**, EnviroAtlas Outreach and Stakeholder Engagement Lead, U.S. Environmental Protection Agency (EPA)
- **Emily Cira**, Recovery Potential Screening (RPS) Lead, U.S. Environmental Protection Agency (EPA)
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EnviroAtlas: Connecting people, nature, health, and the economy

Watershed Academy, October 2021



ANNE NEALE
EnviroAtlas Lead



JESSICA DANIEL
Outreach & Stakeholder
Engagement Lead

*Center for Public Health and Environmental Assessment
U.S. EPA Office of Research and Development*

EnviroAtlas is an online resource providing geospatial data, easy-to-use tools, and other resources related to ecosystem services, their chemical and non-chemical stressors, connections to human health, and equity.

EnviroAtlas Includes:

- Over 500 map layers, environmental and demographic
- Interactive Mapping Application
- Eco-Health Relationship Browser
- Analytic and Interpretive Tools
- GIS Toolboxes

EnviroAtlas
Flagship tools



Data and tools are not enough

Educational materials

K - 6

Exploring Your Watershed

4 - 6

Introduction to Ecosystem Services

4 - 12+

Connecting Ecosystems and Human Health

9 - 12+

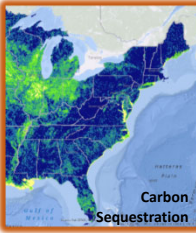
Building a Greenway Case Study

EnviroAtlas Objectives


- Conduct research to produce data and tools linking nature, people, health, and the economy
- Publish that research in the science literature
- Integrate those products with other relevant data in an accessible application and website
- Reach a broad audience, including decision-makers, academia, and educators
- Increase geospatial intelligence



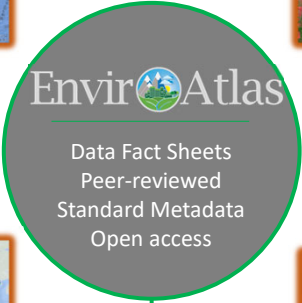




Carbon Sequestration




Population Density

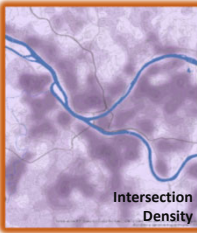


EnvirAtlas

Data Fact Sheets
Peer-reviewed
Standard Metadata
Open access




1 Meter Landcover



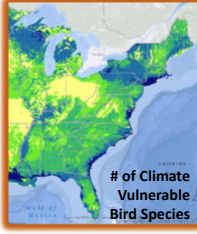
Intersection Density

National Data

30-meter land cover
400+ unique data layers
Consistent data for the conterminous U.S.



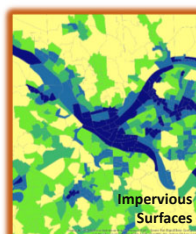
Floodplains



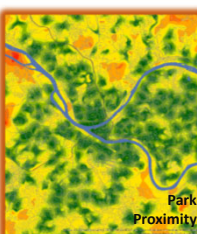
of Climate Vulnerable Bird Species

Community Data

1-meter land cover
100+ unique data layers
30 metropolitan areas
1450 cities & towns (65+ million people)



Impervious Surfaces

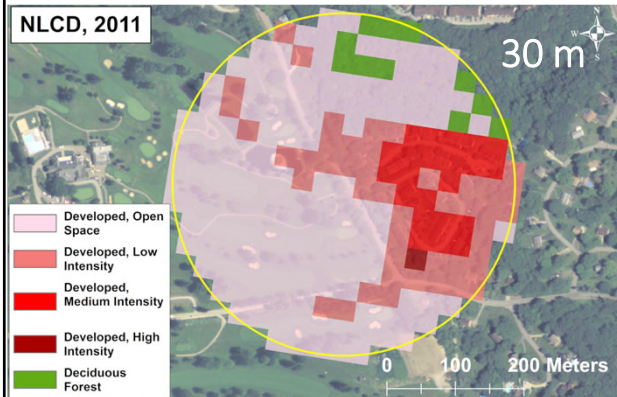


Park Proximity

Land cover



Pittsburgh, PA



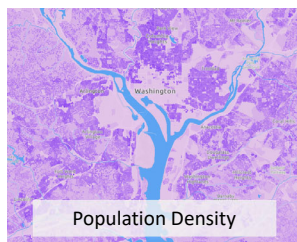
Data in EnviroAtlas

- EnviroAtlas provides data at multiple extents and scales

Types of Data

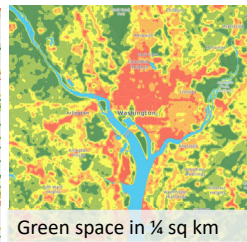
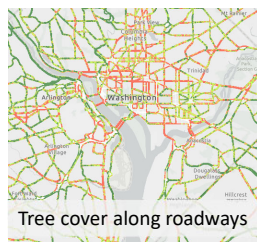
Pixel based / Raster

- Fine detail



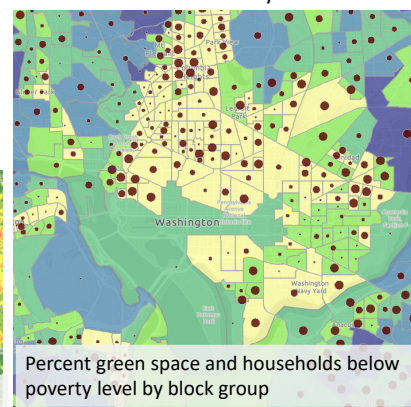
Lines/Vectors

- Individual features

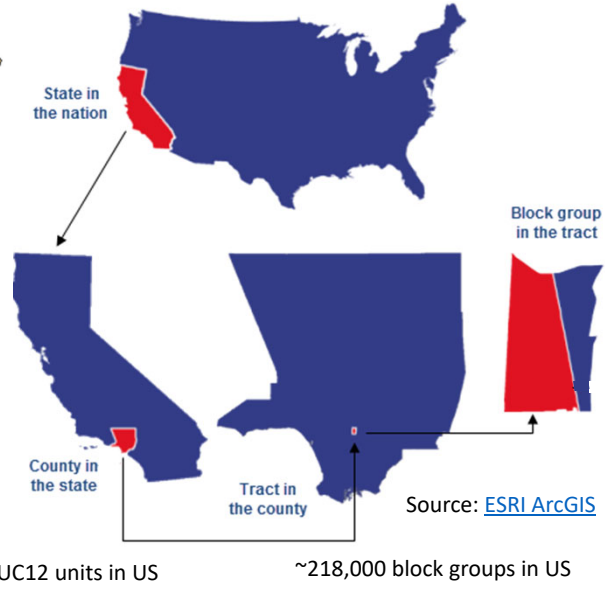
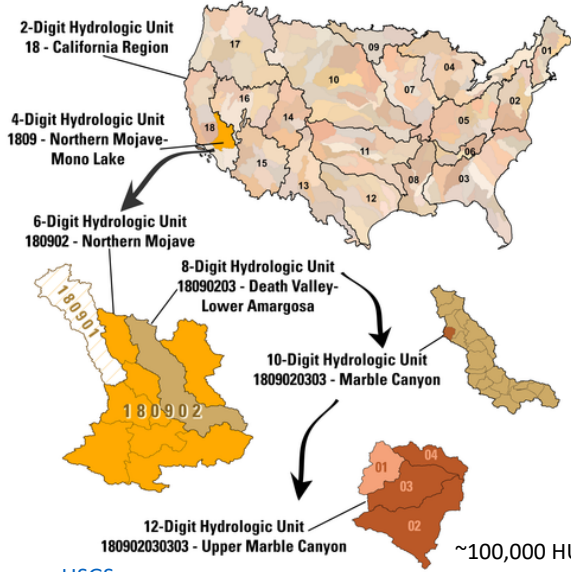


Summaries by Census block group, Census tract, watersheds

- Allows for data overlays



Summarized Data



Source: [USGS](#)

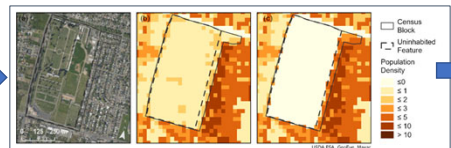
~100,000 HUC12 units in US

~218,000 block groups in US

Research to Action – Dasymetric Population Map

article: [Intelligent Dasymetric Mapping and Its Application to Areal Interpolation](#)
 Jeremy Meentemeyer & Torrin Hullgren
 Computers and Geographical Information Science, Volume 32, 2009, Issue 3
 Published Online: 12 April 2011

Developed data layer and toolbox

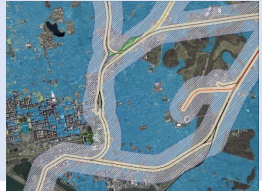


Improving Intelligent Dasymetric Mapping population density estimates at 30-meter resolution for the conterminous United States by excluding uninhabited areas
 Jeremy Meentemeyer, Amber Neater, Loren Stutzinger
 1. Center for Public Health and Environmental Assessment, US Environmental Protection Agency, Research Triangle Park, NC 27711, USA
 2. EPA National Geospatial Support Team, ITS-EPA III Infrastructure Support and Application Hosting Contract, Research Triangle Park, NC 27711, USA
 Correspondence: Jeremy Meentemeyer (Jeremy.Meentemeyer@epa.gov)
 Abstract: Population change impacts almost every aspect of global change from land use, to greenhouse gas emissions, to biodiversity conservation, to the spread of disease. Data on spatial patterns of population density help us understand patterns and drivers of human settlement and can help us quantify the exposures we face to natural disasters, pollution, and infectious disease. Human populations are typically recorded by national or regional units that can vary in shape and size. Using these irregularly sized units and ancillary data related to population dynamics, we can produce high-resolution, gridded estimates of

Uses

Assess exposure and environmental justice for people living near transportation infrastructure

- Use Dasymetric Population data
- Summarize number of people living close to railways, railyards, ports, busy roadways & airports
- Assess EJ issues associated with 100, 200, 500, & 1000 m buffer sizes



Fueling research and decision-making

Practical-Visionaries.org
 Mapping for More Inclusive Evacuation During Climate Emergencies
 12 August 2015 / December 26, 2015

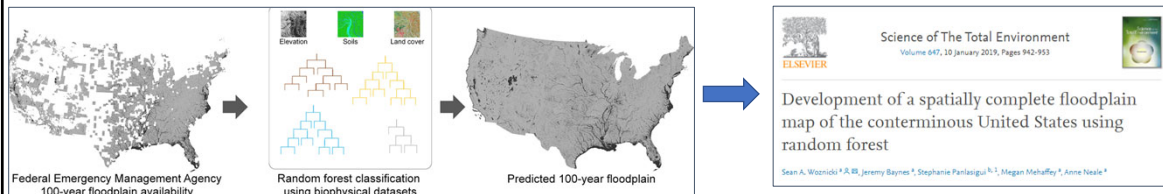
UC DAVIS
 UNIVERSITY OF CALIFORNIA

PLOS ONE
 Large-scale implementation of standardized quantitative real-time PCR fecal source identification procedures in the Tillamook Bay Watershed

Dasymetric Mapping of Census Data for Nepal towards Improved Disaster Risk Assessment Studies
 November 2015
 Conference: FIG – ISPRS workshop, 2015: International Workshop on Remote Sensing and SDI in Disaster Risk Reduction: In the Context of Post-Earthquake - At Kathmandu
 Project: SERVIR-Himalaya

Applied and Environmental Microbiology
 Viral and Bacterial Fecal Indicators in Untreated Wastewater across the Contiguous United States Exhibit Geospatial Trends

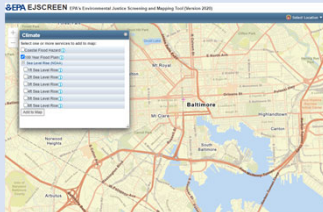
Research to Action – 100 yr Floodplain



Uses

Decision-making through other EPA Tools

- EJSCREEN
- R1 NPL Superfund Vulnerability Assessment Tool
- UST Finder Tool



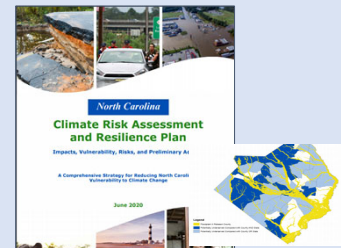
Vulnerable Infrastructure Assessment

- CDC Hospital and Medical Center Vulnerability Assessment

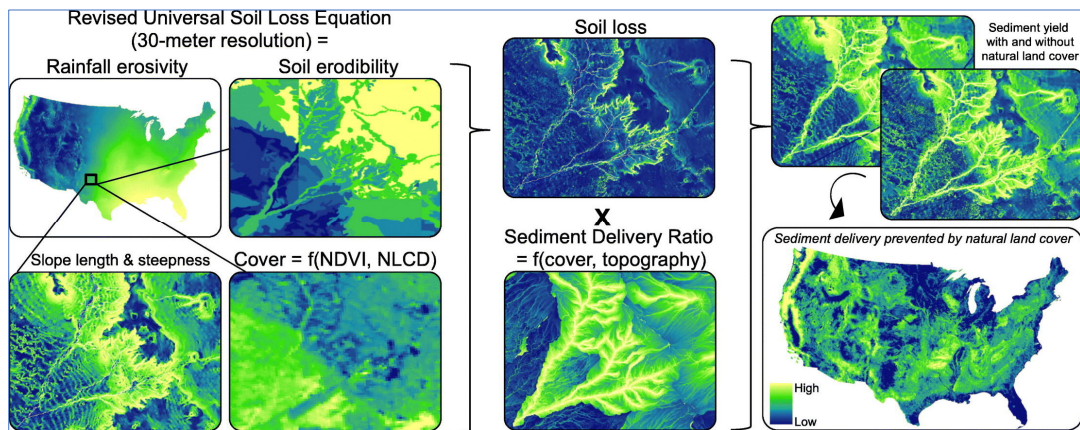


State Resilience Planning

- Chapter 4: Climate and Environmental Justice: Equity, Risk, and Resilience in North Carolina



Research to Action -- Erosion and Erosion Avoided



Science of The Total Environment, Volume 745, 25 November 2020, 140972. Sediment retention by natural landscapes in the conterminous United States. Sean A. Woznicki¹, Peter Cade^{1,2}, James Wickham^{1,2}, Michelle Schmidt^{1,2}, Jeremy Baynes^{1,2}, Megan Mehaffey^{1,2}, Anne Neale^{1,2}

Uses

- Pollutant fate and transport
- Benefits of natural land cover to water quality, land stability, etc.
- Identify where to protect, restore

EnviroAtlas & Environmental Justice

- Includes data relevant to environmental justice, such as:
 - Demographic Data
 - Opportunity Zones
 - Climate scenarios, flooding, exposure, and other environmental variables affecting vulnerable populations
 - Redlining (coming soon)
- Add data function allows for inclusion of:
 - EJSCREEN indices
 - Local data of interest
- Educational lesson plan (high school, undergraduate) incorporating EJ concepts and data from EJSCREEN

Demonstration

<https://www.epa.gov/enviroatlas>

Where to Next

- **New Functionality**

- Tool allowing users to combine data layers and calculate for any desired area
- Tool allowing users to create index values from multiple data layers
- Tool importing water quality data from WQ Portal



- **New Data**

- Number of days exceeding thresholds for air PM and Ozone
- Soil erosion, sedimentation, and retention
- Mines
- Harmful algal blooms
- Expanding time series

THANK YOU!

U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF RESEARCH AND DEVELOPMENT

www.epa.gov/enviroatlas



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ANNE NEALE

EnviroAtlas Lead

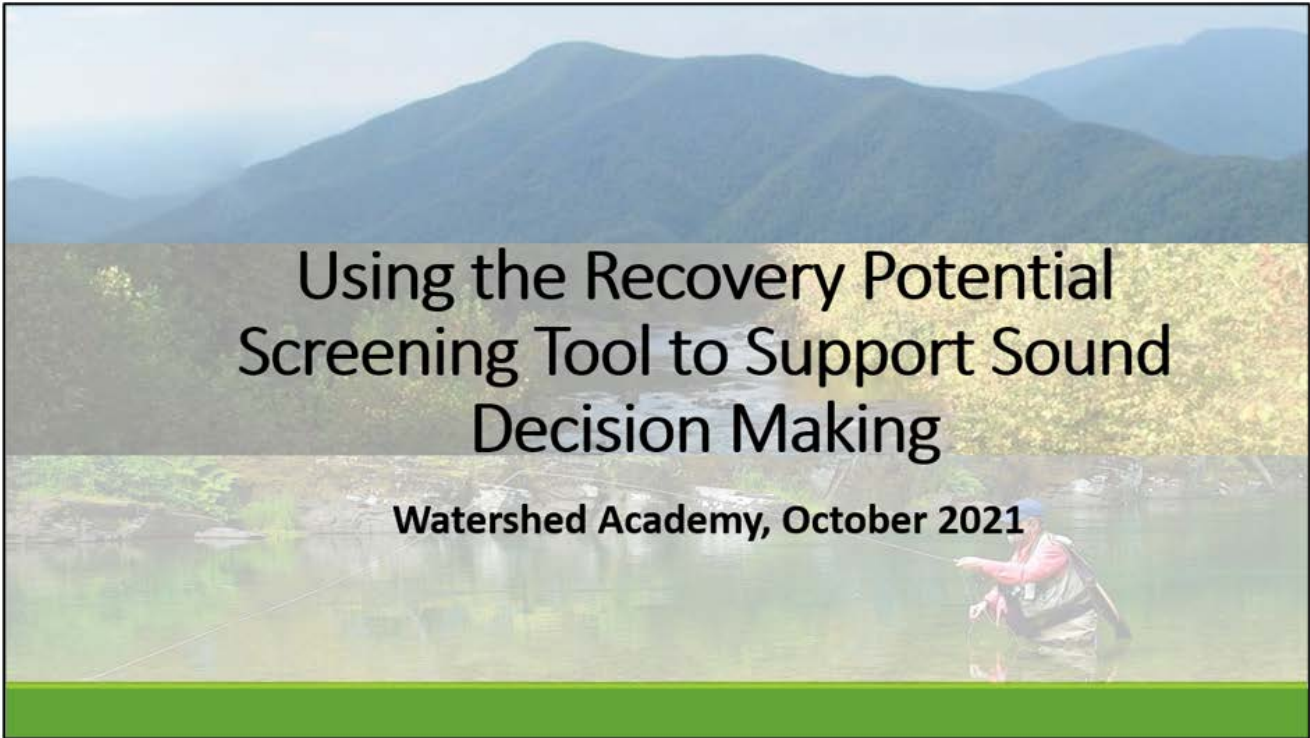
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Using the Recovery Potential Screening Tool to Support Sound Decision Making

Watershed Academy, October 2021

Presenters



Emily Cira

US EPA, Office of Water
Watershed Branch



Andy Somor

The Cadmus Group



Brett Wiley

New Jersey Department of
Environmental Protection

Outline

- What is the RPS Tool?
- RPS Tool demo
- New Jersey example
- Q&A

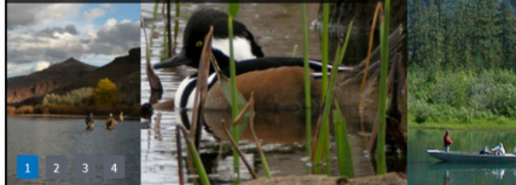
Recovery Potential Screening (RPS)

www.epa.gov/rps

Projects in 40+ states and territories

RPS data and tools for all states/territories

Methods and tools for watershed programs



Featured Resources

- [2020 RPS Tools for All US States and Territories](#)
- [Introducing the RPS Tool \(EXIT\) and Other Training Videos](#)
- [Methods for Comparing HUCs or Watersheds](#)
- [Ecological, Stressor and Social Indicators of Watershed Condition](#)
- [RPS Fact Sheet](#)

How to Use RPS

- [Overview](#)
- [Benefits of RPS](#)
- [Step by Step RPS Methodology](#)

Download RPS Tools

- [State-Specific RPS Tools](#)
- [Generic RPS Tool](#)
- [RPS Tool Training and User Support](#)

Indicator References

- [Indicators Overview](#)
- [Ecological Indicators](#)
- [Stressor Indicators](#)
- [Social Indicators](#)

Related EPA Topics

- [Healthy Watersheds](#)
- [Watershed Index Online](#)
- [Healthy Watersheds Protection](#)
- [Water Quality Assessment \(ATTAINS\) Information](#)

step by step instructions – indicators – tools (for more watershed indicator data also see www.epa.gov/wsio)

What is Recovery Potential Screening (RPS)?

- Framework for comparing a group of watersheds based on environmental, stressor, and social factors relevant for priority-setting
- Developed by EPA in 2006 to provide a systematic method, data, and tool for comparing watersheds to inform management decisions and priorities
- Variety of applications, for example:
 - TMDL development
 - State nonpoint source program five-year plans & 319 grants
 - Healthy watersheds protection
 - Wetland and riparian buffer mitigation grants
 - Water quality monitoring strategies
 - Deepwater Horizon restoration funding

What is the RPS Tool?

- An Excel file with custom macros and menus for running a screening with pre-loaded watershed data
- Produced for all US states and territories
- Each tool is pre-loaded with HUC12 indicators calculated from national datasets
- Updates released every 1-2 years with new indicator data and tool functions

Downloadable Statewide RPS Tools

You may need additional software to view some of the links on this page. See [EPIC's Easy Viewers and Readers.aspx](#). The links will vary in file size.



Choose a state from the map above or the pull-down list below. Find your tool copy in your computer's downloads folder, then open it offline in Excel.

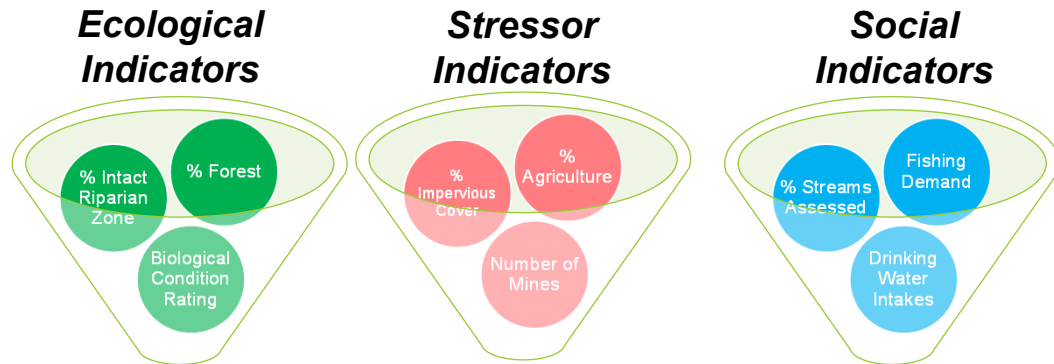
Alabama | CO

RUN SCREENING		RESET SCREENING	
Select Watersheds Select watershed(s) to compare the screening by clicking the Select Watersheds button below. To view only watersheds, click the Clear Watershed Selection button.		Select Ecological Indicators Select ecological indicators to include in the screening by clicking the Select Ecological Indicators button below. To clear your selections, click the Clear Ecological Indicator Selection button.	
Clear Watershed Selections HUC12		Clear Ecological Indicator Selections Ecological Indicator	
% of Watersheds with Contiguous Forest % of Watersheds with Forest % of Watersheds with Forest (Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous)		% of Watersheds with Forest (Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous) % of Watersheds with Forest (Non-Contiguous)	
Select Stressor Indicators Select stressor indicators to include in the screening by clicking the Select Stressor Indicators button below. To clear your selections, click the Clear Stressor Indicator Selection button.		Select Social Indicators Select social indicators to include in the screening by clicking the Select Social Indicators button below. To clear your selections, click the Clear Social Indicator Selection button.	
Clear Stressor Indicator Selections Stressor Indicator		Clear Social Indicator Selections Social Indicator	
% of Watersheds with Low Inflow to Bay (2011) % of Watersheds with Low Inflow to Bay (2011) % of Watersheds with Low Inflow to Bay (2011) % of Watersheds with Low Inflow to Bay (2011) % of Watersheds with Low Inflow to Bay (2011)		% of Watersheds with Low Inflow to Bay (2011) % of Watersheds with Low Inflow to Bay (2011) % of Watersheds with Low Inflow to Bay (2011) % of Watersheds with Low Inflow to Bay (2011) % of Watersheds with Low Inflow to Bay (2011)	

<https://www.epa.gov/rps/downloadable-rps-tools-comparing-watersheds#Statewide>

Watershed Indicators

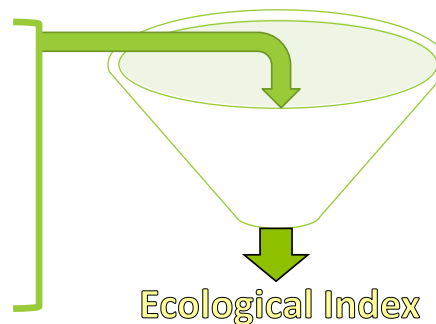
- Indicator-based method for watershed comparison and priority-setting
- Indicators are measures of watershed attributes that are relevant to water quality restoration and protection



Ecological Indicators

- Describe the condition of aquatic ecosystems and related watershed characteristics
- Offer insight into the capacity to maintain or regain ecological functions

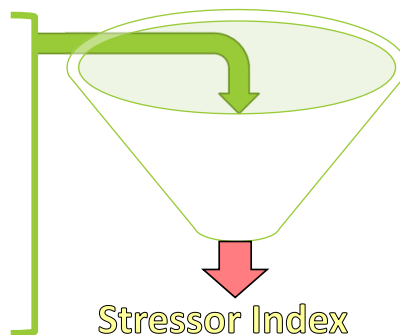
1. Forest, wetland, and other natural land cover
2. Aquatic life and habitat
3. Flow and geomorphic regime
4. Soil attributes
5. Ecological history (species/habitat occurrence)



Stressor Indicators

- Describe anthropogenic attributes of the watershed
- Characterize risks to aquatic ecosystem health and effort required to address those risks

1. Watershed disturbance
2. Riparian disturbance
3. Flow or geomorphic alteration
4. Biological stressors
5. Severity, complexity of pollution
6. Land use change



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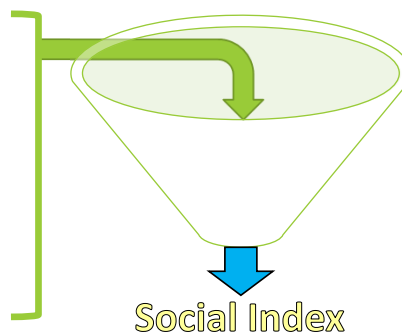
Social Indicators

- Societal or programmatic factors that support successful water quality restoration and protection

or

- Are otherwise important for priority-setting

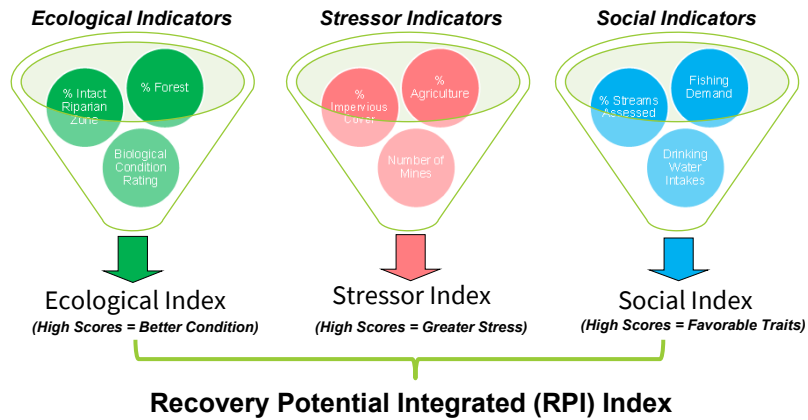
1. Leadership and engagement
2. Level of information and planning
3. Restoration cost and complexity
4. Human uses and incentives
5. Land protection or regulation
6. Socio-economic factors



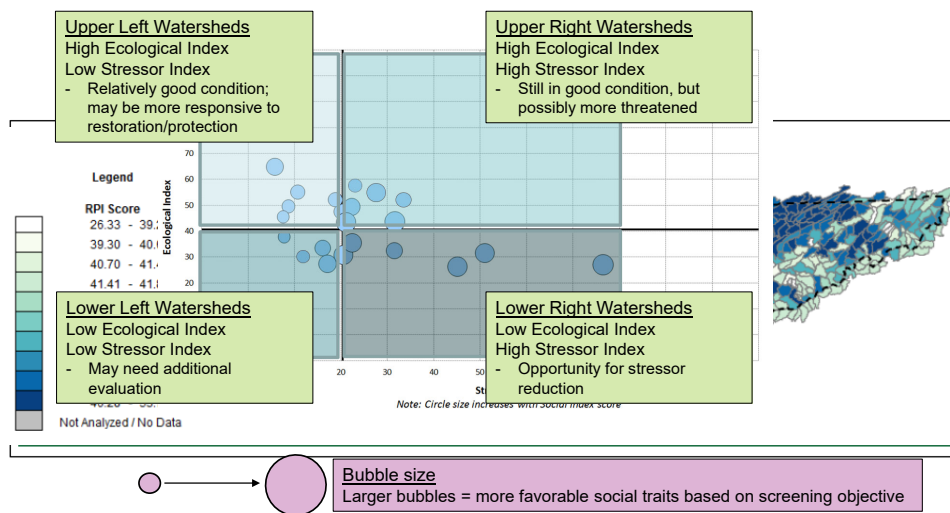
30

RPS Index Scores

- Indicators are combined into **Index Scores** – offer overall picture of ecological, stressor, and social characteristics

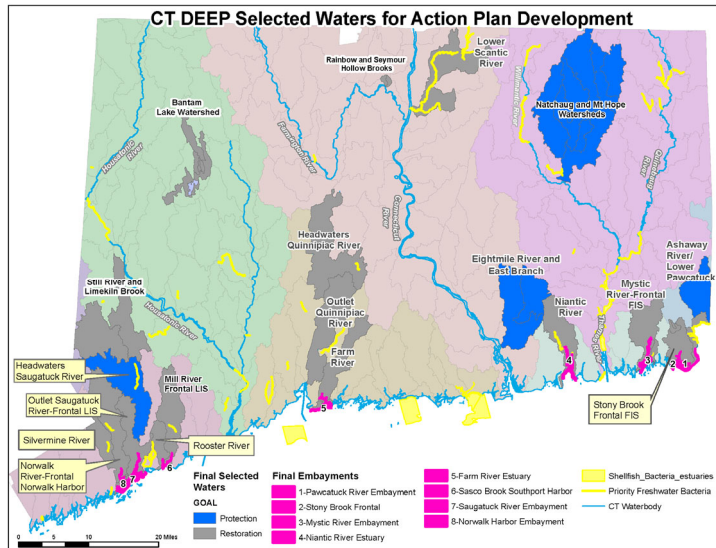


RPS Results



Example RPS Uses

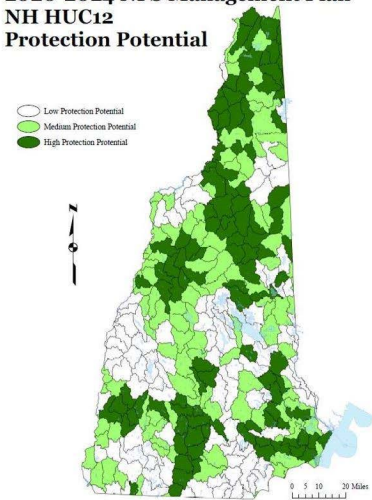
Water Quality Concerns	
	General Watershed Health (~ALUS) • Restoration • Protection
	Stormwater • Restoration • Protection
	Nutrients • Restoration • Protection



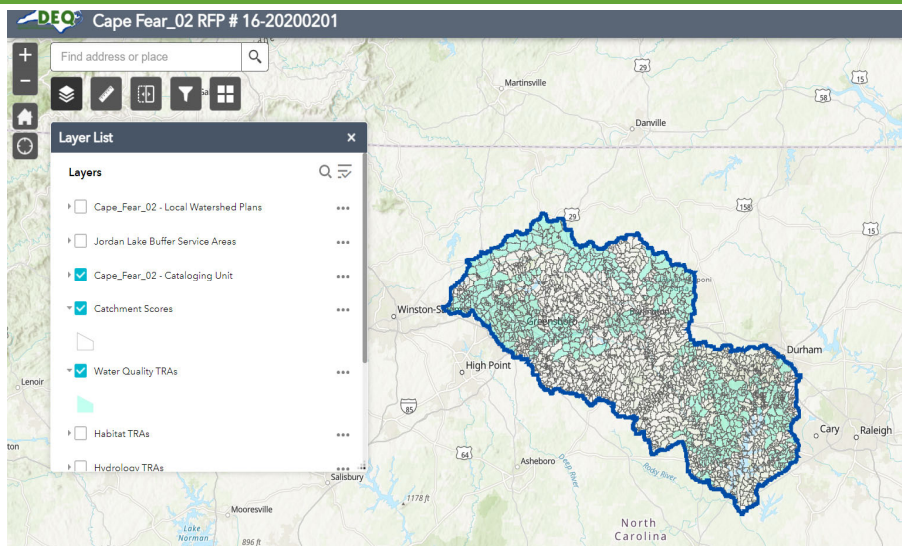
Example RPS Uses

Criteria		Max Points
Water Quality Improvement (either/or)	Impaired Waters: Project will achieve or lead to removing an impairment from the 305(b) or 303(d) list, resulting in a Section 319 Success Story (see EPA's Nonpoint Source Success Stories webpage).	40*
	High Quality Waters: Project will achieve or lead to quantifiable progress toward water quality goals in a high quality watershed.	30*
Local Capacity	Commitment of the applicant's support network, and capacity to complete the proposed project. Ranking will be based upon the grantee's description and/or demonstration of their team's ability to successfully complete the proposed project.	25
Relative Value of the Waterbody	The availability (access), and extent of use of the waterbody. Uses include, but are not limited to: drinking water supply; public recreational opportunities; aquatic and terrestrial habitat benefits.	15
Priority Ranking	Project is located in high or medium priority watersheds as identified in the NHDES Nonpoint Source Management Program Plan.	10
Proposal Thoroughness	General quality and completeness of the proposal package.	10
Total possible points for Impaired Waters*		100
Total possible points for High Quality Waters*		90

2020-2024 NPS Management Plan NH HUC12 Protection Potential

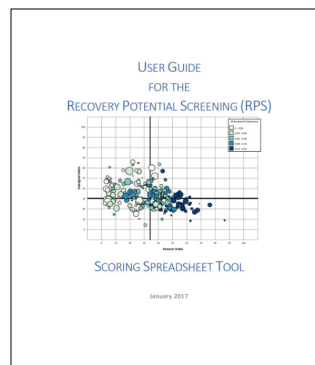


Example RPS Uses



RPS Tool Training Resources

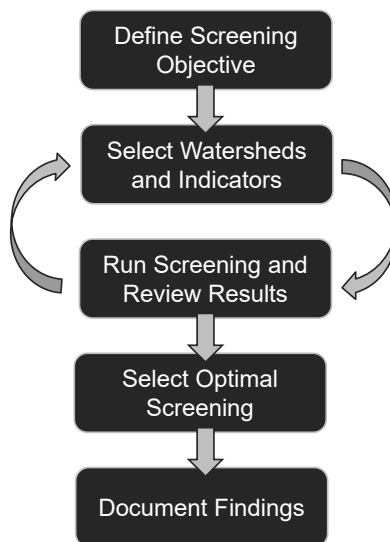
- User Guide with step-by-step instructions
- Video Training Series - short instructional videos that each focus on critical elements of the RPS Tool
- Reports from past projects



<https://www.epa.gov/rps/rps-training-and-user-support>

RPS Tool Demo

RPS Screening Process



RPS Tool Demo

- The *State of Paradise* has allocated funding to the Department of Environmental Protection to support climate change resilience and address environmental justice concerns through nonpoint source management

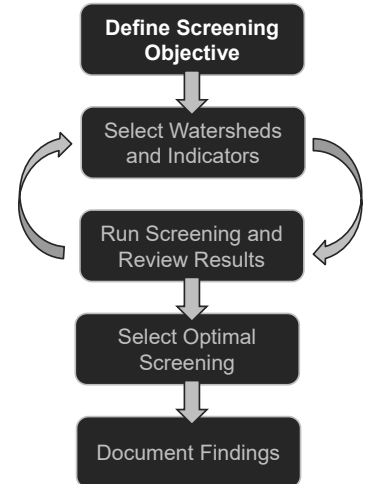


RPS Tool Demo

- This initiative requires DEP to consider both climate vulnerability and environmental justice factors in project decisions (new indicators!)
- The RPS Tool will be used to identify an initial group of priority HUC12s for further evaluation

RPS Tool Demo – Screening Objective

Hypothetical example:
“Identify target HUC12s for stormwater management practices to support climate change and community resilience”



RPS Tool Demo – Select Watersheds & Indicators

- ❑ Statewide screening – all HUC12s selected
- ❑ Characteristics of “target” HUC12s for improved stormwater management
 - 1) Indicators of a potential underserved community
 - 2) Presence of stormwater sources
 - 3) Increased pollutant loading and other climate impacts over time

RPS Tool Demo – Select Watersheds & Indicators

➤ Potential underserved communities



Social Indicators
% Low Income Population
% Minority Population
% < High School Educated Population
% Linguistically Isolated Population
% Vulnerable Age Groups

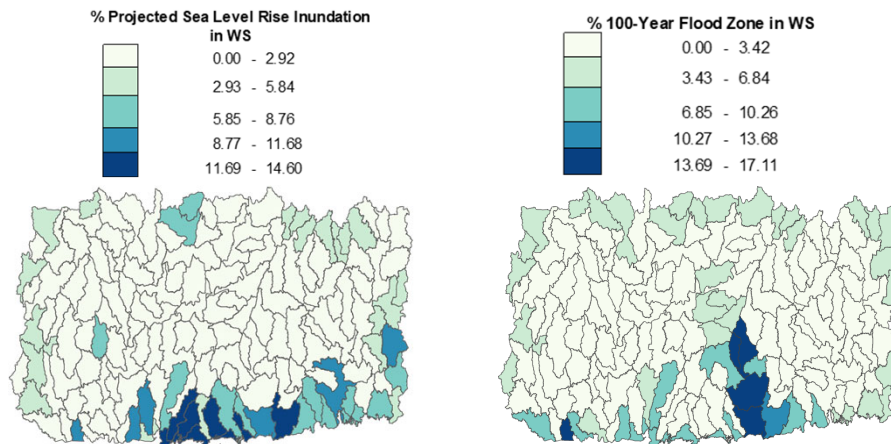
➤ Increased pollutant loading and other climate impacts over time



Stressor Indicators
% Projected Sea Level Rise Inundation
% 100-Year Flood Zone
% Imperviousness (2016)
% Urban Change (2001-16)

➤ Presence of stormwater sources

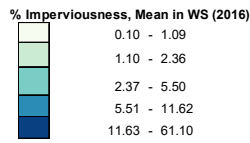
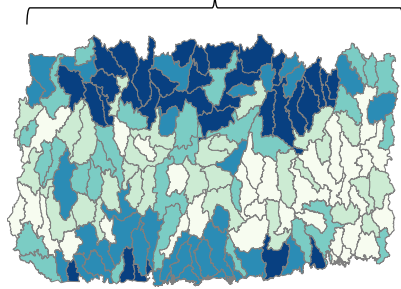
RPS Tool Demo – Run Screening and Review Results



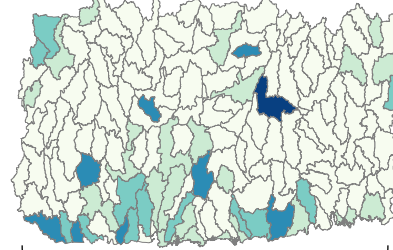
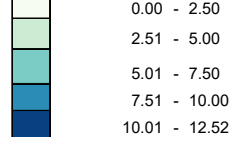
Higher potential for flood-related climate impacts in south coast HUC12s

RPS Tool Demo – Run Screening and Review Results

High density development concentrated in north coast HUC12s



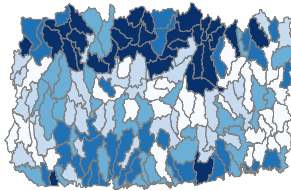
% Urban Change in WS (2001-16)



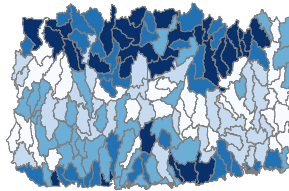
Signs of increasing development in south coast HUC12s

RPS Tool Demo – Run Screening and Review Results

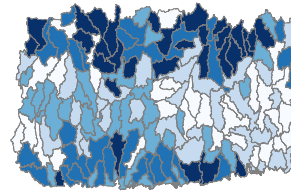
% Low-Income Population



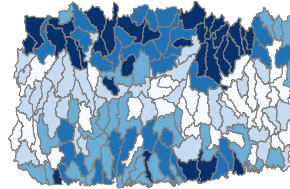
% Minority Population



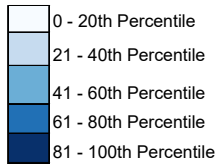
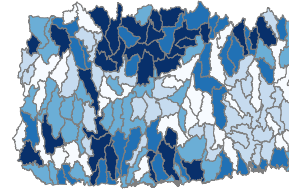
% < High School Educated



% Linguistically Isolated Population

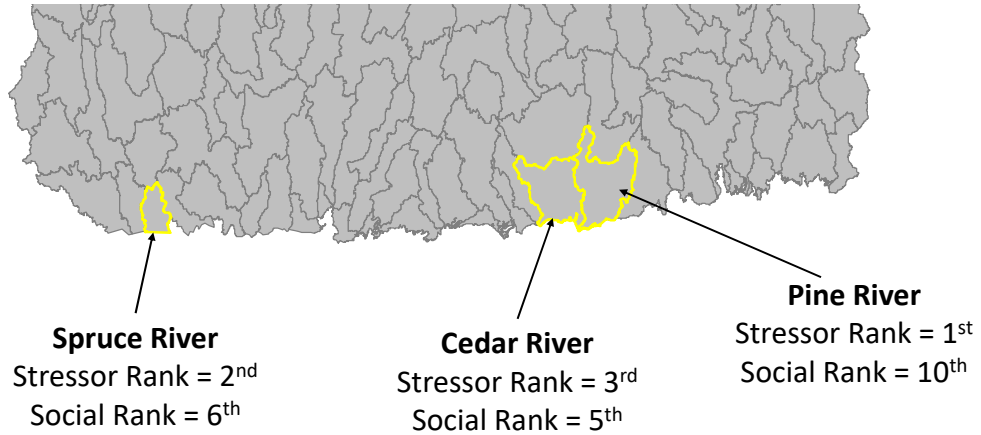


% Vulnerable Age Groups



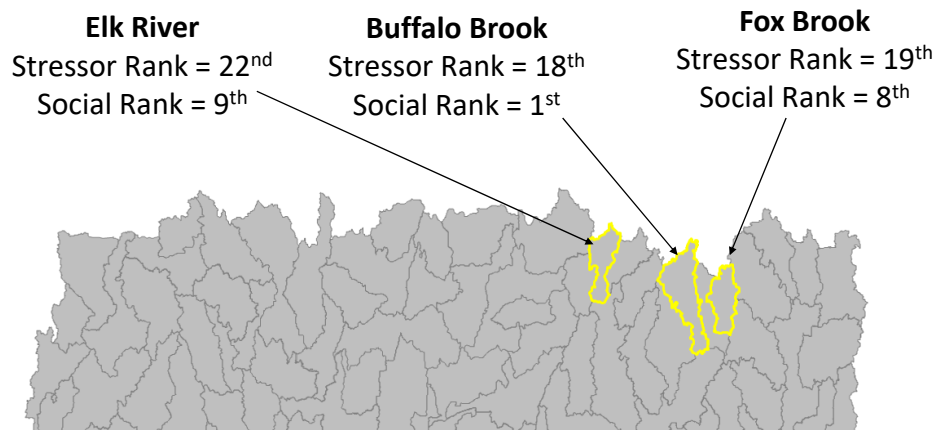
RPS Tool Demo – Run Screening and Review Results

Priority HUC12s – South Coast



RPS Tool Demo – Run Screening and Review Results

Priority HUC12s – North Coast

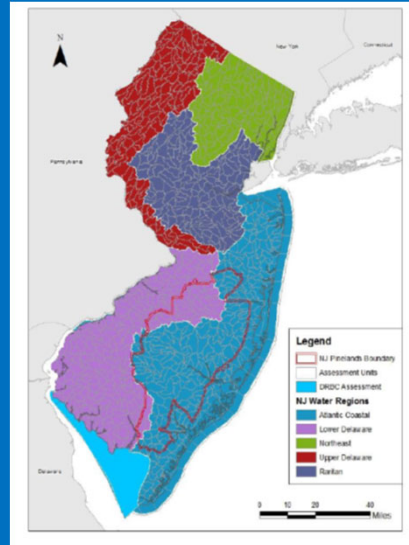
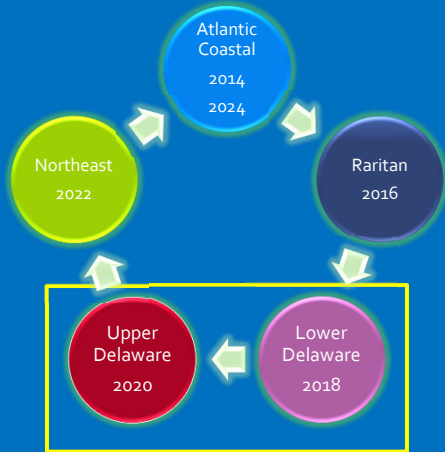




Uses for Screening Assessments

- 1) Identify, among watersheds with heavy pollutant loads, the healthier watersheds where substantial load reduction could still be accomplished.
- 2) Identify relative differences in restorability among all watersheds and related factors, to better anticipate restoration workloads.
- 3) Identify where impaired watershed restoration and healthy watershed protection efforts can have great synergy.
- 4) Coordinate with major groups or agencies who carry out restoration themselves.
- 5) Evaluate where best to make nonpoint source (319, NRD) or other restoration investments.

Rotating Basin Approach



NJDEP Water Monitoring and Standards

Similar interface to publicly available tool, HUC12/HUC14 optionality and customized New Jersey indicators are key difference

RUN SCREENING		RESET SCREENING																																																																																																																																																										
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Select Ecological Indicators

Clear Ecological Indicator Selections

Ecological Indicator	Weight
General Aquatic Life Use Support Flag	1
Trout Aquatic Life Use Support Flag	2
% N-Index2 in WS (2011)	2
% N-Index2 in RZ (2011)	3
Average Fish IBI Rating	1
Average Macroinvertebrate Condition Rating	1
Average Aquatic Habitat Rating	1
% Category 1 Waters	2
% TPTM waters	2
Rare Plant Species Count	1
Rare Plant Species Flag	1

Select Stressor Indicators

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Select Stressor Indicators

Clear Stressor Indicator Selections

Stressor Indicator	Weight
% Imperviousness, Mean in WS (2011)	3
% Imperviousness, Mean in RZ (2011)	3
% Human Use Change, U-Index2 Chng in WS (2001-11)	2
% Developed Cover Projected Change (2010-2050)	3
Soil Erodibility, Mean in WS	1
Impaired Designated Uses Count	2
Impaired Waters Pollutant Count	2
Dam Count	1
Remediation/Contamination Site Count	2
% Landfill	1
CSO Outfall Count	1
NJPDES Discharger Count	2

Select Social Indicators

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Select Social Indicators

Clear Social Indicator Selections

Social Indicator	Weight
Recreation Use Support Flag	1
TMDL Count	2
% Wellhead Protection Area in WS	1
Source Area Flag for Surface Drinking Water Supply	1
% Source Area for Surface Drinking Water Supply	1
% Open Space in WS	1
% Farmland Preservation Areas in WS	2
Restoration Project Count in WS	1

Upper Delaware

NJDEP data

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Select Ecological Indicators

Clear Ecological Indicator Selections

Ecological Indicator	Weight
% N-Index2 in WS (2011)	3
% N-Index2 in RZ (2011)	3
Average Fish IBI Rating	1
Average Macroinvertebrate Condition Rating	1
Average Aquatic Habitat Rating	1
% Category 1 Waters	2
Rare Plant Species Count	1
Rare Plant Species Flag	1
General Aquatic Life Use Support Flag	1

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% Developed Cover Projected Change (2010-2050)	3
Soil Erodibility, Mean in WS	1
Impaired Designated Uses Count	2
Impaired Waters Pollutant Count	2
Dam Count	1
Remediation/Contamination Site Count	2
% Golf Course	1
% Landfill	1
CSO Outfall Count	1
NJPDES Discharger Count	2

Select Social Indicators

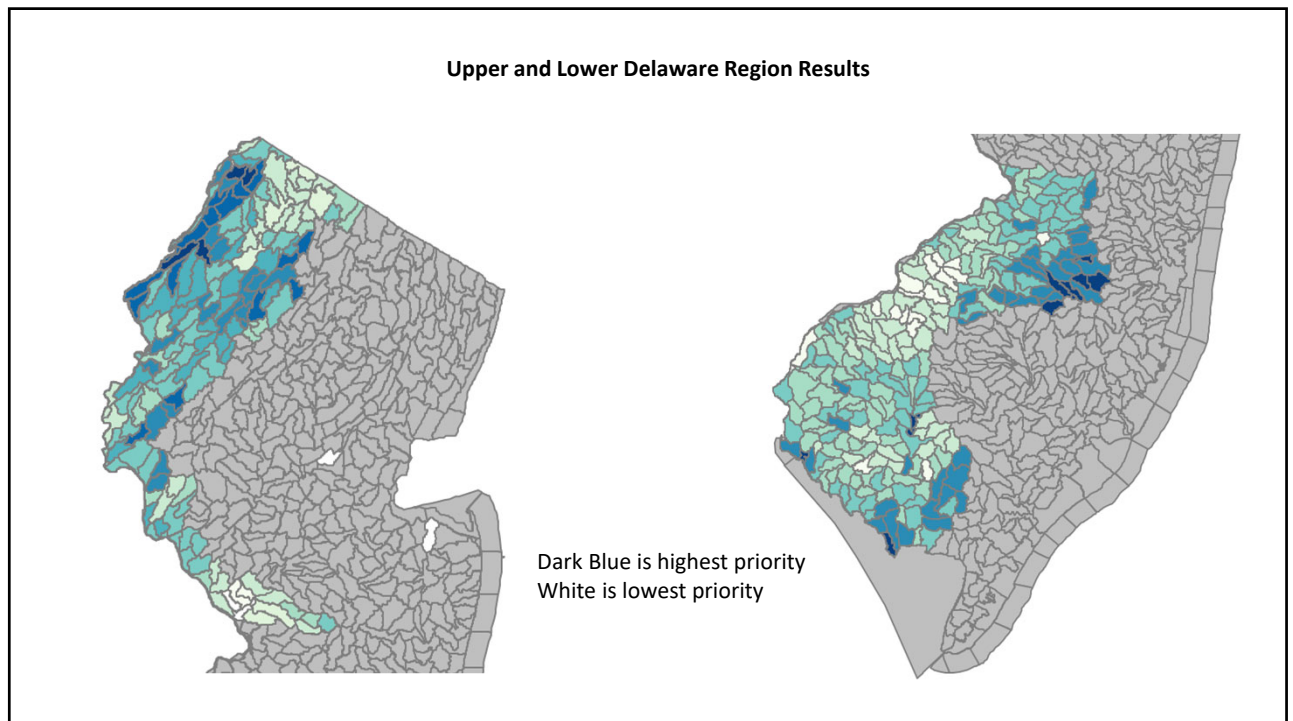
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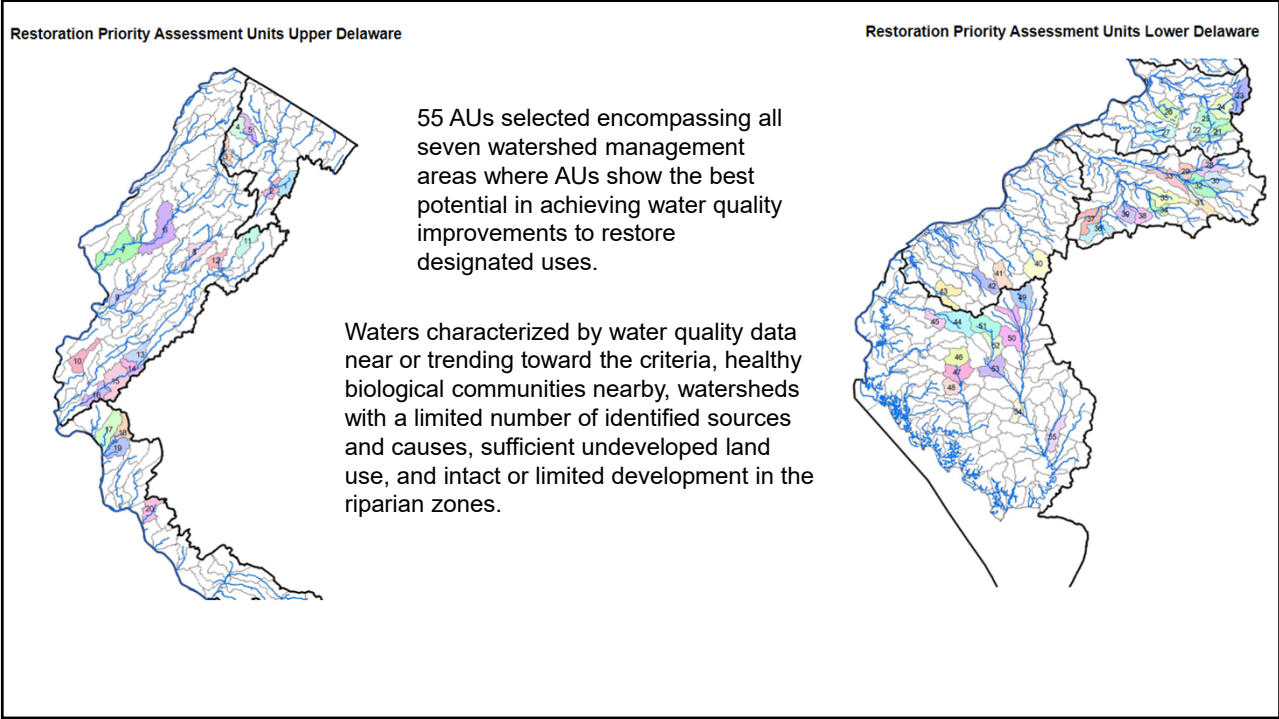
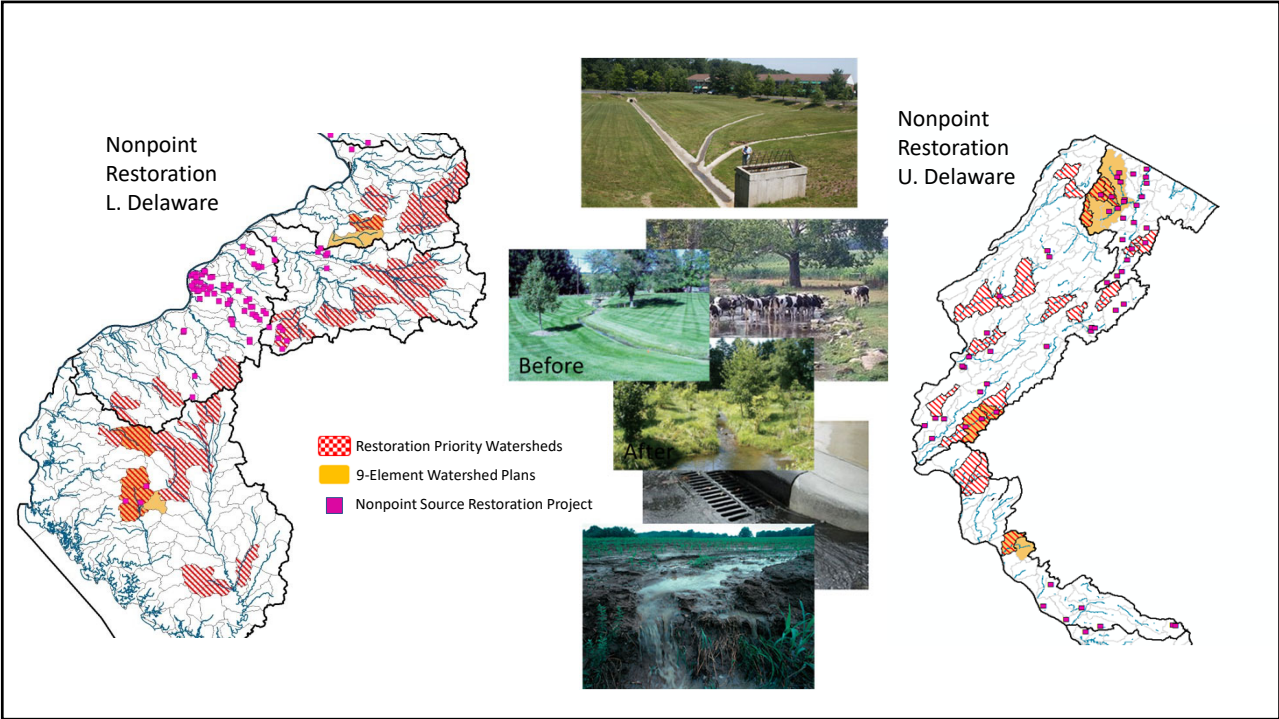
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Clear Social Indicator Selections

Social Indicator	Weight
Recreation Use Support Flag	1
TMDL Count	2
% Wellhead Protection Area in WS	1
Source Area Flag for Surface Drinking Water Supply	2
% Source Area for Surface Drinking Water Supply	1
% Open Space in WS	2
% Farmland Preservation Areas in WS	2
Restoration Project Count in WS	1
Shellfish Harvesting Area Flag (All)	1
Shellfish Harvesting Area Flag (Non-Prohibited)	1

Lower Delaware
(also consists of NJDEP data)





Future of the NJ RPS Tool

- Ongoing layer updates (collaborating with EPA and Cadmus)
- Possible addition of Overburdened Community (OBC) layer
- Updates to be used in the 2022 IR (Northeast Water Region)

Thank you to the EPA and the
Cadmus Group

and

Thank you all for attending!

Participation Certificate

- If you would like to obtain a participation certificate you can access the PDF in the **Handouts** section of your control panel.

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Watershed Academy Webcasts

More webcasts coming soon!

The slides from today's presentations are posted on the Watershed Academy webpage.

A recording of the webcast will be posted within the next month.

www.epa.gov/watershedacademy

Thank You!