

Background & Purpose

The Restoration and Protection Screening (RPS) Tool was developed by the U.S. Environmental Protection Agency (EPA) to support strategic planning to prioritize waters and watersheds. Key steps in the RPS process include selecting watersheds to screen and choosing indicators that serve as the basis for comparison and prioritization (Figure 1). Recognizing that these steps can be challenging for beginner RPS Tool users, the EPA developed the RPS Scenario Fact Sheet Series to support users who have a basic understanding of RPS concepts but are uncertain about how to begin their own screening.

Users that are new to the RPS Scenario Fact Sheet Series can first review the [RPS Scenario Fact Sheet Introduction](#) to understand how to apply the concepts presented in this Fact Sheet. The RPS Tool is available as both a web application (the Web RPS Tool) and an Excel-based version (the Excel RPS Tool). Users can apply the information in this Fact Sheet using either version of the RPS Tool.

This Fact Sheet describes concepts for HUC12 subwatershed¹ and indicator selection for a screening that focuses on addressing excess levels of nutrients (nitrogen and phosphorus) in surface waters. While the approaches described in this Fact Sheet offer a starting point for conducting a screening with the RPS Tool, users can refine and customize their watershed and indicator selections based on their own specific objectives and initial results (Figure 1).

Select Watersheds

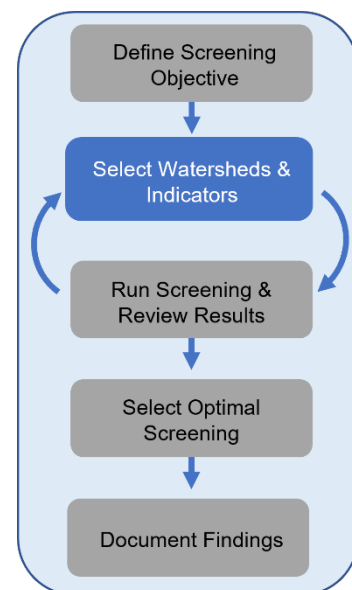
Although a screening can include all HUC12 subwatersheds in a state, river basin or other large geographic area, RPS Tool users often target a subset of relevant HUC12s to compare within a screening. Both the Web RPS Tool and the Excel RPS Tool include built-in menus for defining a subset of HUC12s to screen. Table 1 lists example indicators that could be used to create a HUC12 subset for a nutrients-focused screening. The indicators measure characteristics that are relevant to nutrient loading and can help to identify HUC12s with nutrient issues.

Table 1. Example indicators in the RPS Tool for identifying HUC12s with known or potential nutrient issues.

Indicator Subcategory	Example Indicators
Pollutant Loading Severity	Nitrogen Yield in HUC12; Phosphorus Yield in HUC12
Impaired Waters	Nutrient Impaired Waters Count in HUC12
Urban/Developed Cover	% Urban in HUC12
Impervious Cover	% Impervious Cover in HUC12
Agricultural Cover	% Cultivated Crops in HUC12
Nutrient Application and Deposition	Manure Nitrogen Application in HUC12; Manure Phosphorus Application in HUC12
Hazardous Waste & Wastewater	National Pollutant Discharge Elimination System (NPDES) Permit Count in HUC12

The RPS Tool contains pre-calculated values of the indicators listed in Table 1 for HUC12s in the contiguous U.S. The indicators in Table 1 include:

- Average annual nitrogen and phosphorus yields from a HUC12 (i.e., the amount of nitrogen and phosphorus exported to surface waters from sources within the HUC12),



*Figure 1. The RPS process. This Fact Sheet focuses on the **Select Watersheds and Indicators** step.*

¹ HUC12s are subwatershed delineations in the [National Watershed Boundary Dataset](#). HUC12s are referenced by their 12-digit Hydrologic Unit Code.

- The number and extent of nutrient-impaired waters in a HUC12 (i.e., waters included on a state impaired waters list due to nutrient-related causes of impairment),
- The extent of developed and agricultural land cover, agricultural nutrient applications, and wastewater dischargers in a HUC12. Several studies have highlighted relationships between nutrient levels in waterbodies and these characteristics²³.

As a starting point for HUC12 subsetting, users could enter one or more of the following criteria in the RPS Tool to select HUC12s with known or potential nutrient issues:

- Phosphorus Yield **greater than the state median yield** in kilograms per square kilometer
- Nitrogen Yield in Watershed **greater than the state median yield in** kilograms per square kilometer
- Nutrient Impaired Waters Count **greater than zero**

Selection criteria for subsetting HUC12s can be refined to better match a user's specific geographic setting and screening objective by including additional indicators or adjusting thresholds for HUC12 selection. Examples include refining thresholds for nitrogen and phosphorus yields or adding minimum levels of urban or agricultural cover as subsetting criteria.

Select Indicators

The indicators selected for a screening serve as the basis for users to compare watersheds and evaluate priorities for restoration and protection. For a nutrients-focused screening, the **Ecological** indicator selections can reflect attributes that are associated with healthy aquatic ecosystems and functional watershed processes; the **Stressor** indicator selections can reflect the presence of key nutrient sources in a user's geographic area; and the **Social** indicator selections can reflect social or programmatic factors that are favorable for successful nutrient reduction. A complete list of indicators available in the RPS Tool and indicator descriptions are provided in the RPS Tool for users to review when selecting indicators.

As a starting point for indicator selection, Table 2 highlights example indicators for a nutrients-focused screening. The example indicators in Table 2 are intended to assist users in setting up an initial screening in the RPS Tool to better understand how the RPS Tool functions and the results that are generated.

² Preston, SD, et. al. 2011. Factors Affecting Stream Nutrient Loads: A Synthesis of Regional SPARROW Model Results for the Continental United States. Journal of the American Water Resources Association (JAWRA) 47(5):891-915.

³ EPA. 2014. [Wisconsin Integrated Assessment of Watershed Health](#). EPA 841-R-14-001.

Table 2. Example indicators for an initial screening to identify priority HUC12s for nutrient management

Category	Subcategory	Indicator Name	Description
Ecological	Integrated Watershed Health Index & Sub-Indices	PHWA Watershed Health Index, State	The statewide Watershed Health Index score for the HUC12 from the EPA Preliminary Healthy Watersheds Assessment (PHWA).
Stressor	Agricultural Cover	% Cultivated Crops in HUC12	Percent of the HUC12 that is classified as cropland cover.
	Livestock	Livestock Density (AEU) in HUC12	Livestock population density in the HUC12, measured in animal equivalent units (1,000 pounds of animal weight per acre).
	Nutrient Application and Deposition	Manure Phosphorus Application in HUC12	Average annual rate of phosphorus applied to agricultural lands as animal manure in 2012 (kilograms of phosphorus per hectare per year).
		Synthetic Phosphorus Fertilizer Application in HUC12	Average annual rate of phosphorus applied to agricultural lands as inorganic fertilizer in 2012 (kilograms of phosphorus per hectare per year).
	Impervious Cover	% Impervious Cover in HUC12	Percent of the HUC12 with impervious cover.
	Urban/Developed Cover	% Urban in HUC12	Percent of the HUC12 classified as urban cover.
Social	Participation in Conservation Programs	USDA Conservation Reserve Program Area in HUC12	Area of land enrolled in the US Department of Agriculture (USDA) Conservation Reserve Program (CRP) in the HUC12.
		Nutrients Nonpoint Control Projects Presence in HUC12	Presence or absence of nutrient-related nonpoint source pollution control projects funded by Clean Water Act Section 319 grants in the HUC12.

Below is additional discussion of the example indicators for an initial screening listed in Table 2 and their relevance to a nutrients-focused screening:

- The **Ecological** indicator listed in Table 2 is the Watershed Health Index from the EPA Preliminary Healthy Watersheds Assessment (PHWA). The Watershed Health Index is an integrated measure of watershed condition that combines several indicators which reflect six key attributes of watershed health: Landscape Condition, Geomorphology, Habitat, Water Quality, Hydrology, and Biological Condition. Higher Watershed Health Index scores correspond to greater potential for a HUC12 to support healthy aquatic ecosystems and provide important ecosystem services to surrounding communities. An [Overview of the Preliminary Healthy Watersheds Assessments Project](#) provides additional background and methodology on the PHWA.

By including the Watershed Health Index in a screening, users can factor overall watershed condition into the identification of priority HUC12s for nutrient management. Depending on the interests and perspectives of a reader, both high and low scoring HUC12s could be considered priorities. Higher scoring HUC12s may contain aquatic ecosystems that are healthy but threatened by increased nutrient loading while lower scoring HUC12s may be good candidates for efforts to restore degraded ecosystems.

- The **Stressor** indicators listed in Table 2 describe the extent of developed, impervious, and cultivated crop land cover types in the HUC12, the magnitude of agricultural nutrient applications, and the density of livestock populations. Each of these reflect typical sources of nutrients in a HUC12 that could be the focus of management practices to reduce nutrient loading.

- The **Social** indicators listed in Table 2 describe the extent of lands protected through conservation easements and the presence of nutrient reduction projects that are funded by Clean Water Act Section 319 grants. These highlight past stakeholder engagement in the HUC12 and the potential for partnerships to implement additional nutrient management strategies.

Users may choose an alternative set of ecological, stressor and social indicators depending on a user's specific geographic setting and screening objective. For example, stressor indicator selections could be refined to target nutrient sources that are most relevant to a user's area while social indicators could be refined to align with a user's organization's preferences and approach to priority-setting.

After running a screening and reviewing results, users may refine their initial watershed and indicator selections. For example, a user could be interested in evaluating how the screening results change when an indicator is removed or a new indicator is added. Iterative adjustments to watershed or indicator selections are an important part of the RPS process (Figure 1) and the RPS Tool is designed to allow users to easily adjust watershed and indicator selections.

Links to RPS Tools and Additional Information

The Web RPS Tool and Excel RPS Tool can be accessed from the [EPA RPS](#) website.

The [training page](#) of the EPA RPS website includes several reports that provide detailed descriptions of projects that applied the RPS Tool to identify potential priority watersheds for addressing excess nutrients in Kentucky, Tennessee, Louisiana, New Mexico, Iowa, North Dakota, Kansas and Massachusetts.