

# Watershed Index Online (WSIO)

## Frequently Asked Questions

### **WSIO Team:**

*EPA: Region 4 WPD ~ Office of Water ~  
Office of Research and Development ~  
Office of Environmental Information ~  
SAIC ~ Cadmus*

*April 2015*

# Watershed Index Online (WSIO)

## Disclaimer and User Requirements

**Software requirements:** The WSIO Tool requires Microsoft Excel 2010 (or later) for data download and calculation. Excel 2013, the ESRI Maps for Office Add-in, and access to ArcGIS Online are required to use the tool's interactive mapping feature. Mention of product names does not denote endorsement by the EPA.

**The WSIO is intended to be used as a decision-support tool** by government, professional, academic, and community users with a basic understanding of how the ecological condition of a watershed and the stressors that act upon it can affect hydrology, biology, and water quality. The WSIO data and tool outputs do not represent, change or substitute for any statute, regulation, policy, EPA decision or position.

**It is the responsibility of the user to read and evaluate dataset limitations, restrictions, and intended use.** To the best of our knowledge, the data, information, and supporting materials on the WSIO website are accurate; however, no warranty expressed or implied is made regarding the accuracy or utility of the data for general or scientific purposes, nor shall the distribution constitute any such warranty. All modeled geographic data are, by their nature, imperfect. The data provided by this tool shall not be taken as absolute truth, but rather as an approximation made in good faith based on the best available data.

**For site-specific data, WSIO data will not replace “boots-on-the-ground” measurements or local knowledge.** Better local data may be available from local sources.

**Neither the EPA, EPA contractors, nor any other organizations cooperating with the EPA assume any responsibility for damages or other liabilities** related to the accuracy, availability, use or misuse of the information provided on this website. The EPA reserves the right to change information at any time without public notice. Any errors or omissions should be reported to WSIO team using “Contact Us” on the website. We are always happy to hear your feedback and use that feedback for future enhancements.

*April 2015*

**Q:** What is the Watershed Index Online (WSIO)?

**A:** The WSIO is a free, publically available data library of watershed indicators and a decision-support tool, developed by the EPA, to assist resource managers with evaluating, comparing, and prioritizing watersheds to support a variety of objectives.

**Q:** What are the main components of the WSIO?

**A:** The WSIO consists of:

- **Nationwide Watershed Indicator data:** A library of indicators measured on all conterminous U.S. watersheds at the HUC12 scale, viewable and downloadable online.
- **The WSIO Tool:** A coded Excel workbook used to download data, perform calculations and compare and contrast watersheds. The WSIO Tool is downloaded and run locally by users.
- **Approach:** The tool's calculations are based on the EPA Science Advisor Board's recommendations and combine indicators using a consistent method to screen large numbers of watersheds in order to identify a subset for further assessment in light of a user's objectives .

**Q:** What are the intended uses of the  
WSIO?

**A:** The goals of the WSIO include:

- Providing states and others with data and tools that allow them to allocate limited resources for maintaining and restoring clean and healthy water.
- Comparing watersheds for resource planning and prioritization.
- Comparing watersheds to target healthy watersheds for protection.
- Helping non-GIS users understand and use geospatial watershed data to support decisions.

**Q:** Who is the intended audience?

**A:** Potential users of the WSIO include:

- Federal, State, and local water quality programs.
- Their stakeholders and collaborators.
- Non-Government Organizations (NGO)
- Anyone involved with watersheds and water quality.

**Q:** How does the WSIO Tool work?

**A:** The WSIO process involves:

- Establishing an objective for watershed comparison.
- Selecting a geographic area of interest.
- Selecting relevant watershed indicators.
- Using the WSIO Tool to calculate indices.
- Using the results to compare watersheds and make decisions.

# Q: How does a user begin using the tool?

## A: The first step is to select geographic area.

- Selecting a geographic area of interest establishes the project area.
- Recommended minimum area is 4 to 6 HUC8s (which should contain around 250 - 500 HUC12s)
- Smaller project areas do not provide sufficient hydrologic, ecological, topographic, and physical variety to provide context for normalizing indicators and ranking watersheds.
- Screening runs and analysis can be performed on subsets of the project area.

The screenshot shows the 'Select Geography' tool interface in Excel. The interface is divided into three steps:

- Step 1: Select a filter geography type.** Options: State, River Basin, Ecoregion, EPA Region.
- Step 2: Select filter geography values and click Get HUC8 Watersheds.** A list of HUC8s is shown, with '031101 (Suwannee)' selected. A 'Get HUC8 Watersheds' button is visible.
- Step 3: Choose one or more HUC8 watersheds and click Add Selected.** A list of HUC8 watersheds is shown, with several selected (e.g., 03110101, 03110102, 03110103, 03110201, 03110202, 03110203, 03110204, 03120001, 03120002, 03120003). Buttons for 'Clear Selection', 'Select All', 'Add Selected', 'Remove Selected', and 'Remove All' are visible.

The interface also includes a 'Reset Page' button and a 'Continue' button at the bottom.



**Q:** What are watershed indicators?

**A:** A (WSIO) watershed indicator is:

- An attribute of a watershed that is useful for watershed comparison and can be consistently measured throughout the geographic area of interest.
- Most indicators are derived from geospatial data analysis.
- Indicator types in the WSIO database are Ecological, Stressor, Social, or Base.
- Indicators are further sub-divided into Components, to aid in selecting indicators.

# Q: Why are watershed indicators organized into components?

A: Components are related to the Essential Ecological Attributes (EEAs) and stressors as defined by the EPA SAB (2002).

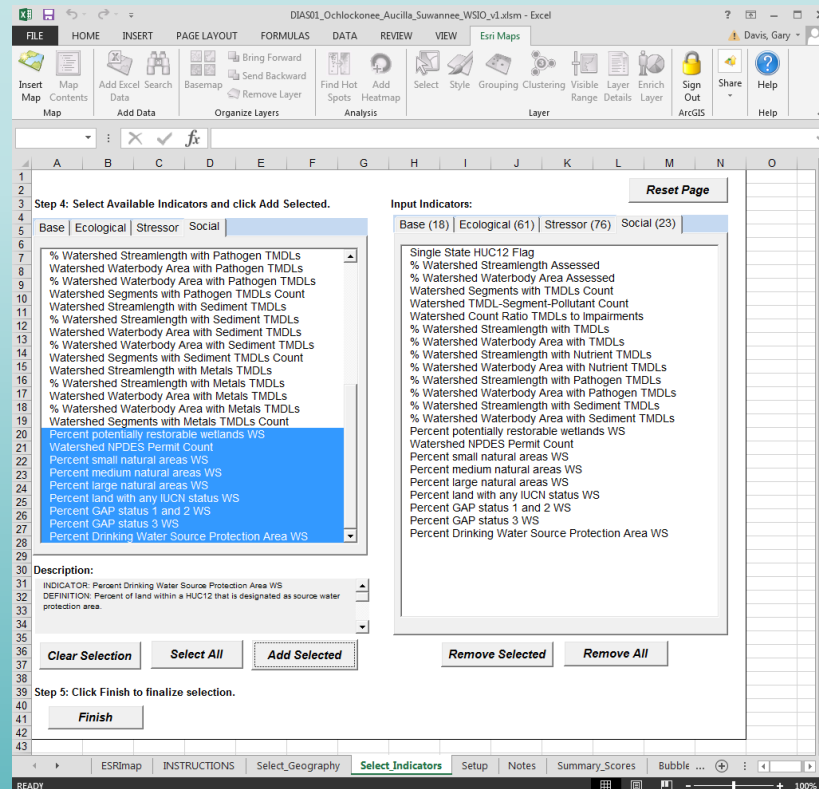
- The EPA Science Advisory Board's recommended EEAs are used as a guide to assess ecological condition and stressors.
- Considering stressors separately enables more systematic assessment of the relationships between these stressors and ecosystem impacts.

Type	Type_Value	Component	Component_Value	Count in Abridged Version 1_3
Base	0	HUC ID Political	1	9
		Hydrologic EcoRegion	2	12
		User Defined	3	
Ecological	1	Biotic Community Condition	0	3
		Watershed Natural Condition	1	31
		HCZ -Corridor Natural Condition	2	10
		RZ -Corridor Natural Condition	3	9
		Other - Corridor Natural Condition	4	
		Hydrology Flow & Channel	5	9
		Aquatic Condition / Connectivity	6	9
		WS -Ecological History	7	5
		HCZ -Ecological History	8	5
RZ -Ecological History	9	5		
Stressor	2	Biotic / Climate Risks	0	
		Watershed Disturbance	1	26
		HCZ -Corridor Disturbance	2	15
		RZ -Corridor Disturbance	3	14
		Other -Corridor Disturbance	4	
		Hydrologic Alteration	5	23
		Severity of Pollutant Loading / Fragmentation	6	42
		WS -History, Legacy of past, trajectory of future land use	7	4
		HCZ -History, Legacy of past, trajectory of future land use	8	4
RZ -History, Legacy of past, trajectory of future land use	9	4		
Social	3	Flags	0	1
		Leadership	1	
		Level of Information	2	32
		Complexity / Suitability	3	1
		Protection	4	7
		Human Health	5	1

# Q: How should a user choose which watershed indicators to download?

# A: It is recommended that users be inclusive and select a variety of indicators to download to the tool.

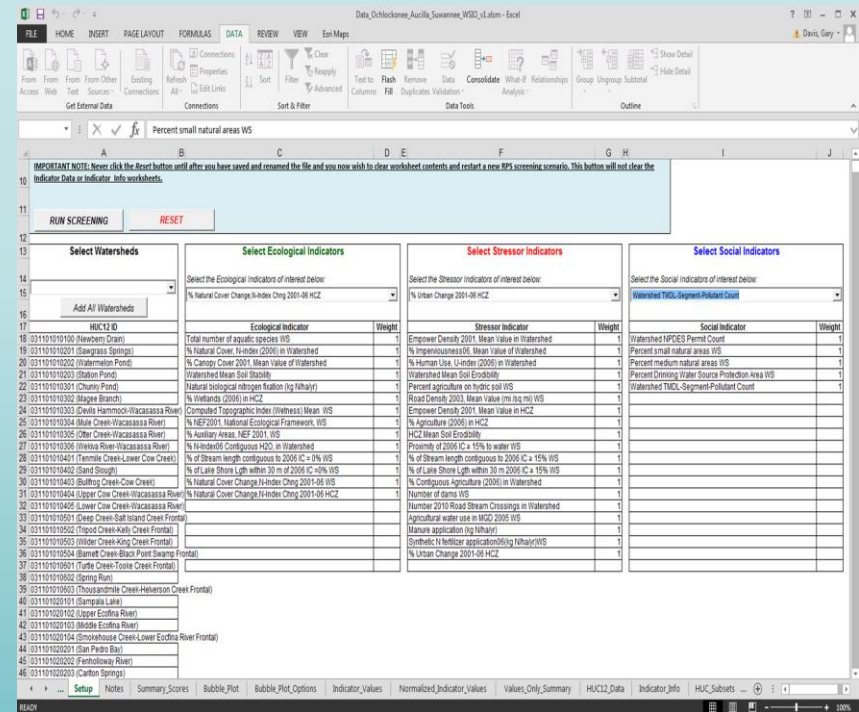
- A variety of indicators allows the user to perform screenings for multiple possible project objectives.
- It is also good to select indicators from as many Components as practical for objectives. This ensures that the SAB EEAs and stressors have been included.



# Q: How do users select Indicators for screening?

# A: Users select a sub-set of downloaded Indicators.

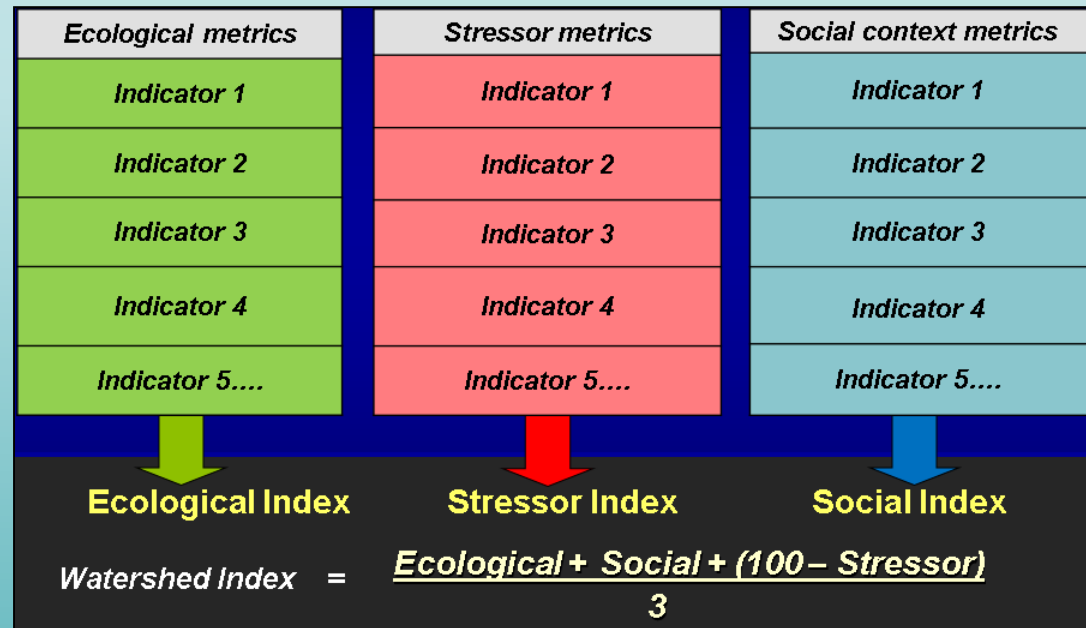
- Users pick indicators relevant to the objectives of the screening run.
- It is recommended that users select between 6 to 12 indicators of each Type for a screening run.
- It is also recommended that the indicators represent as many Components as is practical, while avoiding correlated indicators.
- Users may analyze indicators to determine which ones add power to the screening.



# Q: How does the WSIO Tool work?

A: The WSIO Tool automatically calculates four Index values from selected indicators, including a combined Watershed Index.

- Indicator values for each HUC12 are normalized and weighted (if desired).
- Ecological, Stressor, Social, and overall WSIO scores are calculated.



**Q: What are Ecological, Stressor, Social and Watershed Index values?**

**A: The four index values are:**

- **Ecological:** Reflects the overall condition and the capacity of the watershed to maintain or regain functionality, based on metrics related to natural watershed processes and structure.
- **Stressor:** Reflects pressures (Drivers of change) on watershed condition from several primary sources of pollutants and water quality impairments.
- **Social:** Includes many factors that strongly influence the level of effort and complexity in making improvements in the watershed.
- **WSI:** An index of watershed condition calculated from the combined effects of the Ecological, Stressor and Social Index values.

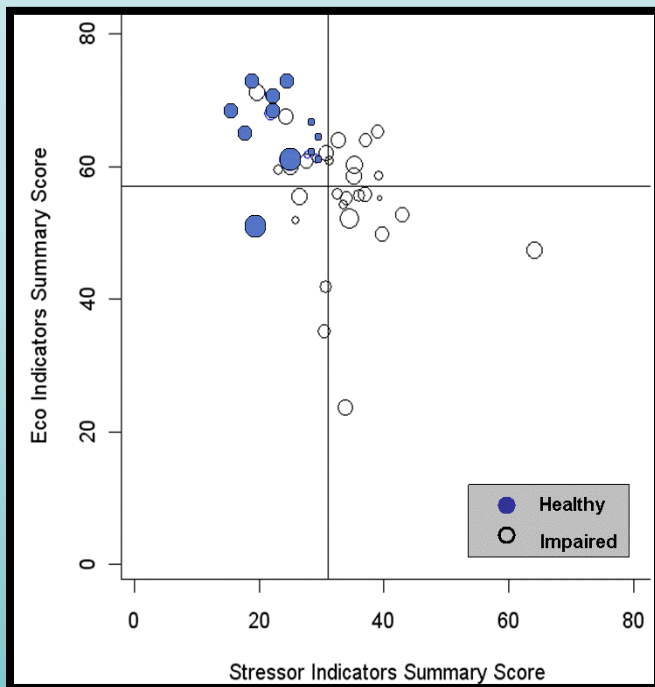
**Q:** How does the WSIO Tool show the results from a watershed screening?

	A	B	C	D	E
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-Cata	3.44	7	
9	010900020203	Chequesset ground	3.43	8	
10	010802060103	Dead Branch Westl	3.39	9	
11	010802040202	East Branch Ware F	3.38	10	
12	010802060202	West Branch Westl	3.37	11	
13	010802060201	West Branch Westl	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*

**A:** The tool displays a table of Ecological, Stressor, Social and combined WSI Scores for each screened watershed. The rank order of each watershed is also provided.

**Q:** How does the WSIO Tool show the results from a watershed screening?

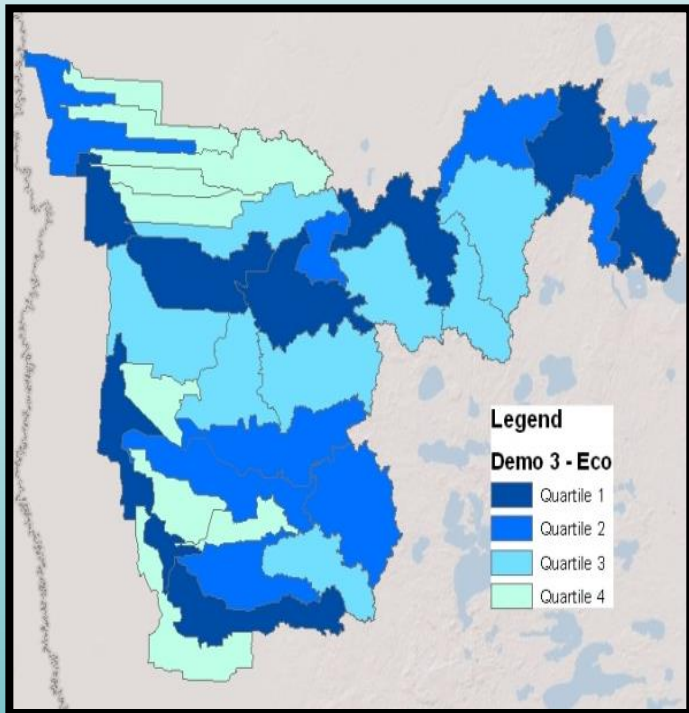


*Bubble Plotting*

**A:** The tool also displays results as a 3-d bubble chart, with each watershed plotted based on its stressor score (X) ecological score (Y), and dot size reflecting its social score.



**Q:** How does the WSIO Tool show the results from a watershed screening?



*Mapping*

**A:** The tool contains an embedded map allowing users to plot indicator data and/or index scores directly within the workbook in order to understand geographic patterns.

# SUMMARY

- The WSIO provides states and others with data and tools that assist them to allocate limited resources for maintaining and restoring clean and healthy watersheds.
- Users can compare watersheds for resource planning and prioritization.
- The flexibility of the WSIO Tool and data allow users to run and save multiple screenings on different spatial areas to address different objectives.
- Data and resulting indices can be filtered, sorted, and displayed in a variety of ways to assist interpretation.