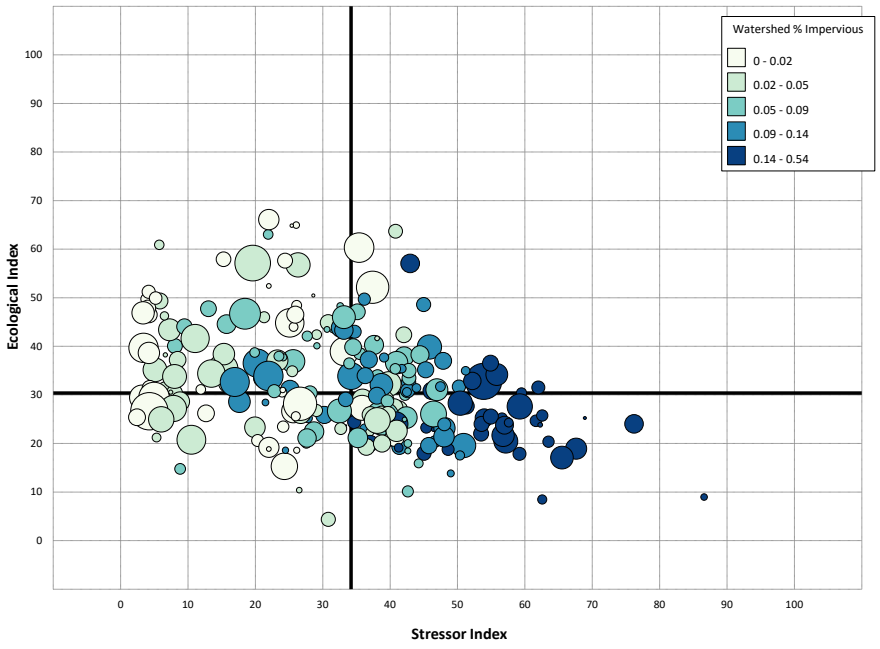
EXCEL RESTORATION AND PROTECTION SCREENING TOOL

USER GUIDE



November 2024

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1. Introduction & Background

1.1. RPS Overview

Restoration and Protection Screening is a systematic method, tool and database that was developed by the U.S. Environmental Protection Agency to support strategic planning of priority waters and watersheds. RPS provides states and other planners with a flexible screening tool to guide prioritization of watersheds so that available resources can be focused on areas with the highest needs or where the greatest benefits are likely to occur.

RPS involves identifying a group of watersheds to be compared and a specific purpose for comparison; selecting appropriate indicators in three categories (Ecological, Stressor and Social; Figure 1); and calculating index scores for the subwatersheds which summarize indicator data. Index scores include the Ecological Index, Stressor Index and Social Index. Index scores are calculated by combining indicators from each category. For example, the Ecological Index is calculated from all ecological indicators, while the Stressor Index is calculated from all stressor indicators. In addition, an overall Restoration and Protection Integrated, or RPI, index score is calculated by combining the Ecological Index, Stressor Index and Social Index.

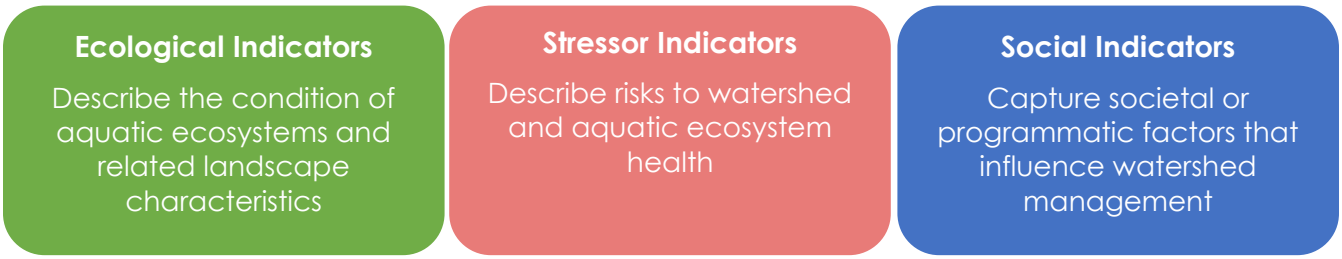


Figure 1. RPS uses three categories of indicators to compare watersheds.

1.2. Excel RPS Tool

The Excel RPS Tool is a custom-coded workbook that enables users to set up an RPS screening and view the screening results. The Excel RPS Tool:

- Stores indicator data which characterize subwatershed conditions and characteristics.
- Contains a user-friendly interface for setting up a screening.
- Automatically calculates RPS index scores and ranks for the screened subwatersheds.
- Displays results in customizable table, plot and map form.
- Can be readily updated with user-generated custom indicator data.

The Excel RPS Tool is designed for use by anyone with basic familiarity with Microsoft Excel. This User Guide provides detailed, step-by-step directions on how to operate the tool. A description of the screening process and information to help interpret the results of a screening, are provided on the RPS Methods page of the EPA RPS website.

1.3. File Versions

Multiple Excel RPS Tool files are available for download from the EPA RPS website. These files are explained below:

- **Standard File**: The Standard File starts as a blank template which can be configured for any state in the contiguous U.S. and provides access to the most up-to-date HUC12 indicator data maintained by the EPA. Users begin by choosing their state of interest and the file imports indicator data for all HUC12 subwatersheds[1] in the selected state from the EPA's online indicator database (https://gispub.epa.gov/arcgis/rest/services/OW/RPS/MapServer).
- **Custom Files**: Custom Files have been developed for a subset of states and territories. Unlike the Standard File, these contain pre-loaded indicator data and do not import data from the EPA's online indicator database. The pre-

[1] HUC12s are 12-digit hydrologic units from the National Watershed Boundary Dataset maintained by the US Geological Survey (USGS) and other federal agencies.

loaded data typically includes indicators which have been calculated from state-specific or territory-specific datasets in addition to national datasets. In some cases, these files allow users to screen additional or alternative watershed units beyond HUC12 subwatersheds (e.g., HUC14 subwatersheds).

- **Generic Template File:** The Generic Template File enables a user to define their own geographic area of interest (e.g., river basin or multi-state region) and add indicator data for up to three different watershed scales within that area of interest. Once a user has added watershed units and indicator data, a screening can be run to calculate the RPS indices and results can be viewed in table or graph form. Mapping is not supported in this version of the Excel RPS Tool.
- **Legacy Files**: The Legacy Files were last updated in August 2022 and contain 300+ pre-loaded HUC12 indicators. Each file stores indicator data for a single state (e.g., the Maine file contains indicator data for all HUC12s in Maine). These files are no longer maintained with updated indicator data and have been replaced with the new Standard File described above that imports indicator data from the EPA's online database for any user-selected state.

Table 1. Comparison of Excel RPS Tool versions.

Excel RPS Tool Version	Geographic Scope	Watershed Scale	Indicator Data
Standard File	Automatically configured for a user-selected state in the contiguous US	HUC12 subwatersheds only	Imported from the EPA's online database of indicators calculated from national datasets
Custom Files	Pre-configured for an individual state or territory	Varies by file; may include multiple watershed scales in a single file	Pre-loaded with indicators calculated from state-specific, territory-specific and national datasets
Generic Template File	Defined by user	Defined by user	Supplied by user
Legacy Files	Pre-configured for an individual state in the contiguous US	HUC12 subwatersheds only	Pre-loaded with indicators calculated from national datasets

1.4. User Guide Organization

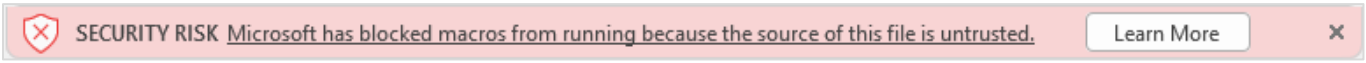
The Excel RPS Tool is made up of several worksheets within a Microsoft Excel workbook. Some worksheets contain interactive menus and buttons while others store data for viewing and use in RPS calculations.

Each section of this User Guide describes a worksheet in the Excel RPS Tool. Worksheet contents are summarized and step-by-step instructions are provided for interactive features within the worksheet. For some worksheets and features, a set of advanced tips are also provided for users that have become proficient in basic use of the tool.

2. Enabling Macros

The Excel RPS Tool files contains macros but they are not a security risk. The macros are needed for the tool to function. The following instructions describe how to enable macros when first opening an Excel RPS Tool file.

1. If the red Security Risk banner is displayed (see image below), then follow steps a through c below. If the red Security Risk banner does not appear, skip to step 2.

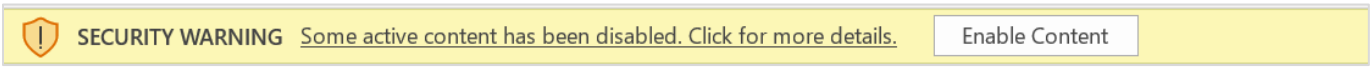


   a. Remove **Mark of the Web** by following steps on this Microsoft website. If this option is not available to you, or does not resolve the red Security Risk banner, move to step b.

   b. **Change macro settings in the Trust Center** by following directions in the section titled "Change macro settings in the Trust Center" on this Microsoft website. If your macros were already enabled, or this does not resolve the red Security Risk banner, move to step c.

   c. Designate the folder containing your downloaded Excel RPS Tool as a **Trusted Location** by following steps on this Microsoft website.

2. If the yellow Security Warning banner is displayed (see image below), then click the *Enable Content* button to allow macros to run.

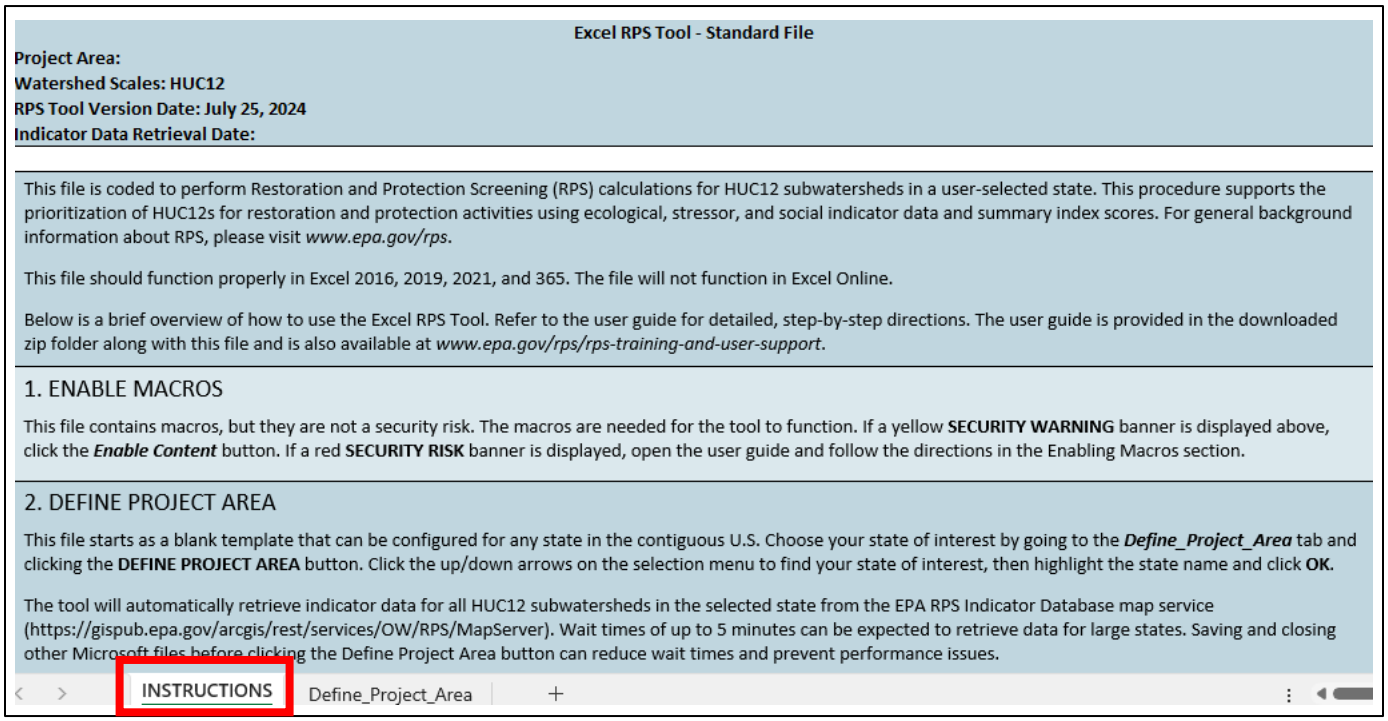


3. Instructions Worksheet

The ***Instructions*** worksheet provides an abridged set of instructions for using the Excel RPS Tool. The ***Instructions*** worksheet is intended to serve as a built-in reference for users of the Excel RPS Tool. It does not supplant the more detailed instructions presented in this User Guide.

Listed at the top of the ***Instructions*** are four key pieces of information for the tool file you are working with:

- **Project Area** – The state, river basin or other geographic area that the file is configured to screen. This row will be blank if you are opening the Standard File for the first time and will be filled after defining a Project Area.
- **Watershed Scales** – The watershed scales that the file is configured to screen. The term "watershed scale" refers to pre-defined watershed delineations. A typical tool file is able to screen HUC12 subwatersheds. Some Custom Files are able to screen additional watershed scales such as 14-digit hydrologic units (HUC14s) or other custom watershed delineations created by state water agencies.
- **Version Date** – The date the file was last updated to add new user features or modify existing features.
- **Indicator Data Retrieval Date (Standard File Only)** – The date when indicator data were imported from the EPA's online indicator database into the file. This row is only displayed in the Standard File and will be blank if you are opening the Standard File for the first time. The date will be filled after defining a Project Area.



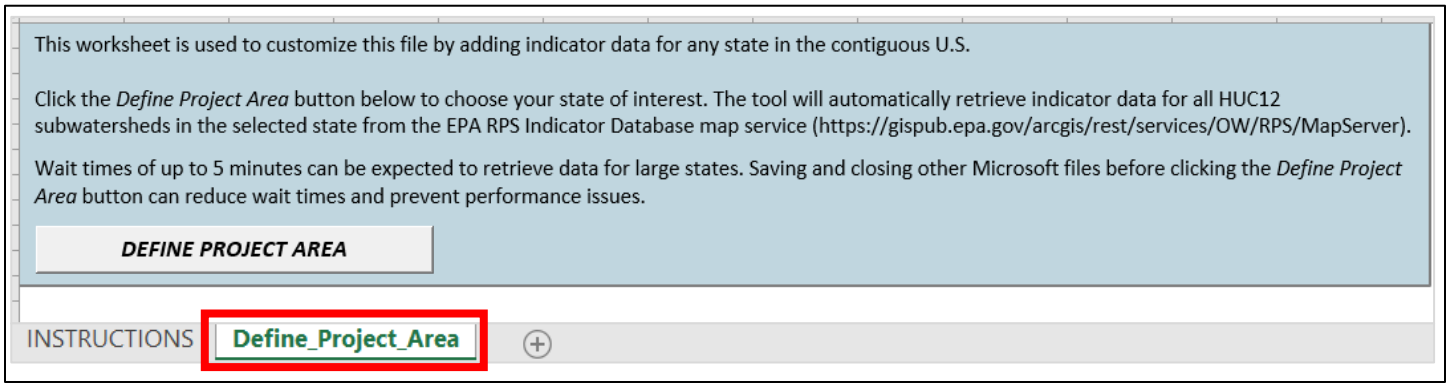
4. Define Project Area Worksheet

4.1. Overview

The ***Define Project Area*** worksheet is found in the Standard File only. The worksheet is used to configure the file for a specific state in the contiguous U.S. The file is configured by automatically retrieving and importing indicator data for all HUC12 subwatersheds in the selected state from the EPA's online indicator database.

Users should understand the following when using the ***Define Project Area*** worksheet:

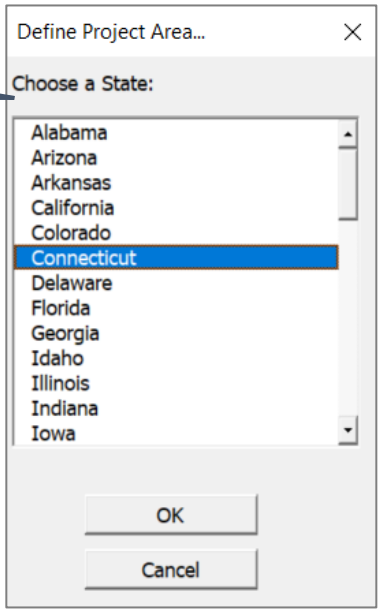
- The ***Define Project Area*** worksheet is only visible when the Standard File is opened for the first time. The worksheet is no longer accessible after a user has selected a state. Users must download and open a fresh copy of the Standard File to import data for another state or to import updated indicator data.
- A working internet connection is needed to import indicator data from the EPA's online indicator database.
- Wait times of up to 5 minutes can be expected to retrieve indicator data for large states. Saving and closing other Microsoft files before clicking the *Define Project Area* button can reduce wait times and prevent performance issues.

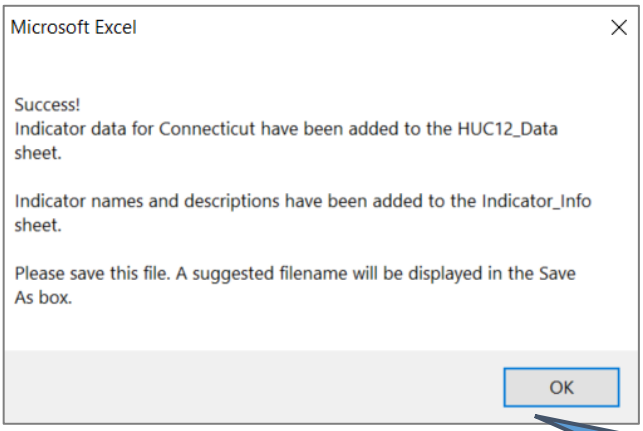


The following section describes how to use the ***DEFINE PROJECT AREA*** button to configure the file for a user-selected state.

To configure the file for a state, click the ***DEFINE PROJECT AREA*** button on the ***Define Project Area*** worksheet.

Click the up/down arrows to find your state of interest in the popup selection menu. Highlight the state name and click ***OK***.

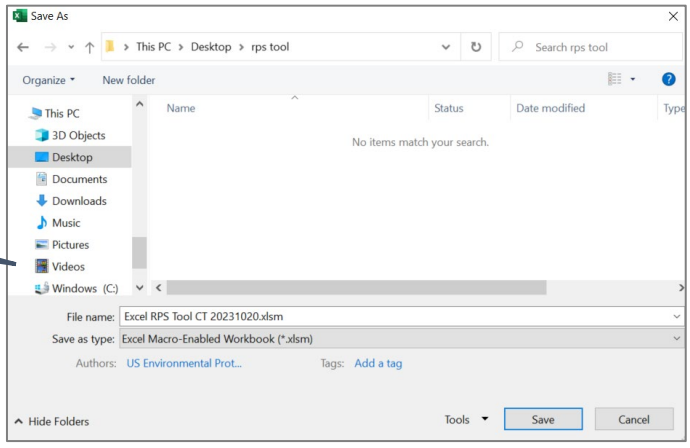




A popup message will display after the file imports indicator data from the EPA's online HUC12 database for the selected state. Click ***OK***.

The *Save As* prompt will appear with a suggested filename that includes the selected state and date.

Navigate to the preferred folder for saving the file and edit the file name as desired. Click **Save** to save the file.

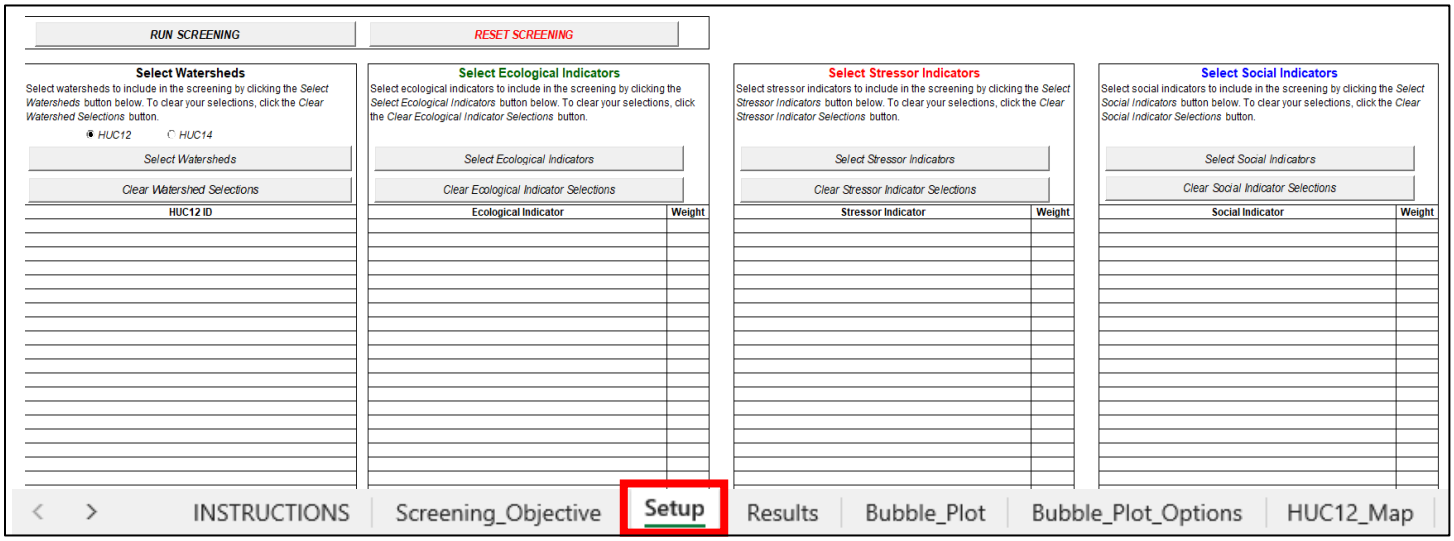


5. Setup Worksheet

5.1. Overview

Basics

The ***Setup*** worksheet is your "home base" for configuring and running a screening. It is the first worksheet you should use after opening the tool file, reviewing instructions and planning your screening run. The ***Setup*** worksheet is the only worksheet where you can choose (and change) the watersheds and indicators that are used in your screening run.



The ***Setup*** worksheet is organized into four sections:

- In the **Select Watersheds** section you will specify which watersheds will be included in the screening.
- In the **Select Ecological Indicators** section you will specify which ecological indicators will be used in the screening and how those ecological indicators will be weighted.
- In the **Select Stressor Indicators** section you will specify which stressor indicators will be used in the screening and how those stressor indicators will be weighted.
- In the **Select Social Indicators** section you will specify which social indicators will be used in the screening and how those social indicators will be weighted.

After selecting watersheds, indicators and weights, you will click the ***RUN SCREENING*** button to populate other worksheets in the tool with screening results. The ***Setup*** worksheet also includes a ***RESET SCREENING*** button to clear the current watershed/indicator selections from the ***Setup*** worksheet and screening results from other worksheets so that a new screening run can be configured from scratch.

The following sections provide step-by-step instructions for how to:

- ***Choose Watershed Scale***
- ***Select Watersheds to Screen***
- ***Select Indicators and Weights***
- ***Run Screening Button***
- ***Respond to Warning Messages***
- ***Reset Screening Button***

Advanced Tips

- Completing the setup process is far easier if you have already planned out your screening by identifying the screening purpose, watersheds of interest and relevant indicators (from the full list available) beforehand.
- The process of selecting watersheds and indicators to screen can be streamlined by copying and pasting watershed IDs, indicator names and indicator weights that have already been compiled in other spreadsheets. This is faster than typing or selecting individually from popup menus on the ***Setup*** worksheet. Instructions for copying and pasting watersheds and indicators into the ***Setup*** worksheet are provided in the following sections.
- After setting up and running a screening, you may want to make minor adjustments to your screening by adding or removing watersheds, adding or removing indicators or adjusting indicator weights. Do not click the ***RESET SCREENING*** button on the ***Setup*** worksheet if you want to make minor adjustments to an existing screening since clicking the ***RESET SCREENING*** button will clear all selections from the ***Setup*** worksheet. Instead, to adjust an existing screening, simply make the desired changes on the ***Setup*** worksheet and then re-click the ***RUN SCREENING*** button. This will update results stored on other worksheets to reflect the changes made to watershed and indicator selections on the ***Setup*** worksheet.
- Save completed screening runs and change the file name before beginning a new run with different watersheds or indicators, or before using ***RESET SCREENING.***

5.2. Choose Watershed Scale

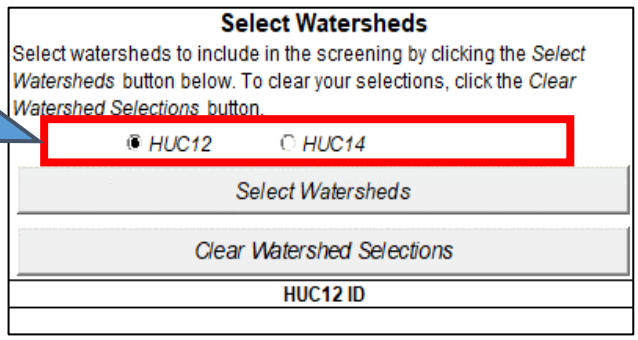
Basics

Some Custom Files are pre-loaded with indicator data for multiple watershed scales (e.g., HUC12 and HUC14 subwatersheds). If your tool file includes multiple watershed scales, you must specify which scale your screening will consider on the ***Setup*** worksheet.

Watershed scale options are displayed right below the **Select Watersheds** section title on the ***Setup*** worksheet.

To select a watershed scale, click the option button next to the watershed scale name.

If your Excel RPS tool contains watershed data at one scale only, there will be no options buttons visible.



Advanced Tips

- Users must select only ***one*** watershed scale per screening run (i.e., you cannot screen watersheds from multiple scales in a single screening run).
- Clicking a watershed scale button will prepare the watershed and indicator popup menus on the ***Setup*** worksheet for next steps. For example, clicking the HUC12 option button will add HUC12 IDs to the popup menu displayed when the **Select Watersheds** button is clicked.
- Be aware that changing to a different watershed scale will reset the ***Setup*** worksheet by clearing any selected watersheds, indicators and weights. If you have begun to setup your screening run by entering watersheds, indicators or weights on the ***Setup*** worksheet then those entries will be deleted if you click a different watershed scale button and will not be recovered by returning to the original scale.

5.3. Select Watersheds to Screen

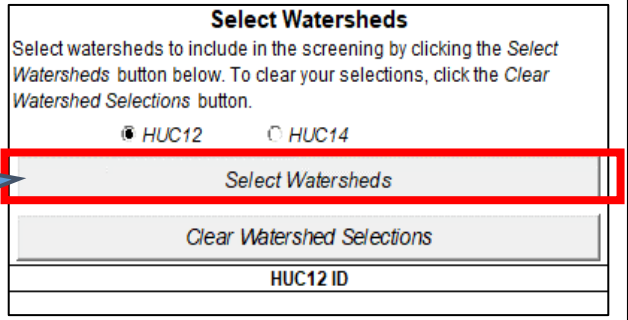
Basics

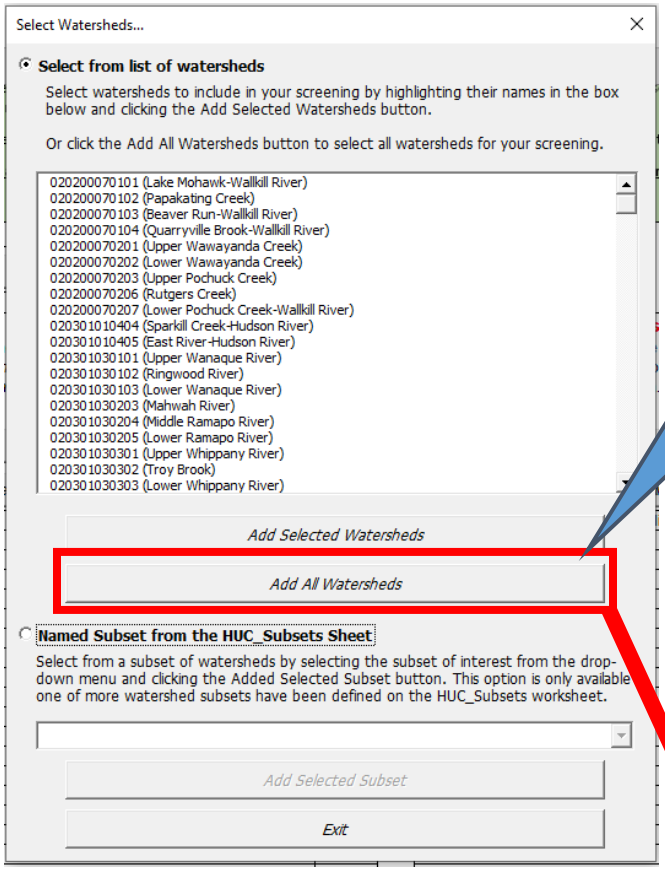
A screening run can include all watersheds in the Project Area that the Excel RPS Tool is designed for, or a targeted subset of watersheds of interest. Users must decide which watersheds to screen based on the purpose and goals of their screening.

In the **Select Watersheds** section of the ***Setup*** worksheet, you will specify which watersheds to include in the screening by entering a list of watershed IDs (one ID per row). Four options are available for entering watersheds IDs.

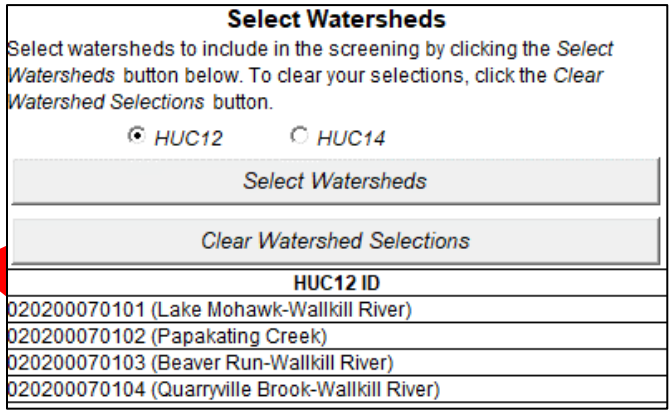
Select Watersheds to Screen Option 1 – Add All Watersheds

Click the ***Select Watersheds*** button. A popup menu will display with a list of watershed IDs that can be selected for the screening.



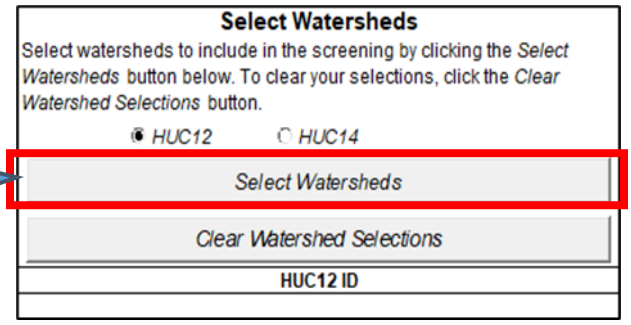


Click the ***Add All Watersheds*** button. This will select all watersheds for the screening by adding the full list of watershed IDs to column A of the ***Setup*** worksheet.



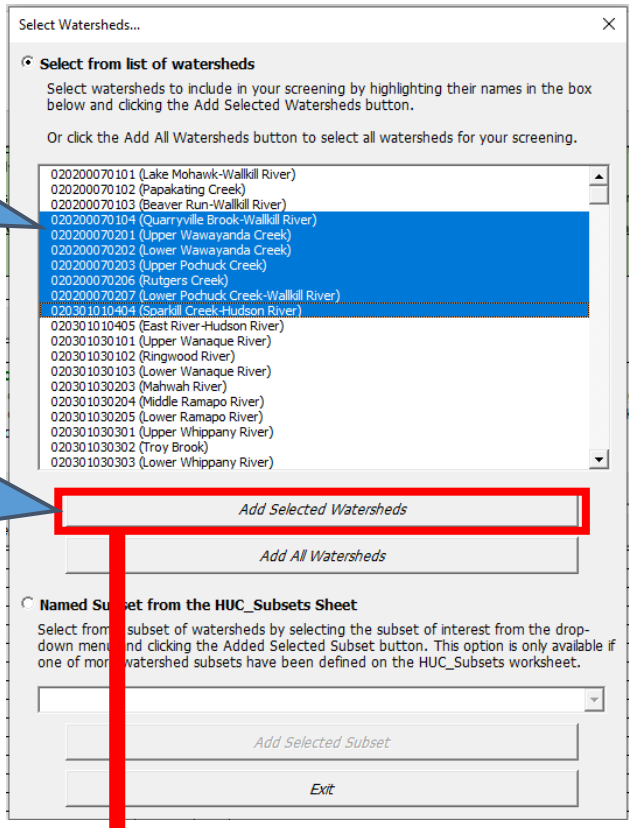
Select Watersheds to Screen Option 2 – Select Watersheds Individually

Click the ***Select Watersheds*** button. A popup menu will display with a list of watershed IDs that can be selected for the screening.



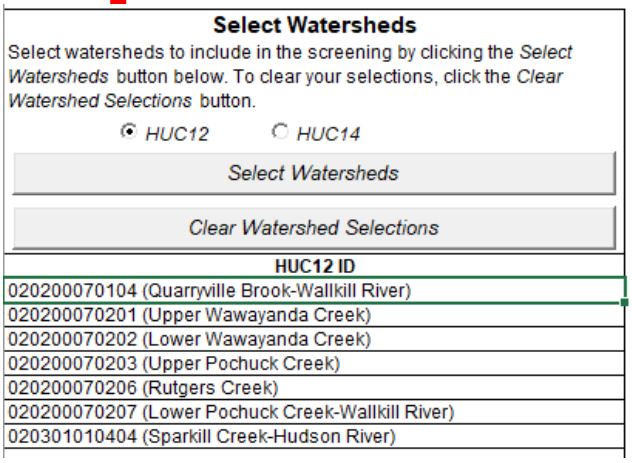
In the popup menu, highlight the watersheds you would like to include in your screening by clicking on their IDs/names.

Multiple watersheds can be highlighted by dragging the mouse cursor down or by holding the Ctrl key and then clicking on each watershed ID individually.



Click the ***Add Selected Watersheds*** button to add the highlighted watersheds to the list of watershed IDs for screening.

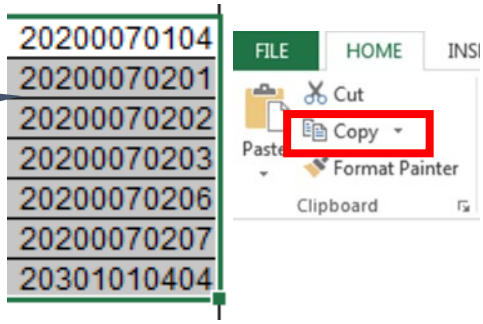
You still have the opportunity to select additional watersheds after clicking the ***Add Selected Watersheds*** button. Repeat the previous step until all watersheds of interest have been selected for the screening, then click the ***Exit*** button to close the popup menu.

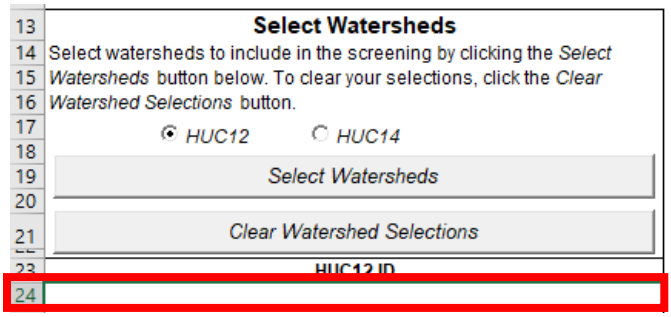


Select Watersheds to Screen Option 3 – Copy and Paste Watershed IDs

To use this option, you must already have a pre-existing list of watershed IDs to screen in a separate worksheet or file. The list of watershed IDs must be formatted with one ID per row.

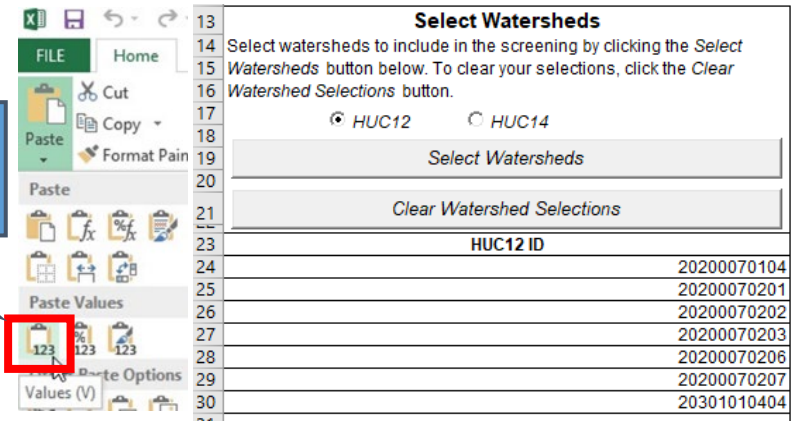
Open the worksheet containing the pre-existing list of watershed IDs to screen. Select the list and click "Copy" on the Excel menu.





Go back to the ***Setup*** worksheet and set the cursor to cell A24 (the first cell of the watershed ID list in the **Select Watersheds** section.

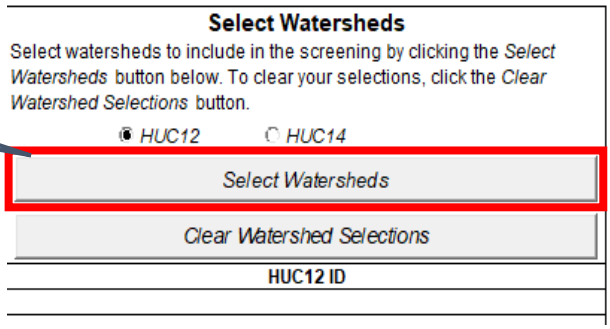
Choose "Paste Values" from the Excel menu to paste the watershed IDs into the **Select Watersheds** section.

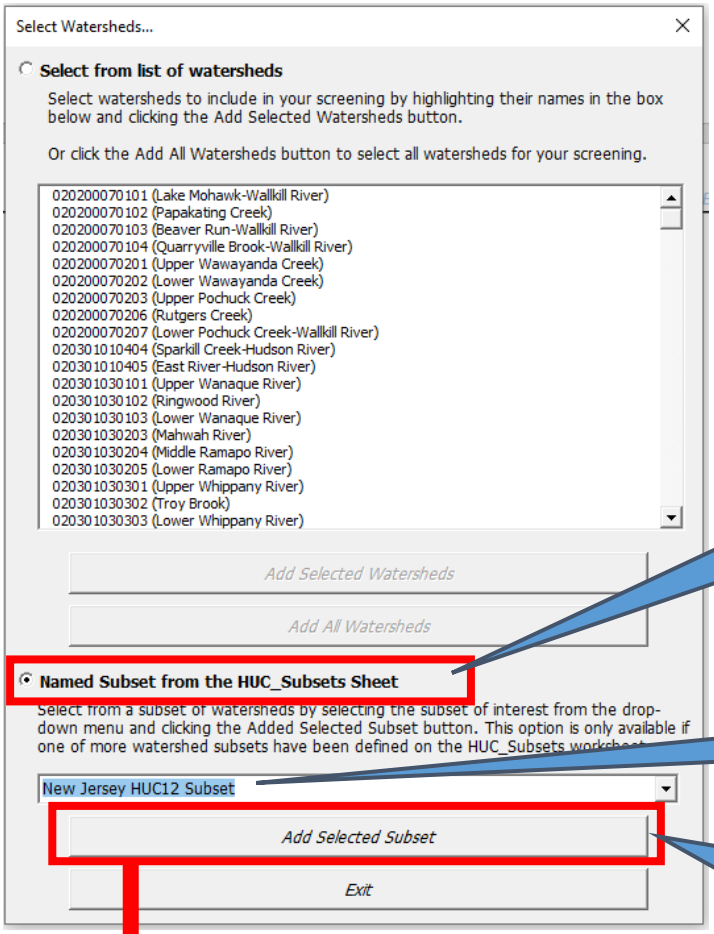


Select Watersheds to Screen Option 4 – Add a Watershed Subset from the HUC_Subsets Sheet

To use this option, you must already have a subset of watersheds defined on the ***HUC_Subsets*** worksheet. A subset is a list of watersheds that meet certain user-defined selection criteria, such as minimum levels of agricultural land cover or impervious cover. See Section 13 (HUC Subsets Worksheet) of this guide for step-by-step instructions on how to define a watershed subset.

Click the ***Select Watersheds*** button. This displays the watershed selection popup menu.

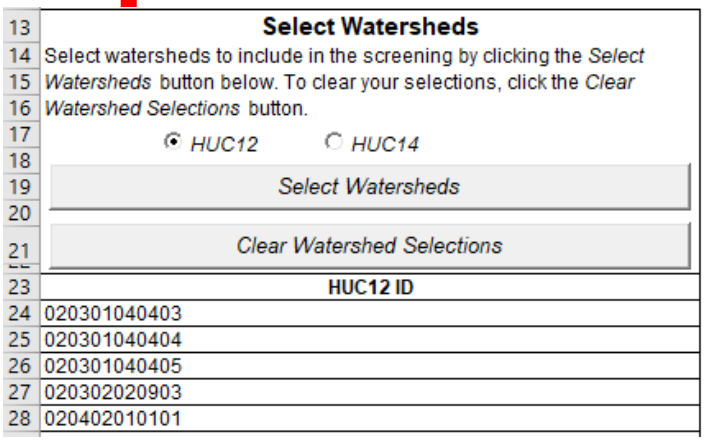




Click the ***Named Subset from the HUC_Subsets Sheet*** option. This activates the drop-down menu containing the names of watershed subsets that have been defined on the ***HUC_Subsets*** worksheet. The drop-down menu will be blank if you have not yet defined a watershed subset.

Choose the name of the watershed subset that you would like to add to the screening.

Click the ***Add Selected Subset*** button to add the watersheds in the subset to the list of watershed IDs for screening. The selected subset will appear in column A of the ***Setup*** sheet.



Advanced Tips

- The watershed ID list in the **Select Watersheds** section must begin in cell A24 of the ***Setup*** worksheet and must contain one watershed ID per row.
- Watershed names alone cannot be added to the watershed ID list. Watershed names can be included in the text but must occur after the watershed ID. For example, the Jacks River HUC12 (HUC12 ID 031501010102) can be entered as "031501010102" or "031501010102 (Jacks River)" but not "Jacks River".
- When manually typing watershed IDs or copying and pasting from another worksheet, be sure that all IDs are present in column A of the ***Indicator Data*** worksheet for the watershed scale you are screening (e.g., the ***HUC12_Data*** worksheet HUC12 subwatersheds are being screened). The tool cannot screen watersheds that are not present in the ***Indicator Data*** worksheet.
- Use the ***HUC Subsets*** worksheet to store lists of watershed IDs that will be of interest for future screenings. For example, you can use the ***HUC Subsets*** worksheet to store lists of HUC12 IDs within each HUC8 in the Project Area.
- Do not omit leading zeros from watershed IDs (e.g., "04030001" cannot be entered as "4030001"). Omitting leading zeros will cause errors in the screening run.
- If HUC8 watersheds are being screened, the first 8 characters in each watershed ID are used to extract indicator values from the indicator data worksheet. Any text after the eighth character is ignored. Similarly, if HUC12 subwatersheds are being screened, only the first 12 characters in each watershed ID are used to extract indicator values from the indicator data sheet. This concept applies across all watershed scales.

5.4. Select Indicators and Weights

RPS index scores and ranks are calculated for each watershed included in a screening using ecological, stressor and social indicators. The choice of which indicators to use for a screening depends on the purpose of the screening and the nature of the watersheds being screened. Thus, users should review the full list of indicators and their definitions in the ***Indicator Info*** worksheet before selecting indicators on the ***Setup*** worksheet.

Basics

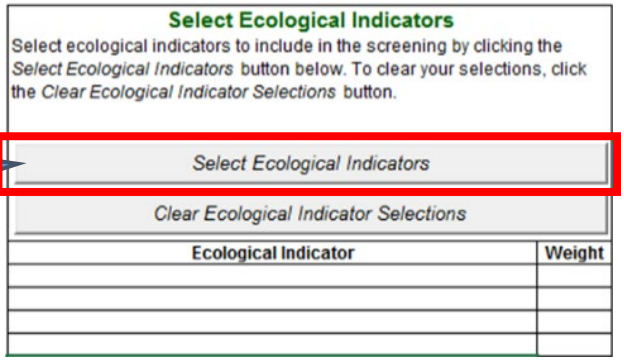
At least one ecological indicator, one stressor indicator and one social indicator must be selected in order to perform a screening run. Neutral indicator values are available in each category if one or more categories are not of interest. In general, three to ten indicators per category are recommended. If too few indicators are selected, index scores will not adequately reflect the factors influencing restoration or protection potential. If too many indicators are selected, index scores will reflect random noise in the indicator data rather than true patterns in restoration or protection potential.

Indicator weights determine the relative influence of each indicator on index scores. Weights must be numeric but any set of numeric values can be used. A typical approach is to select a certain number of weight categories (e.g., 3 = high; 2 = medium; 1 = low) and assign weights to indicators based on their relevance to the purpose of the screening and data quality considerations.

Two options are available for selecting indicators and weights on the ***Setup*** worksheet. Step-by-step instructions for each option are provided on the following pages.

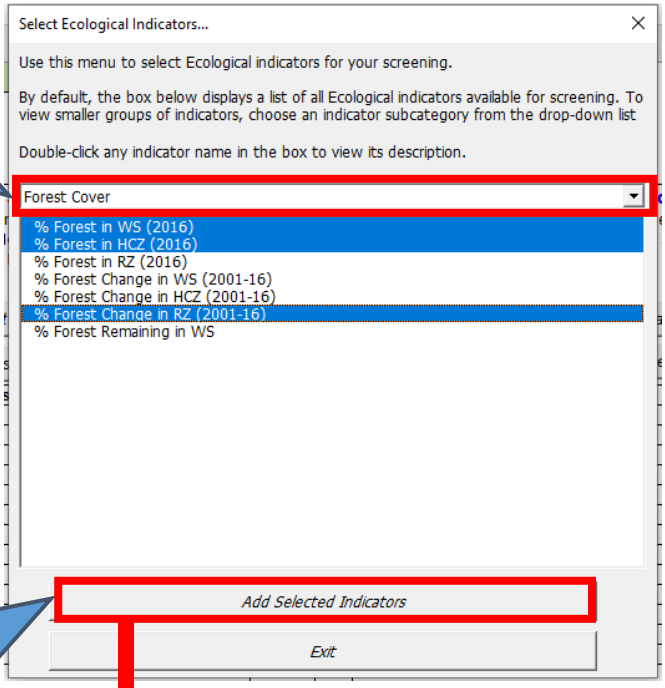
Select Indicators and Weights Option 1 Select from Popup Menu

Click on the ***Select Ecological Indicators*** button. A popup menu will display a list of ecological indicators that can be selected for the screening.



By default, the list will include all ecological indicators that are available for the screening. Users can filter the list to display groups of indicators by subcategory. Example subcategories include forest cover or wetland cover.

To filter the list by subcategory, select the subcategory of interest from the drop down menu.

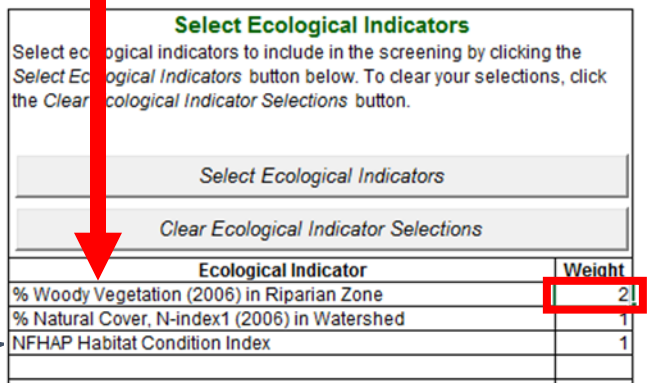


Highlight the indicators you would like to include in your screening by clicking on their name.

Double clicking an indicator name will display a popup box with its description.

Click the ***Add Selected Indicators*** button to add the highlighted indicators to the list of indicators selected for the screening.

You still have the opportunity to select additional indicators after clicking the ***Add Selected Indicators*** button. Repeat the previous step until all indicators of interest have been selected for the screening then click the ***Exit*** button to close the popup menu.



By default, indicators selected from the popup menu will be assigned a weight of 1.

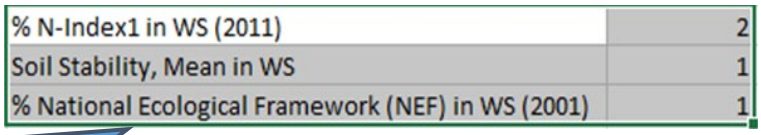
Indicator weights can be adjusted by placing the cursor on the cell containing the weight and typing in a new weight.

Repeat these steps in the **Select Stressor Indicators** section to select stressor indicators and weights and again in the **Select Social Indicators** section to select social indicators and weights.

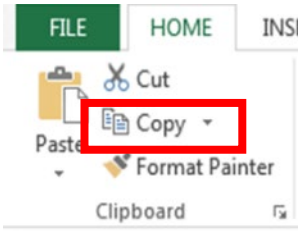
Select Indicators and Weights Option 2 – Copy and Paste Indicator List

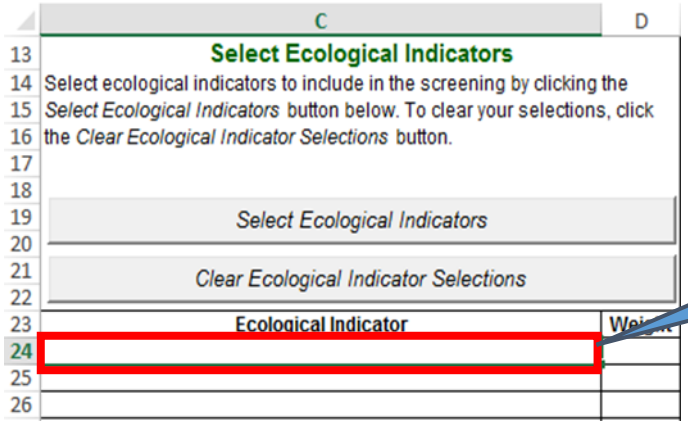
To use this option, you must already have a pre-existing list of ecological indicator names and weights stored in a separate worksheet or file. The pre-existing indicator list must be formatted with one indicator per row, with the indicator name in the first column and the indicator weight in the second column.

Open the worksheet with the pre-existing indicator list. Select the indicator names and weights and click "Copy" on the Excel menu.



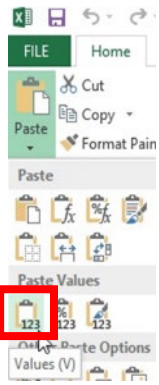
% N-Index1 in WS (2011)	2
Soil Stability, Mean in WS	1
% National Ecological Framework (NEF) in WS (2001)	1

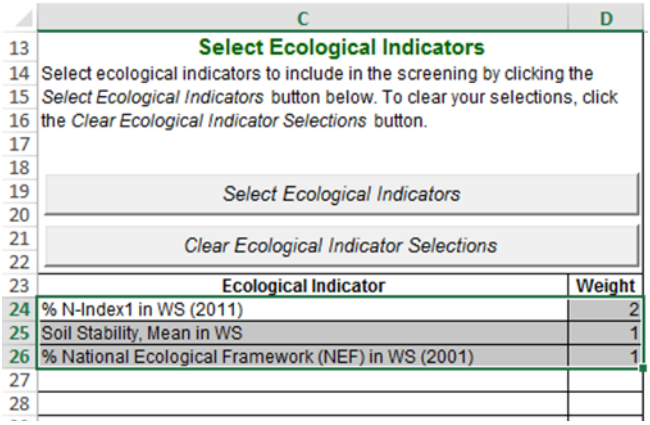




Go back to the ***Setup*** worksheet and set the cursor to cell C24 (the first cell of the indicator list in the **Ecological Indicators** section).

Select "Paste Values" from the Excel menu to paste the ecological indicators and weights into the **Select Ecological Indicators** section.





Repeat these steps in the **Select Stressor Indicators** section to select stressor indicators and weights and again in the **Select Social Indicators** section to select social indicators and weights.

Advanced Tips

- The Ecological Indicator list must begin in cell C24 of the ***Setup*** worksheet and must contain one indicator per row.
- The Stressor Indicator list must begin in cell G24 of the ***Setup*** worksheet and must contain one indicator per row.
- The Social Indicator list must begin in cell K24 of the ***Setup*** worksheet and must contain one indicator per row.
- The Ecological, Stressor and Social Indicator lists must be continuous (no blank rows). If blank rows are present, any indicators below the first blank row will not be included in the screening.
- When viewing the lists of available Ecological, Stressor and Social indicators, remember that the lists can be filtered to only display indicators within a subcategory of interest. When selecting indicators in multiple subcategories, users should click the ***Add Selected Indicators*** button before changing to a different subcategory.
- When copying and pasting from another worksheet, be sure that indicator names exactly match names in the header row (row 7) of the ***Indicator Data*** worksheet for the selected watershed scale (e.g., the ***HUC12_Data*** worksheet if HUC12 subwatersheds are being screened). Any differences in indicator spelling, capitalization or whitespace will result in errors when the screening is run.
- Indicator weights can be set to zero. A weight of zero means that the indicator has no effect on index scores.
- Indicator weights can be set to negative values. A negative weight will reverse the directional effect of the indicator on index scores. The standard directionality is for larger indicator values to increase Ecological Index, Stressor and Social Index scores. A negative weight will reverse directionality so that smaller values increase Ecological Index, Stressor and Social Index scores. Alternatively, the directionality of an indicator can be reversed by adding an inverted version of the indicator data to the tool. Instructions for inverting indicator data are provided in Appendix B.
- For ecological indicators, higher numbers correspond to healthier conditions; for stressor indicators, higher numbers indicate greater stress on watershed processes and aquatic ecosystems; for social indicators, higher numbers correspond to more favorable characteristics for watershed prioritization.
- Indicator selections within each category (Ecological, Stressor and Social) should be topically diverse. A diverse set of indicators will reflect a range of factors relevant to restoration or protection rather than one single topic.
- Users may want to consider numeric redundancy as part of the indicator selection process. Non-redundant indicators can be identified by examining correlation coefficients between indicator pairs.
- Up to 20 indicators can be selected in each category.

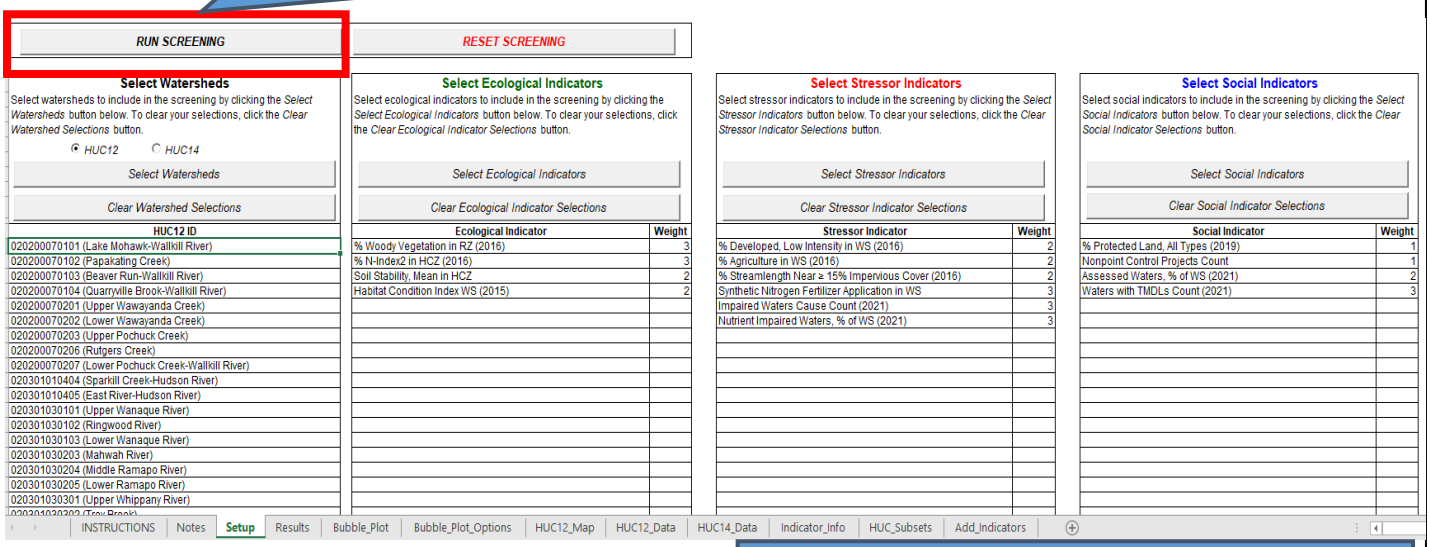
5.5. Run Screening Button

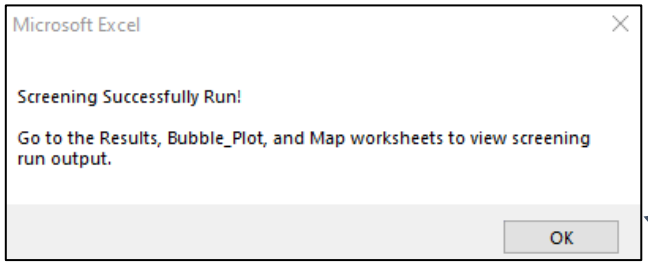
Basics

After selecting watersheds, indicators and weights for your screening, use the ***RUN SCREENING*** button to auto-calculate Ecological Index, Stressor Index, Social Index and RPI Index scores for each watershed. Clicking the ***RUN SCREENING*** button will populate other worksheets in the Excel RPS Tool with screening results. Any results from previous screenings will be cleared from other worksheets in the Excel RPS Tool when the ***RUN SCREENING*** button is clicked.

When the ***RUN SCREENING*** button is clicked from the ***Setup*** worksheet, the tool will first check to verify that watersheds, indicators and weights have been selected by the user. The tool will then look for potential issues with indicator data.

If no data issues are found, index scores will be automatically calculated and screening results will be added to other worksheets in table, plot and map form. If indicators data issues are identified, a warning message will appear. Indicator data warnings are described in the next section.





After auto calculating index scores and populating worksheets with the screening results, a message box will appear to notify you that your screening successfully ran to completion.

If your screening includes several thousand watersheds, processing times of up to 1 minute can be expected before the message box appears.

Click ***OK*** and then proceed to other worksheets to review screening results.

Advanced Tips

- After clicking the ***RUN SCREENING*** button an error message may appear. A screening will not successfully run to completion and an error message will be displayed if any of the following errors occur:
  - Watersheds, indicators and/or weights are not specified.
  - One or more watershed IDs entered in the **Select Watersheds** section do not have an exact match in column A of the ***Indicator Data*** worksheet for the watershed scale you are screening (e.g., the ***HUC12_Data*** worksheet if HUC12 subwatersheds are being screened).
  - One or more indicator names entered in the **Select Ecological Indicators**, **Select Stressor Indicators** or **Select Social Indicators** sections do not have an exact match in the header row of the ***Indicator Data*** worksheet (e.g., the ***HUC12_Data*** worksheet if HUC12 subwatersheds are being screened).
  - One or more of the indicators selected for the screening contain non-numeric data in the ***Indicator Data*** worksheet. Indicator data must be numeric (blank cells are allowed for missing data).

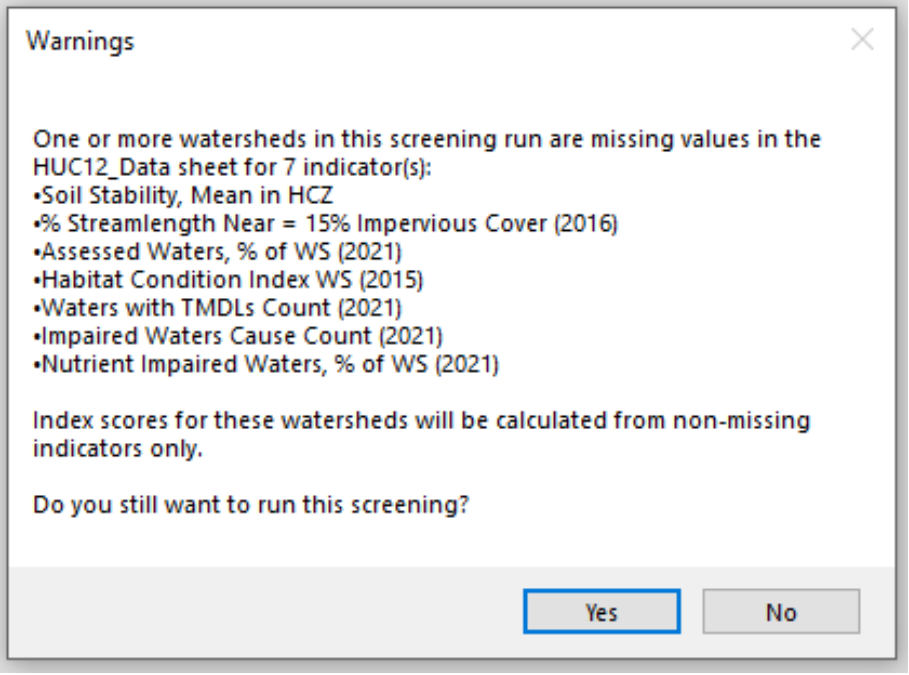
5.6. Respond to Warning Messages

Basics

After clicking the ***RUN SCREENING*** button on the ***Setup*** worksheet, the tool will automatically check for potential issues with indicator data, including:

- Missing indicator values. In most cases, each indicator will have a numeric value for every watershed selected for the screening in the ***Indicator Data*** worksheet. However, indicator values may be missing for one or more watersheds. Missing indicator values are denoted as blank cells in the ***Indicator Data*** worksheet. If a watershed is missing indicator values, then RPS index scores for that watershed will be calculated from non-missing indicators only. In rare cases, a watershed will be missing values of all ecological, stressor and social indicators selected for the screening. If a watershed is missing values for all indicators, RPS index scores cannot be calculated for that watershed.
- Equal-value indicators. Equal value indicators are indicators that have the same exact value for every watershed selected for the screening. Equal value indicators therefore provide no information on differences between watersheds. RPS index calculations are based on the assumption that indicator values vary between watersheds and cannot be applied to equal value indicators. An equal-value indicator can be included in a screening but normalized values of the equal-value indicator are set to 0.5 for all watersheds to prevent index calculation errors.

After clicking the ***RUN SCREENING*** button, a message box will appear if the tool finds any indicator data issues. The warning message will notify users if missing indicator data or equal-value indicators were found and will list the names of indicators with issues. Users have the option to continue the screening by clicking ***Yes*** on the message box or to stop the screening to adjust indicator selections by clicking ***No***.

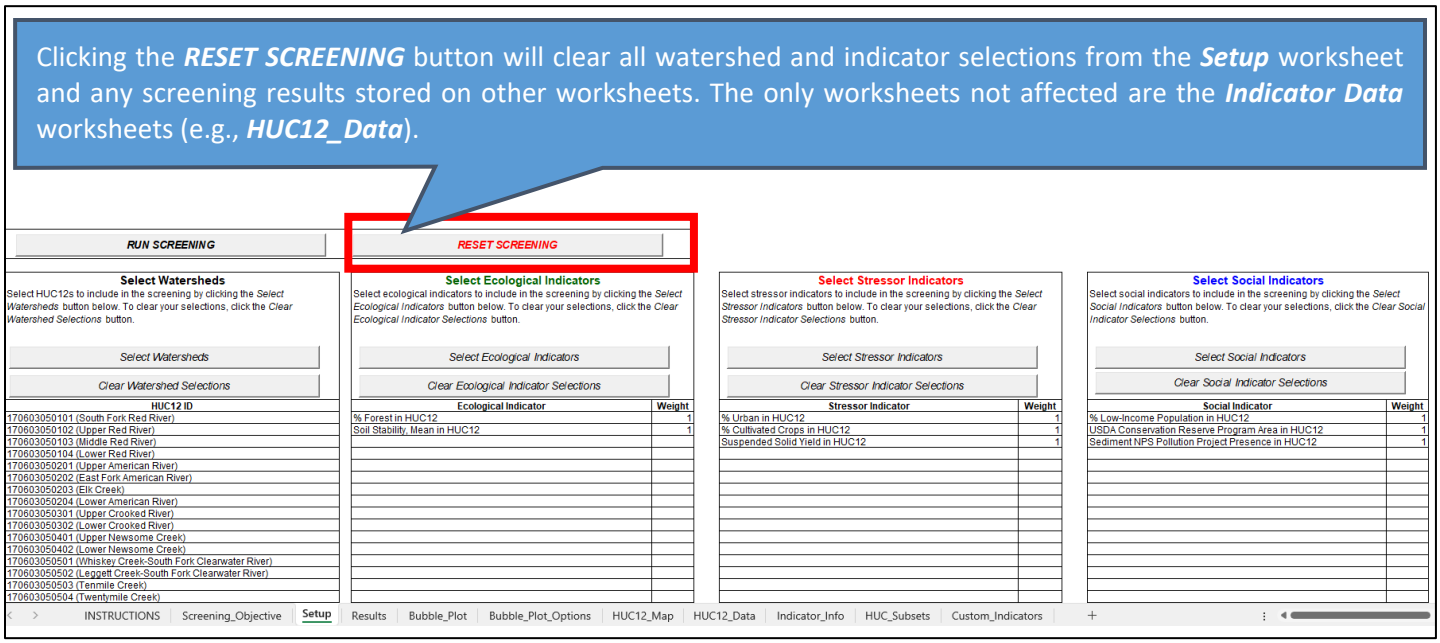


Advanced Tips

- Users can remove indicators with missing values or equal-value indicators by clicking ***No*** on the warning message box and deleting the names of indicators from the **Select Ecological Indicators**, **Select Stressor Indicators** and/or the **Select Social Indicators** sections.
- Decisions on whether to remove indicators with missing values can be based on the number of watersheds with missing data. Missing indicator values are denoted as blank cells on the indicator data worksheet. As the number of watersheds with missing data increases, the value of the indicator for describing differences between watersheds decreases. If most of the watersheds selected for screening are missing values of an indicator, it is likely advantageous to remove that indicator from the screening, particularly if it can be replaced with another indicator with a more complete record that describes a similar watershed characteristic.
- Equal-value indicators should be removed from a screening since they provide no information on differences between watersheds. The exception is when a user intentionally selects an equal-value indicator as the only indicator for one of the Ecological, Stressor or Social groups to evaluate the effect on RPI Index scores. For example, selecting an equal-value indicator as the only Social indicator will nullify the effect of Social Index scores on the RPI Index since all watersheds will receive an equal Social Index score.

5.7. Reset Screening Button

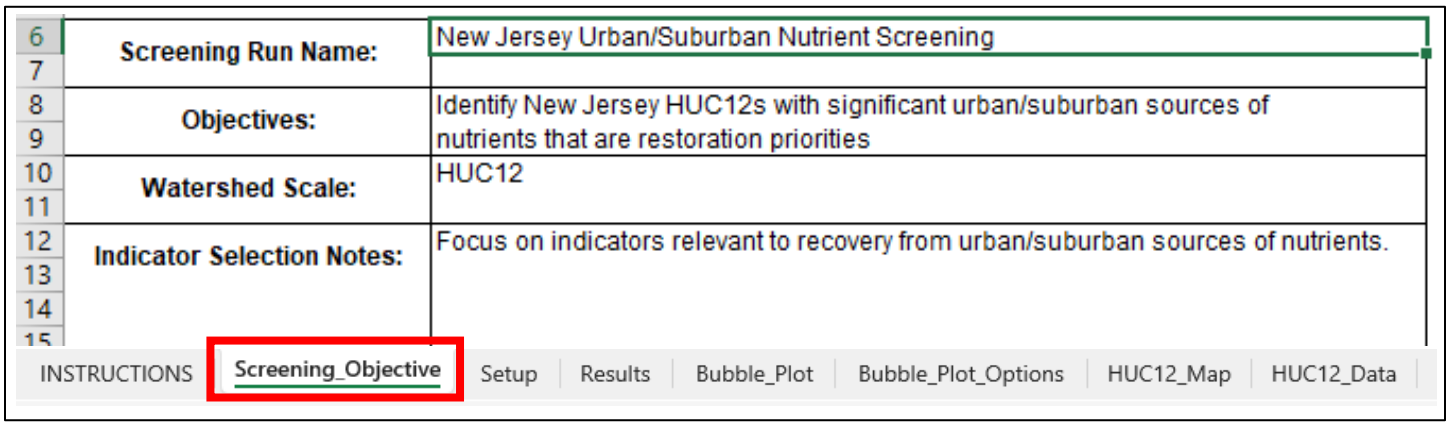
The ***RESET SCREENING*** button on the ***Setup*** worksheet can be used to produce a "clean slate" version of the Excel RPS Tool. Do not click the ***RESET SCREENING*** button unless you have saved the current screening setup and results under a separate filename or you are sure you do not want to store the current screening setup and results for future use.



6. Screening Objective Worksheet

The ***Screening Objective*** worksheet provides users with a space to document information related to their screening run, including a screening run name, screening objectives, watershed scale screened and notes on indicator selection and weighting.

Filling the ***Screening Objective*** worksheet is optional, its contents are not used in any of the auto-calculation methods in the Excel RPS Tool.



7. Results Worksheet

7.1. Overview

Basics

The ***Results*** worksheet displays a table of Ecological Index, Stressor Index, Social Index and RPI Index scores and ranks for each watershed selected for screening. Also displayed are values of the indicators selected for the screening. All base indicator values are also displayed to allow for sorting or filtering according to base indicator values.

Index scores and ranks are automatically calculated and added to the ***Results*** worksheet after clicking the ***RUN SCREENING*** button on the ***Setup*** worksheet. Watersheds are displayed in the same order as they are entered in the **Select Watersheds** section of the ***Setup*** worksheet.

Ecological Index, Stressor Index and Social Index scores are calculated as the average of weight-adjusted, normalized indicator values. RPI Index scores are calculated from Ecological Index, Stressor Index and Social Index scores. Index scores can be interpreted using the following guidelines:

- Watersheds with **Higher Ecological Index** scores are more likely to be healthier and contain environmental features which can support successful restoration and protection outcomes.
- Watersheds with **Higher Stressor Index** scores have greater presence of pollutant sources and other water quality threats and are at increased risk for degraded health.
- Watersheds with **Higher Social Index** scores have societal attributes that can support successful restoration and protection outcomes or are otherwise preferred for priority setting.
- Watersheds with **Higher RPI Index** scores generally have higher Ecological and Social Index scores and a lower Stressor Index score, compared to other watersheds in the screening. Users that are interested in prioritizing watersheds with this scoring combination can use the RPI Index to inform prioritization decisions.

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
020200070101	Lake Mohawk-Wallkill River	44.87	107	9.61	25	33.24	141	56.17	66
020200070102	Papakating Creek	39.90	152	25.99	139	38.13	64	50.68	125
020200070103	Beaver Run-Wallkill River	38.35	165	11.87	44	31.57	196	52.69	102
020200070104	Quarryville Brook-Wallkill River	48.88	82	14.05	54	35.40	107	56.74	60
020200070201	Upper Wawayanda Creek	45.38	104	8.89	24	31.59	195	56.03	70
020200070202	Lower Wawayanda Creek	43.97	119	22.58	114	36.10	100	52.50	103
020200070203	Upper Pochuck Creek	38.91	159	24.17	122	7.57	270	40.77	232
020200070206	Rutgers Creek	36.79	179	11.22	38	27.83	259	51.13	123
020200070207	Lower Pochuck Creek-Wallkill River	38.68	162	22.41	112	6.59	271	40.95	229
020301010404	Sparkill Creek-Hudson River	15.97	258	25.54	136	27.60	260	39.34	242
020301010405	East River-Hudson River	17.07	255	44.95	244	35.24	110	35.79	256
020301030101	Upper Wanaque River	41.60	142	9.93	29	36.83	87	56.17	67
020301030102	Ringwood River	44.75	111	3.27	7	38.77	51	60.09	45

... Setup **Results** Bubble_Plot Bubble_Plot_Options HUC12_Map HUC8_Data HUC12_Data

Advanced Tips

- The formula used to calculate each weight–adjusted normalized indicator value is:

$$Ind_{Norm} = Weight * \frac{(Ind - Ind_{Min})}{(Ind_{Max} - Ind_{Min})}$$

  where Ind_{Norm} is the weight-adjusted normalized indicator value, *weight* is the indicator weight, *Ind* is the raw indicator value, Ind_{Min} is the minimum indicator value for watersheds selected for screening and Ind_{Max} maximum indicator value for watersheds selected for screening.

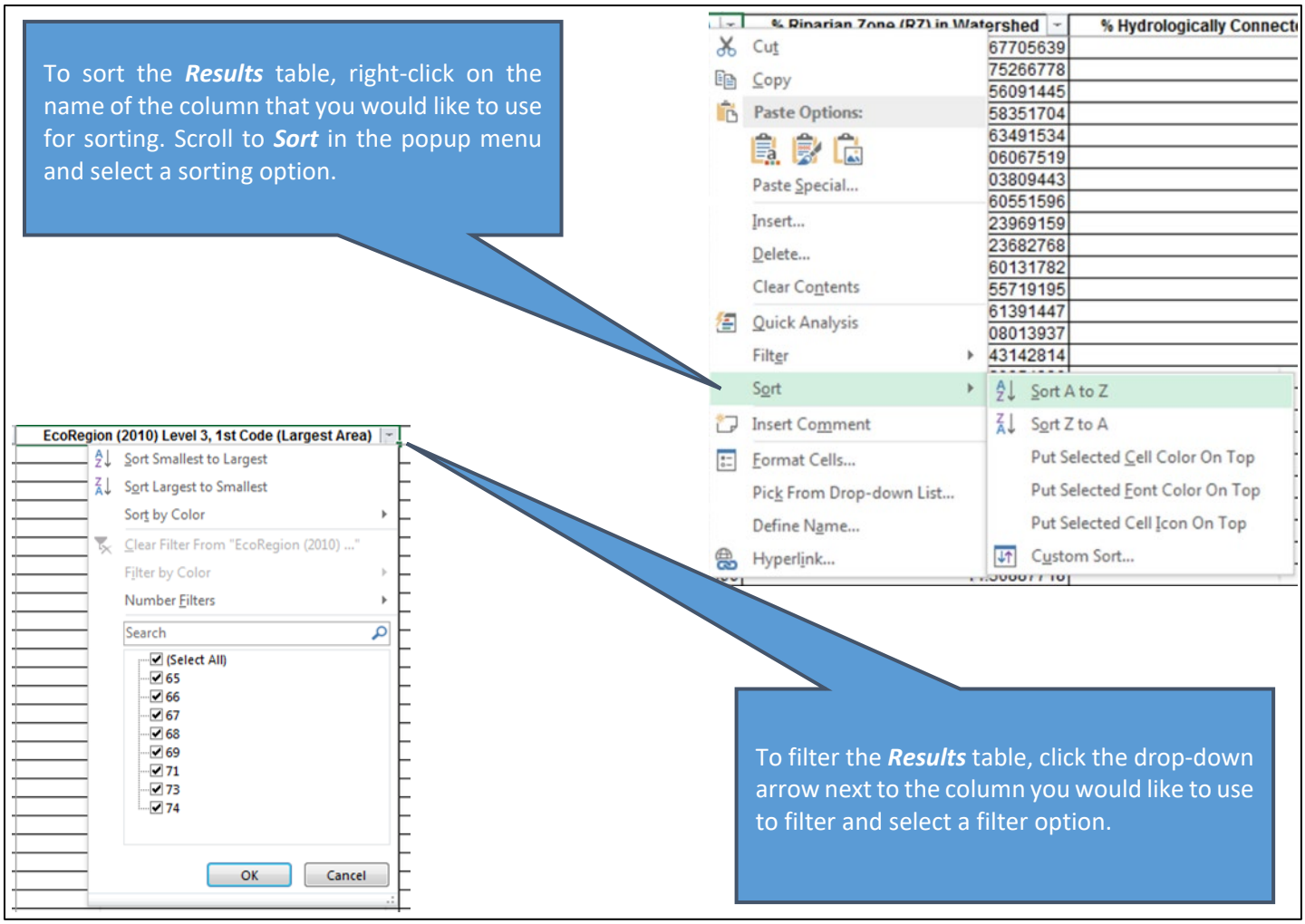
- RPI Index scores are calculated from Ecological Index, Stressor Index and Social Index scores using the formula:

$$RPI\ Index = \frac{[Ecological\ Index + Social\ Index + (100 - Stressor\ Index)]}{3}$$

- Ecological Index, Social Index and RPI Index ranks are determined by sorting index scores from highest to lowest (i.e., the watershed with the highest Ecological Index score receives a rank of 1).
- Stressor Index ranks are determined by sorting index scores from lowest to highest (i.e., the watershed with the lowest Stressor Index score receives a rank of 1).

7.2. Sort and Filter

By default, the ***Results*** table displays indicator data and index scores for all watersheds included in the screening and sorted by watershed ID. Users can sort the ***Results*** table based on values in any column in the table (e.g., from highest to lowest Ecological Index score). Users can also filter the ***Results*** table to only display watersheds that meet certain criteria (e.g., watersheds within a particular ecoregion).

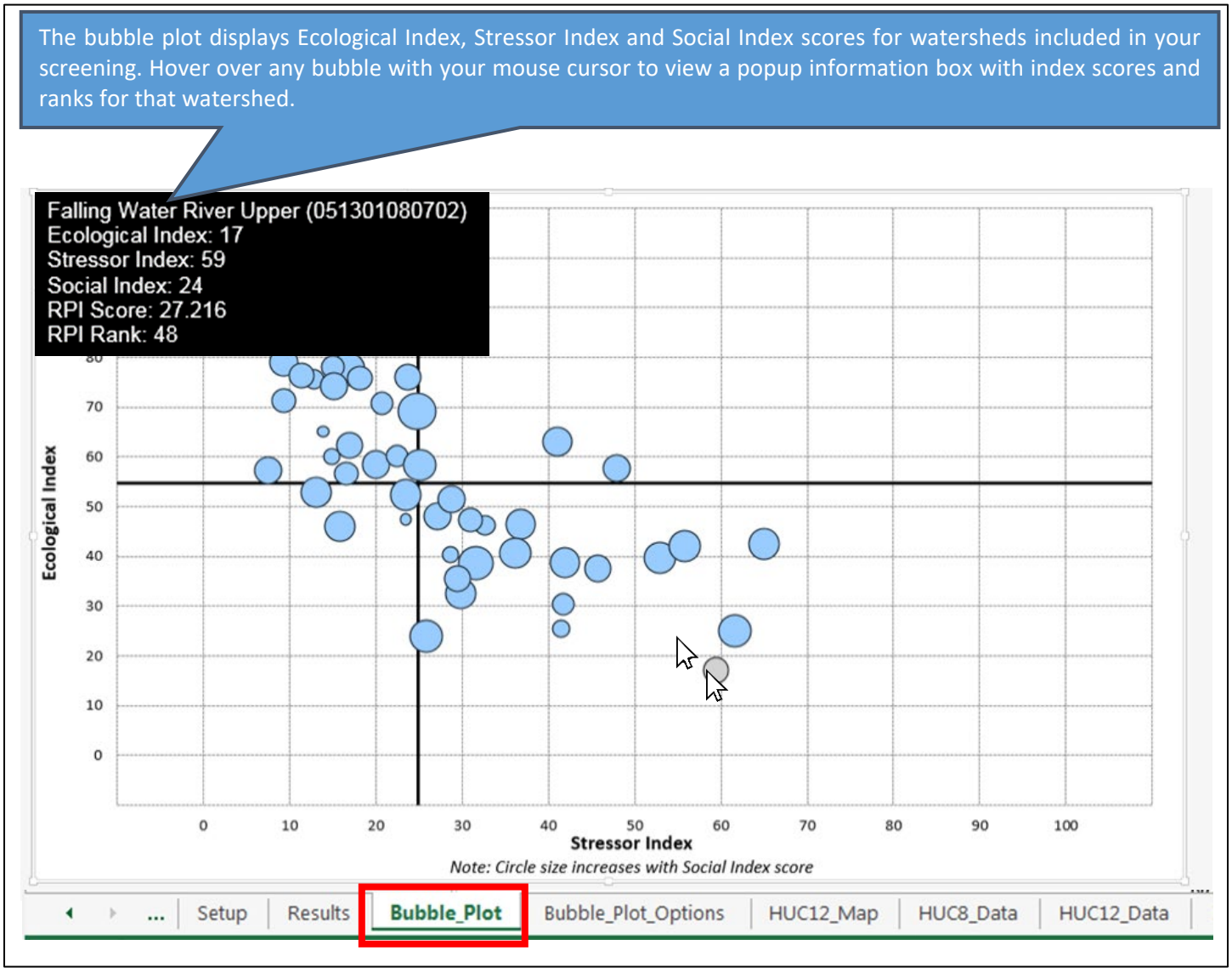


8. Bubble Plot Worksheet

The ***Bubble Plot*** worksheet contains a bubble plot that displays RPS results.

The ***Bubble Plot*** is automatically created when the ***RUN SCREENING*** button is clicked on the ***Setup*** worksheet. It contains one "bubble" for each watershed selected for screening, with the Stressor Index score plotted on the horizontal (x) axis, Ecological Index score plotted on the vertical (y) axis and Social Index plotted as the bubble size. Larger bubbles have higher Social Index scores relative to smaller bubbles.

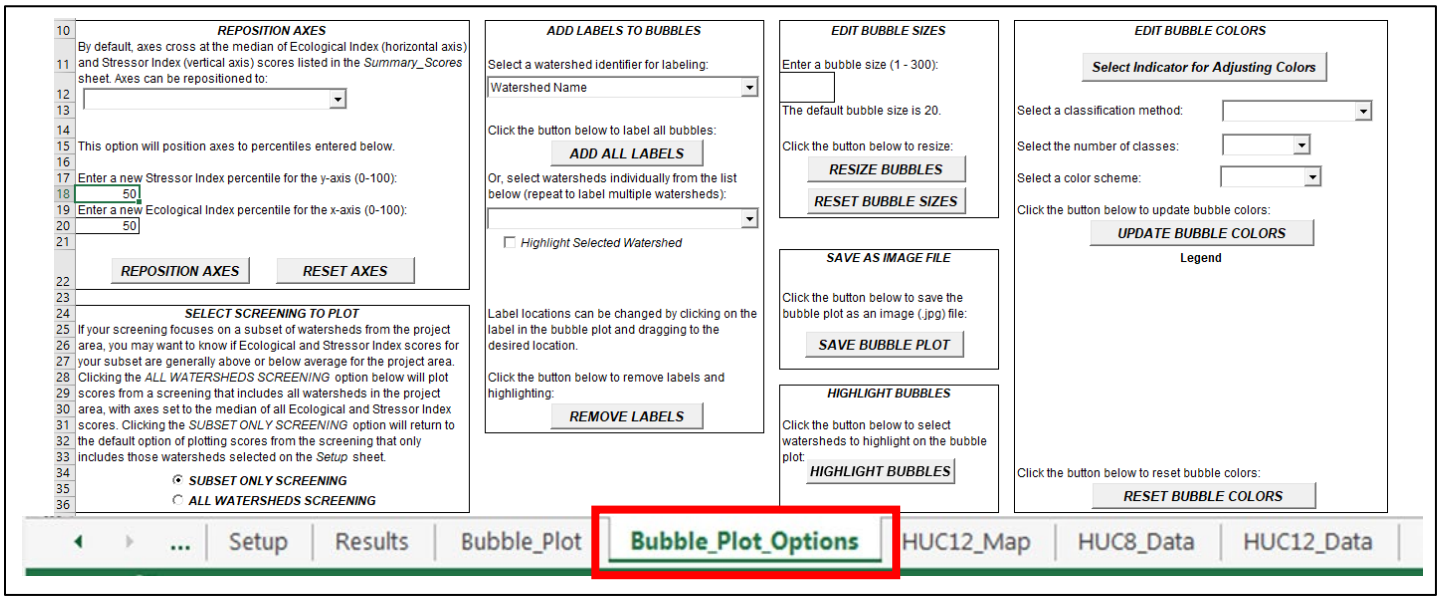
The bubble plot can be customized using controls on the ***Bubble Plot Options*** worksheet.



9. Bubble Plot Options Worksheet

9.1. Overview

The ***Bubble Plot Options*** worksheet provides users the ability to customize the ***Bubble Plot*** worksheet that displays screening results.



The following sections provide step-by-step instructions for how to use the ***Bubble Plot Options*** worksheet to:

- ***Reposition Axes***
- ***Toggle Between Plotting a Subset Only Screening or an All Watersheds Screening***
- ***Add Labels to Bubbles***
- ***Edit Bubble Sizes***
- ***Edit Bubble Colors***
- ***Highlight Bubbles***
- ***Save an Image File of the Bubble Plot***

9.2. Reposition Axes

The horizontal axis and vertical axis of the ***Bubble Plot*** can be set to any user-defined position.

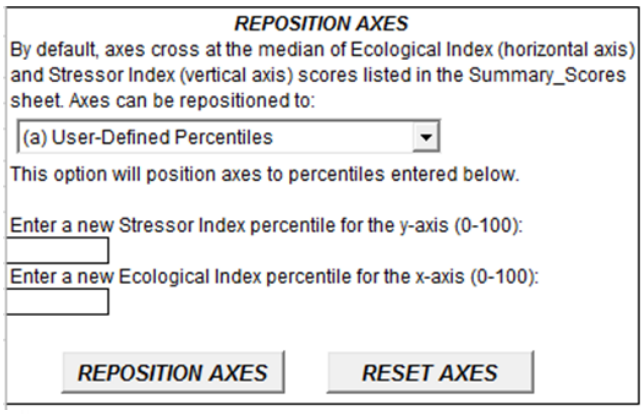
By default, the horizontal axis is positioned at the median of Ecological Index scores for the active screening and the vertical axis is positioned at the median of Stressor Index scores.

Users have two options for repositioning ***Bubble Plot*** axes:

- Reposition to new index percentiles – Under this option, users can reposition axes to any desired percentile of Ecological Index and Stressor Index scores (25th percentile, 75th percentile, etc.);
- Reposition to specific index scores – Under this option, users can reposition axes to any desired Ecological and Stressor Index score (e.g., index scores of 50).

Reposition Axes Option 1
Reposition to New Percentiles

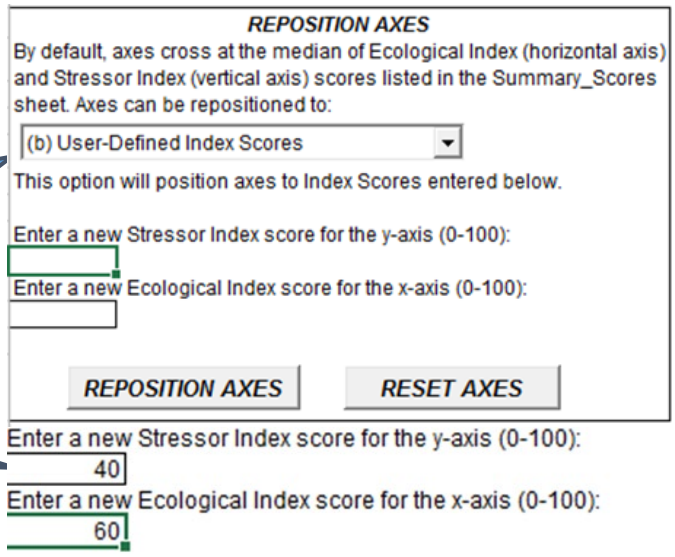
To reposition axes to new percentiles, select the "User Defined Percentiles" option from the drop down menu in the **Reposition Axes** section of the ***Bubble Plot Options*** worksheet.



Then enter new a new Stressor Index percentile for the vertical axis and a new Ecological Index percentile for the horizontal axis in the designated cells.

Reposition Axes Option 2
Reposition to Specific Index Scores

To reposition axes to specific index scores, select the "User Defined Index Scores" option from the drop down menu in the **Reposition Axes** section of the ***Bubble Plot Options*** worksheet.



Then enter new Stressor Index score for the vertical axis and a new Ecological Index score for the horizontal axis in the designated cells.

After entering new index percentiles or scores, click the ***REPOSITION AXES*** button.

Axes on the ***Bubble Plot*** will be automatically moved to the new index percentiles or scores.

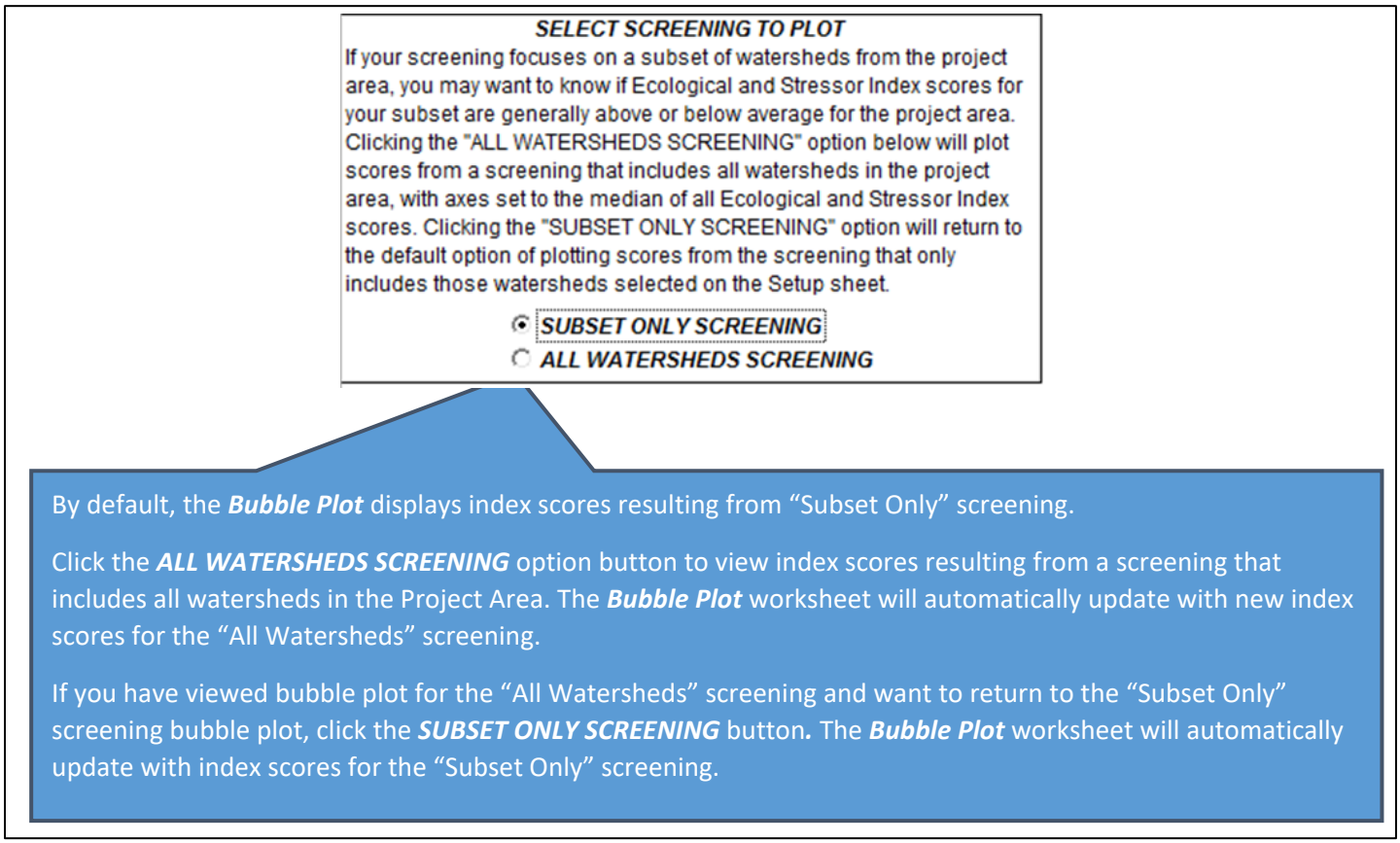
To move ***Bubble Plot*** axes back to their default position, click the ***RESET AXES*** button.

9.3. Toggle Screening to Plot

By default, the ***Bubble Plot*** displays Ecological Index, Stressor Index and Social Index scores listed in the ***Summary Scores*** worksheet. These scores are derived from indicators that are normalized to minimum and maximum values for the subset of watersheds included in the screening. Index scores are therefore relative rather than absolute, they depend on the subset of watersheds selected for screening. A given watershed will have two different sets of index scores for two screenings that include different groups of watersheds.

Users may be interested in how the subset of watersheds selected for screening compares to all other watersheds in the Project Area. For example, users may want to know whether ecological conditions in the screened subset are above- or below-average for the Project Area as a whole. Such questions can be answered by running the same screening on all watersheds in the Project Area and then reviewing the resulting index scores for the watershed subset of interest. To streamline this process, the Excel RPS Tool allows users to view an alternate version of the bubble plot with index scores that result from a screening that includes all watersheds in the Project Area. This can be done on-the-fly in the **Select Screening to Plot** section of the ***Bubble Plot Options*** worksheet without adjusting settings on the ***Setup*** worksheet or creating a new file.

The **Select Screening to Plot** section contains option buttons to toggle between a "Subset Only" screening or an "All Watersheds" screening. A "Subset Only" screening includes only those watersheds selected for screening on the ***Setup*** worksheet. An "All Watersheds" screening includes all watersheds in the Project Area. Note that if you selected all watersheds in the Project Area on the ***Setup*** worksheet then there is no difference between the two options.



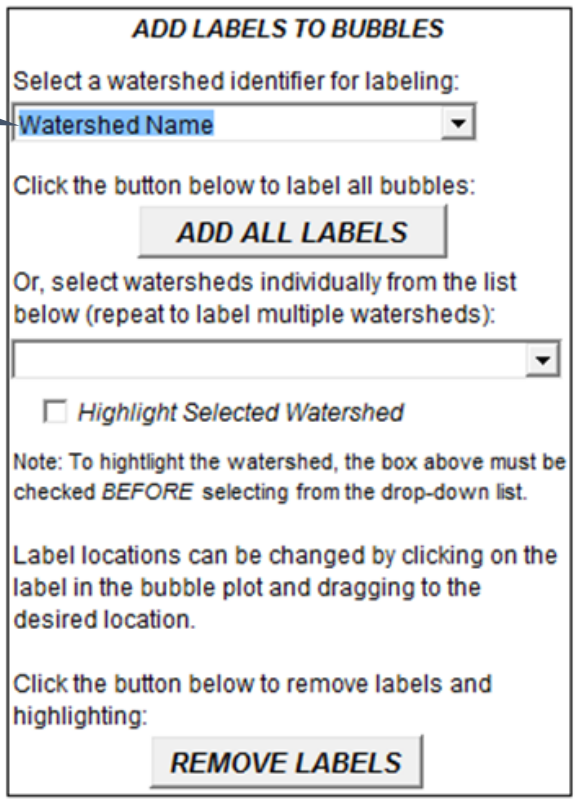
9.4. Label Bubbles

Bubbles in the ***Bubble Plot*** worksheet can be labeled to identify one or more watersheds. Bubbles can be labeled with the watershed name or the watershed ID. Users also have the option to highlight labeled bubbles to make them stand out from other unlabeled bubbles.

Basics

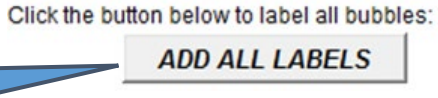
To label bubbles, first select a label option from the drop down menu in the **Add Labels to Bubbles** section of the ***Bubble Plot Options*** worksheet.

Users can choose to have labels display watershed names or watershed IDs.



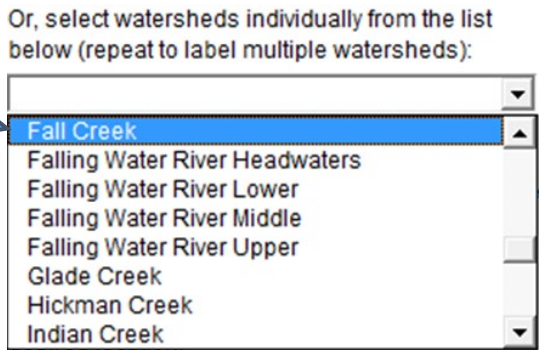
Add Labels Option 1 Label All Bubbles

If you would like to add labels to all bubbles on the ***Bubble Plot*** worksheet, click the ***ADD ALL LABELS*** button. Labeling all bubbles is generally not recommended if your screening includes more than 20 watersheds.

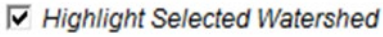


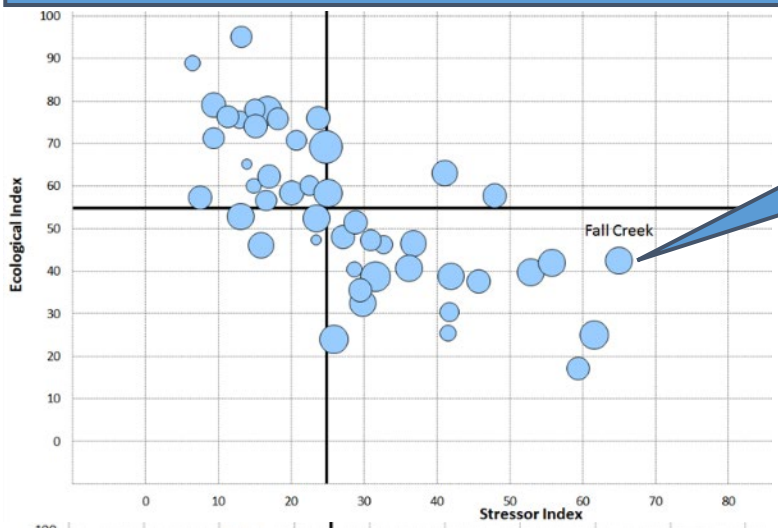
Add Labels Option 2 Label Bubbles Individually

To label individual bubbles in the ***Bubble Plot***, select the watershed to label from the drop down menu in the **Add Labels to Bubbles** section of the ***Bubble Plot Options*** worksheet. Watersheds names are displayed in the drop down menu alphabetically from A to Z. Watershed IDs are displayed in ascending numerical order.

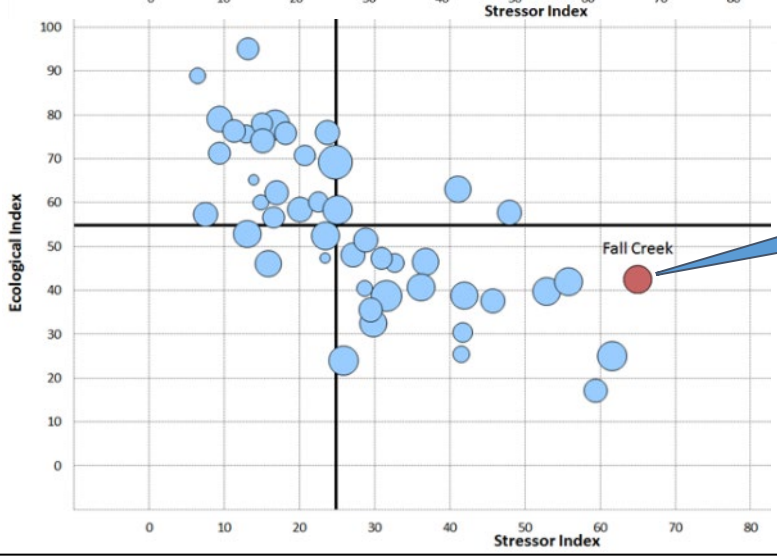


To highlight the labeled bubble, check the ***Highlight Selected Watershed*** box before selecting a watershed from the drop down menu.





A label will be automatically added to the bubble for the selected watershed.



The labeled bubble will also be highlighted if the ***Highlight Selected Watershed*** box is checked when selecting the watershed from the drop down menu.

To remove labels from the ***Bubble Plot***, click the ***REMOVE LABELS*** button. This will also remove any highlighting from labeled bubbles.

Advanced Tips

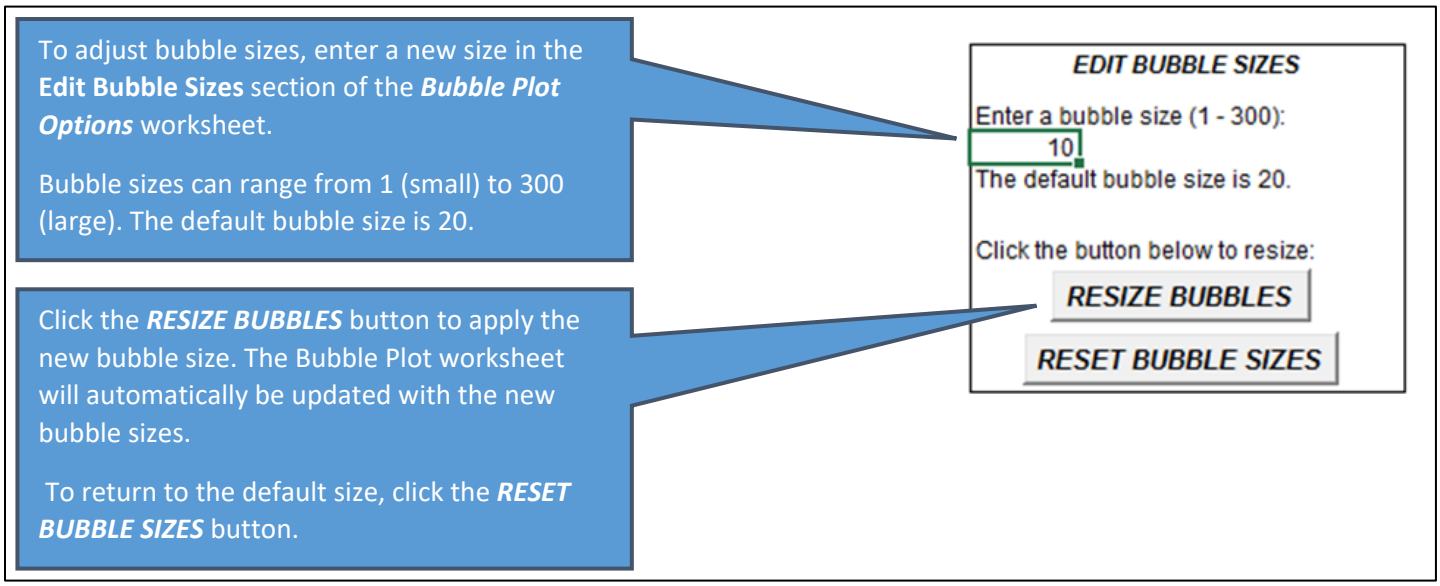
- Label text, formatting and position can be edited manually after labels are added.
- To edit label text, click on the label in the ***Bubble Plot*** worksheet and revise the text as desired.
- To edit label formatting (font size, color, etc.) click on the label in the ***Bubble Plot*** worksheet and use Excel's font formatting menu.
- To edit the position of a label, click on the label in the ***Bubble Plot*** worksheet and drag it to the desired location.

9.5. Edit Bubble Sizes

The size of each bubble in the ***Bubble Plot*** is based on the Social Index score for the corresponding watershed (i.e., bubbles for watersheds with higher Social Index scores are larger than bubbles for watersheds with lower Social Index scores).

While users cannot adjust the size of an individual bubble, they can collectively increase or decrease the size of all bubbles to improve the look of the ***Bubble Plot***.

A common reason for editing bubble sizes is to reduce overlap between bubbles with similar Ecological Index and Stressor Index scores.

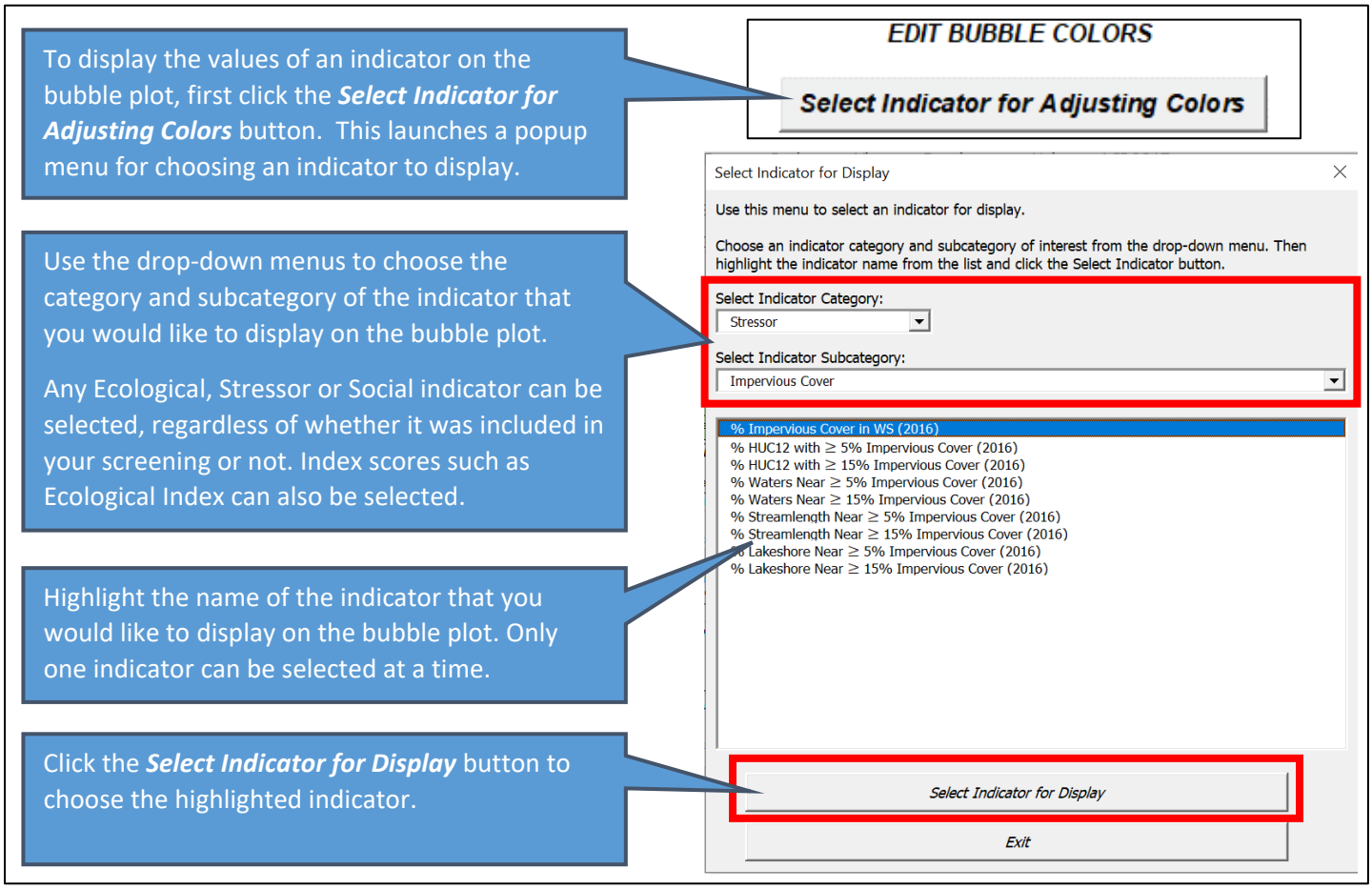


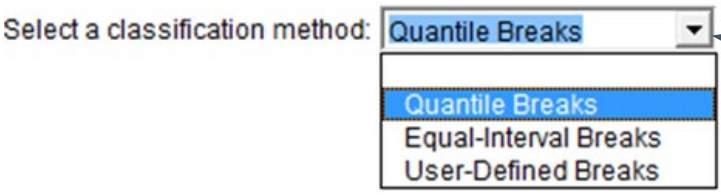
9.6. Edit Bubble Colors

The ***Bubble Plot*** worksheet displays three pieces of information for each watershed included in your screening: the Ecological Index score on the y-axis, Stressor Index score on the x-axis and Social Index score using the bubble size. The ***Bubble Plot*** worksheet can also display a fourth piece of information by shading bubbles different colors to reflect different values of an indicator. This feature is implemented in the **Edit Bubble Colors** section of the ***Bubble Plot Options*** worksheet.

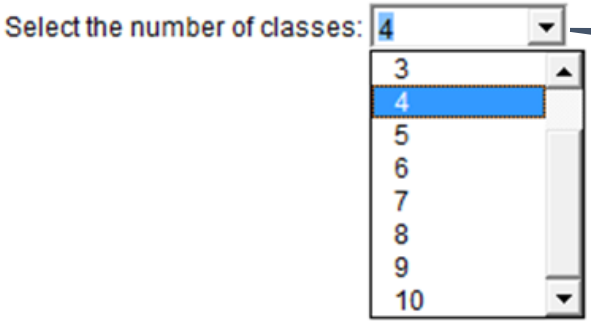
To display indicator values using bubble colors, users must select the number of **Classes** to display, a method for defining **Class Breaks** and a **Color Scheme**. These terms are defined below.

- **Classes** – The number of groups or bins to separate watersheds into. Up to 10 classes can be selected.
- **Class Breaks** – The cutoff indicator values used to define class membership. Three options are available for defining class breaks:
  - *Quantile Breaks* result in classes that have an equal number of watersheds. For example, if four classes are selected then then quantile breaks option would result in each class containing one-quarter of the total number of watersheds using the 25th percentile, 50th percentile and 75th percentile of indicator values as class breaks.
  - *Equal-Interval Breaks* result in classes that cover an equal range of indicator values. For example, if four classes are selected for an indicator with a minimum value of 0% and a maximum value of 100%, then the equal-interval breaks option would result in each class spanning 25 percentage points use values of 25%, 50% and 75% as class breaks. Under the equal-interval option, the definition of breaks is independent of the number of watersheds within each class. Depending on the distribution of indicator values, some classes may contain zero watersheds.
  - *User-Defined Breaks* are supplied by the user to apply user-specified class breaks.
- **Color Scheme** – The primary color(s) used to shade bubbles. Options are blue, green or blue-green.





After selecting an indicator, choose a method for defining class breaks (Quantile, Equal Interval or User Defined) from the classification method drop down menu.



Next, choose the number of classes to use for plotting (between 2 and 10).

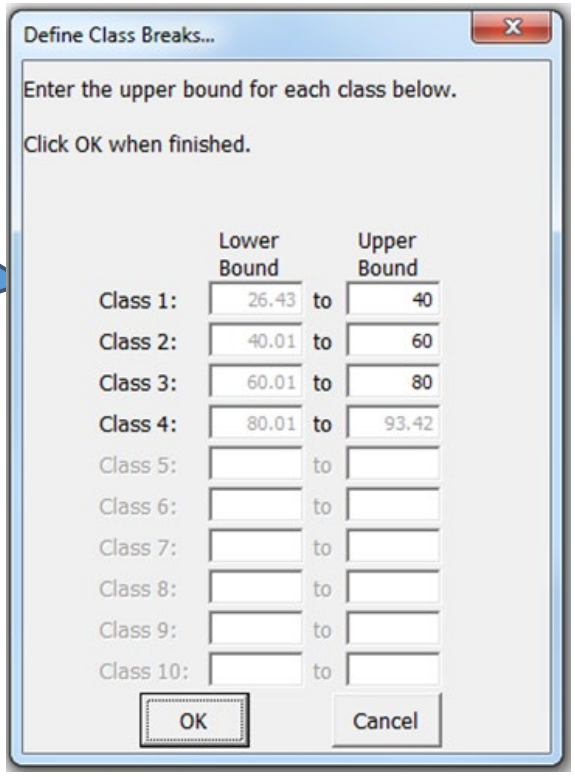
If the Quantile or Equal Interval options are selected for defining class breaks, then break values will be automatically calculated.

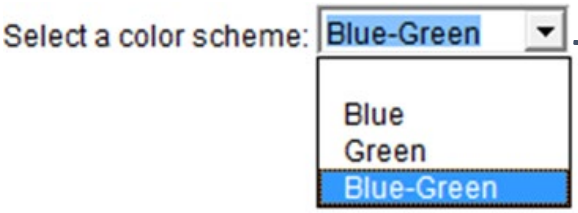
If the User Defined option is selected, a popup form will display for you to enter class breaks.

In the class break form, the lower bound of the first class will automatically be set to the minimum value of the selected indicator. The upper bound of the last class will be set to the indicator's maximum value.

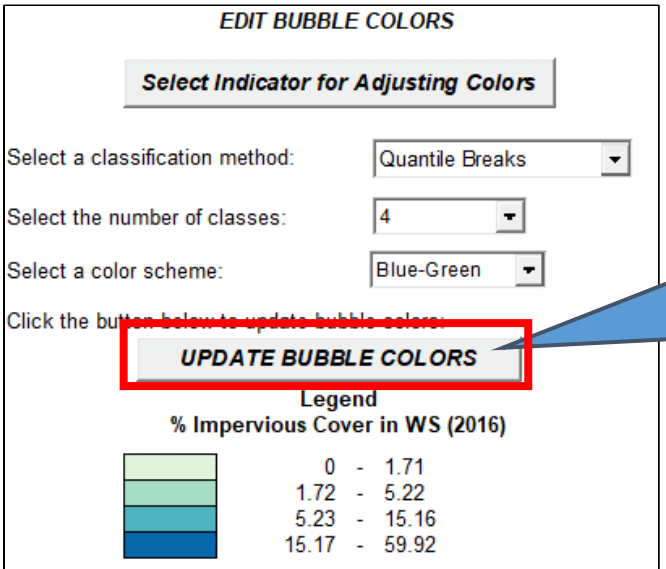
Enter break values for each class in the "Upper Bound" column. The lower bound of the next class will be calculated automatically by adding 0.01 to the upper bound you entered for the preceding class.

When all breaks have been entered, click the ***OK*** button.





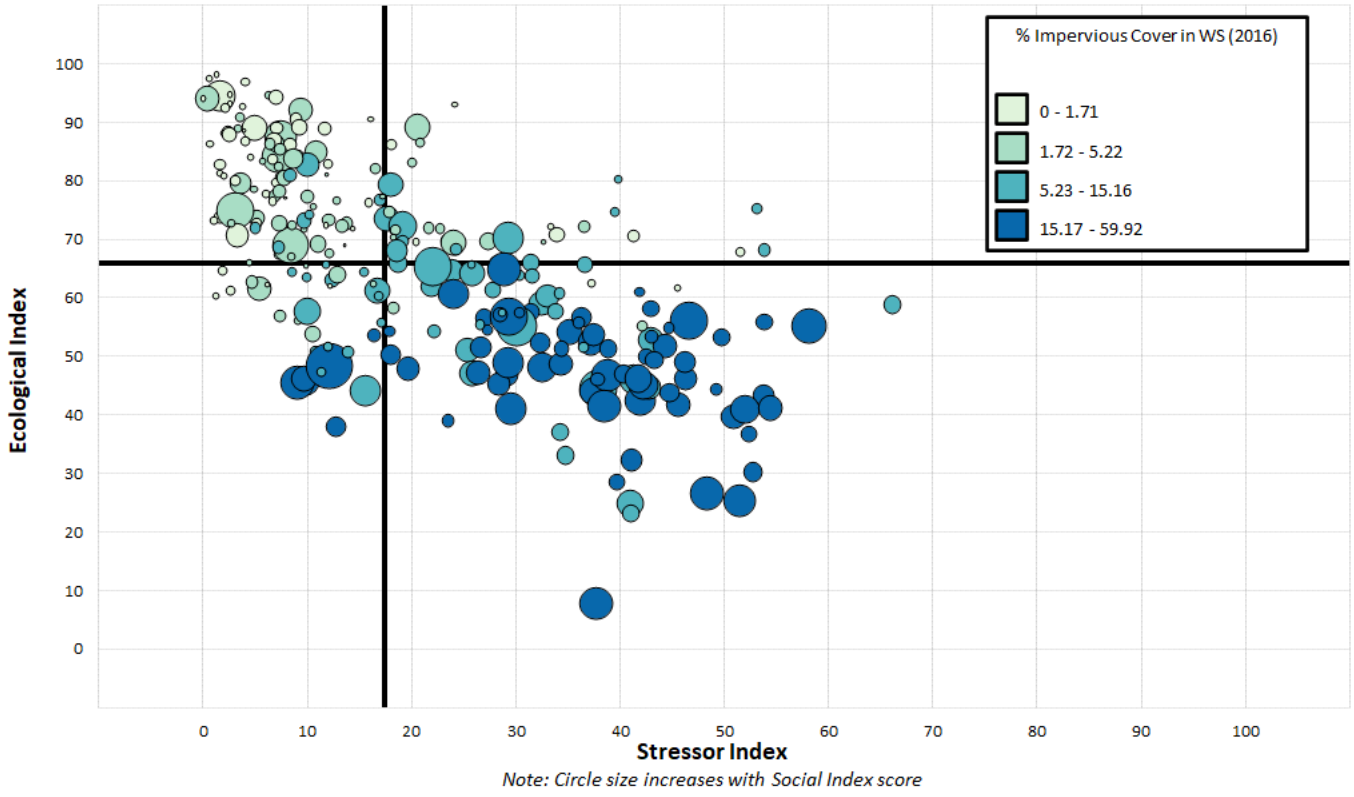
Finally, select a color scheme to use for shading bubbles. Options are blue, green or blue green.



After you have selected the indicator to plot, the method for defining class breaks, the number of classes and the color scheme, a legend will display in the **Edit Bubble Colors** section that illustrates your selections.

Click the ***UPDATE BUBBLE COLORS*** button to apply the selected settings to the ***Bubble Plot*** worksheet.

After clicking the ***UPDATE BUBBLE COLORS*** button, the ***Bubble Plot*** worksheet will automatically update to shade bubbles according to the selected indicator. Users can adjust bubble color settings at any time by revising selections in the **Edit Bubble Colors** section of the ***Bubble Plot Options*** sheet and clicking the ***UPDATE BUBBLE COLORS*** button.



Note: Circle size increases with Social Index score

To return to the default bubble plot (all bubbles shaded the same color), click the ***RESET BUBBLE COLORS*** button.

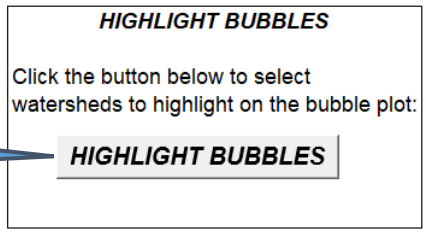
RESET BUBBLE COLORS

9.7. Highlight Bubbles

Bubbles can be highlighted in the bubble plot to call attention to one or more watersheds of interest. Two options are available for choosing watersheds to highlight.

Highlight Bubbles Option 1
Select Individual Watersheds

Click the ***Highlight Bubbles*** button to display a popup menu with highlighting options.

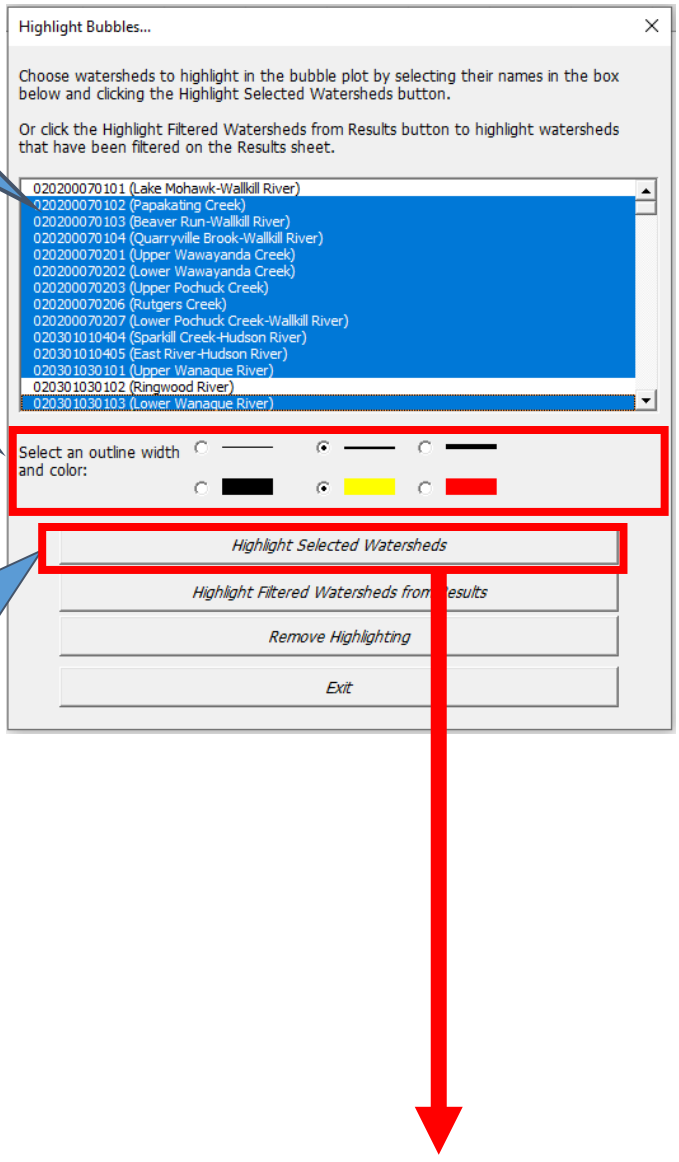


The popup menu contains a list of watersheds included in the screening. Select individual watersheds to highlight by clicking on their ID and name.

By default, bubbles are highlighted with a yellow outline and a medium outline width. Users can adjust these settings by choosing a different outline color or width.

After the watersheds of interest are selected, click the ***Highlight Selected Watersheds*** button to highlight the bubbles for the selected watersheds.

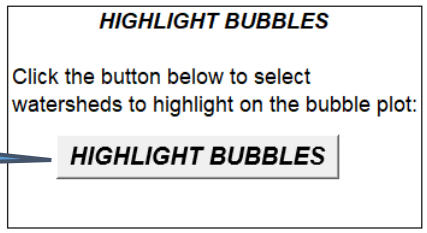
You still have the opportunity to select additional watersheds after clicking the ***Highlight Selected Watersheds*** button. Repeat the previous step until all watersheds of interest have been selected for highlighting, then click the Exit button to close the popup menu.



Highlight Bubbles Option 2
Highlight Filtered Watersheds from the Results Worksheet

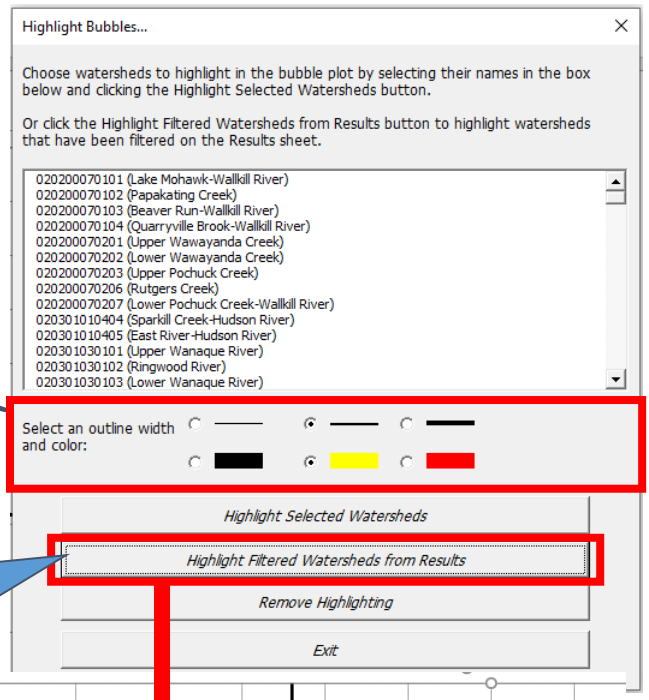
To use this option, you must have already applied filters on the ***Results*** worksheet to display watersheds that meet user specified criteria. For example, the ***Results*** worksheet could be filtered to only display watersheds with top ranked Ecological Index, Stressor Index, and/or Social Index scores. See Section 5 of this guide for instructions on how to filter the ***Results*** worksheet.

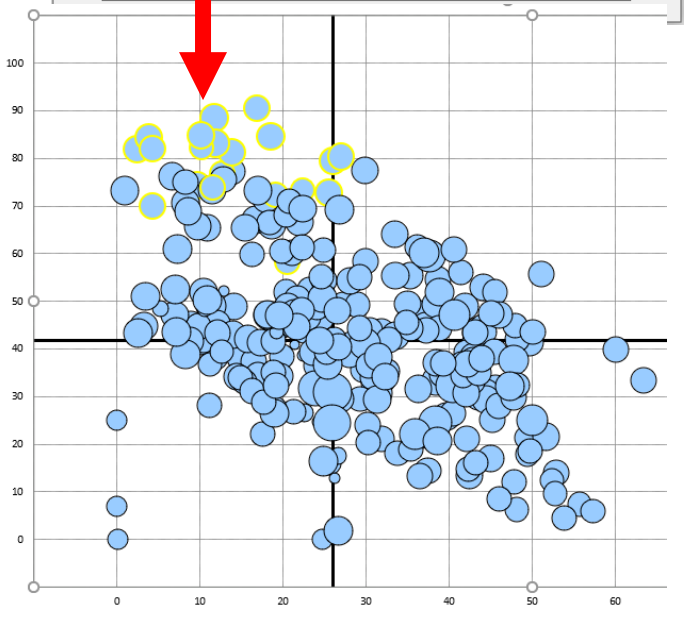
Click the ***Highlight Bubbles*** button to display a popup menu with highlighting options.



By default, bubbles are highlighted with a yellow outline and a medium outline width. Users can adjust these settings by choosing a different outline color or width.

Click the ***Highlight Filtered Watersheds from Results*** button. The tool will automatically highlight bubbles for the watersheds that are displayed on the ***Results*** worksheet.





9.8. Save As Image File

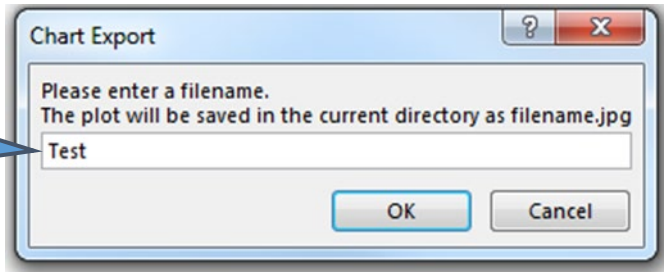
A copy of the ***Bubble Plot*** worksheet can be saved as an image file for use in reports or presentations.

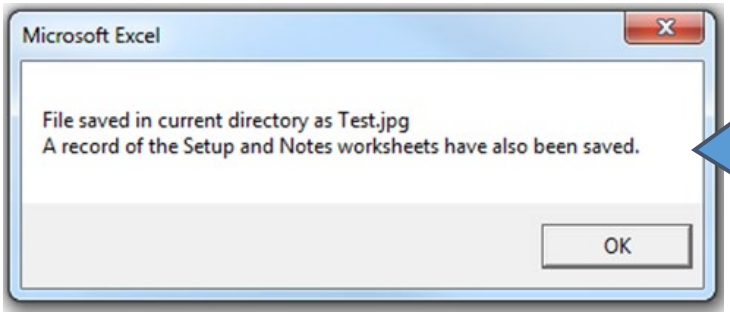
The ***Bubble Plot*** can be saved as an image file from the **Save As Image File** section of the ***Bubble Plot Options*** worksheet.

First, click the ***SAVE BUBBLE PLOT*** button.

You will then be prompted to enter a filename for the image file.

Type a filename into the space provided and click ***OK***.





A message box will notify you that the image file saved in JPEG format using the filename you provided.

The file will be saved in the same directory that the Excel RPS Tool file is saved in.

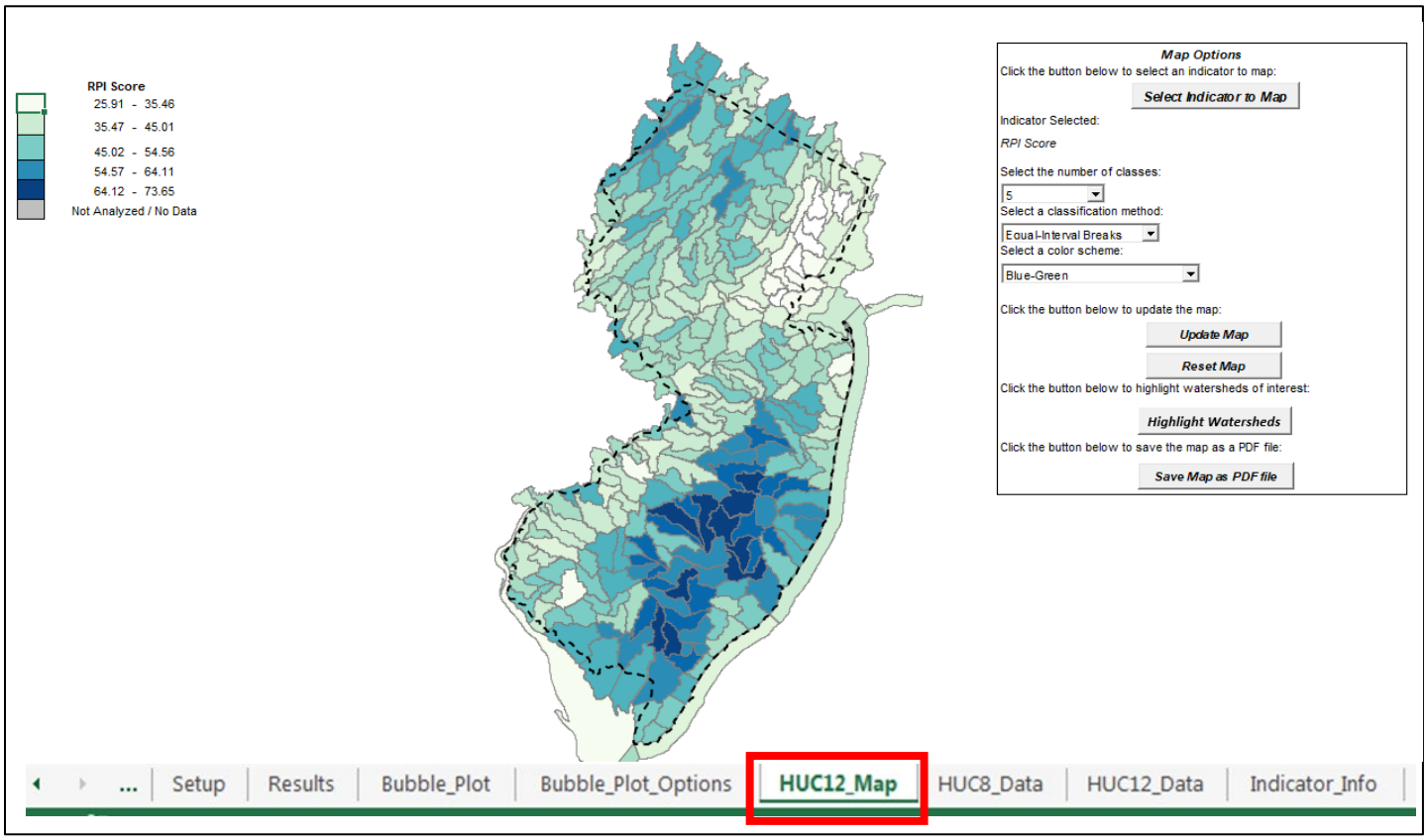
Two PDF files storing the contents of the ***Setup*** sheet and ***Screening Objective*** sheet are also saved to provide a record of the screening settings used to produce the ***Bubble Plot*** image

10. Map Worksheet

10.1. Overview

The ***Map*** worksheet that displays screening results in map form. The ***Map*** worksheet is automatically created when the ***RUN SCREENING*** button is clicked on the ***Setup*** worksheet. By default, the ***Map*** worksheet displays RPI Index scores.

The name of the ***Map*** worksheet displayed in the bottom tab of your Excel RPS Tool will reflect the scale of watersheds selected for screening. For example, if you screened HUC12 subwatersheds, then the ***Map*** worksheet will be named ***HUC12_Map***. Most Excel RPS Tool files have a map worksheet for HUC12 subwatersheds and, if the tool is also setup to screen HUC14 watersheds, a map for HUC14s. Excel RPS Tool files that are setup to screen other watershed scales may not have a map for those additional watershed scales.



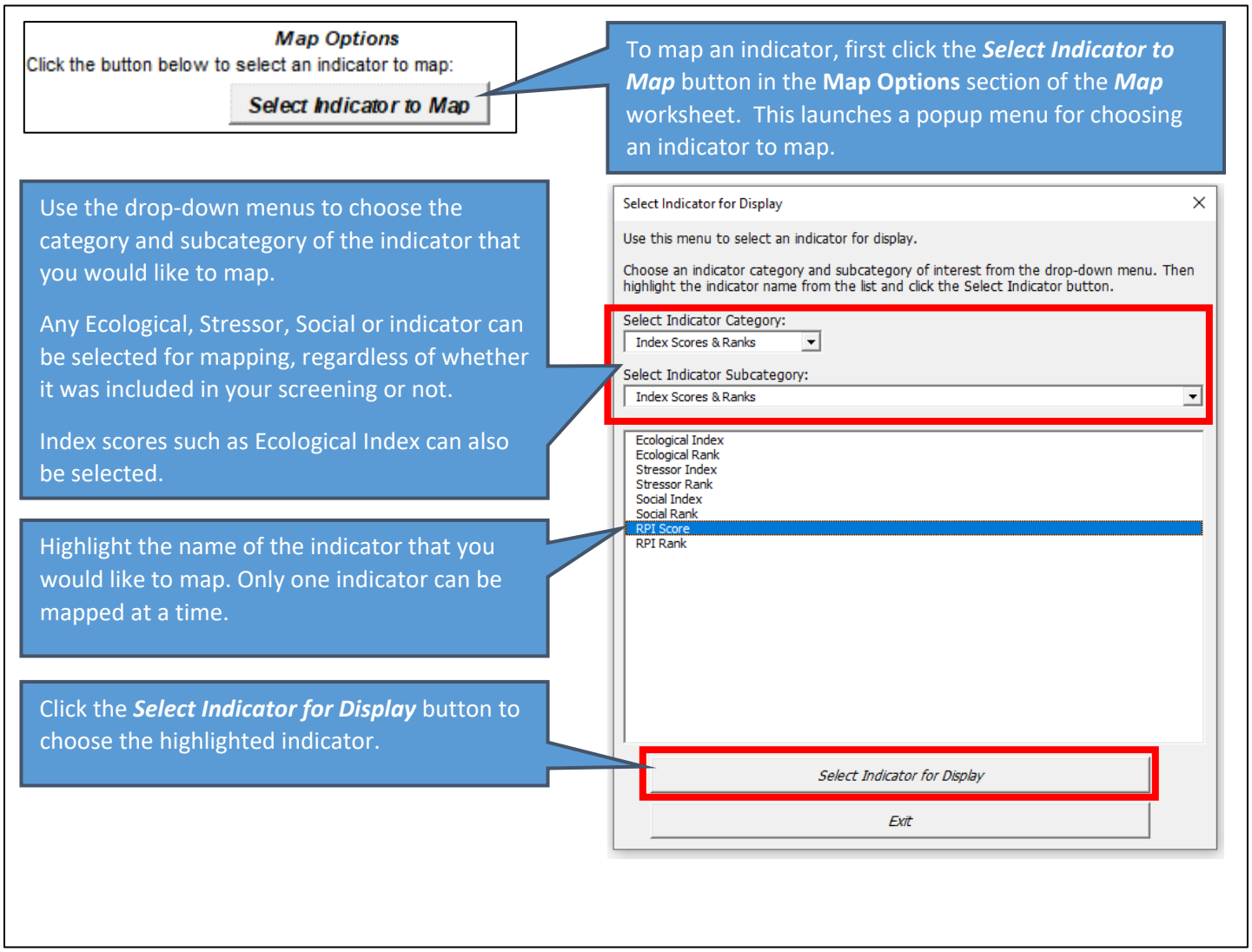
The following sections describe how to:

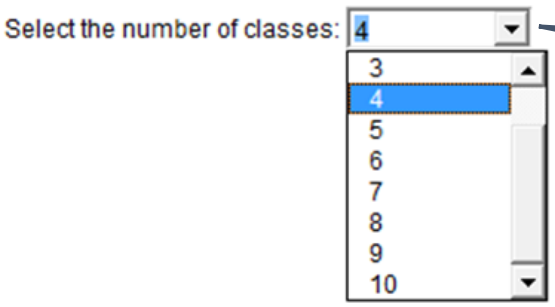
- ***Create a Custom Map***
- ***Highlight Watersheds of Interest***
- ***Save the Map as a PDF File***

10.2. Create Custom Map

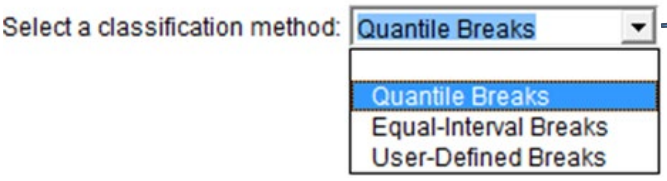
Users can customize the ***Map*** worksheet to shade watersheds on the map using any indicator or index. To customize the ***Map*** worksheet, users must select the mapped indicator, the number of **Classes** to display, a method for defining **Class Breaks** and a **Color Scheme**. These terms are defined below.

- **Classes** – The number of groups or bins to separate watersheds into. Up to 10 classes can be selected.
- **Class Breaks** – The cutoff indicator values used to define class membership. Three options are available for defining class breaks:
  - *Quantile Breaks* result in classes that have an equal number of watersheds. For example, if four classes are selected then the quantile breaks option would result in each class containing one-quarter of the total number of watersheds using the 25th percentile, 50th percentile and 75th percentile of indicator values as class breaks.
  - *Equal-Interval Breaks* result in classes that cover an equal range of indicator values. For example, if four classes are selected for an indicator with a minimum value of 0% and a maximum value of 100%, then the equal-interval breaks option would result in each class spanning 25 percentage points using values of 25%, 50% and 75% as class breaks. Under the equal-interval option, the definition of breaks is independent of the number of watersheds within each class. Depending on the distribution of indicator values, some classes may contain zero watersheds.
  - *User-Defined Breaks* are supplied by the user to utilize user-specific class breaks.
- **Color Scheme** – The primary color(s) used to shade watersheds on the map. Options are blue, green or blue-green.





After selecting an indicator, choose the number of classes to use for mapping (between 2 and 10).



Next, select a method for defining class breaks (Quantile, Equal Interval or User Defined).

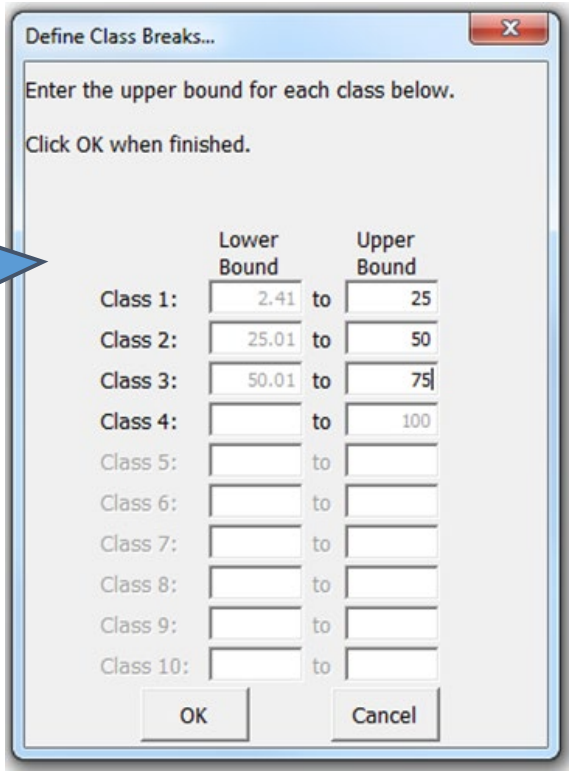
If the Quantile or Equal Interval options are selected for defining class breaks, then break values will be calculated automatically.

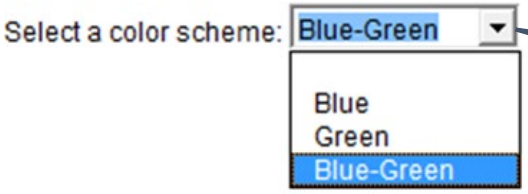
If the User Defined option is selected, a popup form will display for entering class breaks.

In the class break form, the lower bound of the first class will automatically be set to the minimum value of the selected indicator. The upper bound of the last class will be set to the indicator's maximum value.

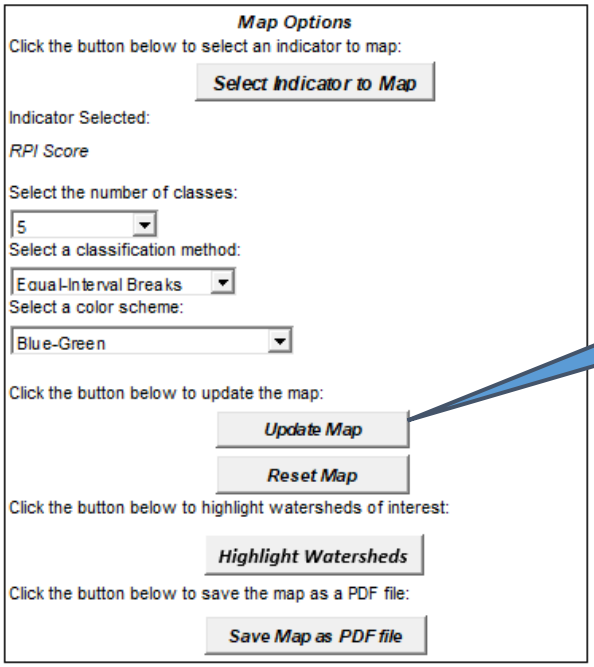
Enter break values for each class in the "Upper Bound" column. The lower bound of the next class will be calculated automatically by adding 0.01 to the upper bound you entered for the preceding class.

When all breaks have been entered, click the ***OK*** button.



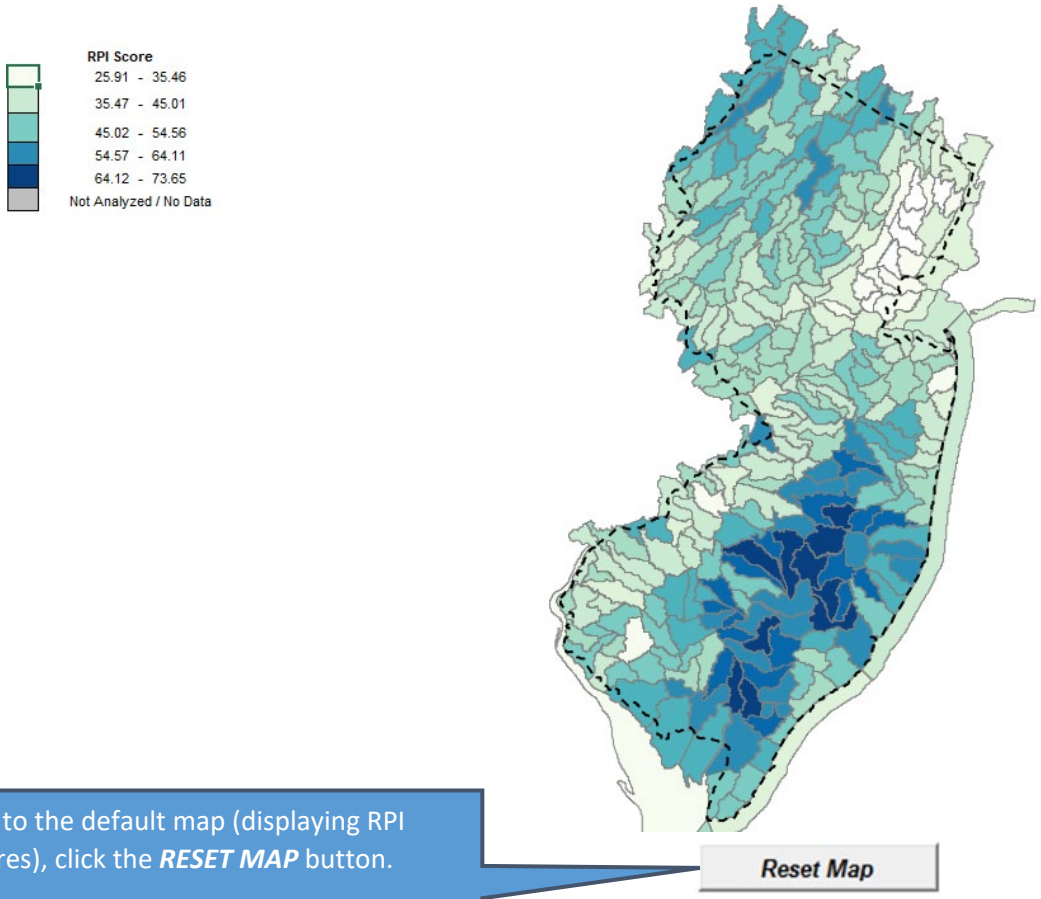


Finally, select a color scheme to use for shading watersheds in the map. Options are blue, green or blue green.



After you have selected the indicator to map, the number of classes, the method for defining class breaks and the color scheme click the ***UPDATE MAP*** button to apply the selected settings to the watershed map.

The ***Map*** worksheet will automatically update to shade watersheds according to the selected indicator or index. Users can adjust map settings at any time by revising selections in the **Map Options** section of the ***Map*** worksheet and clicking the ***UPDATE MAP*** button.

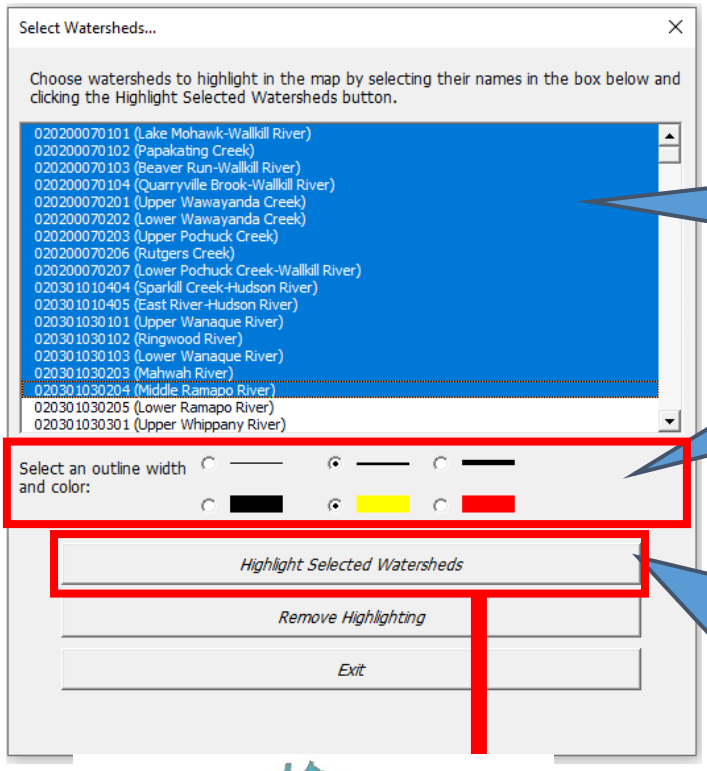


To return to the default map (displaying RPI Index scores), click the ***RESET MAP*** button.

10.3. Highlight Watersheds of Interest

Watersheds can be highlighted on the map to call attention to one or more watersheds of interest.

Click the ***Highlight Watersheds*** button to display a popup menu with highlighting options.

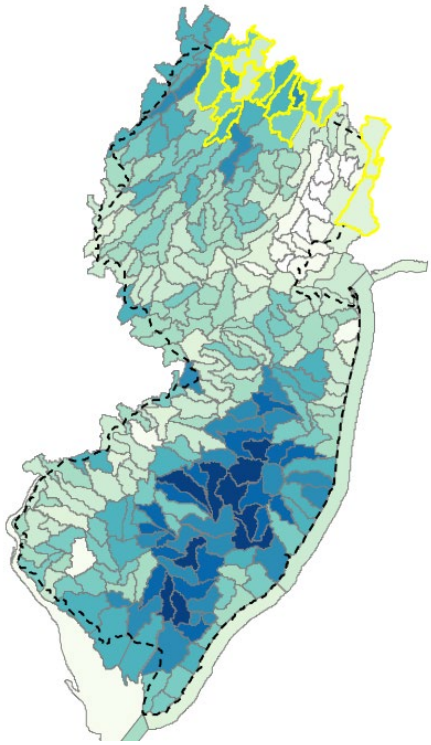


The popup menu contains a list of watersheds included in the screening. Select individual watersheds to highlight by clicking on their ID/name.

By default, watersheds are highlighted with a yellow outline and a medium outline width. Users can adjust these settings by choosing a different outline color or width.

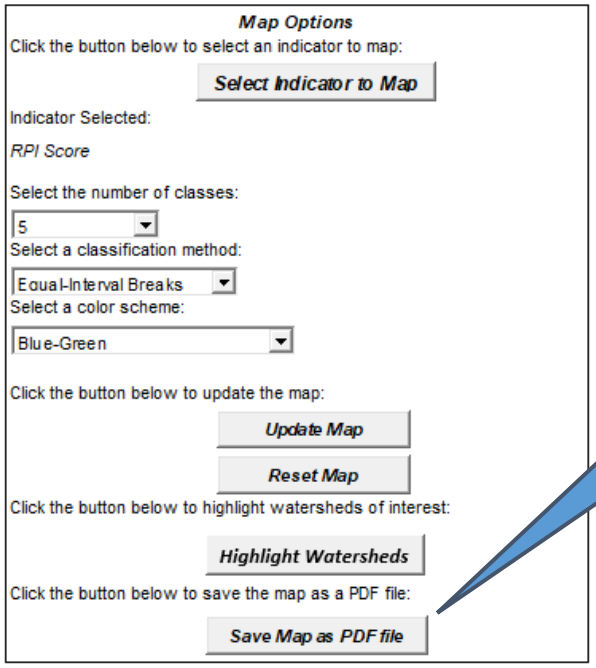
After the watersheds of interest are selected, click the ***Highlight Selected Watersheds*** button to highlight the watersheds on the map.

You still have the opportunity to select additional watersheds after clicking the ***Highlight Selected Watersheds*** button. Repeat the previous step until all watersheds of interest have been selected for the highlighting, then click the Exit button to close the popup menu.



10.4. Save Map as PDF File

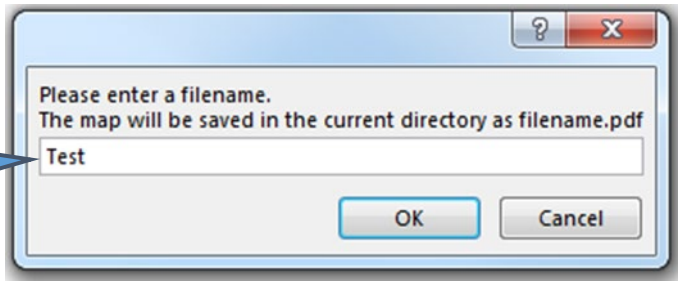
The watershed map on the ***Map*** worksheet can be saved as a PDF file for use in reports or presentations.

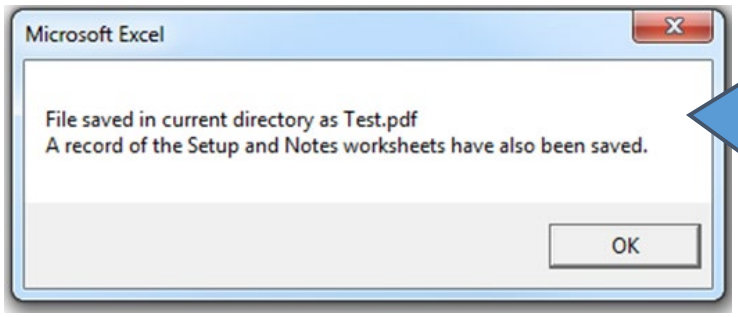


The watershed map can be saved as a PDF by clicking the ***SAVE MAP AS PDF FILE*** button from the **Map Options** section of the ***Map*** worksheet.

You will then be prompted to enter a filename for the PDF file.

Type a filename into the space provided and click ***OK***.





A message box will notify you that the PDF file saved using the filename you provided.

The file will be saved in the same directory that the Excel RPS Tool file is saved in.

Two PDF files storing the contents of the ***Setup*** sheet and ***Screening Objective*** sheet are also saved to provide a record of the screening settings used to produce the watershed map.

11. Indicator Data Worksheet(s)

The ***Indicator Data*** worksheet contains a table of indicator values for all watersheds in the Project Area covered by your Excel RPS Tool file.

Indicators are grouped by category in the ***Indicator Data*** worksheet and are ordered from left-to-right as Base, Ecological, Stressor and Social indicators. Indicator categories are displayed in row 6. Indicator names are displayed in row 7.

The name of the ***Indicator Data*** worksheet displayed in the bottom tab of your Excel RPS Tool will reflect the watershed scale of the indicator data it stores. For example, the ***Indicator Data*** worksheet for HUC12 subwatersheds is named ***HUC12_Data***. If your tool file includes multiple watershed scales (e.g., both HUC14 and HUC12) then it will contain multiple ***Indicator Data*** worksheets, one for each scale (e.g., ***HUC14_Data*** and ***HUC12_Data***).

6	BASE INDICATORS				
7	Hydrologic Unit Code 12-Digit (HUC12)	Name HUC12 Watershed	Hydrologic Unit Code 8-Digit (HUC8)	Name HUC8 Watershed	Hydrologic Unit Code 6-Digit (HUC6)
8	020200070101	Lake Mohawk-Wallkill River	02020007	Rondout	020200
9	020200070102	Papakating Creek	02020007	Rondout	020200
10	020200070103	Beaver Run-Wallkill River	02020007	Rondout	020200
11	020200070104	Quarryville Brook-Wallkill River	02020007	Rondout	020200
12	020200070201	Upper Wawayanda Creek	02020007	Rondout	020200
13	020200070202	Lower Wawayanda Creek	02020007	Rondout	020200
14	020200070203	Upper Pochuck Creek	02020007	Rondout	020200
15	020200070206	Rutgers Creek	02020007	Rondout	020200
16	020200070207	Lower Pochuck Creek-Wallkill River	02020007	Rondout	020200
17	020301010404	Sparkill Creek-Hudson River	02030101	Lower Hudson	020301
18	020301010405	East River-Hudson River	02030101	Lower Hudson	020301
19	020301030101	Upper Wanaque River	02030103	Hackensack-Passaic	020301
20	020301030102	Ringwood River	02030103	Hackensack-Passaic	020301
21	020301030103	Lower Wanaque River	02030103	Hackensack-Passaic	020301
22	020301030203	Mahwah River	02030103	Hackensack-Passaic	020301
23	020301030204	Middle Ramapo River	02030103	Hackensack-Passaic	020301
24	020301030205	Lower Ramapo River	02030103	Hackensack-Passaic	020301
25	020301030301	Upper Whippany River	02030103	Hackensack-Passaic	020301
26	020301030302	Troy Brook	02030103	Hackensack-Passaic	020301
27	020301030303	Lower Whippany River	02030103	Hackensack-Passaic	020301
28	020301030401	Upper Rockaway River	02030103	Hackensack-Passaic	020301
29	020301030402	Beaver Brooker	02030103	Hackensack-Passaic	020301
30	020301030403	Middle Rockaway River	02030103	Hackensack-Passaic	020301
31	020301030404	Lower Rockaway River	02030103	Hackensack-Passaic	020301
32	020301030501	Upper Pequannock River	02030103	Hackensack-Passaic	020301
33	020301030502	Lower Pequannock River	02030103	Hackensack-Passaic	020301
34	020301030503	Morris Canal-Pompton River	02030103	Hackensack-Passaic	020301
35	020301030601	Great Brook-Passaic River	02030103	Hackensack-Passaic	020301
36	020301030602	Black Brook-Passaic River	02030103	Hac	020301

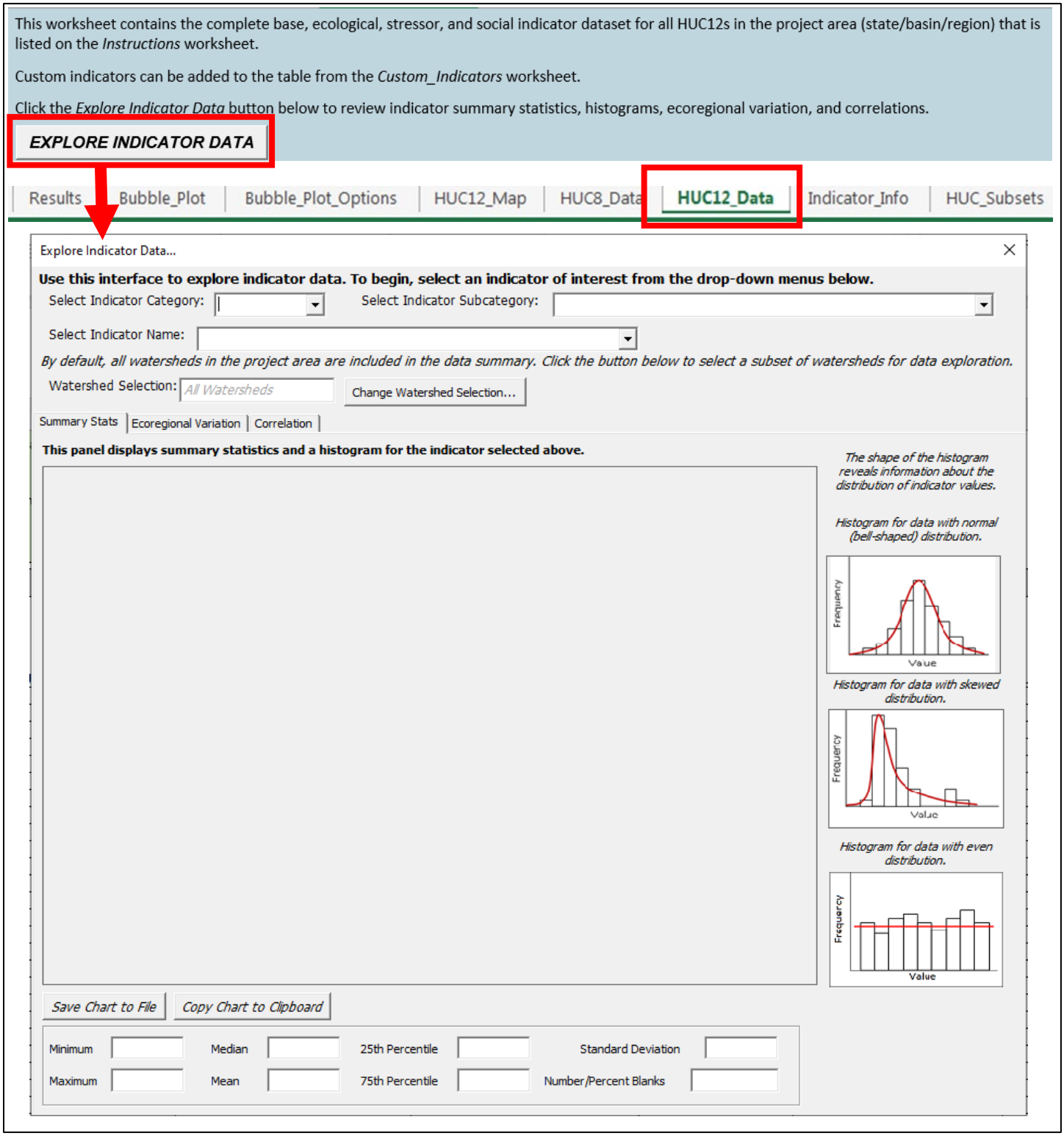
Results | Bubble_Plot | Bubble_Plot_Options | HUC12_Map | HUC8_Data | **HUC12_Data** | Indicator_Info | HUC_Subsets

12. Explore Indicator Data Menu

12.1. Overview

The Excel RPS Tool includes built-in functions for exploring the statistical properties of indicator data. This information can be useful when making decisions on which indicators to include in a screening.

Indicator statistics are displayed within the ***Explore Indicator Data*** menu. To open the menu, select an indicator data worksheet tab (***HUC12_Data***, ***HUC14_Data,*** etc.). Then click the ***EXPLORE INDICATOR DATA*** button.



The ***Explore Indicator Data*** menu contains drop-down menus for selecting an indicator to explore and three tabs for reviewing the statistical properties of the selected indicator:

- The ***Summary Stats*** tab displays summary statistics (minimum, maximum, mean, etc.) and a histogram of indicator values;
- The ***Ecoregional Variation*** tab displays a boxplot of indicator summary statistics by Level 3 Ecoregion (https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states). The tab also contains a table listing the number of watersheds in each ecoregion and the number of watersheds with blank or missing values of the selected indicator per ecoregion. The ***Ecoregional Variation*** tab is only visible when reviewing indicator data for HUC12 subwatersheds.
- The ***Correlation*** tab contains additional drop-down menus for users to select a second covariate indicator to evaluate correlation between two indicators. Correlation statistics and a scatterplot of indicator values are displayed in the tab.

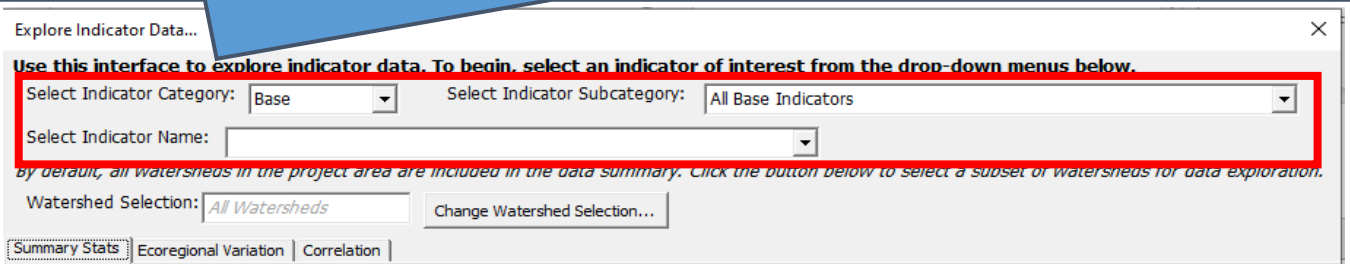
By default, all watersheds in your tool's study area are included in the indicator data summary. The menu also contains the ***CHANGE WATERSHED SELECTION*** button for selecting a custom subset of watersheds for the indicator data summary.

The following sections describe how to:

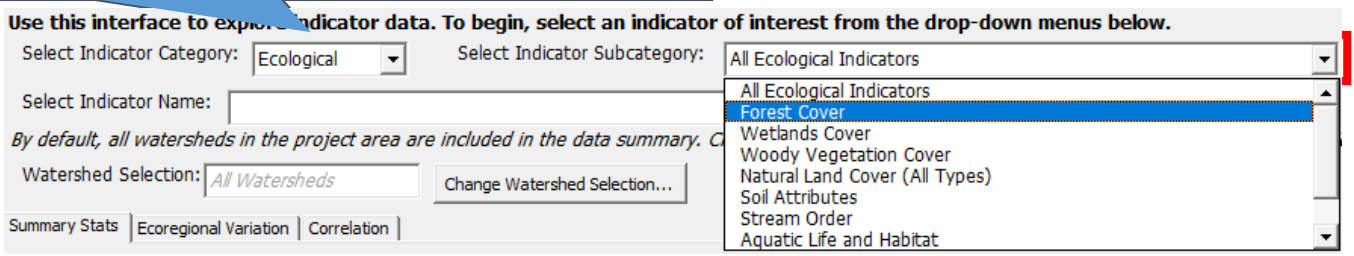
- ***Select an Indicator to Explore***
- ***Select a Covariate Indicator to Review Correlation***
- ***Save or Copy a Chart***
- ***Use the Change Watershed Selection Button***

12.2. Select an Indicator to Explore

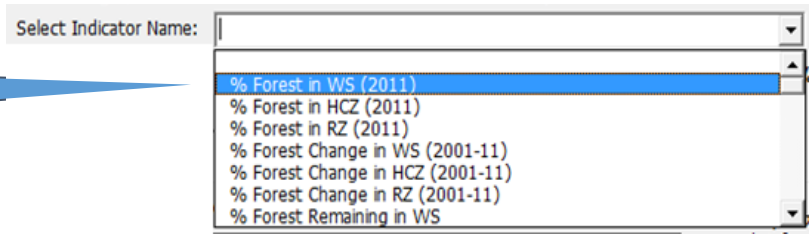
To explore the statistical properties of an indicator, select the indicator of interest from the drop down menus at the top of the ***Explore Indicator Data*** menu.



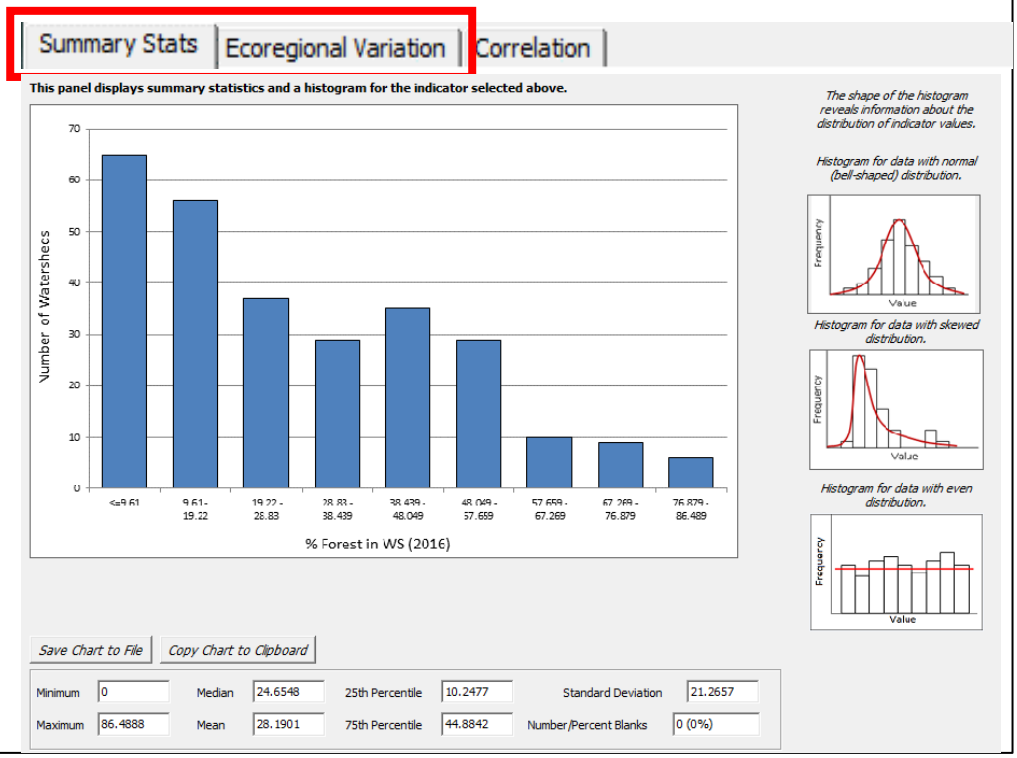
First choose the indicator category and subcategory from the dropdown menus.



Then choose the indicator name from the ***Select Indicator Name*** menu.

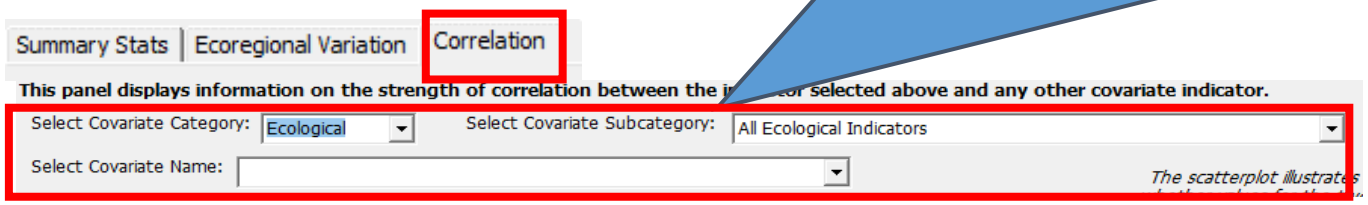


The ***Summary Stats*** and ***Ecoregional Variation*** tabs will automatically populate with statistical information for the selected indicator. Click on each tab name to view its contents.

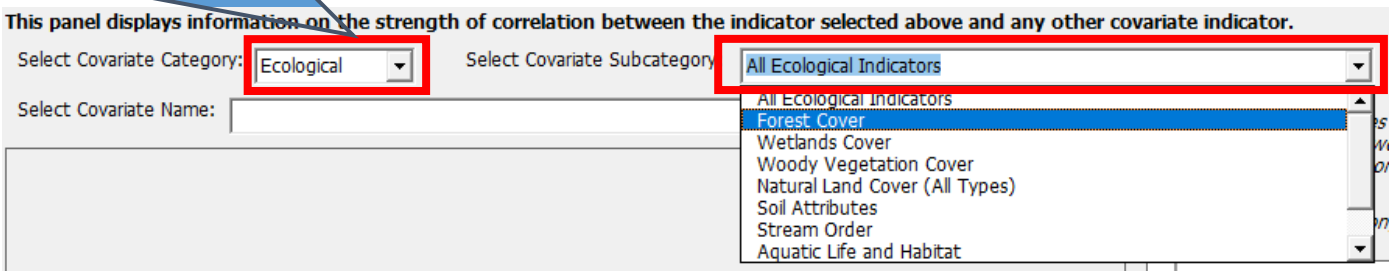


12.3. Select a Covariate Indicator

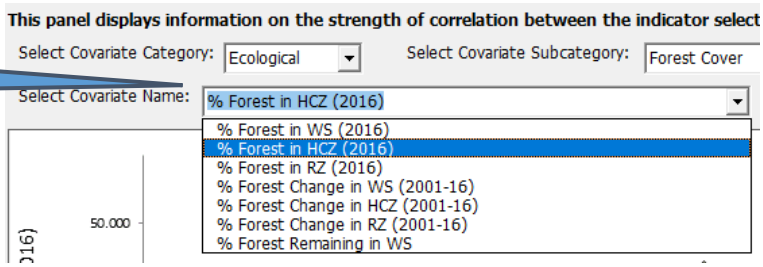
The ***Correlation*** tab of the ***Explore Indicator Data*** menu contains additional drop down menus for users to select a second covariate indicator to evaluate correlation between two indicators.



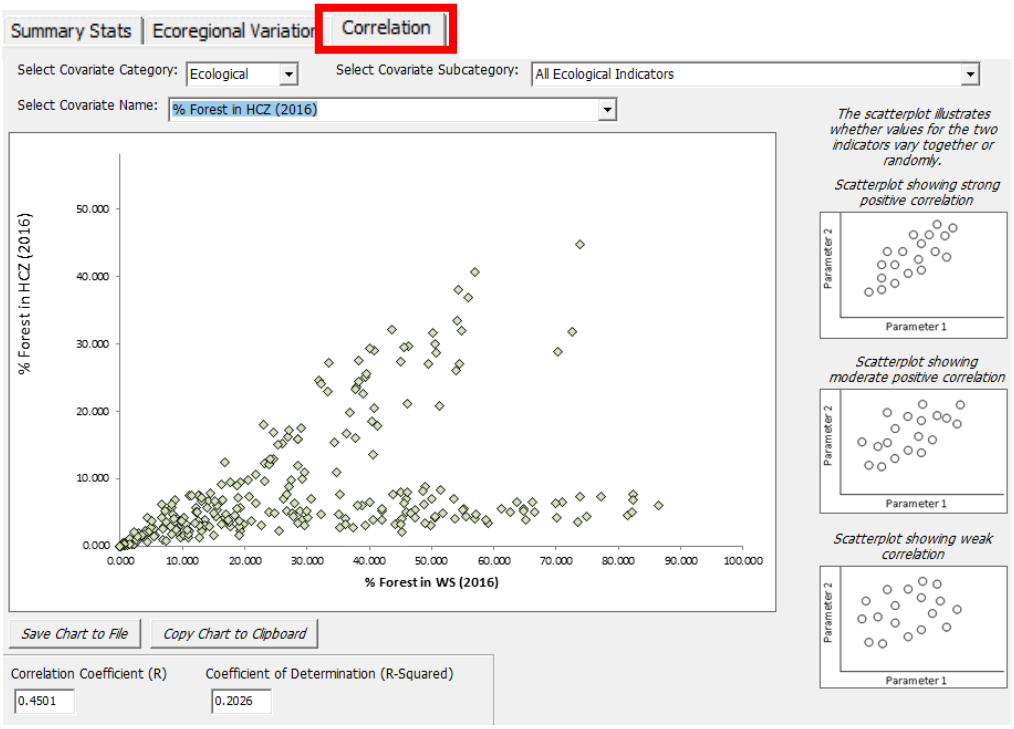
First choose the indicator category and subcategory from the dropdown menus.



Then choose the indicator name from the ***Select Covariate Name*** menu.

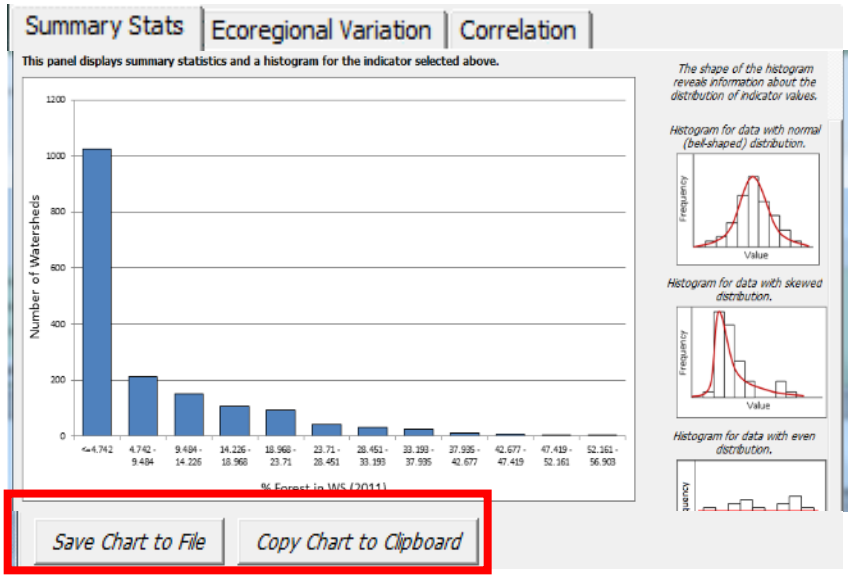


The scatterplot and correlation statistics will automatically populate with values for the selected indicator and the covariate indicator.



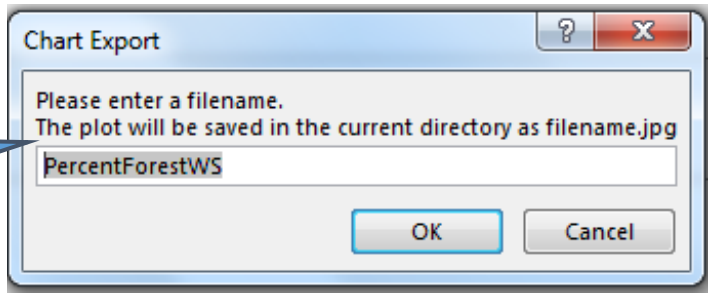
12.4. Save or Copy a Chart

The ***Summary Stats***, ***Ecoregional Variation*** and ***Correlation*** tabs each have buttons that allow users to save or copy an image of the histogram, ecoregional boxplot or correlation scatterplot.

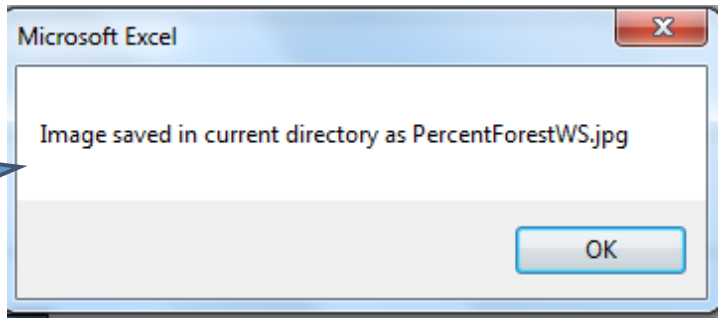


A copy of your chart can be saved as an image file in JPEG format by clicking the ***SAVE CHART TO FILE*** button.

Enter a filename for the chart image in the Chart Export box. Click ***OK***.



A message box will then display to notify you that the image was successfully saved. The file will be saved in the same folder as your Excel RPS tool file.

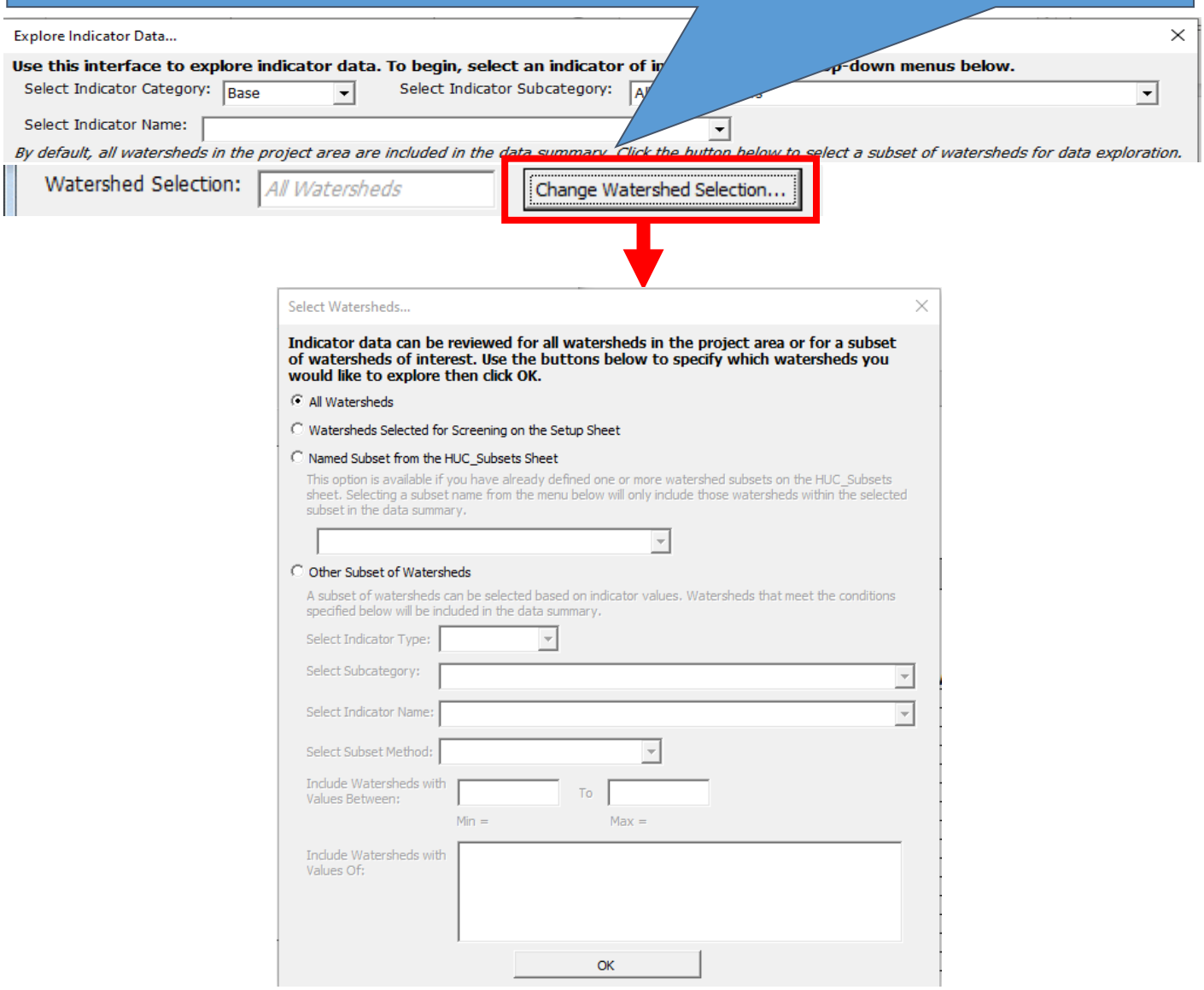


An image of your chart can also be copied to the clipboard by clicking the ***COPY CHART TO CLIPBOARD*** button.

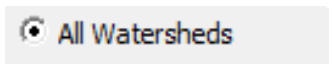
You can then paste your chart into a report document or other file using the Paste menu button or by typing Ctrl V.

12.5. Change Watershed Selection Button

By default, the ***Explore Indicator Data*** menu displays indicator statistical properties for all watersheds in your tool's study area. You can instead explore indicator data for just a subset of watersheds using the ***CHANGE WATERSHED SELECTION*** button at top of the ***Explore Indicator Data*** menu. Clicking the button will launch the ***Select Watersheds*** menu.

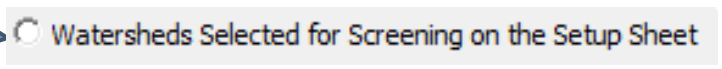


The ***Select Watersheds*** menu contains four option buttons for choosing watersheds to include in your indicator data summary. By default, the ***ALL WATERSHEDS*** button is selected.



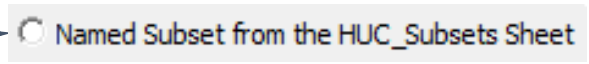
The second option button selects watersheds that have already been chosen for an RPS screening on the ***Setup*** worksheet.

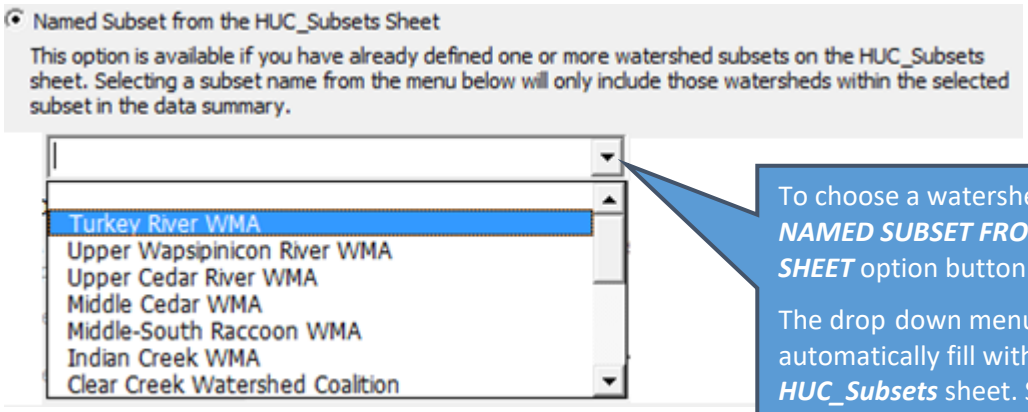
To use this option, you must have previously entered a list of watershed IDs in the ***Select Watersheds*** section of the ***Setup*** worksheet (see Section 5.3).



The third option button selects watersheds that have already been defined in a named watershed subset on the ***HUC_Subsets*** worksheet.

To use this option, you must have previously entered one or more watershed subsets on the ***HUC_Subsets*** worksheet (see Section 15).



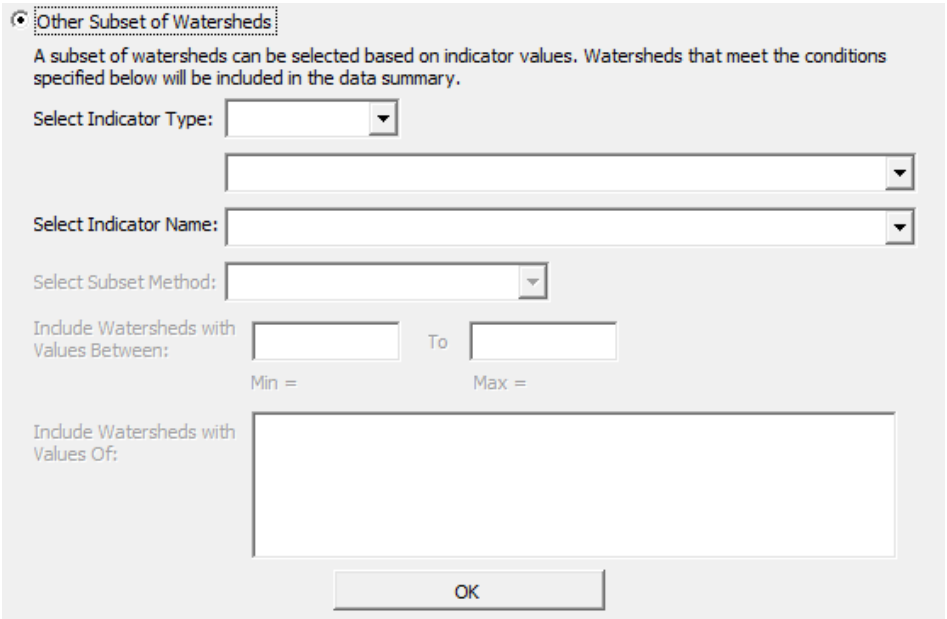


To choose a watershed subset, click the ***NAMED SUBSET FROM THE HUC_SUBSETS SHEET*** option button.

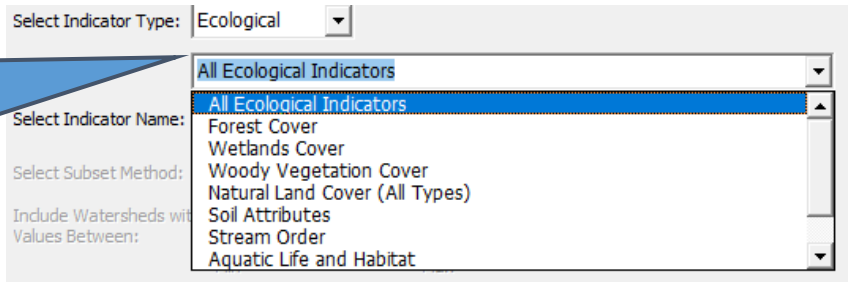
The drop down menu below the button will automatically fill with subset names from the ***HUC_Subsets*** sheet. Select the name of the subset of interest.

The fourth option button allows you to select a group of watersheds based on the values of any indicator stored in the Excel RPS Tool.

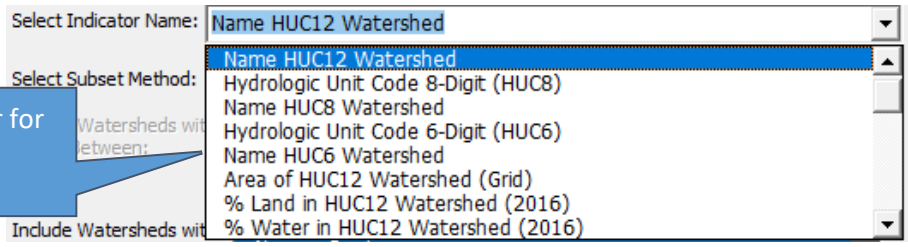
Clicking the ***OTHER SUBSET OF WATERSHEDS*** option button will activate drop down menus for selecting the indicator type, name and values to use for your watershed selection.



After clicking the ***OTHER SUBSET OF WATERSHEDS*** option button, choose the type of indicator for selecting watersheds (Base, Ecological, Stressor or Social) from the ***Select Indicator Type*** drop down menu and the indicator subcategory from the following dropdown.



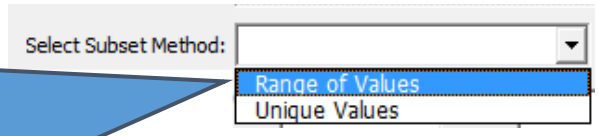
Then choose the name of the indicator for selecting watersheds from the ***Select Indicator Name*** drop down menu.



Next, choose a subset method for selecting watersheds from the ***Select Subset Method*** drop down menu.

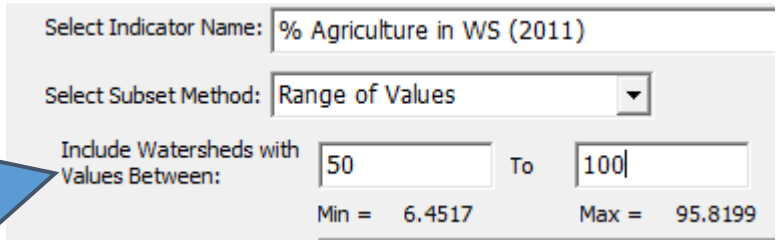
The Range of Values option allows you to specify minimum and maximum values of interest for the selected indicator. Watersheds with indicator values in the specified range will be included in the indicator data summary.

The Unique Values option allows you to select one or more unique values of interest for the selected indicator. Watersheds with the specified values will be included in the data summary. The unique values option will typically only be used for categorical variables.



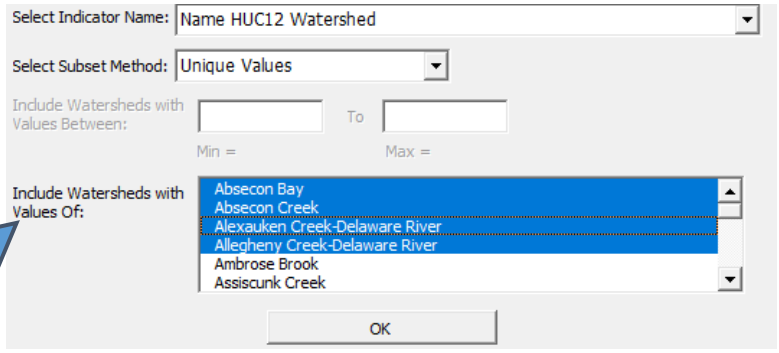
If you choose the Range of Values method, enter the range of values of interest for the selected indicator in the text boxes.

For reference, the tool will display minimum and maximum values of the selected indicator below the boxes.

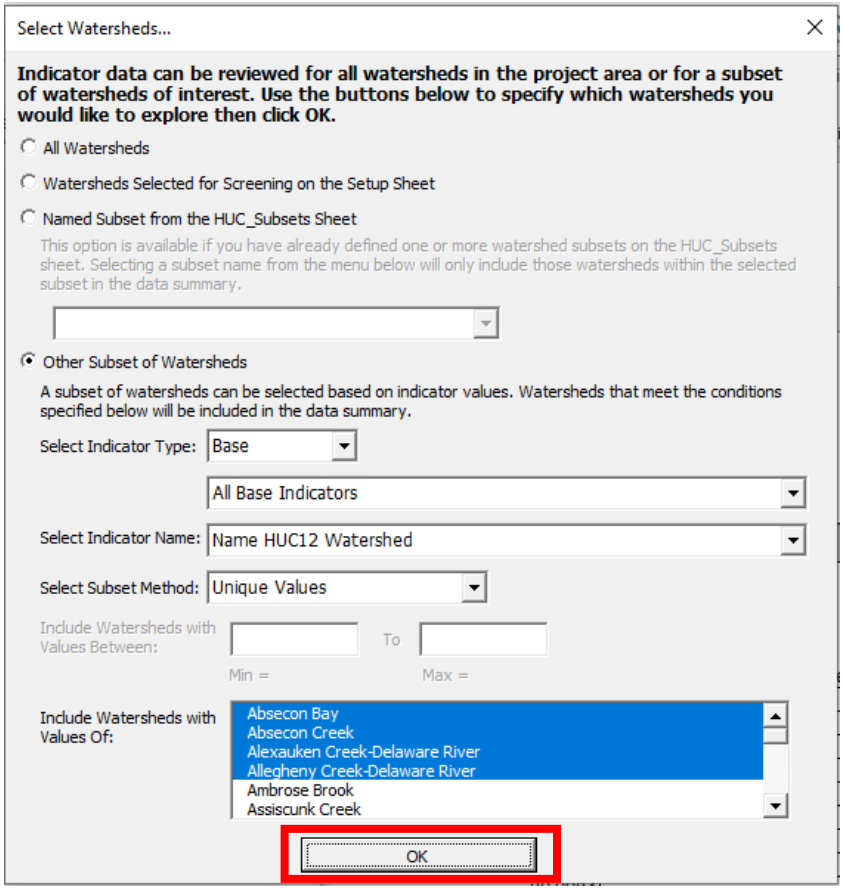


If you choose the Unique Values method, a list of unique indicator values will automatically display in the selection box below the ***Select Subset Method*** drop down menu.

Choose one or more of the unique indicator values by highlighting the values in the selection box.



After choosing an option for selecting watersheds to include in the indicator data summary, click the ***OK*** button at the bottom of the ***Select Watersheds*** menu.

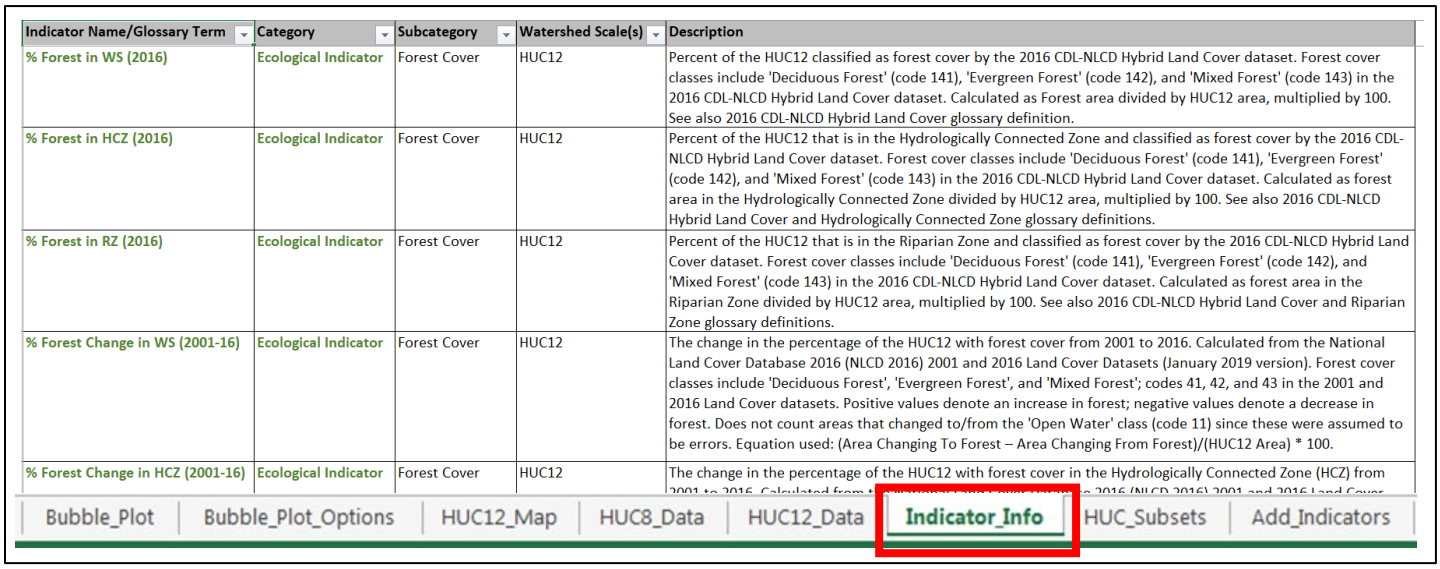


The ***Explore Indicator Data*** menu will now only display indicator summary statistics, histograms, correlations and other statistical properties for the group of watersheds specified on the ***Select Watersheds*** menu. You can adjust your watershed selection at any time by clicking the ***CHANGE WATERSHED SELECTION*** button on the ***Explore Indicator Data*** menu.

13. Indicator Info Worksheet

13.1. Overview

The ***Indicator Info*** worksheet contains a table of indicator information, including the category of each indicator (Base, Ecological, Stressor or Social), subcategory, the watershed scale(s) that each indicator is quantified at and a description of what watershed characteristic the indicator measures.



Indicator Name/Glossary Term	Category	Subcategory	Watershed Scale(s)	Description
% Forest in WS (2016)	Ecological Indicator	Forest Cover	HUC12	Percent of the HUC12 classified as forest cover by the 2016 CDL-NLCD Hybrid Land Cover dataset. Forest cover classes include 'Deciduous Forest' (code 141), 'Evergreen Forest' (code 142), and 'Mixed Forest' (code 143) in the 2016 CDL-NLCD Hybrid Land Cover dataset. Calculated as Forest area divided by HUC12 area, multiplied by 100. See also 2016 CDL-NLCD Hybrid Land Cover glossary definition.
% Forest in HCZ (2016)	Ecological Indicator	Forest Cover	HUC12	Percent of the HUC12 that is in the Hydrologically Connected Zone and classified as forest cover by the 2016 CDL-NLCD Hybrid Land Cover dataset. Forest cover classes include 'Deciduous Forest' (code 141), 'Evergreen Forest' (code 142), and 'Mixed Forest' (code 143) in the 2016 CDL-NLCD Hybrid Land Cover dataset. Calculated as forest area in the Hydrologically Connected Zone divided by HUC12 area, multiplied by 100. See also 2016 CDL-NLCD Hybrid Land Cover and Hydrologically Connected Zone glossary definitions.
% Forest in RZ (2016)	Ecological Indicator	Forest Cover	HUC12	Percent of the HUC12 that is in the Riparian Zone and classified as forest cover by the 2016 CDL-NLCD Hybrid Land Cover dataset. Forest cover classes include 'Deciduous Forest' (code 141), 'Evergreen Forest' (code 142), and 'Mixed Forest' (code 143) in the 2016 CDL-NLCD Hybrid Land Cover dataset. Calculated as forest area in the Riparian Zone divided by HUC12 area, multiplied by 100. See also 2016 CDL-NLCD Hybrid Land Cover and Riparian Zone glossary definitions.
% Forest Change in WS (2001-16)	Ecological Indicator	Forest Cover	HUC12	The change in the percentage of the HUC12 with forest cover from 2001 to 2016. Calculated from the National Land Cover Database 2016 (NLCD 2016) 2001 and 2016 Land Cover Datasets (January 2019 version). Forest cover classes include 'Deciduous Forest', 'Evergreen Forest', and 'Mixed Forest'; codes 41, 42, and 43 in the 2001 and 2016 Land Cover datasets. Positive values denote an increase in forest; negative values denote a decrease in forest. Does not count areas that changed to/from the 'Open Water' class (code 11) since these were assumed to be errors. Equation used: (Area Changing To Forest – Area Changing From Forest)/(HUC12 Area) * 100.
% Forest Change in HCZ (2001-16)	Ecological Indicator	Forest Cover	HUC12	The change in the percentage of the HUC12 with forest cover in the Hydrologically Connected Zone (HCZ) from

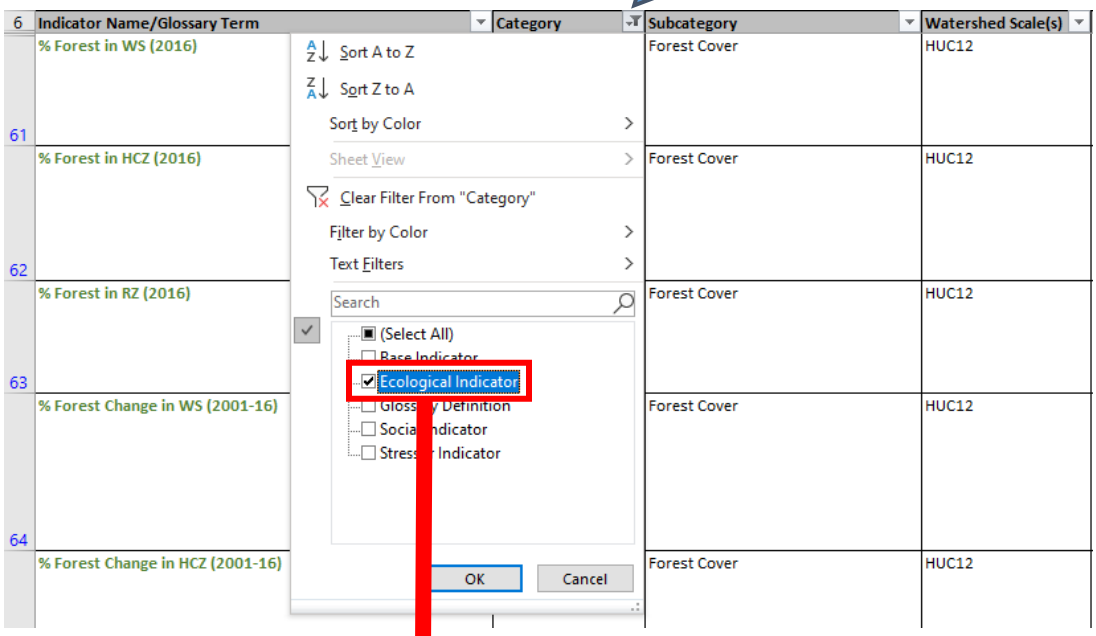
The following sections describe how to:

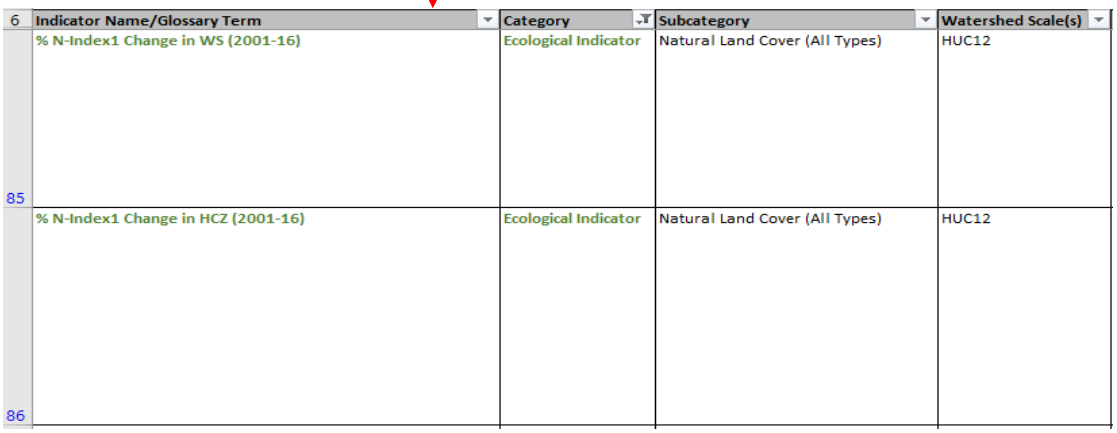
- ***Filter the Indicator Info Table***
- ***Add Indicator Info***

13.2. Filter the Indicator Info Table

The indicator information table can be filtered to view information for a specific indicator category (Base, Ecological, Stressor or Social), indicator subcategory or watershed scale by clicking the drop-down arrow next to the column name and selecting a filter option.

In the example below, the table is filtered to only display information for Ecological indicators.





13.3. Add Indicator Info

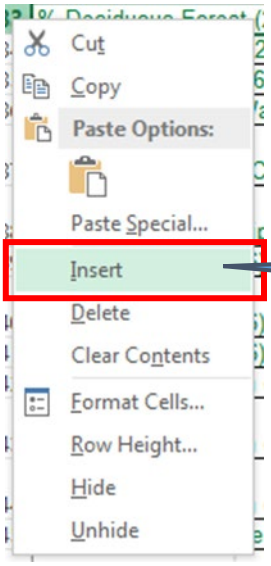
The ***Indicator Info*** worksheet can be updated by users to store information for new indicators added to the ***Indicator Data*** worksheet(s).

To add indicator information for a new indicator, first insert a row for the new indicator.

Right-click the margin of the ***Indicator Info*** worksheet (where row numbers are displayed) where you would like to insert the new row.

For example, if you would like to add information for a new Ecological indicator, right-click the margin of the first Stressor indicator row.

1	Indicator Name/Glossary Term	Category	Subcategory
139	PHWA Water Quality Sub-Index, ER Percentile	Ecological Indicator	Integrated Waters
140	Neutral Variable, Ecological Category	Ecological Indicator	Neutral Variable
141	% Urban in WS (2016)	Stressor Indicator	Urban/Developed
	% Urban in HCZ (2016)	Stressor Indicator	Urban/Developed



After right-clicking, select "Insert" from the Excel popup menu.

A new row will be inserted into the indicator information table.

Type the name of the new indicator in the Indicator Name column.

1	Indicator Name/Glossary Term	Category	Subcategory	Watershed Scale(s)
141	New Ecological Indicator			

Type the category of the new indicator (Base, Ecological, Stressor or Social) in the Indicator Category column.

1	Indicator Name/Glossary Term	Category
141	New Ecological Indicator	Ecological Indicator

Type the subcategory of the new indicator. Users can enter an existing subcategory or a new subcategory.

Note that the subcategory entered here will only be relevant for sorting and filtering the ***Indicator Info*** sheet. The subcategory drop-down menus in other worksheets will store new indicators under a "user-added" subcategory.

1	Indicator Name/Glossary Term	Category	Subcategory
141	New Ecological Indicator	Ecological Indicator	Ecological Subcategory

Type the watershed scale of the new indicator in the Indicator Scale(s) column. For example, if the indicator is calculated for HUC12s in the Project Area then type "HUC12".

1	Indicator Name/Glossary Term	Category	Subcategory	Watershed Scale(s)
141	New Ecological Indicator	Ecological Indicator	Ecological Subcategory	HUC12

Type a description of the new indicator in the Indicator Description column.

1	Indicator Name/Glossary Term	Category	Subcategory	Watershed Scale(s)	Description
41	New Ecological Indicator	Ecological Indicator	Ecological Subcategory	HUC12	Example new Ecological indicator.

Repeat these steps for each new indicator added to the ***Indicator Data*** worksheet.

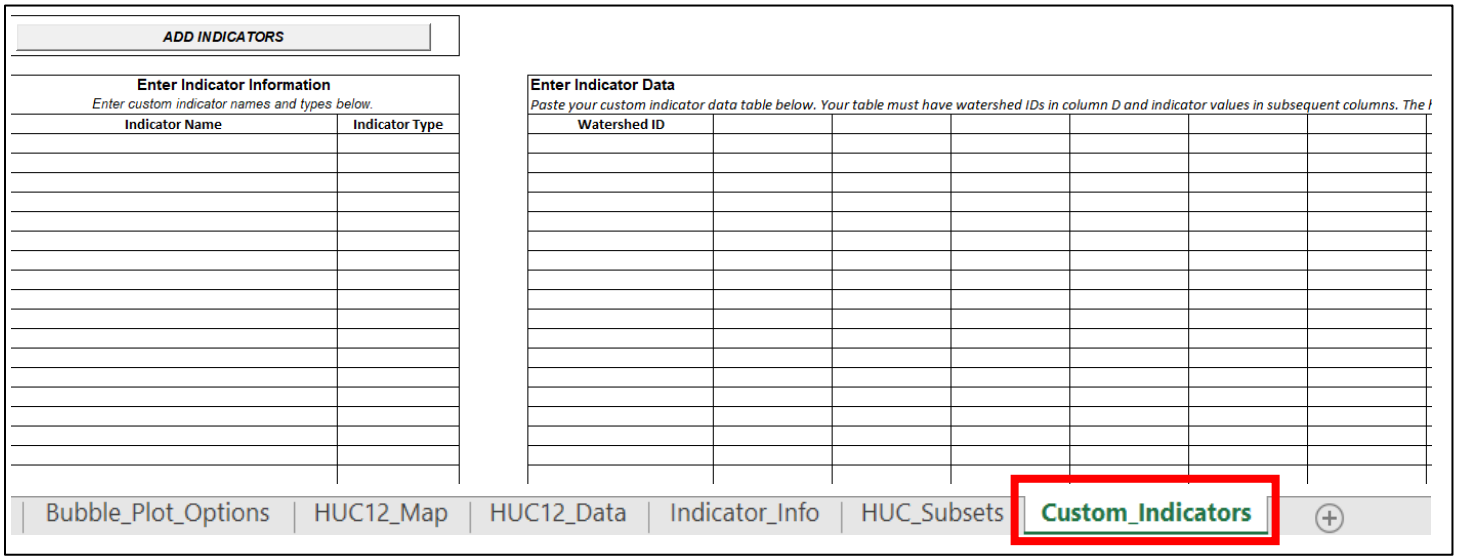
14. Custom Indicators Worksheet

14.1. Overview

New indicators can be added to the Excel RPS Tool from the ***Custom Indicators*** worksheet for use in a screening run. Note that the Excel RPS Tool does not include features for calculating new indicators. New indicators must be calculated outside of the Excel RPS Tool and, once calculated, can be added at any time. New indicators are inserted into new columns on the ***Indicator Data*** worksheet and will display in the indicator menus on the ***Setup***, ***Bubble Plot Options*** and ***Map*** worksheets.

If your Excel RPS Tool file is setup to screen multiple watersheds scales then new indicators must be added separately for each watershed scale. For example, if you would like to add new HUC12 indicators and new HUC14 indicators, you must add the HUC12 indicators in a separate step from the HUC14 indicators. Up to 50 indicators can be added at a time for each scale.

Appendix A provides more information for users interested in adding their own custom indicators by summarizing key concepts for developing new indicators and calculating indicator data.



The ***Custom Indicators*** worksheet is organized into two sections:

- In the **Enter Indicator Information** section you will enter a list of new indicator names and types (Ecological, Stressor, Social or Base).
- In the **Enter Indicator Data** section you will paste in a table of indicator values for watersheds in the Study Area.

The following sections provide step-by-step instructions for how to:

- ***Enter New Indicator Information***
- ***Enter New Indicator Data***
- ***Use the Add Indicators Button***

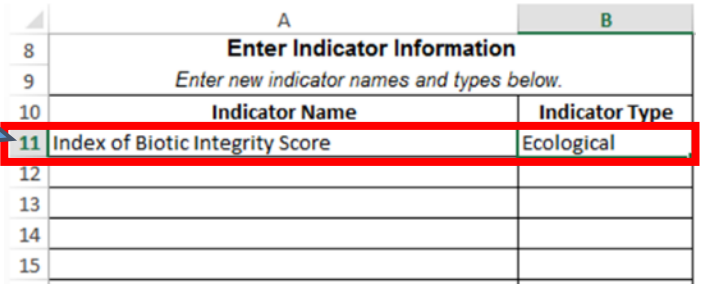
14.2. Enter New Indicator Information

In the **Enter Indicator Information** section of the ***Custom Indicators*** worksheet, you will enter the name and type of each new indicator. This information is used to update the indicator menus on the ***Setup***, ***Bubble Plot Options*** and ***Map*** worksheets.

Enter New Indicator Information Option 1 – Type New Indicator Names and Types

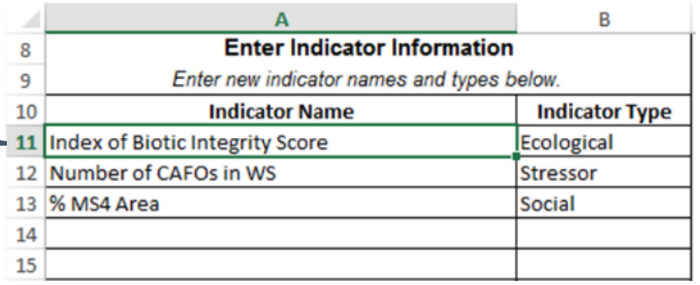
In the **Enter Indicator Information** section, select cell A11 and type the name of the first new indicator.

Then enter the new indicator type in cell B11. Indicator type must be Ecological, Stressor, Social or Base.



	A	B
8	**Enter Indicator Information**	
9	*Enter new indicator names and types below.*	
10	**Indicator Name**	**Indicator Type**
11	Index of Biotic Integrity Score	Ecological
12		
13		
14		
15		

Repeat until each new indicator name and type has been added.

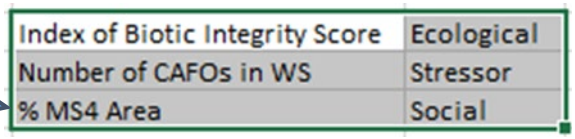


	A	B
8	**Enter Indicator Information**	
9	*Enter new indicator names and types below.*	
10	**Indicator Name**	**Indicator Type**
11	Index of Biotic Integrity Score	Ecological
12	Number of CAFOs in WS	Stressor
13	% MS4 Area	Social
14		
15		

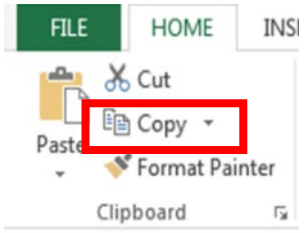
Enter New Indicator Information Option 2 – Copy and Paste New Indicator Names and Types

To use this option you must already have a pre-existing list of new indicator names and types stored in a separate worksheet. The pre-existing indicator list must be formatted with one indicator per row with the indicator name in the first column and indicator type in the second column.

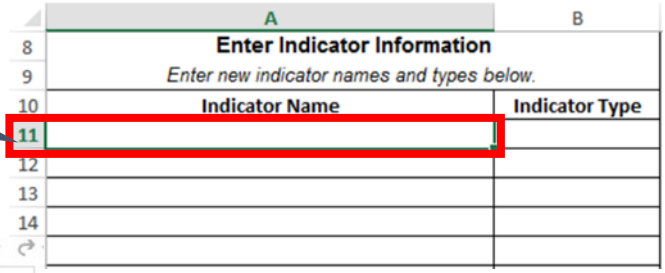
Open the worksheet with the pre-existing indicator list. Select the indicator names and types and click "Copy" on the Excel menu.



Index of Biotic Integrity Score	Ecological
Number of CAFOs in WS	Stressor
% MS4 Area	Social

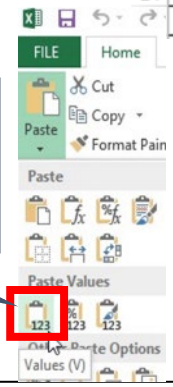


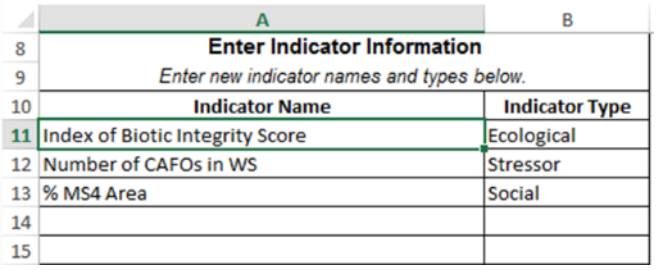
Go back to the ***Custom Indicators*** worksheet and set the cursor to cell A11 in the **Enter Indicator Information** section.



	A	B
8	**Enter Indicator Information**	
9	*Enter new indicator names and types below.*	
10	**Indicator Name**	**Indicator Type**
11		
12		
13		
14		

Select "Paste Values" from the Excel menu to paste the new indicator names and types into the **Enter Indicators Information** section.





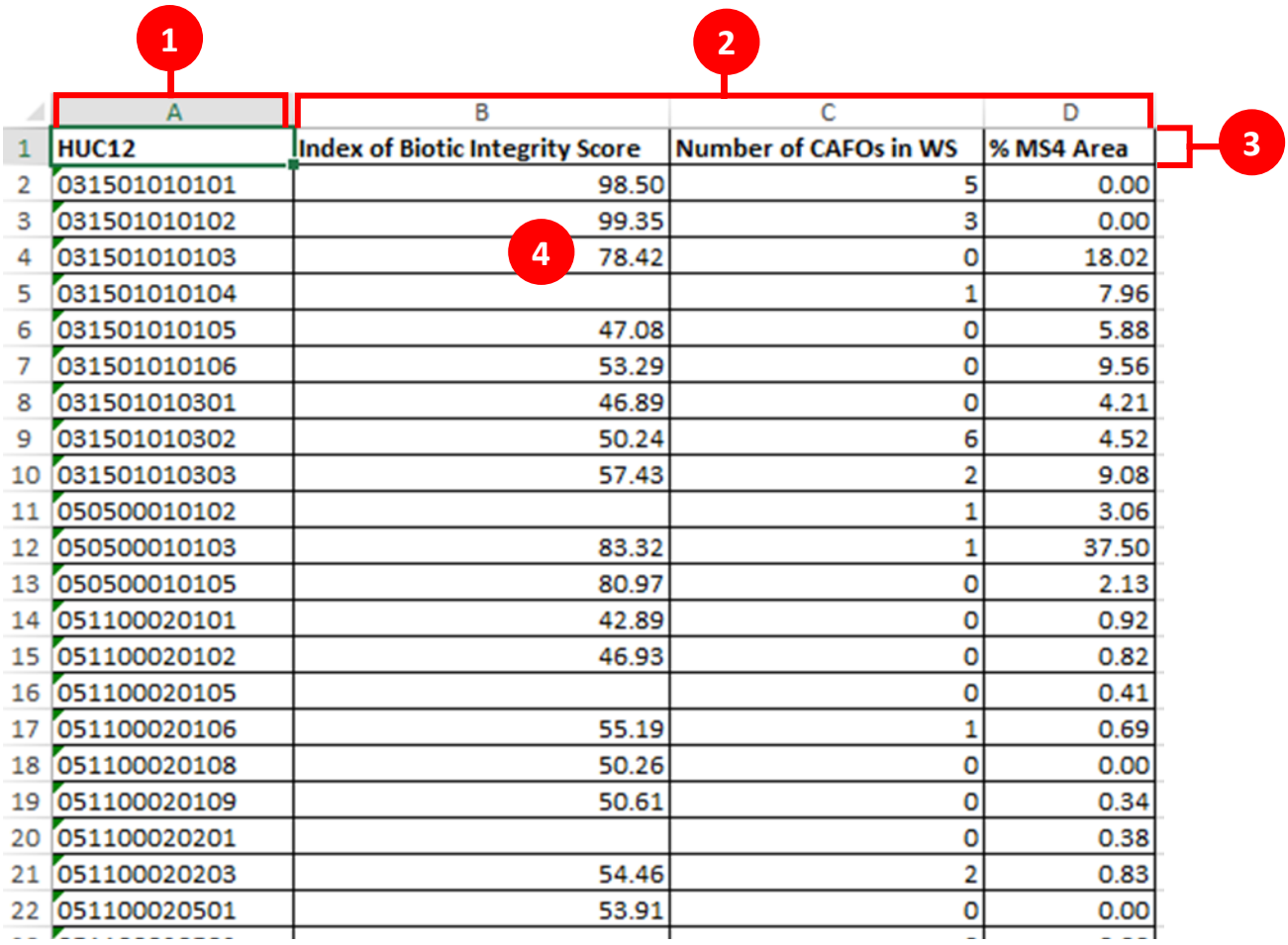
	A	B
8	**Enter Indicator Information**	
9	*Enter new indicator names and types below.*	
10	**Indicator Name**	**Indicator Type**
11	Index of Biotic Integrity Score	Ecological
12	Number of CAFOs in WS	Stressor
13	% MS4 Area	Social
14		
15		

14.3. Enter New Indicator Data

In the **Enter Indicator Data** section of the ***Custom Indicators*** worksheet, you will copy and paste a table of new indicator values for watersheds in the Study Area. These values are used to update the indicator data table in the ***Indicator Data*** worksheet.

To add new indicators, you must first prepare a table of new indicator values in a separate spreadsheet file. An example indicator table is displayed below. Note the following characteristics of the table:

1. The table must have watershed IDs entered in the first column. Your table does not need to have a row for every watershed in the study area. Any watersheds that are missing from your table will have blank cells for the new indicators when added to the ***Indicator Data*** worksheet. Your table can include extra watersheds that are not in the study area; however, those watersheds will be skipped when updating the ***Indicator Data*** worksheet. Watersheds can be sorted in any order in your table.
2. The table must have indicator values in subsequent columns.
3. The table must have a header row with indicator names. Names of new indicators cannot match an existing indicator name already in the tool. We recommend limiting indicator names to 50 characters or less to properly display in tool menus.
4. Values of new ecological, stressor and social indicators in your table should be numeric or blank. Non numeric values will be skipped when updating the ***Indicator Data*** worksheet. Non numeric values are allowed for base indicators.

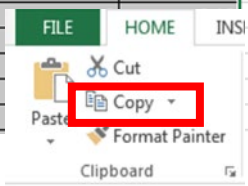


	A	B	C	D
1	HUC12	Index of Biotic Integrity Score	Number of CAFOs in WS	% MS4 Area
2	031501010101	98.50	5	0.00
3	031501010102	99.35	3	0.00
4	031501010103	78.42	0	18.02
5	031501010104		1	7.96
6	031501010105	47.08	0	5.88
7	031501010106	53.29	0	9.56
8	031501010301	46.89	0	4.21
9	031501010302	50.24	6	4.52
10	031501010303	57.43	2	9.08
11	050500010102		1	3.06
12	050500010103	83.32	1	37.50
13	050500010105	80.97	0	2.13
14	051100020101	42.89	0	0.92
15	051100020102	46.93	0	0.82
16	051100020105		0	0.41
17	051100020106	55.19	1	0.69
18	051100020108	50.26	0	0.00
19	051100020109	50.61	0	0.34
20	051100020201		0	0.38
21	051100020203	54.46	2	0.83
22	051100020501	53.91	0	0.00

After you have prepared your indicator data table in a separate spreadsheet file, you will copy and paste the table into the **Enter Indicator Data** section.

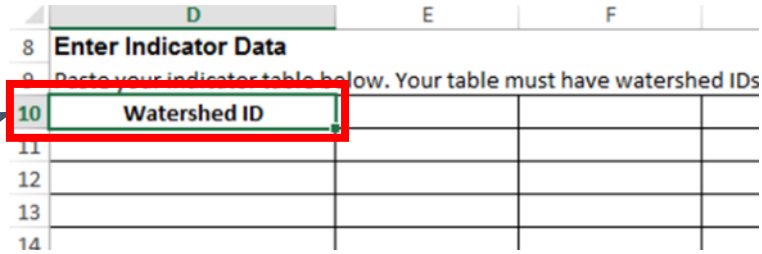
Open the spreadsheet file containing your pre calculated new indicators. Select the cells containing watershed IDs and new indicator values in that file (including the header row) and click "Copy" on the Excel menu.

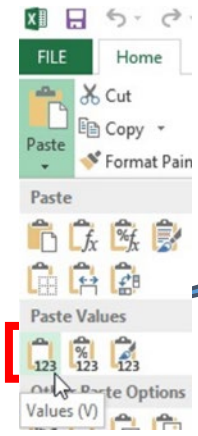
	A	B	C	D
1	HUC12	Index of Biotic Integrity Score	Number of CAFOs in WS	% MS4 Area
2	031501010101	98.50	5	0.00
3	031501010102	99.35	3	0.00
4	031501010103	78.42	0	18.02
5	031501010104		1	7.96
6	031501010105	47.08	0	5.88
7	031501010106	53.29	0	9.56
8	031501010301	46.89	0	4.21
9	031501010302	50.24	6	4.52
10	031501010303	57.43	2	9.08
11	050500010102		1	3.06
12	050500010103	83.32	1	37.50
13	050500010105	80.97		
14	051100020101	42.89		
15	051100020102	46.93		
16	051100020105			
17	051100020106	55.19		



Go back to the ***Custom Indicators*** worksheet and set the cursor to cell D10.

Note that by default cell D10 contains the text "Watershed ID". This text is included as a placeholder and should be overwritten by your indicator data table.





Select "Paste Values" from the Excel menu to paste the indicator data table into the ***Custom Indicators*** worksheet.

	D	E	F	G
8	Enter Indicator Data			
9	Paste your indicator table below. Your table must have watershed IDs in column D and indicator valu			
10	HUC12	Index of Biotic Integrity Score	Number of CAFOs	% MS4 Area
11	031501010101	98.49662401	5	0
12	031501010102	99.35390734	3	0
13	031501010103	78.42011275	0	18.02
14	031501010104		1	7.96026228
15	031501010105	47.0843994	0	5.880882549
16	031501010106	53.28558028	0	9.559236623
17	031501010301	46.89142972	0	4.214230407
18	031501010302	50.2423724	6	4.519161244
19	031501010303	57.42810532	2	9.08079115
20	050500010102		1	3.058646903
21	050500010103	83.31772027	1	37.5
22	050500010105	80.97092932	0	2.125675012
23	051100020101	42.88632856	0	0.921042273
24	051100020102	46.93380457	0	0.816190158
25	051100020105		0	0.408689922

14.4. Add Indicators Button

After entering new indicator names, types and values use the ***ADD INDICATORS*** button to update the other tool worksheets with new indicators.

Clicking the ***ADD INDICATORS*** button from the ***Custom Indicators*** worksheet will display a message box listing the requirements for adding new indicators. Review that the requirements are met and click ***YES*** to continue.

Enter Indicator Information

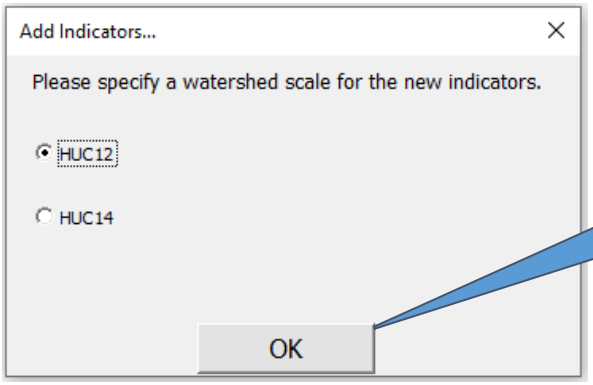
Enter new indicator names and types below.

Indicator Name	Indicator Type
Index of Biotic Integrity Score	Ecological
Number of CAFOs in WS	Stressor
% MS4 Area	Social

Enter Indicator Data

Paste your indicator table below. Your table must have wate

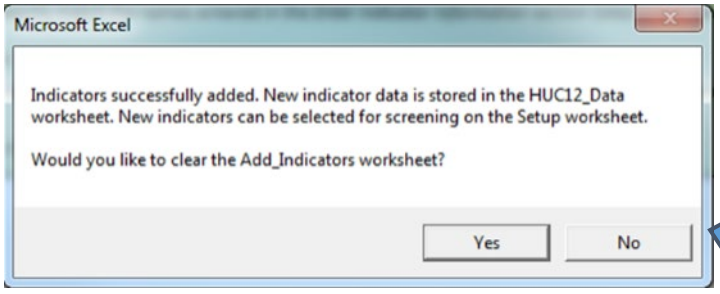
HUC12	Index of Biotic Integrity Score
031501010101	98.49662401
031501010102	99.35390734
031501010103	78.42011275
031501010104	



If your tool file includes multiple watershed scales, a message box will prompt you to specify which scale the new indicators apply to. Select the option button for the appropriate watershed scale and click ***OK***.

The tool will then check to verify that indicator names, types and values have been correctly entered on the ***Custom Indicators*** worksheet. The tool will also look for potential issues with new indicator data.

If no data issues are found, the new indicators will be automatically added as new columns to the ***Indicator Data*** worksheet and will be added to menus on the ***Setup***, ***Bubble Plot Options*** and ***Map*** worksheets. If issues are identified, an error message will appear.



A message box will appear to notify you that your new indicators were successfully added to the tool file.

The message box will prompt you to clear new indicator names, types and values from the ***Custom Indicators*** worksheet. If you would like to automatically clear the ***Custom Indicators*** worksheet click ***YES***. Or click ***NO*** to clear manually.

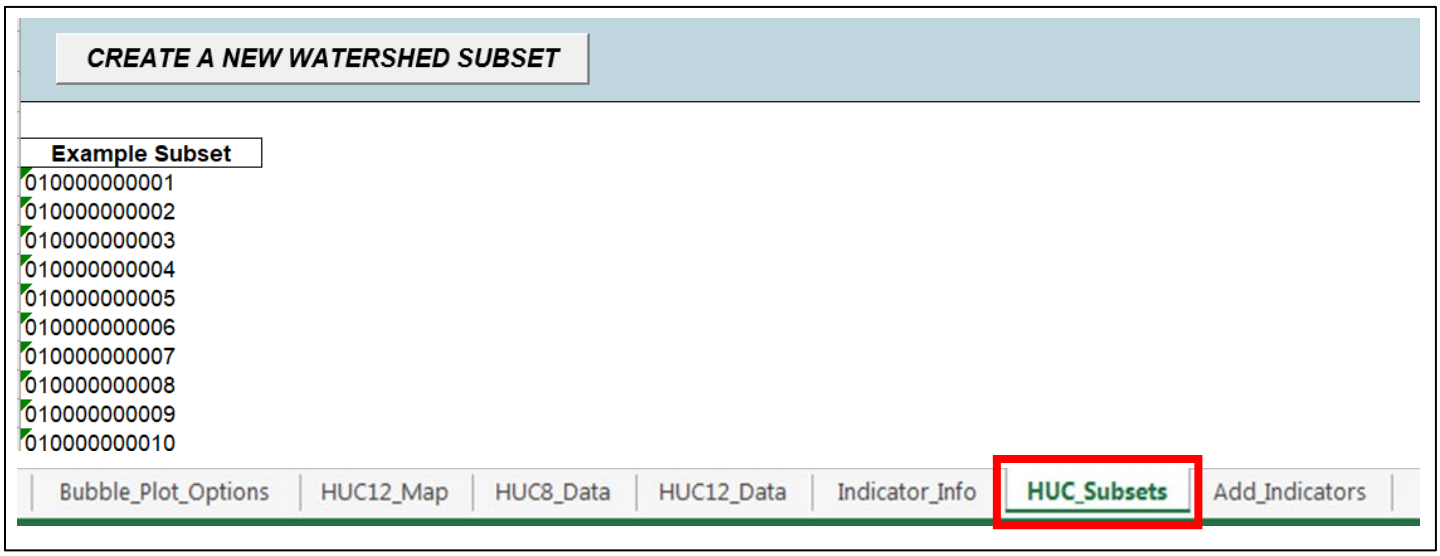
It is strongly recommended that you enter information for the new indicators (name, type, scale and description) to the ***Indicator Info*** worksheet. Refer to the ***Indicator Info*** worksheet section of this guide for instructions on inserting information for new indicators.

15. HUC Subsets Worksheet

15.1. Overview

When setting up an RPS screening, you'll often want to focus on just a subset of watersheds of interest rather than all watersheds in the Project Area. The ***HUC Subsets*** worksheet provides a space to identify and store groups of watershed subsets for use in a screening. For example, within the ***HUC Subsets*** tab you can generate a list of HUC12 subwatersheds that are located in a particular HUC8 of interest or that have a certain land cover profile.

Watershed subsets include only a portion of all watersheds in the Project Area. A watershed subset is a list of watershed IDs that meet one or more user-defined selection criteria. Watershed subsets are stored on the ***HUC Subsets*** worksheet with one watershed ID per row. A subset can be added to the **Select Watersheds** section of the ***Setup*** worksheet to screen and compare the watersheds in the subset. Watershed subsets are defined automatically with the ***CREATE A NEW WATERSHED SUBSET*** button or entered manually.



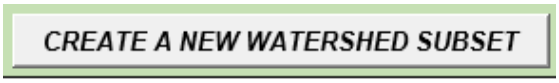
The following sections provide step-by-step instructions for how to:

- ***Use the Create a New Watershed Subset Button***
- ***Manually Add a Subset List***

15.2. Create a New Watershed Subset Button

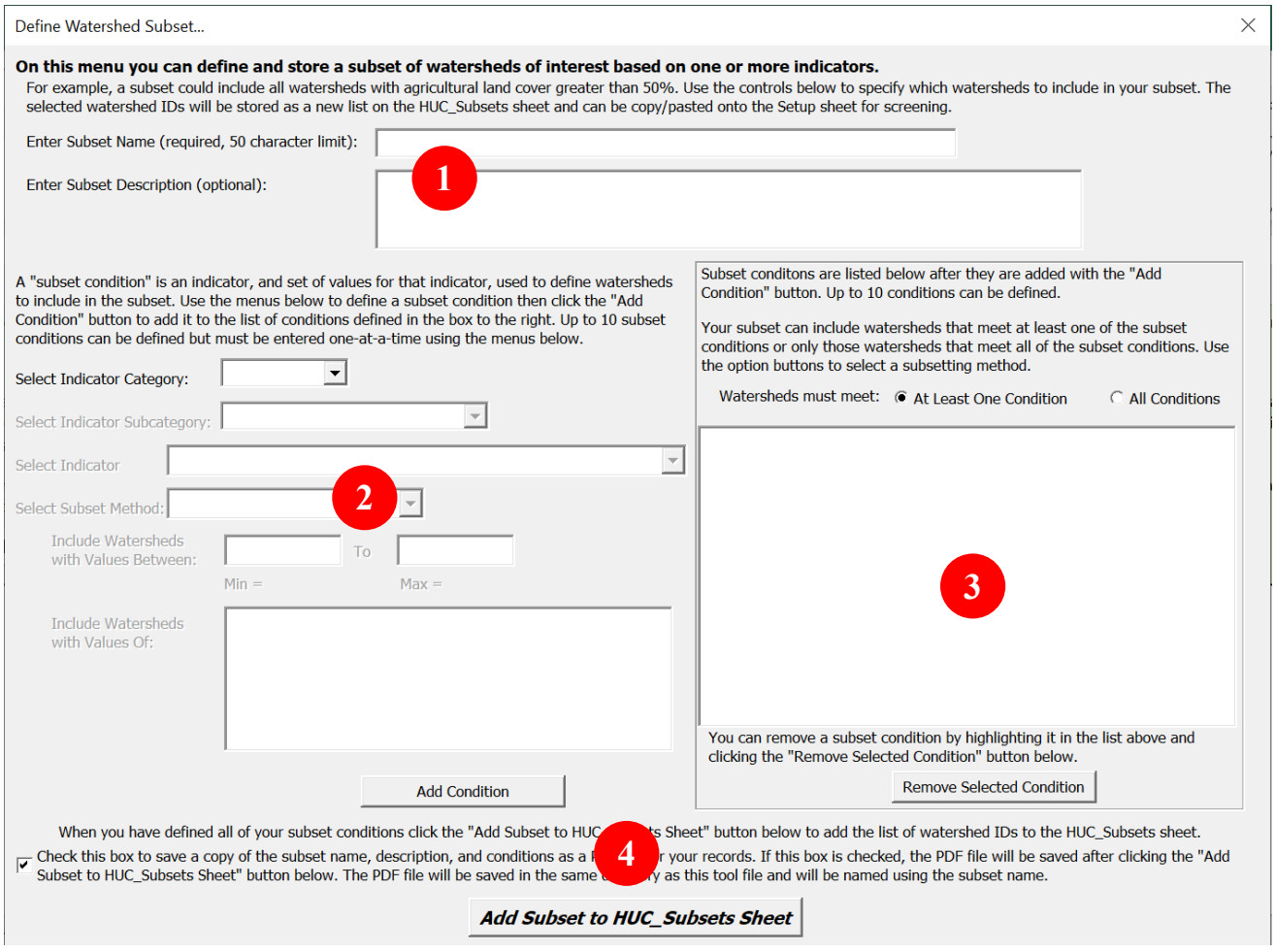
The Excel RPS Tool includes an interface for defining a watershed subset. The interface can be accessed by clicking the ***CREATE A NEW WATERSHED SUBSET*** button on the ***HUC Subsets*** worksheet.

Before clicking the button, you should already have in mind a set of criteria or conditions for defining your watershed subset.



The ***Define Watershed Subset*** interface will now display. The interface contains four components:

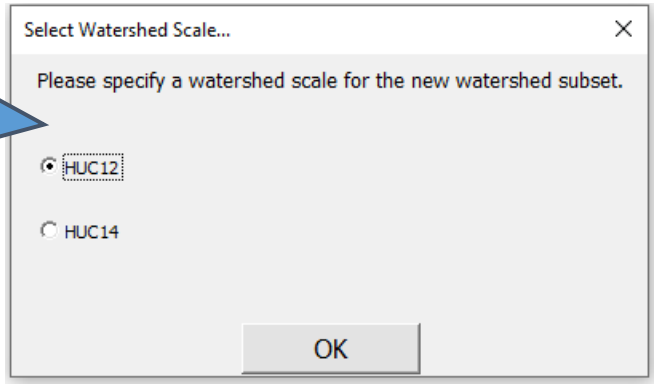
1. Text boxes for entering a subset name and description.
2. Drop down menus and boxes for defining a subset condition. A "subset condition" is an indicator and a set of values for that indicator, that is used to select the watersheds included in the subset (at least 50% cropland cover in the watershed, for example). Up to 10 conditions can be defined for a given subset.
3. A list of subset conditions that have been entered for the current subset with buttons for removing a condition and defining how the conditions are used.
4. The ***ADD SUBSET TO HUC_SUBSETS*** sheet button with an optional check box to save a record of the subset name, description and conditions in PDF format.



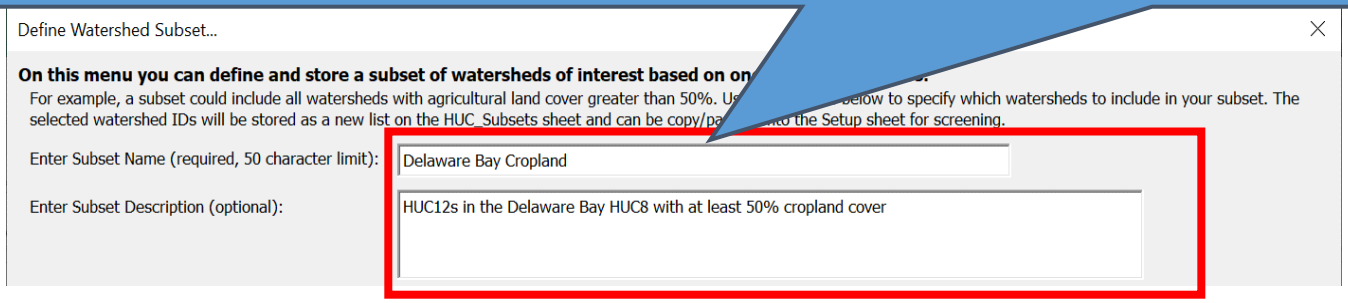
If your tool file includes multiple watershed scales, a popup box will display after you click the ***CREATE A NEW WATERSHED SUBSET*** button.

The popup box will contain a list of watershed scales and ask you to specify the scale to use for defining your subset.

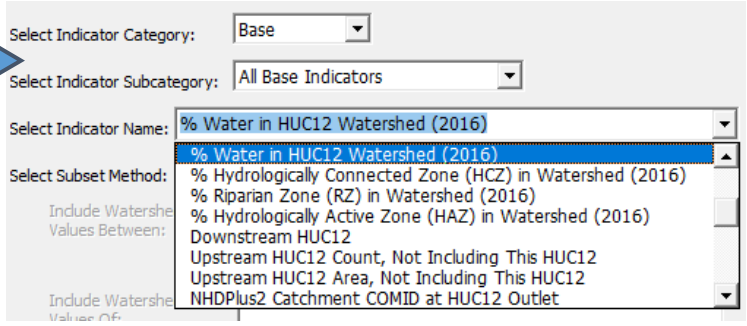
A subset can only contain watersheds from a single scale. Choose your desired scale and click OK.



On the ***Define Watershed Subset*** menu, type a name for your subset in the ***Enter Subset Name*** text box and an optional description in the ***Enter Subset Description*** text box.



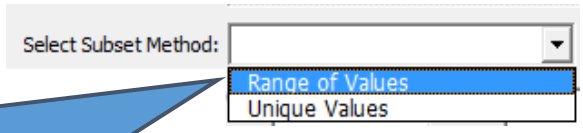
You can now begin to define subset conditions. First select an indicator category (Base, Ecological, Stressor or Social), indicator subcategory and indicator name.



Next, choose a subset method from the ***Select Subset Method*** drop down menu.

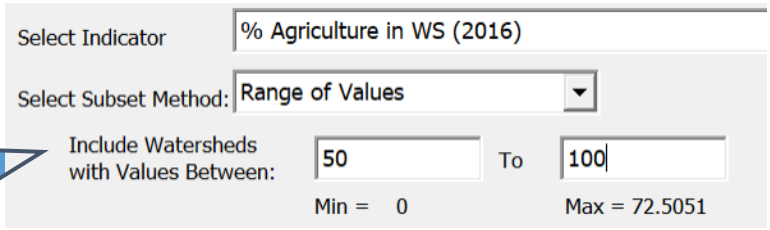
The Range of Values option allows you to specify minimum and maximum values of interest for the selected indicator. Watersheds with indicator values in the specified range will be included in the subset.

The Unique Values option allows you to select one or more unique values of interest for the selected indicator. Watersheds with the specified values will be included in the subset. The unique values option will typically only be used for categorical indicators.



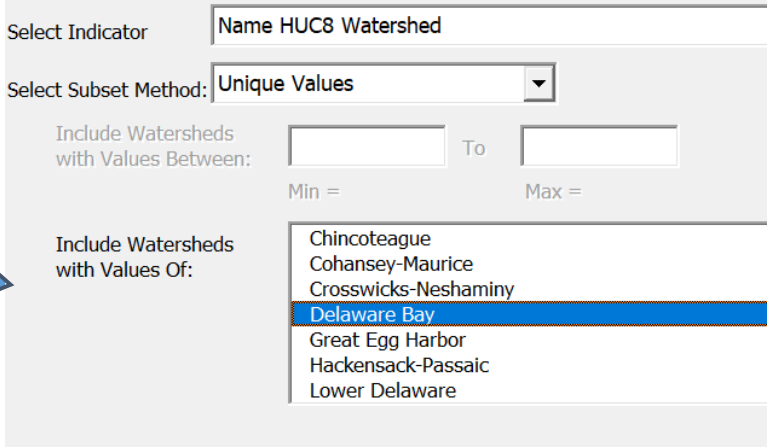
If you choose the Range of Values method, enter the range of values of interest for the selected indicator in the text boxes.

For reference, the tool will display minimum and maximum values of the selected indicator below the boxes.



If you choose the Unique Values method, a list of unique indicator values will automatically display in the selection box below the ***Select Subset Method*** drop down menu.

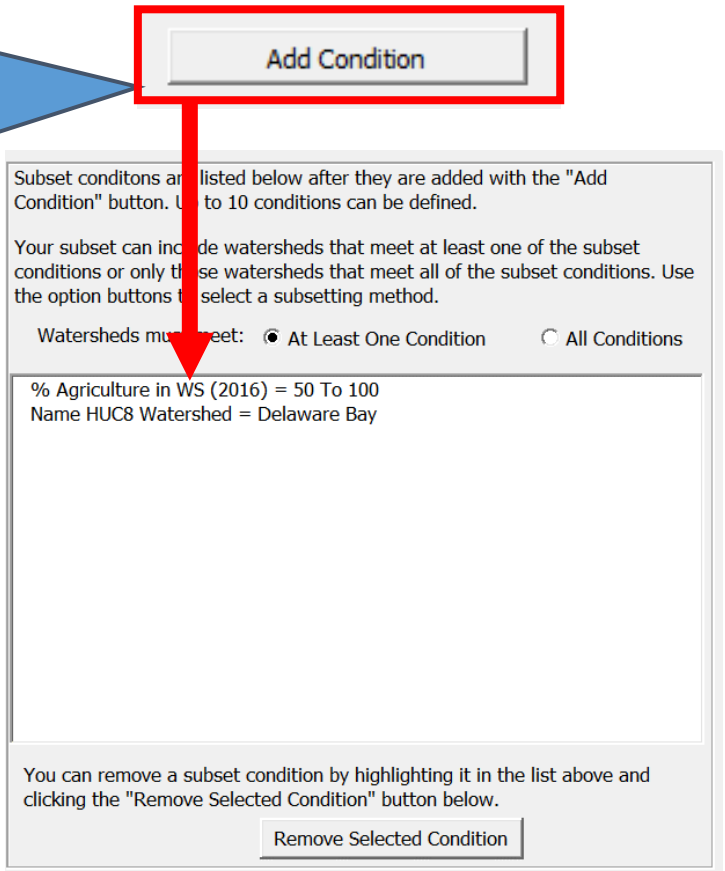
Choose one or more of the unique indicator values by highlighting the values in the selection box.



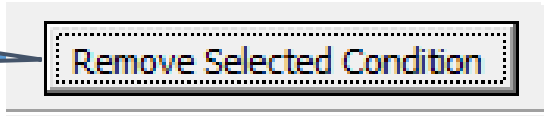
After you have selected an indicator type, name, subset method and indicator values for your subset condition, click the ***ADD CONDITION*** button.

The condition will now be added to the list of subset conditions on the right side of the interface.

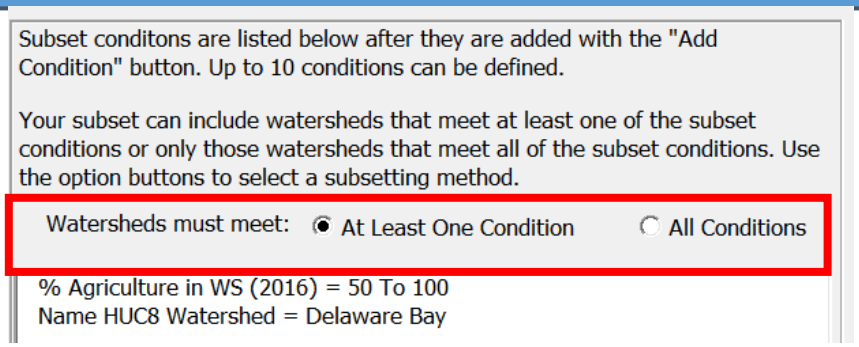
Repeat this process as needed to enter up to ten conditions for your subset.



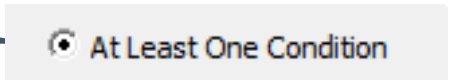
You can remove any subset condition from the list by highlighting it and clicking the ***REMOVE SELECTED CONDITION*** button.



The ***Define Watershed Subset*** interface contain two option buttons for choosing how the subset conditions will be used to select watersheds to include in your subset. The option buttons are displayed on the right side of the interface above the subset list.



If the ***AT LEAST ONE CONDITION*** button is selected, then your subset will include any watershed that meets at least one condition in the subset condition list.

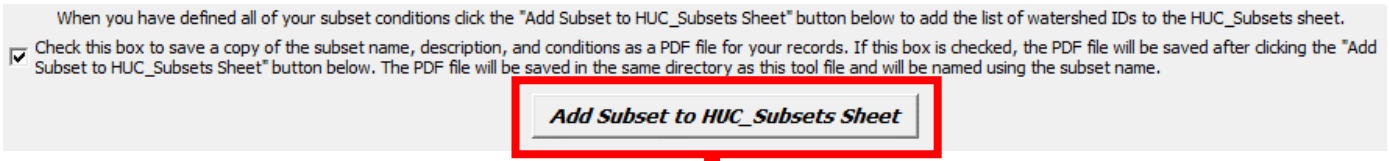


If the ***ALL CONDITIONS*** button is selected, then your subset will only include watersheds that meet all of the conditions in the subset condition list.

After defining your subset conditions and selecting an option for applying the conditions (i.e., At Least One Condition versus All Conditions), you are ready to add the watershed subset to your tool file with the ***ADD SUBSET TO HUC_SUBSETS SHEET*** button.

By default, a record of the subset name, description and conditions are saved in a PDF file when the ***ADD SUBSET TO HUC_SUBSETS SHEET*** button is clicked. The PDF file is saved in the same folder as your tool file using the subset name in the PDF filename. If you would like to create your subset without saving a record of the subset settings, uncheck the box above the ***ADD SUBSET TO HUC_SUBSETS SHEET*** button.

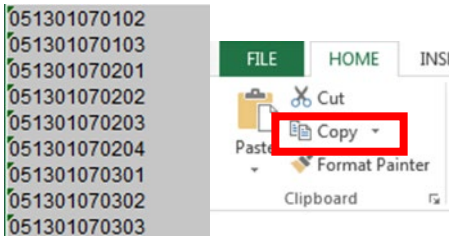
After clicking the ***ADD SUBSET TO HUC_SUBSETS SHEET*** button, the tool will automatically identify watersheds that satisfy your subset conditions. The subset name and list of watershed IDs in the subset will be added to the first available column in the ***HUC Subsets*** worksheet for use in a screening run.

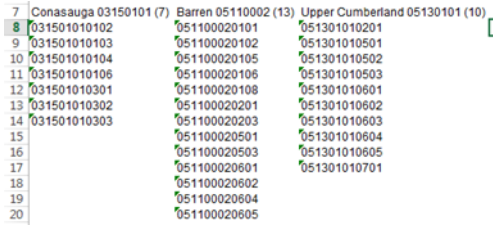


Delaware Bay Cropland
020200070207
020301050104
020301050107
020401050603
020401050902
020401050905
020402010401
020402010402

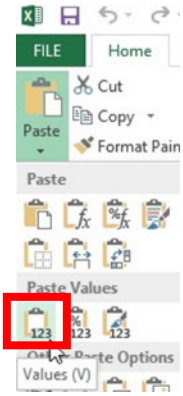
15.3. Manually Add a Subset List

To add a new subset list to the ***HUC Subsets*** worksheet, select the pre-existing list of watershed IDs from a separate worksheet (formatted with one ID per row) and click "Copy" on the Excel menu.





Set the cursor to row 8 in the first open column on the ***HUC Subsets*** worksheet.



Select "Paste Values" from the Excel menu to paste the watershed IDs into the ***HUC Subsets*** worksheet.

If desired, type a descriptive header for the subset list in row 7. Save the tool file. The new subset list is now stored for future use in a screening run.

Appendix A. Calculating New Indicators

Purpose

After reviewing lists and definitions of available indicators, RPS users often decide that they have additional data and can compile more indicators that will make their screening results better. Although it can be time-consuming to compile additional indicators, local or state-specific data sources often include key parameters (such as bioassessment datasets) that haven't been possible to compile nationally. It can be well worth the effort to compile new indicators if they can fill information gaps or add significant value to the quality of watershed comparison results. This appendix can help RPS users ensure that new indicators will be properly formatted and fully usable along with existing RPS indicator data.

Conceptualizing an Indicator Need: What Gap Might It Fill?

After reviewing all the sources of existing indicator data and the subcategories of information recommended under the ecological, stressor and social categories, unfilled subcategory gaps are commonly evident. Often this doesn't imply that the data are non-existent, but rather that the data for some indicator categories is available on statewide or watershed scales but spotty in coverage nationally. Biotic community data and social context data are good examples of data that are available in many states but are impractical to consistently measure nationally. A close look at the purpose for the planned screening, along with reviewing all the indicator subcategories and what is already available in each, should verify what new indicators may be worth the effort to compile.

Consistency: Will New and Existing Indicator Data Be Fully Compatible?

The answer to this question depends on several things. A new data source, first of all, must cover the entire project area in question and contain data that is finely grained enough spatially to be expressed as a watershed attribute at the same scale as the rest of your watershed indicators (e.g., as a measured attribute per HUC12). Second, it would be best if the distribution of the new data is spatially dense enough that it will generate indicator values for most if not all of the watersheds in your screening (some 'no value' blanks are acceptable). Third, new data already compiled on a watershed basis must match not just the watershed (e.g., HUC) scale but the version of the watershed boundary dataset used for all your indicators. Watershed indicator data from the RPS Indicator Database or the EPA EnviroAtlas all use the same version of the national HUC12 geospatial "snapshot" dataset as a common standard. Note that the official national download site for the Watershed Boundary Dataset managed by the US Geological Survey allows the data to be changed by state data stewards on an ongoing basis, which results in inconsistencies with the snapshot standard used by the above-named projects. In summary, all of these factors should be checked to ensure full consistency with other RPS data before investing the effort required to compile a new indicator.

Calculation: Is It Measurable?

Even when it would appear valuable topically to a watershed comparison effort, information in a raw data source is often not in the ideal form to be used meaningfully. This is what makes indicator design and development necessary – transforming related data into usable data. For example, mapped information on stream patterns contains valuable but unusable information, unless functionally important attributes such as mean sinuosity are measured so that channelized, highly altered stream mileage can be contrasted with other, more natural stream forms. Further, as RPS compares watersheds, a measurable attribute must be reasonably suited to being expressed as a watershed attribute. The measurement also needs to be not just mechanically feasible but pertinent to the watershed screening and comparison purpose. Good indicators are developed when quality data sources are not just measurable, but measurable in relevant ways.

Indicator Spatial Scale: Local Versus Cumulative Values

For all indicators, users should be aware of whether the indicator value represents local or cumulative conditions. This can have a strong influence on screening results. The distinction between local and cumulative is due to the fact that most commonly-used watershed units, such as the Hydrologic Unit Codes (HUCs) that have been delineated at several scales across the country, are partial rather than whole watersheds. In other words, a HUC may be a drainage area that has other upstream HUCs draining into it, or it may be a true watershed in the headwaters with nothing else draining into it. It would have been impossible to map the HUC units across the nation at several useful scales (with similarly sized watershed units in each) without mapping many HUCs that have additional watersheds upstream. For this reason, an indicator value for a

specific HUC may represent either the measured characteristic only within the HUC (i.e., a local indicator) or the accumulation of the characteristic throughout the HUC plus all its upstream HUCs (i.e., a cumulative indicator, which sums the characteristic through its whole watershed). Only in the case of true headwaters HUCs will the local and cumulative versions of an indicator be identical. Local indicator datasets are far more common than cumulative datasets. If only local data are available but cumulative values are also desired, cumulative values can be calculated from local data where flow routing relationships among the units are known. In the case of HUC12s, about 50% from the lower 48 states are actually true watersheds whereas the other half receive flow from additional HUC12s up-gradient from them.

Directionality: What Does the Indicator's Gradient of Values Mean?

This question relates again to indicator use in specific RPS categories, as well as developing the calculation method. Indicator scores in each of the ecological, stressor and social context classes need to be directionally consistent within-category for the multi-metric indices to also be directionally consistent. All ecological indicator scores are aligned so that higher values imply better condition or recovery potential and social scores are also aligned so that higher is better. Stressor indicator scores, as most users would intuitively expect, are aligned to have a higher score associated with more impacts and lower recovery potential. However, source data may sometimes be in an opposite directional gradient of values than the indicator category must consistently have for its index to make sense. In such cases, it may be necessary to invert the order of the numerical raw scores of an indicator (for example, an ecological indicator like % highly erodible soils, whose higher values are associated with lower restorability) to align it with the other indicators of the same category (see Appendix B for instructions on how to invert indicator data). Errors in directionality are one of the more common pitfalls in new indicator development and can have substantial negative effects on screening results.

Validation: Does the Indicator Measure What's Intended?

Rarely does an indicator measure directly and exactly what would be ideal. Thus, indicators typically vary as to how well they approximate the watershed attribute they purport to measure. Although all of the principles discussed above can help improve the quality and usefulness of an indicator, testing the end result against known data is a necessary QA/QC element of indicator compilation. Quality control procedures should be part of the indicator compilation and data table development steps. It is especially important for your QA/QC process to detect indicators that are not directionally aligned (e.g., when watersheds strongly expected to score high turn out low) and guard against data transfer errors in which an entire indicator's values may be incorrect due to faulty calculation, miscopying or mislabeling. These two types of error can skew the results substantially but are relatively easy to find through diligent QC before they do their damage.

Your evaluation procedures should also examine each indicator's set of values in comparison to reference sites of known quality, including healthy as well as impaired waters or watersheds. One commonly used approach involves spot-checking sample watersheds by manually checking raw values where watershed conditions related to the indicator are well-known, particularly if examples of what should be high and low scoring watersheds are available. For each indicator's measured set of values, observe whether the indicator performed as expected with regard to these sites. For example, did a high percentage of healthy reference sites score in the top quartile for a specific ecological indicator? If healthy reference site scores were low, the indicator might have been incorrectly scored.

Compilation: Add a New Indicator to an Excel RPS Tool

Ultimately, development of a new indicator for addition to an existing Excel RPS Tool boils down to a few key products, the main one being quality-assured, watershed-specific values for that indicator for all (or most of) the watersheds of interest. These results should be compiled in a data table organized by watershed ID and capable of being sorted into the identical order and total watershed number found in the Excel RPS Tool to which they will be added. Metadata standards for geospatial data should also be compiled, especially a brief indicator name and descriptive definition including what has been measured, data source and date. The new names and descriptions should always be added to the ***Indicator Info*** tab of the Excel RPS Tool. Instructions for adding indicators and their data are found on the ***Custom Indicators*** tab of the Excel RPS Tool. Finer details on adding new indicators are available in Section 14 (*Custom Indicators Worksheet*) of this user guide.

RPS Indicator Scoring Techniques

There are usually multiple ways to measure a watershed attribute when a new indicator is being developed. This section describes several of the common ways in which different indicators can scored.

Continuous Values

The indicator can have any numerical value along a gradient of possible values (Examples: 3,212.4 acres of protected riparian buffer; 32% highly erodible soils in the watershed). This scoring approach is important when useful to know the differences in magnitude among different entities the indicator is comparing. Most recovery potential indicators are scored in this manner.

Rank Ordering

The raw, continuous value of the indicator is used to arrange the entities from highest to lowest and give each a rank number (Examples: 15th highest bioassessment score; smallest watershed size). This method still provides comparisons among entities but the magnitude of differences among ranks is unknown and may involve abrupt or gradual changes.

Intervals

Ranges of indicator value are established and all members within the same interval have the same score (Examples: Percent protected land in 25% increments based on land measurement; number of impairment causes in 25% increments based on quartering the rank-ordered list of waters). This method trades off detail for simplicity, but can be appropriate when all members of each interval can be legitimately generalized to the same value. Intervals may be equal in value ranges or numbers of members or may be unequal but based on natural breaks in the range of values.

Thresholds

This approach combines continuous and interval valuing concepts and involves scoring continuously on one side of a threshold value while assigning a simplified, single value to entities on the other side of the threshold (Example: use actual % of impervious cover below 14%, assigning a uniform value of 1 if above 14%).

Absolute Value Scoring

Some characteristics may have a key target value most meaningful for recovery potential somewhere in the mid-range of values instead of at the maximum or minimum. Values closest to a target value on either side are desirable and greater distance to either side diminishes the value (Example: nearness to a numeric water quality criterion - waters barely failing the criterion have greater recovery potential than waters severely below the criterion and threatened waters barely achieving the criterion are of greater priority for restoration than unthreatened waters well above the criterion). Using the mathematical concept of absolute value enables such situations to be scored by calculating the absolute value of the target value minus the individual water's value.

Binary Values

The indicator scoring has just two values, 1 or 0. This type of scoring reflects simple presence or absence of a recovery-relevant characteristic (Examples: existence of a TMDL or watershed plan; presence/absence of a target fish species being assessed). When this indicator type is being developed, special care should go into deciding whether a watershed with no reported presence of the indicator trait is truly its absence (which might justify the score of 0 for those watersheds) or merely lack of evidence about presence (which is properly expressed by leaving the value blank for those watersheds).

Ordered Categorical Variables

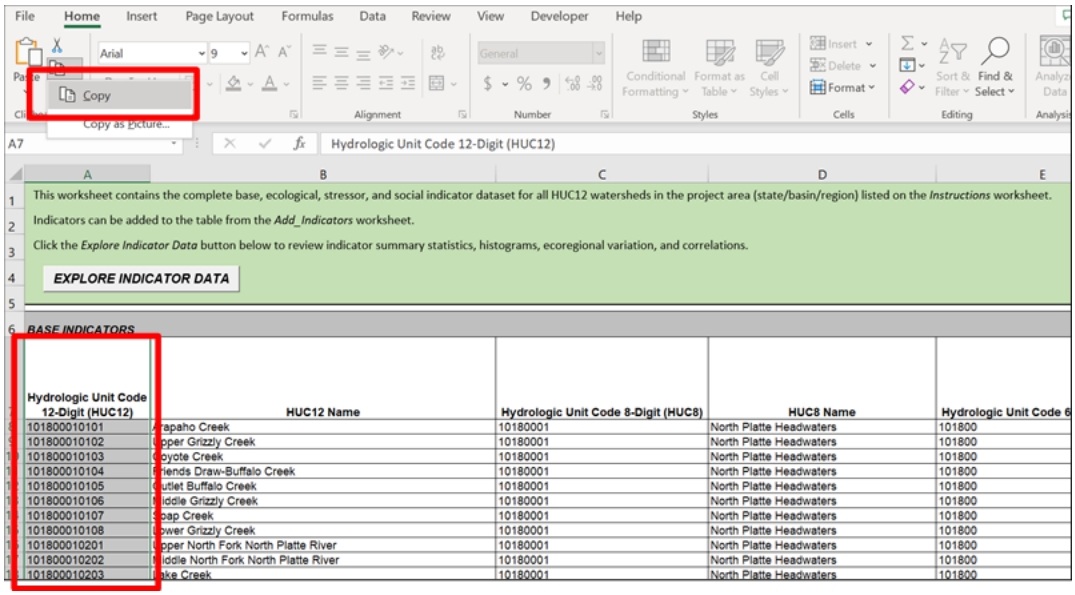
This approach starts with non-numeric categories and assigning them in sequence of importance according to a stated criterion (Example: assigning urban dominated, agriculture-dominated and forest-dominated subwatersheds different category values based on general restoration cost and complexity). The method enables coarse consideration of non-numeric concepts that may significantly affect recovery, but if used, assignment of relative value differences should be reasonably supportable.

Appendix B. Inverting Indicator Data

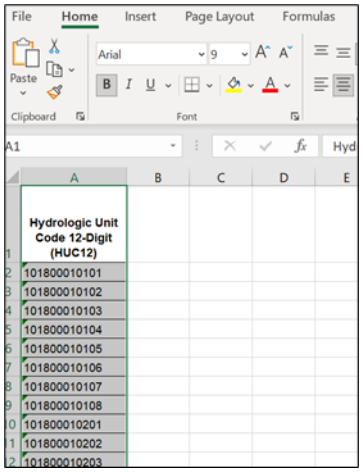
This appendix contains instructions on how to invert the values of existing indicators in the Excel RPS Tool. Indicator data must be inverted when smaller values of the indicator are preferred for priority-setting. For example, if you are interested in prioritizing HUC12s with fewer assessed waters, you can invert values of the "Assessed Waters, % of HUC12" indicator so that fewer assessed waters contribute to higher Social Index scores.

1. Open the Excel RPS Tool file and a second new Excel spreadsheet file.
2. Go to the ***HUC12_Data*** sheet.

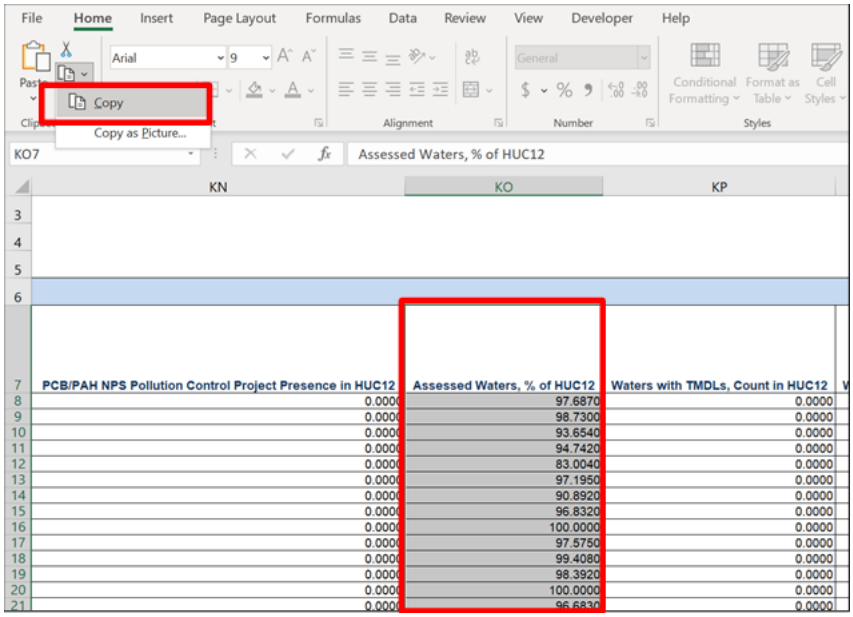
3. Select and copy HUC12 IDs from column A.



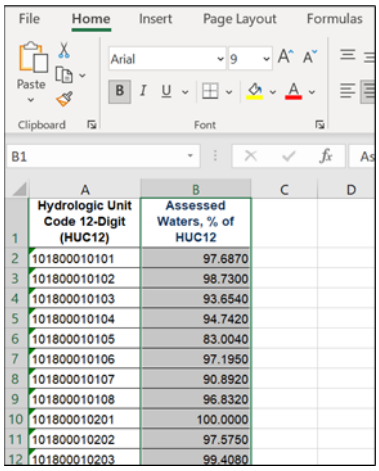
4. Open the new Excel spreadsheet and paste the HUC12 IDs into column A.



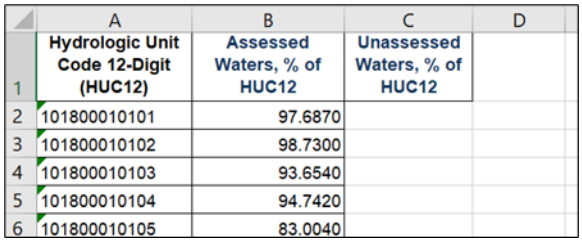
5. Go to the ***HUC12_Data*** sheet and find the column containing the indicator of interest. Select and copy the indicator values.



6. Open the new Excel spreadsheet and paste the indicator values into column B.

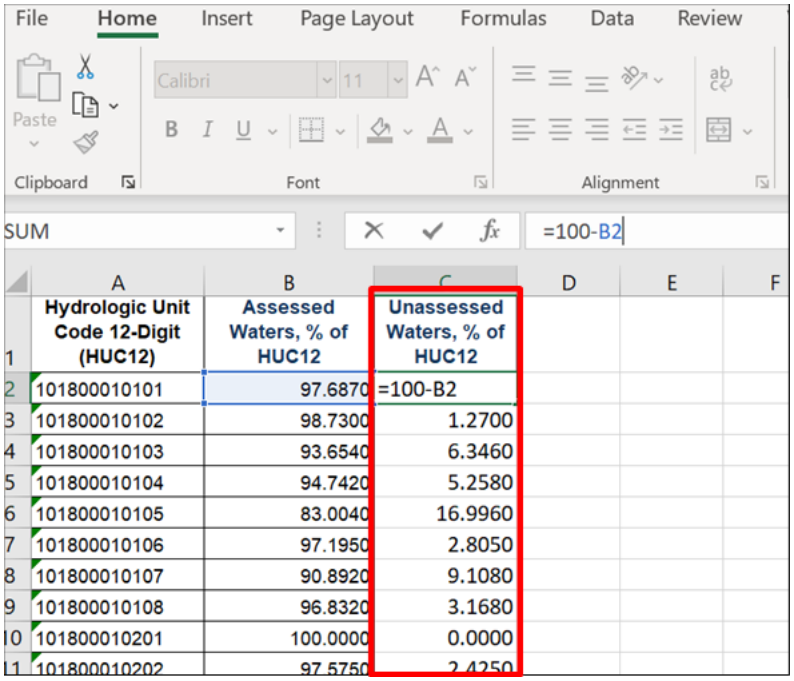


7. In the new Excel spreadsheet, enter a name for the inverted indicator into cell C1.
    - For example, an inverted version of "Assessed Waters, % of HUC12" could be "Unassessed Waters, % of HUC12" or "Inverted Assessed Waters, % of HUC12".



	A	B	C	D
1	Hydrologic Unit Code 12-Digit (HUC12)	Assessed Waters, % of HUC12	Unassessed Waters, % of HUC12	
2	101800010101	97.6870		
3	101800010102	98.7300		
4	101800010103	93.6540		
5	101800010104	94.7420		
6	101800010105	83.0040		

8. In the new Excel spreadsheet, calculate the inverted indicator values in column C.
    - Inverted values can be calculated using a variety of different methods.
    - For indicators that are expressed as percentages, inverted values can be calculated as: (100 – Indicator Value).
    - For other indicators, inverted values can be calculated as: (Maximum – Indicator Value) or (1 / Indicator Value).



	A	B	C	D	E	F
1	Hydrologic Unit Code 12-Digit (HUC12)	Assessed Waters, % of HUC12	Unassessed Waters, % of HUC12			
2	101800010101	97.6870	=100-B2			
3	101800010102	98.7300	1.2700			
4	101800010103	93.6540	6.3460			
5	101800010104	94.7420	5.2580			
6	101800010105	83.0040	16.9960			
7	101800010106	97.1950	2.8050			
8	101800010107	90.8920	9.1080			
9	101800010108	96.8320	3.1680			
10	101800010201	100.0000	0.0000			
11	101800010202	97.5750	2.4250			

9. Use the ***Custom_Indicators*** worksheet to add the inverted values into the Excel RPS Tool file as a new indicator.
    - Instructions are provided in Section 14 (*Custom Indicators Worksheet*) of this user guide.