

Factoring Climate Change into Protection Plans

Wisconsin Department of Natural Resources

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86,000 Miles
of Streams



17,000 Lakes



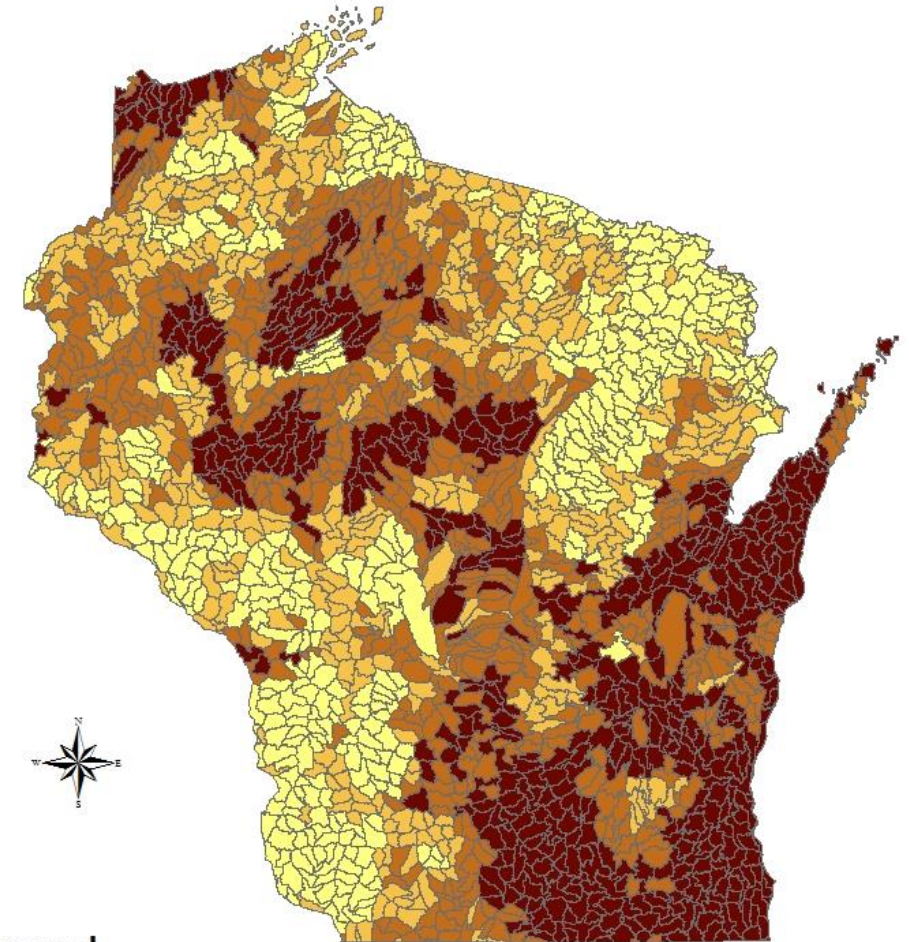
5.3 Million Acres
of Wetlands



650 Miles of
Great Lakes Shoreline

Wisconsin's 2014 Healthy Watersheds Project

- Vulnerability Index based on Climate Change, Land Use, and Water Use metrics
- Climate Change Vulnerability metrics
 - Projected Change in (2010 – 2050):
 - Surface Runoff
 - Total Nitrogen (TN) Yield
 - Total Phosphorus (TP) Yield
 - Total Suspended Solids (TSS) Yield



Legend

HUC-12 Watersheds

Area-weighted Vulnerability Index

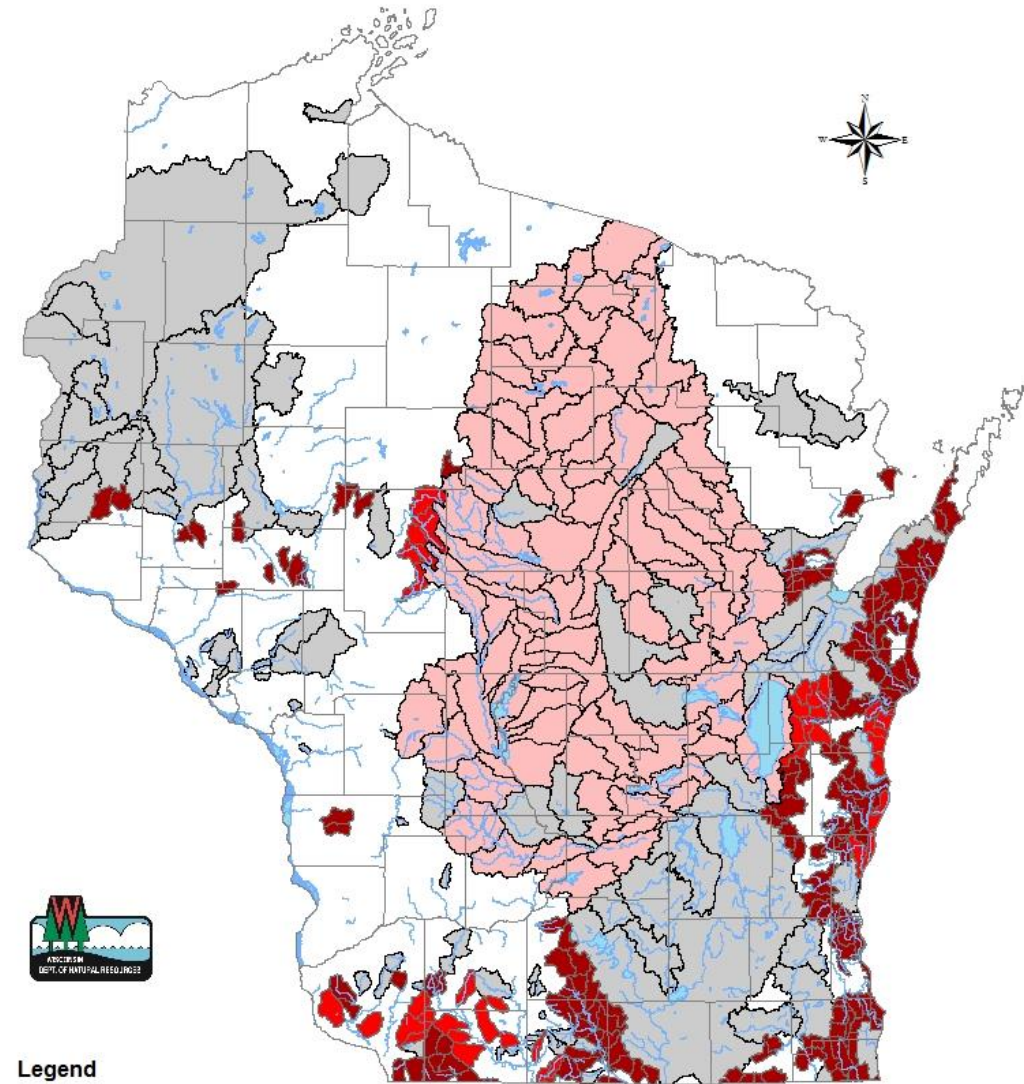
- Lowest Vulnerability
- Low Vulnerability
- Higher Vulnerability
- Highest Vulnerability

2015 Water Quality Restoration and Protection Prioritization Framework

- Level 1 Priority Areas – Ongoing TMDL projects
- Level 2 Priority Areas
 - Restoration plan priority areas: the 25% of watersheds with *lowest* Ecosystem Health scores.
 - Protection plan priority areas: watersheds with both high Ecosystem Health scores and high Vulnerability scores (25% of watersheds with *highest* EH Index scores and 50% of watersheds with *highest* Vulnerability Index scores)
 - 2013 Nutrient Reduction Plan priority watersheds

Wisconsin's Protection Plans

- Parameter-specific protection plans via TMDL creation.
- Newly TP impaired waters within a TMDL (approved after 2017) can be added to the TMDL the next listing cycle.



Legend

- Counties
- TP or TSS Impaired Lakes
- TP or TSS Impaired Streams
- Level 1 Restoration Priority Areas
- Level 2 Restoration Priority Areas (based on Nutrient Strategy)
- Level 2 Restoration Priority Areas (based on Ecosystem Health Index)
- Approved Restoration Plan Areas

0 20 40 80 Miles

Date: 01/30/2015



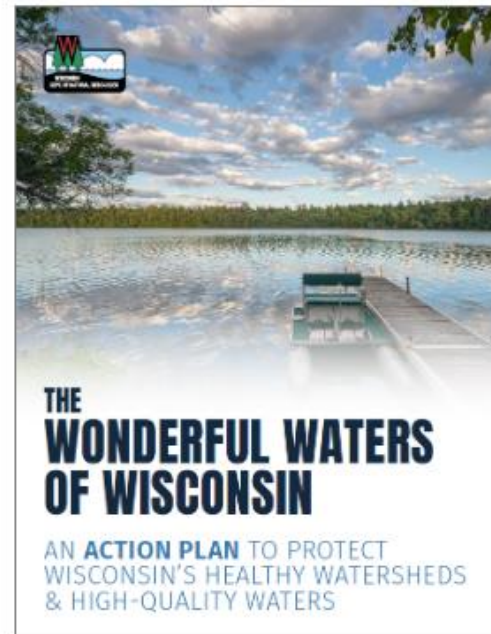
HEALTHY WATERSHEDS, HIGH-QUALITY WATERS

PROTECTING WISCONSIN'S WATER RESOURCES

Healthy Watersheds, High-Quality Waters provides a road map for how to strike an improved balance between restoration and protection, all while emphasizing and celebrating the wonderful waters of Wisconsin.

The [Healthy Watersheds, High-Quality Waters Action Plan \[PDF\]](#) is now available.

This [supporting file \[PDF\]](#) includes maps and information dashboards for the geographic protection priorities and the [Watershed Restoration and Protection Viewer](#) includes an interactive display of the modeling and assessment results.



Surface Water Quality

[Assessment Process](#)

[Monitoring](#)

[Planning](#)

[Standards and Classifications](#)

[Search Wisconsin Waters](#)

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[Subscribe to updates about the initiative.](#)

Website: <https://dnr.wisconsin.gov/topic/SurfaceWater/HQW.html>

Lessons Learned from 2011-2014 Healthy Watershed Assessment Experience:

- ✓ **Modeling & dataset management can be challenging**
 - Underrepresented resources – lakes, wetlands, groundwater
 - Watershed scaling
 - Data quality – appropriate and timely?
 - Repeatability
 - Recording decisions
 - Data display, user guide, and contractor deliverables
- ✓ **Think through messaging**
 - Model results don't necessarily indicate "Good/Bad" quality
 - The model is a screening tool. Local knowledge and field verification can improve it
- ✓ **Involve more partners earlier on**
 - Identify key partners, including tribes, and engage them early on
 - Brainstorm potential uses for the product with your programs/partners and document needs
- ✓ **Strive for implementation as an outcome**
 - Workplan for staff: development AND implementation
 - Expect continued mapping & database technical assistance
 - Look beyond traditional funding sources



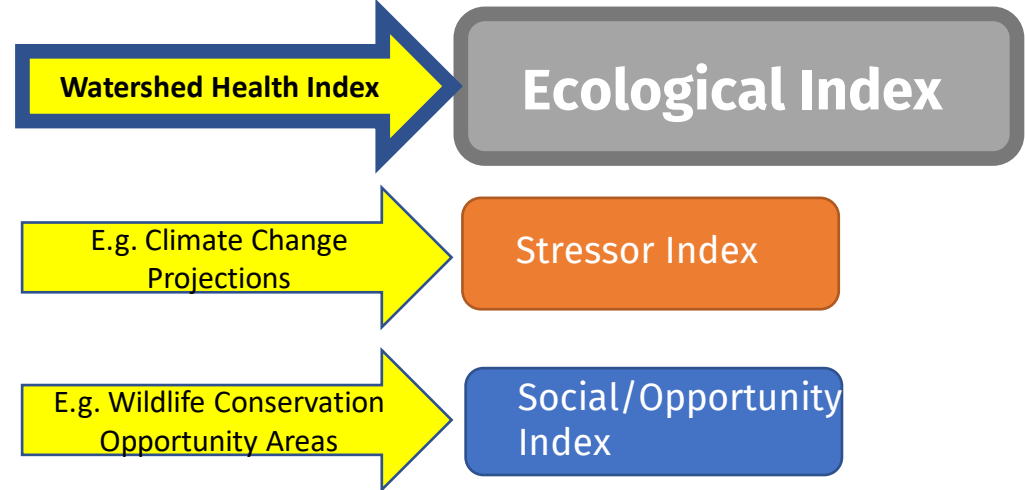
EPA's Recovery Potential Screening Tool

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

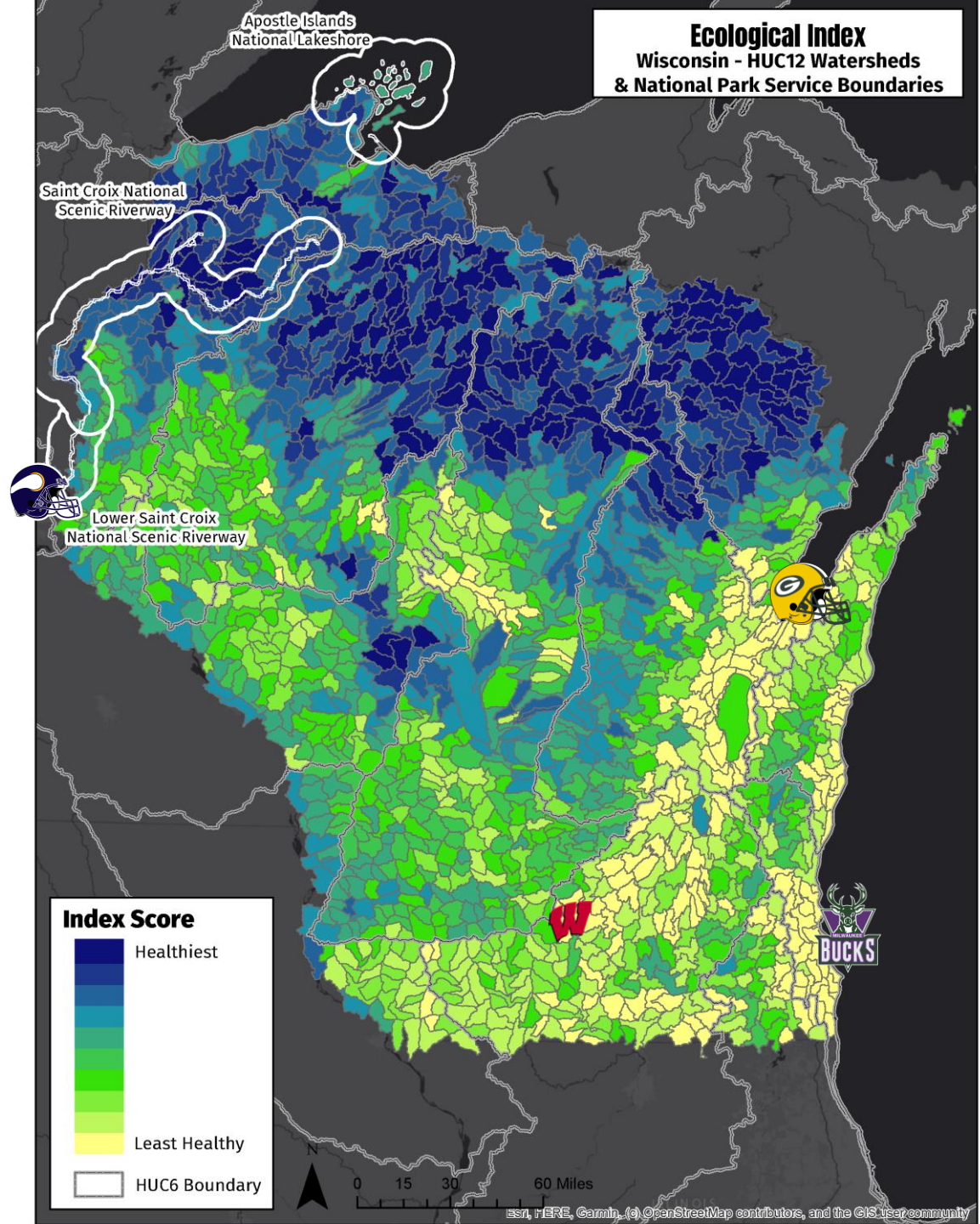
Benefits

- HUC12 scale = Base Unit (additional scaling possible)
- Over 200+ metrics updated frequently (WSIO)
- Customization and Repeatability
- EPA and contractor (Cadmus) support

RPS Score Based on 3 Indicator Bins:

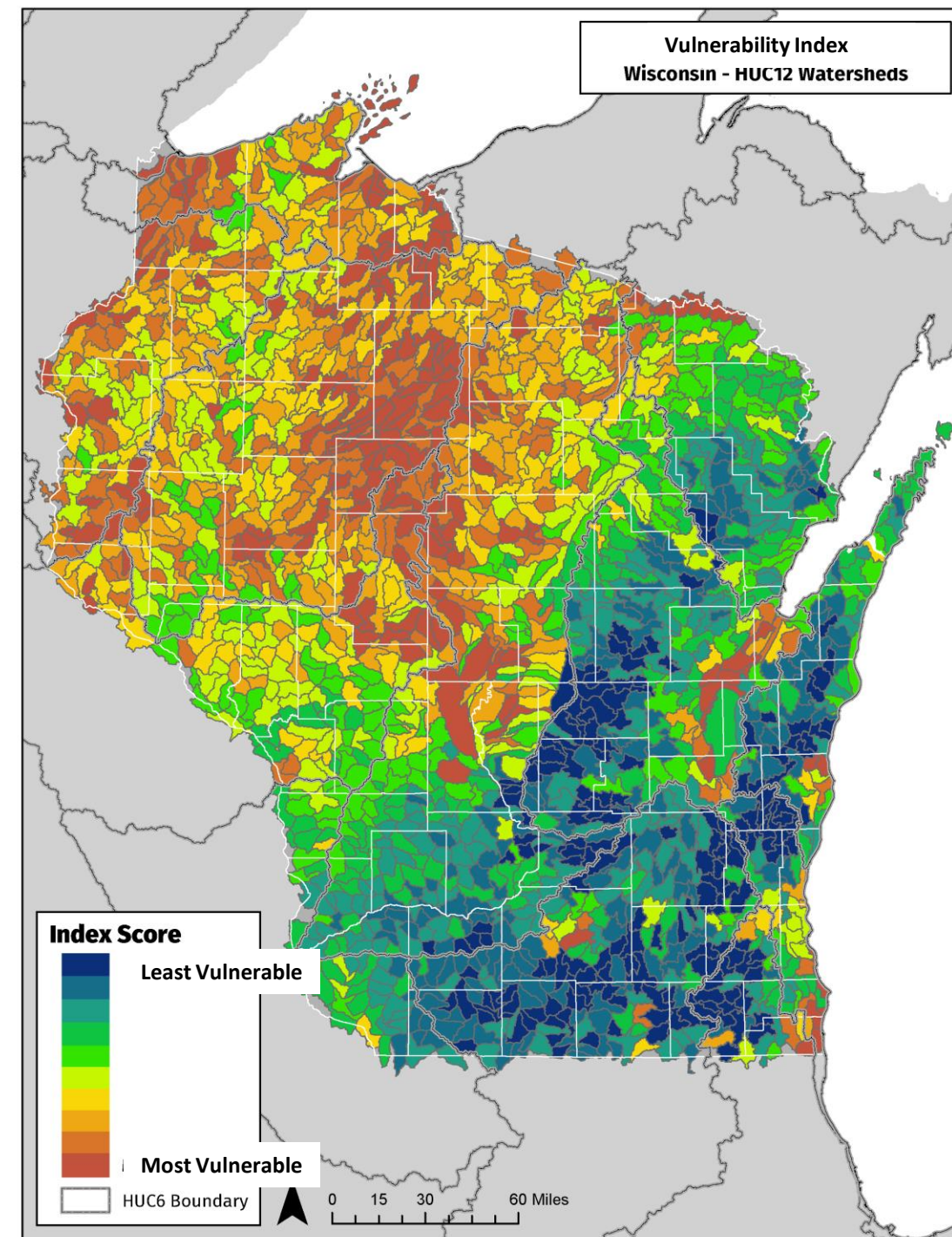


Natural land cover and hydrological connectivity are the major drivers of watershed health



STRESSOR INDICATORS

- **Shoreland Land Use** - Number of WDNR Wetland and Waterway Permits, 2015-2020 (WS)
- **Shoreland Land Use**- % Human Use Change, 2001-2016 (HCZ)
- **Watershed Land Use** - % Developed Cover Change, 2010-2050 (WS)
- **Watershed Land Use** - % Waters Near $\geq 5\%$ Impervious Cover (WS)
- **Watershed Land Use** - % Urban Cover Change, 2001-2016 (WS)
- **Watershed Land Use** - % Agriculture Cover Change, 2001-2016 (WS)
- **Wetland Loss** - Cumulative Loss of Wetland Ecosystem Services (WS), including flood abatement and carbon storage
- **Climate Change** - Average Projected Change of Summer Air Temperature 2061-2090
- **Climate Change** - % Projected Change in Spring Runoff Volume 2061-2095 (WS)



CURRENT WATERSHED INDEX ONLINE (WSIO) INDICATORS

Climate Change

Projected Climate and Hydrologic Change	Projected Change in Annual Temperature
Projected Climate and Hydrologic Change	Projected Change in Summer Temperature
Projected Climate and Hydrologic Change	% Projected Change in Annual Precipitation
Projected Climate and Hydrologic Change	% Projected Change in Annual Precipitation, Inverse
Projected Climate and Hydrologic Change	% Projected Change in Summer Precipitation
Projected Climate and Hydrologic Change	% Projected Change in Summer Precipitation, Inverse
Projected Climate and Hydrologic Change	% Projected Change in Annual Runoff
Projected Climate and Hydrologic Change	% Projected Change in Annual Runoff, Inverse
Projected Climate and Hydrologic Change	% Projected Change in Spring Runoff
Projected Climate and Hydrologic Change	% Projected Change in Spring Runoff, Inverse
Projected Climate and Hydrologic Change	% Projected Decrease in March Snow Water Equivalence
Projected Climate and Hydrologic Change	% Projected Change in Annual Evaporative Deficit

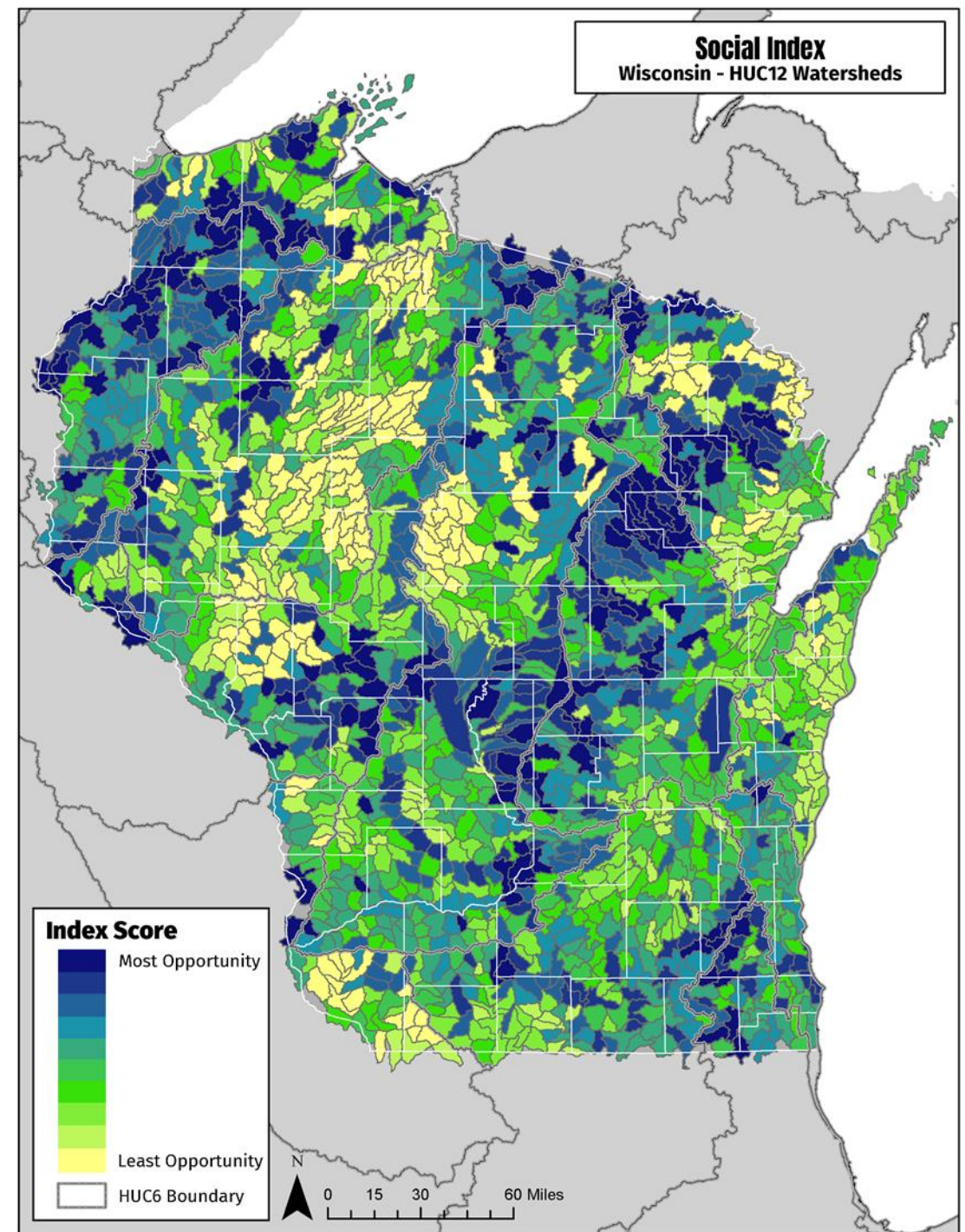
Environmental Justice

Community Context	Mobile Home Parks, Count in WS
Community Context	% Low-Income Population in WS
Community Context	% Minority Population in WS
Community Context	% < High School Educated Population in WS
Community Context	% Linguistically Isolated Population in WS
Community Context	% Vulnerable Age Group Population in WS
Community Context	Freshwater Fishing Demand in WS



SOCIAL/OPPORTUNITY INDICATORS

- **Wildlife** - Stream and River Length Classified as a WDNR Conservation Opportunity Area
- **Wildlife** - WDNR Terrestrial and/or Lake Conservation Opportunity Area.
- **Fisheries** - WDNR Fisheries Management Program Brook Trout Environmental Resilience Reserve Area
- **Water Quality** – WDNR Protection Designated Watershed within an Existing Approved TMDL Area
- **Forestry** – WDNR Forestry Ecological Landscape Priorities
- **Local Capacity** - Number of Lake, River, and Watershed Organizations
- **Recreation** - Freshwater Fishing Demand



PROTECTION POTENTIAL

We prioritized the 30% healthiest watersheds (statewide & HUC6 scales) and then applied the Opportunity and Vulnerability indexes to those priorities to determine **Protection Potential**.

